

Ecological site R035XC319AZ Limestone/Sandstone 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

Common Resource Area 35.3 - Colorado Plateau Sagebrush - Grasslands

This Common Resource Area 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. Elevations for the Common Resource Area where this ecological site may occur 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 edge 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.

Associated sites

R035XC308AZ	Limestone/Sandstone Hills 10-14" p.z. Hills of shallow to very shallow soils, often steeper with substantial rock outcrop.
R035XC313AZ	Loamy Upland 10-14" p.z. Moderately deep to very deep soils, often found in drainageways and valleys as part of a complex.
R035XC342AZ	Gypsum Hills 10-14" p.z. Sites where the limestone/sandstone bedrock has weathered away and a gypsiferous formation underneath has been exposed.

Similar sites

R035XC301AZ	Basalt Upland 10-14" p.z.
	Basalt is the restricting bedrock and soil textures are fine-loamy, usually clayloam.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) Atriplex confertifolia
Herbaceous	(1) Achnatherum hymenoides (2) Pleuraphis jamesii

Physiographic features

This site occurs on gently rolling plateaus and structural benches; it includes the summits, backslopes, and toeslopes that are shallow (usually 14 inches or more) to moderately deep (usually under 25inches). The surface texture is dominantly loam, but can be fine sandy loam or sandy clay loam. The surface is also usually gravelly or very gravelly, but small areas may be non-gravelly or extremely gravelly. Rock outcrop is uncommon, but can be present. Slope range is most often 1 to 15 percent, but may be as high as 25 percent at times. This site occurs on all aspects.

Table 2. Representative physiographic features

Landforms	(1) Plateau(2) Structural bench(3) Hill
Flooding frequency	None
Ponding frequency	None
Elevation	4,800–6,700 ft
Slope	0–15%
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
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Freeze-free period (average)	193 days
Precipitation total (average)	14 in

Influencing water features

The soil moisture on this site is from precipitation. The site does not benefit from run-on moisture. Bedrock on the site may concentrate water in deeper soil pockets, increasing productivity on those areas.

Soil features

The soils characterizing this site are shallow (<20")to bedrock. There may be small areas with deeper soil pockets. Rock outcrop is uncommon. The surface texture is dominantly loam, but can be fine sandy loam or sandy clay loam. The soil is also generally gravelly to very gravelly at the surface; it may be extremely gravelly (chert bed areas) or non-gravelly (sandstone or toe-slope areas) in some places. The sub-soil is usually very to extremely gravelly and coarse-loamy. This soil has a calcic horizon that is occasionally a petrocalcic; most often, bedrock is the restricttive feature. At the surface the soil is typically non-effervescent to slightly effervescent, but there may be small patches that have strong effervescence. Cryptobiotic crusts have a minor presence at times.

Soils map unit components correlated to this site are:

Shivwits Area (AZ623) 45-Mellenthin, 46-Mellenthin, 48-Mellenthin;

Mohave County NE part (AZ625) 6-Bond 7- Bond, 17-Havasupai, 25-Klondike, 17-Mellonthin, 30-Mellonthin, 31-Mellonthin, 32-Mellonthin, 35-Mellonthin 41 Mellonthin;

Coconino County North Kaibab part (AZ629) 10-Curhollow, 23-Klondike, 10-Mellenthin 25-Mellenthin;

Hualapai/Supai Area (AZ699) 7-Curhollow, 9-Curhollow, 7-Puertecito, 9-Tenderfoot;

Grand Canyon Area (AZ701) 27-Curhollow, 28-Curhollow, 29-Curhollow, 31-Curhollow, 26-Curhollow (family), 30-Curhollow (family), 27-Mellenthin, 26-Mellenthin (family), 30-Mellenthin (family), 30-Puertecito (family), 97-Puertecito (family), 81-Tassi, 121-Tassi (gravelly loam very find sand), 31-Tenderfoot;

Little Colorado River Area (AZ707) 26-Mellenthin 29-Merishiticia, 29-Tassi, 60-Tassi

