USDA Natural Resources
Conservation Service

Ecological site DX035X01I104
Clay Loam Wash 10-14" p.z.

Accessed: 05/09/2024

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.

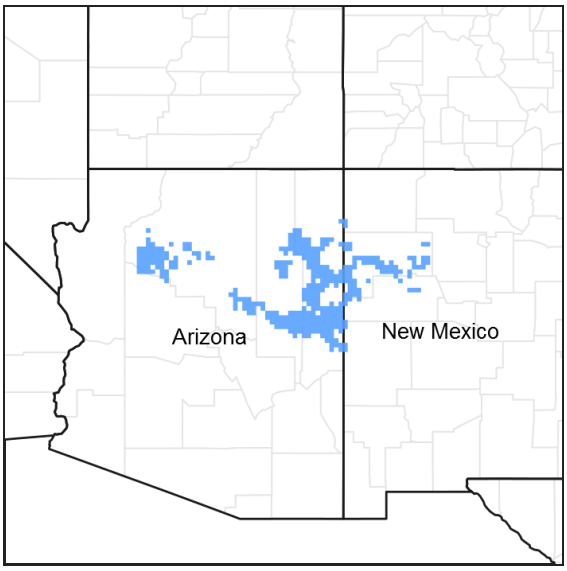

Figure 1. Mapped extent

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

“PROVISIONAL ecological site concepts developed and described. See Project Plan [insert Project Plan Name] for more details and related milestones.”

This ecological site occurs in Land Resource Area 35.1 - the Colorado Plateau Mixed Grass Plains

Elevations range from 5300 to 6500 feet and precipitation averages 10 to 14 inches per year. Vegetation includes Stipa species, Indian ricegrass, galleta, and blue grama, fourwing saltbush, winterfat, and cliffrose. The soil temperature regime is mesic and the soil moisture regime is ustic aridic. This unit occurs within the Colorado Plateau Physiographic Province and is characterized by a sequence of flat to gently dipping sedimentary rocks eroded into plateaus, valleys and deep canyons. Sedimentary rock classes dominate the plateau with volcanic fields occurring for the most part near its margin.

Ecological site concept

“ATTENTION: This ecological site meets the requirements for PROVISIONAL (if not more). A provisional ecological site is established after ecological site concepts are developed and an initial state-and-transition model is drafted. A provisional ecological site typically will include literature reviews, land use history information, legacy data (prior

approved range site descriptions, forage suitability groups, woodland suitability groups, etc.,) , and includes some soils data, and estimates for canopy and/or species composition by weight,. A provisional ecological site provides the conceptual framework of soil-site correlation for the development of the ESD. For more information about this ecological site, please contact your local NRCS office."

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Atriplex canescens*
Herbaceous	(1) *Sporobolus airoides* (2) *Pascopyrum smithii*

Legacy ID

R035XA104AZ

Physiographic features

Site occurs in a bottom position on floodplains, valley floors, stream terraces and drainageways and benefits significantly from run-in moisture from adjacent areas.

Table 2. Representative physiographic features

Landforms	(1) Valley floor (2) Stream terrace (3) Flood plain
Flooding duration	Extremely brief (0.1 to 4 hours) to very brief (4 to 48 hours)
Flooding frequency	None to occasional
Elevation	1,463–1,920 m
Slope	0–5%
Aspect	Aspect is not a significant factor

Climatic features

50-60% of moisture falls as rain Jul-Sep and is the most effective moisture for plant growth. The remaining moisture comes as snow during the winter.

Mean temperature for the hottest month (Jul) is 72 F; for the coldest month (Jan) is 32 F. Extreme temperatures of 105 F and -28F have been recorded. Long periods with little or no effective moisture are relatively common.

Cool season plants begin growth in early spring and mature early summer. Warm season plants take advantage of summer rains and are growing and nutritious from Jul-Sep.

