Ecological site R024XY042NV
STEEP GRAVELLY LOAM 14+ P.Z.

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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): 024X–Humboldt Basin and Range Area

Major land resource area (MLRA) 24, the Humboldt Area, covers an area of approximately 8,115,200 acres (12,680 sq. mi.). It is found in the Great Basin Section of the Basin and Range Province of the Intermontane Plateaus. Elevations range from 3,950 to 5,900 feet (1,205 to 1,800 meters) in most of the area, some mountain peaks are more than 8,850 feet (2,700 meters). A series of widely spaced north-south trending mountain ranges are separated by broad valleys filled with alluvium washed in from adjacent mountain ranges. Most valleys are drained by tributaries to the Humboldt River. However, playas occur in lower elevation valleys with closed drainage systems. Isolated ranges are dissected, uplifted fault-block mountains. Geology is comprised of Mesozoic and Paleozoic volcanic rock and marine and continental sediments. Occasional young andesite and basalt flows (6 to 17 million years old) occur at the margins of the mountains. Dominant soil orders include Aridisols, Entisols, Inceptisols and Mollisols. Soils of the area are generally characterized by a mesic soil temperature regime, an aridic soil moisture regime and mixed geology. They are generally well drained, loamy and very deep. Approximately 75 percent of MLRA 24 is federally owned, the remainder is primarily used for farming, ranching and mining. Irrigated land makes up about 3 percent of the area; the majority of irrigation water is from surface water sources, such as the Humboldt River and Rye Patch Reservoir. Annual precipitation ranges from 6 to 12 inches (15 to 30 cm) for most of the area, but can be as much as 40 inches (101 cm) in the mountain ranges. The majority of annual precipitation occurs as snow in the winter. Rainfall occurs as high-intensity, convective thunderstorms in the spring and fall.

Ecological site concept

This site is on a steep mountain side slopes on mostly northern aspects. Soils are moderately deep, well drained and formed in residuum. The soil profile is characterized by a mollic epipedon, a calcic horizon and greater than 35 percent rock fragments by volume. Important abiotic factors contributing to the presence of this ecological site include the north aspect, allowing for increased effective moisture, and lack of effervescence in the surface horizons.

Associated sites

R024XY032NV	**LOAMY SLOPE 14+ P.Z.** The soil profile is characterized by a mollic (pachic) epipedon and greater than 35 percent rock fragments by volume.
R024XY023NV	**NORTH SLOPE 14+ P.Z.** The soil profile is characterized by a pachic epipedon and greater than 35 percent rock fragments in the particle size control section. The north aspect and the thick mollic epipedon reflecting the increased vegetative production due to increased available soil moisture. Site dominated by Mountain big sagebrush (ARTRV)/ Idaho fescue (FEID); soils very deep, higher AWC.

R024XY016NV	**Mountain Ridge** This ecological site is on convex-convex landform positions, such as mountain ridges, summits and shoulders. Soils associated with this site are shallow, well drained, and formed in colluvium or residuum derived from igneous and/or sedimentary rocks. Important abiotic factors associated with this ecological site include low water holding capacity and reduced effective moisture due to high runoff, reduced snow accumulation, shallow depth and high amounts of rock fragments throughout the profile.
R024XY021NV	**Loamy Slope 12-14 P.Z.** Soils are moderately deep, well drained, and formed in residuum/colluvium derived from volcanic parent material. The soil profile is characterized by a dark surface horizon (mollic epipedon), a horizon of clay accumulation (argillic horizon) within 12 inches (30cm), and 18-35 percent clay in the particle size control section.

Similar sites

R024XY030NV	**SHALLOW CALCAREOUS LOAM 8-10 P.Z.** Thurber's neddlegrass (ACTH7)-Indian ricegrass (ACHY) codominant grasses; less productive site.
R024XY031NV	**SHALLOW CALCAREOUS LOAM 10-14 P.Z.** Bluebunch wheatgrass (PSSPS)-Thurber's nedleegrass (ACTH7) codominant grasses; less productive site.
R024XY016NV	**Mountain Ridge** Less productive site.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia nova*
Herbaceous	(1) *Festuca idahoensis*

Physiographic features

This site is on steep mountain side slopes of mostly northerly aspect. Slopes range from 30 to 75 percent, but slope gradients of 30 to 50 percent are typical. Elevation ranges from 5500 to about 8000 feet (1676 to about 2834m).

Table 2. Representative physiographic features

Landforms	(1) Mountain slope
Runoff class	Medium to high
Elevation	1,680 – 2,440 m

Slope	30 – 80 %
Water table depth	180 cm
Aspect	N

Climatic features

The climate associated with this site is semiarid and characterized by cool, moist winters and warm, dry summers. Average annual precipitation is 14 to over 18 inches (36 to over 46cm). Mean annual air temperature is 40 to 45 degrees F. The average growing season is about 50 to 90 days. No climate stations are available.