Shiprock Area NM/AZ (AZ717) 319-Lavellga and 310-Millett

Table 4. Representative soil features

Parent material	(1) Alluvium–limestone
Surface texture	(1) Gravelly loam(2) Stony loam(3) Extremely gravelly loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately slow to moderate
Soil depth	10–20 in
Surface fragment cover <=3"	20%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	1.22–1.6 in
Calcium carbonate equivalent (0-40in)	10–35%

Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	7.4–8.4
Subsurface fragment volume <=3" (Depth not specified)	30%
Subsurface fragment volume >3" (Depth not specified)	5%

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 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 and research is available, these plant communities may be revised, removed, and even added to reflect the ecological dynamics of this site.

State and transition model

35.3AZ Shallow Loamy 10-14" p.z. (R035XC319AZ)



Figure 4. State and Transition Model - R035XC319AZ

State 1 Reference State

Community 1.1 Historic Climax Plant Community



Figure 5. 35.3 Limestone/Sandstone Upland 10-14" p.z.

The interpretive plant community for this site is HCPC. This community has a large component of warm season perennial grasses along with a much smaller component of cool season perennial grasses. Mid-shrubs are also a large part of the community and big sagebrush is a dominant shrub; it may comprise as much as one-third of the

total plant community. Taller shrubs and short trees are scattered across the site. Trees may become more plentiful near the upper boundary of the Land Resource Unit (LRU). Black sagebrush will occasionally replace big sagebrush in transitions areas and along the rims of high plateaus.

 Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	230	285	350
Shrub/Vine	150	200	260
Tree	5	30	60
Forb	10	25	40
Total	395	540	710

Figure 7. Plant community growth curve (percent production by month). AZ3531, 35.3 10-14" p.z. all sites. Growth begins in the spring and continues through the summer..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	1	3	17	18	10	19	20	10	1	1	0

Community 1.2 Sagebrush - Other Shrubs with Some Grasses

State 2 Dense Sagebrush State

Community 2.1 Sagebrush Dominated - Loss of Perennial Grasses

This state developed under the influences of long-term lack of fire and a pattern of continuous heavy grazing. It is a stable plant community and will not shift significantly toward the HCPC simply because of short-term climate fluctuation or changes in grazing management. By itself, fire may shift the plant community toward domination by annuals, most of them exotic; seeding (native and/or naturalized) is often necessary to shift the plant community back toward a significant perennial grass component. Other types of brush management, such as herbicides, can be effective at restoring a grassland community if the remaining perennial grass component is well distributed across the site.

Table 6. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	388	436	484
Tree	6	56	108
Grass/Grasslike	6	44	81
Forb	0	14	27
Total	400	550	700

Table 7. Ground cover

Tree foliar cover	0-2%
Shrub/vine/liana foliar cover	3-5%
Grass/grasslike foliar cover	1-5%
Forb foliar cover	0-1%
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 (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	-	-	-	-
>0.5 <= 1	-	-	1-5%	0-2%
>1 <= 2	-	-	-	-
>2 <= 4.5	-	20-30%	-	-
>4.5 <= 13	0-10%	_	-	_
>13 <= 40	-	-	-	-
>40 <= 80	-	_	-	-
>80 <= 120	-	-	-	-
>120	-	_	-	-

Figure 9. Plant community growth curve (percent production by month). AZ3531, 35.3 10-14" p.z. all sites. Growth begins in the spring and continues through the summer..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	1	3	17	18	10	19	20	10	1	1	0

State 3 Cheatgrass - Annual Forbs State

Community 3.1 Invasion by Exotic Annuals

This state can result if this site burns when it has a plant community dominated by big sagebrush. Fires burn very hot and can remove the perennial vegetation completely. If there is a seed source for exotic annuals on the site, particularly cheatgrass brome (*Bromus tectorum*), the annuals cand dominate the site very quickly. The site has the potential to remain dominated by annuals for a long period of time.

