USDA Natural Resources Conservation Service

Ecological site R025XY052NV
CEANOTHUS THICKET

Last updated: 4/25/2024
Accessed: 05/15/2024

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

MLRA Notes 25—Owyhee High Plateau
This area is in Nevada (56 percent), Idaho (30 percent), Oregon (12 percent), and Utah (2 percent). It makes up about 27,443 square miles. MLRA 25 is characteristically cooler and wetter than the neighboring MLRAs of the Great Basin. The western boundary is marked by a gradual transition to the lower and warmer basins of MLRA 24. The boundary to the south-southeast, with MLRA 28B, is marked by gradual changes in geology marked by an increased dominance of singleleaf pinyon and Utah juniper and a reduced presence of Idaho fescue. The boundary to the north, with MLRA 11, is a rapid transition from the lava plateau topography to the lower elevation Snake River Plain.
Physiography:
All of this area lies within the Intermontane Plateaus. The southern half is in the Great Basin section of the Basin and Range province. This part of the MLRA is characterized by isolated, uplifted fault-block mountain ranges separated by narrow, aggraded desert plains. This geologically older terrain has been dissected by numerous streams draining to the Humboldt River.
The northern half of the area lies within the Columbia Plateaus province. This part of the MLRA forms the southern boundary of the extensive Columbia Plateau basalt flows. Most of the northern half is in the Payette section, but the northeast corner is in the Snake River Plain section. Deep, narrow canyons draining into the Snake River have been incised into this broad basalt plain. Elevation ranges from 3,000 to 7,550 feet on rolling plateaus and in gently sloping basins. It is more than 9,840 feet on some steep mountains. The Humboldt River crosses the southern half of this area
Geology:
The dominant rock types in this MLRA are volcanic. They include andesite, basalt, tuff, and rhyolite. In the north and west parts of the area, Cretaceous granitic rocks are exposed among Miocene volcanic rocks in mountains. A Mesozoic igneous and metamorphic rock complex dominates the south and east parts of the area. Upper and Lower Paleozoic calcareous sediments, including oceanic deposits, are exposed with limited extent in the mountains. Alluvial fan and basin fill sediments occur in the valleys.
Climate:
The average annual precipitation in most of this area is typically 11 to 22 inches. It increases to as much as 49 inches at the higher elevations. Rainfall occurs in spring and sporadically in summer. Precipitation occurs mainly as snow in winter. The precipitation is distributed fairly evenly throughout fall, winter, and spring. The amount of precipitation is lowest from midsummer to early autumn. The average annual temperature is 33 to 51 degrees F. The freeze-free period averages 130 days and ranges from 65 to 190 days, decreasing in length with elevation. It is typically less than 70 days in the mountains.
Water:
The supply of water from precipitation and streamflow is small and unreliable, except along the Owyhee, Bruneau, and Humboldt Rivers. Streamflow depends largely on accumulated snow in the mountains. Surface water from mountain runoff is generally of excellent quality and suitable for all uses. The basin fill sediments in the narrow alluvial valleys between the mountain ranges provide some ground water for irrigation. The alluvial deposits along the large streams have the most ground water. Based on measurements of water quality in similar deposits in

