USDA Natural Resources Conservation Service

Ecological site R025XY028ID
LOAMY BOTTOM 12-16

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General information

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

MLRA notes

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

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

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

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

Ecological site concept

This ecological site is on terraces and floodplains of alluvial flats and basin floors. Soils are very deep, moderately well to well drained and formed in mixed alluvium derived from volcanic parent material. The soil profile is characterized by a thick, dark, surface horizon (mollic epipedon). Important abiotic factors contributing to the presence of this site include an increase in available soil moisture due to landscape position, seasonal water table, and low run off. Under historic conditions the plant community associated with this site was dominated by basin wildrye and basin big sagebrush was sub-dominant.

Associated sites

R025XY011ID	**LOAMY 13-16** LOAMY 13-16; ARTRV dominant shrub; dark surface horizon 35-50cm thick
R025XY024ID	**LOAMY 12-16** LOAMY 12-16; FEID and PSSP dominant grasses; soil mod deep
R025XY039ID	**DRY MEADOW** DRY MEADOW; PONE and PHAL2 dominant species; seasonal water table >50cm from soil surface

R025XY044ID	**VERY SHALLOW STONY LOAM 10-14** VERY SHALLOW STONY LOAM 10-14; ARAR8 dominant shrub; >35% rock fragments by volume
R025XY019ID	**LOAMY 10-13** LOAMY 10-13; ARTRW dominant shrub; soil 50-100cm deep
R025XY010ID	**CLAYPAN 12-16** CLAYPAN 12-16; ARARL dominant shrub; <35% rock fragments by volume

Similar sites

R025XY043ID	**LOAMY 11-13** PSSP dominant grass; soils well drained with calcic horizon below 50cm
R025XY024ID	**LOAMY 12-16** FEID and PSSP dominant grasses; soil mod deep
R025XY011ID	**LOAMY 13-16** ARTRV dominant shrub; dark surface horizon 35-50cm thick
R025XY039ID	**DRY MEADOW** PONE and PHAL2 dominant species; seasonal water table >50cm from soil surface
R025XY005OR	**SHRUBBY LOAMY BOTTOM** soil characteristics, landform, production and species composition are not different from R025XY028ID/R025XY007OR.
R025XY007OR	**SILTY SWALE 11-13 PZ** soil characteristics, landform, production and species composition are not different from R025XY028ID/R025XY005OR.
R025XY003NV	**LOAMY BOTTOM 8-14 P.Z.** occurs on run-in landscape positions, not associated with perennial streams, no water table. Occurs in the Piedmont Slope land resource unit.
R025XY062OR	**SILTY SWALE 8-11 PZ** occurs on stream terraces, soils are well drained, no water table. Occurs in the Dissected low lava plateau land resource unit.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia tridentata subsp. tridentata*
Herbaceous	(1) *Leymus cinereus*

Physiographic features

This ecological site is on terraces and floodplains along drainageways and alluvial flats and basin floors. This site is on all aspects. Slopes are less than 15 percent. Elevations range from 4,500 to 5,500 feet (1,372 to 1,676 meters). Runoff is typically low and this site experiences rare to occasional flooding for brief periods.

Table 2. Representative physiographic features

Landforms	(1) Basin floor > Flood plain (2) Stream terrace (3) Drainageway
Runoff class	Low to medium
Flooding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Flooding frequency	Very rare to occasional
Elevation	4,500–5,500 ft
Slope	0–15%
Water table depth	42–72 in

Aspect	Aspect is not a significant factor

Climatic features

The climate associated with this site is defined by hot, dry summers and cold, snowy winters. Annual precipitation on this site averages 12 to 16 inches (30 to 40 cm) with the greatest amount of precipitation in late fall, winter and early spring as snow.

The plant growth period typically begins March 15 to April 30 and most grasses and forbs mature by July 15. The average frost-free period is 60-120 days.

*The above data is averaged from the climate station; Murphy Desert Hot SPRG, The Western Regional Climate Center and the National Soil Information System (NASIS).

Table 3. Representative climatic features

Frost-free period (characteristic range)	60-120 days
Freeze-free period (characteristic range)	70-130 days
Precipitation total (characteristic range)	12-18 in
Frost-free period (actual range)	30-160 days
Freeze-free period (actual range)	50-130 days
Precipitation total (actual range)	6-21 in
Frost-free period (average)	90 days
Freeze-free period (average)	76 days
Precipitation total (average)	14 in

