Ecological site R025XY048NV
CLAY BASIN

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General information

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

MLRA notes

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

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

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

Ecological site concept

This site occurs on broad lake plains at the fringe of floodplain playas. Slope gradients are 0 to 2 percent. Elevations are 5300 to 7177 feet.

The soils associated with this site are deep and very poorly to somewhat poorly drained. The soils have a seasonally high water table within 30 to 60 inches of the surface. Textures are dominantly clay or silty clay.

The reference plant community is dominated by mountain silver sagebrush and mat muhly. Mountain silver sagebrush dominates the aspect. Potential vegetative composition is about 35% grasses, 5% forbs and 60% shrubs. Approximate ground cover (basal and crown) is 15 to 25 percent.

Associated sites

R025XY019NV	**LOAMY 8-10 P.Z.**
R025XY049NV	**WET CLAY BASIN**

Similar sites

R025XY049NV	**WET CLAY BASIN** MURI dominant plant; more productive site

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia cana subsp. viscidula*
Herbaceous	(1) *Muhlenbergia richardsonis*

Physiographic features

This site occurs on broad lake plains at the fringe of floodplain playas. Slope gradients are 0 to 2 percent. Elevations are 5300 to 7177 feet.

Table 2. Representative physiographic features

Landforms	(1) Lake plain (2) Flood-plain playa
Runoff class	High to very high
Flooding duration	Long (7 to 30 days)
Flooding frequency	None to occasional
Ponding duration	Long (7 to 30 days)
Ponding frequency	None to frequent
Elevation	1,615–2,188 m
Slope	0–2%
Ponding depth	0–30 cm
Water table depth	0–61 cm
Aspect	W, NW, N, NE, E, 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 8 to 10 inches. Mean annual air temperature is about 45 to 50 degrees F.

Mean annual precipitation across the range in which this ES occurs is 9.85".

Monthly mean precipitation: January 1.00”; February 0.72”; March 0.87”; April 0.79”; May 1.32”; June 1.06”; July 0.47”; August 0.53”; September 0.59”; October 0.70”; November 0.84”; December 0.96”.

*The above data is averaged from the Elko AP and Contact WRCC climate stations.
Frost free days (>32): 89.5
Freeze free days (>28): 120.5

Table 3. Representative climatic features

Frost-free period (average)	74 days
Freeze-free period (average)	105 days
Precipitation total (average)	279 mm

