

Ecological site R026XY057NV LOAMY BOTTOM 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): 026X—Carson Basin and Mountains

The area lies within western Nevada and eastern California, with about 69 percent being within Nevada, and 31 percent being within California. Almost all this area is in the Great Basin Section of the Basin and Range Province of the Intermontane Plateaus. Isolated north-south trending mountain ranges are separated by aggraded desert plains. The mountains are uplifted fault blocks with steep side slopes. Most of the valleys are drained by three major rivers flowing east across this MLRA. A narrow strip along the western border of the area is in the Sierra Nevada Section of the Cascade-Sierra Mountains Province of the Pacific Mountain System. The Sierra Nevada Mountains are primarily a large fault block that has been uplifted with a dominant tilt to the west. This structure leaves an impressive wall of mountains directly west of this area. This helps create a rain shadow affect to MLRA 26. Parts of this eastern face, but mostly just the foothills, mark the western boundary of this area. Elevations range from about 3,806 feet (1,160 meters) on the west shore of Pyramid Lake to 11,653 feet (3,552 meters) on the summit of Mount Patterson in the Sweetwater Mountains.

Valley areas are dominantly composed of Quaternary alluvial deposits with Quaternary playa or alluvial flat deposits often occupying the lowest valley bottoms in the internally drained valleys, and river deposited alluvium being dominant in externally drained valleys. Hills and mountains are dominantly Tertiary andesitic flows, breccias, ash flow tuffs, rhyolite tuffs or granodioritic rocks. Quaternary basalt flows are present in lesser amounts, and Jurassic and Triassic limestone and shale, and Precambrian limestone and dolomite are also present in very limited amounts. Also of limited extent are glacial till deposits along the east flank of the Sierra Nevada Mountains, the result of alpine glaciation.

The average annual precipitation in this area is 5 to 36 inches (125 to 915 millimeters), increasing with elevation. Most of the rainfall occurs as high-intensity, convective storms in spring and autumn. Precipitation is mostly snow in winter. Summers are dry. The average annual temperature is 37 to 54 degrees F (3 to 12 degrees C). The freeze-free period averages 115 days and ranges from 40 to 195 days, decreasing in length with elevation.

The dominant soil orders in this MLRA are Aridisols and Mollisols. The soils in the area dominantly have a mesic soil temperature regime, an aridic or xeric soil moisture regime, and mixed or smectitic mineralogy. They generally are well drained, are clayey or loamy and commonly skeletal, and are very shallow to moderately deep.

This area supports shrub-grass vegetation characterized by big sagebrush. Low sagebrush and Lahontan sagebrush occur on some soils. Antelope bitterbrush, squirreltail, desert needlegrass, Thurber needlegrass, and Indian ricegrass are important associated plants. Green ephedra, Sandberg bluegrass, Anderson peachbrush, and several forb species also are common. Juniper-pinyon woodland is typical on mountain slopes. Jeffrey pine, lodgepole pine, white fir, and manzanita grow on the highest mountain slopes. Shadscale is the typical plant in the drier parts of the area. Sedges, rushes, and moisture-loving grasses grow on the wettest parts of the wet flood plains and terraces. Basin wildrye, alkali sacaton, saltgrass, buffaloberry, black greasewood, and rubber rabbitbrush grow on the drier sites that have a high concentration of salts.

Some of the major wildlife species in this area are mule deer, coyote, beaver, muskrat, jackrabbit, cottontail, raptors, pheasant, chukar, blue grouse, mountain quail, and mourning dove. The species of fish in the area include trout and catfish. The Lahontan cutthroat trout in the Truckee River is a threatened and endangered species.

LRU notes

The Bodie Hills LRU straddles the California-Nevada state boundary, just north of Mono Lake. The area is underlain by late Miocene age volcanic fields with upper Miocene and Pliocene sedimentary deposits over top. The youngest faults in the area are north and north-east striking. Extensive zones of hydrothermally altered rocks and large mineral deposits, including gold and silver rich veins, formed during hydrothermally active periods of the Miocene (John et al. 2015). A primary distinguishing factor between the Bodie Hills and other hills in MLRA 26 is the dominance of volcanic parent material. Elevations range from 2170 to 2650 meters and slopes typically range from 5 to 35 percent. FFD range from 75-105.