State 4 Introduced Grasses with Shrubs State

Community 4.1 Introduced Seeded Perennial Grasses

Areas of dense sagebrush that have burned or that have had the sagebrush physically removed may be seeded to get perennial species established before invading annuals become dominant on the site. adapted grasses such as crested wheatgrass, Russian wildrye, and others have often been used as a majority of the seed mix.

Additional community tables

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass	/Grasslike				
1	Common Native Summer P	erennial S	hortgrasses	140–195	
	blue grama	BOGR2	Bouteloua gracilis	55–110	_
	James' galleta	PLJA	Pleuraphis jamesii	5–110	_
2	Occasional Native Summer	r Perennial	Mid Grasses	0–20	
	Grass, perennial	2GP	Grass, perennial	0–20	_
	sideoats grama	BOCU	Bouteloua curtipendula	0–20	_
	black grama	BOER4	Bouteloua eriopoda	0–20	-
	sand dropseed	SPCR	Sporobolus cryptandrus	0–20	-
	Forb, annual	2FA	Forb, annual	0–13	-
	Forb, perennial	2FP	Forb, perennial	0–13	-
	milkvetch	ASTRA	Astragalus	0–13	-
	buckwheat	ERIOG	Eriogonum	0–13	-
	pingue rubberweed	HYRI	Hymenoxys richardsonii	0–13	-
	globemallow	SPHAE	Sphaeralcea	0–13	_
	bush muhly	MUPO2	Muhlenbergia porteri	0–5	_
3	Occasional Native Summer	r Perennial	Short Grasses	0–10	
	Wyoming big sagebrush	ARTRW8	Artemisia tridentata ssp. wyomingensis	32–195	_
	fourwing saltbush	ATCA2	Atriplex canescens	32–65	-
	winterfat	KRLA2	Krascheninnikovia lanata	32–65	-
	jointfir	EPHED	Ephedra	6–32	_
	bastardsage	ERWR	Eriogonum wrightii	6–32	_
	pricklypear	OPUNT	Opuntia	0–26	_
	skunkbush sumac	RHTR	Rhus trilobata	0–13	_
	Apache plume	FAPA	Fallugia paradoxa	0–13	_
	snakeweed	GUTIE	Gutierrezia	0–13	_
	turpentine bush	ERLA12	Ericameria laricifolia	0–13	-
	brickellbush	BRICK	Brickellia	0–13	_
	Greene's rabbitbrush	CHGR6	Chrysothamnus greenei	0–13	-
	Fremont's mahonia	MAFR3	Mahonia fremontii	0–13	_
	globe cactus	MAMMI	Mammillaria	0–13	-
	agave	AGAVE	Agave	0–13	-
	Grass, perennial	2GP	Grass, perennial	0–5	-
	ring muhly	MUTO2	Muhlenbergia torreyi	0–5	-
	burrograss	SCBR2	Scleropogon brevifolius	0–5	-
4	Common Native Spring Pe	rennial Mic	l Grasses	40–100	
	juniper	JUNIP	Juniperus	17–65	_
	Indian ricegrass	ACHY	Achnatherum hymenoides	10–40	-
	needle and thread	HECOC8	Hesperostipa comata ssp. comata	10–40	
	New Mexico feathergrass	HENE5	Hesperostipa neomexicana	10–40	

