USDA Natural Resources Conservation Service

Ecological site R025XY035ID
CHURNING CLAY 12-16

Last updated: 4/25/2024
Accessed: 05/20/2024

General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

MLRA notes

Major Land Resource Area (MLRA): 025X–Owyhee High Plateau

The Owyhee High Plateau, MLRA 25, lies within the Intermontane Plateaus physiographic province. The southern half is found in the Great Basin while the northern half is located in the Columbia Plateaus. The southern section of the Owyhee High Plateau is characterized by isolated, uplifted fault-block mountain ranges separated by narrow, aggraded desert plains. This geologically older terrain has been dissected by numerous streams draining to the Humboldt River. The northern section forms the southern boundary of the extensive Columbia Plateau basalt flows. Deep, narrow canyons drain to the Snake River across the broad volcanic plain.

This MLRA is characteristically cooler and wetter than the neighboring MLRAs of the Great Basin. Elevation ranges from 3,000 to 7,550 feet on rolling plateaus and in gently sloping basins. It is more than 9,840 feet on some steep mountains. The average annual precipitation in most of this area is typically 11 to 22 inches. It increases to as much as 49 inches at the higher elevations. Precipitation occurs mainly as snow in winter. The supply of water from precipitation and streamflow is small and unreliable, except along major rivers. Streamflow depends largely on accumulated snow in the mountains.

The dominant soil orders in this MLRA are Aridisols and Mollisols. The soils in the area dominantly have a mesic or frigid temperature regime and an aridic, arid bordering on xeric, or xeric moisture regime. Most of the soils formed in mixed parent material. Volcanic ash and loess mantle the landscape. Surface soil textures are loam and silt loam, and have ashy texture modifiers in some cases. Argillic horizons occur on the more stable landforms.

Ecological site concept

This ecological site is on depressions associated with playas on tablelands and lava plateaus. Soils associated with this site are very deep, somewhat poorly drained and formed in lacustrine deposits and alluvium derived mixed volcanic rocks.
The soil profile is characterized by a light colored (ochric epipedon) surface horizon. Greater than 40 percent clay is typical in the particle size control section and redoximorphic features are typical below 6 inches (15 cm).
Important abiotic features associated with this site include occasional or frequent ponding for long durations in winter and spring. Cracks occur on the soil surface during the summer. Historically the reference plant community was dominated by silver sagebrush and Nevada bluegrass.

Associated sites

R025XY011ID	**LOAMY 13-16** ARTRV dominant shrub; occurs on backslopes of hills and plateaus; soils are very deep and characterized by a mollic epipedon
R025XY014ID	**CLAYEY 12-16** ARARL dominant shrub; occurs on tablelands and terraces; soils are moderately deep and well drained with a layer of clay of accumulation (argillic horizon)

Similar sites

R025XY048NV	**CLAY BASIN** similar soils, supports ARCA13, occurs at lower elevation and warmer soil temperature

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia cana*
Herbaceous	(1) *Poa*

Physiographic features

This site is on depressions associated with playas on basalt tablelands and lava plateaus, on all aspects. Slopes are nearly level (0 to 2 percent). Elevations extend from 5,000 to 6,000 feet (1,524-1,829 meters). High rates of runoff combined with slow to moderate permeability on nearly level slopes results in occasional to frequent seasonal ponding.

Table 2. Representative physiographic features

Landforms	(1) Lava plateau > Lakebed (2) Playa
Runoff class	Medium to high
Flooding frequency	None
Ponding duration	Brief (2 to 7 days) to long (7 to 30 days)
Ponding frequency	Occasional to frequent
Elevation	1,524–1,829 m
Slope	0–2%
Ponding depth	15–102 cm
Water table depth	152 cm
Aspect	W, NW, N, NE, E, SE, S, SW

Climatic features

The climate associated with this site is defined by hot dry summers and cold snowy winters.

Mean annual precipitation is 13 inches (33cm), with the highest rainfall occurring in May 2.1 inches (5.3 cm) and the lowest in August 0.4 inches (1.0 cm). Averages snowfall is around 35 inches (89 cm) per year. Air temperatures average 26 degrees F in January (coldest) and 66 degrees F in July (warmest).

* The above and below data was provided by the MTN CITY RS, Murphy Desert Hot Springs, Jackpot, and Jarbidge 7N climate stations, the National Information System (NASIS) and, The Western Regional Climate Center.

Table 3. Representative climatic features

Frost-free period (characteristic range)	60-110 days
Freeze-free period (characteristic range)	70-120 days
Precipitation total (characteristic range)	305-381 mm
Frost-free period (actual range)	45-120 days

Freeze-free period (actual range)	55-130 days
Precipitation total (actual range)	279-406 mm
Frost-free period (average)	70 days
Freeze-free period (average)	80 days
Precipitation total (average)	330 mm