adjacent areas, the basin fill deposits probably contain moderately hard water. The water is suitable for almost all uses. The carbonate rocks in this area are considered aquifers, but they are little used. Springs are common along the edges of the limestone outcrops.
Soils:
The dominant soil orders in this MLRA are Aridisols and Mollisols. The soils in the area dominantly have a mesic or frigid temperature regime and an aridic, aridic bordering on xeric, or xeric moisture regime. Soils with aquic moisture regimes are limited to drainage or spring areas, where moisture originates or runs on and through. These soils are of a very limited extent throughout the MLRA. They generally are well drained, clayey or loamy, and shallow or moderately deep. Most of the soils formed in mixed parent material. Volcanic ash and loess mantle the landscape. Surface soil textures are loam and silt loam with ashy texture modifiers in some areas. Argillic horizons occur on the more stable landforms. They are exposed nearer the soil surface on convex landforms, where ash and loess deposits are more likely to erode. Soils that formed in carbonatic parent material in areas that receive less than 12 inches of precipitation are characterized by calcic horizons throughout the profile, while soils in areas that receive more than 12 inches of precipitation do not have calcic horizons in the upper part of the profile. Soils that formed on stable landforms at the lower elevations are dominated by ochric horizons. Soils that formed at the middle and upper elevations are characterized by mollic epipedons. Soils in drainage areas at all elevations that receive moisture running on or through them are characterized by thicker mollic epipedons.
Biological Resources:
This MLRA supports shrub-grass vegetation. Lower elevations are characterized by Wyoming big sagebrush associated with bluebunch wheatgrass, western wheatgrass, and Thurber’s needlegrass. Other important plants include bluegrass, squirreltail, penstemon, phlox, milkvetch, lupine, Indian paintbrush, aster, and rabbitbrush. Black sagebrush occurs but is less extensive. Singleleaf pinyon and Utah juniper occur in limited areas. With increasing elevation and precipitation, vast areas characterized by mountain big sagebrush or low sagebrush/early sagebrush in association with Idaho fescue, bluebunch wheatgrass, needlegrasses, and bluegrass become common. Snowberry, curl-leaf mountain mahogany, ceanothus, and juniper also occur. Mountains at the highest elevations support whitebark pine, Douglas-fir, limber pine, Engelmann spruce, subalpine fir, aspen, and curl-leaf mountain mahogany.
Major wildlife species include mule deer, bighorn sheep, pronghorn, mountain lion, coyote, bobcat, badger, river otter, mink, weasel, golden eagle, red-tailed hawk, ferruginous hawk, Swainson’s hawk, northern harrier, prairie falcon, kestrel, great horned owl, short-eared owl, long-eared owl, burrowing owl, pheasant, sage grouse, chukar, gray partridge, and California quail. Reptiles and amphibians include western racer, gopher snake, western rattlesnake, side-blotched lizard, western toad, and spotted frog. Fish species include bull, red band, and rainbow trout.

Ecological site concept

This site occurs on smooth to concave mountain sideslopes of mostly southerly exposures. Slopes range from 2 to 50 percent, but slope gradients of 4 to 15 are most typical. Elevations range from 7,500 to 9,500 feet.

Average annual precipitation ranges from 16 to over 20 inches. Mean annual air temperature is 40 to 43 degrees F. The average growing season is about 50 to 70 days.

The soils associated with this site are moderately deep, well drained soils that formed in colluvium and/or residuum derived from quartzite or rhyolite. They typically occur on backslope positions. Mean annual soil temperature ranges from 40 to 52 degrees F.

The reference plant community is dominated by a dense stand of shrubs mostly one to three meters tall, dominated by snowbrush ceanothus. Mountain brome, slender wheatgrass, Idaho fescue and needlegrass are understory species commonly associated with this site.

Associated sites

R025XY004NV	**LOAMY SLOPE 16+ P.Z.**
R025XY017NV	**CLAYPAN 12-16 P.Z.**
R025XY024NV	**MOUNTAIN RIDGE**

Similar sites

R025XY004NV	**LOAMY SLOPE 16+ P.Z.**

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Ceanothus velutinus*
Herbaceous	Not specified

Physiographic features

This site occurs on smooth to concave mountain sideslopes of mostly southerly exposures. Slopes range from 15 to 75 percent. Elevations range from 7500 to 9000 feet.

Table 2. Representative physiographic features

Landforms	(1) Mountains > Mountain slope
Runoff class	High to very high
Flooding frequency	None
Ponding frequency	None
Elevation	7,500–9,000 ft
Slope	15–75%
Water table depth	60 in
Aspect	SE, S, SW

Climatic features

The climate associated with this site is semiarid, characterized by cold, moist winters and warm, dry summers. The average annual precipitation ranges from 14 or more inches. Mean annual air temperature is typically <45 degrees F.

Mean annual precipitation across the range in which this ES occurs is 18.58".

Monthly mean precipitation: January 1.65”; February 1.68”; March 1.98”; April 2.43”; May 2.41”; June 1.62”; July 0.61”; August 0.63”; September 0.84”; October 1.41”; November 1.51”; December 1.79”.

