USDA Natural Resources Conservation Service

Ecological site R025XY043ID
LOAMY 11-13

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 structural benches, terraces, tablelands, and foothills associated with basalt plains and lava plateaus. Slopes are less 25 percent and elevations range from 4,500 to 6,000 feet (1,372 to 1,829 meters). Soils formed in alluvium and loess derived from volcanic ash and volcanic rock. Soils are well drained and moderately deep to a restrictive horizon of calcium carbonate and silica accumulation (duripan). Clay percentage is typically greater than 35 percent in the particle size control section.
Important abiotic factors contributing to this ecological site include accumulation of calcium carbonates below 20 inches (50 cm) and a low available water holding capacity.
Under natural conditions the reference plant community is dominated by basin big sagebrush and bluebunch wheatgrass.

Associated sites

R025XY010ID	**CLAYPAN 12-16** ARAR8 dominant shrubs; soils derived from residuum/colluvium; accumulation of clay (argillic horizon) within 11cm of the soil surface

R025XY011ID	**LOAMY 13-16** ARTRV dominant shrub; occurs on backslopes on hills and plateaus
R025XY019ID	**LOAMY 10-13** ARTRW8 dominant shrub; soils less than 100cm deep to bedrock

Similar sites

R025XY019ID	**LOAMY 10-13** ARTRW8 dominant shrub; soils less than 100cm deep to bedrock; lacks calcic horizon
R025XY028ID	**LOAMY BOTTOM 12-16** LECI4 dominant grass; occurs on floodplains and alluvial flats on basin floors

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia tridentata ssp. tridentata*
Herbaceous	(1) *Pseudoroegneria spicata*

Physiographic features

This ecological site is on structural benches, terraces, tablelands, and foothills associated with basalt plains and lava plateaus. Slopes are less than 25 percent with elevations of 4,500 to 6,000 feet (1,372 to 1,829 meters). The runoff potential is low.

Table 2. Representative physiographic features

Landforms	(1) Lava plateau > Structural bench (2) Lava plateau > Terrace (3) Foothills
Runoff class	Low to medium
Flooding frequency	None
Ponding frequency	None
Elevation	1,372–1,829 m
Slope	0–25%
Water table depth	254 cm
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.

Mean annual precipitation is 12 inches (30 cm), with the highest rainfall occurring in May; 1.9 inches (48 cm) and the lowest in August 0.4 inches (1.0 cm). Average snowfall is typically 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 is averaged from the MTN CITY RS, Murphy Desert Hot Springs, Jackpot, and Danner climate stations, The National Soil Information System (NASIS), and the Western Regional Climate Center.

Table 3. Representative climatic features

Frost-free period (characteristic range)	50-110 days
Freeze-free period (characteristic range)	60-120 days
Precipitation total (characteristic range)	279-330 mm

Frost-free period (actual range)	50-110 days
Freeze-free period (actual range)	60-120 days
Precipitation total (actual range)	279-330 mm
Frost-free period (average)	80 days
Freeze-free period (average)	90 days
Precipitation total (average)	305 mm

