

Ecological site R035XC377AZ

Sandy Slopes

10-14" 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): 035X–Colorado Plateau

This ecological site is found in Common Resource Area 35.3 – the Colorado Plateau Sagebrush – Grasslands. The Common Resource Area occurs within the Colorado Plateau Physiographic Province. It is characterized by a sequence of flat to gently dipping sedimentary rocks eroded into plateaus, valleys and deep canyons. Elevations range from 4800 to 6700 feet and precipitation averages 10 to 14 inches. The elevation range is lower (about 4500 to 6000) on the western side of the Colorado Plateau along the Grand Canyon, and moves up about 500 to 800 feet higher on the eastern side in the areas of the Navajo and Hopi Indian Reservations due to rain shadow effects from the Kaibab Plateau and Mogollon Rim. Common vegetation in this region includes Wyoming big sagebrush, Utah juniper, Colorado pinyon - cliffrose, Mormon tea, fourwing saltbush, blackbrush Indian ricegrass, needle and thread, western wheatgrass Galleta, black grama, blue grama, and sand dropseed. Sedimentary rock classes dominate the plateau with volcanic fields occurring for the most part near its margin. The soil temperature regime is mesic and the soil moisture regime is ustic aridic.

Similar sites

R035XC315AZ	Sandy Upland 10-14" p.z.
F035XC323AZ	Sandy Upland 10-14" p.z. (JUOS)

Table 1. Dominant plant species

Tree	(1) <i>Juniperus</i> (2) <i>Pinus edulis</i>
Shrub	(1) <i>Artemisia tridentata</i> ssp. <i>wyomingensis</i> (2) <i>Atriplex canescens</i>
Herbaceous	(1) <i>Bouteloua gracilis</i> (2) <i>Achnatherum hymenoides</i>

Physiographic features

This ecological site occurs on stabilized dunes with steep slopes. The overall slope of the site is 15 to 45 percent, but may include flatter or steeper spots. This ecological site is found on hillslopes, edges of plateaus and valley sides with soils that are deep to very deep to any plant root restricting layer. The surface texture of the soil is generally loamy sand, loamy fine sand or fine sand. Subsurface horizons are generally fine sand or sand.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Escarpment (3) Valley side
Flooding frequency	None
Ponding frequency	None
Elevation	1,460 – 2,040 m
Slope	20 – 50 %
Aspect	N, S, W

Climatic features

Winter summer moisture ratios range from 70:30 to 60:40. Late spring is usually the driest period, and early fall moisture can be sporadic. Summer rains fall from June through September; moisture originates in the Gulf of Mexico and creates convective, usually brief, intense thunderstorms. Cool season moisture from October through May tends to be frontal; it originates in the Pacific and the Gulf of California and falls in widespread storms with longer duration and lower intensity. Precipitation generally comes as snow from December through February. Accumulations above 12 inches are not common but can occur. Snow usually lasts for 3-4 days, but can persist much longer. Summer daytime temperatures are commonly 95 - 100 F and on occasion exceed 105 F. Winter air temperatures can regularly go below 10 F and have been recorded below - 20 F.

Table 3 Representative climatic features

Frost-free period (average)	170 days
Freeze-free period (average)	190 days
Precipitation total (average)	360 mm

Influencing water features

The soil moisture on this ecological site comes from precipitation. The site does not benefit significantly from run-on moisture. The sandy surface texture of the soil allows the site to capture the majority of both gentle winter storms and intense summer thunderstorms with little runoff.

Soil features

The soils associated with this ecological site are deep to very deep to any plant root restricting layer. The surface texture of the soil is generally fine sand, loamy sand to loamy fine sand. Subsurface horizons are generally sand, fine sand, loamy sand and loamy fine sand. Parent material is eolian material and alluvium derived mainly from sandstone. The soil ranges from slightly to moderately alkaline (pH 7.4 to 8.4). The permeability is moderately rapid to rapid and the soil profile can absorb all the moisture the climate can supply. The available water capacity is very low to low. Wind erosion is a severe problem if the vegetative cover is lost. Soil moisture regime is ustic aridic. Soil temperature regime is mesic.

Typical taxonomic units on this site include:

SSA 711 Navajo Mountain Area MU's 35 Pinavetes and 39 Mido;

SSA 713 Chinle Area MU 39 Mido;

SSA 715 Fort Defiance Area AZ/NM MU's 82 & 84 Pinavettes family.

Table 4. Representative soil features

Parent material	(1) Eolian deposits – sandstone
Surface texture	(1) Loamy sand (2) Loamy fine sand (3) Fine sand
Family particle size	(1) Sandy
Drainage class	Excessively drained
Permeability class	Moderately rapid to rapid
Soil depth	150 – 200 cm
Surface fragment cover <=3"	0 – 20 %
Surface fragment cover >3"	0 – 10 %
Available water capacity (0-101.6cm)	6.35 – 10.16 cm
Calcium carbonate equivalent (0-101.6cm)	Not specified
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	Not specified
Soil reaction (1:1 water) (0-101.6cm)	7.4 – 8.4

Ecological dynamics

The plant communities found on an ecological site are naturally variable. Composition and production will vary with yearly conditions, location, aspect, and the natural variability of the soils. The historical climax plant community (HCPC) represents the natural potential of plant communities found on relict or relatively undisturbed sites. Other plant communities described here represent plant communities that are known to occur when the site is disturbed by factors such as grazing, fire, or drought.

