USDA Natural Resources Conservation Service

Ecological site R024XY066NV
SODIC DUNES

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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.
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 ascends the western slopes of the Sierra Range, the air cools, condensation takes place 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.

Ecological site concept

This site is found on partially stabilized sand dunes that typically occurs adjacent to and on the leeward side of large playas. The soils associated with this site are sandy throughout, somewhat excessively drained, fine sandy surface and an ochric epipedon.

Associated sites

R023XY038NV	**DROUGHTY LOAM 8-10 P.Z.**
R024XY022NV	**SODIC TERRACE 8-10 P.Z.**

Similar sites

R024XY001NV	**DUNES 6-10 P.Z.** Basin big sagebrush dominant.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Sarcobatus vermiculatus*
Herbaceous	(1) *Achnatherum hymenoides*

Physiographic features

This site occurs on partially stabilized sand dunes that typically occur adjacent to, and on the leeward side, of large playas. Slopes range from 2 to 15 percent, but slope gradients of 4 to 15 percent slopes are most typical. Elevations are 4200 to 5900 feet.

Table 2. Representative physiographic features

Landforms	(1) Dune
Runoff class	Negligible to very low
Elevation	4,200–5,900 ft
Slope	2–15%
Water table depth	72 in
Aspect	Aspect is not a significant factor

Climatic features

The climate associated with this site is semiarid and characterized by cool, moist winters and warm, dry summers. Average annual precipitation is 6 to 10 inches. Mean annual air temperature is 45 to 53 degrees F. The average growing season is about 90 to 130 days.

Table 3. Representative climatic features

Frost-free period (average)	130 days
Freeze-free period (average)	
Precipitation total (average)	10 in

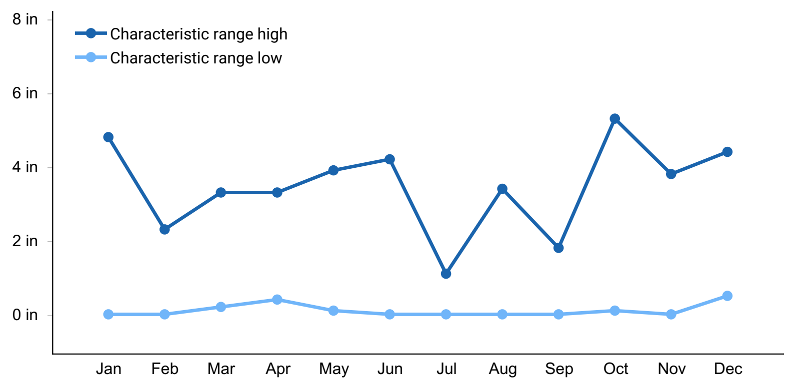


Figure 1. Monthly precipitation range

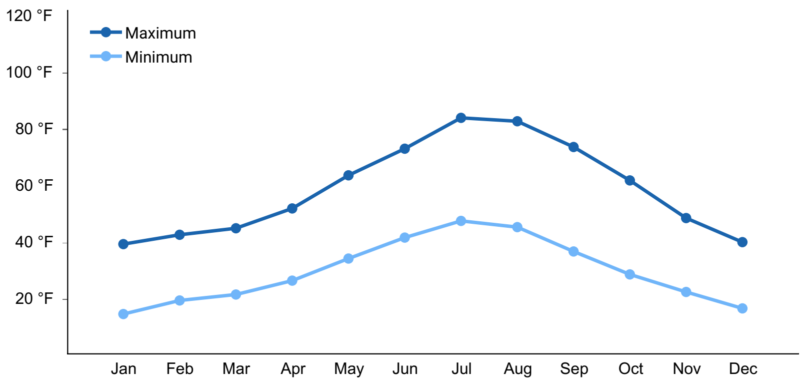


Figure 2. Monthly average minimum and maximum temperature

Influencing water features

There are no influencing water features associated with this site.

Soil features

Soils associated with this site exhibit minimal characteristics associated with soil development and are somewhat excessively drained. The soils are windblown fine sands typically more than 40 inches in depth. The soil profile is sandy throughout and has an ochric epipedon.
Underground water occurs within the rooting depth of black greasewood. Because of rapid to very rapid intake and deep percolation of water, surface runoff is very low. The extremely loose and unstable surface soils and low fertility of these soils are not favorable to uniform stands of perennial herbaceous plants. These soils are extremely susceptible to wind erosion.
Soil component correlated to site: Goldrun.