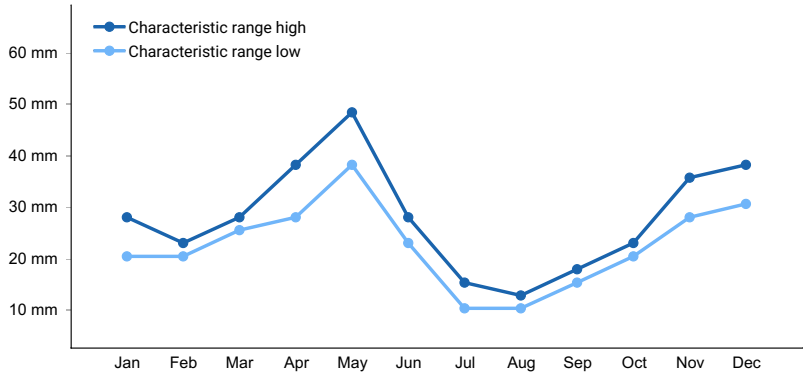


Figure 1. Monthly precipitation range

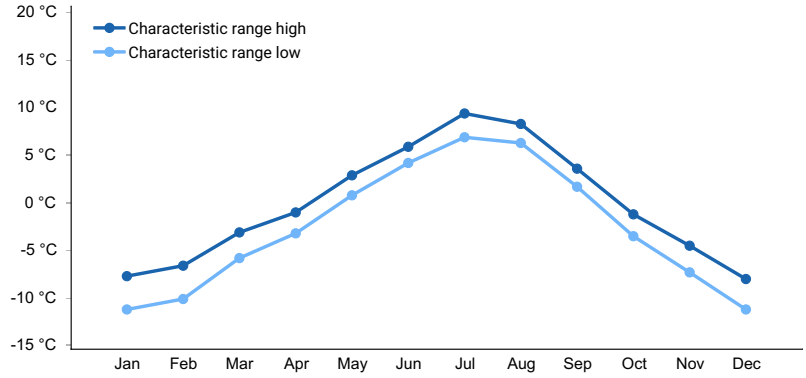


Figure 2. Monthly minimum temperature range

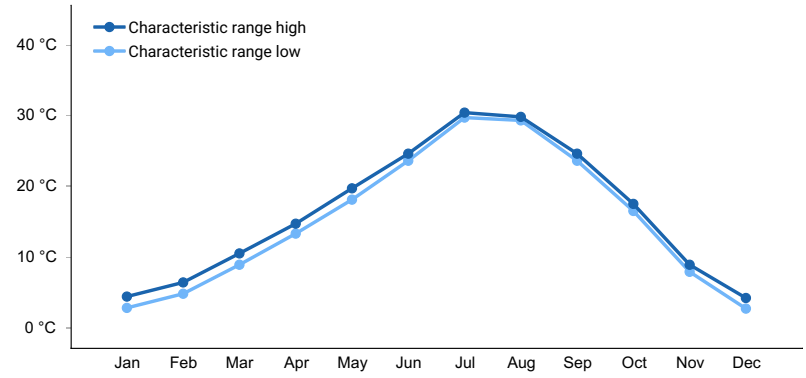


Figure 3. Monthly maximum temperature range

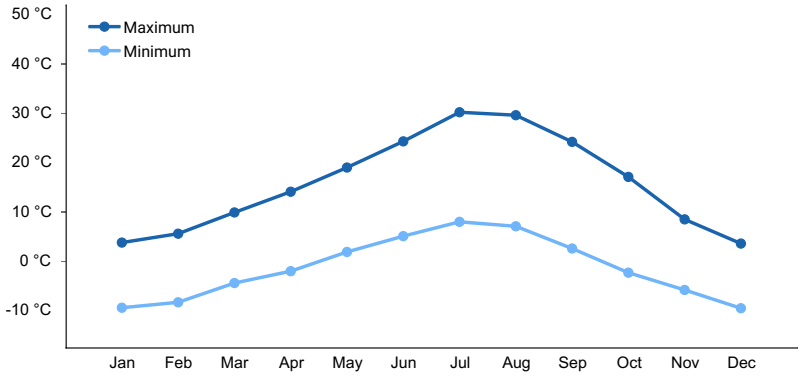


Figure 4. Monthly average minimum and maximum temperature

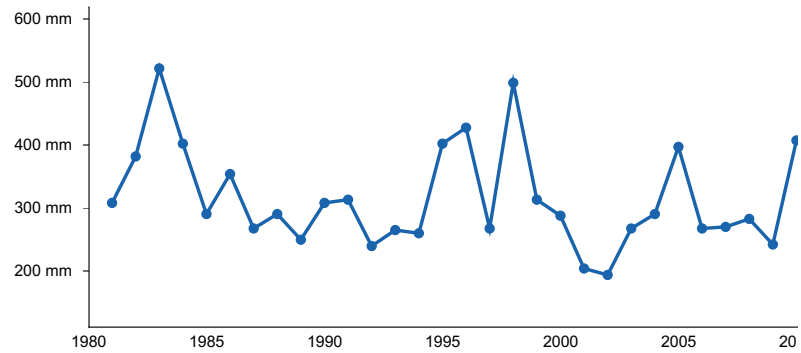


Figure 5. Annual precipitation pattern

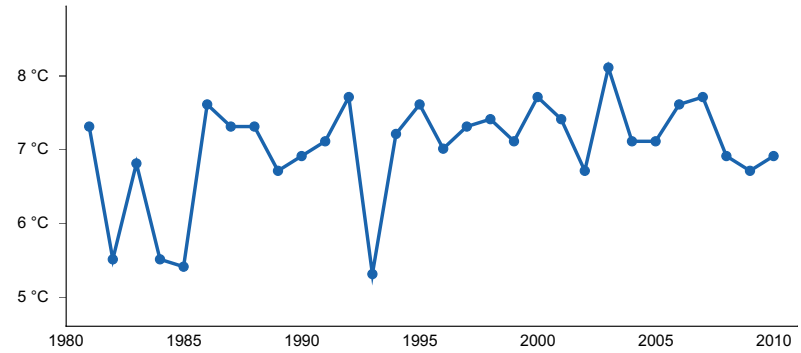


Figure 6. Annual average temperature pattern

Climate stations used

- (1) DANNER [USC00352135], Jordan Valley, OR
- (2) MURPHY DESERT HOT SPRG [USC00106250], Bruneau, ID
- (3) JACKPOT [USC00264016], Jackpot, NV
- (4) MTN CITY RS [USC00265392], Mountain City, NV

Influencing water features

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

Wetland description

N/A

Soil features

The soils associated with this site are moderately deep to a root-limiting layer of silica and carbonate cementation (duripan). The soils associated with this site formed in alluvium derived from volcanic rock.

The soils at this site have a dark colored surface horizon (mollic epipedon). The soil surface textures are typically silt loam or loam over a silty clay loam or clay loam in the subsoil. The subsoil profile is characterized by greater than 35 percent clay in the particle size control section.
Accumulation of calcium carbonates (calcic horizon) is typical at 20 inches (50cm) or deeper. Root development is limited by restrictive duripan or hard bedrock within 39 inches (100cm) of the soil surface.
