USDA Natural Resources Conservation Service

Ecological site R025XY022ID
LOAMY 16-22

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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.

Classification relationships

Artemisia vaseyana/ 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 site occurs on gently sloping to steep mountains. Slopes are nearly level to steep and range from 2 to 35 percent. It occurs on all aspects and elevations range from approximately 5500 to 7500 feet (1676-2286 meters). Except at upper elevations, this site occurs in areas of moisture accumulation such as bottoms or on east and north facing slopes.

The soils supporting this site are predominately deep to very deep, (Ola and Watchabob soils are moderately deep to bedrock), well drained, with moderately slow to moderately rapid permeability. Runoff is very low to very high, and increases with slope. The erosion hazard is slight to high by water, and moderate to high by wind. The available water holding capacity (AWC) is very low to moderate.

This site is dominated by a Wyoming big sagebrush and Idaho fescue community.

Associated sites

R025XY001ID	**ASPEN THICKET**
R025XY010ID	**CLAYPAN 12-16**

R025XY011ID	**LOAMY 13-16**
R025XY018ID	**MAHOGANY SAVANNA 16-22**

Similar sites

R025XY024ID	**LOAMY 12-16**
R025XY011ID	**LOAMY 13-16**

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia tridentata var. vaseyana*
Herbaceous	(1) *Festuca idahoensis*

Physiographic features

This site is typically on gently sloping to steep mountains and terraces. Slopes are nearly level to steep and range from 2 to 35 percent. Site is on all aspects. At upper elevations, this site may be in moisture accumulation positions or on east and north facing slopes. Elevations range from approximately 5500 to 7500 feet (1676-2286 meters).

Table 2. Representative physiographic features

Landforms	(1) Mountain (2) Terrace
Runoff class	High to very high
Flooding frequency	None
Ponding frequency	None
Elevation	5,500–7,500 ft
Slope	2–35%
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 for this site is at least 16 inches.
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 (characteristic range)	79-103 days
Freeze-free period (characteristic range)	114-140 days
Precipitation total (characteristic range)	12-25 in
Frost-free period (actual range)	79-103 days
Freeze-free period (actual range)	114-140 days

Precipitation total (actual range)	12-25 in
Frost-free period (average)	90 days
Freeze-free period (average)	120 days
Precipitation total (average)	16 in

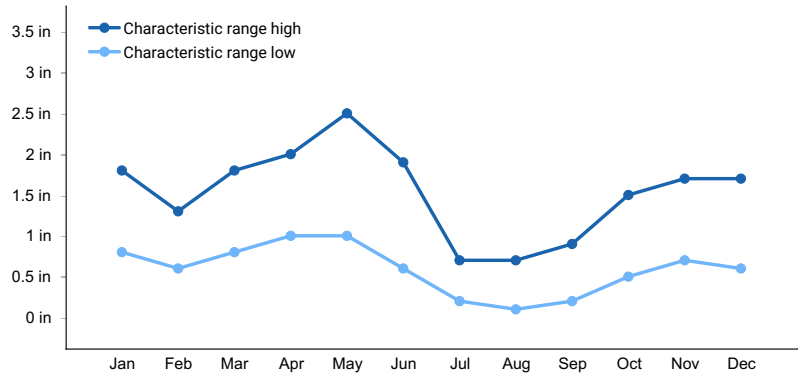

Figure 1. Monthly precipitation range

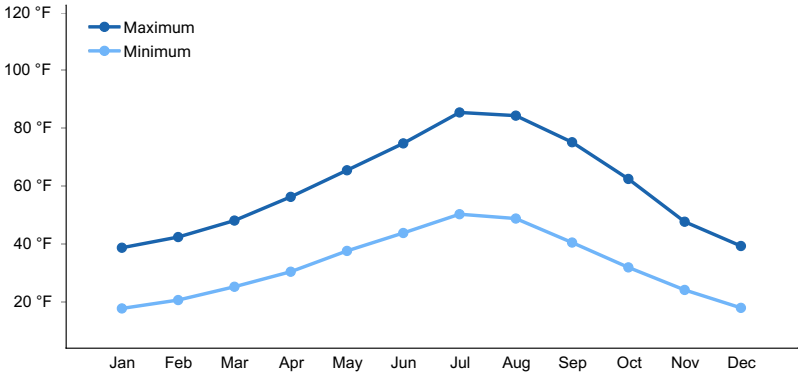

Figure 2. Monthly average minimum and maximum temperature

Influencing water features

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

Soil features

The soils supporting this site are predominately deep to very deep, (Ola and Watchabob soils are moderately deep to bedrock), well drained, with moderately slow to moderately rapid permeability. Runoff is very low to very high and increases with slope. The erosion hazard is slight to high by water, and moderate to high by wind. The available water holding capacity (AWC) is very low to moderate.
Rock outcrops are occasionally associated with these soils when they are on steeper slopes. The subsoil clay percentages* typically range from 14 to 33 percent. Soils at this site are characterized by a xeric soil moisture regime, relatively high precipitation compared to lower elevations in MLRA 25. Soil temperature regime is typically either frigid or cryic.
* (The Manila soil has 48 percent clay in the subsoil.)

Soil Series Correlated to this Ecological Site:
Bauscher, Blackleg, Dehana, Doodlelink, Earcree, Hades, Keman, Kiyi, Manila, Ola, Parkay, Povey and Watchabob.