Production data provided in this site description is standardized to air-dry weight at the end of the summer growing season. The plant communities described in this site description are based on near normal rainfall years.

NRCS uses a Similarity Index to compare existing plant communities to the plant communities described here. Similarity Index is determined by comparing the production and composition of a plant community to the production and composition of a plant community described in this site description. To determine Similarity Index, compare the production (air-dry weight) of each species to that shown in the plant community description. For each species, count no more than the maximum amount shown for the species, and for each group, count no more than the maximum shown for the group. Divide the resulting total by the total normal year production shown in the plant community description. If rainfall has been significantly above or below normal, use the total production shown for above or below normal years. If field data is not collected at the end of the summer growing season, then the field data must be corrected to the end of the year production before comparing it to the site description. The growth curve can be used as a guide for estimating production at the end of the summer growing season.

The State and Transition model shows the most common occurring plant communities likely to be encountered on this ecological site. This model may not show every possible plant community, but only those that are most prevalent and observed through field inventory. As more data is collected these plant communities may be revised, removed, and some added to reflect the ecological dynamics of this site.

State and transition model

Figure 3. STM - R035XC377AZ

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
0	Cool Season Grasses			112-224	
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	84-140	–
	needle and thread	HECO26	<i>Hesperostipa comata</i>	56-112	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	28-56	–
	muttongrass	POFE	<i>Poa fendleriana</i>	0-28	–
1	Warm Season Grasses			90-179	
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	56-112	–
	sandhill muhly	MUPU2	<i>Muhlenbergia pungens</i>	6-34	–
	James' galleta	PLJA	<i>Pleuraphis jamesii</i>	6-34	–
	black grama	BOER4	<i>Bouteloua eriopoda</i>	6-34	–
	spike dropseed	SPCO4	<i>Sporobolus contractus</i>	0-22	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	0-22	–
	floating bur-reed	SPFL	<i>Sparganium fluctuans</i>	0-22	–
	mesa dropseed	SPFL2	<i>Sporobolus flexuosus</i>	0-22	–
Forb					
2	All Forbs			28-73	
	James' galleta	PLJA	<i>Pleuraphis jamesii</i>	7-62	–
	Forb, perennial	2FP	<i>Forb, perennial</i>	0-22	–
	Forb, annual	2FA	<i>Forb, annual</i>	0-17	–
	beardtongue	PENST	<i>Penstemon</i>	0-11	–

	globemallow	SPHAE	<i>Sphaeralcea</i>	0-11	-
	Wyoming Indian paintbrush	CALI4	<i>Castilleja linariifolia</i>	0-11	-
	rose heath	CHER2	<i>Chaetopappa ericoides</i>	0-11	-
	cryptantha	CRYPT	<i>Cryptantha</i>	0-11	-
	winged buckwheat	ERAL4	<i>Eriogonum alatum</i>	0-11	-
	sand verbena	ABRON	<i>Abronia</i>	0-7	-
	locoweed	OXYTR	<i>Oxytropis</i>	0-6	-
Shrub/Vine					
7	Common Shrubs			78-202	
	Wyoming big sagebrush	ARTRW8	<i>Artemisia tridentata ssp. wyomingensis</i>	11-56	-
	fourwing saltbush	ATCA2	<i>Atriplex canescens</i>	11-56	-
	jointfir	EPHED	<i>Ephedra</i>	6-34	-
	winterfat	KRLA2	<i>Krascheninnikovia lanata</i>	6-34	-
	antelope bitterbrush	PUTR2	<i>Purshia tridentata</i>	6-34	-
	sand sagebrush	ARFI2	<i>Artemisia filifolia</i>	6-34	-
8	Other Shrubs			45-78	
	rubber rabbitbrush	ERNAB2	<i>Ericameria nauseosa ssp. nauseosa var. bigelovii</i>	0-17	-
	broom snakeweed	GUSA2	<i>Gutierrezia sarothrae</i>	0-17	-
	Greene's rabbitbrush	CHGR6	<i>Chrysothamnus greenei</i>	0-17	-
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	0-17	-
	prairie sagewort	ARFR4	<i>Artemisia frigida</i>	0-11	-
	common dunebroom	PAFI4	<i>Parryella filifolia</i>	0-11	-
	frosted mint	POIN3	<i>Poliomintha incana</i>	0-11	-
	narrowleaf yucca	YUAN2	<i>Yucca angustissima</i>	0-6	-
	plains pricklypear	OPPO	<i>Opuntia polyacantha</i>	0-6	-
	Whipple cholla	CYWH	<i>Cylindropuntia whipplei</i>	0-6	-
	sand buckwheat	ERLE9	<i>Eriogonum leptocladon</i>	0-6	-
	Subshrub (<.5m)	2SUBS	<i>Subshrub (<.5m)</i>	0-6	-
Tree					
14	Trees			28-95	
	juniper	JUNIP	<i>Juniperus</i>	17-56	-
	twoneedle pinyon	PIED	<i>Pinus edulis</i>	11-39	-