Table 4. Representative soil features

Parent material	(1) Eolian deposits
Surface texture	(1) Fine sand
Family particle size	(1) Sandy
Drainage class	Somewhat excessively drained to excessively drained
Permeability class	Rapid to very rapid
Soil depth	72–84 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	3–3.1 in
Calcium carbonate equivalent (0-40in)	0–3%
Electrical conductivity (0-40in)	0–32 mmhos/cm
Sodium adsorption ratio (0-40in)	0–12
Soil reaction (1:1 water) (0-40in)	6.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

Ecological dynamics:
This plant community is dynamic in response to changing weather patterns and disturbance regimes. The potential native plant community is dominated by Indian ricegrass, spiny hopsage and fourwing saltbush. Shadscale, Nevada dalea, bud sagebrush and winterfat are associated shrub species. Needleandthread, squirreltail and basin wildrye are common species found throughout.

The soils of this ecological site are windblown fine sands typically more than 40 inches in depth. The soil profile is somewhat excessively to excessively drained and available water capacity is low. Underground water occurs within the rooting depth of black greasewood. Because of rapid to very rapid intake and deep percolation of water, surface runoff is very low. The extremely loose and unstable surface soils and low fertility of these soils are not favorable to uniform stands of perennial herbaceous plants. These soils are extremely susceptible to wind erosion. In arid and semi-arid systems coarse-textured soils lose less moisture to evaporation than fine-textured soils and thus have higher water availability (Lane et al 1998). This principle known as the inverse-texture hypothesis, predicts that plant communities on coarse-textured soils should have higher above-ground net primary productivity than communities on fine-textured soils in arid or semi-arid regions. Sandy soils are highly susceptible to wind erosion. Management of the plant community should insure sufficient plant cover to protect site from soil surface movement. Infiltration is rapid on coarse-textured soil reducing the potential for sheet and rill erosion during typical precipitation events.

Black greasewood occurs in nearly pure stands on saline sites. On less saline site it can be found growing with a variety of shrub species including, spiny hopsage, fourwing saltbrush, Nevada Ephedra, horsebrush and rabbitbrush. Black greasewood reproduces by seed and by sprouting from its root crown and spreading lateral root system. It is clonal and may have many major stems arising from one large clump. Black greasewood is phreatophytic, it distribution is correlated to the distribution of ground water. The maximum rooting depth is determined by depth to a saturated zone, where ground water is present, and also drought tolerant. Black greasewood is typically deep rooted with few shallow roots near the surface (Anderson 2004). On sites dominated by black greasewood, surface soil may contain elevated levels of sodium and other cations, especially directly under shrubs where localized recycling occurs. Salt accumulates on black greasewood leaves and leaches in to the soil from fallen leaves.