Ecological site concept

The Loamy Bottom 14+ P.Z. site is found on stream terraces at slopes less than 8 percent. The dominant vegetation is mountain sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and basin wildrye (*Leymus cinereus*).

Associated sites

F026XY068NV	Poorly Drained Stream Terrace POTR5 WSG:2W1710
R026XY038NV	LOAMY SLOPE 14+ P.Z.
R026XY053NV	LOAMY 16+ P.Z.
R026XY054NV	WET MEADOW 14+ P.Z.
R026XY055NV	DRY MEADOW

Similar sites

R026XY030NV	LOAMY BOTTOM 8-12 P.Z. ARTRT dominant shrub; less diversity of mountain browse species; more productive site
R026XY055NV	DRY MEADOW PONE3 dominant grass

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Artemisia tridentata</i> ssp. <i>vaseyana</i>
Herbaceous	(1) <i>Leymus cinereus</i>

Physiographic features

The Loamy Bottom 14+ P.Z. site occurs on inset fans and perennial stream terraces of mountain valleys. Slopes range from 2 to 8 percent. Elevations are 6500 to 9000 feet.

Table 2. Representative physiographic features

Landforms	(1) Stream terrace
Flooding duration	Very brief (4 to 48 hours)
Flooding frequency	Rare
Ponding frequency	None
Elevation	1,981–2,743 m
Slope	2–8%

Water table depth	Not specified
Aspect	Aspect is not a significant factor

Climatic features

The climate is cool-semiarid with cool, moist winters and warm, dry summers. Mean annual precipitation is 12 to over 16 inches. Mean annual air temperatures are 42 to 44 degrees F. Average frost free season is 80 to 110 days.

Nevada's climate is predominantly arid, with large daily ranges of temperature, infrequent severe storms, heavy snowfall in the higher mountains, and great location variations with elevation. Three basic geographical factors largely influence Nevada's climate: continentality, latitude, and elevation. Continentality is the most important factor. The strong continental effect is expressed in the form of both dryness and large temperature variations. Nevada lies on the eastern, lee side of the Sierra Nevada Range, a massive mountain barrier that markedly influences the climate of the State. The prevailing winds are from the west, and as the warm moist air from the Pacific Ocean ascend the western slopes of the Sierra Range, the air cools, condensation occurs and most of the moisture falls as precipitation. As the air descends the eastern slope, it is warmed by compression, and very little precipitation occurs. The effects of this mountain barrier are felt not only in the West but throughout the state, with the result that the lowlands of Nevada are largely desert or steppes. The temperature regime is also affected by the blocking of the inland-moving maritime air. Nevada sheltered from maritime winds, has a continental climate with well-developed seasons and the terrain responds quickly to changes in solar heating.

Nevada lies within the mid-latitude belt of prevailing westerly winds which occur most of the year. These winds bring frequent changes in weather during the late fall, winter and spring months, when most of the precipitation occurs. To the south of the mid-latitude westerlies, lies a zone of high pressure in subtropical latitudes, with a center over the Pacific Ocean. In the summer, this high-pressure belt shifts northward over the latitudes of Nevada, blocking storms from the ocean. The resulting weather is mostly clear and dry during the summer and early fall, with scattered thundershowers. The eastern portion of the state receives significant summer thunderstorms generated from monsoonal moisture pushed up from the Gulf of California, known as the North American monsoon. The monsoon system peaks in August and by October the monsoon high over the Western U.S. begins to weaken and the precipitation retreats southward towards the tropics (NOAA 2004).

Table 3. Representative climatic features

Frost-free period (characteristic range)	
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	305-406 mm
Frost-free period (average)	95 days
Freeze-free period (average)	
Precipitation total (average)	356 mm

