

**Ecological site R040XB204AZ**  
**Clayey Upland 7"-10" p.z.**

Accessed: 05/19/2024

**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.

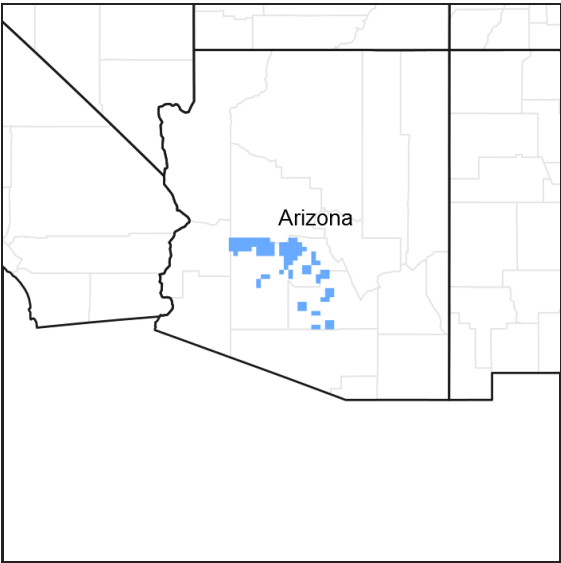


Figure 1. Mapped extent

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): 040X–Sonoran Basin and Range

AZ 40.2 – Middle Sonoran Desert

Elevations range from 1200 to 2000 feet and precipitation averages 7 to 10 inches per year. Vegetation includes saguaro, palo verde, creosotebush, triangle bursage, brittlebush, prickly pear, cholla, desert saltbush, wolfberry bush muhly, threeawns, and big galleta. The soil temperature regime is hyperthermic and the soil moisture regime is typical aridic. This unit occurs within the Basin and Range Physiographic Province and is characterized by numerous mountain ranges that rise abruptly from broad, plain-like valleys and basins. Igneous and metamorphic rock classes dominate the mountain ranges and sediments filling the basins represent combinations of fluvial, lacustrine, colluvial and alluvial deposits.

Table 1. Dominant plant species

Tree	(1) <i>Parkinsonia florida</i> (2) <i>Parkinsonia microphylla</i>
Shrub	(1) <i>Ambrosia deltoidea</i> (2) <i>Lycium berlandieri</i>

Herbaceous	(1) <i>Pleuraphis mutica</i> (2) <i>Pleuraphis rigida</i>
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## Physiographic features

This site occurs on relatively flat fan terraces and mesa tops, mostly associated with basalt bedrock types. The site has cracking clay soils with high shrink-swell capability. Slopes typically range from 1 to 10 percent. In the historic climax plant community, the site is dominated by tobosa.

**Table 2. Representative physiographic features**

Landforms	(1) Fan (2) Terrace (3) Mesa
Elevation	335–610 m
Slope	1–10%

## Climatic features

Precipitation in the sub-resource area ranges from 7 to 10 inches. Elevations range from 900 to 2050 feet. Winter-summer rainfall ratios range from 40% to 60% in the southern part along the international boundary, to 60% to 40% in the central and northern parts of the sub-resource area. As one moves from east to west in this resource area rains become more unpredictable and variable with Coefficients of Variation of annual rainfall equal to 38% at Florence and 46% at Aguila. Summer rains fall July- September, originate in the Gulf of Mexico, and are convective, usually brief, intense thunderstorms. Summer precipitation is extremely erratic and undependable in this area. Cool season moisture tends to be frontal, originates in the Pacific and Gulf of California, and falls in widespread storms with long duration and low intensity. This is the dependable moisture supply for vegetation in the area. Snow is very rare and usually melts on contact. May-June is the driest time of the year. Humidity is very low.

Winter temperatures are very mild with very few days recording freezing for short periods of time. Summertime temperatures are hot to very hot with many days in June-July exceeding 105 degrees F. Frost-free days range from 280 at stations in major river valleys with cold air drainage to 320 to 350 days at upland stations.