Table 3. Representative climatic features

Frost-free period (average)	160 days
Freeze-free period (average)	180 days
Precipitation total (average)	330 mm

Influencing water features

Soil features

Soils grouped together in this site are deep to plant root restricting layers. The surface horizons typically have

textures of clay loam to clay about 2 - 6 inches thick. The subsurface horizons have textures of clay loam to clay and contain very little gravel. Some soils may have stratified layers of coarser textures in the subsurface. The soil normally can absorb and hold most of the moisture the climate supplies. Soluble salts are low. Soil reaction ranges from mildly to moderately alkaline (pH 7.4 to 8.4).

Typical taxonomic units include:

SSA Central Coconino County - Rune MU's 037, 038;
SSA Central Navajo County - Nuffel MU 043, Bagley MU 004;
Central Apache County - Shay MU Sh, Tours MU's TmC, TO, TrA, TrB, Navajo NaB, NaC, NC, NdA, NdB, NdC and SSA-715 Fort Defiance Area MU 104 Wenota.

Table 4. Representative soil features

Parent material	(1) Alluvium–sandstone and shale
Surface texture	(1) Clay loam (2) Clay
Family particle size	(1) Clayey
Drainage class	Moderately well drained to well drained
Permeability class	Moderately slow to very slow
Soil depth	102–152 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	5.08–15.24 cm
Calcium carbonate equivalent (0-101.6cm)	0%
Electrical conductivity (0-101.6cm)	0 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	7.4–8.4
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

The historic climax plant community (HCPC) for a site in North America is the plant community that existed at the time of European immigration and settlement. It is the plant community that was best adapted to the unique combination of environmental factors associated with the site. The historic climax plant community was in dynamic equilibrium with its environment. It is the plant community that was able to avoid displacement by the suite of disturbances and disturbance patterns (magnitude and frequency) that naturally occurred within the area occupied by the site. Natural disturbances, such as drought, fire, grazing of native fauna, and insects, were inherent in the development and maintenance of these plant communities. The effects of these disturbances are part of the range of characteristics of the site that contribute to that dynamic equilibrium. Fluctuations in plant community structure and function caused by the effects of these natural disturbances establish the boundaries of dynamic equilibrium. They are accounted for as part of the range of characteristics for an ecological site. Some sites may have a small range of variation, while others have a large range.
The historic climax plant community of an ecological site is not a precise assemblage of species for which the proportions are the same from place to place or from year to year. In all plant communities, variability is apparent in

productivity and occurrence of individual species. Spatial boundaries of the communities; however, can be recognized by characteristic patterns of species composition, association, and community structure. The HCPC for this ecological site has been estimated by sampling relict or relatively undisturbed sites and/or reviewing historic records.
Plant communities that are subjected to abnormal disturbances and physical site deterioration or that are protected from natural influences, such as fire and grazing, for long periods seldom typify the historic climax plant community. The physical site deterioration caused by the abnormal disturbance results in the crossing of a threshold or irreversible boundary to another state, or equilibrium, for the ecological site. There may be multiple thresholds and states possible for an ecological site, determined by the type and or severity of abnormal disturbance. The known states and transition pathways for this ecological site are described in the accompanying state and transition model.
The Plant Community Plant Species Composition table provides a list of species and each specie's or group of species' annual production in pounds per acre (air-dry weight) expected in a normal rainfall year. Low and high production yields represent the modal range of variability for that species or group of species across the extent of the ecological site.
The Annual Production by Plant Type table provides the median air-dry production and the fluctuations to be expected during favorable, normal, and unfavorable years.
The present plant community on an ecological site can be compared to the various common vegetation states that can exist on the site. The degree of similarity is expressed through a similarity index. To determine the similarity index, compare the production 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 representative value shown in the Annual Production by Plant Type table for the reference plant community. Variations in production due to above or below normal rainfall, incomplete growing season or utilization must be corrected before comparing it to the site description. The Worksheet for Determining Similarity Index is useful in making these corrections. The accompanying growth curve can be used as a guide for estimating percent of growth completed.