Soils are well drained with a moderate available water holding capacity. The soils support a productive plant community,

Representative soil components correlated to this ecological site include Tanner, Perla, Schipper, Jumpcreek and Arness.

Table 4. Representative soil features

Parent material	(1) Volcanic ash (2) Alluvium–basalt (3) Alluvium–tuff
Surface texture	(1) Loam (2) Silt loam
Drainage class	Well drained
Permeability class	Slow to moderately slow
Depth to restrictive layer	51–102 cm
Soil depth	51–102 cm
Surface fragment cover <=3"	5–10%
Surface fragment cover >3"	2–12%
Available water capacity (0-101.6cm)	5.59–16.76 cm
Calcium carbonate equivalent (50.8-101.6cm)	20–30%
Soil reaction (1:1 water) (0-101.6cm)	6.6–7.8
Subsurface fragment volume <=3" (Depth not specified)	4–26%
Subsurface fragment volume >3" (Depth not specified)	2–13%

Ecological dynamics

The Reference Plant Community is dominated by bluebunch wheatgrass and big sagebrush. Subdominant species include sandberg bluegrass, thurber’s needlegrass, squirreltail, arrowleaf balsamroot, tapertip hawksbeard, and antelope bitterbrush. Total annual production is 900 lbs/acre in a normal year, 1300 lbs/acre in a favorable year, and 600 lbs/acre in a unfavorable year. Structurally, cool season deep rooted perennial bunchgrasses are dominant, followed by tall shrubs and perennial forbs. The dominant visual aspect of this site is mixed grasses and big sagebrush. Composition by weight is approximately 60-70% grasses, 5-10% forbs and 20-30% shrubs.

