

Ecological site R030XY045NV DUNES 3-7 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.

Ecological site concept

This site occurs on stabilized sand dunes and sand sheets as part of the playa complex. This site is part of the group concept represented by R030XB045CA.

Associated sites

R030XA010NV	GRAVELLY SANDY LOAM 3-5 P.Z.
R030XB004NV	SANDY 5-7 P.Z.

Similar sites

R030XA064NV	LOAMY BOTTOM More productive site; SPAI-LECI4 codominant grasses; does not occur on sand dunes
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Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Prosopis</i> (2) <i>Atriplex canescens</i>
Herbaceous	Not specified

Physiographic features

This site occurs on stabilized sand dunes and sand sheets. Slope gradients range from 4 to 30 percent, but slope gradients of 4 to 15 percent are most typical. Elevations are 1000 to about 5000 feet.

Table 2. Representative physiographic features

Landforms	(1) Dune (2) Sand sheet
Elevation	310 – 1,520 m
Slope	0 – 30 %
Aspect	Aspect is not a significant factor

Climatic features

The climate is arid with hot, dry summers and warm, moist winters. Average annual precipitation is 3 to about 7 inches. Mean annual air temperature is 55 to 76 degrees F. The average growing season is about 230 to 360 days.

Table 3 Representative climatic features

Frost-free period (average)	360 days
Freeze-free period (average)	
Precipitation total (average)	180 mm

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soils associated with this site are coarse textured aeolian deposits derived from mixed rock sources. These soils are very deep and somewhat excessively drained. The coarse textured, single-grained, surface soils are at least 20 inches in depth. Surface cover of pebble-sized rock fragments is typically less than 2 percent. Because of rapid intake and deep percolation of water, the loss of soil moisture due to evaporation is reduced and runoff is low to very low. The soils are extremely susceptible to wind erosion. Small "blow-out" spots are common and, collectively, may represent as much as 5 percent of the total surface area for the site. Potential for sheet and rill erosion is slight, but wind erosion potential is high. The soil series associated with this site is Bluepoint, a mixed, thermic Typic Torripsamment. The soils have a typic-aridic soil moisture regime and an ochric epipedon. The soils are calcareous in some part or all of the control section with 0 to 2 percent gypsum or calcium carbonate by volume.

Table 4. Representative soil features

Surface texture	(1) Fine sand
Family particle size	(1) Sandy
Drainage class	Somewhat excessively drained
Permeability class	Rapid

Soil depth	180 – 210 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	7.49 – 15.01 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)	7.6 – 8.2
Subsurface fragment volume <=3" (Depth not specified)	0 – 20 %
Subsurface fragment volume >3" (Depth not specified)	Not specified

Ecological dynamics

Aeolian processes, which are presumably the dominant mechanism of soil detachment and transport on this ecological site, are largely responsible for the removal of nutrient-rich soil particles from the intercanopy areas and the deposition onto shrub patches. This sediment redistribution leads to the accumulation of nutrients under the shrub canopies, a process known as "islands of fertility" (Schlesinger et al. 1990). Thus, the landscape exhibits a mosaic of sources and sinks, with bare soil interspaces acting as sources and vegetated patches as sinks of nutrients and sediments (Puigdefabregas 2005). Hydrological processes, such as infiltration and runoff, determine the conditions favorable for the establishment and survival of different vegetation functional groups with a consequent impact on the structure and function of these systems.

Fine sediments are redistributed by aeolian processes from the interspaces on the mesquite mounds where they remain sheltered by the vegetation. This process leads to the formation of an area of fine-textured soils with higher concentration of wind borne fines inside the shrub patch. These fine-textured soils have a lower infiltration rate, thus runoff occurs from the middle of the mesquite mounds toward the edges where it infiltrates. The edges of the mounds are ideal sites for the uptake of water by the existing plants or growth and establishment of new plants. Thus the formation and development of coppice dunes, and of associated vegetation patterns results from the interaction between hydrologic and aeolian processes (Ravi et al 2007).

Honey mesquite is a deciduous, thorny shrub or small tree exhibiting a high degree of variation in growth form. All mesquites have a

strong tendency for apical dominance and a well-developed crown. Undisturbed trees therefore develop into single-stemmed trees. If the aboveground growth is damaged or removed, such as by freezing weather, drought, fire, trampling, browsing, cutting, or herbicide treatment, dormant buds located on the underground stem initiate new growth, resulting in the many-stemmed growth form. Honey mesquite's root system is well adapted to dry climates, during and shortly after seedling establishment, the rate of root growth exceeds that of shoot growth. Honey mesquite is a facultative phreatophyte which extracts moisture from a large volume of soil through a well-developed root system of both shallow and deep roots. Honey mesquite's taproot commonly reaches depths of 40 feet (12 m) when subsurface water is available. Sands are most effective at absorbing light rains and the moisture is readily absorbed by the shallow roots. As a legume, honey mesquite is capable of housing N2-fixing bacteria in nodes along its roots; it is also commonly heavily colonized by arbuscular mycorrhizal fungi. Mesquites obtain about half of their nitrogen from symbiotic bacteria housed in root nodules(Steinberg 2001). Growth during the spring and early summer is relatively fast. As summer progresses, the stomata close during the hot, dry midday but remain open in early mornings and late afternoons. Mesquite drops its leaves in fall when air temperatures moderate and rain returns (Pavlik 2008).