Both the spring and the summer growing seasons are equally important for perennial grass, forb and shrub growth. Cool and warm season annual forbs and grasses can be common in their respective seasons with above average rainfall. Perennial forage species can remain green throughout the year with available moisture.

**Table 3. Representative climatic features**

Frost-free period (average)	350 days
Freeze-free period (average)	0 days
Precipitation total (average)	254 mm

## Influencing water features

### Soil features

These are old soils formed in clay rich alluvium from basaltic origin. They are moderately deep and have high shrink-swell potential. They crack and churn with wetting and drying. Plant-soil relationships are good. The soil surface is clay or heavy clay loam textured, over a calcic horizon, duripan, or bedrock at moderate depths. In some areas there is a thin lighter textured surface less than 3 inches thick.

Soils mapped on this site include: in

SSA-645 Aguila-Carefree area MU's Carefree-12, Beardsley & Carefree-13, Contine-23 & Mohall-79;

SSA-651 Central Maricopa County MU's Glenbar-Gv & Mohall-Ms;

SSA-659 Western Pinal County MU's Contine-10 & Saminiego-41.

**Table 4. Representative soil features**

Parent material	(1) Alluvium–basalt
Surface texture	(1) Gravelly loam (2) Very gravelly clay loam
Family particle size	(1) Clayey
Drainage class	Well drained
Permeability class	Moderately slow to slow
Soil depth	102–152 cm
Surface fragment cover ≤3"	1–45%
Surface fragment cover >3"	0–5%
Available water capacity (0–101.6cm)	8.13–22.86 cm
Calcium carbonate equivalent (0–101.6cm)	5–30%
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)	1–45%
Subsurface fragment volume >3" (Depth not specified)	0–5%

## 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 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 the 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.

## State and transition model



Group	Common Name	Symbol	Scientific Name	(Kg/Hectare)	(%)
<b>Grass/Grasslike</b>					
1	<b>Summer Native Dominant Perennial Colonizing Mid Gr</b>			224–303	
	tobosagrass	PLMU3	<i>Pleuraphis mutica</i>	224–303	–
2				22–50	
	big galleta	PLRI3	<i>Pleuraphis rigida</i>	0–17	–
	purple threeawn	ARPU9	<i>Aristida purpurea</i>	0–6	–
	Parish's threeawn	ARPUP5	<i>Aristida purpurea</i> var. <i>parishii</i>	0–3	–
	Wright's threeawn	ARPUW	<i>Aristida purpurea</i> var. <i>wrightii</i>	0–3	–
	spidergrass	ARTE3	<i>Aristida ternipes</i>	0–2	–
	spidergrass	ARTEG	<i>Aristida ternipes</i> var. <i>gentilis</i>	0–2	–
	curly-mesquite	HIBE	<i>Hilaria belangeri</i>	0–2	–
	bush muhly	MUPO2	<i>Muhlenbergia porteri</i>	0–1	–
	low woollygrass	DAPU7	<i>Dasyochloa pulchella</i>	0–1	–
3				22–73	
	sixweeks fescue	VUOC	<i>Vulpia octoflora</i>	0–11	–
	sixweeks threeawn	ARAD	<i>Aristida adscensionis</i>	0–11	–
	prairie threeawn	AROL	<i>Aristida oligantha</i>	0–11	–
	needle grama	BOAR	<i>Bouteloua aristidoides</i>	0–11	–
	sixweeks grama	BOBA2	<i>Bouteloua barbata</i>	0–11	–
	Rothrock's grama	BORO2	<i>Bouteloua rothrockii</i>	0–6	–
	Eastwood fescue	VUMIC	<i>Vulpia microstachys</i> var. <i>ciliata</i>	0–6	–
	Pacific fescue	VUMIP	<i>Vulpia microstachys</i> var. <i>pauciflora</i>	0–6	–
	Arizona brome	BRAR4	<i>Bromus arizonicus</i>	0–1	–
	feather fingergrass	CHVI4	<i>Chloris virgata</i>	0–1	–
	desert lovegrass	ERPEM	<i>Eragrostis pectinacea</i> var. <i>miserrima</i>	0–1	–
	tufted lovegrass	ERPEP2	<i>Eragrostis pectinacea</i> var. <i>pectinacea</i>	0–1	–
	bearded sprangletop	LEFUF	<i>Leptochloa fusca</i> ssp. <i>fascicularis</i>	0–1	–
	mucronate sprangletop	LEPA6	<i>Leptochloa panicea</i>	0–1	–
	sticky sprangletop	LEVI5	<i>Leptochloa viscida</i>	0–1	–
	delicate muhly	MUFR	<i>Muhlenbergia fragilis</i>	0–1	–
	littleseed muhly	MUMI	<i>Muhlenbergia microsperma</i>	0–1	–
	Bigelow's bluegrass	POBI	<i>Poa bigelovii</i>	0–1	–
	Arizona signalgrass	URAR	<i>Urochloa arizonica</i>	0–1	–
4				6–22	
	Alga	2ALGA	<i>Alga</i>	2–11	–
	Lichen	2LICHN	<i>Lichen</i>	2–6	–
	Moss	2MOSS	<i>Moss</i>	1–3	–
	Fungus	2FUNGI	<i>Fungus</i>	1–2	–
<b>Forb</b>					
5				22–50	
	Louisiana vetch	VILU	<i>Vicia ludoviciana</i>	2–11	–