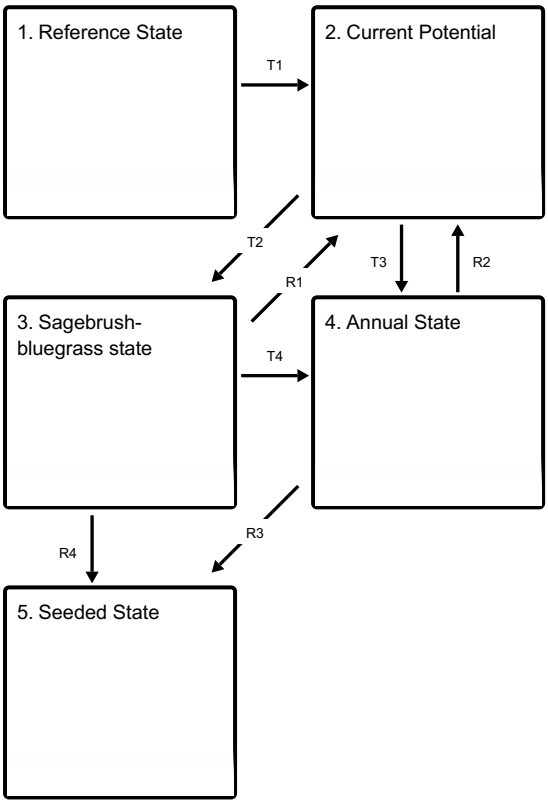
Herbivory has historically occurred on the site at low levels of utilization. Native herbivores include pronghorn antelope, mule deer, lagomorphs and rodents. Upland bird species such as chuckers, sagegrouse, and Hungarian partridge utilize the resources at this site. Livestock grazing has become prevalent across this site. Overutilization of resources due to grazing (from livestock, wildlife, and feral horses) can degrade the site and decrease forage availability and quality. This will lead to a decrease in perennial bunch grasses and an increase of invasive species (Williamson, 2020). Annual and perennial invasive species compete with desirable plants for moisture and nutrients. Insect galls caused by flies, midges and fruit flies are found on big sagebrush. They do not usually affect the overall health of the individual plant. Black stem rust can be found on big sagebrush and could reduce seed production (Welch, 1995).

Wildfire frequency across this site has historically been low to medium in occurrence. Sagebrush evolved with low intensity wildfire that left a mosaic of burned and unburned patches (Baker, 2006). In the absence of wildfire, big sagebrush will gradually dominate the site. Species such as cheatgrass, medusahead, and bulbous bluegrass can be troublesome invaders on this site after wildfire, preventing re-establishment of native shrubs and grasses. Invasive, annual species have the ability increase wildfire frequency and intensity (K. Haubensak, 2009). This could cause the dominate shrub population to shift away from big sagebrush to a shrub population with quicker establishment.

High annual precipitation will increase the total plant production. These weather patterns can increase the total amount of viable seed production across the site. Higher wildfire frequency following annual plant production can be expected due to a larger fuel load (Pilliod, 2017). Lower annual precipitation can significantly reduce total annual production and could be detrimental to seed production. Infiltration can be maintained with a mixed stand of bunchgrasses and shrubs. When big sagebrush dominate a site, runoff increases. Runoff potential following large precipitation events is medium with a slight erosion risk. Decreased infiltration, increased runoff, and increased erosion occur when big sagebrush is removed by frequent wildfires (C.J. Williams, 2018).

State and transition model

Ecosystem states



T1 - Introduction of annual non-native species.

T3 - Repeated, widespread and severe fire.

R1 - Seeding with native species

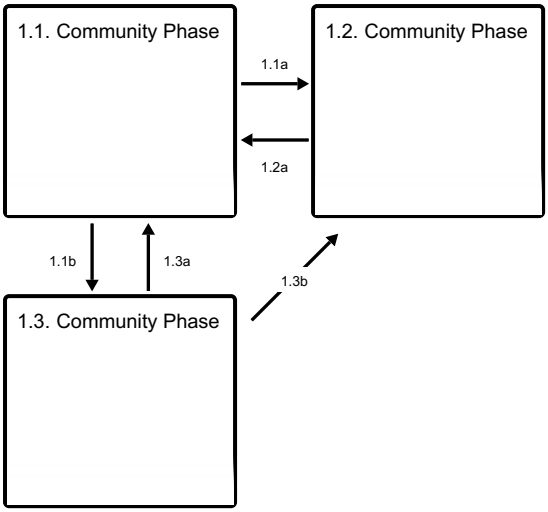
T4 - Repeated, widespread and severe fire.

R4 - Rangeland seeding

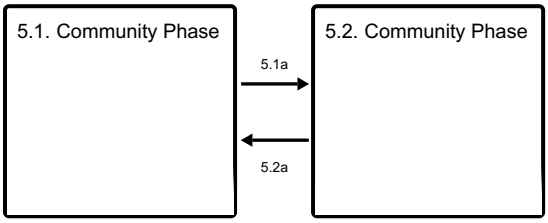
R2 - Seeding with native species

R3 - Rangeland seeding

State 1 submodel, plant communities



State 5 submodel, plant communities



State 1
Reference State

The Reference State is a representative of the natural range of variability under pristine 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 dominated by basin big sagebrush and bluebunch wheatgrass.