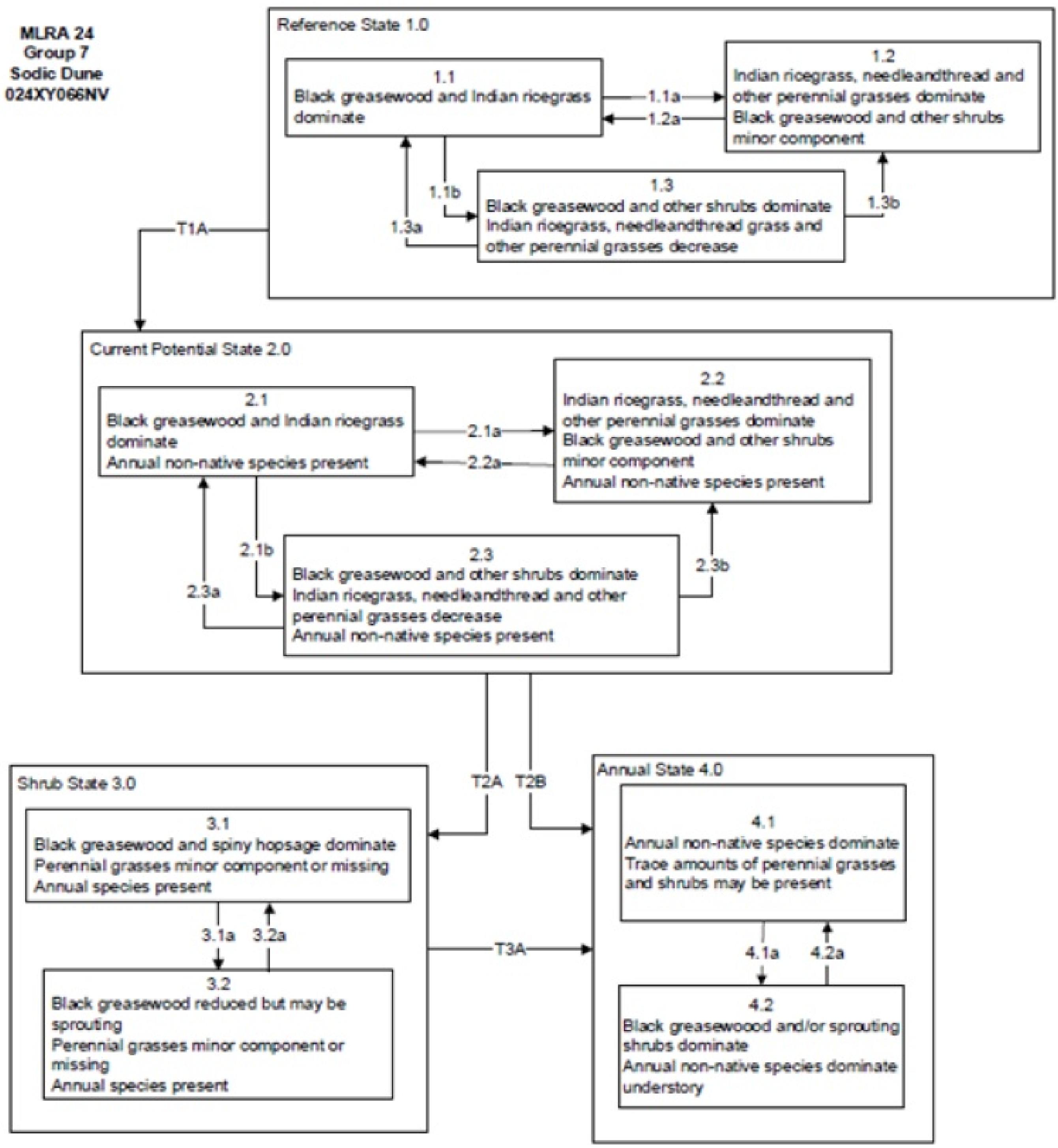
Spiny hopsage is well adapted to sagebrush deserts and is highly drought tolerant. It can be evergreen in southern deserts, but is deciduous in the summer in northern deserts. Spiny hopsage accumulates large amounts of potassium in its leaves. The decay of the leaf litter under the canopy is capable of concentrating potassium on the soil surface and raising the surface soil pH. These soil changes may affect future growth of spiny hopsage and associated shrubs. Spiny hopsage, a member of the Chenopodiaceae is fairly tolerant of alkaline and saline soils and it commonly found on highly calcareous alkaline soils. It is capable of growing on a wide range of soil textures, but prefers sandy soils (Tirmenstein 1999).

This ecological site is co-dominated by perennial bunchgrasses. Grasses have an extensive fibrous root system that aids in soil stabilization and contributes organic matter to the soil profile. Grasses are intensive exploiters; they extract a large portion of their moisture from shallow soil horizons through their dense network of shallow roots (Burgess 1995). This trait makes grasses very efficient competitors for limited shallow soil moisture, especially during summer precipitation events. The shrubs of this site are extensive exploiters; they have roots systems that penetrate large volumes of soil both shallow and deep layers (Burgess 1995). This allows shrubs to extract moisture from layers that are too deep or distributed too erratically for intensive exploiters.
Vegetation plays an important role in reducing the erodibilty of the soil surface. Incorrect management actions may result in reduced vegetative cover and increased soil erosion. Long-term surface disturbance or reoccurring wildfire will reduce native plant cover, plant density, and species diversity of this site. As ecological condition declines, Indian ricegrass and needleandthread decrease in the understory. Black greasewood, spiny hopsage, horsebrush and rabbitbrush increase and become the dominant vegetation as conditions decline. When this sites burns grazing needs to be curtailed until perennial grass species are well established. Cheatgrass, halogeton and Russian thistle are species likely to invade this site.