Table 4. Representative soil features

Parent material	(1) Alluvium–volcanic breccia

Surface texture	(1) Gravelly loam (2) Very gravelly sandy loam (3) Stony silt loam
Family particle size	(1) Fine-loamy (2) Coarse-loamy
Drainage class	Well drained
Permeability class	Moderately slow to moderately rapid
Depth to restrictive layer	20–60 in
Soil depth	20–60 in
Surface fragment cover <=3"	0–23%
Surface fragment cover >3"	0–37%
Available water capacity (0-40in)	2–6.9 in
Calcium carbonate equivalent (0-40in)	0–5%
Electrical conductivity (0-40in)	0 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	4.5–7.3
Subsurface fragment volume <=3" (Depth not specified)	0–20%
Subsurface fragment volume >3" (Depth not specified)	0–80%

Ecological dynamics

The dominant visual aspect of this site is Idaho fescue and mountain big sagebrush. The composition by weight is approximately 60-70 percent grass, 10-20 percent forbs and 15-25 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 mule deer, Rocky Mountain elk, lagomorphs and small rodents.

Fire has historically occurred on the site at intervals of 20-50 years.

The Reference Plant Community Phase is dominated by Idaho fescue in the understory and mountain big sagebrush in the overstory. Subdominant species include Columbia needlegrass, bluebunch wheatgrass, mountain brome, bottlebrush squirreltail, prairie junegrass, arrowleaf balsamroot, tapertip hawksbeard, horsemint and lupine. Total annual production is 1300 pounds per acre (1456 kilograms per hectare) in a normal year. Production in a favorable year is 1800 pounds per acre (2016 kilograms per hectare). Production in an unfavorable year is 800 pounds per acre (896 kilograms per hectare). Structurally, cool season deep rooted perennial bunchgrasses are very dominant, followed by tall shrubs being more dominant than perennial forbs while shallow rooted bunchgrasses are subdominant.

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 is Phase 1.1. The plant species composition of Phase 1.1 is listed later under “Reference Plant Community Phase Plant Species Composition”.

FUNCTION:

This site is suited for livestock grazing in the spring, summer and fall. There are few limitations to grazing. Water is generally more abundant on this site than adjacent sites. Usually this site is a key area in a management program. This site provides good habitat for mule deer, Rocky Mountain elk, sage grouse, lagomorphs, raptors, songbirds and others due to the variety of grasses, forbs and shrubs. Due to its accessibility by livestock and lack of surface stones, this site is easily degraded by improper grazing management.

Impacts on the Plant Community:

Influence of fire:

In the absence of normal fire frequency, mountain big sagebrush and antelope bitterbrush can gradually increase on the site. Grasses and forbs decrease as shrubs increase. With the continued absence of fire, juniper can displace most of the shrubs and other understory species. See “Influence of juniper invasion” below.

When fires become more frequent than historic levels (20-50 years), mountain big sagebrush is reduced significantly. Rabbitbrush and snowberry can increase slightly. With continued short fire frequency, mountain big sagebrush and antelope bitterbrush can be completely eliminated along with many of the desirable understory species such as Idaho fescue and bluebunch wheatgrass. These species may be replaced by Sandberg bluegrass and bulbous bluegrass along with a variety of annual and perennial forbs including noxious and invasive plants. Cheatgrass and medusahead will invade the site. These fine fuels will increase the fire frequency.

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. With reduced vigor, recruitment of these species declines. As these species decline, the plant community becomes susceptible to an increase in mountain big sagebrush and/or an invasion of noxious and invasive species. If a juniper seed source is in the proximity, an increase in tall shrubs generally leads to an increase in juniper by providing bird perches and “nursery” sites for juniper establishment.

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

Proper grazing management that addresses frequency, duration, and intensity of grazing can also keep fine fuels from developing, thereby reducing fire frequency. This can lead to gradual increases in mountain big sagebrush. A planned grazing system can 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 and other annuals which will lead to more frequent fire intervals.

Weather influences:

Above normal precipitation in April, May and June 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 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 of grasshoppers and mormon crickets occasionally occur. Since defoliation typically happens only once during the growing season, mortality seldom occurs. Disease outbreaks can affect vegetation health but no specific data is available for this site.

Influence of noxious and invasive plants:

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

Western juniper can invade the site. Juniper invades only when a seed source is in the vicinity. If this species becomes dominant, historic fire frequency is changed and water and nutrient cycles are altered.

Influence of wildlife:

Big game, primarily mule deer and Rocky Mountain elk, use this site in the spring, summer and fall and in moderate winters. Their numbers are seldom high enough to adversely affect the plant community.

Watershed:

Decreased infiltration and increased runoff occur with an increase in mountain big sagebrush and juniper if it invades the site. Desired understory species can be reduced. This composition change can affect nutrient and water cycles. Increased runoff also causes sheet and rill erosion. Abnormally short fire frequency also gives the same results, but to a lesser degree. The long term effect is a transition to a different state.

Influence of juniper invasion:

In plant communities that are invaded by juniper, the species has a competitive advantage for the following reasons:
• Juniper is very drought tolerant.
• It has the ability to extract soil moisture from a wide range of soil depths.
• Juniper has high evapo-transpiration rates.
• The species intercepts rain and snow before it reaches the soil surface.
• It has the ability to grow as long as there is soil moisture and the temperature is above freezing.
• Juniper has a relatively rapid growth rate and is long-lived. It can readily over-top shade ntolerant species which leads to mortality.
• Nutrient cycling is reduced.
• As the canopy closes, juniper gains control of energy capture.

As juniper extracts water, other plants are unable to acquire sufficient water and nutrients to sustain growth and reproduction, thus reducing cover and biomass in the interspaces. After the canopy closes, there is sufficient soil moisture available for shallow-rooted, shade tolerant species to persist directly under the tree.