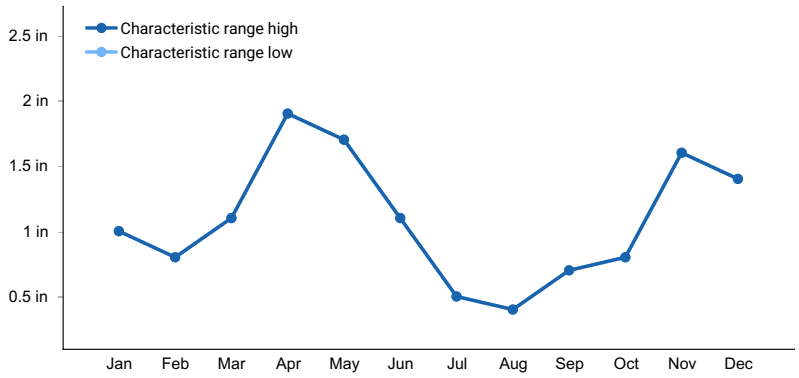


Figure 1. Monthly precipitation range

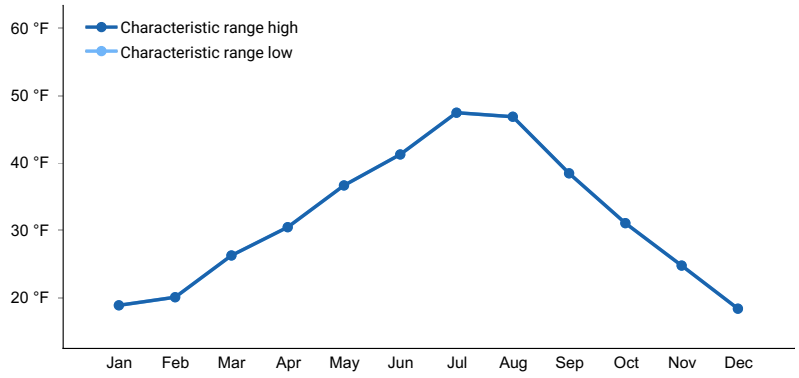


Figure 2. Monthly minimum temperature range

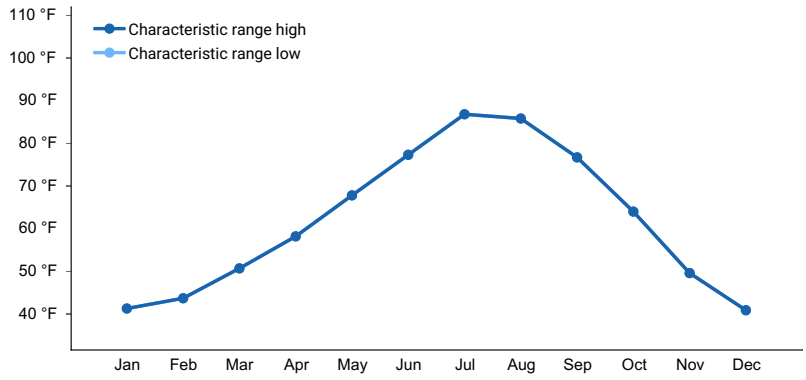


Figure 3. Monthly maximum temperature range

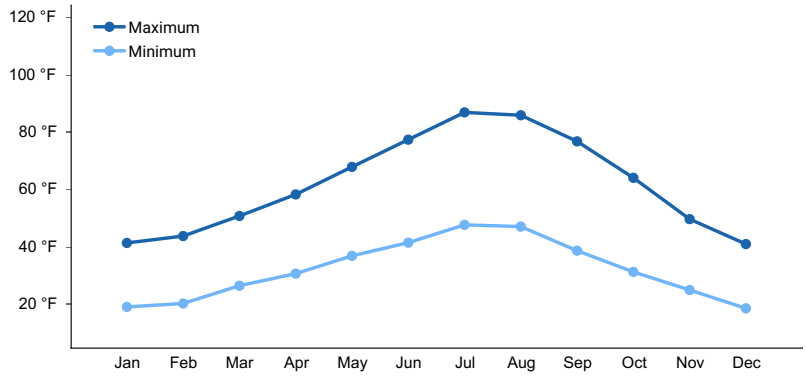


Figure 4. Monthly average minimum and maximum temperature

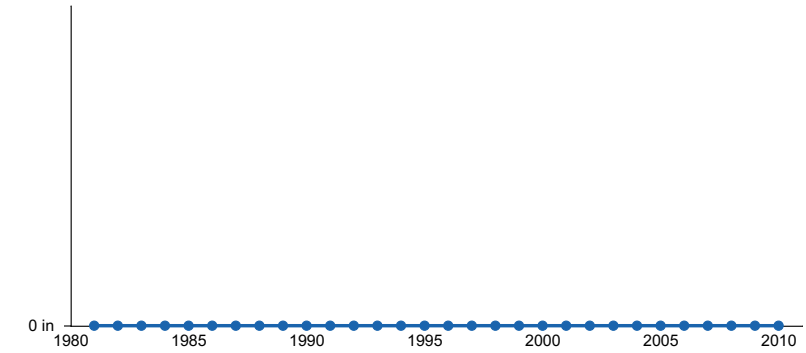


Figure 5. Annual precipitation pattern

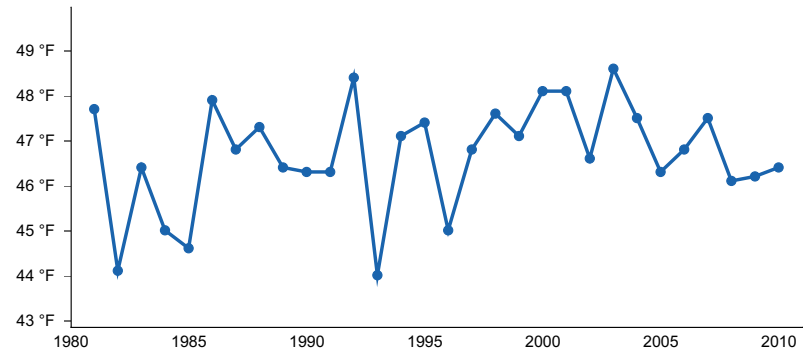


Figure 6. Annual average temperature pattern

Climate stations used

- (1) MURPHY DESERT HOT SPRG [USC00106250], Bruneau, ID

Influencing water features

This site is influenced by proximity to intermittent streams and run-on moisture from the surrounding landscape. A seasonal high water table below 40 inches (102cm) contributes to available soil moisture, when present.

Wetland description

N/A

Soil features

The soils supporting this site are very deep, moderately well to well drained and formed in alluvium derived from mixed volcanic parent material. These soils have greater than 18 percent clay in the particle size control section and stratified coarse textured material below 39.3 inches (100cm). The soil profile is characterized by a dark surface horizon (mollic epipedon) greater than 7.9 inches (20cm) thick and less than 35 percent rock fragments by volume.