Fire Ecology:
Black greasewood communities have been historically subject to stand-replacing fire regimes with intervals of <100 years. Black greasewood may be killed by severe fires, but it commonly sprouts soon after low to moderate-severity

fires. Spiny hopsage is considered to be somewhat fire tolerant and often survives fires that kill sagebrush. Mature spiny hopsage generally sprout after being burned. Spiny hopsage is reported to be least susceptible to fire during summer dormancy. Indian ricegrass can be killed by fire, depending on severity and season of burn. Indian ricegrass reestablishes on burned sites through seed dispersed from adjacent unburned areas. Needleandthread is top-killed by fire. It may be killed if the aboveground stems are completely consumed. Needleandthread is slightly to severely damaged by fire. Needleandthread sprouts from the caudex following fire, if heat has not been sufficient to kill underground parts. Recovery usually takes 2 to 10 years. 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



Sodic Dune
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Reference State 1.0 Community Phase Pathways
1.1a: Low severity fire creates grass/shrub mosaic.
1.1b: Time and lack of disturbance such as fire. Excessive herbivory and/or drought will reduce perennial bunchgrasses.
1.2a: Time and lack of disturbance allows for shrub regeneration.
1.3a: Low severity fire resulting in a mosaic pattern.
1.3b: High severity fire significantly reduces shrub cover leading to early/mid-seral community.

Transition T1A: Introduction of non-native species such as cheatgrass, mustards and Russian thistle.

Current Potential State 2.0 Community Phase Pathways
2.1a: Low severity fire creates grass/shrub mosaic; non-native annual species present.
2.1b: Time and lack of disturbance such as fire. Inappropriate grazing and/or drought will reduce perennial bunchgrasses.
2.2a: Time and lack of disturbance allows for regeneration of shrubs.
2.3a: Low severity fire creates shrub/grass mosaic. Brush management (aerial herbicide application), late-fall/winter grazing causing mechanical damage to shrubs.
2.3b: High severity fire significantly reduces shrub cover leading to early mid-seral community.

Transition T2A: Inappropriate grazing management favoring shrub dominance and reducing perennial bunchgrasses and/or drought (3.1) Fire (3.2).

Transition T2B: Catastrophic wildfire (4.1). Inappropriate grazing management in the presence of non-native annual species would decrease the perennial grass and some of the palatable shrubs, and/or higher than normal spring precipitation could increase the non-native annual species in the understory.

Shrub State 3.0 Community Phase Pathways
3.1a: Fire, brush management (aerial herbicide application), and/or late-fall/winter grazing causing mechanical damage to shrubs.
3.2a: Time and lack of disturbance (an unlikely/slow transition).

Transition T3A: Fire (4.1). Inappropriate grazing management, may be combined with higher than normal spring precipitation could increase annual non-native species in the understory (4.2)

Annual State 4.0 Community Phase Pathways
4.1a: Time and lack of disturbance allows for the shrubs to sprout/increase
4.2a: Fire

State 1
Reference State

The reference state is representative of the natural range of variability under pristine conditions. The visual aspect of the plant community is dominated by an evergreen shrub community. State dynamics are maintained by interactions between climatic patterns and disturbance regimes. Plant community phase changes are primarily driven by fire, periodic drought and insect or disease attack.

Community 1.1
Reference Plant Community

The reference plant community is dominated by Indian ricegrass and black greasewood. Needleandthread and spiny hopsage are important species associated with this site. Potential vegetative composition is about 45% grasses, 5% forbs and 50% shrubs. Approximate ground cover (basal and crown) is 15 to 25 percent.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	100	200	300
Grass/Grasslike	90	180	270
Forb	10	20	30
Total	**200**	**400**	**600**

Community 1.2
Plant Community 1.2

This plant community is characteristic of a post-disturbance, early seral community phase. This community is dominated by Indian ricegrass, needleand thread, bottlebrush squirreltail and basin wildrye. Shrubs initially decrease. However, black greasewood, spiny hopsage, rabbitbrush and Nevada ephedra sprout from the surviving root crown following fire and quickly recover. This plant community phase is at risk of invasion by non-native species. Non-natives are able to take advantage of increased availability of critical resources following disturbance.