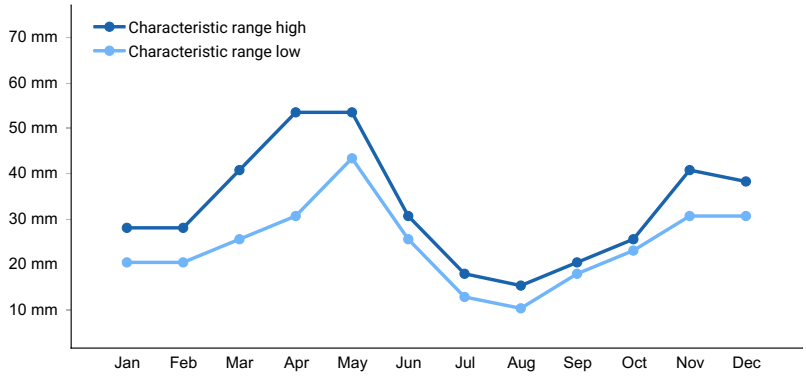


Figure 1. Monthly precipitation range

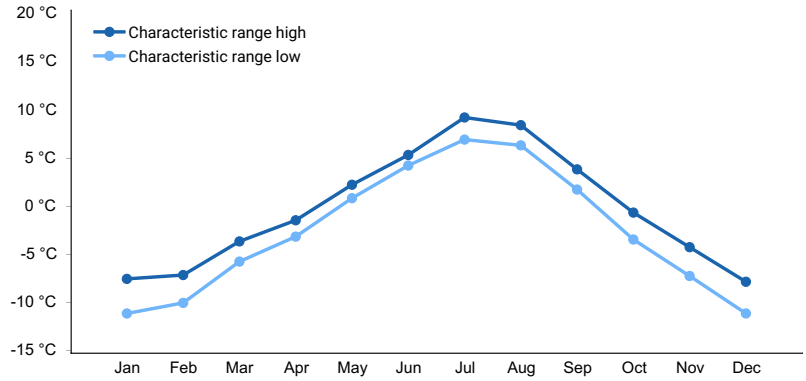


Figure 2. Monthly minimum temperature range

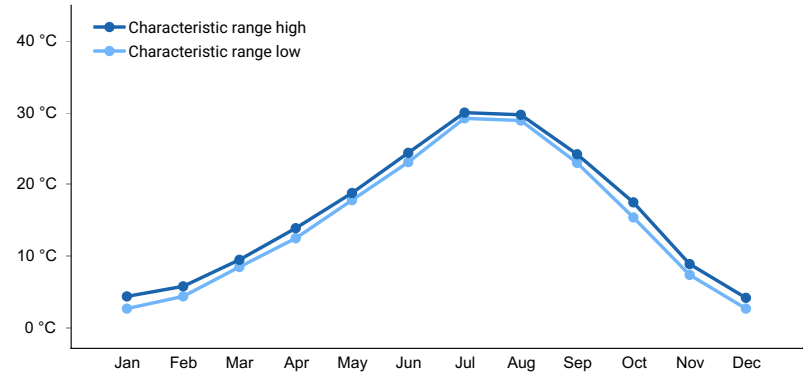


Figure 3. Monthly maximum temperature range

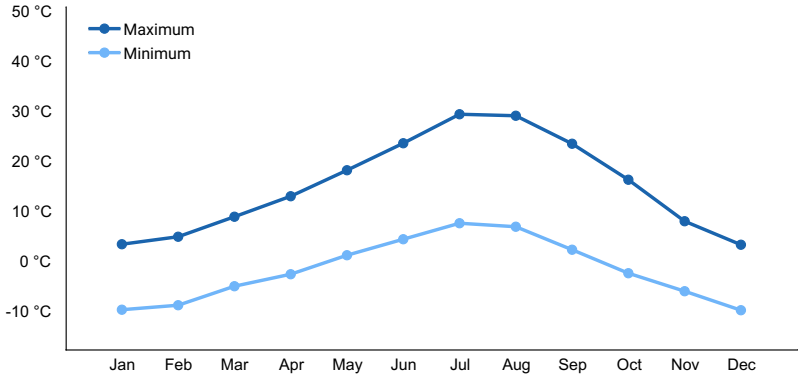


Figure 4. Monthly average minimum and maximum temperature

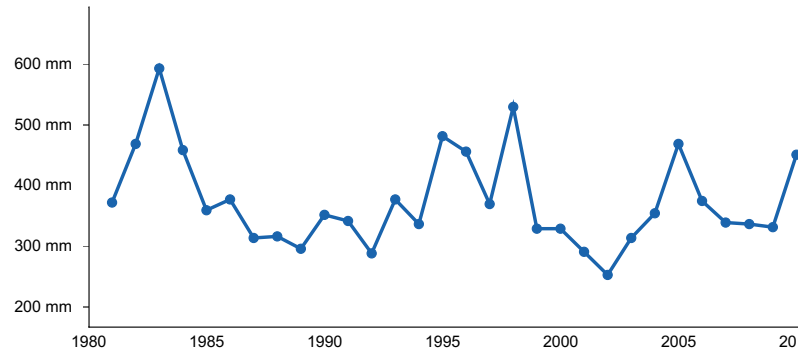


Figure 5. Annual precipitation pattern

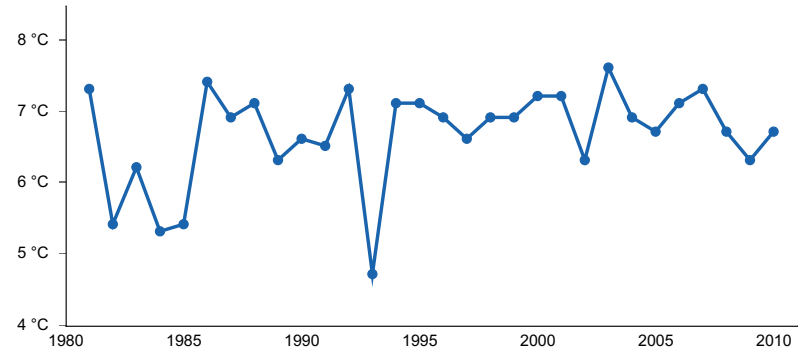


Figure 6. Annual average temperature pattern

Climate stations used

- (1) MURPHY DESERT HOT SPRG [USC00106250], Bruneau, ID
- (2) JARBIDGE 7 N [USC00264039], Jackpot, NV
- (3) JACKPOT [USC00264016], Jackpot, NV
- (4) MTN CITY RS [USC00265392], Mountain City, NV

Influencing water features

This site is influenced by run-on moisture, but not from wetlands or perennial streams. This site is in depressions and accumulates run-off from the surrounding landscape, resulting in seasonal ponding that last up to 45 days .

Wetland description

N/A

Soil features

The soils supporting this site are very deep, somewhat poorly drained, and are typically formed in lacustrine

deposits and alluvium derived mainly from volcanic rocks. The soil profile is characterized by a light colored (ochric epipedon) surface horizon. Greater that 40 percent clay is typical in the particle size control section and redoximorphic features below 6 inches (15cm).
The surface texture is fine textured (typically clay, silty clay or silty clay loam) resulting in slow permeability and high runoff (where slopes allow). Productivity, root development, and infiltration are not limited by restrictive soil horizons and soils may be saturated to a depth of 30 to 59 inches (76 to 150cm) in late winter and spring.
These soils are characterized by seasonal cracks on the soil surface during summer and early fall. Cracks are up to 3 inches (8 cm) wide and are 3 to 6 inches (8 to 15 cm) apart. They decrease in width with increasing depth and cracks remain open for fewer than 180 consecutive days.