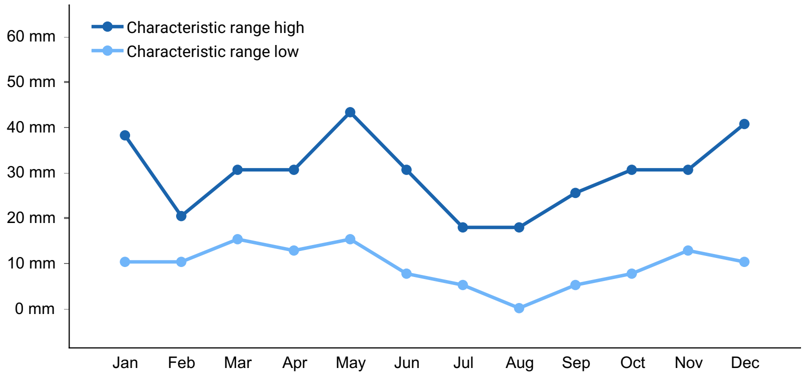

Figure 1. Monthly precipitation range

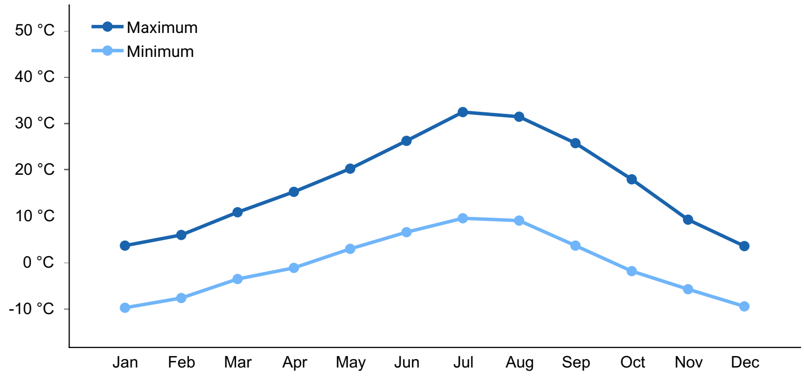

Figure 2. Monthly average minimum and maximum temperature

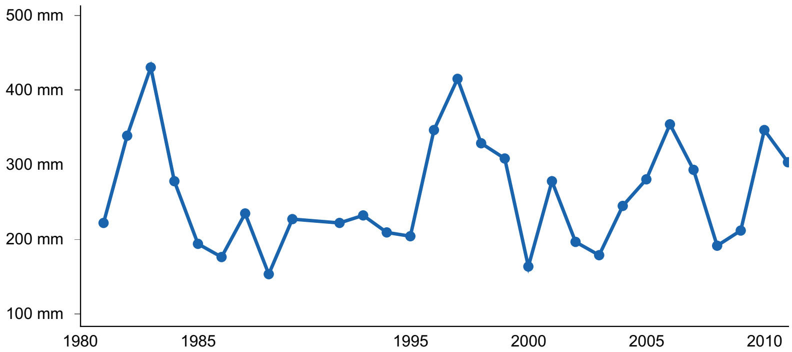

Figure 3. Annual precipitation pattern

Climate stations used

- (1) ELKO RGNL AP [USW00024121], Elko, NV
- (2) CONTACT [USC00261905], Jackpot, NV

Influencing water features

The soils are influenced by a seasonally high water table.

Soil features

The soils associated with this site are deep and very poorly to somewhat poorly drained. The soils have a seasonally high water table within 30 to 60 inches of the surface. Textures are dominantly clays, silt loams or silty clay loams.

The soil series associated with this site include Boulder Lake, McCleary, and Piline.

A representative soil series is McCleary, classified as a fine, smectitic, nonacid, mesic Vertic Epiaquept. These soils are very deep, very poorly drained and were formed in alluvium derived from mixed rocks with a thin loess mantle. Reaction is moderately alkaline. Diagnostic features include an ochric epipedon occurring form the soil surface to 7 inches and a cambic horizon from 4 to 22 inches. Rock fragments range from 0 to 15 percent, and clay content in the particle-size control section ranges from 40 to 50 percent.

Table 4. Representative soil features

Parent material	(1) Alluvium (2) Loess
Surface texture	(1) Silt loam (2) Silty clay
Family particle size	(1) Fine
Drainage class	Poorly drained
Permeability class	Very slow
Depth to restrictive layer	183 cm
Soil depth	183 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	14.99–16 cm
Calcium carbonate equivalent (0-101.6cm)	0%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–5
Soil reaction (1:1 water) (0-101.6cm)	6.1–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–13%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

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

The Clay Basin ecological site is dominated by mountain silver sagebrush, and is geographically limited to Humboldt, Elko, White Pine, Eureka, and Nye Counties in Nevada (Perryman 2014). Silver sagebrush is rhizomatous and is often found on deep, poorly drained, often flooded, alluvial soils high in clay with a seasonally high water table.
Silver sagebrush is an evergreen shrub that often forms colonies from a system of extensive rhizomes (Stubbendieck 1992). The root system of silver sagebrush consists of a taproot with lateral roots and rhizomes, usually located within a few inches of the soil surface. Silver sagebrush is the most vigorous sprouter of all sagebrush (Wright et al 1979), as it is able to sprout from roots, rhizomes, and the root crown after disturbance (Ellison and Woolfolk 1937, Whitson 1999, Blaisdell 1982). It has been known to readily layer, meaning it can generate adventitious roots from branches touching soil (Blaisdell 1982). This species is also capable of

reproducing by seeds (Whitson 1999).

