

Ecological site R028AY122UT

Desert Gravelly Sandy Loam (Indian Ricegrass)

Last updated: 5/02/2025
Accessed: 09/06/2026

General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

MLRA notes

Major Land Resource Area (MLRA): 028A–Ancient Lake Bonneville

MLRA 28A occurs in Utah (82%), Nevada (16%), and Idaho (2%). It encompasses approximately 36,775 square miles (95,246 square kilometers). A large area west and southwest of Great Salt Lake is a salty playa. This area is the farthest eastern extent of the Great Basin Section of the Basin and Range Province of the Intermontane Plateaus. It is an area of nearly level basins between widely separated mountain ranges trending north to south. The basins are bordered by long, gently sloping alluvial fans. The mountains are uplifted fault blocks with steep side slopes. Most of the valleys are closed basins containing sinks or playa lakes. Elevation ranges from 3,950 to 6,560 feet (1,204 to 2000 meters) in the basins and from 6,560 to 11,150 feet (1996 to 3398 meters) in the mountains. Much of the MLRA has alluvial valley fill and playa lakebed deposits at the surface from pluvial Lake Bonneville, which dominated this MLRA 13,000 years ago. A level line of remnant lake terraces on some mountain slopes indicates the former extent of this glacial lake. The Great Salt Lake is what remains of the pluvial lake. Mountains in the interior of this MLRA consist of tilted blocks of marine sediments from Cambrian to Mississippian age with scattered outcrops of Tertiary continental sediments and volcanic rocks. The average annual precipitation is 5 to 12 inches (13 to 30 cm) in the valleys and ranges up to 49 inches (124 cm) in the mountains. Most of the rainfall in the southern LRU occurs as high-intensity, convective thunderstorms during the growing season (April through September). The driest period is from midsummer to early autumn in the northern LRU. Precipitation in winter typically occurs as snow. The average annual temperature is 39 to 53 °F (4 to 12 °C). The freeze-free period averages 165 days and ranges from 110 to 215 days, decreasing in length with increasing elevation. The dominant soil orders in this MLRA are Aridisols, Entisols, and Mollisols. Soils are dominantly in the mesic or frigid soil temperature regime, aridic or xeric soil moisture regime, and mixed mineralogy. They generally are well drained, loamy or loamy-skeletal, and very deep.

LRU notes

The Basin and Range North LRU exhibits dry summer with stronger xeric patterns than the Basin and Range South LRU. Ranges in the north LRU are about 50 percent Paleozoic sedimentary/metasedimentary (limestone/quartzite dominant) and about 10 percent Tertiary volcanics. The basin floors are between 4,200 and 5,100 feet (1280 to 1554 meters) in elevation. Pinyon and juniper sites have a greater percentage of Utah juniper (*Juniperus osteosperma*) in the plant community than pinyon pine (*Pinus edulis* or *monophylla*). The Basin and Range North have few semidesert ecological sites with Utah juniper. Cool season grasses, such as bluebunch wheatgrass (*Pseudoroegneria spicata*), are dominant in the plant community, while warm season grasses are largely absent or a small component of the plant community.

Classification relationships

MLRA 28A, LRU A, northern desert zone

Ecological site concept

This site is dominated by Indian ricegrass in reference condition. It is typically found on alluvial fans, fan terraces, and lake terraces at low slopes. This site is typically found on gravelly loam soils.

Associated sites

R028AY124UT	Desert Loam (Shadscale) This site will occur on finer textured soils and is dominated by shadscale.
R028AY215UT	Semidesert Gravelly Loam (Wyoming Big Sagebrush) North This site occurs upslope in gravelly soils.
R028AY224UT	Semidesert Sandy Loam (Winterfat) This site occurs upslope on sandy soils.

Similar sites

R028AY014NV	GRAVELLY SANDY LOAM 5-8 P.Z. This site is similar in soils and vegetation.
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Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) <i>Achnatherum hymenoides</i>

Physiographic features

This site occurs on alluvial fans, fan terraces, and lake terraces. It occurs between 4200 and 5800 feet on slopes between 2 to 8 percent. There is no flooding or ponding on this site.