	threeawn	ARIST	Arıstıda	5–30	_
	twoneedle pinyon	PIED	Pinus edulis	0–17	-
5	Common Native Early Spri	ng Perenni	al Short Grasses	30–55	
	squirreltail	ELEL5	Elymus elymoides	30–55	_
6	Occasional Native Spring I	Perennial M	lid Grasses	0–10	
	Grass, perennial	2GP	Grass, perennial	0–5	_
	desert needlegrass	ACSP12	Achnatherum speciosum	0–5	_
	prairie Junegrass	KOMA	Koeleria macrantha	0–5	_
	muttongrass	POFE	Poa fendleriana	0–5	_
	slim tridens	TRMU	Tridens muticus	0–5	_
7	Occasional Native Annual	Grasses		0–10	
	Grass, annual	2GA	Grass, annual	0–10	_
	sixweeks grama	BOBA2	Bouteloua barbata	0–10	_
	sixweeks fescue	VUOC	Vulpia octoflora	0–10	_
Forb					
8	Occasional Native Spring I	Perennial S	hort Forbs	5–30	
	Forb, perennial	2FP	Forb, perennial	0–10	_
	onion	ALLIU	Allium	0–10	_
	rockcress	ARABI2	Arabis	0–10	_
	groundcover milkvetch	ASHU2	Astragalus humistratus	0–10	_
	Silver's milkvetch	ASSU6	Astragalus subcinereus	0–10	_
	winding mariposa lily	CAFL	Calochortus flexuosus	0–10	_
	sego lily	CANU3	Calochortus nuttallii	0–10	_
	pale bastard toadflax	COUMP	Comandra umbellata ssp. pallida	0–10	_
	springparsley	CYMOP2	Cymopterus	0–10	_
	desert larkspur	DEPA	Delphinium parishii	0–10	_
	matted buckwheat	ERCA8	Eriogonum caespitosum	0–10	_
	desert trumpet	ERIN4	Eriogonum inflatum	0–10	_
	pepperweed	LEPID	Lepidium	0–10	_
	bladderpod	LESQU	Lesquerella	0–10	_
	Lewis flax	LILE3	Linum lewisii	0–10	_
	spiny phlox	PHHO	Phlox hoodii	0–10	
	longleaf phlox	PHLO2	Phlox longifolia	0–10	
	globemallow	SPHAE	Sphaeralcea	0–10	
	stemless Townsend daisy	TOEX2	Townsendia exscapa	0–10	
	foothill deathcamas	ZIPA2	Zigadenus paniculatus	0–10	_
9	Occasional Native Summe	r Perennial	Short Forbs	0–20	
	Forb, perennial	2FP	Forb, perennial	0–10	-
	Indian paintbrush	CASTI2	Castilleja	0–10	-
	rose heath	CHER2	Chaetopappa ericoides	0–10	
	shaggy fleabane	ERPU2	Erigeron pumilus	0–10	_
	fineleaf hymenopappus	HYFI	Hymenopappus filifolius	0–10	_
	horehound	MAVU	Marrubium vulgare	0–10	_
	Colorado four o'clock	MIMU	Mirabilis multiflora	0–10	_