Representative soil components include Babbington, Koosharem, Zola, Goose Creek, Renslow and Beetville.

Seasonal high water table may occur below 40 inches (102cm), evidence of soil saturation includes redoximorphic features. Other soils may exhibit characteristics of historic soil saturation as evidenced by relict redoximorphic features, but incision by stream channel entrenchment has removed the zone of saturation from these soils as evidenced by depth to current stream that is commonly confined within sheer vertical walls. These soils are run-in areas and therefore are more subject to channel and gully erosion than sheet and rill erosion. Headcutting can be a problem in some areas. Extensive channel or gully erosion may lower the water table. This historical drainage is not considered artificial (in other words upon removal of disturbances or practices that contributed to drainage, aquic conditions would not return).

Where this site is correlated to somewhat poorly, poorly, or very poorly drained soil series full consideration should be given to field checking these components to determine if they are a degraded ecological state of a wet meadow. Somewhat poorly drained soil components correlated to this ecological site include Upcreek.

Table 4. Representative soil features

Parent material	(1) Alluvium–volcanic rock
Surface texture	(1) Loam (2) Silt loam
Drainage class	Somewhat poorly drained to well drained
Permeability class	Moderately slow to moderate
Soil depth	20–60 in
Surface fragment cover <=3"	0–8%
Surface fragment cover >3"	0–2%
Available water capacity (0-40in)	4.4–7.5 in
Soil reaction (1:1 water) (0-40in)	6.4–7.8
Subsurface fragment volume <=3" (Depth not specified)	4–20%
Subsurface fragment volume >3" (Depth not specified)	2–25%

Ecological dynamics

This ecological site is dominated by deep-rooted cool season perennial bunchgrasses and long-lived shrubs (50+ years) with high root to shoot ratios. Sagebrush have a flexible generalized root system with development of both deep taproots and laterals near the surface (Comstock and Ehleringer 1992). Basin big sagebrush grows in relatively more mesic habitats when compared to other sagebrush types and is an indicator of deep fertile soils

(Tirmenstein 1999). It is associated with seasonally dry soils adjacent to drainages. The root system is able to extract moisture from both shallow and deep portions of the soil profile (Tweit and Houston 1980). However, prolonged drought conditions will result in reduced cover and vigor.

Basin wildrye is weakly rhizomatous and has root depths of up to 80 inches and exhibits greater lateral root spread than many other grass species (Abbott et al. 1991, Reynolds and Fraley 1989). Basin wildrye is a large, cool-season perennial bunchgrass with an extensive and deep fibrous root system (Reynolds and Fraley 1989). Clumps may reach up to 6 feet in height (Ogle et al. 2012). Basin wildrye does not tolerate long periods of inundation; rather, it prefers cycles of wet winters and dry summers and is most commonly found in deep soils with high water holding capacities or seasonally high water tables (Ogle et al 2012, Perryman and Skinner 2007).

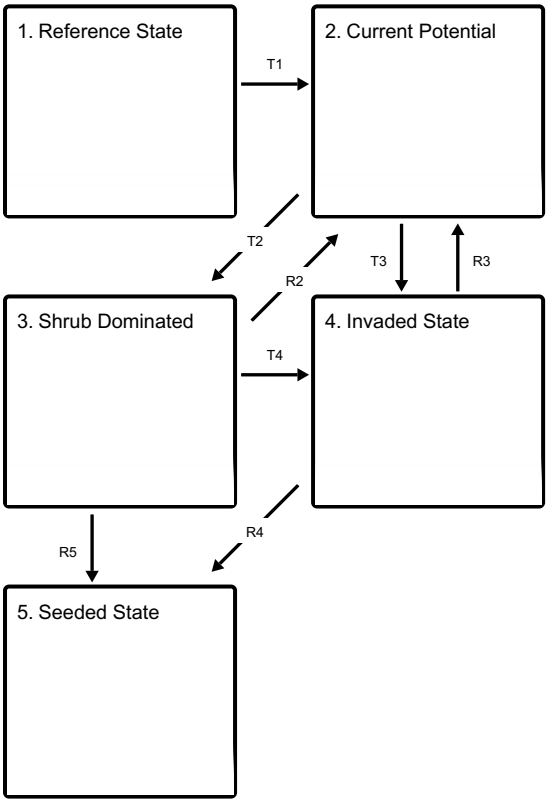
This ecological site has moderate resilience to disturbance and resistance to invasion. The introduction of annual species (cheatgrass) may cause an increase in fire frequency and eventually lead to a state change dominated by rabbitbrush. Potential invasive/noxious weeds are rubber rabbitbrush, annual mustards, poverty weed, whitetop, thistle, annual kochia, and pigweed.

In many basin big sagebrush communities, changes in fire frequency occur with fire suppression, livestock grazing and off-highway vehicle (OHV) use. Few, if any, fire history studies have been conducted on basin big sagebrush; however, Sapsis and Kauffman (1991) suggest that fire return intervals in basin big sagebrush are intermediate between mountain big sagebrush (15 to 25 years) and Wyoming big sagebrush (*Artemisia tridentata* ssp. wyomingensis) (50 to 100 years). Fire severity in big sagebrush communities is described as "variable" depending on weather, fuels, and topography.

The primary disturbances on this site are channel incision and down cutting cause by soil erosion. This facilitates an increase in shrubs and a decrease in basin wildrye. With continued site degradation, rubber rabbitbrush (*Ericameria nauseosa*) becomes the dominant plant species. There is some evidence that as currently mapped many Loamy Bottom ecological sites are degraded states of Wet Meadow ecological sites created through channel incision processes.