Community 1.3
Plant community 1.3

This plant community is characterized by a decadent shrub overstory. Perennial grasses are declining from drought, completion from over-mature shrub overstory and inadequate rest and recovery from defoliation. In the absence of stand replacing disturbances shrubs become over mature and decadent. This results in reduced quantity and diversity of plant species and increased bare ground. This plant community is at risk of invasion by non-native species. Non-natives can easily invade plant communities where structural and functional groups are reduced. Increased bare ground is an indicator of site susceptibility to accelerated wind erosion.

Pathway 1.1a
Community 1.1 to 1.2

Low severity fire creates grass/shrub mosaic.

Pathway 1.1b
Community 1.1 to 1.3

Time and lack of disturbance such as fire. Excessive herbivory and/or drought will reduce perennial bunchgrasses

Pathway 1.2a
Community 1.2 to 1.1

Absence of disturbance and natural regeneration over time. Recovery of plant community to pre-fire conditions may take greater than 5 years, depending on season of burn.

Pathway 1.3a
Community 1.3 to 1.1

Low severity fire resulting in a mosaic pattern

Pathway P1.3b
Community 1.3 to 1.2

High severity fire significantly reduces shrub cover leading to early/mid-seral community

State 2
Invaded State

This state is characterized by the presence of non-native invasive species in the understory. This state is similar to the Reference State (1). Ecological function (soil hydrology, nutrient cycling, and energy capture) has not changed, however the resiliency of the state has been reduced by the presence of invasive weeds. Prescribed grazing and infrequent fire maintains state dynamics. These non-natives are highly flammable and can promote wildfire where fires historically have 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 cheatgrass’s high seed output, persistent seed bank, rapid growth rate, ability to cross pollinate and adaptations for seed dispersal.

Community 2.1
Plant Community 2.1

This community is compositionally similar to 1.1 Plant Community with a trace of non-native annuals. Ecological processes (soil hydrology properties, nutrient cycling and productivity) are also similar to 1.1 plant community. Ecological resilience has been reduced by the presence of non-native annual species and this community may respond differently following a disturbance, when compared to non-invaded plant communities.

Community 2.2
Plant Community 2.2

This plant community is characteristic of a post-disturbance, early seral community phase. It is dominated by Indian ricegrass, needleandthread, and basin wildrye. Black greasewood, spiny hopsage, rabbitbrush and Nevada ephedra sprout from the root crown following fire and recover quickly. Annual non-native species are present in the understory and are stable to increasing, depending on weather patterns and management decisions. This plant community is at risk of reoccurring wildfire due to large amount of herbaceous biomass.

Community 2.3
Plant Community 2.3

This plant community is characterized by the over dominance of shrubs. Inadequate rest and recovery from defoliation, results in increase cover of non-palatable shrubs species. Prolonged drought results in an overall decrease in the herbaceous component of the plant community. Annual non-native species are stable or increasing within the understory. Bare ground is increasing. Increased bare ground is an indicator of site susceptibility to wind erosion. Further reduction of perennial vegetation and continued soil loss may cause this plant community to cross an irreversible threshold in to State 4.

Pathway 2.1a
Community 2.1 to 2.2

Low severity fire creates grass/shrub mosaic; non-native annual species present.

Pathway 2.1b
Community 2.1 to 2.3

Time and lack of disturbance such as fire. Inappropriate grazing and/or drought will reduce perennial bunchgrasses.

Pathway 2.2a
Community 2.2 to 2.1

Absence of disturbance and natural regeneration over time. Recovery of the plant community to pre-fire conditions may take 5 years or greater, depending on season of the burn.

Pathway 2.3a
Community 2.3 to 2.1

Low severity fire creates shrub/grass mosaic. Brush management (aerial herbicide application), late-fall/winter grazing causing mechanical damage to shrubs.

Pathway 2.3b
Community 2.3 to 2.2

High severity fire significantly reduces shrub cover leading to early mid-seral community.