The following hydrological impacts occur on sites invaded by juniper:
• Infiltration in the interspaces is reduced.
• Run-off increases resulting in increased sheet and rill erosion with elevated sediment loads.
• Soil temperatures increase in the interspaces which results in accelerated drying of the soil surface.
• Increased bare ground in the interspaces.
• Soil moisture storage is reduced.

As bare ground and interconnectiveness of bare ground increases, flow rates are accelerated (reduction of flow sinuosity) and run-off out of the area increases.

Degradation of these systems can result in the formation of a feedback cycle in which greater juniper cover and density results in greater plant and soil disturbance between the canopies.

In summary, a closed juniper community takes control of the following ecological processes: hydrology, energy capture and nutrient cycling. The changes are primarily driven by the hydrological processes. The development of a closed juniper canopy always results in a transition across the threshold to a different state. Generally, when juniper canopy cover nears 20%, the plant community is approaching the threshold.

Plant Community and Sequence:

Transition pathways between common vegetation states and phases:

State 1.
Phase 1.1 to 1.2. Develops in the absence of fire. No juniper seed source present.
Phase 1.1 to 1.3. Usually results from improper grazing management and absence of fire. Juniper seed source is present.
Phase 1.1 to 1.4. Results from one or more fires, either wildfire or prescribed burns.
Phase 1.1 to 1.5. Develops in the absence of fire. Juniper seed source present.
Phase 1.1 to 1.6. Results from improper grazing management and absence of fire. No juniper seed source is present.
Phase 1.3 to 1.1. Results from prescribed burning or fire and prescribed grazing.
Phase 1.4 to 1.1. Develops with prescribed grazing and no fire.
Phase 1.5 to 1.1. Results from prescribed burning or fire and prescribed grazing.
Phase 1.6 to 1.1. Results from prescribed grazing, brush management and no fire.
Phase 1.2 to 1.4. Results from prescribed burning or fire and prescribed grazing..
Phase 1.3 to 1.4. Results from prescribed burning or fire.
Phase 1.5 to 1.4. Results from prescribed burning or fire.
Phase 1.6 to 1.4. Results from prescribed burning or fire.

State 1 Phase 1.6 to State 2 Phase 2.1. Develops through no fire and improper grazing management. The site has crossed the threshold. It is not economically feasible to move this state back towards state 1.

State 1 Phase 1.3 or Phase 1.5 to State 3. Develops with no fire and improper grazing management. The site has crossed the threshold. It is not economically feasible to move this state back towards state 1.

State 2. Phase 2.1 to 2.2. Develops with frequent wildfire and possibly improper grazing management. The site has crossed the threshold. It is not economically feasible to move this state back towards state 1.

State 2 to State 4. Brush management, pest management and/or prescribed fire are used prior to range seeding.

State 2 to unknown site. Excessive soil loss and changes in the hydrologic cycle caused by improper grazing management and/or frequent fire cause this state to retrogress to a new site with reduced potential. It has crossed the threshold. It is not economically feasible to move this state back towards state 1.

State 3 to State 2. Develops with fire.

State 3 to State 4. Develops from brush management, fire, or pest management in preparation for a range seeding.

State 3 to unknown site. Continued improper grazing management and lack of fire cause this state to retrogress to a new site with reduced potential due to significant soil loss and changes in hydrology. It has crossed the threshold. It will not go back to state 1.

Practice Limitations.

Only slight limitations exist on this site for implementing vegetation management practices. Usually this site is a key area for livestock management due to flatter slopes and non-stony soils. This site is suited to seeding if needed. Areas of this site where the soils are very stony present severe limitations to seeding to ground moving equipment. Mechanical, chemical and fire are satisfactory methods of brush management on this site. Stony areas may present limitations to control brush using ground moving equipment. Planning should carefully analyze the stand of perennial grasses and forbs because removal of mountain big sagebrush can result in a significant increase in cheatgrass. If the plant community becomes dominated with cheatgrass and/or medusahead, increased fire frequency could irreversibly degrade the community.