State and transition model

Ecosystem states



T1 - introduction of non-natives

T2 - Hydrologic altering of the site

T3 - Wide spread and repeated wildfire and/or soil disturbing practices

R2 - Brush management and seeding of native perennials

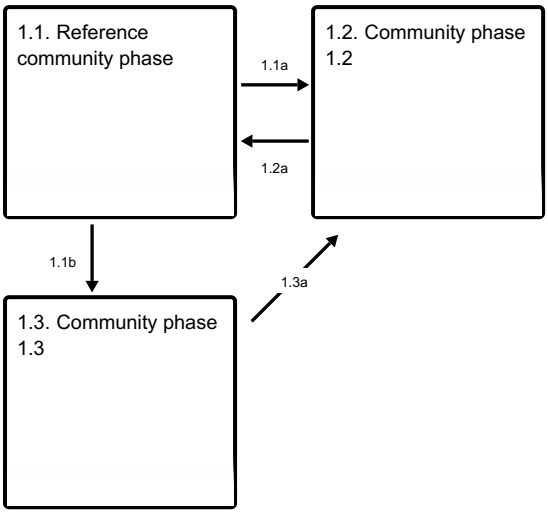
T4 - Severe and repeated wildfire and/or failed brush management or seeding

R5 - Seeding with non-native perennials using minimal soil disturbing practices

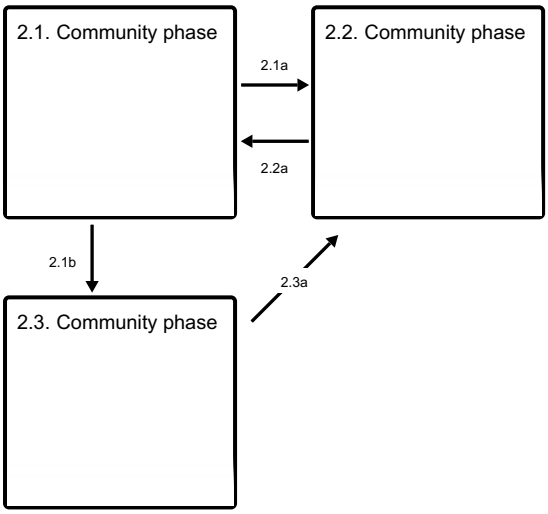
R3 - Seeding with native species

R4 - Seeding with non-native perennials using minimal soil disturbing practices

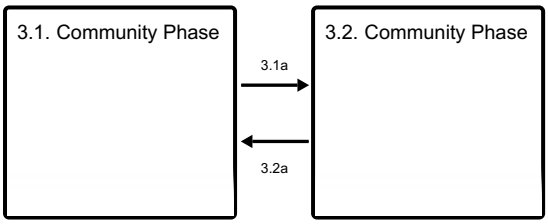
State 1 submodel, plant communities



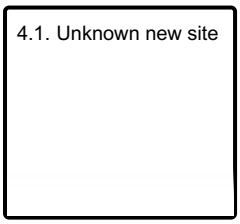
State 2 submodel, plant communities



State 3 submodel, plant communities



State 4 submodel, plant communities



State 1

Reference State

The Reference State is a representative of 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.

Dominant plant species

- basin big sagebrush (*Artemisia tridentata ssp. tridentata*), shrub
- basin wildrye (*Leymus cinereus*), grass

Community 1.1
Reference community phase

The representative community phase is characterized by a dense stand of tall, cool-season perennial grasses with scattered basin big sagebrush. This plant community is dominated by basin wildrye. Basin big sagebrush is prevalent. Understory species include Nevada bluegrass, bottlebrush squirreltail, sedges and thickspike wheatgrass. Potential vegetative composition is about 70 percent grass, 10 percent forbs, and 20 percent shrubs. Total annual production is 3500 pounds per acre (3900 kilograms per hectare) in a normal year.

Resilience management. Fire return interval is estimated to be 15-25 years.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1400	2450	3150
Shrub/Vine	400	700	900
Forb	200	350	450
Total	**2000**	**3500**	**4500**

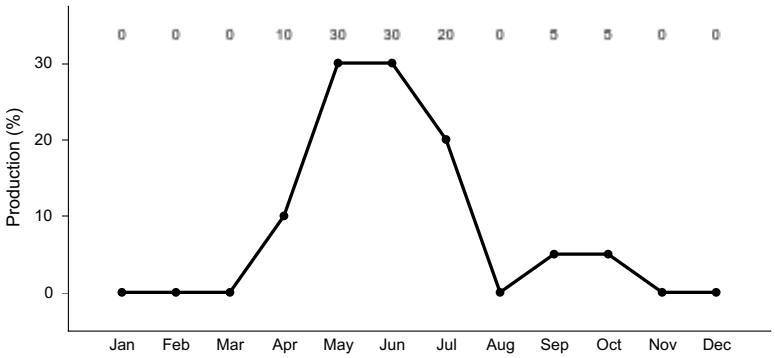


Figure 8. Plant community growth curve (percent production by month). ID0913, ARTRT/LECI4.