State 3

Shrub/non-native State

This state is characterized by a sparse overstory of shrubs and an understory of non-native annuals in the plant community primarily; cheatgrass, mustard, halogeton and Russian thistle. Sprouting shrubs are present in trace amounts. Negative feedbacks contributing to the stability of this state include the persistence of non-natives and competition from non-natives for soil moisture and nutrients preventing recruitment of native species. Fine fuels provided by non-native annuals support a fire regime too frequent for the successful establishment of woody native perennials and favor an increase in non-native annuals. Fire occurs often enough in this state to preclude the establishment of rabbitbrush, fourwing saltbush or dominance of sprouting shrubs. Biogeochemical cycling is altered by the dominance of cheatgrass modifying the soil environment. Cheatgrass monocultures have low VAM fungal populations, increasing the difficulty of reestablishing sagebrush and native bunchgrasses that require these mycorrhizae.

Community 3.1
Plant Community 3.1

This plant community is characterized by a native shrub overstory and non-native annual dominated understory. Perennial native grasses are present and initially increase following fire. Annual species, primarily mustards, halogeton and cheatgrass, dominate the site. This plant community is at risk of increased wildfire due to fine fuel loading. Grazing may be used to manage fuel loading and reduce non-native biomass. However careful management is required to avoid damaging desirable native perennials.

Community 3.2
Community Phase 3.2

This plant community is characterized by the dominance of non-native species. Perennial grasses and native shrubs are present in trace amounts, but are not controlling ecological dynamics. Ecological processes (soil hydrology, nutrient cycling) are controlled by non-native species and abundance of bare ground. This plant community is at risk of reoccurring wildfire due to dominance by non-native annuals. Ecological resilience and resistance is reduced by decreasing native perennial vegetation and increasing cover of bare ground. This plant community is at risk of crossing an irreversible threshold into State 4.

Pathway 3.1a
Community 3.1 to 3.2

Fire, brush management (aerial herbicide application), and/or late-fall/winter grazing causing mechanical damage to shrubs

Pathway 3.2a
Community 3.2 to 3.1

Adequate rest and recovery from defoliation and absence of fire allows for recovery of some native perennials.

State 4
Eroded State

This state is characterized by active soil movement. Annual non-native species, including cheatgrass, halogeton, mustards and Russian thistle, dominate the plant community. Sprouting shrubs may be present in trace amounts. Ecological processes are controlled by the non-native annual community during the spring growing season and by the physical process of wind movement of soil after the annual plant cover has senesced. In extremely degraded sites wind erosion of soil may progress to dune formation or flattening (depending on landscape position) and near elimination of the annual plant community. Negative feedbacks contributing to the stability of this state include the persistence of non-natives and competition from non-natives for soil moisture and nutrients prevent recruitment of native species. Fine fuels provided by non-native annuals support a fire regime too frequent for the successful establishment of sagebrush and favor an increase in non-native invasive annuals.

Community 4.1

Plant Community 4.1

This plant community is characterized by active soil movement and the dominance of non-native annual species. Perennial native vegetation is largely absent. This plant community is highly unstable and maybe subject to active dune formation. Dune formation is a function of landscape position. Soils are very active and vegetation reestablishment is limited. Restoration methods available to repair this plant community are limited.

Community 4.2
Plant community 4.2

Sagebrush and/or sprouting shrubs dominate the overstory. Cheatgrass, annual mustards and other non-native annual species dominate the understory. This phase is very at risk of fire and conversion to an annual dominated site.

Pathway P4.1a
Community 4.1 to 4.2

Time and lack of disturbance allows for the shrubs to sprout/increase.

Pathway P4.2a
Community 4.2 to 4.1

Fire

Transition T1A
State 1 to 2

Trigger: introduction of non-native annual species. Slow variables: Changes in the kinds of animals and their grazing patterns, drought and/or changes in fire history that altered recruitment rates of native species. Threshold: Reduction in deep-rooted herbaceous understory reduces productivity, changes nutrient cycling and soil stability. 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 T2A
State 2 to 3

Trigger: Multiple stand replacing fires to severely damage black greasewood and other fire tolerant shrubs. Typically occurs in the hot season. Slow variables: Increased reproduction and cover of non-native invasive annuals. Threshold: Loss of deep-rooted perennial bunchgrasses reduced infiltration and increases runoff; this leads to reduced soil organic matter and soil moisture. Modified fire regime (changes in intensity, size and spatial variability of fires).