State and transition model

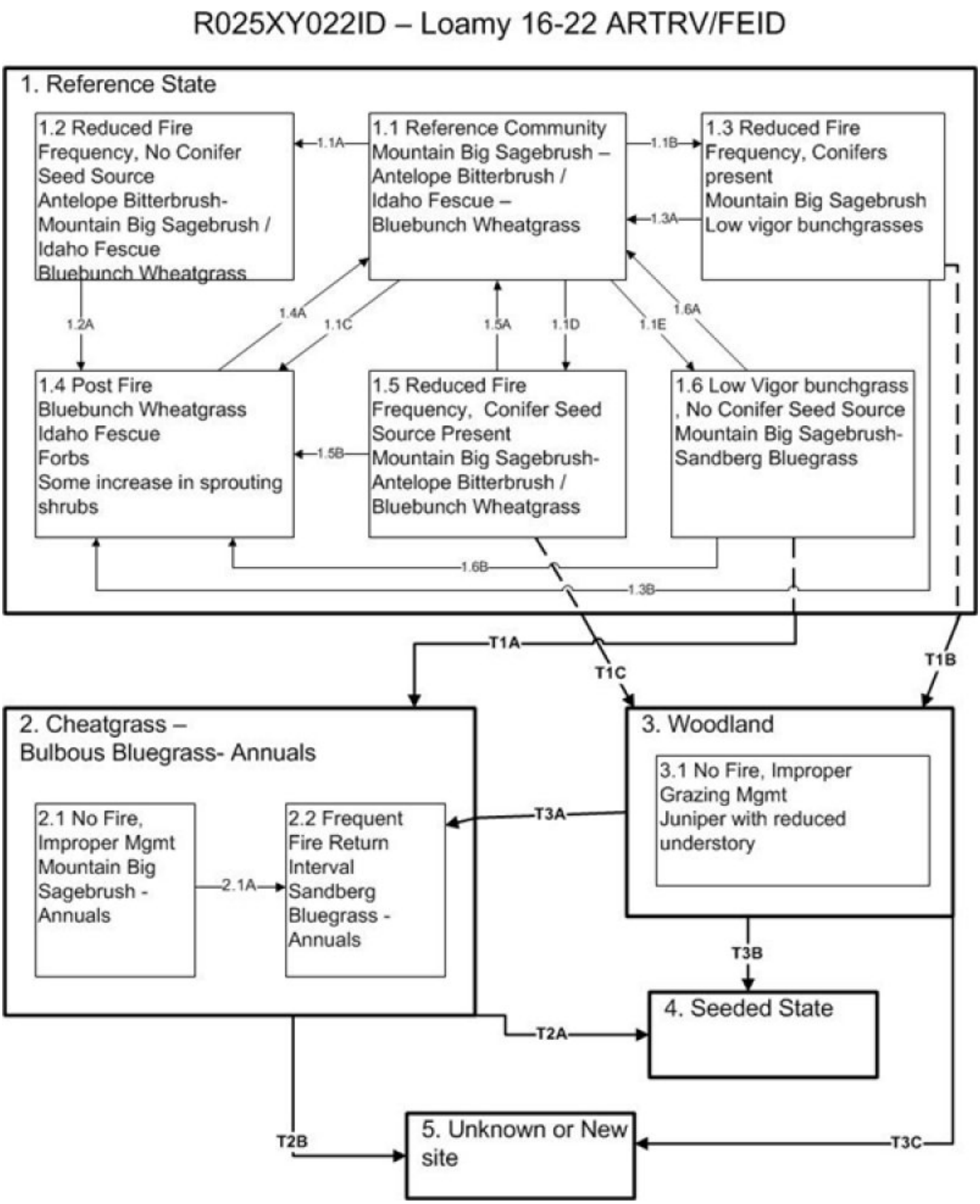

Figure 3. 25x-22

State 1
Reference State

Community 1.1
Reference Plant Community

This plant community has mountain big sagebrush and bitterbrush in the overstory with Idaho fescue dominant in the understory. Other significant species in the plant community are bluebunch wheatgrass, mountain brome, Columbia needlegrass, purple oniongrass, Sandberg bluegrass and arrowleaf balsamroot. Natural fire frequency is 20 to 50 years.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	520	845	1170
Shrub/Vine	160	260	360
Forb	120	195	270
Total	**800**	**1300**	**1800**

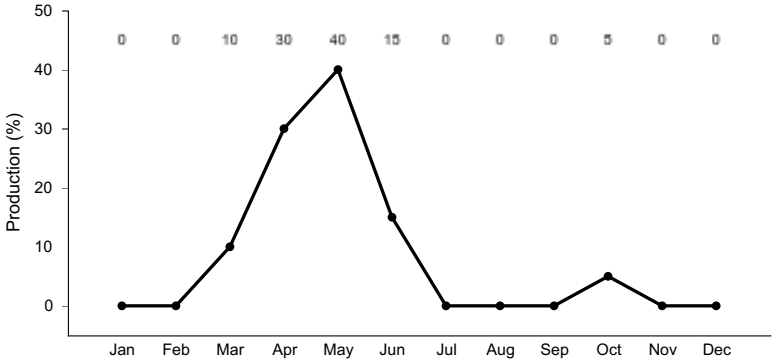

Figure 5. Plant community growth curve (percent production by month). ID0902, D25 ARTRV Early Seral.

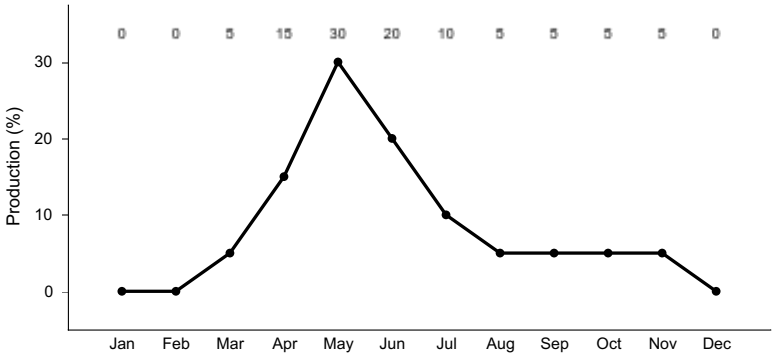

Figure 6. Plant community growth curve (percent production by month). ID0903, D25 JUOC/POSE/ANNUALS.

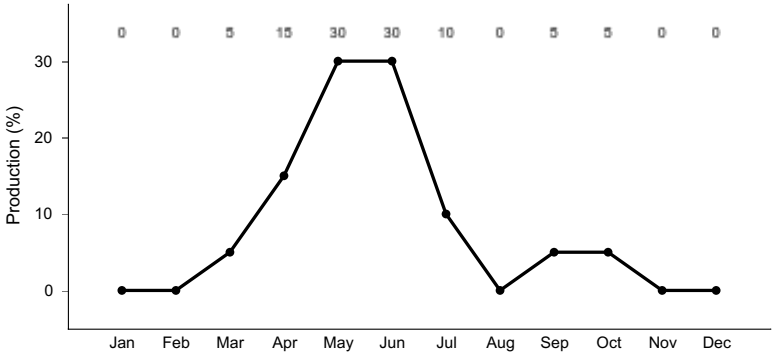

Figure 7. Plant community growth curve (percent production by month). ID0912, ARTRV-PSSP6 high elevation.