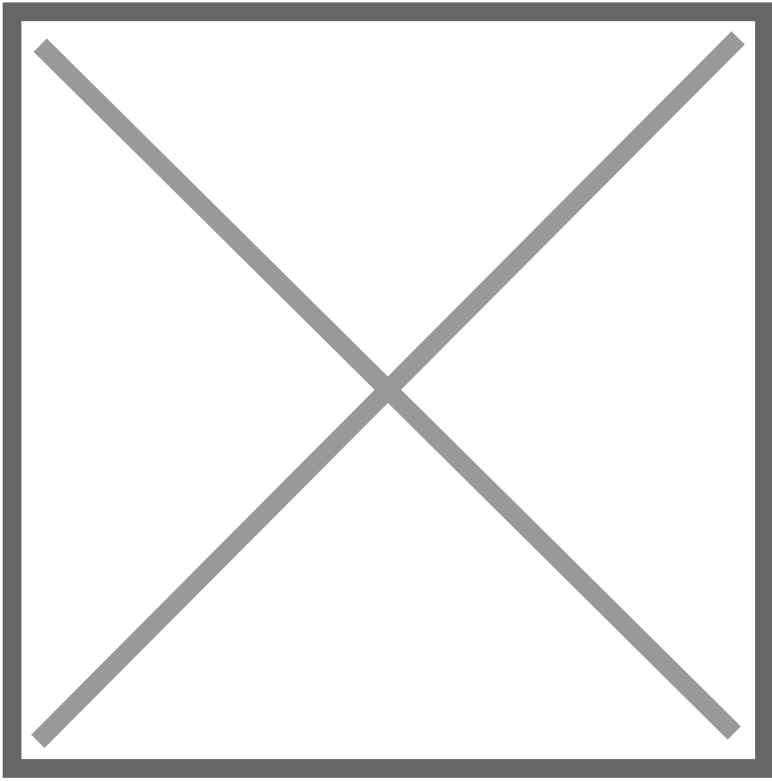


Figure 1.

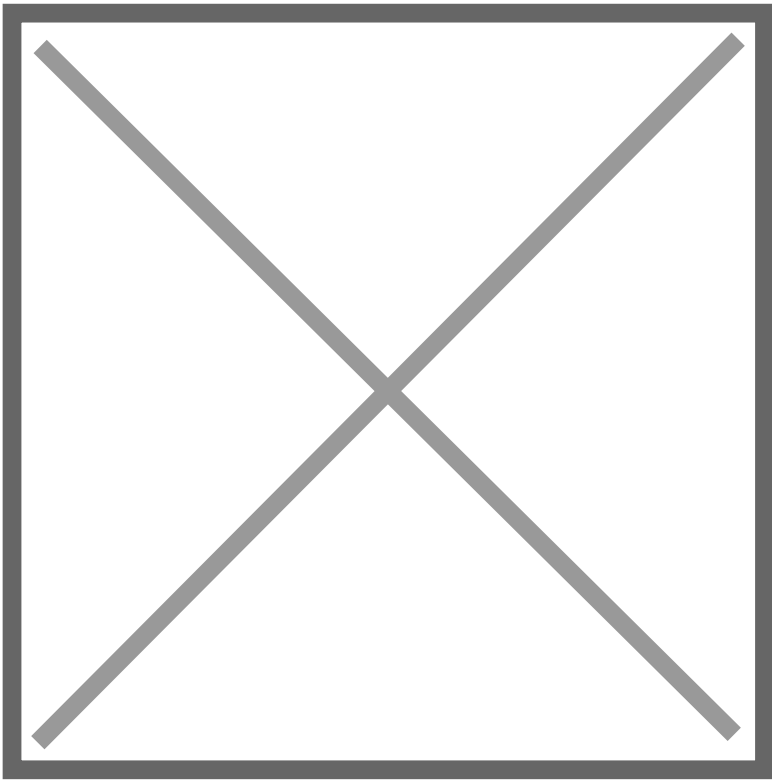


Figure 2.

