

Ecological site R085AY187TX

Steep Rocky

30-38" PZ

Last updated: 9/21/2023
Accessed: 09/17/2026

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): 085A–Grand Prairie

The Grand Prairie MLRA is characterized by predominately loam and clay loam soils underlain by limestone and shale. Topography transitions from steeper ridges and summits of the Lampasas Cut Plain on the southern end to the more rolling hills of the Fort Worth Prairie to the north. The Arbuckle Mountain area in Oklahoma is also within this MLRA.

Classification relationships

This ecological site is correlated to soil components at the Major Land Resource Area (MLRA) level which is further described in USDA Ag Handbook 296.

Ecological site concept

These sites occur over steep, shallow, rocky soils over limestone. Stones and boulders cover much of the soils surface and rock ledges are common. The reference vegetation includes native tall and midgrasses with scattered forbs and oak trees. The woody canopy is less than 30% under reference conditions. However, without periodic fires or other brush management, woody species may increase and dominate the site.

Associated sites

R085AY182TX	Low Stony Hill 30-38" PZ The Low Stony Hill site frequently occur downslope from the Steep Rocky site. It differs from the site by having a slope <12% and only 10 to 20% of surface rock fragments being >3 inches in size.
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Similar sites

R085AY182TX	Low Stony Hill 30-38" PZ The Low Stony Hill site is similar to Steep Rocky in that both sites have similar soils and species composition. Sites with >12 percent slope are classified as Steep Rocky while sites with under 12 percent slope are Low Stony Hill.
R085AY186TX	Steep Adobe 30-38" PZ The Steep Adobe site is similar to Steep Rocky in that both sites are located on similar topography and are underlain by limestone. It differs from Steep Rocky by its lighter-colored loamy soils, lower fertility, and occurrence away from larger streams and rivers.

Table 1. Dominant plant species

Tree	(1) <i>Quercus fusiformis</i>
Shrub	Not specified
Herbaceous	(1) <i>Schizachyrium scoparium</i>

Physiographic features

This site occurs on interfluvies and crests of hillslopes in the Grand Prairie. Characteristic of this site are outcrops of massive indurated limestone. Slopes may be up to 40 percent.

Table 2. Representative physiographic features

Landforms	(1) Hills > Ridge (2) Hills > Hill (3) Hills > Hillslope
Runoff class	High to very high
Elevation	150 – 580 m
Slope	10 – 40 %
Aspect	Aspect is not a significant factor

Climatic features

The climate is subhumid subtropical and is characterized by hot summers and relatively mild winters. Tropical maritime air controls the climate during spring, summer and fall. In winter and early spring, frequent surges of Polar Canadian air cause sudden drops in temperatures and add considerable variety to the daily weather. The average first frost should occur around November 5 and the last freeze of the season should occur around March 19.

The average relative humidity in mid-afternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 75 percent of the time possible during the summer and 50 percent in winter. The prevailing wind direction is from the south and highest windspeeds occur during the spring months.

Approximately two-thirds of annual rainfall occurs during the April to September period. Rainfall during this period generally falls during thunderstorms, and fairly large amounts of rain may fall in a short time. The driest months are usually July and August.

Table 3 Representative climatic features

Frost-free period (characteristic range)	190-210 days
Freeze-free period (characteristic range)	220-240 days
Precipitation total (characteristic range)	810-970 mm

Frost-free period (actual range)	190-210 days
Freeze-free period (actual range)	210-250 days
Precipitation total (actual range)	790-990 mm
Frost-free period (average)	200 days
Freeze-free period (average)	230 days
Precipitation total (average)	890 mm

- (1) BENBROOK DAM [USC00410691], Fort Worth, TX
- (2) CLEBURNE [USC00411800], Cleburne, TX
- (3) WHITNEY DAM [USC00419715], Clifton, TX
- (4) DENTON MUNI AP [USW00003991], Ponder, TX
- (5) DECATUR [USC00412334], Decatur, TX
- (6) EVANT 1SSW [USC00413005], Evant, TX
- (7) BROWNWOOD 2ENE [USC00411138], Early, TX
- (8) LAMPASAS [USC00415018], Lampasas, TX

Influencing water features

Due to the steep slopes and rocky surface of these sites, the shed water rapidly to lowland sites. They are not associated with wetlands.