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

Periodic drought regularly influences sagebrush ecosystems. Drought duration and severity has increased throughout the 20th century in much of the Intermountain West. Major shifts away from historical precipitation patterns have the greatest potential to alter ecosystem function and productivity. Species composition and productivity on this site can be altered by the timing of precipitation and water availability within the soil profile (Bates et al. 2006).

The Great Basin sagebrush communities have high spatial and temporal variability in precipitation, both among years and within growing seasons. The Clay Basin ecological site is subject to both periodic drought and flooding, therefore nutrient availability, although typically low, is not subject to the same linear increase with elevation and moisture availability as upland sagebrush sites. The invasibility of plant communities is often linked to resource availability. Disturbance can decrease resource uptake due to damage or mortality of the native species and depressed competition or can increase resource pools by the decomposition of dead plant material following disturbance. The invasion of sagebrush communities by cheatgrass (*Bromus tectorum*) and other annual weeds has been linked to disturbances (fire, abusive grazing) that have resulted in fluctuations in resources (Chambers et al. 2007).

The dominant grass is mat muhly, a warm-season, strongly rhizomatous perennial grass that usually grows in loose clumps or mats (Penskar 1999, Schultz 2002). Mat muhly reproduces by seed or rhizomes. It does well on disturbed sites, withstands heavy grazing and is considered an effective soil binder.

As ecological condition declines, Nevada bluegrass decreases in the understory as povertyweed and other annual forbs increase. Mountain silver sagebrush increases in density in the overstory shrub canopy. Annual mustards are plants likely to invade this site.

This ecological site has moderate resilience to disturbance and resistance to invasion. Significant year-to-year variation in ponding and depth to water table are primary drivers for above ground biomass production. Prolonged drought or prolonged flooding decreases resilience and increases the probability of annual or perennial weed invasion. Four possible alternative stable states have been identified for this ecological site.

Fire Ecology:
The Clay Basin ecological site is often found embedded within the larger Wyoming big sagebrush (*Artemisia tridentata* var. wyomingensis) or basin big sagebrush (*Artemisia tridentata* var. tridentata) landscape. Therefore, its susceptibility to fire is driven by the neighboring ecological sites fire return intervals and fuel accumulation within the Clay Basin site. Fire is the principal means of renewal of decadent stands of Wyoming big sagebrush. Wyoming big sagebrush communities historically had low fuel loads and patchy fires that burned in a mosaic pattern were common at 10 to 70 year return intervals (West and Hassan 1985, Bunting et al. 1987). Davies et al. (2007) suggest fire return intervals in Wyoming big sagebrush communities were around 50 to 100 years.

Silver sagebrush steppes experience stand-replacement fires. Fire frequencies are uncertain: fire histories for silver sagebrush communities are sparse to altogether lacking. Since plant productivity and community structure vary across the species' wide geographical distribution, historic fire intervals were probably similarly varied.
Silver sagebrush has been found to be less sensitive to fire due to its ability to resprout. Silver sagebrush is capable of resprouting from roots and rhizomes when topgrowth is destroyed (Cronquist 1994, Blaisdell 1982, Whitson 1999). Silver sagebrush also reproduces by seed. Seedling establishment can occur in the years after fire if the growing season is favorably wet (Wambolt et al. 1989). White and Currie (1983) found both spring and fall burning resulted in complete topkill of silver sagebrush regardless of fire intensity; spring burning when soil moisture was high and before plants began rapid stem growth resulted in low mortality and vigorous sprouting, however. Fall burning resulted in mortality of 40 to >70% of the silver sagebrush plants, suggesting summer wildfires could cause substantial stand death. Post-fire recovery and resilience is primarily influenced by pre-fire site conditions, fire severity, and post-fire weather and land use that relates to vegetation recovery. Sites with low abundances of native

perennial grasses and forbs typically have reduced resiliency following disturbance and are less resistant to invasion or increases in cheatgrass or other weedy species (Miller et al 2013).