Representative soil components include Boulder Lake and Piline

Table 4. Representative soil features

Parent material	(1) Alluvium–volcanic rock (2) Lacustrine deposits–volcanic rock
Surface texture	(1) Clay (2) Silty clay loam (3) Silty clay
Drainage class	Somewhat poorly drained
Permeability class	Slow to moderately slow
Depth to restrictive layer	152–203 cm
Soil depth	152–203 cm
Surface fragment cover <=3"	0–5%
Surface fragment cover >3"	0%
Available water capacity (0-152.4cm)	13.97–17.27 cm
Soil reaction (1:1 water) (0-152.4cm)	6.1–7.8
Subsurface fragment volume <=3" (15.2-152.4cm)	0–3%
Subsurface fragment volume >3" (15.2-152.4cm)	0%

Ecological dynamics

An ecological site is the product of all the environmental factors responsible for its development and has a set of key characteristics that influence a site's resilience to disturbance and resistance to invasives. Key characteristics include 1) climate (precipitation and temperature), 2) topography (aspect, slope, elevation, and landform), 3) hydrology (infiltration and runoff), 4) soils (depth, texture, structure, and organic matter), 5) plant communities (functional groups and productivity), and 6) natural disturbance regime (fire, herbivory, etc.) (Caudle et al. 2013). Biotic factors that influence resilience include site productivity, species composition and structure, and population regulation and regeneration (Chambers et al. 2013).

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

The dominant visual aspect of this site is silver sagebrush and Nevada bluegrass. Composition by weight is approximately 40-50 percent grass, 10-15 percent forbs and 35-50 percent shrubs. Subdominant species include bottlebrush squirreltail, sedges, prairie junegrass and thickspike wheatgrass. Total annual production is 900 pounds per acre (1008 kilograms per hectare) in a normal year. Production in a favorable year is 1200 pounds per acre (1344 kilograms per hectare). Production in an unfavorable year is 650 pounds per acre (722 kilograms per hectare). Structurally, cool season deep rooted perennial bunchgrasses are about equal to medium height shrubs

and perennial forbs are subdominant.

Silver sagebrush is an evergreen shrub that often forms colonies from a system of extensive rhizomes (Stubbendieck 1992). The root system of silver sagebrush consists of a taproot with lateral roots and rhizomes, usually located within a few inches of the soil surface. Silver sagebrush is the most vigorous sprouter of all sagebrush (Wright et al 1979), as it is able to sprout from roots, rhizomes, and the root crown after disturbance (Ellison and Woolfolk 1937, Whitson 1999, Blaisdell 1982). It has been known to readily layer, meaning it can generate adventitious roots from branches touching soil (Blaisdell 1982). This species is also capable of reproducing by seeds (Whitson 1999).

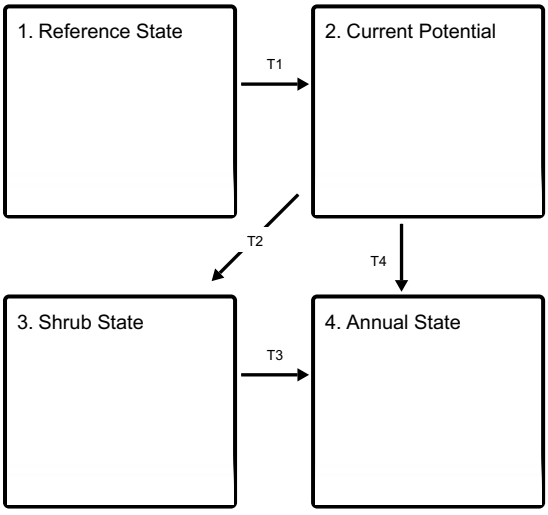
Silver sagebrush is a host species for the sagebrush defoliator, Aroga moth (Aroga websteri) (Henry 1961, Gates 1964, Hall 1965,), but it remains unclear whether the moth causes significant damage or mortality to individual or entire stands of plants. Severe drought has been known to kill the crowns of entire stands of silver sagebrush, however after release from drought it can rapidly regrow due to its vigorous sprouting ability (Ellison and Woolfolk 1937).

Periodic drought regularly influences sagebrush ecosystems. Drought duration and severity has increased throughout the 20th century in much of the Intermountain West. Major shifts away from historical precipitation patterns have the greatest potential to alter ecosystem function and productivity. Species composition and productivity on this site can be altered by the timing of precipitation and water availability within the soil profile (Bates et al. 2006). This ecological site is subject to both periodic drought and seasonal inundation. As ecological condition declines, Nevada bluegrass decreases in the understory as foxtail barley and annual forbs increase. Mountain silver sagebrush increases in density in the overstory shrub canopy. Annual mustards and medusa head are plants likely to invade this site

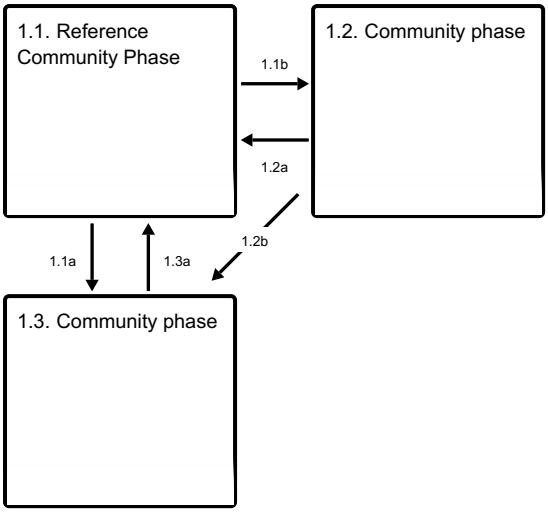
Estimated fire return interval are 50- 70 years for this site. The Churning Clay ecological site is often found embedded within the larger Wyoming big sagebrush (*Artemisia tridentata* var. wyomingensis) or basin big sagebrush (*Artemisia tridentata* var. tridentata) landscape. Therefore, its susceptibility to fire is driven by the neighboring ecological sites fire return intervals as well as fuel accumulation within the Churning Clay site. Silver sagebrush steppes experience stand-replacement fires. Fire frequencies are uncertain: fire histories for silver sagebrush communities are sparse to altogether lacking. Since plant productivity and community structure vary across the species' wide geographical distribution, historic fire intervals were probably similarly varied.