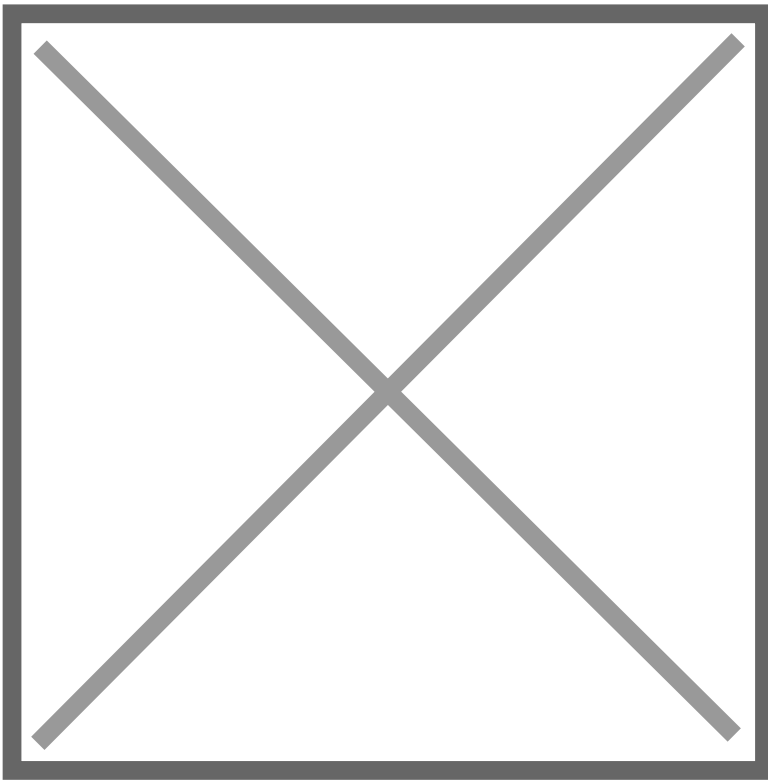


Figure 3.

Table 2. Representative physiographic features

Landforms	(1) Alluvial fan (2) Terrace (3) Lake terrace
Flooding frequency	None
Ponding frequency	None
Elevation	1,300 – 1,770 m
Slope	0 – 10 %

Climatic features

The climate is cold and snowy in the winter and warm and dry in the summer. The average annual precipitation is 5 to 8 inches. Approximately 70 percent comes as rain from March through October. On the average, June through September are the driest months and March through May are the wettest months.

Mean Annual Air Temperature: 45-50

Mean Annual Soil Temperature: 45-50

Table 3 Representative climatic features

Frost-free period (average)	110 days
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Freeze-free period (average)	140 days
Precipitation total (average)	150 mm

- (1) CALLAO [USC00421144], Wendover, UT
- (2) WENDOVER AP AWOS [USW00024193], Wendover, UT

Influencing water features

There is no flooding or ponding on this site.

Soil features

Characteristic soils in this site are over 60 inches deep and well drained. They formed in alluvium derived mainly from limestone and quartzite parent materials. The surface horizon is gravelly sandy loam textures 10 inches thick. About 30 percent of the soil surface is covered by rock fragments. The volume of rock fragments in the soil profile is 35 to 60 percent.

These soils are calcareous throughout the profile. Permeability is moderately rapid. Runoff is slow to medium Available water capacity is 1.4 to 3.2 inches.

Natural geologic erosion in potential is approximately 2 tons/acre/year.

This site is correlated to the following soil components (Soil Survey Area, Component, mapunit):

UT611: Izamatch (27)

UT617: Dera (16, 16, 17, 18), Goshute (26), Yenrab gravelly (90)

Table 4. Representative soil features

Parent material	(1) Alluvium – limestone and sandstone
Surface texture	(1) Gravelly loamy sand
Drainage class	Well drained to somewhat excessively drained
Permeability class	Moderately slow to moderately rapid
Soil depth	150 cm
Surface fragment cover <=3"	20 – 30 %
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	3.56 – 8.13 cm

Calcium carbonate equivalent (0-101.6cm)	10 – 50 %
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	0 – 60
Soil reaction (1:1 water) (0-101.6cm)	7.9 – 10
Subsurface fragment volume <=3" (Depth not specified)	40 %
Subsurface fragment volume >3" (Depth not specified)	0 – 10 %

Ecological dynamics

As ecological condition deteriorates due to overgrazing, Indian ricegrass, galleta, and winterfat decrease while low rabbitbrush and shadscale increase.