Transition T2B
State 2 to 4

Trigger: Inadequate rest and recovery from growing season defoliation and/or prolonged drought. Slow variables: Long term decrease in bunchgrass density and reduced native species (shrub and bunchgrass) recruitment rates. Threshold: Loss of deep-rooted perennial bunchgrasses changes nutrient cycling and nutrient redistribution; thus reducing soil organic matter.

Transition T3A
State 3 to 4

Trigger: Frequent, repeated stand replacing fires Slow Variables: Loss of perennial bunchgrasses and native shrubs, increased reproduction, cover and density of non-native annuals and increased bare ground Threshold: Modified fire regime (changes in frequency, intensity, size and spatial variability of fire). Permanent changes in plant community composition and spatial pattern of vegetation (loss of perennial bunchgrasses and shrubs).

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	**Primary Perennial Grasses**			116–212	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	100–140	–
	needle and thread	HECO26	*Hesperostipa comata*	8–40	–
	basin wildrye	LECI4	*Leymus cinereus*	8–32	–
2	**Secondary Perennial Grasses**			8–40	
	saltgrass	DISP	*Distichlis spicata*	2–8	–
	squirreltail	ELEL5	*Elymus elymoides*	2–8	–
	thickspike wheatgrass	ELLAL	*Elymus lanceolatus ssp. lanceolatus*	2–8	–
	beardless wildrye	LETR5	*Leymus triticoides*	2–8	–
Forb					
3	**Perennial Forbs**			8–32	
	canaigre dock	RUHY	*Rumex hymenosepalus*	2–12	–
	princesplume	STANL	*Stanleya*	2–12	–
4	**Annual Forbs**			1–12	
Shrub/Vine					
5	**Primary Shrubs**			160–240	
	greasewood	SAVE4	*Sarcobatus vermiculatus*	140–180	–
	spiny hopsage	GRSP	*Grayia spinosa*	20–60	–
6	**Secondary Shrubs**			20–60	
	fourwing saltbush	ATCA2	*Atriplex canescens*	4–12	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	4–12	–
	Nevada jointfir	EPNE	*Ephedra nevadensis*	4–12	–
	rubber rabbitbrush	ERNAN5	*Ericameria nauseosa ssp. nauseosa var. nauseosa*	4–12	–
	horsebrush	TETRA3	*Tetradymia*	4–12	–

Animal community

Livestock Interpretations:
This site has value for livestock grazing. Grazing management should be keyed to dominant grasses and palatable shrubs production. Black greasewood is an important winter browse plant for domestic sheep and cattle. It also receives light to moderate use by domestic sheep and cattle during spring and summer months. Black greasewood contains soluble sodium and potassium oxalates that may cause poisoning and death in domestic sheep and cattle if large amounts are consumed in a short time. Spiny hopsage provides a palatable and nutritious food source for livestock, particularly during late winter through spring. Domestic sheep browse the succulent new growth of spiny hopsage in late winter and early spring.
Indian ricegrass is highly palatable to all classes of livestock in both green and cured condition. It supplies a source of green feed before most other native grasses have produced much new growth. Heavy spring grazing has been found to sharply reduce the vigor of Indian ricegrass and decrease the stand (Cook and Child 1971). In eastern Idaho, productivity of Indian ricegrass was at least 10 times greater in undisturbed plots than in heavily grazed ones (Pearson 1976). Cook and Child (1971) found significant reduction in plant cover after 7 years of rest from heavy (90%) and moderate (60%) spring use. The seed crop may be reduced where grazing is heavy (Bich et al. 1995). Tolerance to grazing increases after May thus spring deferment may be necessary for stand enhancement

(Pearson 1964; Cook and Child 1971), however utilization of less than 60% is recommended. Needleandthread provides highly palatable forage, especially in the spring before fruits have developed. Needlegrasses are grazed in the fall only if the fruits are softened by rain. 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.