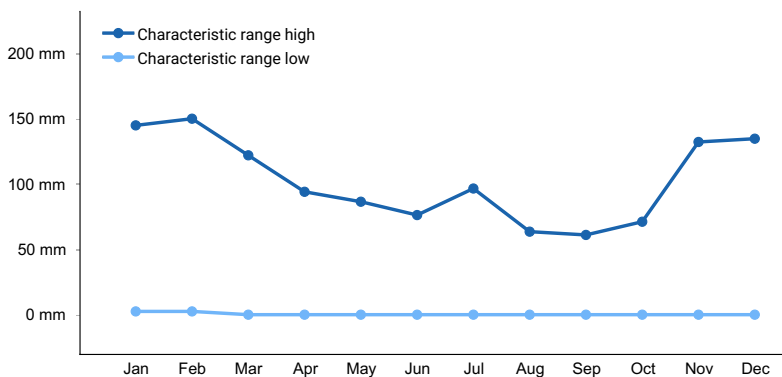


Figure 1. Monthly precipitation range

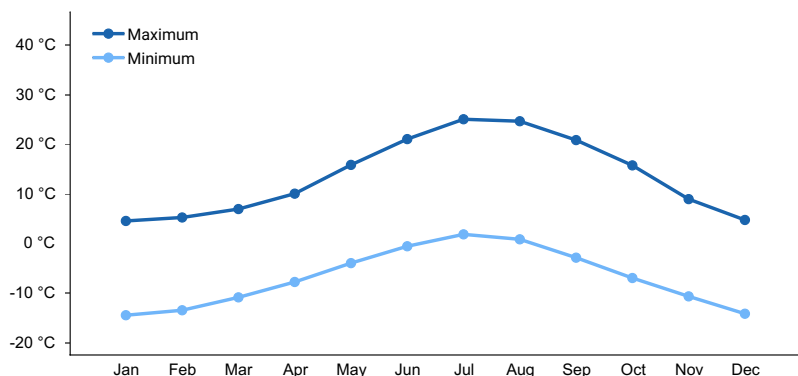


Figure 2. Monthly average minimum and maximum temperature

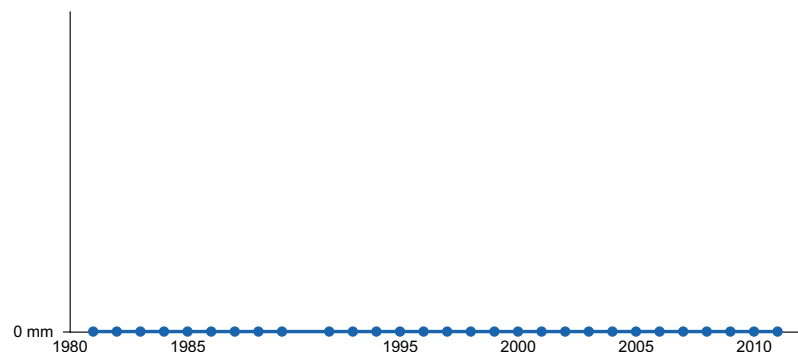


Figure 3. Annual precipitation pattern

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soils in this site are very deep and well drained. Surface soils are thick, fertile and moderately fine to medium textured. The available water capacity is low. Very few soils have a seasonally high water table at depths of 20 to 72 inches which allows for significant fluctuations in herbage production. In some areas, this site occurs where a meadow has deteriorated due to stream channel entrenchment and resultant lowering of the water table. These soils are susceptible to gulying which intercepts normal overflow patterns causing site degradation. The soil series associated with this site includes Welch and dominantly by an unnamed soil series, vitrandic haploxerolls.

Table 4. Representative soil features

Parent material	(1) Alluvium–volcanic rock
Surface texture	(1) Very cobbly sandy loam (2) Ashy, very cobbly sandy loam
Family particle size	(1) Ashy-skeletal
Drainage class	Well drained
Permeability class	Moderately rapid
Soil depth	183–213 cm
Surface fragment cover <=3"	17%
Surface fragment cover >3"	20%
Available water capacity (0-101.6cm)	4.32–6.35 cm
Calcium carbonate equivalent (0-101.6cm)	0%

Electrical conductivity (0-101.6cm)	0 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	5.6–7.3
Subsurface fragment volume <=3" (Depth not specified)	29%
Subsurface fragment volume >3" (Depth not specified)	22%

Ecological dynamics

Where management results in abusive livestock use, basin wildrye, slender wheatgrass, and Nevada bluegrass become less vigorous and subsequently decrease in composition. Mountain big sagebrush and rabbitbrush increase in the overstory as coarse sedges and other, less desirable, forage plants increase in the understory. Thistles are likely to invade this site.