*The above data is averaged from the Jarbridge 4N and Lamoille PH WRCC climate stations.

Table 3. Representative climatic features

Frost-free period (average)	84 days
Freeze-free period (average)	114 days
Precipitation total (average)	19 in

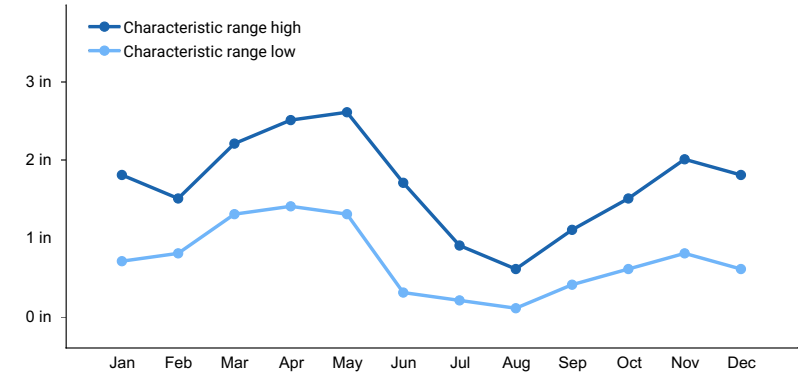

Figure 1. Monthly precipitation range

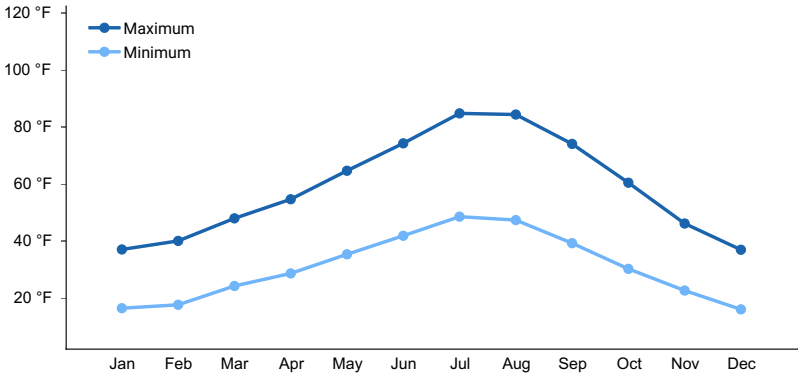

Figure 2. Monthly average minimum and maximum temperature

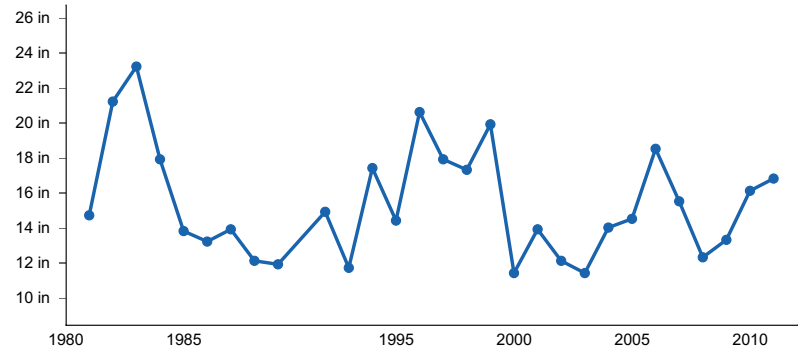

Figure 3. Annual precipitation pattern

Climate stations used

- (1) JARBIDGE 7 N [USC00264039], Jackpot, NV
- (2) LAMOILLE YOST [USC00264394], Spring Creek, NV

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soils associated with this site are moderately deep, well drained soils that formed in colluvium and/or residuum derived from quartzite or rhyolite. They typically occur on backslope positions. Mean annual soil temperature ranges from 40 to 52 degrees F.

Soil series correlated with this site include Littlemud, Dearbush, Zorromount, Littlemud and Juliet.

A representative soil series is Littlemud, classified as a loamy-skeletal, mixed, superactive Pachic Argicryoll. This

soil is moderately deep, well drained and was formed in colluvium and residuum derived from quartzite or rhyolite. Reaction is slightly acid. Diagnostic horizons include a mollic epipedon that occurs from the soil surface to 16 inches and an argillic horizon that occurs from 16 inches to 38 inches. Clay content in the particle-size control section is between 25 to 35 percent. Rock fragments range from 35 to 60 percent, mainly gravel. Lithology of fragments are quartzite or rhyolite.