State and transition model

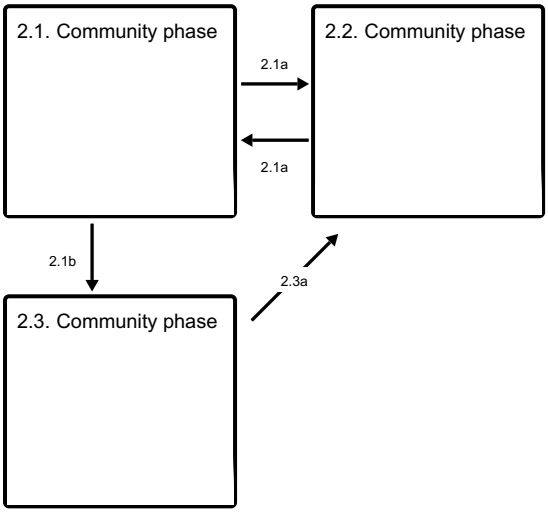
Ecosystem states



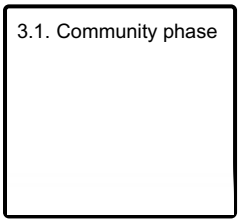
State 1 submodel, plant communities



State 2 submodel, plant communities



State 3 submodel, plant communities



State 1
Reference State

The Reference State 1.0 represents the natural range of variability under pre-Euro settlement conditions. State dynamics are maintained by interactions between climatic patterns and disturbance regimes. Negative feedbacks enhance ecosystem resilience and contribute to the stability of the state. These include the presence of all structural and functional groups, low fine fuel loads, and retention of organic matter and nutrients. Plant community phase changes are primarily driven by fire, periodic drought and/or insect or disease attack.

Characteristics and indicators. This state is characterized by silver sagebrush overstory with Nevada bluegrass in the understory. Bottlebrush squirreltail, big bluegrass and slender wheatgrass and a variety of forbs species are sub-dominant. Natural fire frequency is estimated to be 50-70 years. Significant year-to-year variation in ponding and depth to water table are primary drivers for above ground biomass production. Prolonged drought or prolonged flooding decreases resilience and increases the probability of annual or perennial weed invasion.

Dominant plant species

- silver sagebrush (*Artemisia cana*), shrub

- bluegrass (*Poa*), grass

Community 1.1
Reference Community Phase

This community phase has silver sagebrush in the overstory with Nevada bluegrass dominating the understory. Sub-dominant species include bottlebrush squirreltail, big bluegrass, slender wheatgrass, and a variety of forbs.

Resilience management. Silver sagebrush steppes experience stand-replacement fires. Fire frequencies are uncertain: fire histories for silver sagebrush communities are sparse to altogether lacking. Since plant productivity and community structure vary across the species' wide geographical distribution, historic fire intervals were probably similarly varied.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	336	448	605
Shrub/Vine	308	426	572
Forb	84	135	168
Total	**728**	**1009**	**1345**

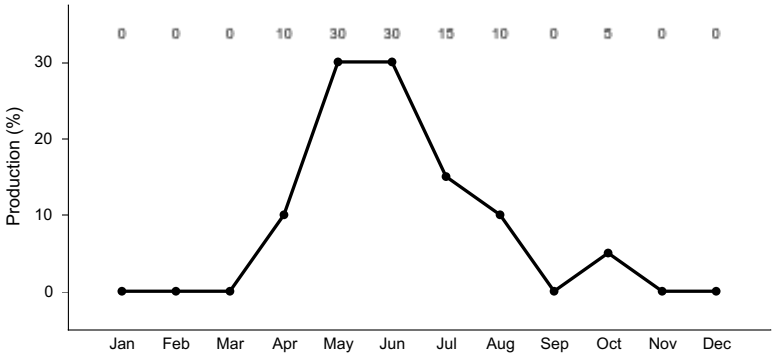


Figure 8. Plant community growth curve (percent production by month). ID0918, ARCA13. State 1.

Community 1.2
Community phase

This community phase is dominated by silver sagebrush with reduced herbaceous understory. All deep-rooted bunchgrasses are typically in low vigor. Silver sagebrush is increasing. This state has developed due to improper grazing management and lack of fire.

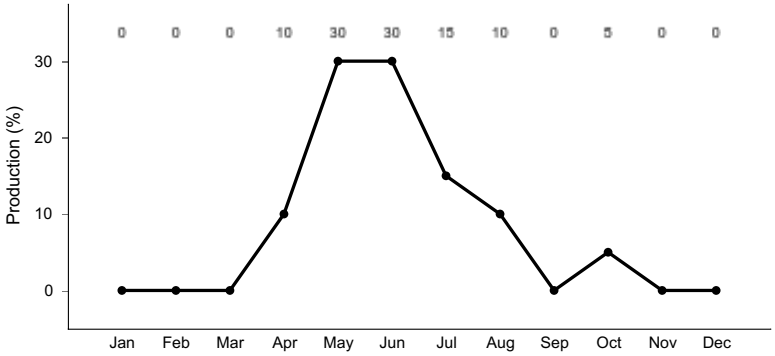


Figure 9. Plant community growth curve (percent production by month). ID0918, ARCA13. State 1.

Community 1.3

Community phase

This community phase is dominated by perennial bunchgrass including Nevada bluegrass and big bluegrass. Forbs remain about in the same proportion as Plant Community 1.1. Carex and rhizomatous grasses are common. Silver sagebrush has been reduced due to wildfire, but it and rabbitbrush are re-sprouting.