Mat muhly is resistant to damage from fire because the rhizome buds are insulated by soil (Benedict 1984). Two studies have observed that fire in the spring has stimulated flowering (Anderson and Bailey 1980, Pemble et al. 1981), however there is little other documentation of this plant's post-fire response. Creeping or beardless wildrye (*Leymus triticoides*), a minor component on this site, may increase after fire due to its aggressive creeping rhizomes (Monsen et al. 2004). Nevada bluegrass is generally not damaged by wildfire due to its short, tufted growth form and panicles that lack in density (Monsen et al. 2004). The lack of litter build up within the grass plant coupled with early dormancy typically preclude extensive damage to the buds, though early fires during dry years may be more damaging (Kearney et al. 1960). Cover of Nevada bluegrass may increase following wildfire (Blackburn et al. 1971). Similarly, Sandberg bluegrass, a minor component of this site, has been found to increase following fire likely due to its low stature and productivity (Daubenmire 1975). Overall, the grass components of this ecological site possess structural attributes suggesting high resiliency to fire.

Povertyweed, a native perennial, rhizomatous forb, will increase following fire due to its prolific seed production and resprouting ability. Povertyweed possesses characteristics of early seral species capable of rapidly increasing within disturbed sites (Whitson et al. 1999).

State and transition model

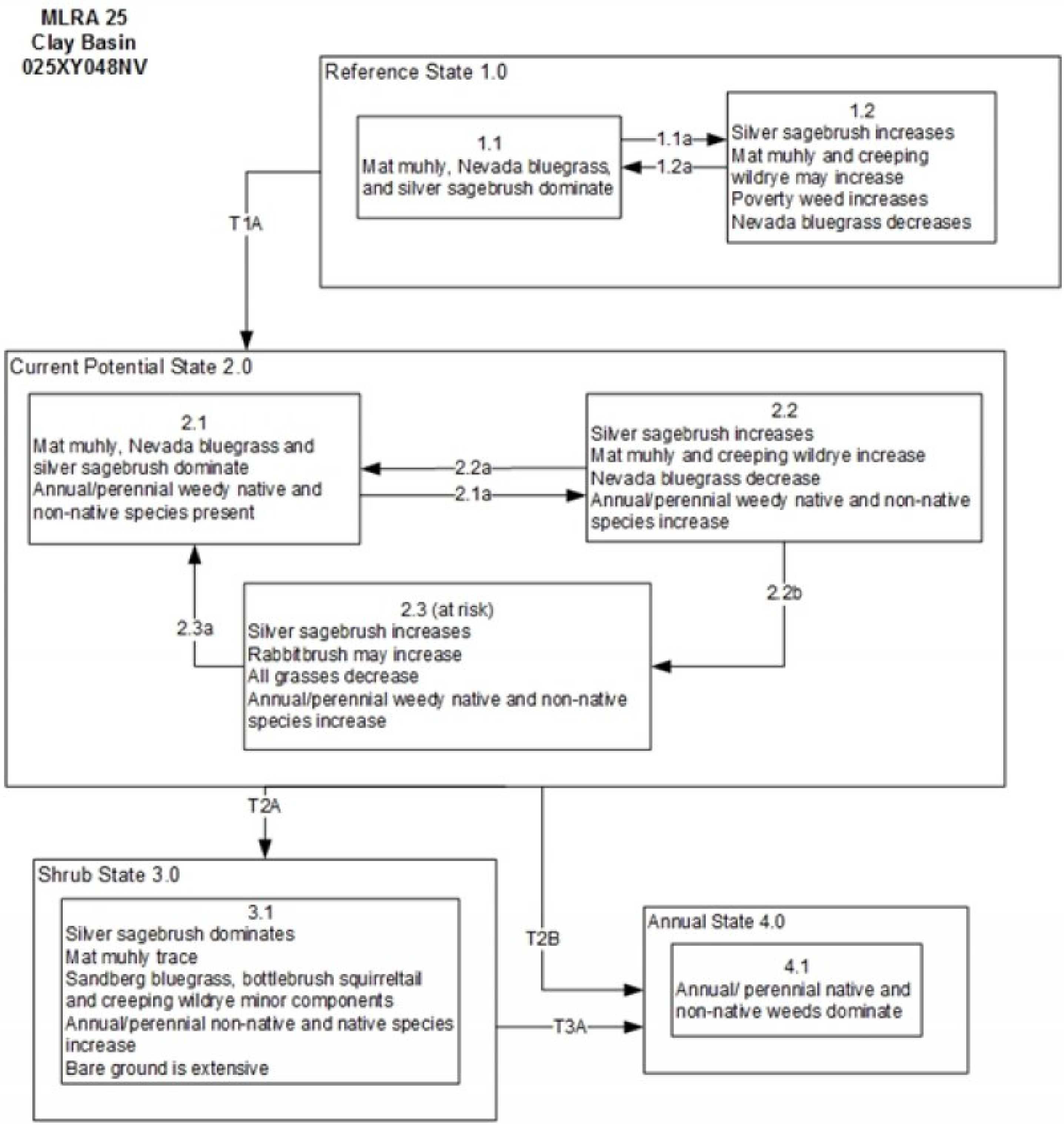

Figure 5. T. Stringham 5/2015

MLRA 25
Clay Basin
025XY048NV
Legend

Reference State 1.0 Community Pathways
1.1a: Drought and/or inappropriate herbivory will reduce Nevada bluegrass and increase rhizomatous grasses and silver sagebrush. Povertyweed may increase.
1.2a: Fire, release from long-term drought, or release from herbivory allows understory species to recover over time.

Transition T1A: Introduction of weedy species

Current Potential State 2.0 Community Pathways
2.1a: Drought and/or inappropriate grazing would reduce Nevada bluegrass and increase rhizomatous grasses and silver sagebrush.
2.2a: Fire, release from long-term drought, or release from grazing pressure allows understory species to recover over time.
2.2b: Continued chronic drought and/or inappropriate grazing facilitate an increase in silver sagebrush, rabbitbrush and weedy species while all grasses decline in production.