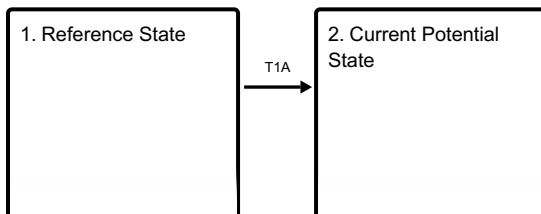
Fire Ecology:

Presettlement fire return intervals in mountain big sagebrush communities varied from 15 to 25 years. Plants are readily killed in all seasons, even light severity fires.

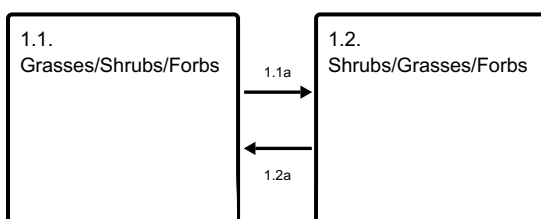
Mountain big sagebrush is highly susceptible to injury from fire. It is often top-killed by fire and will not resprout. Basin wildrye is top-killed by fire. Older basin wildrye plants with large proportions of dead material within the perennial crown can be expected to show higher mortality due to fire than younger plants having little debris. Basin wildrye is generally tolerant of fire but may be damaged by early season fire combined with dry soil conditions.

State and transition model

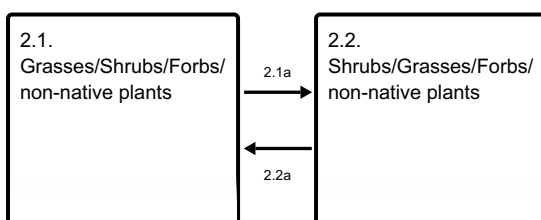
Ecosystem states



State 1 submodel, plant communities



State 2 submodel, plant communities



State 1 Reference State

Characteristics and indicators. The Reference State contains plant communities presumed to occur prior to the

introduction of non-native plants, livestock grazing, and other modern disturbances. Disturbance regimes resemble those described above in the ecological dynamics section.

Community 1.1 Grasses/Shrubs/Forbs

The reference plant community is dominated by basin wildrye and mountain big sagebrush. Potential vegetative composition is about 75 percent grasses and grass-like plants, 10 percent forbs, and 15 percent shrubs.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1261	1849	2522
Shrub/Vine	252	370	504
Forb	168	247	336
Total	1681	2466	3362

Community 1.2 Shrubs/Grasses/Forbs

Phase 1.2 is 35 to 50 percent grasses, 5 to 15 percent forbs, and 40 to 50 percent shrubs. Basin big sagebrush becomes the dominant shrub, though rabbitbrush and greasewood may also be present. This phase occurs 25 to 60 years after fire or an extended wet period. Nutrients have a patchy distribution in the system associated with shrub islands of fertility.

Pathway 1.1a Community 1.1 to 1.2

Community pathway 1.1a represents natural succession without fire or extended wet periods. This pathway usually occurs gradually as sagebrush increases in dominance, out-competing other species for resources. Nutrients are increasingly tied up in wood.

Pathway 1.2a Community 1.2 to 1.1

Community pathway 1.2a is the result of fire or a wet period severe enough to kill shrubs. Perennial grasses and forbs increase in vigor following fire and less so following extended wet periods.

State 2 Current Potential State

The Current Potential State functions comparably to the Reference State, although non-native plant species are present in the community. Under proper management, the current potential state maintains the ecological processes and community phases that were present in the Reference State.

Community 2.1 Grasses/Shrubs/Forbs/non-native plants

Phase 2.1 is 85 to 95 percent grasses, 5 to 20 percent forbs, and 0 to 5 percent shrubs. Basin wildrye, western wheatgrass, and native forbs re-grow vigorously shortly after a fire by taking advantage of the resulting nutrient pulse. This phase can also result from extended wet periods that negatively impact shrubs. Non-native species are present, but not dominant.

Community 2.2 Shrubs/Grasses/Forbs/non-native plants

Phase 2.2 is 35 to 50 percent grasses, 5 to 15 percent forbs, and 40 to 50 percent shrubs. Basin big sagebrush becomes the dominant shrub, though rabbitbrush and greasewood may also be present. This phase occurs 25 to 60 years after fire or an extended wet period. Nutrients have a patchy distribution in the system associated with shrub islands of fertility. Non-native species are present, but are not dominant.

