

Ecological site R035XC337AZ
Sandstone/Shale Upland 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.

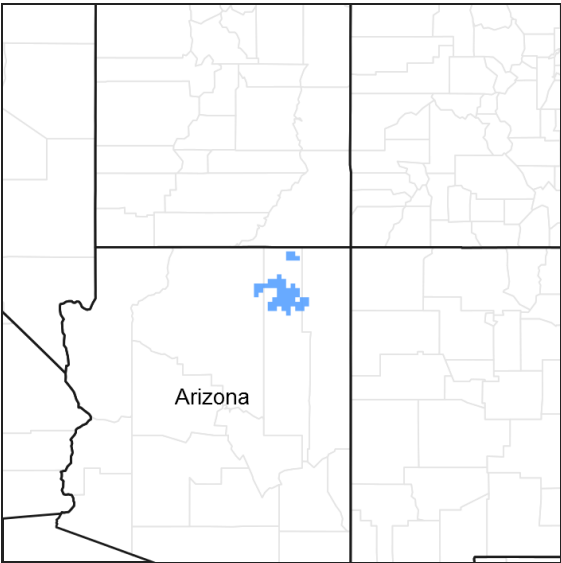


Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

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.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Atriplex confertifolia</i>

Herbaceous	(1) <i>Sporobolus airoides</i> (2) <i>Pleuraphis jamesii</i>
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Physiographic features

This site occurs on shallow soils in an upland position on hill slopes and fan terraces. It neither benefits from run-in, nor suffers from excessive runoff unless denuded of its vegetation.

Table 2. Representative physiographic features

Landforms	(1) Fan (2) Terrace
Flooding duration	Extremely brief (0.1 to 4 hours) to very brief (4 to 48 hours)
Flooding frequency	None to rare
Ponding duration	Very brief (4 to 48 hours)
Ponding frequency	None to rare
Elevation	4,800–6,700 ft
Slope	1–15%
Aspect	Aspect is not a significant factor

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)	168 days
Freeze-free period (average)	193 days
Precipitation total (average)	14 in

Influencing water features

The soil moisture on this ecological site comes from precipitation. The site does not benefit significantly from run-on moisture. Shallow bedrock areas will concentrate water in deeper soil pockets, where most of the vegetation production occurs. Because of the shallow soils, larger rainfall events will not be entirely captured by the site. This site contributes runoff to other ecological sites.

Soil features

Soils are shallow and well drained. They are formed in thin eolian deposits over alluvium or residuum derived dominantly from shale and sandstone. Surface texture are generally fine sandy loam to sandy clay loams. Subsoil is usually clay with 20-75% soft shale fragments. Available water capacity is moderate Water erosion potential is moderate; soil erosion potential is high. Soils are mildly to moderately alkaline (pH 7.4-8.4).

Soil survey map unit components correlated to this ecological site include:

SSA 711 - Navajo Mountain Area 11-Simel, 13-Reef, 39-Zukan;

SSA 713 - Chinle Area 41-Zukan;

Table 4. Representative soil features

Parent material	(1) Alluvium—mudstone (2) Colluvium—sandstone and shale
Surface texture	(1) Very channery sandy clay loam (2) Very channery very fine sandy loam (3) Channery sandy clay loam
Family particle size	(1) Clayey
Drainage class	Moderately well drained to well drained
Permeability class	Moderately slow to slow
Soil depth	5–20 in
Surface fragment cover ≤3"	15–60%
Surface fragment cover >3"	0–20%
Available water capacity (0–40in)	5–7 in
Calcium carbonate equivalent (0–40in)	0–25%
Electrical conductivity (0–40in)	0–2 mmhos/cm
Sodium adsorption ratio (0–40in)	0–5
Soil reaction (1:1 water) (0–40in)	7.4–8.4
Subsurface fragment volume ≤3" (Depth not specified)	20–75%

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 represents the natural potential 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 fire, grazing, 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 amount shown for each group. Divide the resulting total by the total normal year production shown in the plant community description. If the 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

35.3AZ Sandstone/Shale Upland 10-14" p.z. (R035XC337AZ)