Table 3 Representative climatic features

Frost-free period (average)	90 days
Freeze-free period (average)	
Precipitation total (average)	460 mm

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 and formed in residuum. The soil profile is characterized by a mollic epipedon, a calcic horizon and 30 to over 75 percent gravel and cobbles by volume. Soils are slightly effervescent and have identifiable secondary carbonates below 8 inches (20cm).
Soil series associated with this site include: Linrose and Wereld.

Table 4. Representative soil features

Parent material	(1) Residuum
Surface texture	(1) Gravelly loam (2) Very cobbly loam (3) Very gravelly silt loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderate

Soil depth	50 – 150 cm
Surface fragment cover <=3"	20 – 40 %
Surface fragment cover >3"	0 – 20 %
Available water capacity (0-101.6cm)	6.86 – 12.45 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 20 %
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	0 – 10
Soil reaction (1:1 water) (0-101.6cm)	7.4 – 10
Subsurface fragment volume <=3" (Depth not specified)	20 – 40 %
Subsurface fragment volume >3" (Depth not specified)	0 – 20 %

Ecological dynamics

As ecological condition declines and where management results in abusive grazing use by cattle or feral horses, bluebunch wheatgrass and Idaho fescue decrease as Sandberg's bluegrass and bottlebrush squirreltail increase in the understory while black sagebrush and rabbitbrush increase and become the dominant overstory vegetation. Abusive grazing by sheep will reduce black sagebrush and greatly decrease Idaho fescue, Thurber's needlegrass and bluegrass composition in the plant community. Cheatgrass, Russian thistle, and halogeton are species most likely to invade this site.

Fire Ecology:
Black sagebrush communities generally lack enough fine fuels to carry a fire. In addition to low fine fuel loading, wide shrub spacing makes fire infrequent or difficult to prescribe in black sagebrush types. Black sagebrush is highly susceptible to fire-caused mortality; plants are readily killed by all fire intensities. Following burning, reestablishment occurs through off-site sources. Idaho fescue grows in a dense, fine-leaved tuft. Fires tend to burn within the accumulated fine leaves at the base of the plant and may produce temperatures sufficient to kill some of the root crown. Mature Idaho fescue plants are commonly reported to be severely damaged by fire in all seasons. Cusick’s bluegrass is unharmed to slightly harmed by light-severity fall fires. Cusick’s bluegrass regenerates after fire from seed and by tillering. Burning bluebunch wheatgrass may remove most of the aboveground biomass but does not usually result in plant mortality.

Bluebunch wheatgrass is generally favored by burning. Burning stimulates flowering and seed production. However, season of burning affects mortality.

State and transition model

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	**Primary Perennial Grasses**			421-762	
	Idaho fescue	FEID	*Festuca idahoensis*	359-538	–
	Cusick's bluegrass	POCU3	*Poa cusickii*	45-135	–
	bluebunch wheatgrass	PSSPS	*Pseudoroegneria spicata ssp. spicata*	18-90	–
2	**Secondary Perennial Grasses**			18-90	
	Thurber's needlegrass	ACTH7	*Achnatherum thurberianum*	4-27	–
	squirreltail	ELEL5	*Elymus elymoides*	4-27	–
	basin wildrye	LECI4	*Leymus cinereus*	4-27	–
	Sandberg bluegrass	POSE	*Poa secunda*	4-27	–
Forb					
3	**Perennial Forbs**			45-135	
	aster	ASTER	*Aster*	4-45	–
	milkvetch	ASTRA	*Astragalus*	4-45	–
	arrowleaf balsamroot	BASA3	*Balsamorhiza sagittata*	4-45	–
	tapertip hawksbeard	CRAC2	*Crepis acuminata*	4-45	–
	buckwheat	ERIOG	*Eriogonum*	4-45	–
	lupine	LUPIN	*Lupinus*	4-45	–
	phlox	PHLOX	*Phlox*	4-45	–
Shrub/Vine					
4	**Primary Shrubs**			224-314	
	black sagebrush	ARNO4	*Artemisia nova*	224-314	–
5	**Secondary Shrubs**			18-90	
	Utah serviceberry	AMUT	*Amelanchier utahensis*	9-27	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	9-27	–
	snowberry	SYMPH	*Symphoricarpos*	9-27	–

Table 6. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 7. Community 1.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 8. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 9. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 10. Community 2.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 11. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 12. Community 3.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 13. Community 4.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 14. Community 4.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Animal community