Community 1.2
Reduced Fire - Mountain Sagebrush, No Conifers

This plant community is dominated in the overstory by mountain big sagebrush and bitterbrush. Idaho fescue is dominant in the understory. Other perennial grasses and forbs include bluebunch wheatgrass, mountain brome, Columbia needlegrass, purple oniongrass, Sandberg bluegrass, bottlebrush squirreltail, arrowleaf balsamroot and lupine. No juniper seed source is present. This state has developed due to fire frequency being much longer than normal.

Community 1.3
Low Vigor Bunchgrasses with Conifer Seedlings

This plant community is dominated by mountain big sagebrush in the overstory with juniper seedlings and saplings. Sandberg bluegrass is the dominant grass in the understory. Bluebunch wheatgrass, Idaho fescue and other perennial grasses are present but in reduced amounts and typically in low vigor. This state has developed due to lack of fire and improper grazing management. A juniper seed source is in the proximity.

Community 1.4
Post Fire - Grass Dominated with Sprouting Shrubs

This plant community is dominated by Idaho fescue. Bluebunch wheatgrass, Columbia needlegrass, mountain brome, purple oniongrass, Sandberg bluegrass and other perennial grasses and forbs are subdominant. Mountain snowberry and twisted-leaf rabbitbrush are the dominant shrubs. This plant community developed as a result of a wildfire or prescribed burn.

Community 1.5
Reduced Fire Frequency - Conifers Present

This plant community is similar to the HCPC except that western juniper seedlings and saplings are invading the site due to a lack of fire. A juniper seed source is in the proximity. This state has developed due to the absence of fire.

Community 1.6
Low Vigor Bunchgrasses - No Conifer Seed Source

This plant community is dominated by mountain big sagebrush in the overstory. Sandberg bluegrass is the dominant grass in the understory. Bluebunch wheatgrass and Idaho fescue are present but in reduced amounts and typically in low vigor. This state has developed due to improper grazing management and a lack of fire. No western juniper seed source is in the proximity.

Pathway 1.1a
Community 1.1 to 1.2

This pathway develops in the absence of fire. No juniper seed source is present.

Pathway 1.1b
Community 1.1 to 1.3

This pathway typically results from improper grazing management and absence of fire. Juniper seed source is present.

Pathway 1.1c
Community 1.1 to 1.4

This pathway is a result of fire, either wildfire or prescribed burns.

Pathway 1.1d
Community 1.1 to 1.5

This pathway develops in the absence of fire. Juniper seed source present.

Pathway 1.1e
Community 1.1 to 1.6

This pathway is a result of improper grazing management and absence of fire. No juniper seed source is present.

Pathway 1.2a
Community 1.2 to 1.4

This pathway is a result of fire.

Pathway 1.3a
Community 1.3 to 1.1

This pathway is a result of prescribed burning or fire and prescribed grazing.

Pathway 1.3b
Community 1.3 to 1.4

This pathway is a result of prescribed burning or fire.

Pathway 1.4a
Community 1.4 to 1.1

This pathway develops with prescribed grazing and lack of fire.

Pathway 1.5a
Community 1.5 to 1.1

This pathway is a result of prescribed burning or fire and prescribed grazing.

Pathway 1.5b
Community 1.5 to 1.4

This pathway is a result of fire.

Pathway 1.6a
Community 1.6 to 1.1

This pathway is a result of prescribed grazing, brush management and lack of fire.

Pathway P1.6b
Community 1.6 to 1.4

This pathway is a result from prescribed burning or fire.

State 2
Annual Invaded State

Community 2.1
No Fire - Mountain Big Sagebrush, Annuals

This plant community is dominated by mountain big sagebrush with annuals in the interspaces. This state has developed due to improper grazing management and the absence of fire. It has crossed the site threshold. It is not economically feasible to move this state back towards State 1.

Community 2.2
Frequent Fire - Sandberg Bluegrass, Annuals

This plant community is dominated by Sandberg bluegrass and other annual and perennial grasses and forbs. Root sprouting shrubs such as mountain snowberry, twistedleaf rabbitbrush and gray horsebrush are present. This state has developed due to frequent fires and improper grazing management. The site has crossed the threshold. It is not economically feasible to move this state back towards State 1.

Pathway P2.1a
Community 2.1 to 2.2

Develops with frequent wildfire and possibly improper grazing management. The site has crossed the threshold. It is not economically feasible to move this state back towards state 1.

State 3
Woodland

Community 3.1
Juniper Dominated

This plant community is dominated by western juniper. Remnants of Idaho fescue can be found in the understory. Shallow-rooted grasses, such as Sandberg bluegrass, and other annuals can be found in the interspaces. Few shrubs are present. Generally, shrub cover is below 12-13%, bare ground is above 27-28%, juniper cover is greater than 20% and infiltration less than 6 cm/hr. The site is near or has crossed the threshold to this state. This state has developed in the absence of fire and improper grazing management. It is not economically feasible to move this state back towards State 1.

State 4
Seeded

Community 4.1
Range Seeding

The seeding may be introduced species or it may be made up of native species that attempt to mimic the Reference State.

State 5
Unknown new site

Community 5.1
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 or the continued absence of fire where a western juniper seed source is present. This unknown new site can be reached from State 3 with further dominance of the site by juniper. It is not economically feasible to move this state back towards State 1.

Transition T1A
State 1 to 2

This transition develops through lack of fire and improper grazing management. The site has crossed the threshold. It is not economically feasible to move this state back towards state 1.