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

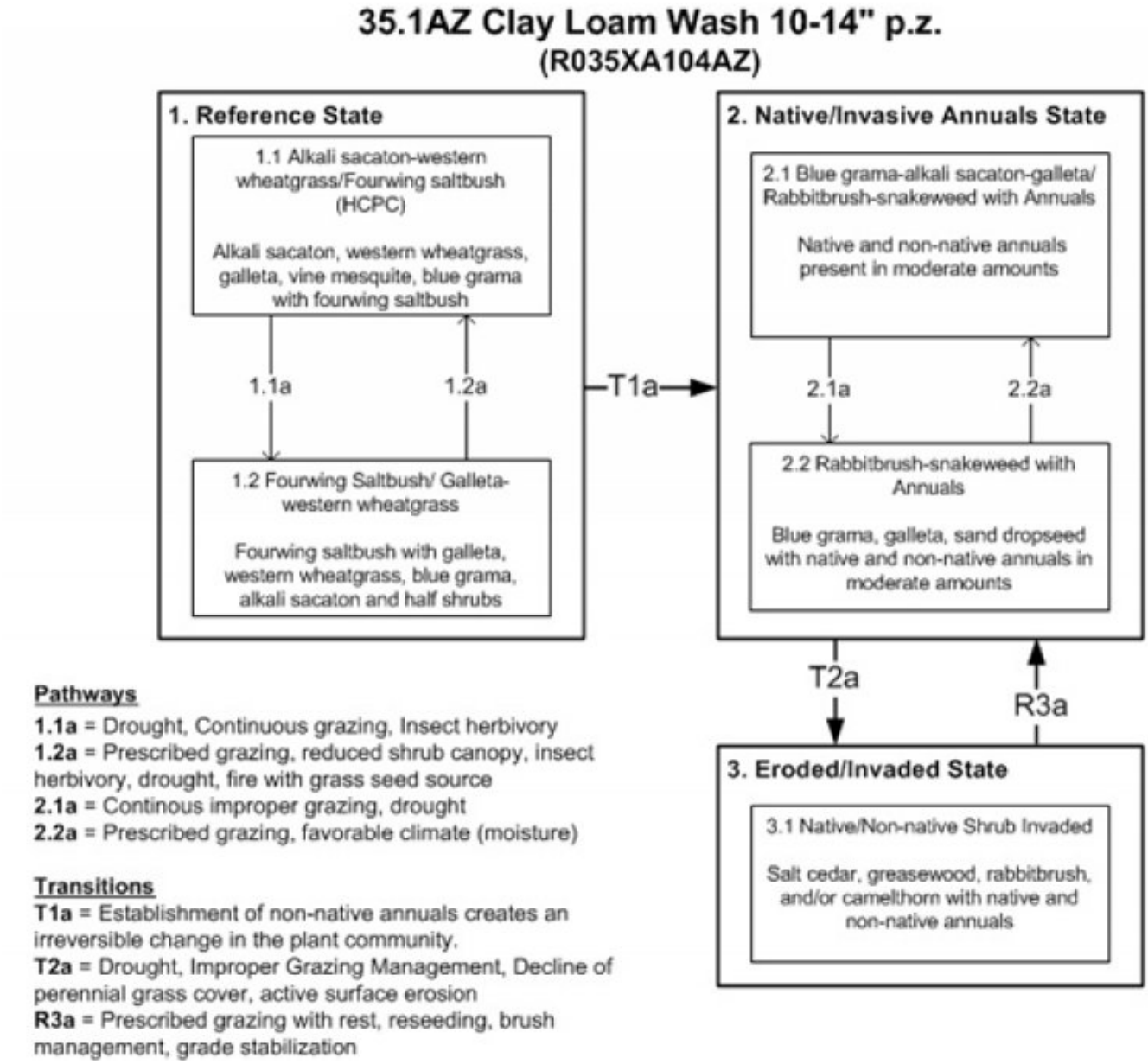

Figure 4. State and Transition - R035XA104AZ

State 1
Reference State

The reference state was described by the observation and study of plant communties that have evolved through a long-term interactions of natural disturbances processes, climate, soils and landforms. This reference state is characterized as a native mid and short grassland dominated by alkali sacaton and western wheatgrass.