Livestock Interpretations: This site has limited value for livestock grazing, due to steep slopes. Grazing management should be keyed to dominant grasses or palatable shrubs production. Idaho fescue provides important forage for many types of domestic livestock. The foliage cures well and is preferred by livestock in late fall and winter. Cusick's bluegrass makes up only a small proportion of the biomass of the sagebrush communities in which it lives, but it is often taken preferentially by cattle, especially early in the season. Bluebunch wheatgrass is considered one of the most important forage grass species on western rangelands for livestock. Although bluebunch wheatgrass can be a crucial source of forage, it is not necessarily the most highly preferred species. In winter, at lower elevations, black sagebrush is heavily utilized by domestic sheep. 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 provides important forage for several wildlife species. It is reported to be good forage for pronghorn, and deer in ranges of northern Nevada. Deer, elk, and mountain goat also use Cusick's bluegrass early in the season. The value of Cusick's bluegrass as cover for small animals has been rated as poor to fair. Bluebunch wheatgrass is considered one of the most important forage grass species on western rangelands for wildlife. Bluebunch wheatgrass does not generally provide sufficient cover for ungulates, however, mule deer are frequently found in bluebunch-dominated grasslands. Black sagebrush is a significant browse species within the Intermountain region. It is especially important on low elevation winter ranges in the southern Great Basin, where extended snow free periods allow animal’s access to plants throughout most of the winter. In these areas it is heavily utilized by pronghorn and mule deer. Sagebrush-grassland communities provide critical sage-grouse breeding and nesting habitats. Sagebrush is a crucial component of their diet year-round, and sage-grouse select sagebrush almost exclusively for cover.

Hydrological functions

Runoff is medium to high. Permeability is moderate. Hydrologic soil groups are B and C. Rills are none. Rock fragments armor the surface. Water flow patterns are none to rare. Rock fragments armor the surface. Pedestals are none to rare. Occurrence is usually limited to areas of water flow patterns. Frost heaving of shallow rooted plants should not be considered an indicator of soil erosion. Gullies are none. Perennial herbaceous plants (especially deep-rooted bunchgrasses [i.e., Idaho fescue]) slow runoff and increase infiltration. Shrub canopy and associated litter break raindrop impact and provide opportunity for snow catch and accumulation on site.

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 hiking and has potential for upland and big game hunting.

Other information

Black sagebrush is an excellent species to establish on sites where management objectives include restoration or improvement of domestic sheep, pronghorn, or mule deer winter range.

Inventory data references

NASIS soil component data.

Type locality

Location 1: Humboldt County, NV	
Township/Range/Section	T32N R43E S2
UTM zone	N
UTM northing	4502894
UTM easting	491538
Latitude	40° 40′36″
Longitude	117° 6′0″
General legal description	NW¼SW¼ West slope off North Peak on Battle Mountain, Elder Creek area, Humboldt County, Nevada. This site also occurs in Elko, Eureka, Lander, and Pershing Counties, Nevada.

Other references

Fire Effects Information System (Online; http://www.fs.fed.us/database/feis/plants/).

USDA-NRCS Plants Database (Online; http://www.plants.usda.gov).

Contributors

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Approval

Kendra Moseley, 3/06/2025

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)	Patti Novak-Echenique
Contact for lead author	State Rangeland Management Specialist

Date	03/19/2010
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** **Rills are none. Rock fragments armor the surface.**

2. **Presence of water flow patterns:** **Water flow patterns are none to rare. Rock fragments armor the surface.**

3. **Number and height of erosional pedestals or terracettes:** **Pedestals are none to rare. Occurrence is usually limited to areas of water flow patterns. Frost heaving of shallow rooted plants should not be considered an indicator of soil erosion.**

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** **Bare Ground 10-20%.**

5. **Number of gullies and erosion associated with gullies:** **Gullies are none.**

6. **Extent of wind scoured, blowouts and/or depositional areas:** **None**

7. **Amount of litter movement (describe size and distance expected to travel):** **Fine litter (foliage from grasses and annual & perennial forbs) expected to move distance of slope length during intense summer convection storms or rapid snowmelt events. Persistent litter (large woody material) will remain in place except during catastrophic events.**

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** **Soil stability values should be 3 to 6 on most soil textures found on this site. (To be field tested.)**

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** **Surface structure is typically thin platy or granular. Soil surface colors are dark and soils have a mollic epipedon. Organic matter of the surface 2 to 4 inches is typically 1 to 3 percent dropping off quickly below. Organic matter content can be more or less depending on micro-topography.**

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Perennial herbaceous plants (especially deep-rooted bunchgrasses [i.e., Idaho fescue]) slow runoff and increase infiltration. Shrub canopy and associated litter break raindrop impact and provide opportunity for snow catch and accumulation on site.

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** Compacted layers are not typical. Subangular blocky, platy, or massive sub-surface horizons are not to be interpreted as compacted.

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

    Dominant: Reference Plant Community: Deep-rooted, cool season, perennial bunchgrasses

    Sub-dominant: Low shrubs (black sagebrush) > shallow-rooted, cool season, perennial bunchgrasses > associated shrubs > deep-rooted, cool season, perennial forbs = fibrous, shallow-rooted, cool season, perennial forbs = annual forbs

    Other:

    Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Dead branches within individual shrubs common and standing dead shrub canopy material may be as much as 20% of total woody canopy; some of the mature bunchgrasses (<10%) have dead centers.

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14. **Average percent litter cover (%) and depth (in):** Between plant interspaces (± 25%) and litter depth is ±¼ inch.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** For normal or average growing season (through mid-June) ± 800 lbs/ac; Spring moisture significantly affects total 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:** Increasers include Douglas' rabbitbrush. Invaders include halogeton and cheatgrass.

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17. **Perennial plant reproductive capability:** All functional groups should reproduce in average (or normal) and above average growing season years.