Resilience management. Silver sagebrush has been found to be less sensitive to fire due to its ability to resprout. Silver sagebrush is capable of resprouting from roots and rhizomes when topgrowth is destroyed (Cronquist 1994, Blaisdell 1982, Whitson 1999). Silver sagebrush also reproduces by seed. Seedling establishment can occur in the years after fire if the growing season is favorably wet (Wambolt et al. 1989). White and Currie (1983) found both spring and fall burning resulted in complete topkill of silver sagebrush regardless of fire intensity; spring burning when soil moisture was high and before plants began rapid stem growth resulted in low mortality and vigorous sprouting, however. Fall burning resulted in mortality of 40 to >70% of the silver sagebrush plants, suggesting summer wildfires could cause substantial stand death. Post-fire recovery and resilience is primarily influenced by pre-fire site conditions, fire severity, and post-fire weather and land use that relates to vegetation recovery. Sites with low abundances of native perennial grasses and forbs typically have reduced resiliency following disturbance and are less resistant to invasion or increases in cheatgrass or other weedy species (Miller et al 2013).

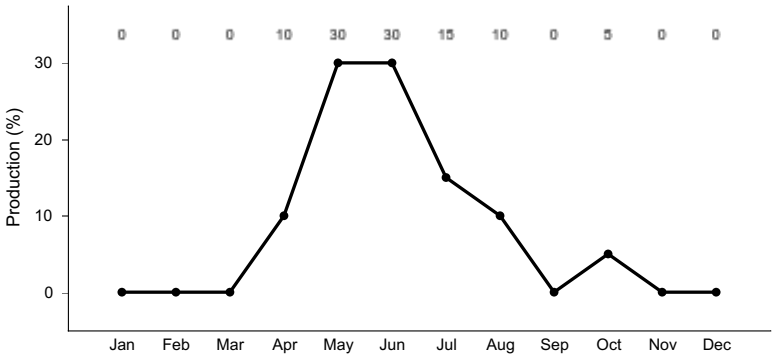


Figure 10. Plant community growth curve (percent production by month). ID0918, ARCA13. State 1.

Pathway 1.1b
Community 1.1 to 1.2

Natural regeneration over time and absence of disturbance. In the absence of normal fire frequency, silver sagebrush can gradually increase on the site. Grasses and forbs decrease as shrubs increase. This community phase pathways may be coupled with excessive utilization and prolonged drought.

Pathway 1.1a
Community 1.1 to 1.3

Wide spread wildfire, combined with release from long term drought. This community phase pathway may be coupled with release from herbivory, allowing herbaceous component to recover.

Context dependence. Silver sagebrush steppes experience stand-replacement fires. Fire frequencies are uncertain: fire histories for silver sagebrush communities are sparse to altogether lacking. Since plant productivity and community structure vary across the species' wide geographical distribution, historic fire intervals were probably similarly varied, but are estimated to range from 50 to 70 years.

Pathway 1.2a
Community 1.2 to 1.1

Low severity or patchy wildfire reduces shrub cover and creates a mosaic with perennial bunchgrasses.

Context dependence. This ecological site is often found embedded within the larger Wyoming big sagebrush (*Artemisia tridentata* var. wyomingensis) or basin big sagebrush (*Artemisia tridentata* var. tridentata) landscape. Therefore, its susceptibility to fire is driven by the neighboring ecological sites fire return intervals and fuel accumulation within the Churning Clay ecological site.

Pathway 1.2b
Community 1.2 to 1.3

Wide spread wildfire, combined with release from long term drought. This community phase pathway may be coupled with release from herbivory, allowing herbaceous component to recover.

Pathway 1.3a
Community 1.3 to 1.1

Natural regeneration over time and lack of disturbance allows silver sagebrush to recover.

Context dependence. Silver sagebrush is capable of resprouting from roots and rhizomes when topgrowth is destroyed (Cronquist 1994, Blaisdell 1982, Whitson 1999). Silver sagebrush also reproduces by seed. Seedling establishment can occur in the years after fire if the growing season is favorably wet (Wambolt et al. 1989). Post-fire recovery and resilience is primarily influenced by pre-fire site conditions, fire severity, and post-fire weather and land use that relates to vegetation recovery. Sites with low abundances of native perennial grasses and forbs typically have reduced resiliency following disturbance and are less resistant to invasion or increases in cheatgrass or other weedy species (Miller et al 2013).

State 2
Current Potential

This state is similar to the Reference State 1.0. Ecological function has not changed, however the resiliency of the state has been reduced by the presence of invasive weeds. Non-natives may increase in abundance but will not become dominant within this State. These non-natives can be highly flammable and can promote fire where historically fire had been infrequent. Negative feedbacks enhance ecosystem resilience and contribute to the stability of the state. These feedbacks include the presence of all structural and functional groups, low fine fuel loads, and retention of organic matter and nutrients. Positive feedbacks decrease ecosystem resilience and stability of the state. These include the non-natives' high seed output, persistent seed bank, rapid growth rate, ability to cross pollinate, and adaptations for seed dispersal.

Dominant plant species

- silver sagebrush (*Artemisia cana*), shrub
- bluegrass (*Poa*), grass

Community 2.1
Community phase

This community phase is similar to the Reference State Community Phase 1.1, with the presence of non-native species in trace amounts. Silver sagebrush and Nevada bluegrass dominate the site. Perennial forbs and grasses and other shrubs are smaller components of this site.

Community 2.2
Community phase

This community phase is characteristic of a post disturbance, early-seral community phase. Silver sagebrush is reduced initially, but is capable of sprouting from the root crown and may recover rapidly. Nevada bluegrass, other perennial grasses, and rabbitbrush increase following wildfire.

Resilience management. Silver sagebrush is the most vigorous sprouter of all sagebrush (Wright et al 1979), as it is able to sprout from roots, rhizomes, and the root crown after disturbance (Ellison and Woolfolk 1937, Whitson 1999, Blaisdell 1982). It has been known to readily layer, meaning it can generate adventitious roots from branches touching soil (Blaisdell 1982). This species is also capable of reproducing by seeds (Whitson 1999).