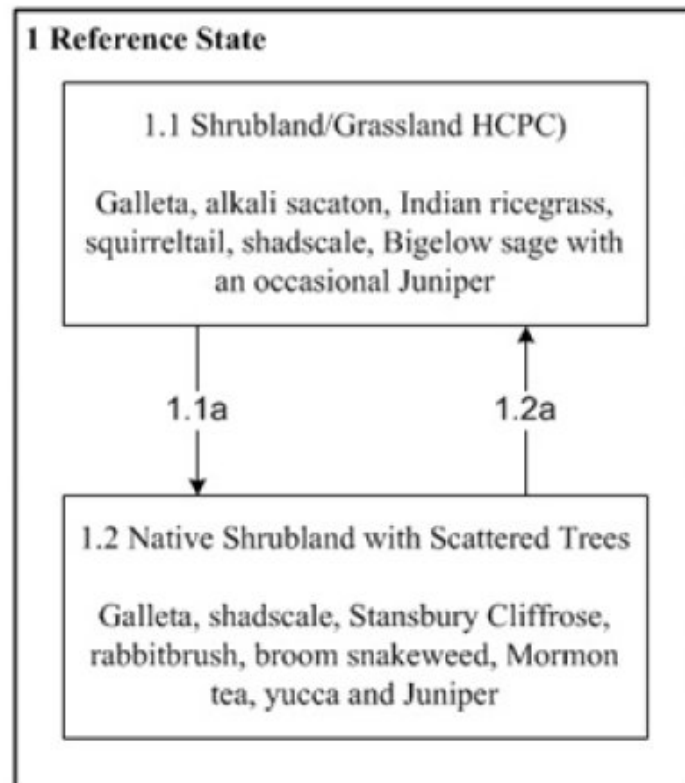


Figure 4. STM - R035XC337AZ

State 1 Reference State

This is a shrubland/grassland plant community that is dominated by shadscale, Bigelow sage, Mormon tea, galleta, alkali sacaton and Indian ricegrass with occasional junipers.

Community 1.1 Shrubland/Grassland (HCPC)



Figure 5. Shale/ Sandstone Upland 10-14" p.z. (Higher Ppt)

This site consists of a plant community primarily a mix of shrubs and grasses with an occasional scattered junipers. In the reference plant community, there is a mixture of cool and warm season grasses. Plant species most likely to increase or invade on this site when it deteriorates are galleta, Russian thistle, Greene's rabbitbrush and broom snakeweed. Continuous livestock grazing during the spring will decrease cool season grasses, which are replaced by lower forage grasses and shrubs. This list of plants and their relative proportions are based on near-normal years. Fluctuations in species composition and relative production may change from year-to-year dependent upon abnormal precipitation or other climatic features. The potential plant community has been determined by study of range relict areas, or areas protected from excessive grazing. Trends in plant communities going from heavily grazed areas to lightly grazed areas, seasonal use pastures and historical accounts have also been used.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	150	225	300
Grass/Grasslike	75	125	175
Forb	15	25	40
Tree	0	10	30
Total	240	385	545

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	0%
Grass/grasslike foliar cover	0%
Forb foliar cover	0%
Non-vascular plants	0%
Biological crusts	0%
Litter	5-12%
Surface fragments >0.25" and <=3"	15-60%
Surface fragments >3"	0-20%
Bedrock	0%
Water	0%
Bare ground	15-35%

Figure 7. Plant community growth curve (percent production by month).
AZ3503, 35.3 10-14" p.z. galleta. Growth begins in spring, most growth occurs during summer and early fall rainy season. Plants will green up again in the fall..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	0	5	20	15	20	30	10	0	0

Figure 8. Plant community growth curve (percent production by month).
AZ3505, 35.3 10-14" p.z. Indian ricegrass. Growth begins in spring, with semi-dormancy occurring during July through August. Plants will green up again in the fall..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	10	20	25	20	5	5	10	5	0	0

Figure 9. Plant community growth curve (percent production by month).
AZ3507, 35.3 10-14" p.z. alkali sacaton. Growth begins in late spring, most growth occurs in summer and early fall..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	20	15	20	30	10	0	0	0

Figure 10. Plant community growth curve (percent production by month). AZ3509, 35.3 10-14" p.z. shadscale saltbush. Growth begins in spring and extends through the summer. Seed set occurs in summer to early fall..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	25	25	15	15	10	5	0	0	0

Community 1.2
Native Shrubland with Scattered Trees

This plant community is comprised of mostly shrubs with scattered grasses with annuals. Shrubs like Greene's rabbitbrush, mormon tea, yucca, snakeweed and shadscale saltbush increase and become dominant. All grasses, mostly cool season grasses, are reduced to and occur widely scattered. There may a trace or minor amounts of non-native annuals in this plant community.

Pathway 1.1a
Community 1.1 to 1.2

Excessive disturbance (ie. grazing, drought) can reduce grass cover and allow various shrubs and annuals to increase.

Pathway 1.2a
Community 1.2 to 1.1

Prescribed grazing is used to aid the increase of native grasses in the plant community.