	dwarf desertpeony	ACNA2	<i>Acourtia nana</i>	2–6	–
	bluedicks	DICA14	<i>Dichelostemma capitatum</i>	2–6	–
	Indian rushpea	HOGL2	<i>Hoffmannseggia glauca</i>	2–6	–
	desert globemallow	SPAM2	<i>Sphaeralcea ambigua</i>	2–6	–
	globemallow	SPHAE	<i>Sphaeralcea</i>	2–6	–
6	<b>Native Occasional Forbs</b>			22–73	
	common fiddleneck	AMME12	<i>Amsinckia menziesii</i> var. <i>intermedia</i>	0–11	–
	desert Indianwheat	PLOV	<i>Plantago ovata</i>	0–11	–
	redseed plantain	PLRH	<i>Plantago rhodosperma</i>	0–11	–
	bristly fiddleneck	AMTE3	<i>Amsinckia tessellata</i>	0–11	–
	western tansymustard	DEPI	<i>Descurainia pinnata</i>	0–6	–
	evening primrose	OENOT	<i>Oenothera</i>	0–6	–
	combseed	PECTO	<i>Pectocarya</i>	0–6	–
	manybristle chinchweed	PEPA2	<i>Pectis papposa</i>	0–1	–
	phacelia	PHACE	<i>Phacelia</i>	0–1	–
	lineleaf whitepuff	OLLI	<i>Oligomeris linifolia</i>	0–1	–
	Florida pellitory	PAFL3	<i>Parietaria floridana</i>	0–1	–
	touristplant	DIWI2	<i>Dimorphocarpa wislizeni</i>	0–1	–
	flatcrown buckwheat	ERDE6	<i>Eriogonum deflexum</i>	0–1	–
	miniature woollystar	ERDI2	<i>Eriastrum diffusum</i>	0–1	–
	spreading fleabane	ERDI4	<i>Erigeron divergens</i>	0–1	–
	fleabane	ERIGE2	<i>Erigeron</i>	0–1	–
	woolly sunflower	ERIOP2	<i>Eriophyllum</i>	0–1	–
	Texas stork's bill	ERTE13	<i>Erodium texanum</i>	0–1	–
	California poppy	ESCAM	<i>Eschscholzia californica</i> ssp. <i>mexicana</i>	0–1	–
	pygmy poppy	ESMI	<i>Eschscholzia minutiflora</i>	0–1	–
	hairy desertsunflower	GECA2	<i>Geraea canescens</i>	0–1	–
	gilia	GILIA	<i>Gilia</i>	0–1	–
	Arizona poppy	KAGR	<i>Kallstroemia grandiflora</i>	0–1	–
	California goldfields	LACA7	<i>Lasthenia californica</i>	0–1	–
	Gordon's bladderpod	LEGO	<i>Lesquerella gordonii</i>	0–1	–
	shaggyfruit pepperweed	LELA	<i>Lepidium lasiocarpum</i>	0–1	–
	pepperweed	LEPID	<i>Lepidium</i>	0–1	–
	Bigelow's linanthus	LIBI2	<i>Linanthus bigelovii</i>	0–1	–
	flax	LINUM	<i>Linum</i>	0–1	–
	coastal bird's-foot trefoil	LOSA	<i>Lotus salsuginosus</i>	0–1	–
	Arizona lupine	LUAR4	<i>Lupinus arizonicus</i>	0–1	–
	Coulter's lupine	LUSP2	<i>Lupinus sparsiflorus</i>	0–1	–
	hollowleaf annual lupine	LUSU3	<i>Lupinus succulentus</i>	0–1	–
	disc mayweed	MADI6	<i>Matricaria discoidea</i>	0–1	–
	Nuttall's povertyweed	MONU	<i>Monolepis nuttalliana</i>	0–1	–
	bristly nama	NAHI	<i>Nama hispidum</i>	0–1	–