	beardtongue	PENST	Penstemon	0–10	_	
	Navajo tea	THSU	Thelesperma subnudum	0–10	_	
10	Occasional Native Annual	Short Forb	S	0–20		
	Forb, annual	2FA	Forb, annual	0–10	_	
	fiddleneck	AMSIN	Amsinckia	0–10	-	
	milkvetch	ASTRA	Astragalus	0–10	_	
	pitseed goosefoot	CHBE4	Chenopodium berlandieri	0–10	-	
	tickseed	COREO2	Coreopsis	0–10	-	
	tansymustard	DESCU	Descurainia	0–10	-	
	sanddune wallflower	ERCA14	Erysimum capitatum	0–10	-	
	miniature woollystar	ERDI2	Eriastrum diffusum	0–10	-	
	erigenia	ERIGE	Erigenia	0–10	-	
	buckwheat	ERIOG	Eriogonum	0–10	-	
	spurge	EUPHO	Euphorbia	0–10	-	
	gilia	GILIA	Gilia	0–10	_	
	trefoil	LOTUS	Lotus	0–10	_	
	whitestem blazingstar	MEAL6	Mentzelia albicaulis	0–10	_	
	phacelia	PHACE	Phacelia	0–10	_	
	groundcherry	PHYSA	Physalis	0–10	_	
	desert Indianwheat	PLOV	Plantago ovata	0–10	_	
Shrub	hrub/Vine					
11	Occasional Native Short Sl	hrubs		5–30		
	broom snakeweed	GUSA2	Gutierrezia sarothrae	0–20	-	
	rough menodora	MESC	Menodora scabra	0–10	_	
	mat penstemon	PECAD2	Penstemon caespitosus var. desertipicti	0–10	_	
	rock goldenrod	PEPU7	Petradoria pumila	0–10	_	
	whitestem paperflower	PSCO2	Psilostrophe cooperi	0–10	_	
	threadleaf ragwort	SEFL3	Senecio flaccidus	0–10	_	
	desert princesplume	STPI	Stanleya pinnata	0–10	_	
	Subshrub (<.5m)	2SUBS	Subshrub (<.5m)	0–10	_	
	longflower rabbitbrush	CHDE2	Chrysothamnus depressus	0–10	_	
	Eastern Mojave buckwheat	ERFA2	Eriogonum fasciculatum	0–10	_	
12	Dominant Native Mid Shrul	bs		80–165		
	Wyoming big sagebrush	ARTRW8	Artemisia tridentata ssp. wyomingensis	80–165	_	
13	Common Native Mid Shrub	s		10–40		
	fourwing saltbush	ATCA2	Atriplex canescens	5–30	_	
	Nevada jointfir	EPNE	Ephedra nevadensis	5–30		
	mormon tea	EPVI	Ephedra viridis	5–30		
14	Common Native Short Shr	ubs		5–30		
	yellow rabbitbrush	CHVI8	Chrysothamnus viscidiflorus	5–20	_	
	winterfat	KRLA2	Krascheninnikovia lanata	5–20		
15	Occasional Native Tall Shr	ubs		5–20		
I	I	_	1		l	

	Fremont's mahonia	MAFR3	Mahonia tremontii	0–20	–
	Stansbury cliffrose	PUST	Purshia stansburiana	0–20	-
16	Occasional Native Mid Sh	irubs		0–25	
	Shrub (>.5m)	2SHRUB	Shrub (>.5m)	0–15	-
	black sagebrush	ARNO4	Artemisia nova	0–15	-
	Greene's rabbitbrush	CHGR6	Chrysothamnus greenei	0–15	-
	blackbrush	CORA	Coleogyne ramosissima	0–15	-
	Cutler's jointfir	EPCU	Ephedra cutleri	0–15	-
	crispleaf buckwheat	ERCO14	Eriogonum corymbosum	0–15	_
	rubber rabbitbrush	ERNA10	Ericameria nauseosa	0–15	_
	Apache plume	FAPA	Fallugia paradoxa	0–15	-
	water jacket	LYAN	Lycium andersonii	0–15	-
	pale desert-thorn	LYPA	Lycium pallidum	0–15	-
	Sonoran scrub oak	QUTU2	Quercus turbinella	0–15	_
	skunkbush sumac	RHTR	Rhus trilobata	0–15	-
	roundleaf buffaloberry	SHRO	Shepherdia rotundifolia	0–15	-
17	Occasional Native Agave	-Yucca-Like		0–15	
	Utah agave	AGUT	Agave utahensis	0–10	-
	banana yucca	YUBA	Yucca baccata	0–10	-
18	Occasional Native Cacti	-		0–15	
	cactus apple	OPEN3	Opuntia engelmannii	0–10	-
	plains pricklypear	OPPO	Opuntia polyacantha	0–10	-
	Engelmann's hedgehog cactus	ECEN	Echinocereus engelmannii	0–5	_
	kingcup cactus	ECTR	Echinocereus triglochidiatus	0–5	-
Tree					
19	Common Native Short Tre	ees		5–55	
	Utah juniper	JUOS	Juniperus osteosperma	5–55	-
	twoneedle pinyon	PIED	Pinus edulis	5–55	