Pathway 2.1a **Community 2.1 to 2.2**

Community pathway 2.1a represents natural succession without fire or extended wet periods. This pathway usually occurs gradually as sagebrush increases in dominance, out-competing other species for resources. Nutrients are increasingly tied up in wood.

Pathway 2.2a **Community 2.2 to 2.1**

Community pathway 2.2a is the result of fire or wet period severe enough to kill shrubs. Perennial grasses and forbs increase in vigor following fire and less so following extended wet periods.

Transition T1A **State 1 to 2**

Transition T1A represents the introduction of non-native plant species associated with European settlement. This transition is irreversible since eradication of non-native species would require costly management inputs; however, this transition results in minimal functional change.

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			2051–3396	
	basin wildrye	LECI4	<i>Leymus cinereus</i>	1681–2186	–
	thickspike wheatgrass	ELLAL	<i>Elymus lanceolatus ssp. lanceolatus</i>	67–269	–
	slender wheatgrass	ELTRT	<i>Elymus trachycaulus ssp. trachycaulus</i>	67–269	–
	sedge	CAREX	<i>Carex</i>	67–168	–
2	Secondary Perennial Grasses			168–504	
	Columbia needlegrass	ACNE9	<i>Achnatherum nelsonii</i>	12–74	–
	mountain brome	BRMA4	<i>Bromus marginatus</i>	12–74	–
	mat muhly	MURI	<i>Muhlenbergia richardsonis</i>	12–74	–
Forb					
3	Perennial			67–336	
	sedge	CAREX	<i>Carex</i>	67–168	–
Shrub/Vine					
4	Primary Shrubs			168–504	
	mountain big sagebrush	ARTRV	<i>Artemisia tridentata ssp. vaseyana</i>	168–504	–
5	Secondary Shrubs			67–336	
	basin wildrye	LECI4	<i>Leymus cinereus</i>	1681–2186	–
	rubber rabbitbrush	ERNA10	<i>Ericameria nauseosa</i>	25–74	–
	chokecherry	PRVI	<i>Prunus virginiana</i>	25–74	–
	currant	RIBES	<i>Ribes</i>	25–74	–
	Woods' rose	ROWO	<i>Rosa woodsii</i>	25–74	–
	willow	SALIX	<i>Salix</i>	25–74	–
	elderberry	SAMBU	<i>Sambucus</i>	25–74	–
	silver buffaloberry	SHAR	<i>Shepherdia argentea</i>	25–74	–
	snowberry	SYMPH	<i>Symphoricarpos</i>	25–74	–

Animal community

Livestock Interpretations:

This site is suited to livestock grazing. Grazing management should be keyed to basin wildrye. The early growth and abundant production of basin wildrye make it a valuable source of forage for livestock. It is important forage for cattle and is readily grazed by cattle and horses in early spring and fall. Though coarse-textured during the winter, basin wildrye may be utilized more frequently by livestock and wildlife when snow has covered low shrubs and other grasses. Mountain big sagebrush is eaten by domestic livestock but has long been considered to be of low palatability, and a competitor to more desirable species.

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:

Mountain big sagebrush is highly preferred and nutritious winter forage for mule deer and elk. Basin wildrye provides winter forage for mule deer, though use is often low compared to other native grasses. Basin wildrye provides summer forage for black-tailed jackrabbits. Because basin wildrye remains green throughout early

summer, it remains available for small mammal forage for longer time than other grasses.

Hydrological functions

Runoff is high. Permeability is moderately slow to moderate.

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

Basin wildrye was used as bedding for various Native American ceremonies, providing a cool place for dancers to stand. Native peoples used big sagebrush leaves and branches for medicinal teas, and the leaves as a fumigant. Bark was woven into mats, bags and clothing.

Other information

Basin wildrye is useful in mine reclamation, fire rehabilitation and stabilizing disturbed areas. Its usefulness in range seeding, however, may be limited by initially weak stand establishment.

Type locality

Location 1: Mineral County, NV	
Township/Range/Section	T8N R28E S11
General legal description	SW1/4 Section 11, T8N. R28E. MDBM. Along Cottonwood Creek drainage, Hawthorne Army Depot, Wassuk Range, Mineral County, 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

FR/GKB

Approval

Kendra Moseley, 4/10/2024

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	05/18/2024
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:**
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17. **Perennial plant reproductive capability:**
-