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 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 8. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 9. Community 3.1 plant community composition

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

This site has limited suitability for grazing by stocker cattle, horses, and sheep during spring, summer and fall with a good variety of plants. In areas of steep slopes, livestock grazing is severely restricted and proper grazing distribution is often impossible to attain. Heavy use may occur in areas where access areas are frequented by livestock. This site provides a great deal of habitat diversity because of the variety of food, topography, exposures and cover for wildlife species. Water can be scarce in natural springs or pockets. Wildlife found on this site include golden eagles, red-tail hawks, badgers, porcupines, ground squirrels, snakes, blacktail jackrabbits, lizards and mule deer.

Recreational uses

Site is typically on edges of escarpments, terraces, valley sides and hills with sandstone parent material. It produces a mix of grasses, shrubs, forbs and a light overstory of trees which can be very picturesque. Winters are cold, however, relatively mild spring, fall and summer months are attractive to recreationists. Activities include hunting, cross-country riding, photography, hiking, and wildlife observation

Other references

Updates and revisions for this ESD were conducted as part of a 2007-2012 Interagency Technical Assistance Agreement between the Bureau of Indian Affairs–Navajo Region and the NRCS-Arizona.

Contributors

Ken Gishi
Larry D. Ellicott

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)	Ken Gishi
Contact for lead author	State Rangeland Management Specialist, NRCS-Arizona State Office, Phoenix, AZ
Date	10/09/2008
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** A few rills may form on steepest slopes.

2. **Presence of water flow patterns:** Somewhat common, probably cover no more than 15% of the area; mostly discontinuous, usually less than 8 feet in length. On steepest slopes water flow patterns may be continuous and as long as 12 feet in length.

3. **Number and height of erosional pedestals or terracettes:** Pedestals and terracettes may be common, especially during a drought, due to high wind erosion hazard of the soils and steepness of soils.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground averages about 50%. Drought may cause an increase in bare ground.

5. **Number of gullies and erosion associated with gullies:** Uncommon, but occasional gullies will form in natural drainages on steeper slopes due to reduced plant cover and lack of rock fragments.

6. **Extent of wind scoured, blowouts and/or depositional areas:** Some wind scoured areas and depositional areas may occur, especially on edges of escarpments and during droughts, due to high wind erosion hazard of the soil. High wind erosion hazard occurs on soils with surface textures of loamy sand, fine sand and sand.

7. **Amount of litter movement (describe size and distance expected to travel):** Herbaceous and fine woody litter will be transported primarily by wind and in water flow pathways. Coarse woody litter will remain under tree and shrub canopies.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil surface texture range from loamy sand to sand. Coarse rock fragments range from 0 to 15 percent and help protect the site. Soil on this site will often have a thin crust (biological or physical) providing some protection against erosion. Soil aggregate stability ratings should average 3 under plant canopies and 2 in the interspaces.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil surface structure is single grain; loose, but some soil surfaces are weakly granular. Surface textures are loamy sand, loamy fine sand and fine sand with thickness ranging from 2-3 inches. Surface color is light brown (7.5YR 6/4) and subsurface is pink (7.5YR 7/4), however color can be variable with hues of 5YR to 7.5YR.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** This site is characterized by scattered plants with a light overstory of trees, generally with less than 15% canopy cover by trees. The plant community consists of about 50% grasses, 35% shrubs, 10% trees and succulents with about 5% forbs. Basal cover range from 5-15% (Grasses>Shrubs>forbs>trees).

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** 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: Cool season bunch grasses > warm season grasses > shrubs

Sub-dominant: forbs >= trees > Opuntia and other succulents

Other:

Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**
All plant functional groups are adapted to survival in all but the most severe droughts. Severe winter droughts affect shrubs and trees the most. Severe summer droughts affect grasses the most.

14. **Average percent litter cover (%) and depth (in):** Litter is a mix of fine herbaceous litter and coarse woody litter. Litter cover and depth will be highest beneath shrubs and trees. Litter cover and depth is lowest in the plant interspaces.

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**
Average annual production on this site is expected to be 500 to 600 lbs/ac in a year of average 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:** Broom snakeweed, rabbitbrush, yucca, Mormon tea, dune broom, and sandhill muhly occur naturally on this site, but can increase with disturbance. Plants that have the potential to invade this site are cheatgrass, ripgut brome and Russian thistle. Both juniper and pinyon pine have the potential to increase and invade a site with overstory canopies reaching up to 30% in the absence of fires and favorable climatic conditions for tree regeneration.

17. **Perennial plant reproductive capability:** All plants native to this site are adapted to the climate and are capable of producing seeds, stolons and rhizomes except during the most severe droughts.