Community 1.1
Alkali sacaton-western wheatgrass/Fourwing saltbush (HCPC)

Figure 5. Alkali sacaton grassland (Dormant)

This plant community is about 70 to 80% grasses, 5 to 10% forbs, and 10 to 20% shrubs based on air dry weight. Alkali sacaton dominates the plant community, making up to 40% of the total annual production of the site. Western wheatgrass is the subdominant. blue grama, galleta grass, vine mesquite, sideoats grama grass, fourwing saltbush and winterfat are important indigenous components. If retrogression is from unmanaged grazing, alkali sacaton, western wheat, vinemesquite, and sideoats grama decrease. Three awn, tumble grass, ring muhly, burrograss and inferior forbs and shrubs can increase. Plant species most likely to increase on a deteriorating condition are rabbitbrush, broom snakeweed, wooly groundsel, annuals and cacti.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1009	1681	2354
Shrub/Vine	224	364	504
Forb	112	196	280
Total	**1345**	**2241**	**3138**

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	15-35%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	20-40%

Table 7. Soil surface cover

Tree basal cover	0%
Shrub/vine/liana basal cover	1-5%
Grass/grasslike basal cover	10-25%

Forb basal cover	1-5%
Non-vascular plants	0%
Biological crusts	0%
Litter	0%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	0%

Table 8. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	0-2%	0-5%	0-2%
>0.15 <= 0.3	–	0-2%	0-15%	0-2%
>0.3 <= 0.6	–	0-2%	0-7%	0-1%
>0.6 <= 1.4	–	0-1%	0-1%	–
>1.4 <= 4	–	–	–	–
>4 <= 12	–	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

Figure 7. Plant community growth curve (percent production by month). AZ3511, 35.1 10-14" p.z. all sites. Growth begins in the spring and continues through the summer, most growth occurs during the summer rainy season.
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Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	1	5	11	18	25	24	13	3	0	0

Figure 8. Plant community growth curve (percent production by month). AZ5102, 35.1 10-14" p.z. blue grama. Growth occurs mostly in summer and early fall during the rainy season..

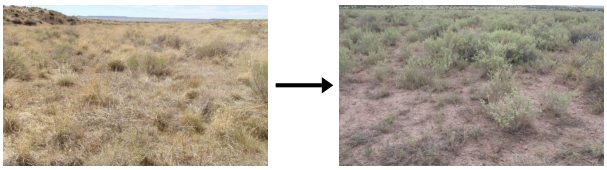
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	5	15	30	30	15	0	0	0

Community 1.2
Fourwing saltbush/Galleta-western wheatgrass

Figure 9. Fourwing shrubland

The aspect of this plant community is a shrubland. The plant community is dominated by fourwing saltbush with galleta, western wheatgrass and lesser amounts of alkali sacaton. Unmanaged grazing, run-in moisture/rare flooding, lack of fire and drought can maintain the shrub component.

Pathway 1.1a
Community 1.1 to 1.2



Alkali sacaton-western wheatgrass/Fourwing saltbush (HCPC)

Fourwing saltbush/Galleta-western wheatgrass

Drought, lack of fire, unmanaged grazing, insect herbivory

Pathway 1.2a
Community 1.2 to 1.1

Fourwing saltbush/Galleta-western wheatgrass

Alkali sacaton-western wheatgrass/Fourwing saltbush (HCPC)

Prescribed grazing, reduction of shrub canopy through drought, insect herbivory, or fire with a seed source for grasses along with periods of favorable moisture can return the plant community to the historic climax plant community

State 2
Native/ Invasive State

This state is characterized by a dominance of warm season grasses and half shrubs with moderate amounts of native and non-native annuals. Common species in this state include galleta, blue grama, alkali sacaton, rabbitbrush and snakeweed.