Table 4. Representative soil features

Parent material	(1) Colluvium–quartzite (2) Residuum
Surface texture	(1) Gravelly loam (2) Very gravelly loam (3) Loam
Family particle size	(1) Loamy-skeletal
Drainage class	Well drained
Permeability class	Moderately slow to very rapid
Depth to restrictive layer	20–40 in
Soil depth	30–40 in
Surface fragment cover <=3"	15–25%
Surface fragment cover >3"	0–11%
Available water capacity (0-40in)	4–6 in
Calcium carbonate equivalent (0-40in)	0%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0–5
Soil reaction (1:1 water) (0-40in)	6–6.4
Subsurface fragment volume <=3" (Depth not specified)	20–60%
Subsurface fragment volume >3" (Depth not specified)	0–17%

Ecological dynamics

An ecological site is the product of all the environmental factors responsible for its development and it 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 2013). Biotic factors that that influence resilience include site productivity, species composition and structure, and population regulation and regeneration (Chambers et al. 2013).

Snowbrush ceanothus is a native evergreen shrub averaging 2 to 5 feet in height with wide ecological amplitudes (USDA 1937, Monsen et al. 2004). On this ecological site, ceanothus does not occur under a tree canopy, thus it is estimated it can live longer than 50 years (Conard et al 1985). It has a single large taproot and a deep spreading root system that extends to depths of 6 to 8 feet (2-2.5 meters) (Stanton 1974). Roots tend to extend laterally well past the crown of the plant (Conard et al 1985). Snowbrush ceanothus is capable of fixing substantial quantities of nitrogen (Youngberg and Wollum 1976, Russel and Evans 1966, Binkley at al. 1982). On this site, ceanothus forms large dense colonies by sprouting or layering. It will also reproduce by seed. The seed can be stored and viable for many years but fire is required to crack the hard seed and allow germination to occur (Gratkowski 1962).

Snow loading – a large accumulation of heavy snow – can cause mortality in snowbrush ceanothus and allow for the understory species to increase. Root collars split under heavy snow and may allow for rot to eventually kill the plant (Zavitkovski and Newton 1968).
In the absence of natural disturbances such as wildfire, snowbrush ceanothus forms an impenetrable thicket with loss of herbaceous vegetation in the understory. Cheatgrass is the species most likely to invade this site.

The Ceanothus Thicket ecological site has moderate to high resilience to disturbance and resistance to invasion. Resilience increases with elevation, aspect, higher precipitation, and higher nutrient availability. Cheatgrass is a likely invader but will not become dominant in this site. Two possible alternative stable states have been identified for this ecological site.

Fire Ecology:
The Ceanothus Thicket ecological site is often found embedded within a larger mountain big sagebrush (*Artemisia tridentata* var. vasayena) landscape. Therefore, this site's fire return interval is largely determined by that of its surrounding vegetation. Pre-settlement fire return intervals in mountain big sagebrush communities varied from 15 to 25 years (Burkhardt and Tisdale 1969, Houston 1973, Miller 2000). Fire frequency is the primary disturbance influencing plant species composition in this site. Snowbrush ceanothus (*Ceanothus velutinus*) is well adapted to fire and will increase following wildfire. Morris (1958 and 1970) observed great increases in snowbrush ceanothus after logging and slash burning in a Douglas fir community. As the snowbrush increases it forms an impenetrable thicket and the perennial understory decreases.

Snowbrush ceanothus is capable of regenerating from seed as well as sprouting from root crowns and rhizomes after fire (Young 1983). Snowbrush ceanothus seeds require heat scarification to germinate, allowing for seedling establishment after fire (USDA 1937, Young 1983, Smith and Fischer 1997). Heat from a fire affects the seed by permanently opening the hilar fissure, thus allowing moisture to enter the seed (Gratkowski 1982).