Table 10. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)	
Grass	/Grasslike					
1	Occasional Native Summer	Short Grasses	0–28			
	blue grama	BOGR2	Bouteloua gracilis	0–28	-	
	James' galleta	PLJA	Pleuraphis jamesii	0–28	-	
	Grass, perennial	2GP	Grass, perennial	0–6	_	
2	Occasional Native Summer	r Perennial	Mid Grasses	0–5		
	Grass, perennial	2GP	Grass, perennial	0–5	-	
	sideoats grama	BOCU	Bouteloua curtipendula	0–5	-	
	black grama	BOER4	Bouteloua eriopoda	0–5	-	
	bush muhly	MUPO2	Muhlenbergia porteri	0–5	-	
	sand dropseed	SPCR	Sporobolus cryptandrus	0–5	_	
3	Occasional Native Spring F	Occasional Native Spring Perennial Mid Grasses				

	Grass, perennial	2GP	Grass, perennial	0–10	_
	Indian ricegrass	ACHY	Achnatherum hymenoides	0–10	_
	threeawn	ARIST	Aristida	0–10	_
	needle and thread	HECOC8	Hesperostipa comata ssp. comata	0–10	_
	New Mexico feathergrass	HENE5	Hesperostipa neomexicana	0–10	_
4	Common Native Early Sprin	ng Perenni	al Short Grasses	6–28	
	squirreltail	ELEL5	Elymus elymoides	6–28	_
5	Occasional Native Annual	Short Gras	ses	0–28	
	Grass, annual	2GA	Grass, annual	0–28	_
	sixweeks grama	BOBA2	Bouteloua barbata	0–28	-
	sixweeks fescue	VUOC	Vulpia octoflora	0–28	_
Forb		-			
6	Occasional Native Perennia	al Short Fo	rbs	0–10	
	Forb, perennial	2FP	Forb, perennial	0–10	-
	winding mariposa lily	CAFL	Calochortus flexuosus	0–10	-
	sego lily	CANU3	Calochortus nuttallii	0–10	
	springparsley	CYMOP2	Cymopterus	0–10	_
	desert larkspur	DEPA	Delphinium parishii	0–10	_
	desert trumpet	ERIN4	Eriogonum inflatum	0–10	_
	longleaf phlox	PHLO2	Phlox longifolia	0–10	_
	globemallow	SPHAE	Sphaeralcea	0–10	_
7	Occasional Native Perennia	al Short Fo	rbs	0–10	
	Forb, perennial	2FP	Forb, perennial	0–10	-
	Indian paintbrush	CASTI2	Castilleja	0–10	_
	rose heath	CHER2	Chaetopappa ericoides	0–10	-
	horehound	MAVU	Marrubium vulgare	0–10	_
	beardtongue	PENST	Penstemon	0–10	_
8	Occasional Native Annual	Short Forb	S	0–15	
	Forb, annual	2FA	Forb, annual	0–15	_
	fiddleneck	AMSIN	Amsinckia	0–15	_
	milkvetch	ASTRA	Astragalus	0–15	_
	pitseed goosefoot	CHBE4	Chenopodium berlandieri	0–15	_
	tickseed	COREO2	Coreopsis	0–15	
	tansymustard	DESCU	Descurainia	0–15	_
	sanddune wallflower	ERCA14	Erysimum capitatum	0–15	_
	miniature woollystar	ERDI2	Eriastrum diffusum	0–15	_
	fleabane	ERIGE2	Erigeron	0–15	_
	buckwheat	ERIOG	Eriogonum	0–15	_
	spurge	EUPHO	Euphorbia	0–15	_
	gilia	GILIA	Gilia	0–15	_
	trefoil	LOTUS	Lotus	0–15	_
	whitestem blazingstar	MEAL6	Mentzelia albicaulis	0–15	
	phacelia	PHACE	Phacelia	0–15	_
	aroundcherrv	PHYSA	Physalis	0–15	_