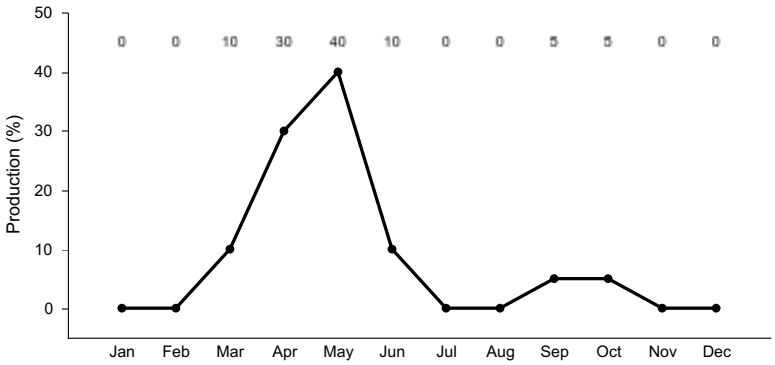


Figure 9. Plant community growth curve (percent production by month). ID0909, ARTR - POSE/Annuals.

Community 1.2
Community phase 1.2

This community phase is characteristic of a post-disturbance, early-seral community. This plant community is dominated by basin wildrye and other perennial grasses including Nevada bluegrass, sedges, bottlebrush squirreltail, lupine and thickspike wheatgrass. Few shrubs are present, since fire has removed them. Immediately after a fire, basin wildrye is stimulated. Gray and green rabbitbrush typically re-sprout and basin big sagebrush is reduced or patchy.

Community 1.3
Community phase 1.3

Sagebrush increases in the absence of disturbance. Decadent sagebrush dominates the overstory and the deep-rooted perennial bunchgrasses in the understory are reduced either from competition with shrubs and/or from herbivory. Sedges and remnants of basin wildrye, Nevada bluegrass and thickspike wheatgrass are present but in extremely low vigor. The perennial grasses that remain are typically protected in and around the sagebrush plants.

Pathway 1.1a
Community 1.1 to 1.2

Fire significantly reduces sagebrush cover and leads to a early/mid-seral community, dominated by grasses and forbs. Aroga moth infestation may also reduce sagebrush cover resulting in a mosaic of perennial grass and sagebrush.

Context dependence. This site has a normal fire frequency of 15-25 years. Immediately after a fire, basin wildrye is stimulated. Gray and green rabbitbrush typically re-sprout and basin big sagebrush is eliminated.

Pathway 1.1b
Community 1.1 to 1.3

Time and lack of disturbance such as fire allows for sagebrush to increase and become decadent. Long term drought, herbivory, or combinations of these will cause a decline in perennial bunchgrasses and fine fuels leading to a reduced fire frequency and allowing big sagebrush to dominate the site.

Context dependence. In the absence of normal fire frequency, basin big sagebrush will increase, while grasses and forbs decrease. When combined with season-long grazing and/or excessive utilization this can be very detrimental to this site. The vigor of the perennial grasses can be reduced significantly by heavy early season grazing, especially the basin wild rye. and other bunchgrasses. With reduced vigor, recruitment of these species declines. As these species decline, the plant community becomes susceptible to an increase in basin big sagebrush and a potential invasion of noxious and invasive species.

Pathway 1.2a
Community 1.2 to 1.1

Time and lack of disturbance will allow sagebrush to increase. Regeneration of sagebrush depends on near by seed source and favorable soil moisture conditions. Completion of this community phase pathway may take a decade or longer.

Pathway 1.3a
Community 1.3 to 1.2

Fire will decrease or eliminate the overstory of sagebrush and allow for the perennial bunchgrasses to dominate the site. Fire will typically remove most of the sagebrush overstory. A severe infestation of Aroga moth could also cause a large decrease in sagebrush within the community, giving a competitive advantage to the perennial grasses and forbs.

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

- basin big sagebrush (*Artemisia tridentata ssp. tridentata*), shrub
- basin wildrye (*Leymus cinereus*), 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. Basin wildrye and Sandberg (Nevada) bluegrass dominate the site. Forbs and other shrubs and grasses make up smaller components of this site.

Community 2.2
Community phase

This community phase is characteristic of a post-disturbance, early/mid seral community where annual non-native species are present. Perennial bunchgrasses and grass-likes dominate the site. Depending on fire severity or intensity of Aroga moth infestations, patches of intact sagebrush may remain. Rabbitbrush may be sprouting. Non-native species are stable or increasing within the community.

Resilience management. Depending on fire severity, rabbitbrush may increase after fire. Rubber rabbitbrush is top-killed by fire, but can rebound after fire (Young 1983). Shortened fire intervals within this ecological site favor a bluegrass understory with a rabbitbrush dominate overstory.

Community 2.3
Community phase

This community is at risk of crossing a threshold to another state. Sagebrush dominates the overstory and perennial bunchgrasses in the understory are reduced, either from competition with shrubs, inappropriate grazing, lowered water table or a combination of the three. Rabbitbrush may be a significant component. Nevada bluegrass and other shallow rooted perennial bunchgrass may increase and become co-dominant with basin wildrye. Non-native species are stable or increasing due to lack of competition with perennial bunchgrasses. This site is susceptible to further degradation from inappropriate grazing, drought, and fire.

Pathway 2.1a
Community 2.1 to 2.2

Fire will decrease or eliminate the sparse stand of sagebrush and perennial bunchgrasses and grass-likes remain dominant on the site. Fire will typically remove most of the sagebrush overstory and rabbitbrush will likely resprout. A severe infestation of Aroga moth could also cause a large decrease in sagebrush giving a competitive advantage to the perennial grasses and forbs. Non-native species are likely to increase after fire.

Context dependence. Depending on fire severity, rabbitbrush may increase after fire. Rubber rabbitbrush is top-killed by fire, but can rebound after fire (Young 1983). Basin wildrye is relatively resistant to fire as plants sprout from surviving root crowns and rhizomes (Zschaechner 1985). Miller et al. (2013) reported increased shoot densities in the first year following the wildfire with a return to normal shoot production by year two.