Community 2.3
Community phase

This community phase is characterized by late-seral silver sagebrush. Nevada bluegrass and other herbaceous species are reduced due to competition from shrubs, prolonged drought and/or excessive herbivory. Recruitment and vigor of bunchgrasses is reduced, contributing to dominance of silver sagebrush. Bare ground and invasive annuals like medusahead also increase, putting this site at-risk for more frequent fires.

Pathway 2.1a
Community 2.1 to 2.2

Fire decreases or removes cover silver sagebrush and allows perennial bunchgrasses and grass-likes to increase. Rabbitbrush will likely resprout and may increase. Non-native species are likely to increase in cover and density.

Context dependence. White and Currie (1983) found both spring and fall burning resulted in complete topkill of silver sagebrush regardless of fire intensity; spring burning when soil moisture was high and before plants began rapid stem growth resulted in low mortality and vigorous sprouting, however. Fall burning resulted in mortality of 40 to >70% of the silver sagebrush plants, suggesting summer wildfires could cause substantial stand death. Post-fire recovery and resilience is primarily influenced by pre-fire site conditions, fire severity, and post-fire weather and land use that relates to vegetation recovery. Sites with low abundances of native perennial grasses and forbs typically have reduced resiliency following disturbance and are less resistant to invasion or increases in cheatgrass or other weedy species (Miller et al 2013).

Pathway 2.1b
Community 2.1 to 2.3

Absence of disturbance and natural regeneration over time allows silver sagebrush to increase. This community phase pathway may be coupled with prolonged drought and excessive grazing. Prolonged drought adversely affects this plant community by reducing run-on. Vigor, recruitment, and production are usually reduced. Mortality can occur. Prolonged drought can lead to a reduction in fire frequency.

Pathway 2.1a
Community 2.2 to 2.1

Natural regeneration over time and absence of disturbance allows silver sagebrush to increase. Silver sagebrush is capable of re-sprouting from roots and rhizomes following wildfire. Silver sagebrush also reproduces by seed. Seedling establishment can occur in the years after fire if the growing season is favorably wet (Wambolt et al. 1989). Completion of this community phase may be rapid (less than 10years) if growing conditions are adequate.

Pathway 2.3a
Community 2.3 to 2.2

Fire decreases or removes cover silver sagebrush and allows perennial bunchgrasses and grass-likes to increase. Rabbitbrush will likely re-sprout and may increase. Non-native species are likely to increase in cover and density.

State 3
Shrub State

The shrub state is the product of long-term reduction in perennial bunchgrasses. Sites may experience many years of heavy grazing during time periods harmful to perennial bunchgrasses. Sites may also transition to a shrub state if the hydrology of the area is affected and seasonal ponding is reduced or eliminated. In both cases, Nevada bluegrass is significantly reduced and silver sagebrush becomes dominant. The shrub overstory and shallow-rooted grasses dominate site resources such that soil water, nutrient capture, nutrient cycling and soil organic matter are temporally and spatially redistributed.

Characteristics and indicators. This state is characterized by the dominance of silver sagebrush, reduced perennial bunchgrasses and forbs, and stable or increasing non-natives. Bare ground is extensive. Rabbitbrush may be a significant component. Bottlebrush squirreltail and creeping wildrye may be maintained as minor components. Medusahead and foxtail barley are common.

Dominant plant species

- silver sagebrush (*Artemisia cana*), shrub

Community 3.1
Community phase

This community phase is dominated by silver sagebrush, rabbitbrush may be a significant component. Deep-rooted perennial bunchgrass are present in trace amounts. Medusahead and foxtail barely are the dominant herbaceous species. These species add to the fine-fuel component and put this community phase at-risk of increased fire frequency.

Resilience management. This community phase is stable in the absence of wildfire. Changes in hydrology have reduced production and species composition.

State 4
Annual State

Increased run-on has cut a channel through the site, ponding has been reduced significantly and soil loss has occurred. Changes in site hydrology and repeated wildfire affect vigor, recruitment, and production of native perennials. This state is dominated by non-native annuals and shallow-rooted, disturbance tolerant, perennials.

Characteristics and indicators. Bare ground is extensive. Soil erosion is actively occurring. Rabbitbrush or remnants of silver sagebrush may be present. Annual non-natives, like medusahead, and shallow-rooted perennials, like foxtail barley, are dominant.

Dominant plant species

- cheatgrass (*Bromus tectorum*), grass

Transition T1
State 1 to 2

Trigger: introduction of non-native annual and perennial plants, such as cheatgrass and medusahead. Slow variables: Over time the non-native species will increase within the community. Organic matter inputs are reduced. Disturbance tolerant native species like foxtail barley may also increase. Threshold: Any amount of introduced non-native species causes an immediate decrease in the resilience of the site. Non-native species cannot be easily removed from the system and have the potential to significantly alter disturbance regimes from their historic range of variation.

Transition T2
State 2 to 3

Trigger: Hydrologic altering of the site (i.e. gulling of associated channel upstream followed by severe soil erosion). Maybe also be coupled with repeated, inappropriate, growing season grazing and long term chronic drought. Slow variables: Long term decrease in deep-rooted perennial grass density, vigor, and reproduction. Threshold: Loss of deep-rooted perennial bunchgrasses changes nutrient cycling, nutrient redistribution, and organic matter inputs. Alteration in the hydrology of the site caused by soil erosion and gullying reduces soil moisture by increasing runoff and reducing or eliminating ponding.

Transition T4
State 2 to 4

Trigger: Long-term chronic drought, inappropriate grazing management coupled with severe trampling, off-site or on-site water diversion, repeated fire, or combinations of these disturbances. Slow variables: Long-term decline in deep-rooted perennial grass density and increase in shrub overstory. Production and cover of non-native annual species increases over time. Long-term lowering of the water table and reduced organic matter inputs. Threshold: Hydrology has permanently changed. Loss of deep-rooted perennial bunchgrasses and shrubs truncates, spatially

and temporally, nutrient capture and cycling within the community. Increased continuous fine fuels from annual non-native plants modify the fire regime by changing intensity, size, and spatial variability of fires.