Community 2.1
Blue grama-alkali sacaton-galleta/Rabbitbrush-snakeweed with Annuals

This plant community is characterized by a dominance of warm season short and mid grasses with an increase of

shrubs like rabbitbrush and snakeweed along with native and non-native annual forbs. Non-native annuals have become well established and can make up to 20% of the plant community by weight. Favorable species, such as western wheatgrass and fourwing saltbush may only be present in minor amounts. Occasional invasive shrubs/trees may occupy the site along drainages and channels in small isolated clumps. Disturbances such as unmanaged grazing, severe drought, past farming activities or other activities have alter the drainages and results in a reduction of beneficial run-in moisture. Grass cover is reduced along with increased bare ground which allows annuals to increase.

Community 2.2
Rabbitbrush-snakeweed with Annuals

This plant community is characterized by a dominance of shrubs like rabbitbrush and snakeweed along with native and non-native annual forbs. Non-native annuals have become well established and can make up to 30% of the plant community by weight. Favorable species, such as alkali sacaton, western wheatgrass and fourwing saltbush may only be present in minor amounts. Occasional invasive shrubs/trees may occupy the site along drainages and channels in small stands or clumps. Disturbances such as unmanaged grazing, severe drought, past farming activities or other activities have alter the drainages and results in a reduction of beneficial run-in moisture. Perennial grass cover is reduced along with increased bare ground which allows annuals to increase and co-dominate.

Pathway 2.1a
Community 2.1 to 2.2

Unmanaged grazing and drought. Increased bare ground and runoff along with reduced run-in moisture allows for increase of shrubs and annuals

Pathway 2.2a
Community 2.2 to 2.1

Prescribed grazing, favorable periods of moisture, and seed source for perennial grass recovery

State 3
Eroded/ Invaded State

This state is characterized by the invasion of native and non-native shrubs and active erosion. The site has lost the ability to capture and store moisture due to entrenched channels and gullies.

Community 3.1
Native/Non-native Shrub Invaded

This site is characterized by a dominance of shrubs, such as rabbitbrush, snakeweed and fourwing saltbush with occasional invasive species. Invasive shrubs/trees, such as tamarisk (salt cedar), camelthorn, Russian knapweed and/or Russian olive can occupy the site along drainages and entrenched channels in small stands. This plant community no longer benefits from extra run-in moisture and/or flooding. Active channel down cutting has drained the site and perennial grass cover is significantly reduced. Native and non-native forbs can make up to 30% of the plant community by weight.

Transition T1A
State 1 to 2

Establishment of non-native annuals creates an irreversible change in the plant community. Other disturbances such as unmanaged grazing, drought and/or lack of fire all allow for the establishment of native and non-native annuals.

Transition T2A
State 2 to 3

Drought, unmanaged grazing, decline or loss of perennial grass cover, active surface erosion create entrenched channels with headcutting

Restoration pathway R3A
State 3 to 2

Managed grazing, woody species management (chemical, biological and/or mechanical) to control invasive shrubs and/or trees, reseeding of favorable species, grade stabilization.