Pathway 2.1b
Community 2.1 to 2.3

Time and lack of disturbance such as fire allows for sagebrush and rabbitbrush to increase and become decadent. Long term drought, herbivory, or combinations of these will cause a decline in perennial bunchgrasses and fine fuels leading to a reduced fire frequency and allowing big sagebrush and rabbitbrush to dominate the site.

Context dependence. The vigor of the perennial grasses can be reduced significantly by heavy early season grazing, especially the basin wild rye. This type of management leads to reduced vigor of the other bunchgrasses also. With reduced vigor, recruitment of these species declines. As these species decline, the plant community becomes susceptible to an increase in basin big sagebrush and a potential invasion of noxious and invasive species.

Pathway 2.2a
Community 2.2 to 2.1

Time and lack of disturbance and/or grazing management that favors the establishment and growth of sagebrush and rabbitbrush allows the shrub component to recover. The establishment of big sagebrush can take many years.

Context dependence. Basin big sagebrush returns to a site primarily from seeds of plants that survived in unburned patches. Approximately 90% of big sagebrush seed is dispersed within 30 feet (9 m) of the parent shrub (Goodrich et al. 1985) with maximum seed dispersal at approximately 108 feet (33 m) from the parent shrub (Shumar and Anderson 1986). Regeneration of basin big sagebrush after stand replacing fires is therefore both difficult and dependent upon proximity of residual mature plants and favorable moisture conditions (Johnson and Payne 1968, Humphrey 1984).

Pathway 2.3a
Community 2.3 to 2.2

Fire will decrease or eliminate the overstory of sagebrush and allow for the perennial bunchgrasses to dominate the site. Fire will typically remove most of the sagebrush overstory. A severe infestation of Aroga moth could also cause a large decrease in sagebrush within the community, giving a competitive advantage to the perennial grasses and forbs. Non-native species respond well to fire and may increase post-burn.

Context dependence. The effect of fire on bunchgrasses relates to culm density, culm-leaf morphology, and the size of the plant. The initial condition of bunchgrasses within the site, in addition to seasonality and intensity of the fire factor into the individual species' responses. For most forbs and grasses, the growing points are located at or below the soil surface, providing relative protection from disturbances that decrease above-ground biomass, such as grazing or fire. Thus, fire mortality is more correlated to the duration and intensity of the wildfire (Wright 1971, Young 1983).

State 3
Shrub Dominated

This state typically results from many years of heavy grazing during time periods harmful to perennial bunchgrasses and/or hydrologic modification resulting in a lowered water table. Basin wildrye is reduced. Creeping wildrye and/or Sandberg bluegrass may become the dominant grass. Sagebrush dominates the overstory and rabbitbrush may be a significant component. Sagebrush may be decadent, reflecting stand maturity. The shrub overstory and creeping wildrye or mat muhly understory dominate site resources such that soil water, nutrient capture, nutrient cycling and soil organic matter are temporally and spatially redistributed.

Dominant plant species

- basin big sagebrush (*Artemisia tridentata ssp. tridentata*), shrub
- bluegrass (*Poa*), grass

Community 3.1

Community Phase

Decadent sagebrush dominates the overstory. Rabbitbrush may be a significant component. Deep-rooted perennial bunchgrasses such as basin wildrye may be present in trace amounts, but are not common. Thickspike wheatgrass is initially tolerant of heavy grazing and may be stable to increasing. Bluegrass and annual non-native species increase. Bare ground may increase.

Community 3.2
Community Phase

This community phase is characteristic of an early-seral community phase. Basin wildrye is absent or minor. Basin wildrye has been replaced by thickspike wheatgrass, bluegrass, bottlebrush squirreltail, and rabbitbrush dominate. Bare ground may increase. Annual non-native species may be present but are not dominant. Trace amounts of sagebrush may be present.

Pathway 3.1a
Community 3.1 to 3.2

Fire or heavy fall grazing that causes mechanical damage to shrubs, and/or brush treatments with minimal soil disturbance, will greatly reduce the overstory shrubs to trace amounts and allow for thickspike wheatgrass, squirreltail, or bluegrass to dominate the site.

Context dependence. In many basin big sagebrush communities, changes in fire frequency occur with fire suppression, livestock grazing and off-highway vehicle (OHV) use. Fire in basin big sagebrush communities are typically stand-replacing (Sapsis and Kauffman 1991). Rabbitbrush has a large taproot and is known to be shorter-lived and less competitive than sagebrush and typically increases following disturbance. Seedling density, flower production, and shoot growth decline as competition from other species increases (McKell and Chilcote 1957, Miller et al. 2013, Young and Evans 1974).

Pathway 3.2a
Community 3.2 to 3.1

Time and lack of disturbance may allow sagebrush to recover.

Context dependence. Basin big sagebrush returns to a site primarily from seeds of plants that survived in unburned patches. Approximately 90% of big sagebrush seed is dispersed within 30 feet (9 m) of the parent shrub (Goodrich et al. 1985) with maximum seed dispersal at approximately 108 feet (33 m) from the parent shrub (Shumar and Anderson 1986). Regeneration of basin big sagebrush after stand replacing fires is therefore both difficult and dependent upon proximity of residual mature plants and favorable moisture conditions (Johnson and Payne 1968, Humphrey 1984).

State 4
Invaded State

This state is characterized by the loss of deep-rooted perennial natives and the dominance of non-native species. Non-native annuals are most common, but dominance of perennial non-native species, like whitetop (*Lepidium latifolium*) may also occur.