Dominant plant species

- big sagebrush (*Artemisia tridentata*), shrub
- antelope bitterbrush (*Purshia tridentata*), shrub
- bluebunch wheatgrass (*Pseudoroegneria spicata*), grass
- Sandberg bluegrass (*Poa secunda*), grass
- Thurber's needlegrass (*Achnatherum thurberianum*), grass
- squirreltail (*Elymus elymoides*), grass
- arrowleaf balsamroot (*Balsamorhiza sagittata*), grass
- tapertip hawksbeard (*Crepis acuminata*), grass

Community 1.1
Community Phase

This community phase is characteristic of a mid-seral plant community and is dominated by basin big sagebrush and bluebunch wheatgrass. Thurber's needlegrass, bottlebrush squirreltail, and antelope bitterbrush are also common on this site. Composition by weight is approximately 60-70 percent grass, 5-10 percent forbs and 20-30 percent shrubs.

Community 1.2
Community Phase

This community phase is characterized by a post-disturbance, early seral, plant community. Sagebrush and other

shrubs are reduced, or patchy. Perennial bunchgrasses and forbs dominate the visual aspect of the plant community. Disturbance tolerant shrubs such as rabbitbrush and antelope bitterbrush will sprout from the root-crown following low and medium intensity wildfire and may begin to dominate the plant community 2 to 5 years post-disturbance.

Resilience management. Basin big sagebrush does not sprout after fire. Because of the time needed to produce seed, it is eliminated by frequent fires (Bunting et al. 1987). Basin big sagebrush establishes on a site primarily by off-site seed or seed from plants that survive in unburned patches. 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 along with seasonality and intensity of the fire all factor into the individual species response. For most forbs and grasses the growing points are located at or below the soil surface providing relative protection from disturbances which decrease above ground biomass, such as grazing or fire. Thus, fire mortality is more correlated to duration and intensity of heat which is related to culm density, culm-leaf morphology, size of plant and abundance of old growth (Wright 1971, Young 1983).

Community 1.3
Community Phase

Natural regeneration and absence of disturbance over time allows sagebrush to mature and dominate the plant community. Perennial bunchgrasses and forbs are reduced in both vigor and productivity due to competition for light, moisture and nutrient resources.

Pathway 1.1a
Community 1.1 to 1.2

Low severity fire creates sagebrush/grass mosaic; higher intensity fires significantly reduce sagebrush cover and lead to early seral community dominated by grasses and forbs. Frequency and intensity of wildfire is primarily driven by cover and amount of herbaceous vegetation. Under pre-Eurosettlement conditions fire return interval is estimated to be between 20 and 50 years.

Pathway 1.1b
Community 1.1 to 1.3

Time, absence of disturbance and natural regeneration over time allows sagebrush to dominate site resources. This community phase pathway may be coupled with drought and/or herbivory further reducing herbaceous understory.

Pathway 1.2a
Community 1.2 to 1.1

Time, absence of disturbance and natural regeneration over time allows sagebrush to recover. Recovery of sagebrush depends on the availability of a local seed source (patches of mature shrubs) as well as precipitation patterns favorable for germination and seedling recruitment. Sagebrush seedlings are susceptible to less than favorable conditions for several years. Completion of this community phase pathways may take decades.

Context dependence. 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). Therefore, regeneration of basin big sagebrush after stand replacing fires is difficult and dependent upon proximity of residual mature plants and favorable moisture conditions (Johnson and Payne 1968, Humphrey 1984).

Pathway 1.3a
Community 1.3 to 1.1

Low intensity, patchy wildfire or insect infestation would reduce sagebrush overstory creating a mosaic on the landscape. Perennial bunchgrasses and forbs dominate disturbed patches due to an increase in light, moisture and nutrient resources.

Pathway 1.3b
Community 1.3 to 1.2

Wide spread wildfire removes sagebrush and allows perennial bunchgrasses and forbs to dominate.

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. 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 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.

Resilience management. Best management will maintain high diversity of desired species to promote organic matter inputs and prevent the dispersal and seed production of the non-native invasive species.

Dominant plant species

- big sagebrush (*Artemisia tridentata*), shrub
- antelope bitterbrush (*Purshia tridentata*), shrub
- cheatgrass (*Bromus tectorum*), grass
- medusahead (*Taeniatherum*), grass
- bulbous bluegrass (*Poa bulbosa*), grass
- thistle (*Cirsium*), grass
- knapweed (*Centaurea*), grass

State 3
Sagebrush-bluegrass state

This state is characterized by the dominance of shallow rooted perennial bunchgrass, which have replaced the deep-rooted perennial bunch grass typical of the site. Big sagebrush and rabbitbrush dominate the overstory. Bluegrass species dominate understory with non-native species present.