Transition T3
State 3 to 4

Trigger: Long-term chronic drought, inappropriate grazing management coupled with severe trampling, off-site or on-site water diversion, repeated fire, or combinations of these disturbances. Slow variable: Increased production and cover of non-native annual species. Long-term lowering of the water table. Reduced organic matter inputs. Threshold: Hydrology has permanently changed. Loss of deep-rooted perennial bunchgrasses and shrubs truncates, spatially and temporally, nutrient capture and cycling within the community. Increased continuous fine fuels from annual non-native plants modify the fire regime by changing intensity, size, and spatial variability of fires.

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Grass/Grasslike**			336–605	
	sedge	CAREX	*Carex*	56–101	–
	squirreltail	ELEL5	*Elymus elymoides*	56–101	–
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	39–73	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	22–45	–
	Idaho fescue	FEID	*Festuca idahoensis*	22–39	–
	meadow barley	HOBR2	*Hordeum brachyantherum*	22–39	–
	basin wildrye	LECI4	*Leymus cinereus*	11–22	–
	Sandberg bluegrass	POSE	*Poa secunda*	11–22	–
	blue wildrye	ELGL	*Elymus glaucus*	0–11	–
	rush	JUNCU	*Juncus*	0–11	–
Forb					
2	**Forbs**			84–168	
	desertparsley	LOMAT	*Lomatium*	0–22	–
	silverpuffs	MICRO6	*Microseris*	0–22	–
	longleaf phlox	PHLO2	*Phlox longifolia*	11–22	–
	cinquefoil	POTEN	*Potentilla*	0–22	–
	common yarrow	ACMI2	*Achillea millefolium*	0–22	–
	agoseris	AGOSE	*Agoseris*	0–22	–
	Hooker's balsamroot	BAHO	*Balsamorhiza hookeri*	0–22	–
	tapertip hawksbeard	CRAC2	*Crepis acuminata*	11–22	–
	fleabane	ERIGE2	*Erigeron*	0–22	–
	buckwheat	ERIOG	*Eriogonum*	0–22	–
	Rocky Mountain iris	IRMI	*Iris missouriensis*	0–11	–
	onion	ALLIU	*Allium*	0–11	–
	aster	ASTER	*Aster*	0–11	–
	owl's-clover	ORTHO	*Orthocarpus*	0–11	–
Shrub/Vine					
3	**Shrubs**			308–572	
	silver sagebrush	ARCA13	*Artemisia cana*	308–572	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	1–22	–
	little sagebrush	ARARL	*Artemisia arbuscula ssp. longiloba*	0–11	–

Animal community

Animal Community – Wildlife Interpretations

The ecological site provides diverse habitat value for wetland and upland wildlife species. The seasonal hydrology results in abundant forage attracting invertebrate and vertebrate animals to this ecological site. Habitat is provided for resident and migratory animals including western toad, western rattlesnake, shrews, bats, jackrabbits, ground squirrels, mice, coyote, red fox, badger, sage-grouse, Ferruginous hawk, prairie falcon, waterfowl and shorebirds. Large herbivore use of the ecological site includes mule deer and pronghorn antelope. Native reptile and amphibians are reliant on these sites on a seasonal basis during the year. Species of concern that may frequent the site includes common sagebrush lizard and greater sage-grouse. Loss of site hydrology significantly reduces

habitat value of this site and also adjacent ecological sites. Open water is seasonal, being provided by seasonal runoff, ponding, flooding, seasonal high water table and natural springs.

State 1 Phase 1.1 – Silver Sagebrush/ Nevada Bluegrass/ Big Bluegrass/ Slender Wheatgrass/ Bottlebrush Squirreltail Reference Plant Community (RPC): The RPC provides a diversity of grasses, forbs and shrubs used by native insect communities who assist in pollination of the plant community. The insects are food for the many predator species utilizing the site. The reptile and amphibian community is represented by common sagebrush lizard, western rattlesnake, western toad and northern leopard frog. Ponding occurs in late fall through early spring. The length of time ponding occurs on the site determines the amount of habitat and season of use for amphibians. Loss of hydrology will limit or exclude amphibians from this ecological site. Sage-grouse may utilize the site as brood-rearing, nesting and winter habitat. Year-round forage for pronghorn antelope and mule deer is available. Silver sagebrush is desirable forage for mule deer and pronghorn. Limited thermal cover and young of year cover for large herbivores is provided by woody vegetation. A small mammal population including deer mouse, meadow vole and yellow-bellied marmots may utilize the habitat on a seasonal basis.

State 1 Phase 1.2 - Silver Sagebrush/ Bluegrasses/ Slender Wheatgrass Plant Community: This phase has developed due to improper grazing management and lack of fire. Insect diversity would be similar to State 1 Phase 1.1 insect community. The increase in sagebrush reduces understory vegetation and cover for ground nesting animals. Quality of nesting and brood-rearing habitat for sage-grouse is reduced due to a reduction in vigor and production of understory vegetation. Silver sagebrush is desirable forage for large herbivores. Continued improper grazing management of the herbaceous vegetation would reduce the summer and fall grazing season for mule deer and pronghorn. Small mammal populations and diversity would be similar to State 1 Phase 1.1 small mammal community.

State 1 Phase 1.3 – Bluegrasses/ Slender Wheatgrass/ Sedges/ Dwarf Green Rabbitbrush Plant Community: This state developed due to a recent wildfire. Pollinators would be supported by an increase in forbs. The loss of sagebrush has reduced the vertical habitat available to animals. Reptile and amphibian community would be similar to Sate 1 Phase 1.1 community. Habitat quality for grassland bird species may increase if grazing of the plant community is managed properly. If the plant community is not managed properly nesting for grassland bird species would be minimal. The open landscape, when ponded, may provide additional nesting, feeding and brood-rearing habitat for waterfowl and shorebirds. Mallards, teal, long-billed curlew and sandhill crane may visit the site during the growing season. Birds of prey (northern harrier and Ferruginous hawk) may range throughout these areas looking for prey species. Mule deer and pronghorn will utilize the herbaceous vegetation in spring and fall although grazing season will be shortened due to improper management. Small mammal populations and diversity would be reduced due to reduced vertical structure and increased vulnerability from predators. Large tracts of this State and Phase would fragment the historic plant community and reduce quality of habitat for sage-steppe obligate animal species.