	5	-	,		<u> </u>
	desert Indianwheat	PLOV	Plantago ovata	0–15	
Shrut	o/Vine	•	•	·	
9	Common Native Short Shr	ubs		17–44	
	broom snakeweed	GUSA2	Gutierrezia sarothrae	17–44	-
10	Dominant Native Mid Shru	bs	•	385–468	
	Wyoming big sagebrush	ARTRW8	Artemisia tridentata ssp. wyomingensis	385–468	_
11	Common Native Mid Shrul	os		0–15	
	Nevada jointfir	EPNE	Ephedra nevadensis	0–10	-
	mormon tea	EPVI	Ephedra viridis	0–10	-
	fourwing saltbush	ATCA2	Atriplex canescens	0–5	-
12	Common Native Short Shr	ubs		17–44	
	yellow rabbitbrush	CHVI8	Chrysothamnus viscidiflorus	17–44	-
13	Occasional Native Tall Shi	ubs		0–10	
	Fremont's mahonia	MAFR3	Mahonia fremontii	0–10	-
	Stansbury cliffrose	PUST	Purshia stansburiana	0–10	-
14	Occasional Native Mid Sru	bs		0–10	
	Shrub (>.5m)	2SHRUB	Shrub (>.5m)	0–10	-
	black sagebrush	ARNO4	Artemisia nova	0–10	-
	Greene's rabbitbrush	CHGR6	Chrysothamnus greenei	0–10	-
	blackbrush	CORA	Coleogyne ramosissima	0–10	_
	Cutler's jointfir	EPCU	Ephedra cutleri	0–10	-
	crispleaf buckwheat	ERCO14	Eriogonum corymbosum	0–10	-
	rubber rabbitbrush	ERNA10	Ericameria nauseosa	0–10	-
	Apache plume	FAPA	Fallugia paradoxa	0–10	-
	water jacket	LYAN	Lycium andersonii	0–10	-
	pale desert-thorn	LYPA	Lycium pallidum	0–10	-
	Sonoran scrub oak	QUTU2	Quercus turbinella	0–10	-
	skunkbush sumac	RHTR	Rhus trilobata	0–10	-
	roundleaf buffaloberry	SHRO	Shepherdia rotundifolia	0–10	_
15	Occasional Native Agave-	Yucca-Like		0–5	
	Utah agave	AGUT	Agave utahensis	0–5	-
	banana yucca	YUBA	Yucca baccata	0–5	-
16	Occasional Native Cacti			0–5	
	Engelmann's hedgehog cactus	ECEN	Echinocereus engelmannii	0–5	-
	kingcup cactus	ECTR	Echinocereus triglochidiatus	0–5	-
	cactus apple	OPEN3	Opuntia engelmannii	0–5	-
	plains pricklypear	OPPO	Opuntia polyacantha	0–5	-
Tree					
17	Common Native Short Tre	es		6–110	
	Utah juniper	JUOS	Juniperus osteosperma	0–110	_
	twoneedle pinyon	PIED	Pinus edulis	0–110	_

Animal community

This site is usable yearlong by all classes of livestock. It will respond well to management even though the soils are often shallow. The diversity of grasses and shrubs on this site promotes a fair diversity of wildlife when the site is in excellent condition. Permanent waters are lacking, which precludes a diverse assemblage of animals. Herbivores adapted to a high desert climate typify the fauna. These include deer, antelope, jackrabbits, cottontails, and horned larks. Predators such as coyotees, bobcats, prarie falcons, golden eagles, buteos and foxes are also important members of the community.

Recreational uses

The land consists principally of undulating plains and rolling hills. Grassland is interspered with shrubs, often with sparse juniper and pinyon. Summers are quite warm and winters are cold. Spring is typically dry and windy. Summer and fall are comfortable for recreation use. Hunting is the main activity on this site. Incidental activities include horseback riging, wildlife observation and rock collecting.

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.

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Approval

Scott Woodall, 10/18/2019

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
Contact for lead author	NRCS State Rangeland Management Specialist, Phoenix AZ
Date	04/17/2006
Approved by	Steve Barker
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. Number and extent of rills: Some minor (short and narrow) rill formation is possible on steeper slopes due to loamy textures, moderate permeability, shallow depth, and rapid runoff. Rill formation will be reduced if the soil has a lot of rock

fragment armor and/or a large amount of rock fragments in the profile.