Dominant plant species

- cheatgrass (*Bromus tectorum*), grass

Community 4.1
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. Gully development has lowered the watertable so that it is below the root zone of the perennial grasses and forbs. This state has developed

due to continued improper grazing management and/or fires. It is not economically feasible to move this unknown site back towards State 1. This plant community may resemble the early seral stages of the following sites: R025XY043ID Loamy 11-13” ARTRT/PSSPS R025XY024ID Loamy 12-16” ARTRT/FEID-PSSPS

State 5
Seeded State

This state is characterized by the dominance of seeded non-native perennials. Deep-rooted native perennials are reduced or absent. Following a successful seeding introduced perennials provide important soil stabilization and help to reduce loss of nutrients and moisture off site.

Characteristics and indicators. Site has been seeded with with non-native seeded forage species. Seeding practices should minimize soil disturbance. Non-native species are stable to increasing within this state.

Dominant plant species

- crested wheatgrass (*Agropyron cristatum*), grass

Transition T1
State 1 to 2

Trigger: introduction of non-native annual and perennial plants, such as cheatgrass, mustards, and whitetop. Slow variables: Over time the non-native species will increase within the community. Organic matter inputs are reduced. 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 prolonged drought. Slow variables: Long term decrease in deep-rooted perennial grass density and increased Sandberg bluegrass favors shrub growth and establishment resulting in reduced organic matter inputs and soil stabilization. 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 infiltration.

Transition T3
State 2 to 4

Trigger: Wide spread and repeated wildfire or soil disturbing practices (failed seeding or abandon farmland) coupled with prolonged drought. Slow variables: Increased production and cover of non-native annual species over time. Threshold: Loss of deep-rooted perennial bunchgrasses and shrubs truncates, spatially and temporally, nutrient capture and cycling within the community.

Restoration pathway R2
State 3 to 2

Brush management such as mowing, coupled with seeding of basin wildrye and other native perennials. This may be coupled with restoration of the water table where channel incision has occurred. Engineered structures may be needed. See USDA, NRCS National Engineering Handbook (2008). This restoration pathway should include prescribed grazing management and minimize soil disturbing practices. A failed restoration attempt may transition the site to an annual dominated state (State 4).

Transition T4
State 3 to 4

Trigger: Severe and repeated wildlife and/or failed brush management and seeding, maybe be coupled with prolonged drought. Slow variables: Increased production and cover of non-native annual species over time. Threshold: Loss of deep-rooted perennial bunchgrasses and shrubs truncates, spatially and temporally, nutrient capture and cycling within the community.

Restoration pathway R5
State 3 to 5

Seeding with non-native perennials using minimal soil disturbing practices. This restoration attempt should be coupled with prescribed grazing management.

Restoration pathway R3
State 4 to 2

This restoration pathway should include seeding of basin wildrye and other native species coupled with prescribed grazing management. The site may also require restoration of the water table where channel incision has occurred. Engineered structures may be needed. See USDA, NRCS National Engineering Handbook (2008). Probability of success is low and dependent on adequate soil moisture conditions. Care should be taken to minimize soil disturbing practices.

Restoration pathway R4
State 4 to 5

Seeding with non-native perennials using minimal soil disturbing practices. This restoration attempt should be coupled with prescribed grazing management. Non-native annuals will remain, but will not dominate.

Additional community tables

Animal community

Animal Community – Wildlife Interpretations

The rangeland ecological site provides diverse habitat for many native wildlife species. Large herbivore use of this ecological site is dominated by mule deer, elk and occasionally pronghorn antelope. Important seasonal habitat is provided by the tall, dense herbaceous vegetation for resident and migratory animals including western toad, common sagebrush lizard, western rattlesnake, shrews, bats, jackrabbits, ground squirrels, mice, coyote, red fox, badger, sage-grouse, Ferruginous hawk, prairie falcon, horned lark and western meadowlark. Area sensitive species include pygmy rabbit, Great Basin ground squirrel, sage-grouse, Brewer’s sparrow, sage thrasher and sage sparrow. Changes in the plant community composition can reduce the numbers and diversity of wildlife species in the area. With reduced shrub cover, shrub obligate bird and mammal species become rare including sage-grouse, brewer’s sparrow and sage thrasher. Encroachment of noxious and invasive plant species (cheatgrass and bulbous bluegrass) replace native plant species which provided critical feed, brood-rearing and nesting cover for a variety of native wildlife. Water is provided by seasonal runoff, artificial water catchments, adjacent streams and spring sites.

State 1 Phase 1.1 - Basin Big Sagebrush/ Basin Wildrye/ Nevada Bluegrass/ 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 for the plant community. The reptile and amphibian community is represented by common sagebrush lizard, western rattlesnake, Great Basin spadefoot, western toad and northern leopard frog. Amphibians are associated with springs, streams and isolated water bodies adjacent to this plant community. Spring developments that capture all available hydrology would preclude the use of these sites by amphibians. The plant community supports a variety of migratory and resident bird species that utilize the grasses, forbs, shrubs and water for food, brood-rearing and nesting cover. When large streams are adjacent to this site, significant use of the tall and dense vegetation by waterfowl and shorebirds may occur. Shrub-steppe obligate bird species of concern include the Brewer’s sparrow, sage sparrow, sage thrasher and sage-grouse. Habitat (i.e. brood-rearing, winter cover and food) for sage-grouse is provided by this diverse plant community. The plant community supports seasonal (late spring, summer and winter) habitat needs for mule deer providing food, thermal cover and young of year cover. A small mammal population including golden-mantled ground squirrels, Merriam’s shrew, pygmy rabbit,

Columbia Plateau ground squirrel, bushy-tailed woodrat, jackrabbit and yellow-bellied marmots utilize this plant community.