Additional community tables

Table 7. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	Grasses			75–175	
	James' galleta	PLJA	<i>Pleuraphis jamesii</i>	50–125	–
	alkali sacaton	SPAI	<i>Sporobolus airoides</i>	20–80	–
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	10–40	–
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	0–15	–
	squirreltail	ELELE	<i>Elymus elymoides</i> ssp. <i>elymoides</i>	0–15	–
	needle and thread	HECOC8	<i>Hesperostipa comata</i> ssp. <i>comata</i>	0–15	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	0–15	–
	Grass, perennial	2GP	<i>Grass, perennial</i>	0–10	–
	Grass, annual	2GA	<i>Grass, annual</i>	0–5	–
Forb					
2	Forbs			15–40	
	James' galleta	PLJA	<i>Pleuraphis jamesii</i>	54–90	–
	Forb, perennial	2FP	<i>Forb, perennial</i>	0–20	–
	Forb, annual	2FA	<i>Forb, annual</i>	0–10	–
	rose heath	CHER2	<i>Chaetopappa ericoides</i>	0–5	–
	widewing springparsley	CYPU	<i>Cymopterus purpurascens</i>	0–5	–
Shrub/Vine					
3	Shrubs			150–300	
	shadscale saltbush	ATCO	<i>Atriplex confertifolia</i>	50–125	–
	Bigelow sage	ARBI3	<i>Artemisia bigelovii</i>	25–75	–
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	19–39	–
	Stansbury cliffrose	PUST	<i>Purshia stansburiana</i>	10–30	–
	Torrey's jointfir	EPTO	<i>Ephedra torreyana</i>	10–30	–
	broom snakeweed	GUSA2	<i>Gutierrezia sarothrae</i>	0–20	–
	Greene's rabbitbrush	CHGR6	<i>Chrysothamnus greenei</i>	0–20	–
	Cutler's jointfir	EPCU	<i>Ephedra cutleri</i>	0–10	–
	winterfat	KRLA2	<i>Krascheninnikovia lanata</i>	0–10	–
	Subshrub (<.5m)	2SUBS	<i>Subshrub (<.5m)</i>	0–10	–
	narrowleaf yucca	YUAN2	<i>Yucca angustissima</i>	0–10	–
	banana yucca	YUBA	<i>Yucca baccata</i>	0–10	–
	fourwing saltbush	ATCA2	<i>Atriplex canescens</i>	0–10	–
Tree					
4	Trees			0–30	
	Utah juniper	JUOS	<i>Juniperus osteosperma</i>	0–30	–

Animal community

This site is suitable for grazing by all classes of livestock during most seasons of the year. Planned grazing systems can be readily adapted when this site is involved. This site will seldom be used as a key management area for livestock.

The lack of free water is the most limiting factor to the site. However, even topography and few hiding places also

limit use of the area.

Recreational uses

This site occurs on fan terraces. The somewhat bareness and sparse plant cover of the site provides an interesting scene. Winters are cold and the spring is usually windy. Late spring, summer and fall are the most pleasant for recreational archtiture. Hiking, rock hounding and photography are potential recreation activities.

Type locality

Location 1: Navajo County, AZ	
Township/Range/Section	T27N R18E S7
General legal description	Four mi SE of Polacca on the Hopi Indian Reservation, Arizona

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

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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)	Kenneth Gishi
Contact for lead author	State Rangeland Management Specialist, NRCS-Arizona State Office, Phoenix, AZ
Date	07/05/2012
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

- Number and extent of rills:** Somewhat common, especially on steepest slopes. Rills less than 10 feet long due to fine-textured soils and scattered perennial plant cover. Sites armored with coarse fragments (gravels and channers) will have shorter rills and less frequent.
- Presence of water flow patterns:** Somewhat common throughout site. Water flow patterns may be long with low sinuosity and connected on steeper slopes. On sites armored with coarse fragments will have less evidence of flow

patterns, but still common. Water flow patterns will show some signs of deposition.

3. **Number and height of erosional pedestals or terracettes:** Some long-lived plants may show some slight pedestals of less than a ½" on slopes and edges of flow paths. Terracettes are common.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Expected bare ground range 15-35 percent depending on surface fragments. Well developed, intact biological crust should not be counted as bare ground. Rock fragment cover can range up to 75 percent.

5. **Number of gullies and erosion associated with gullies:** None to very few. When site is well vegetated and covered with rock fragments gullies are stable and will only show minor signs of active erosion.

6. **Extent of wind scoured, blowouts and/or depositional areas:** Deposition and blowouts by wind are not expected.

7. **Amount of litter movement (describe size and distance expected to travel):** Litter movement or redistribution by water is common and expected in water flow patterns due to steepness of slopes. Some litter removal in water flow patterns is expected.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** The expected average soil stability is 3. Surface fragments, litter, and vegetation cover aid in reducing erosion.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil surface horizon is 2 to 4 inches deep. Structure is mostly weak thin platy parting to moderate very fine granular structure. See specific soil survey for additional site information.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** This site is characterized by a relatively even distribution of perennial grasses with scattered half-shrubs, forbs, large shrubs and widely scattered tress. The vegetation when well distributed across the site lends to slowing runoff and allowing for moderate infiltration.

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: Warm season perennial grasses (Alkali sacaton & galleta) > Half Shrubs (Shadscale saltbush, Bigelow sage)

Sub-dominant: Cool season perennial grasses > Large shrubs (fourwing saltbush, Stansbury cliffrose)

Other: Forbs > Trees

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 the shrubs the most. Severe summer droughts affect grasses the most.
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14. **Average percent litter cover (%) and depth (in):** Litter amounts can increase following wet years and decrease during drought years.
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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** The expected annual total production in an average year is 350 – 450 lbs/ac.
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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:** Shadscale saltbush, broom snakeweed and rabbitbrush are all native to the site, but may have the potential to increase with continued disturbance. Cheatgrass, annual wheatgrass, and Russian thistle are non-native annuals that have the potential to invade the site with or without disturbance.
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17. **Perennial plant reproductive capability:** All plants native to the site are adapted to the climate and are capable of producing seeds, stolons, and/or rhizomes during the most severe droughts.
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