When the potential natural plant community is burned, Indian ricegrass, galleta, winterfat, and shadscale decrease while low rabbitbrush and horsebrush increase.

Cheatgrass, halogeton, and snakeweed are most likely to invade this site.

This site is similar to other shadscale sites in Nevada and Utah and a similar STM has been developed for 028AY014NV that is used in this ESD (Stringham et al. 2015).

State and transition model

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Shrub/Vine					
0	Primary Shrubs			168-280	
	shadscale saltbush	ATCO	<i>Atriplex confertifolia</i>	56-84	–
	winterfat	KRLA2	<i>Krascheninnikovia lanata</i>	56-84	–
	bud sagebrush	PIDE4	<i>Picrothamnus desertorum</i>	28-56	–
	Nuttall's horsebrush	TENU2	<i>Tetradymia nuttallii</i>	28-56	–
3	Secondary Shrubs			28-56	
	fourwing saltbush	ATCA2	<i>Atriplex canescens</i>	6-17	–

	green molly	BAAM4	<i>Bassia americana</i>	6-17	–
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	6-17	–
	Nevada jointfir	EPNE	<i>Ephedra nevadensis</i>	6-17	–
	spiny hopsage	GRSP	<i>Grayia spinosa</i>	6-17	–
Grass/Grasslike					
0	Primary Grasses			174-252	
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	112-140	–
	James' galleta	PLJA	<i>Pleuraphis jamesii</i>	28-56	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	17-28	–
	needle and thread	HECO26	<i>Hesperostipa comata</i>	17-28	–
1	Secondary Grasses			6-17	
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	6-17	–
Forb					
2	Frobs			28-56	
	quill cryptantha	CRAF	<i>Cryptantha affinis</i>	28-56	–
	western tansymustard	DEPI	<i>Descurainia pinnata</i>	28-56	–
	robin's plantain	ERPU	<i>Erigeron pulchellus</i>	28-56	–
	whitestem blazingstar	MEAL6	<i>Mentzelia albicaulis</i>	28-56	–
	longleaf phlox	PHLO2	<i>Phlox longifolia</i>	28-56	–
	scarlet globemallow	SPCO	<i>Sphaeralcea coccinea</i>	28-56	–

Table 6. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 7. Community 2.1 plant community composition

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

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 9. Community 2.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 10. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 11. Community 4.1 plant community composition

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

This site is suited for sheep and cattle grazing during fall, winter, and spring. Wildlife using this site include rabbit, coyote, fox, pronghorn antelope, and mule deer (seasonal). This is a short list of the more common species found. Many other species are present as well and migratory birds are present at times.

Hydrological functions

The soils are in hydrologic group A with runoff curves ranging from 39 to 68 depending on hydrologic condition.

Recreational uses

Resources that have special aesthetic and landscaping value are wildflowers. Some recreation uses of this site are hiking and horseback riding.

Wood products

None

Other information

Threatened and endangered species include plants and animals.

Type locality

Location 1: Millard County, UT	
General legal description	Type Location: South End of House Range P14-3, P19-1, Millard County, Utah.

Other references

Stringham, T.K., P. Novak-Echenique, P. Blackburn, C. Coombs, D. Snyder, and A. Wartgow. 2015. Final Report for USDA Ecological Site Description State-and-Transition Models, Major Land Resource Area 28A and 28B Nevada. University of Nevada Reno, Nevada Agricultural Experiment Station Research Report 2015-01. p. 1524.

Contributors

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Approval

Jamin Johanson, 5/02/2025

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.

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Date	01/07/2009

Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

- 1. Number and extent of rills:** Very rare rill development may be evident in reference communities on this site. Development will be more pronounced following significant storm or snow melt events. The presence of rills may also be more apparent where run-on from adjacent upland sites or exposed bedrock concentrate flows. Rill development will be moderately short (< 6') and widely spaced (12' – 20'). Evidence of rills will decrease in the months following major weather events as they heal. Rills should heal rapidly due to the course textured soils.

- 2. Presence of water flow patterns:** Evidence of water flow is not evident in the reference community except slight flow activity may be observed following significant weather events. Where site is found on steeper slopes (10 – 15%) water flow patterns may occupy up to 5% of the area. Any flow patterns present are normally <15 feet long, follow natural contours, and are typically spaced 10 to 15 feet apart.