Transition T1B

State 1 to 3

From community phase 1.3 or 1.5 this transition develops with lack of fire and improper grazing management. The site has crossed the threshold. It is not economically feasible to move this state back towards state 1.

Transition T2A
State 2 to 4

This transition is a result of brush management, pest management or prescribed fire prior to range seeding.

Transition T2B
State 2 to 5

This transition is a result of excessive soil loss and changes in the hydrologic cycle caused by improper grazing management or frequent fire. This state retrogresses to a new site with reduced potential. The site has crossed the threshold and is not economically feasible to move the state back towards state 1.

Transition T3A
State 3 to 2

This transition develops with fire.

Transition T3B
State 3 to 4

This transition develops from brush management, fire, or pest management in preparation for a range seeding.

Transition T3C
State 3 to 5

This transition is a result of improper grazing management and lack of fire. This state retrogresses to a new site with reduced potential due to significant soil loss and changes in hydrology. It has crossed the threshold, and it will not go back to state 1.

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1				520–1170	
	Idaho fescue	FEID	*Festuca idahoensis*	320–720	–
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	60–135	–
	Columbia needlegrass	ACNE9	*Achnatherum nelsonii*	1–100	–
	western needlegrass	ACOC3	*Achnatherum occidentale*	1–100	–
	mountain brome	BRMA4	*Bromus marginatus*	1–100	–
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	1–55	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	1–55	–
	oniongrass	MEBU	*Melica bulbosa*	1–55	–
	Sandberg bluegrass	POSE	*Poa secunda*	25–50	–
Forb					
2				120–270	
	arrowleaf balsamroot	BASA3	*Balsamorhiza sagittata*	60–135	–
	tapertip hawksbeard	CRAC2	*Crepis acuminata*	60–135	–
	nettleleaf giant hyssop	AGUR	*Agastache urticifolia*	15–35	–
	lupine	LUPIN	*Lupinus*	15–35	–
	longleaf phlox	PHLO2	*Phlox longifolia*	10–30	–
	fleabane	ERIGE2	*Erigeron*	10–30	–
	buckwheat	ERIOG	*Eriogonum*	10–30	–
	common yarrow	ACMI2	*Achillea millefolium*	15–30	–
	castilla	CASTI	*Castilla*	1–20	–
	aster	ASTER	*Aster*	1–20	–
	milkvetch	ASTRA	*Astragalus*	1–20	–
	slender cinquefoil	POGR9	*Potentilla gracilis*	1–20	–
	woolly groundsel	PACA15	*Packera cana*	1–20	–
	mustard	BRASS2	*Brassica*	0–10	–
Shrub/Vine					
3				160–360	
	mountain big sagebrush	ARTRV	*Artemisia tridentata ssp. vaseyana*	120–270	–
	antelope bitterbrush	PUTR2	*Purshia tridentata*	80–180	–
	snowberry	SYMPH	*Symphoricarpos*	30–60	–
	Woods' rose	ROWO	*Rosa woodsii*	10–30	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	10–30	–
	Saskatoon serviceberry	AMAL2	*Amelanchier alnifolia*	10–25	–

Animal community

Animal Community – Wildlife Interpretations

The rangeland ecological site provides diverse habitat for many native wildlife species. The plant community exhibits a diverse mixture of forbs throughout the growing season offering excellent habitat for invertebrates. Mule deer, and elk may utilize the site at different times of the year. The rangeland habitat provides seasonal habitat for resident and migratory animals including western toad, shrews, bats, ground squirrels, mice, coyote, red fox, badger, Ferruginous hawk and prairie falcon. Area sensitive bird species include Brewer’s sparrow, sage thrasher,

sage sparrow and greater sage-grouse. Water features are sparse provided by seasonal runoff, artificial water catchments and springs.

State 1 Phase 1.1 – Mountain Big Sagebrush/ Antelope Bitterbrush/ Idaho Fescue Reference Plant Community (RPC): This plant community provides a diversity of grasses, forbs and shrubs, used by native insect communities that assist in pollination. An extensive array of forbs is represented throughout the growing season leading to a diverse insect community. Many bird and mammal species utilize this habitat based on the availability of invertebrate prey species. The reptile and amphibian community is represented by common sagebrush lizard, western rattlesnake, western toad and northern leopard frog. Amphibians are associated with springs and isolated water bodies adjacent to this plant community. Development of spring sites that collect all available water would exclude amphibian use on these sites. Native shrub-steppe obligate bird species utilizing the habitat include the Brewer's sparrow, sage sparrow and sage thrasher. Sage-grouse habitats (leks, nesting, brood-rearing and winter) are provided by this plant community. The plant community provides seasonal (spring, summer and fall) food and cover for mule deer and elk. South and west facing slopes may provide winter habitat for large herbivores. Antelope bitterbrush may be present in this plant community, along with Idaho fescue and bluebunch wheatgrass are desirable forage species for large herbivores. A small mammal population including golden-mantled ground squirrels, Merriam's shrew, Columbia Plateau ground squirrel, bushy-tailed woodrat, jackrabbit and yellow-bellied marmots utilize this plant community.

State 1 Phase 1.2 – Mountain Big Sagebrush/ Antelope Bitterbrush/ Idaho Fescue Reference Plant Community (RPC): This state has developed due to fire frequency being much longer than normal. The insect community will be similar to State 1 Phase 1.1 community. The reptile and amphibian community is represented by common sagebrush lizard, western rattlesnake, and western toad. Amphibians are associated with adjacent spring sites. An increase in antelope bitterbrush would provide an increase in quality of available forage for large herbivores. Antelope bitterbrush, along with Idaho fescue and bluebunch wheatgrass are desirable forage species for large herbivores. During mild winters, south and west facing slopes would provide winter habitat for large herbivores. Thermal cover and young of year cover would be provided to mule deer, elk and pronghorn. A small mammal population including golden-mantled ground squirrels, Merriam's shrew, Columbia Plateau ground squirrel, bushy-tailed woodrat, jackrabbit and yellow-bellied marmots utilize this plant community.