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:
Black greasewood is an important winter browse plant for big game animals and a food source for many other wildlife species. It also receives light to moderate use by mule deer and pronghorn during spring and summer months. Spiny hopsage provides a palatable and nutritious food source for big game animals. Spiny hopsage is used as forage to at least some extent by domestic goats, deer, pronghorn, and rabbits. Indian ricegrass is eaten by pronghorn in moderate amounts whenever available. In Nevada it is consumed by desert bighorns. A number of heteromyid rodents inhabiting desert rangelands show preference for seed of Indian ricegrass. Indian ricegrass is an important component of jackrabbit diets in spring and summer. In Nevada, Indian ricegrass may even dominate jackrabbit diets during the spring through early summer months. Indian ricegrass seed provides food for many species of birds. Doves, for example, eat large amounts of shattered Indian ricegrass seed lying on the ground. Needleandthread is moderately important spring forage for mule deer, but use declines considerably as more preferred forages become available. 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 very slow. Permeability is rapid to very rapid. Hydrologic soil group is A. Rills are none. Water flow patterns none. Pedestals are few to common with occurrence due to wind scouring. Gullies are none. Perennial herbaceous plants (especially deep-rooted bunchgrasses [i.e., Indian ricegrass] 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 products

The leaves, seeds and stems of black greasewood are edible. Some Native American peoples traditionally ground parched seeds of spiny hopsage to make pinole flour. Indian ricegrass was traditionally eaten by some Native Americans. The Paiutes used seed as a reserve food source. Basin wildrye was used as bedding for various Native American ceremonies, providing a cool place for dancers to stand.

Other information

Black greasewood is useful for stabilizing soil on wind-blown areas. It successfully revegetates eroded areas and sites too saline for most plant species. Spiny hopsage has moderate potential for erosion control and low to high potential for long-term revegetation projects. It can improve forage, control wind erosion, and increase soil stability on gentle to moderate slopes. Spiny hopsage is suitable for highway plantings on dry sites in Nevada. Needleandthread is useful for stabilizing eroded or degraded sites. 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.

Inventory data references

NASIS soil component data.

Type locality

Location 1: Washoe County, NV	
Township/Range/Section	T37N R19E S17
UTM zone	N
UTM northing	4552552
UTM easting	258532
Latitude	41° 5′ 18″
Longitude	119° 52′ 29″
General legal description	Northeast portion of Duck Flat, Washoe County, Nevada. This site also occurs in Humboldt County, Nevada.

Other references

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Burgess, T.L. 1995. Desert Grassland, Mixed Shrub Savanna, Shrub Steppe, or Semidesert Scrub? Pp. 31-67 in M.P. McClaran and T.R. Van Devender (eds.), the Desert Grassland. University of Arizona Press, Tucson Arizona
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Pearson, L.C. 1976. Primary production in grazed and ungrazed desert communities of eastern Idaho. Ecology 46(3):278-285.
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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	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rills are none.

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2. **Presence of water flow patterns:** Water flow patterns none.

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3. **Number and height of erosional pedestals or terracettes:** Pedestals are few to common with occurrence due to wind scouring.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare Ground ± 70%.

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

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6. **Extent of wind scoured, blowouts and/or depositional areas:** Slight to moderate wind scouring.

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7. **Amount of litter movement (describe size and distance expected to travel):** Fine litter (foliage from grasses and annual & perennial forbs) expected to move unsheltered distance during heavy wind. Persistent litter (large woody material) expected to remain in place.

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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 1 to 4 on the sandy soil textures found on this site. (To be field tested.)

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Surface structure is typically single grain. Soil surface colors are light and are typified by an ochric epipedon. Organic matter of the surface 2 to 3 inches is typically less than 1 percent. Organic matter content can be more or less depending on micro-topography.

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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., Indian

ricegrass] 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. Massive sub-surface horizons are not to be interpreted as compacted layers.

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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: Tall shrubs (black greasewood) > deep-rooted, cool season, perennial bunchgrasses

    Sub-dominant: Associated shrubs > shallow-rooted or rhizomatous, cool season perennial grasses > deep-rooted, cool season, perennial forbs = fibrous, shallow-rooted, cool season, annual and perennial 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 40% of total woody canopy; some of the mature bunchgrasses (±25%) have dead centers.

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14. **Average percent litter cover (%) and depth (in):** Between plant interspaces (± 10-15%) and depth of litter 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 (February thru May) ± 400 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 rabbitbrush, horsebrush, and black greasewood. Invaders include cheatgrass, halogeton, Russian thistle, annual mustards, annual kochia, and bassia.

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