State 1 Phase 1.2 - Basin Wildrye/ Nevada Bluegrass/ Bottlebrush Squirreltail Plant Community: This phase has developed due to fire. The plant community, dominated by herbaceous vegetation with little or no basin big sagebrush provides less vertical structure, limiting use by sagebrush obligate animals. Insect diversity may be reduced due to the loss of shrubs but a native forbs plant community similar to State 1 Phase 1.1 would still support select pollinators. Quality of habitat for common sagebrush lizard and western rattlesnakes would be reduced due to the absence of sagebrush. The dominance of herbaceous vegetation with little sagebrush canopy would prevent use of this area for nesting by Brewer's sparrow, sage sparrow and sage thrasher. This plant community provides brood-rearing habitat for sage grouse when sagebrush cover is nearby. The dominance of herbaceous vegetation improves habitat for grassland bird species (horned lark and western meadowlark). Mule deer, elk and occasionally pronghorn habitat (forage, thermal cover and young of year cover) would still be provided. A small mammal population including golden-mantled ground squirrels, chipmunks and yellow-bellied marmots would utilize the site. 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 1.3 - Basin Big Sagebrush/ Sedges Plant Community: This plant community is the result of improper grazing management and lack of fire. An increase in canopy of sagebrush contributes to a sparse herbaceous understory. Basin wildrye is severely reduced in vigor and production. The reduced herbaceous understory results in reduced diversity of insects. You can expect a decrease in population and diversity of reptiles due to the reduced diversity and canopy cover of herbaceous vegetation. Shrub-steppe obligate bird species include Brewer's sparrow, sage sparrow, sage thrasher and sage-grouse. Winter cover and food for sage-grouse is available but the quality of brood rearing habitat may be reduced due to poor understory vegetation. The loss of basin wildrye reduces available thermal cover and young of year cover for mule deer and elk. The loss of understory will result in a shorter forage season for large mammals. A small mammal community would be similar to State 1 Phase 1.1 small mammal community. Quality of habitat for pygmy rabbit may increase due to an increase in sagebrush.

State 2 – Tall Green Rabbitbrush/ Tall Grey Rabbitbrush/ Cheatgrass Plant Community: This state has developed due to fire and improper grazing management. This plant community would not support as diverse an insect community as in State 1 Phase 1.1. The rabbitbrushes would provide late summer and fall pollinator habitat. The reduced forbs component in the plant community would support a very limited population of pollinators throughout the seasons. Food and cover for reptile species would be reduced due to the loss of perennial understory vegetation. The quality of habitat for sage-grouse, sage thrasher, Brewer's sparrow and sage sparrow would be reduced. Birds of prey including hawks and falcons may range throughout these areas looking for prey species. Mule deer may graze the invasive herbaceous vegetation in the early part of the year and rabbitbrush in the winter when the plants are more palatable. The rabbitbrush may provide thermal cover and young of year cover for mule deer and elk. Pygmy rabbits would not utilize this site due to the loss of sagebrush.

State 3 - 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 1.2. A diverse seed mixture of grasses, forbs and shrubs would provide similar habitat conditions as described in State 1 phase 1.1 or 1.3.

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 suitable for livestock grazing in late spring, summer and fall. Water is often limited in the summer and fall.

Estimated initial stocking rate will be determined with the landowner or decision-maker. They will be based on the

inventory, past use history and type, condition of vegetation, production, season of use and seasonal preference.

Hydrological functions

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

Recreational uses

This site provides limited opportunities for recreational activities.

Wood products

None.

Other products

None.

Inventory data references

Information presented here has been derived from NRCS clipping and other inventory data. Also, field knowledge of range-trained personnel was used.
Old SS Manuscripts, Range Site Descriptions, etc.

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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.

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Date	06/13/2007
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Approval date	

Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rills are not common on this site. If the site is degrading due to gully down-cutting, rills may occur on the side slopes of the gully.

2. **Presence of water flow patterns:** Water-Flow patterns are common on this site. When they occur, they are long, often running the length of the site and disrupted by cool season grasses and tall shrubs. Water flow patterns are also commor from run-in from the adjacent uplands.

3. **Number and height of erosional pedestals or terracettes:** Pedestals and/or terracettes 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):** On sites in mid-seral status, bare ground may range from 40-60 percent.

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

6. **Extent of wind scoured, blowouts and/or depositional areas:** Usually not present. Immediately following wildfire some soil movement may occur on lighter textured soils.

7. **Amount of litter movement (describe size and distance expected to travel):** Fine litter in the interspaces may move 6 feet or more following a significant run-off event. Coarse litter generally does not move.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Values should range from 4-6 .

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** The surface horizon is typically 4 to 24 inches thick. Structure typically includes moderate thin and medium platy, weak fine, moderate medium and coarse granular, and moderate fine subangular blocky. Soil organic matter (SOM) ranges from 1 to 5 percent.

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

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** Not present.

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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):** Basin wildrye, basin big sagebrush and antelope bitterbrush, when present, 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 and basin wildrye, 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):** 3500 pounds per acre (3900 Kg/ha) in a year with normal precipitation and temperatures. Perennial grasses produce 70 percent of the total production, forbs 10 percent and shrubs 20 percent.

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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:** Invasive Plants include cheatgrass, bulbous bluegrass, leafy spurge, whitetop, annual kochia, annual mustards, Russian thistle, rush skeletonweed, Canada, musk and scotch thistle and diffuse and spotted knapweed.

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