State and transition model

MLRA 25
Ceanothus Thicket
025XY052NV

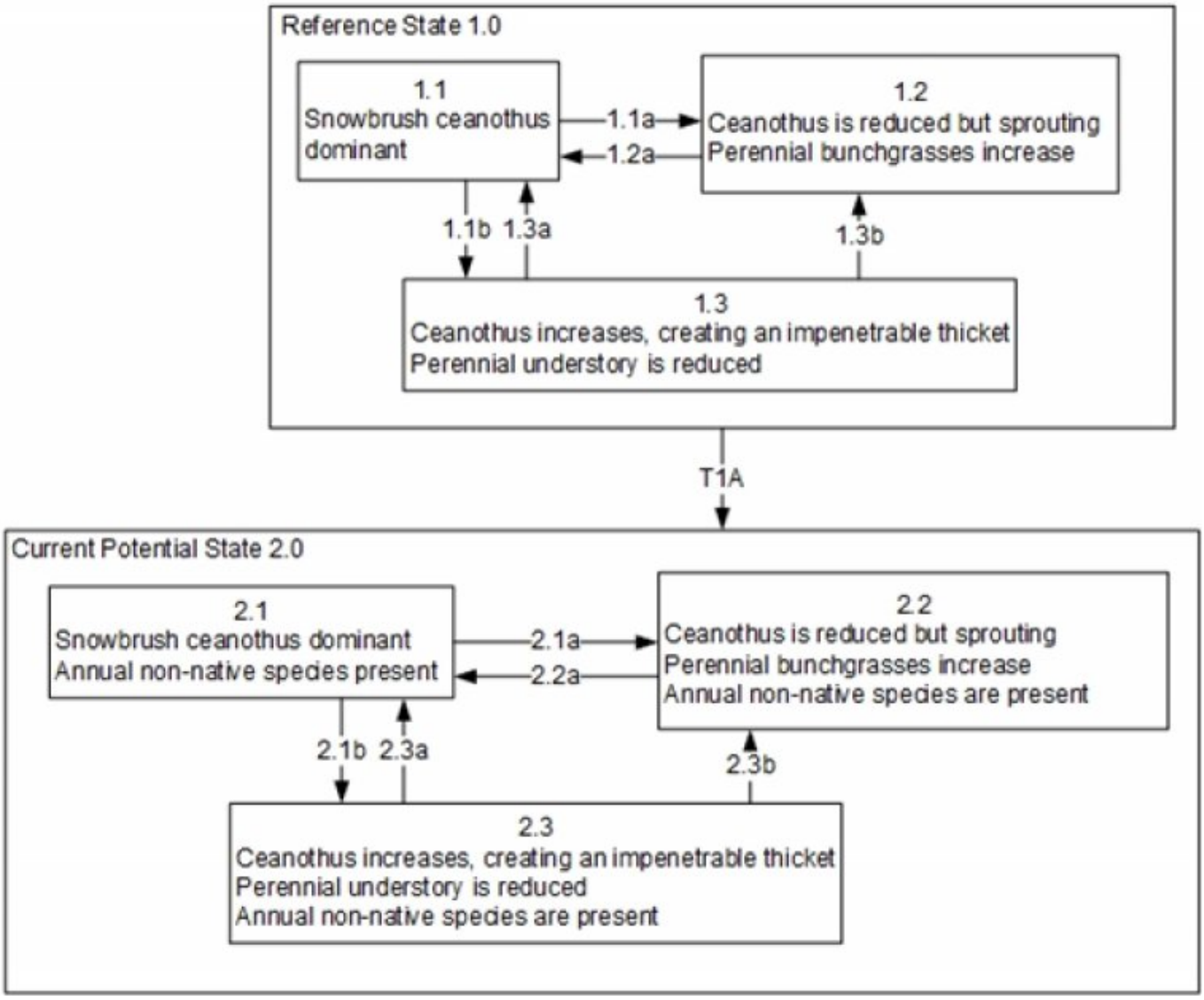

Figure 5. T. Stringham 3/2015

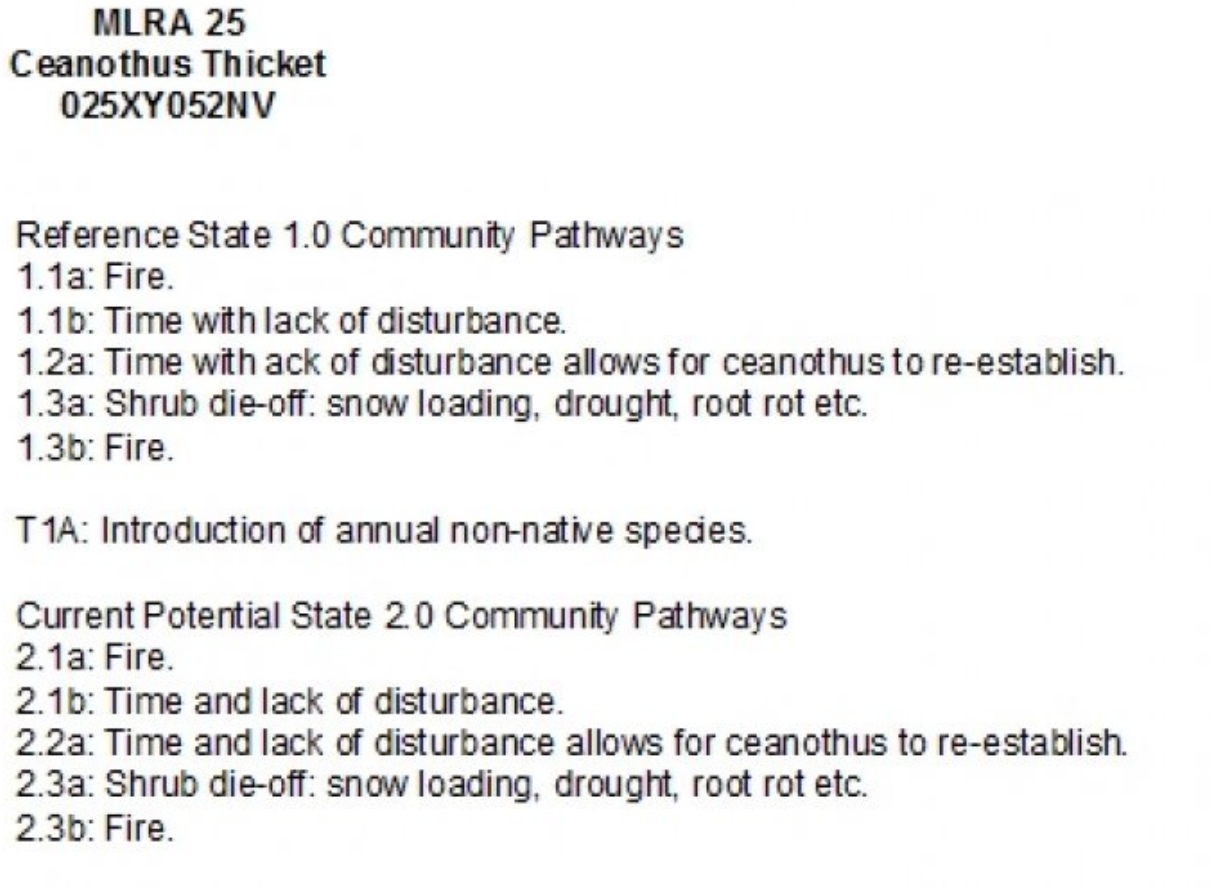

Figure 6. Legend

State 1
Reference State

The Reference State 1.0 is a representative of the natural range of variability under pristine conditions. The reference state has three general community phases; a snowbrush ceanothus-perennial grasses dominant phase, a sprouting ceanothus and perennial grass dominant phase and a ceanothus dominant phase. 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.

Community 1.1
Snowbush ceanothus

The reference plant community is dominated by a dense stand of shrubs mostly one to three meters tall, dominated by snowbrush ceanothus. Mountain brome, slender wheatgrass, Idaho fescue and needlegrass are understory species commonly associated with this site. Potential vegetative composition is approximately 10 percent grasses, 10 percent forbs and 80 percent shrubs. Approximate ground cover (basal and crown) is 30 to 60 percent.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	1360	1600	2240
Grass/Grasslike	170	200	280
Forb	170	200	280
Total	**1700**	**2000**	**2800**

Community 1.2
Perennial bunchgrasses/sprouting ceanothus

Ceanothus is reduced but sprouting, and perennial bunchgrasses have increased.