Characteristics and indicators. Sandberg bluegrass has been found to increase following fire likely due to its low stature and productivity (Daubenmire 1975). Sandberg bluegrass may retard reestablishment of deeper rooted bunchgrass. Reduced bunchgrass vigor or density provides an opportunity for Sandberg bluegrass expansion and/or cheatgrass and other invasive species to occupy interspaces.

Dominant plant species

- cheatgrass (*Bromus tectorum*), grass
- medusahead (*Taeniatherum*), grass
- bulbous bluegrass (*Poa bulbosa*), grass
- thistle (*Cirsium*), grass
- knapweed (*Centaurea*), grass

State 4
Annual State

Annual non-natives dominated site productivity and site resources. The dominance of non-native annuals control the spatial and temporal distribution of soil moisture, soil nutrients and energy resources. Remaining patches of sagebrush and/or perennial bunchgrass suffer from increased competition and narrowed fire return intervals.

Characteristics and indicators. This state experiences frequent fire due to increased cover and continuity of fine fuels. Fire is frequent enough to prevent the recovery of long-lived native perennials like big sagebrush. Disturbance tolerant shrubs may be present or increasing depending on time since disturbance. As cheatgrass

increases, fire frequencies also increase. As cheatgrass increases, fire frequencies also increase to frequencies between 0.23 and 0.43 times a year; then even sprouting shrubs such as rabbitbrush will not survive (Whisenant 1990).

Dominant plant species

- big sagebrush (*Artemisia tridentata*), shrub

State 5
Seeded State

This state is characterized by the dominance of non-native perennial wheatgrass species, like crested wheatgrass (*Agropyron cristatum*) or desert wheatgrass (*Agropyron desertorum*). Non-native perennial wheatgrass are frequently seeded following disturbance for erosion control and forage. These seed species are long-lived and persistent in the plant community and are able compete with native perennial bunchgrass spatial and limited soil moisture resource. Native species, grass and forbs, may still be present in small amounts.

Community 5.1
Community Phase

This community phase is characteristic of a successful restoration attempt. Crested wheatgrass, forage kochia, or other non-native seeded species dominate. Big sagebrush may be present. Annual non-natives present.

Community 5.2
Community Phase

This community phase is characterized by the recovery of big sagebrush. Crested wheatgrass is persistent and dominates understory. Annual non-native species are present but do not dominate.

Pathway 5.1a
Community 5.1 to 5.2

Time, absence of disturbance and natural regeneration over time allows sagebrush to increase.

Pathway 5.2a
Community 5.2 to 5.1

Insect infestation, wildfire, brush management or other shrub removing disturbance that does not disturb the soil surface. Soil disturbing practices have the potential to significantly increase annual non-natives.

Transition T1
State 1 to 2

Trigger: Introduction of annual non-native species Slow variable: Over time the annual non-native plants increase within the community. Threshold: Any amount of introduced non-native species causes an immediate decrease in the resilience of the site. Annual 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: inappropriate grazing management, prolonged drought or a combination. Slow variable: Reduction of deep-rooted perennial bunchgrass and increased cover of shallow-rooted perennial grasses and shrubs. Threshold: Changes in the spatial and temporal patterns of infiltration and runoff effects soil moisture. Shallow-rooted perennial grasses are highly competitive for moisture and nutrient resources in the surface soil horizon.

Context dependence. Loss of deep-rooted perennial bunchgrasses

Transition T3
State 2 to 4

Trigger: Repeated, widespread and severe fire. Slow variables: Increased production and cover of non-native annual species over time. Threshold: Loss of native perennial bunchgrasses and shrubs truncates, spatially and temporally, nutrient capture and cycling within the community.

Restoration pathway R1
State 3 to 2

Seeding with native species followed by prescribed grazing Minimize soil disturbance and maximize non-native annual plant biomass removal during early spring. Combine prescribed grazing with seeding of native species. Continue to protect site from wildfire. Probability of success is extremely low.

Transition T4
State 3 to 4

Trigger: Repeated, widespread and severe fire. Slow variables: Increased production and cover of non-native annual species over time. Threshold: Loss of native perennial bunchgrasses and shrubs truncates, spatially and temporally, nutrient capture and cycling within the community.