Additional community tables

Table 9. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Dominant grasses**			897–2018	
	alkali sacaton	SPAI	*Sporobolus airoides*	448–897	–
	western wheatgrass	PASM	*Pascopyrum smithii*	336–673	–
	James' galleta	PLJA	*Pleuraphis jamesii*	112–336	–
	blue grama	BOGR2	*Bouteloua gracilis*	112–336	–
	vine mesquite	PAOB	*Panicum obtusum*	112–336	–
2	**Other grasses**			224–504	
	sideoats grama	BOCU	*Bouteloua curtipendula*	11–90	–
	spike dropseed	SPCO4	*Sporobolus contractus*	11–90	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	11–90	–
	squirreltail	ELELE	*Elymus elymoides ssp. elymoides*	6–67	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	0–67	–
	threeawn	ARIST	*Aristida*	0–45	–
	mat muhly	MURI	*Muhlenbergia richardsonis*	0–45	–
	ring muhly	MUTO2	*Muhlenbergia torreyi*	0–45	–
	spike muhly	MUWR	*Muhlenbergia wrightii*	0–45	–
	burrograss	SCBR2	*Scleropogon brevifolius*	0–45	–
	tumblegrass	SCPA	*Schedonnardus paniculatus*	0–45	–
	Grass, annual	2GA	*Grass, annual*	0–45	–
	Grass, perennial	2GP	*Grass, perennial*	0–45	–
Forb					
3	**All forbs**			112–303	
	threeawn	ARIST	*Aristida*	13–84	–
	Forb, annual	2FA	*Forb, annual*	22–67	–
	Forb, perennial	2FP	*Forb, perennial*	22–67	–
	burrograss	SCBR2	*Scleropogon brevifolius*	10–62	–
	tumblegrass	SCPA	*Schedonnardus paniculatus*	10–62	–
	Rocky Mountain beeplant	CLSE	*Cleome serrulata*	0–22	–
	western tansymustard	DEPI	*Descurainia pinnata*	0–22	–
	globemallow	SPHAE	*Sphaeralcea*	0–22	–

	common sunflower	HEAN3	*Helianthus annuus*	0–22	–
	woolly plantain	PLPA2	*Plantago patagonica*	0–22	–
	little hogweed	POOL	*Portulaca oleracea*	0–11	–
	kiss me quick	POPI3	*Portulaca pilosa*	0–11	–
	ragwort	SENEC	*Senecio*	0–11	–
	fleabane	ERIGE2	*Erigeron*	0–11	–
	spurge	EUPHO	*Euphorbia*	0–11	–
	Texas croton	CRTE4	*Croton texensis*	0–11	–
	flatspine bur ragweed	AMAC2	*Ambrosia acanthicarpa*	0–11	–
	milkvetch	ASTRA	*Astragalus*	0–11	–
	whitemargin sandmat	CHAL11	*Chamaesyce albomarginata*	0–11	–
Shrub/Vine					
4	**Dominant shrub**			112–336	
	fourwing saltbush	ATCA2	*Atriplex canescens*	112–336	–
5	**Other shrubs**			56–224	
	winterfat	KRLA2	*Krascheninnikovia lanata*	11–90	–
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	6–67	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	6–45	–
	shadscale saltbush	ATCO	*Atriplex confertifolia*	0–45	–
	pale desert-thorn	LYPA	*Lycium pallidum*	0–45	–
	rough menodora	MESC	*Menodora scabra*	0–45	–
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–45	–
	Subshrub (<.5m)	2SUBS	*Subshrub (<.5m)*	0–22	–
	prairie sagewort	ARFR4	*Artemisia frigida*	0–22	–
	pricklypear	OPUNT	*Opuntia*	0–22	–
	woolly groundsel	PACA15	*Packera cana*	0–22	–
	greasewood	SAVE4	*Sarcobatus vermiculatus*	0–22	–
	Greene's rabbitbrush	CHGR6	*Chrysothamnus greenei*	6–22	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	6–22	–
	Whipple cholla	CYWH	*Cylindropuntia whipplei*	0–22	–

Animal community

Site is favorable for grazing throughout most of the year except when snow cover restricts availability of forage. With continuous grazing use during winter and spring, the relatively scarce cool season mid grasses are replaced by rabbit brush, snakeweed and lower value forbs and grasses. Planned grazing systems adapt well to use on this site.