Community 1.3
Ceanothus thicket

Ceanothus increases and creates an impenetrable thicket. Perennial bunchgrasses in the understory are present but reduced due to the overstory competition.

Pathway 1.1a
Community 1.1 to 1.2

Fire would decrease the ceanothus and allow the understory forbs and grasses to increase.

Pathway 1.1b
Community 1.1 to 1.3

Time and lack of disturbance would allow for the ceanothus to recover and once again dominate the site.

Pathway 1.2a
Community 1.2 to 1.1

Time and lack of disturbance would allow for the ceanothus to recover and dominate the site.

Pathway 1.3a
Community 1.3 to 1.1

Drought, root rot, or snow loading could cause patches of shrub die-off and allow for perennial bunchgrasses to increase.

Pathway 1.3b
Community 1.3 to 1.2

Stand-replacing fire would reduce the ceanothus thicket and allow for the perennial understory to increase.

State 2
Current Potential State

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. This state has the same three general community phases. 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.

Community 2.1
Snowbrush ceanothus

Figure 8. Ceanothus Thicket (R025XY052NV) Phase 2.1. T. Stringham, August 2011

This community phase is similar to the Reference State Community 1.1, with the presences of non-native species in trace amounts. Snowbrush ceanothus dominates the site. Other shrubs make up a small component of the site. An assortment of perennial grasses and forbs make up the understory.

Community 2.2
Perennial bunchgrasses/sprouting ceanothus

Ceanothus is reduced but is sprouting while perennial bunchgrasses increase. Annual non-native species, likely cheatgrass, are stable to increasing.

Community 2.3
Ceanothus thicket

Ceanothus increases, creating an impenetrable thicket. Perennial bunchgrass understory is present but in trace amounts. Annual non-native species are present.

Pathway 2.1a
Community 2.1 to 2.2

Stand-replacing fire would decrease the ceanothus temporarily and allow the understory forbs and grasses to increase.

Pathway 2.1b
Community 2.1 to 2.3

Time without disturbance would allow for the ceanothus to increase and reduce the perennial understory.

Pathway 2.2a
Community 2.2 to 2.1

Time without disturbance would allow for the ceanothus to recover and dominate the site.

Pathway 2.3a
Community 2.3 to 2.1

Drought, root-rot, or snow loading would cause patches of shrub die-off and allow for the perennial understory to recover.

Pathway 2.3b
Community 2.3 to 2.2

Stand-replacing fire would reduce the ceanothus thicket and allow for the perennial understory to increase.

Transition T1A
State 1 to 2

Trigger: Introduction of annual non-native species. Slow variable: Over time, the annual non-native plants will 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.

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Perennial Grasses**			100–300	
	Letterman's needlegrass	ACLE9	*Achnatherum lettermanii*	10–60	–
	Columbia needlegrass	ACNE9	*Achnatherum nelsonii*	10–60	–
	western needlegrass	ACOC3	*Achnatherum occidentale*	10–60	–
	mountain brome	BRMA4	*Bromus marginatus*	10–60	–
	sedge	CAREX	*Carex*	10–60	–
	blue wildrye	ELGL	*Elymus glaucus*	10–60	–
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	10–60	–
	Idaho fescue	FEID	*Festuca idahoensis*	10–60	–
	basin wildrye	LECI4	*Leymus cinereus*	10–60	–
	melicgrass	MELIC	*Melica*	10–60	–
Forb					
2	**Perennial Forbs**			100–300	
	blue wildrye	ELGL	*Elymus glaucus*	10–60	–
	basin wildrye	LECI4	*Leymus cinereus*	10–60	–
	Indian paintbrush	CASTI2	*Castilleja*	10–40	–
	helianthella	HELIA	*Helianthella*	10–40	–
	carrotleaf biscuitroot	LODIM	*Lomatium dissectum var. multifidum*	10–40	–
	lupine	LUPIN	*Lupinus*	10–40	–
	bluebells	MERTE	*Mertensia*	10–40	–
	ragwort	SENEC	*Senecio*	10–40	–
Shrub/Vine					
3	**Primary Shrubs**			1400–1600	
	snowbrush ceanothus	CEVE	*Ceanothus velutinus*	1400–1600	–
	melicgrass	MELIC	*Melica*	10–60	–
4	**Secondary Shrubs**			40–160	
	sedge	CAREX	*Carex*	10–60	–
	Utah serviceberry	AMUT	*Amelanchier utahensis*	10–40	–
	yellow rabbitbrush	CHVIL4	*Chrysothamnus viscidiflorus ssp. lanceolatus*	10–40	–
	black chokecherry	PRVIM	*Prunus virginiana var. melanocarpa*	10–40	–
	snowberry	SYMPH	*Symphoricarpos*	10–40	–