2.3a: Fire, release from long-term drought, or release from grazing pressure allows understory species to recover over time.

Transition T2A: Long-term chronic drought and/or inappropriate grazing management.
Transition T2B: Long-term chronic drought, inappropriate grazing management coupled with severe trampling, off-site or on-site water diversion, repeated fire, or combinations of these disturbances. Hydrology has permanently changed.

Shrub State 3.0 Community Pathways
None.

Transition T3A: Long-term chronic drought, inappropriate grazing management coupled with severe trampling, off-site or on-site water diversion, repeated fire, or combinations of these disturbances. Hydrology has permanently changed.

Annual State 4.0 Community Pathways
None.

Figure 6. Legend

State 1
Reference State

The Reference State 1.0 represents the natural range of variability under pristine conditions. The Reference State has 3 general community phases: a shrub-grass-dominant phase, a perennial grass-dominant phase and a shrub-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. Plant community phase changes are primarily driven by fire, periodic drought and/or insect or disease attack.

Community 1.1
Community Phase

The reference plant community is dominated by mountain silver sagebrush and mat muhly. Mountain silver sagebrush dominates the aspect. Potential vegetative composition is about 35% grasses, 5% forbs and 60% shrubs. Approximate ground cover (basal and crown) is 15 to 25 percent.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	101	168	235
Grass/Grasslike	58	98	137
Forb	9	15	20
Total	**168**	**281**	**392**

Community 1.2
Community Phase

Silver sagebrush increases, mat muhly and creeping wildrye may also increase. Povertyweed increases. Nevada bluegrass is reduced.

Pathway a
Community 1.2 to 1.1

Fire, release from long-term drought, or release from herbivory allows understory species to recover over time.

State 2
Current Potential State

This state is similar to the Reference State 1.0, but has an additional community phase. Ecological function has not changed in this state; 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.

Community 2.1
Community Phase

This community phase is similar to the Reference State Community Phase 1.1, but non-native species are present in trace amounts. This phase is characterized by its healthy understory grass community. Mat muhly, Nevada bluegrass, and mountain silver sagebrush dominate.