	tuber anemone	ANTU	<i>Anemone tuberosa</i>	0–1	–
	milkweed	ASCLE	<i>Asclepias</i>	0–1	–
	milkvetch	ASTRA	<i>Astragalus</i>	0–1	–
	Coulter's spiderling	BOCO2	<i>Boerhavia coulteri</i>	0–1	–
	hoary bowlesia	BOIN3	<i>Bowlesia incana</i>	0–1	–
	exserted Indian paintbrush	CAEXE	<i>Castilleja exserta</i> ssp. <i>exserta</i>	0–1	–
	yellow tackstem	CAPA7	<i>Calycoseris parryi</i>	0–1	–
	white tackstem	CAWR	<i>Calycoseris wrightii</i>	0–1	–
	whitemargin sandmat	CHAL11	<i>Chamaesyce albomarginata</i>	0–1	–
	brittle spineflower	CHBR	<i>Chorizanthe brevicornu</i>	0–1	–
	New Mexico thistle	CINE	<i>Cirsium neomexicanum</i>	0–1	–
	sand pygmyweed	CRCO34	<i>Crassula connata</i>	0–1	–
	cryptantha	CRYPT	<i>Cryptantha</i>	0–1	–
	hairy prairie clover	DAMO	<i>Dalea mollis</i>	0–1	–
	American wild carrot	DAPU3	<i>Daucus pusillus</i>	0–1	–
	New Mexico plumeseed	RANE	<i>Rafinesquia neomexicana</i>	0–1	–
	sleepy silene	SIAN2	<i>Silene antirrhina</i>	0–1	–
	Coulter's globemallow	SPCO2	<i>Sphaeralcea coulteri</i>	0–1	–
	woollyhead neststraw	STMI2	<i>Stylocline micropoides</i>	0–1	–
	cutleaf thelypody	THLA	<i>Thelypodium laciniatum</i>	0–1	–
	woolly tidestromia	TILA2	<i>Tidestromia lanuginosa</i>	0–1	–
	carelessweed	AMPA	<i>Amaranthus palmeri</i>	0–1	–
	weakleaf bur ragweed	AMCO3	<i>Ambrosia confertiflora</i>	0–1	–