- 3. Number and height of erosional pedestals or terracettes:** Pedestals or terracettes caused by accelerated water erosion are not typically evident in the reference state. 1 – 2 inches of depositional mounding in perennial grass clumps and under Shadscale canopies are normal and may not be water erosion caused.

- 4. Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground ranges from 10% - 15% in the reference community. Ground cover (the inverse of bare ground) typically includes: coarse fragments – 50% to 75%; plant canopy – 20% to 30%; litter – 10% to 20%.

- 5. Number of gullies and erosion associated with gullies:** Rare. Some gully channels are a normal component of desert environments. Gullies associated with reference areas will typically have stable, partially vegetated sides and bottoms with no evidence of head-cutting. Some evidence of disturbance may be evident following significant weather events or when gullies convey runoff from higher elevation rocky or naturally eroding areas.

- 6. Extent of wind scoured, blowouts and/or depositional areas:** Some minor evidence of wind generated soil movement is present in reference communities. Slight depositional mounding in Indian ricegrass bunches, James galleta clumps, and under Shadscale canopies is a normal characteristic of this site.

- 7. Amount of litter movement (describe size and distance expected to travel):** Most litter resides in place within or under plant canopies. Some movement of the finest material (< 1/8" or less) may move (1' – 2') in the direction of prevailing winds or down slope if

being transported by water. Little accumulation is observed behind obstructions. Increased litter size (<1/4) and distance travelled (2' – 4') may occur on the steeper slopes associated with this site.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** This site should have a soil stability rating of 4 to 5. Surface textures are typically sandy loams containing 50 to 75% rock fragments.
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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil surface is 3 - 4 inches deep and structure varies from granular to thin platy. The A-horizon color varies from 10YR 6/2 to 10YR 6/3. Some soils have a weak Ochric epipedon that extends 3 – 4 inches into the soil profile. The A horizon is normally deeper and better developed under plant canopies. Where surface soil is lost, increased clay or silt percentages are common in the remaining soil material.
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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** The presence of healthy perennial bunchgrasses and Shadscale in the reference community provides for the best infiltration and least runoff from storm events and snow melt. As perennial vegetation decreases and bare ground increases, runoff increases and soil loss is accelerated.
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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. Soils are deep to very deep. Increases in clay or silt content in subsoil layers could be mistaken for compaction.
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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: Dominant: Cool season grasses (e.g. Indian ricegrass and Bottlebrush squirreltail) 20 – 30%, > non-sprouting shrubs (e.g. Shadscale and Bud sage) 10 – 20%.

Sub-dominant: Sub-dominant: Sprouting shrubs (e.g. Winterfat and Nuttall horsebrush) 10 – 20%, > warm season grasses (e.g. Galleta) 5 – 10%, short Cool season grasses (e.g. Sandberg and Nevada bluegrasses) 1-3%.

Other: Others: Shrubs (e.g. Nevada jointfir and Spiny hopsage) 1-3%, perennial forbs (e.g. Scarlet globemallow and Longleaf phlox) 3-5%

Additional: Functional/structural groups may appropriately contain non-native species if their ecological function is the same as the native species in the reference state. Perennial and annual forbs can be expected to vary widely in their expression in the plant community based upon departures from average growing conditions.

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** During years with average to above-average precipitation, there should be very little recent mortality or decadence apparent in either the shrubs or grasses. During severe (multi-year) drought or insect infestations up to 80% of the shadscale may die. There may be partial mortality of individual bunchgrasses and other shrubs during severe drought.
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14. **Average percent litter cover (%) and depth (in):** Litter cover ranges from 10 to 20% with a spike when Bud Sage and Shadscale drops its leaves. Depth varies from $\frac{1}{4}$ - $\frac{3}{4}$ inch with depth increasing near plant canopies.

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**
450 – 500 pounds on an average year.

16. **Potential invasive (including noxious) species (native and non-native).** List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site: Broom snakeweed, Redstem storksbill, annual bromes and Halogeton are likely to increase in or invade this site.

17. **Perennial plant reproductive capability:** All perennial plant species have the ability to reproduce in most years except drought years.