Mistletoe (Phoradendron) is a common parasite on mesquite. Mistletoe takes a long time to kill a tree but certainly causes decline. Mistletoe infections cause swelling and witches' brooms. Old severe infections may result in swollen areas of dead wood that are brittle and break easily. As ecological condition deteriorates, perennial grasses decrease while mesquite, creosotebush, wolfberry, and shadscale increase. Species likely to invade this site are exotic annual forbs and grasses.

Fire Ecology:

It is assumed that fuels in the Mojave Desert were so discontinuous in the past that fire was infrequent. The estimated historic fire return interval for mesquite communities ranges from 35 to 100+ years. When the aboveground portion of honey mesquite is damaged by fire, regeneration occurs by sprouting from lateral roots in the upper 1 foot (0.3 m) of soil and establishing from seed. Mature plants contain numerous, dormant buds on the upper 12 inches (30 cm) of the taproots where they are insulated from the heat of most fires. Following top-kill by fire, numerous sprouts arise from the underground buds. Even 6- month- old seedlings have sufficiently developed underground stem buds to allow plants to survive "cool" burns.

Screwbean mesquite can survive fire, but little is known of the adaptations that allow for this. Weak resprouting after fire has been reported, from surviving apical buds or adventitious buds on the root crown. Fire top-kills or kills fourwing saltbush, depending upon ecotype. Fourwing saltbush may sprout after top-kill. Indian ricegrass is slightly to moderately damaged by fire depending on fire intensity and season. Indian ricegrass regenerates from seed following fire.

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			13-101	
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	13-101	–
2	Secondary Perennial Grasses			13-54	
	big galleta	PLRI3	<i>Pleuraphis rigida</i>	3-13	–
	alkali sacaton	SPAI	<i>Sporobolus airoides</i>	3-13	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	3-13	–
Forb					
3	Perennial Frobs			13-54	
4	Secondary Forbs			1-67	
Shrub/Vine					
5	Primary Shrubs			377-639	
	fourwing saltbush	ATCA2	<i>Atriplex canescens</i>	135-269	–
	honey mesquite	PRGL2	<i>Prosopis glandulosa</i>	118-168	–
	screwbean mesquite	PRPU	<i>Prosopis pubescens</i>	118-168	–
	creosote bush	LATR2	<i>Larrea tridentata</i>	6-34	–
6	Secondary Shrubs			34-101	
	catclaw acacia	ACGR	<i>Acacia greggii</i>	3-34	–
	burrobush	AMDU2	<i>Ambrosia dumosa</i>	3-34	–
	shadscale saltbush	ATCO	<i>Atriplex confertifolia</i>	3-34	–

	jointfir	EPHED	<i>Ephedra</i>	3-34	–
	desert-thorn	LYCIU	<i>Lycium</i>	3-34	–
	pricklypear	OPUNT	<i>Opuntia</i>	3-34	–

Table 6. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 7. Community 1.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 8. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 9. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 10. Community 2.3 plant community composition

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

Livestock Interpretations: This site is suited to livestock grazing. Grazing management should be keyed to Indian ricegrass and the palatable shrub species. The fruits of honey and screwbean mesquite are valuable forage for livestock. Cattle, horses, domestic sheep and goats, mules, and burros eat large quantities of the ripe fruit during summer and fall. Domestic animals disperse the seeds of honey mesquite, contributing to its regeneration. Livestock do not consume the foliage to any great extent. Foliage consumption is high only during drought years, especially in the early spring when other forage is sparse. Mesquite increases on ranges where inappropriate grazing pressure has removed more palatable species. Fourwing saltbush is one of the most palatable shrubs in the West. Its protein, fat, and carbohydrate levels are comparable to alfalfa. It provides nutritious forage for all classes of livestock. Palatability is rated as good for domestic sheep and domestic goats; fair for cattle; fair to good for horses in winter, poor for horses in other seasons. Indian ricegrass is highly palatable to livestock and wildlife. It is a preferred feed for cattle, horses and elk in all seasons. It is considered a preferred feed for sheep, deer and antelope in spring and a desirable feed for sheep, deer, and antelope in late fall and winter. It reaches its peak production from mid-June through mid-July. It holds its nutrient value well at maturity. Indian ricegrass establishes slowly and new seedlings should not be grazed until at least late summer or fall of the second growing season. It makes its initial growth in early spring and matures seed by mid summer. 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: Honey and screwbean mesquite are important trees to wildlife for both cover and as a food source. The seeds are eaten by jackrabbits, Gambel quail, songbirds and various small mammals. Western chipmunks, ground squirrels, pocket mice, and various species of kangaroo and wood rats consume the foliage. A variety of birds also nest in the tree's canopy. Fourwing saltbush provides valuable habitat and year-round browse for wildlife. Granivorous birds consume the fruits and wild ungulates, rodents and lagomorphs readily consume all aboveground portions of the plant. Indian ricegrass is considered an excellent food source for birds and rodents. It is considered good cover habitat for small animals and birds.