State 1 Phase 1.3- Mountain Big Sagebrush/ Sandberg Bluegrass/ Western Juniper Plant Community: This state has developed due to improper grazing management with no fire. An increase in canopy of sagebrush and junipers contributes to a sparse herbaceous understory. A reduced herbaceous understory results in less diversity and numbers of insects. The reptile and amphibian community is represented by common sagebrush lizard, western rattlesnake, and western toad. Amphibians are associated with adjacent spring sites. The reduced diversity of insects and understory cover may reduce quality of food and cover for the reptile community. As juniper increases, habitat quality for Brewer's sparrow, sage thrasher and sage sparrow may decrease. Remaining sagebrush provides brood-rearing, winter cover and winter food for sage-grouse but as juniper encroaches the quality of this habitat is severely reduced or eliminated. The plant community supports limited seasonal (spring and fall) habitat for elk. The quality of spring, fall and winter habitat for mule will increase. As juniper encroaches the site will provide additional thermal cover for large mammals. A small mammal population including golden-mantled ground squirrels, Merriam's shrew, Columbia Plateau ground squirrel, bushy-tailed woodrat, jackrabbit and yellow-bellied marmots utilize this plant community.

State 1 Phase 1.4 – Idaho Fescue/ Bluebunch Wheatgrass/ Mountain Snowberry/ Twistedleaf Rabbitbrush Plant Community: The plant community is a result of recent wildfire, prescribed burning or brush management. The plant community, dominated by herbaceous vegetation with little or no sagebrush would provide less vertical structure for animals. An increase in rabbitbrush may add additional vertical structure for animals over-time. Insect diversity would be reduced but a native forbs plant community similar to State 1 Phase 1.1 would still support select pollinators. Habitat for common sagebrush lizard and western rattlesnake would be limited due to the loss of sagebrush. The dominance of herbaceous vegetation with little sagebrush canopy would limit use of these areas as nesting habitat by Brewer's sparrow, sage sparrow and sage thrasher. Brood-rearing habitat for sage-grouse would be provided if site is adjacent to sagebrush cover. The dominant herbaceous vegetation improves habitat for grassland bird species (horned lark, savannah sparrow, vesper sparrow and western meadowlark). Mule deer and elk use would be seasonal (spring and fall) and site would offer little thermal cover and young of year cover due to the loss of shrub cover. The diversity and populations of small mammals would be dominated by open grassland

species. Large blocks of this plant community would fragment historic plant community and reduce the quality of habitat for shrub-steppe obligate animal species.

State 1 Phase 1.5 – Mountain Big Sagebrush/ Antelope Bitterbrush/ Idaho Fescue/ Western Juniper Plant Community: This plant community is the result of no fire. The insect community would be similar to State 1 Phase 1.1 insect community. The reptile and amphibian community is represented by common sagebrush lizard, western rattlesnake and western toad. Amphibians are associated with springs adjacent to the site. Shrub-steppe obligate bird species include Brewer's sparrow, sage sparrow, sage thrasher and sage-grouse. Habitat (brood-rearing and nesting cover) quality for sage-grouse is reduced due to an increase in juniper canopy into the plant community. Winter habitat (cover and food) for sage-grouse is provided. As juniper increases in cover the quality of habitat for sage-grouse will be severely reduced or eliminated. The reduced vigor of understory vegetation provides for a shorter foraging season for mule deer and elk. Young of year cover would be provided for mule deer, elk and pronghorn. Quality of winter habitat for mule deer will increase as juniper cover increases. Small mammal diversity and populations would be similar to State 1 Phase 1.1 small mammal community.

State 1 Phase 1.6- Mountain Big Sagebrush/ Sandberg Bluegrass Plant Community: This state has developed due to improper grazing management and a lack of fire. An increase in canopy of sagebrush contributes to a sparse herbaceous understory. A reduced herbaceous understory results in less diversity and numbers of insects. The reptile and amphibian community is represented by common sagebrush lizard, western rattlesnake, and western toad. Amphibians are associated with adjacent spring sites. The reduced diversity of insects and understory cover may reduce quality of food and cover for the reptile community. Brewer's sparrow, sage thrasher and sage sparrow habitat is provided on this site. Nesting, brood-rearing and winter habitat for sage-grouse is provided on this site. The plant community supports seasonal forage for mule deer and elk. A small mammal population including golden-mantled ground squirrels, Merriam's shrew, Columbia Plateau ground squirrel, bushy-tailed woodrat, jackrabbit and yellow-bellied marmots utilize this plant community.

State 2 Phase 2.1 – Mountain Big Sagebrush/ Annuals Plant Community: This plant community is the result of improper grazing management and no fire. An increase in canopy of sagebrush and improper grazing management contributes to an increase in cheatgrass. The reduced diversity of herbaceous understory and increase in invasive plants results in less diversity of insects. The reptile community is similar to State 1, Phase 1.6 reptile community. The reduced diversity of insects may reduce reptile diversity and populations. Reduced perennial herbaceous understory will lower quality of habitat for ground nesting bird species. Brewer's sparrow, sage sparrow, sage thrasher and sage-grouse habitat quality is reduced due to poor vigor and less diversity in the herbaceous plant community. Winter habitat (cover and food) for sage-grouse is provided. Limited forage for large mammals is available in the spring when annuals are more palatable. Young of year cover would be provided for mule deer and elk. Small mammal diversity and populations would be similar to State 1, Phase 1.6 small mammal community.