Animal community

Livestock Interpretations:
Snowbrush ceanothus provides poor forage for domestic cattle, sheep and horses.

Mountain brome is ranked as excellent forage for both cattle and horses and good for domestic sheep, though domestic animals will graze mountain brome only when it is fairly succulent. A study by Mueggler (1967) found that with clipping, mountain brome increased in herbage production when clipped in June. When clipped in July, mountain brome increased due to reduced competition from forb species. The study also found that after three successive years of clipping, however, mountain brome started to exhibit adverse effects.

Slender wheatgrass is tolerant to grazing and is a highly palatable species (USDA 1937). In a study by Nimir and Payne (1978), slender wheatgrass showed a significant increase after a spring burn on the Gallatin National Forest in Montana. Slender wheatgrass was also found to be an increaser after burning in northwestern Wyoming (Wright and Bailey 1982).

Idaho fescue provides important forage for many types of domestic livestock (Wood 1995). The foliage cures well and is preferred by livestock in the late fall and winter. Idaho fescue tolerates light to moderate grazing (Ganskopp and Bedell 1980) and is moderately resistant to trampling (Cole 1987). Heavy grazing may lead to replacement of Idaho fescue with non-native species such as cheatgrass (Mueggler 1984).

Ceanothus is not a preferred browse species for domestic cattle or horses (USDA 1937, Stanton 1974).

Stocking rates vary over time depending upon season of use, climate variations, site, and previous and current management goals. A safe starting stocking rate is an estimated stocking rate that is fine-tuned by the client by adaptive management through the year and from year to year.

Wildlife Interpretations:
Idaho fescue is an important source of forage for pronghorn and deer in ranges of northern Nevada (Wood 1995).

Ceanothus is browsed year-round by deer and in winter by elk (USDA 1937, Stanton 1974). Small mammals and birds eat the seeds. It also provides cover for upland game birds and song birds. Small birds also use snowbrush for nesting sites.

Mountain brome seedheads and seeds provide food for many birds and small mammals. Pronghorn antelope will consume mountain brome primarily in the spring. The palatability of mountain brome is excellent for deer, particularly during the late spring and early summer.

Hydrological functions

Runoff is very high.

Other information

Snowbrush ceanothus is recommended for land reclamation, range restoration, and amenity plantings. Snowbrush ceanothus' ability to rapidly invade disturbed sites and it's extensive root systems are effective for erosion control. The nitrogen-fixing ability of snowbrush ceanothus may be useful in replenishing soil nutrients.

Inventory data references

Soils and Physiographic features were gathered from NASIS.

Type locality

Location 1: Elko County, NV	
Township/Range/Section	T39N R44E S8
General legal description	Approximately 15 miles west of Midas, Snowstorm Mountain Range, Elko County, Nevada. Also occurs in Humboldt County, Nevada.

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Approval

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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	
Date	05/15/2024
Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

2. **Presence of water flow patterns:**

3. **Number and height of erosional pedestals or terracettes:**

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

5. **Number of gullies and erosion associated with gullies:**

6. **Extent of wind scoured, blowouts and/or depositional areas:**

7. **Amount of litter movement (describe size and distance expected to travel):**

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

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

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:

    Sub-dominant:

    Other:

    Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

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14. **Average percent litter cover (%) and depth (in):**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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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:**

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17. **Perennial plant reproductive capability:**