Restoration pathway R4
State 3 to 5

Seeding with drought tolerant, non-native, species. May be combined with brush management or herbicide application.

Restoration pathway R2
State 4 to 2

Seeding with native species followed by prescribed grazing Minimize soil disturbance and maximize non-native annual plant biomass removal during early spring. Combine prescribed grazing with seeding of native species. Continue to protect site from wildfire. Probability of success is extremely low.

Restoration pathway R3
State 4 to 5

Seeding with drought tolerant, non-native, species. May be combined with brush management or herbicide application.

Additional community tables

Animal community

The site is valuable as habitat for mule deer, antelope and feral horses. Upland game birds such as chukars, sagegrouse and Hungarian partridge are also present.
Grazing Interpretations.

Livestock grazing should occur in spring and fall. Natural water supplies are limited. Initial stocking rate should be determined with the landowner or decision-maker by utilizing forage analysis yearly in their specific allotment.

Hydrological functions

The soils in this site are in hydrologic groups B and C and have moderately low runoff potential.

Recreational uses

Hunting, horseback riding, recreational vehicle usage and hiking are all occur on this site.

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

Baker, W.L. 2006. Fire and Restoration of Sagebrush Ecosystems. Wildlife Society Bulletin 34:177–185.

Haubensak K. and D'Antonio C. 2009. Effects of fire and environmental variable on plant structure and composition in grazed salt desert shrublands of the Great Basin (USA). Journal of Arid Environment. Elsevier. 643–650.

Pilliod, D.S. and J.L. Welty. 2017. Refining the cheatgrass–fire cycle in the Great Basin: Precipitation timing and fine fuel composition predict wildfire trends. Ecology and Evolution. Wiley.

Welch, B.L. and D.L. Nelson. 1995. Black stem rust reduces big sagebrush seed production. Journal of Range Management 48:398–401.

Williams, C.J. and F.B. Pierson. 2018. Effectiveness of prescribed fire to re-establish sagebrush steppe vegetation and ecohydrologic function on woodland-encroached sagebrush rangelands, Great Basin, USA: Part I: Vegetation, hydrology, and erosion responses.

Williamson, M.A. and E. Fleishman. 2019. Fire, livestock grazing, topography, and precipitation affect occurrence and prevalence of cheatgrass (Bromus tectorum) in the central Great Basin, USA.

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

Contributors

Dave Franzen And Jacy Gibbs
Trevor Crandall/ Erin 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/NRCS 9173 W. Barnes Drive, Suite C Boise, ID 83709 208-378-5722
Date	06/12/2007
Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rills rarely occur on this site. If rills are present, they are most likely to occur on steeper slopes >15% and immediately following wildfire. Rills are most likely to occur on soils with surface textures of silt loam and clay loam.

---

2. **Presence of water flow patterns:** Water flow patterns rarely occur on this site except on slopes >15%. When they occur, they are short, disrupted by cool season perennial grasses and tall shrubs and are not extensive.

---

3. **Number and height of erosional pedestals or terracettes:** Pedestals and/or Terracettes are rare on this site but both can occur. In areas of >15% slopes where flow patterns and /or rills are present, few pedestals may be expected. Do not misinterpret frost heaving for pedestals.

---

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Data not available. On sites in mid-seral status, bare ground may range from 30-40 percent.

---

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

---

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

---

7. **Amount of litter movement (describe size and distance expected to travel):** Fine litter in the interspaces may move

up to 3 feet or further following a significant run-off event. Terracettes and rocks can trap fine 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 but needs to be tested.

---

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** The surface horizon is typically 3 to 6 inches thick. Structure typically includes moderate thin and medium platy, weak or moderate fine and medium granular, and moderate fine subangular blocky. Soil organic matter (SOM) is 1 to 3 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. Terracettes provide a favorable micro-site for vegetation establishment which further increases infiltration.

---

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

---

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

    Dominant: Cool season deep-rooted perennial bunchgrasses

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

    Other:

    Additional:

---

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

---

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 can accumulate on the terracettes and behind surface stones.

---

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 45-55

percent of the total, forbs 10-15 percent and shrubs 25-35 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:** Invasive Plants are cheatgrass, medusahead rye, bulbous bluegrass, rush skeletonweed, scotch thistle, spotted and diffuse knapweed.

---

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