State 2 Phase 2.2– Sandberg/ Annuals/ Forbs/ Tall Green Rabbitbrush Plant Community: The community has developed due to continued improper grazing management and frequent fire. The plant community does not support a diverse insect community. The reduced forbs and shrubs in the plant community would support a very limited population of pollinators. Quality of food and cover habitat for reptilian species is reduced. This plant community does not support the life requisites for sage thrasher, Brewer's sparrow, sage-grouse or sage sparrow. Birds of prey including hawks and falcons may range throughout these areas looking for prey species. Large herbivores may utilize the herbaceous vegetation in spring and early summer when the vegetation is more palatable. The diversity and populations of small mammals would be dominated by open grassland species. Large blocks of this plant community would fragment historical plant community and reduce the quality of habitat for shrub-steppe obligate animal species.

State 3 – Western Juniper/ Sandberg Bluegrass/ Annuals Plant Community: This site has developed due to improper grazing management and no fire. The loss of native forbs and understory vegetation will reduce insect diversity on the site. This plant community does not support life requisites for sage-grouse. Birds using this site as resident or migratory habitat include Juniper titmouse, western bluebird and Virginia's warbler. The Juniper titmouse relies heavily on juniper seeds for winter food. Hunting success on the site by raptors may decrease due to heavy overstory of juniper. Hunting success by raptors on adjacent ecological sites may increase due to an increase in roosting sites. As juniper increases, the site will provide additional thermal cover for large mammals. This site can provide food and cover for mule deer in spring, fall and winter.

State 4 - Range Seeding Plant Community: The proposed seeding mixture (native or non-native) would determine

the animal species that would utilize the area. A diverse seed mixture of grasses and forbs would provide similar habitat conditions as in the herbaceous plant community described in State 1 phase 1.4. A diverse seed mixture of grasses, forbs and shrubs would provide similar habitat conditions as described in State 1 phase 1.1, 1.2 or 1.6.

A monoculture of non-native grass species would not support diverse populations of insects, reptiles, birds or mammals. Sagebrush obligate animal species would not be supported with a monoculture of grass. Animal species including western meadowlark, horned lark, savannah sparrow, deer mouse, kangaroo rat, mule deer and antelope would utilize this site for nesting and/or seasonal foraging. Birds of prey including hawks and falcons may range throughout these areas looking for prey species. Large blocks of this plant community would fragment historic plant community and reduce the quality of habitat for shrub-steppe obligate animal species.

Grazing Interpretations.

This site is well suited for grazing by domestic livestock from late spring through fall. Water on this site is more abundant as opposed to adjacent sites.

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.

Hydrological functions

Soils on this site are in hydrologic group B. They have moderately low run-off potential.

Recreational uses

This site has high value for hunting, hiking and other recreational activities. The site has numerous showy flowers in spring and summer.

Wood products

Posts, poles and firewood can be gathered from juniper if it invades the site.

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	T8 S R1 E S19
General legal description	SE ¼, SW ¼, SEC. 19
Location 2: Owyhee County, ID	

Township/Range/Section	T10 S R4 W S29
General legal description	NW ¼, SW ¼, SEC. 29
Location 3: Owyhee County, ID	
Latitude	42° 31′ 34″
Longitude	116° 50′ 73″
Location 4: Owyhee County, ID	
Township/Range/Section	T9 S R3 W S25
General legal description	SE ¼, SE ¼, SEC. 25
Location 5: Owyhee County, ID	
Township/Range/Section	T7 S R4 W S36
General legal description	NW ¼, NE ¼, SEC. 36
Location 6: Owyhee County, ID	
Township/Range/Section	T10 S R2 W S6
General legal description	NE ¼, NE ¼, SEC 6

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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)	
Contact for lead author	USDA/NRCS 9173 W. Barnes Drive, Suite C Boise, ID 83709 208-378-5722
Date	06/13/2007
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 greater than 20 percent and immediately following wildfire. Rills are most likely to occur on soils with surface textures of silt loam and clay loam.

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

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3. **Number and height of erosional pedestals or terracettes:** Pedestals and/or terracettes are rare on this site. In areas where slopes approach 20 percent and where flow patterns and/or rills are present, a few pedestals may be expected.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Of sites in mid-seral status, bare ground may range from 30-60 percent.

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5. **Number of gullies and erosion associated with gullies:** Do not occur on this site.

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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.

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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.

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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 .

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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 5 to 34 inches thick. Structure ranges from weak medium and moderate fine and medium

granular, weak thin and moderate medium and thick platy, to weak fine to medium subangular blocky. Soil organic matter (SOM) ranges from 2 to 8 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 run-off and increase infiltration. Tall shrubs accumulate 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):** 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

    Sub-dominant: Tall shrubs>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):** Mountain big sagebrush and antelope bitterbrush will become decadent in the absence of fire and ungulate grazing. Grass and forb mortality will occur as tall shrubs increase.

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14. **Average percent litter cover (%) and depth (in):** Additional litter cover data is needed but is expected to be 20-25 percent to a depth of 0.2 inches. Under mature shrubs, litter is >0.5 inches deep and is 90-100 percent ground cover.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 1300 pounds per acre (1456 kilograms per hectare) in a year with normal temperatures and precipitation. Perennial grasses produce 60-70 percent of the total production, forbs 10-20 percent and shrubs 15-25 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, bulbous bluegrass, whitetop, rush skeletonweed, annual sunflower, musk and scotch thistle and diffuse and spotted knapweed. Western juniper can invade the site if a seed source is in the vicinity.

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