Community 2.2
Community Phase

Silver sagebrush, mat muhly, and creeping wildrye increase. Nevada bluegrass declines. Annual and perennial weedy species, such as cheatgrass and povertyweed, increase.

Community 2.3
Community Phase (at risk)

Silver sagebrush is dominant. Annual and perennial weedy species such as cheatgrass and povertyweed increase. Rabbitbrush may increase in this phase. All perennial grasses are reduced.

Pathway a
Community 2.1 to 2.2

Drought and/or inappropriate grazing would reduce Nevada bluegrass and increase rhizomatous grasses and silver sagebrush.

Pathway a
Community 2.2 to 2.1

Fire, release from long-term drought, or release from grazing pressure allows understory species to recover over time.

Pathway b
Community 2.2 to 2.3

Continued chronic drought and/or inappropriate grazing facilitate an increase in silver sagebrush, rabbitbrush and weedy species while all grasses decline in production.

Pathway a
Community 2.3 to 2.1

Fire, release from long-term drought, or release from grazing pressure allows understory species to recover over time.

State 3
Shrub State

This state has one community phase and is a product of many years of heavy grazing during time periods harmful to perennial bunchgrasses. Sites may also transition to a shrub state if the hydrology of the area is affected by lowering water tables. In both cases, mat muhly is significantly reduced and silver sagebrush becomes dominant. Rabbitbrush may be a significant component. Sandberg bluegrass, bottlebrush squirreltail, and creeping wildrye may be maintained as minor components. The shrub overstory and shallower rooted grasses dominate site resources such that soil water, nutrient capture, nutrient cycling and soil organic matter are temporally and spatially redistributed.

Community 3.1
Community Phase

Silver sagebrush dominates site resources. Rabbitbrush may be a significant component. Mat muhly may be present in trace amounts, and other grasses such as Sandberg bluegrass, bottlebrush squirreltail, and creeping wildrye may be maintained as minor components. Non-native annual and native species increase. Povertyweed may increase. Bare ground is extensive.

State 4
Annual State

This state has one community phase and is characterized by the dominance of weedy species such as povertyweed and cheatgrass. Russian thistle (*Salsola tragus*), whitetop (*Cardaria draba*), clasping pepperweed (Lepidium perfolatum) are non-native species that may be present in the annual state.

Community 4.1
Community Phase

Povertyweed and non-native invasive grasses and forbs dominate.

Transition A
State 1 to 2

Trigger: This transition is caused by the introduction of non-native annual plants, such as cheatgrass and mustards. Slow variables: Over time the annual non-native species 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.

Transition A
State 2 to 3

Trigger: Long-term chronic drought, and/or inappropriate grazing management. Slow variables: Long-term reduction in mat muhly and other grasses. Threshold: Loss of the perennial grass component changes nutrient cycling, nutrient redistribution, and reduces soil organic matter.

Transition B
State 2 to 4

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

Transition A
State 3 to 4

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

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Primary Perennial Grasses**			71–127	
	mat muhly	MURI	*Muhlenbergia richardsonis*	56–84	–
2	**Secondary Perennial Grasses**			6–22	
	squirreltail	ELELE	*Elymus elymoides ssp. elymoides*	1–6	–
	beardless wildrye	LETR5	*Leymus triticoides*	1–6	–
	Sandberg bluegrass	POSE	*Poa secunda*	1–6	–
Forb					
3	**Primary Forbs**			6–15	
	mat muhly	MURI	*Muhlenbergia richardsonis*	56–84	–
	povertyweed	IVAX	*Iva axillaris*	6–15	–
4	**Secondary Forbs**			6–15	
Shrub/Vine					
5	**Primary Shrubs**			140–183	
	silver sagebrush	ARCAV2	*Artemisia cana ssp. viscidula*	140–183	–
6	**Secondary Shrubs**			1–9	

Animal community

Livestock Interpretations:
This site is suited for livestock grazing. Considerations for grazing management include timing, intensity and duration of grazing.