Hydrological functions

Runoff is low to very low. Permeability is rapid. Rills and water flow patterns are none. Runoff occurs from the middle of the mesquite mounds toward the edges where it infiltrates and provides suitable sites for growth and establishment of new plants.

Other products

Many parts of honey mesquite were useful to indigenous groups of California, the Southwest and northern Mexico. The Cahuilla picked the flowers of honey mesquite in the spring and roasted them in a pit of heated stones, after which they were formed into balls and eaten. The blossoms were also utilized in making a tea. Many tribes in southern California and the Southwest including the Timbisha Shoshone, Nevada and Utah Southern Paiute, Kawaiisu, Cahuilla, Panamint, Luiseno, Pima, Yuma, and Commanche ate the edible pods. The seeds made into a fermented pinole was a favorite intoxicating drink. The Cahuilla gathered the pods in two stages, green or ripe. The green pods were pounded into a juicy pulp and consumed as a summer beverage. The ripe pods were eaten without any processing or were pounded into a flour in a mortar and then placed in a vessel, dampened with water, and left for 24 hours to harden. The meal was formed into cakes and eaten dry, made into a mush, or mixed with water for a beverage. Screwbean mesquite was also a food source for many southwestern tribes. Screwbean mesquite was used by many southwestern tribes in a variety of other ways. The bark and roots had medicinal value and were used to treat wounds. The use of gum, bark, and blossoms as food, medicine, dyes, and in making pottery

have been reported for other southwestern mesquites, but it is uncertain if screwbean mesquite was also used for these purposes. Fourwing saltbush is traditionally important to Native Americans. They ground the seeds for flour. The leaves, placed on coals, impart a salty flavor to corn and other roasted food. Top-growth produces a yellow dye. Young leaves and shoots were used to dye wool and other materials. The roots and flowers were ground to soothe insect bites. The nutritious seed of Indian ricegrass was one of the staple foods of Native American.

Other information

Fourwing saltbush is widely used in rangeland and riparian improvement and reclamation projects, including burned area recovery. It is probably the most widely used shrub for restoration of winter ranges and mined land reclamation. One of Indian ricegrass' greatest values is for stabilizing sites susceptible to wind erosion. It is well adapted to stabilization of disturbed sandy soils in mixes with other species. It is naturally an early invader onto disturbed sandy sites (after and in concert with needle and thread grass). It is also one of the first to establish on cut and fill slopes.

Type locality

Location 1: Clark County, NV	
Township/Range/Section	T23S R55E S10
General legal description	S½ Section 10, T23S. R55E. MDBM. About 2 miles southeast of Stump Spring, along unpaved road road leading from Sandy to Hidden Hills Ranch (south of Pahrump), Clark County, Nevada. This site also occurs in southern Lincoln Counties, Nevada.

Other references

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Contributors

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Approval

Sarah Quistberg, 2/24/2025

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)	P. Novak-Echenique
Contact for lead author	State Rangeland Management Specialist
Date	10/19/2011
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. Number and extent of rills: None

2. Presence of water flow patterns: None

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

4. Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):
Bare Ground 40-50%.

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

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

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) will remain in place except during intense summer convection storms.

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 3 on the sandy 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 single grained. Soil surface colors are light and soils are typified by an ochric epipedon. Organic matter of the surface 2 to 3 inches is typically 1 to 1.5 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., Indian ricegrass]) slow runoff and increase infiltration. Shrub canopy and associated litter break raindrop impact.

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 none.

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 (mesquite) > low shrubs (saltbush) >>

Sub-dominant: associated shrubs > deep-rooted, cool season, perennial bunchgrasses> perennial, rhizomatous grass> deep-rooted, perennial forbs = fibrous, shallow-rooted, annual forbs.

Other:

Additional:

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 35% of total woody canopy; some of the mature bunchgrasses (<20%) have dead centers.

14. Average percent litter cover (%) and depth (in): Between plant interspaces 10-20% and depth ($\pm \frac{1}{4}$ in.)

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) $\pm$ 600 lbs/ac; Spring moisture significantly affects total 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: Potential invaders include red

brome, Mediterranean grass, redstem filaree and annual mustards.

17. **Perennial plant reproductive capability:** All functional groups should reproduce in average (or normal) and above average growing season years. Some functional groups will not reproduce in unfavorable years.
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