- 2. Presence of water flow patterns: Water flow patterns may be occasional to common due to moderate permeability, shallow depth, and rapid runoff. These patterns are generally short and stable. There will be more water flow patterns in steeper areas and in areas with more rock outcrop and/or very shallow (<10") soils.
- 3. Number and height of erosional pedestals or terracettes: Some pedestals and terracettes may form, but they should be very short.
- 4. Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground): Bare ground generally ranges from 30-50%. Areas with greater cover of rock fragments and/or rock outcrop have less bare ground. This site usually has less than 1.5 inches of available water capacity, so the potential for production of plant cover is very low. Drought may cause an increase in bare ground.
- 5. Number of gullies and erosion associated with gullies: none
- 6. Extent of wind scoured, blowouts and/or depositional areas: none
- 7. Amount of litter movement (describe size and distance expected to travel): Herbaceous and fine woody litter will be transported in water flow pathways. Coarse woody litter will remain under shrub and tree canopies. Litter movement may be greater in areas with very shallow soils and lots of rock outcrop.
- 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 loamy very fine sand to sandy clay loam, but are mostly loam. Most surface horizons contain a significant amount of rock fragments (mostly gravels). Most oils also have at least 20% cover of rock fragments (mostly gravels). Cryptogams may cover up to 3% of the soil surface. When well vegetated or covered with rock armor, the soils have a high resistance to both water and wind erosion.
- Soil surface structure and SOM content (include type of structure and A-horizon color and thickness): Soil surface structure is mostly granular (weak to moderate, very fine to fine) or platy (weak to strong, thin to thick), while a few areas have surfaces that are subangular blocky (weak to moderate, fine to medium). Surface thickness ranges from 1-8 inches, but is usually 1-3 inches. Color varies depending upon parent material.
- 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 uniform distribution of mostly shrubs and grasses with a few forbs. Canopy cover ranges from 15-40%, with the majority split between shrubs and grasses. Basal plant cover ranges from 10-20% (mostly grasses). The cover (especially basal cover) is reduced by the amount of rock fragment and/or bedrock ground cover. Both cover values decrease during a prolonged drought.

- 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 loamy surface textures, this sois may be easily compacted, but it is generally protected by a significant amount of rock fragment armor on the surface and within the surface horizons. Some of the soils have a naturally platy surface structure.
- 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: none

Sub-dominant: shrubs > warm season colonizing grasses > cool season bunchgrasses >

Other: Minor: trees > perennial forbs > warm season bunchgrasses > half shrubs > Trace: annual forbs = annual grasses = Agave family = cacti

Additional:

- 13. Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence): All plant functional groups ar adapted to survival except during the most severe droughts. Sever winter droughts affect shrubs and trees the most. Severe summer droughts affect grasses most. Very shallow (<10") soils will show the most mortality in all functional groups.</p>
- 14. Average percent litter cover (%) and depth (in): Litter consists of a combination of woody and herbaceous. Litter amounts increase during the first few years of drought, then decrease in later years.
- 15. Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annualproduction): 400-475 pounds per acre (dry weight) in drought years, 475-625 pounds per acre in median years, 625-700 pounds per acre in wet years.
- 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: Wyoming big sagebrush is native to the site, but has the potential to increase and dominate after heavy grazing. Broom snakeweed, Douglas rabbitbrush, pricklypear cactus, and cholla cactus are natives that have the potential to increase and dominate the site after a sagebrush fire and/or heavy grazing. Cheatgrass, red brome and redstem filaree are exotic annuals that are becoming endemic to the site regardless of management or fire frequency. They may become dominant plants on the site after a sagebrush fire, even with conservative or no grazing.
- 17. **Perennial plant reproductive capability:** All plants native to the site are adapted to the climate and are capable of producing seeds, stolons, and rhizomes except during the most severe droughts.