In general, inappropriate grazing by domestic livestock or feral horses can cause Nevada bluegrass to decrease and mat muhly to initially increase. Continued deterioration leads to a decrease in mat muhly an increase in poverty weed and other annual and perennial weedy forbs along with silver sagebrush. Additional concerns with the Clay Basin ecological site are the potential for soil damage if grazing occurs during the time period when soils are saturated with water, generally in the spring.

Livestock use of silver sagebrush is variable depending upon availability of palatable herbs. Domestic sheep generally browse silver sagebrush more heavily than cattle. Livestock may make greater use of silver sagebrush when there is ample grass to go with it. Silver sagebrush can provide an important source of browse and is used by livestock and big game when other food sources are scarce (Kufeld et al. 1973, Wasser 1982, Cronquist 1994). In fall and winter feeding trials, silver sagebrush was among the most preferred sagebrush species for mule deer and sheep (Sheehy and Winward 1981). However, silver sagebrush is an aggressive colonizer and can occupy areas at high densities, due to its ability to resprout from the crown and to spread by rhizomes (Munson 2004). Therefore, silver sagebrush can increase significantly under inappropriate grazing management on this site.

Young mat muhly is readily eaten by livestock, though plants become less palatable as they mature. Mat muhly plants usually grow in scattered patches, so they are seldom sufficiently abundant to be of major importance to livestock. In the northern part of its range, mat muhly is rated as good to very good forage for cattle and horses and fairly good for domestic sheep. Mat muhly withstands heavy grazing due to of its sod-forming growth form (USDA 1988). It is a short-statured plant with stems typically 3 to 8 inches long and many basal and stem leaves between one-half and two or more inches long (USDA 1988).

Nevada bluegrass is very palatable and is preferred by both domestic livestock and wildlife during the spring and early summer, with reported crude protein levels of over 17% (Monson et al. 2004). The landscape position of the Clay Basin ecological site typically provides more soil moisture for extended plant growth than the surrounding sagebrush landscape, increasing the attractiveness of these areas for animals seeking forage. In today's botanical climate, Nevada bluegrass and Sandberg bluegrass are no longer differentiated taxonomically, however the grasses typically grow in different ecological niches; Nevada bluegrass prefers locations with greater soil moisture during the growing season. Nevada bluegrass exhibits the characteristic of early spring growth, however in locations with sufficient soil moisture the growing season may be extended allowing the plant to increase in stature. Depending on soil moisture availability along with intensity, frequency and season of use, Nevada bluegrass may decrease under grazing pressure. Conversely, Sandberg bluegrass has been found to increase under grazing pressure due to its early dormancy and short stature (Tisdale and Hironaka 1981).

Povertyweed is a weedy, native, perennial forb with early seral characteristics such as high seed production that allow it to spread rapidly in disturbed areas (Whitson et al. 1999). Reduction in the perennial grass component or increases in bare ground through excessive mechanical damage to the perennial grasses or soil during wet periods could facilitate an expansion of povertyweed.

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.

Recreational uses

Aesthetic value is derived from the diverse floral and faunal composition and the colorful flowering of wild flowers and shrubs during the spring and early summer. This site offers rewarding opportunities to photographers and for nature study. This site is used for camping and hiking and has potential for upland and big game hunting.

Other products

Tribes of the Great Basin used silver sagebrush branches as a fuelbed for roasting pinyon pinecones. Many tribes use the branches in ceremonial rites.

Other information

Silver sagebrush has potential as a soil stabilizer and for use in rangeland, wildlife and riparian restoration projects.

Inventory data references

Soils and Physiographic features were gathered from NASIS.

Type locality

Location 1: Elko County, NV	
Township/Range/Section	T44N R47E S26
General legal description	Approximately 18 miles west of Wilson Reservoir on the Owyhee Desert, Elko County, Nevada. Elko, Eureka, Humboldt and Lander Counties, Nevada.

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Contributors

RK/GKB

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	
Date	11/13/2024
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:

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

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

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

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:**

17. **Perennial plant reproductive capability:**