Grazing Interpretations.

This site is best suited for summer and fall grazing by domestic livestock. Vegetation tends to stay green longer on this site due to more available soil moisture as a result of run-on and seasonal ponding. Grazing by domestic livestock should be avoided in the spring due to wet soils.
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 D. Erosion hazard is slight.

Recreational uses

This site provides some visual diversity to the landscape. Colorful spring flowers and many species of birds using the site in the spring provide good opportunities for photography and nature study.

Wood products

None

Other products

None

Other information

Field Offices

Marsing, ID
Twin Falls, ID
Mountain Home, ID
Ontario, OR

Inventory data references

Information presented here has been derived from NRCS clipping and other inventory data.
Old SS Manuscripts, Range Site Descriptions, etc.
Also, field knowledge of range-trained personnel was used.
Those involved in developing this site description include:
Dave Franzen, co-owner, Intermountain Rangeland Consultants, LLC
Jacy Gibbs, co-owner, Intermountain Rangeland Consultants, LLC
Jim Cornwell, 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)

References

Bates, J.D., T. Svejcar, R.F. Miller, and R.A. Angell. 2006. The effects of precipitation timing on sagebrush steppe vegetation. Journal of Arid Environments 64:670–697.

Caudle, D., H. Sanchez, J. DiBenedetto, C. Talbot, and M. Karl. 2013. Interagency Ecological Site Handbook for Rangelands.

Chambers, J.C., B.A. Bradley, C.S. Brown, C. D'Antonio, M.J. Germino, J.B. Grace, S.P. Hardegree, R.F. Miller, and D.A. Pyke. 2013. Resilience to Stress and Disturbance, and Resistance to Bromus tectorum L. Invasion in Cold Desert Shrublands of Western North America. Ecosystems 17:360–375.

Ellison, L. and E.J. Woolfolk. 1937. Effects of Drought on Vegetation Near Miles City, Montana. Ecology 18:329–336.

Gates, D.H. 1964. Sagebrush Infested by Leaf Defoliating Moth. Journal of Range Management 17:209–210.

Hall. 1965. Sagebrush defoliator outbreak in northern California. U.S. Department of Agriculture. Pacific Southwest Forest and Range Experiment Station.

Henry. 1961. The biology of the sagebrush defoliator, Aroga websteri Clarke, in Idaho.

Olson and Whitson. 1999. Enhancing rangeland productivity and biodiversity by thinning big sagebrush with tebuthiuron.

Stubbendieck, J., S.L. Hatch, and C.H. Butterfield. 1992. North American range plants. University of Nebraska Press, 4th edition. University of Nebraska Press, Lincoln, NE. 493.

Wright. 1979. The role and use of fire in sagebrush grass and pinyon juniper plant communities. USDA Forest Service.

Other references

Hironaka, M., M.A. Fosberg, A. H. Winward. 1983. Sagebrush- Grass Habitat Types of Southern Idaho. University of Idaho. Moscow, Idaho. Bulletin Number 35
USDA Forest Service, Rocky Mountain Research Station. 2004. Restoring Western Ranges and Wildlands. General Technical Report RMRS-GTR-136-vols. 1-3.
USDA, NRCS.2001. The PLANTS Database, Version 3.1 (http://plants.usda.gov.). National Plant Data Center, Baton Rouge, LA 70874-4490 USA
USDA, Forest Service, Fire Effects Information Database. 2004. www.fs.fed.us/database.
USDI Bureau of Land Management, 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
DLF
E. Hourihan

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, Natural Resources Conservation Service Idaho State Office 9173 W. Barnes Drive, Suite C Boise, ID 83709 (208) 378-5722
Date	06/11/2007
Approved by	Kendra Moseley
Approval date	

Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Do not occur on this site due to the relatively flat slopes. If rills do develop, they are broken up by the churning action of the soil.

2. **Presence of water flow patterns:** Do not occur on this site due to the relatively flat slopes. If water flow patterns do develop, they are broken up by the churning action of the soil.

3. **Number and height of erosional pedestals or terracettes:** These are rare on this site.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Ranges from 20-40 percent.

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

6. **Extent of wind scoured, blowouts and/or depositional areas:** This does not occur.

7. **Amount of litter movement (describe size and distance expected to travel):** Cracks in the soil surface that occur during the summer and fall trap litter. 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.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** The A or A1 horizon is typically 1 to 10 inches thick. Structure ranges from strong fine and medium granular to strong medium and thick platy. Soil organic matter (SOM) ranges from 0 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. Shrubs accumulate snow in the interspaces. Cracks in the soil surface aid infiltration in late winter and early spring.

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** This can develop if the site is grazed when the soils are wet.

12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant: Cool season deep-rooted perennial bunchgrasses = medium shrubs

    Sub-dominant: Perennial forbs> shallow rooted grasses

    Other:

    Additional:

---

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Some mortality of grasses and forbs occurs from the shrinking and swelling of the soil.

---

14. **Average percent litter cover (%) and depth (in):** Annual litter cover in the interspaces will be 5-10 percent to a depth of <0.1. Under the mature shrubs, litter is greater than 0.5 inches. Fine litter falls or blows into the surface cracks in the soil.

---

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 900 lbs. per acre in a year with normal precipitation and temperatures. Perennial grasses produce 40-50 percent of the total, forbs 10-15 percent, and shrubs 35-50 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:** Medusahead is the most troublesome plant on this site. Other invasive plants that may be found on the site include cheatgrass, foxtail barley, Vulpia sp., bulbous bluegrass, rush skeletonweed, scotch thistle, spotted and diffuse knapweed.

---

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