The potential plant community produced by this site provides food for those species of wildlife that utilize grass as a major portion of their diet. When vegetative retrogression occurs, unpalatable shrubby species increase and some wildlife species may be benefit

Recreational uses

Site is found in grassy swales and flood plains. If not disturbed it is characterized by open grasslands interspersed with a few flowering forbs and shrubs giving such activities as hiking, horseback riding, and camping a pleasant view. Hunting is also a use here. The winters are cold but relatively mild summers make the site an enjoyable recreation site.

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
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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)	Karlynn Huling (2005 original author), Kenneth Gishi (2012 contributor)
Contact for lead author	State Rangeland Management Specialist, NRCS State Office, Phoenix, AZ
Date	08/27/2012
Approved by	Byron Lambeth
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Very few expected due to the high plant cover potential of this site. Rills may occur due to finer textures, slow permeability, medium runoff, moderate to high shrink/swell (cracking) characteristic of many soils and rare to occasional flooding. The number and length of rills will be limited by the low slopes on the site.

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2. **Presence of water flow patterns:** Water flow patterns (and occasional ponding) may be common due to the slow permeability of the soils. Water flow patterns should be short and shallow.

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3. **Number and height of erosional pedestals or terracettes:** Few expected, Pedestals should be very short and along water flow patterns. Terracettes should also be very short and stop at obstructions.

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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 is expected to be less than 20-40%.

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5. **Number of gullies and erosion associated with gullies:** Very few expected. Due to occasional flooding and extra run-on moisture a few gullies can form in areas where water flow is concentrated from adjacent uplands. There should be no active erosion and there will be vegetation stabilizing the gully.

6. **Extent of wind scoured, blowouts and/or depositional areas:** None expected.

7. **Amount of litter movement (describe size and distance expected to travel):** None expected. During or after severe droughts, a few minor areas of deposition or hummock clay deposits may be present.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil surface textures range from sandy clay loam to clay, but are mostly silty clay loam and sandy clay loam. The expected soil stability average ranges between 3-4. When well vegetated and not subjected to severe flood events, these soils have a low to moderate resistance to water erosion and a moderate resistance to wind erosion.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil surface structure is usually massive or granular (moderate, fine to medium). It may occasionally be platy (weak to moderate, medium to thick) or subangular blocky (weak, fine). Surface horizon thickness is generally 2 to 8 inches. Some soils may have been altered by past farming practices and have altered soil structure and thickness. Color is variable depending upon parent material.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** The site is characterized by a relatively even distribution of vegetation dominated by grasses with some shrubs. This plant community structure is highly effective at capturing and storing precipitation.

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None. Due to the sites position on the landscape, it accumulates finer particles such silts and clays. The associated soil structure is platy or subangular blocky in the soil subsurface. These should not be considered to be compaction layers.

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 bunchgrasses >>

    Sub-dominant: Warm season colonizing grasses > Cool season colonizing grasses >

    Other: Large shrubs > Forbs > Cool season bunchgrasses = Half shrubs > Cacti

    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 the most. Severe summer droughts affect grasses the most.

14. **Average percent litter cover (%) and depth (in):** Litter cover is mostly fines with depths usually less than ½". Litter depths will be the greatest under canopies. Of the total litter amount, it would be expected that approximately 80-90% would be herbaceous litter and 10-20% would be woody litter. Litter amounts increase during the first few years of drought, then decrease in later years.

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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 1600 to 2400 lbs/ac. in a year of average annual precipitation.

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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:** Ring muhly, tumble grass, burrograss, snakeweed and rubber rabbitbrush are all native to the site, but they have the potential to increase and dominate the site after unmanaged grazing or surface disturbance. Russian thistle, filaree and cheatgrass are non-native annuals that can invade with or without disturbance.

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17. **Perennial plant reproductive capability:** All plants native to this site are adapted and are capable of producing seeds, stolons and rhizomes in all but the most severe drought.