#### Shrub/Vine

7				22–50	
	triangle bur ragweed	AMDE4	<i>Ambrosia deltoidea</i>	0–6	–
	creosote bush	LATR2	<i>Larrea tridentata</i>	0–6	–
	Berlandier's wolfberry	LYBE	<i>Lycium berlandieri</i>	0–2	–
	desert-thorn	LYCIU	<i>Lycium</i>	0–2	–
	pale desert-thorn	LYPA	<i>Lycium pallidum</i>	0–2	–
	desert ironwood	OLTE	<i>Olnya tesota</i>	0–2	–
	blue paloverde	PAFL6	<i>Parkinsonia florida</i>	0–2	–
	yellow paloverde	PAMI5	<i>Parkinsonia microphylla</i>	0–2	–
	velvet mesquite	PRVE	<i>Prosopis velutina</i>	0–2	–
	banana yucca	YUBA	<i>Yucca baccata</i>	0–1	–
	lotebush	ZIOB	<i>Ziziphus obtusifolia</i>	0–1	–
	whitethorn acacia	ACCO2	<i>Acacia constricta</i>	0–1	–
	catclaw acacia	ACGR	<i>Acacia greggii</i>	0–1	–
8				22–50	
	dollarjoint pricklypear	OPCH	<i>Opuntia chlorotica</i>	0–3	–
	cactus apple	OPEN3	<i>Opuntia engelmannii</i>	0–2	–
	candy barrelcactus	FEWI	<i>Ferocactus wislizeni</i>	0–2	–
	globe cactus	MAMMI	<i>Mammillaria</i>	0–1	–
	Engelmann's hedgehog	ECEN	<i>Echinocereus engelmannii</i>	0–1	–

## Animal community

Tobosa, the dominant forage species, is very unpalatable when cured and is best used when green (in either spring or summer growing season). It will grow year round with available moisture. Utilization in the growing season should not exceed 50%. The potential plant community on this site is deficient in digestible protein in the fall and winter. In wet winters, the production of annual grasses and forbs can provide for very high stocking rates through a March-May grazing season.

Water developments are very important to wildlife species on this site. Cover and diversity is lacking for the larger desert mammals like mule deer and Javalina, but the high production of spring annuals make this site an important springtime forage area for those species. This site is home to a variety of small mammals and their predators.

## Recreational uses

Recreation on this site includes hiking, backpacking, horse riding, and hunting. Due to hot summer temperatures, recreational activities are mostly limited to the fall through spring.

## Wood products

No significant wood products are produced on this site.

## Type locality

Location 1: Maricopa County, AZ	
Township/Range/Section	T5N R2E S3
General legal description	Phoenix FO - Black Canyon Shooting Range
Location 2: Pinal County, AZ	
Township/Range/Section	T8S R2E S2
General legal description	Casa Grande FO - Top of Table Top Mountain

## 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)	Dave Womack, Dan Robinett, Emilio Carrillo
Contact for lead author	NRCS Tucson Area Office
Date	03/07/2005
Approved by	S. Cassady
Approval date	



## Indicators

1. **Number and extent of rills:** Rills are common and continuous in absence of high gravel cover.

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2. **Presence of water flow patterns:** Water flow patterns are common, continuous, and occupy 15-20% of area.

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3. **Number and height of erosional pedestals or terracettes:** Shrubs have symmetrical mounds caused by the actions of splash, erosion and rodent activity. There are no pedestals on rock or gravel fragments and no terracettes are present.

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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 10-60%. Expect low values in dry years.

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

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6. **Extent of wind scoured, blowouts and/or depositional areas:** No evidence of soil movement by wind.

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7. **Amount of litter movement (describe size and distance expected to travel):** Herbaceous litter can move by wind and water. Woody litter remains under shrub canopies.

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil surface resistance to erosion is good under shrub canopies to moderate in interspaces due to crusts formed by raindrop impact.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Weak thin platy to granular to subgranular blocky; 5-7.5YRS5/6 dry, 5-7.5YR4/6 moist, to 16 inches thick.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Canopy 15-25%. Herbaceous litter is present in some years and absent in others. Large shrubs with large coppice mounds with high infiltration rates. Subshrubs with small mounds with high infiltration rates. Mounds occupy 15-30% of the surface and are evenly spaced over the area.

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None

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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: subshrubs = large shrubs & trees > winter annuals > summer annuals > perennial grasses and forbs > succulents > cryptogams

Sub-dominant:

Other:

Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** 0-50% canopy mortality on trees & shrubs, 90-100% mortality on perennial grasses.
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14. **Average percent litter cover (%) and depth ( in):** Herbaceous litter not persistent on the site.
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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 300 lbs/ac unfavorable precipitation; 450 lbs/ac normal precipitation; 1000 lbs/ac favorable 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:** Sahara mustard (potential)
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17. **Perennial plant reproductive capability:** Not impaired for shrubs, drought impaired for perennial grasses and forbs.
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