Wetland description

NA

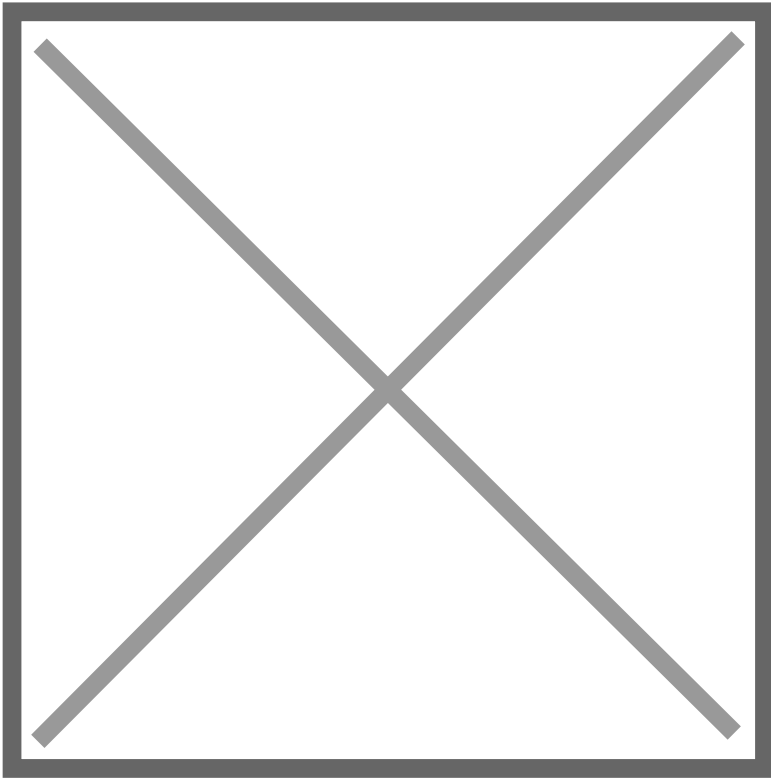


Figure 7.

Soil features

Representative soil components for this ecological site include: Eckrant and Tarrant

The site is characterized by very shallow and shallow to indurated limestone bedrock, interbedded with marl and chalk. These well drained soils formed in residuum derived from limestone with a high concentration of cobbles or stones.

Table 4. Representative soil features

Parent material	(1) Residuum – limestone (2) Residuum – mudstone
Surface texture	(1) Very cobbly clay (2) Cobbly clay (3) Stony clay
Drainage class	Well drained
Permeability class	Moderately slow to slow
Soil depth	10 – 50 cm
Surface fragment cover <=3"	0 – 20 %

Surface fragment cover >3"	20 – 60 %
Available water capacity (0-101.6cm)	0 – 2.54 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 40 %
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	Not specified
Soil reaction (1:1 water) (0-101.6cm)	6.6 – 8.4
Subsurface fragment volume <=3" (Depth not specified)	10 – 20 %
Subsurface fragment volume >3" (Depth not specified)	30 – 80 %

Ecological dynamics

Steep Rocky 30-38" PZ is a live oak savannah ecological site. The reference plant community for the Steep Rocky site is a fire-influenced mosaic of tallgrass and oak plant communities, interspersed with a high diversity of perennial forbs and midgrasses due to terrain. Grass-dominated areas make up 65% or more of the area and mix with groups (mottes) of oak trees (10-20% of the area) to create a mosaic of grass and shrub communities. Improper grazing will result in a reduction of tallgrasses and an increase in composition of midgrasses, unpalatable forbs, and woody species. The steeper portions of this site receive limited grazing from large ungulates (cattle) due to its slope and surface rockiness. However, smaller ruminants (goats, deer, and pronghorn) graze this site.

Continued degradation of the site will result in the site crossing a threshold to a shrubland community characterized by invasive shrubs, mid and shortgrasses, and unpalatable forbs. Bare ground, erosion, and water flow patterns will increase. Forage production will decline. Over time the size and amount of eroded areas will increase as the A horizon erodes.

Precipitation patterns are highly variable. Long-term droughts, occurring three to four times per century, cause shifts in species composition by causing die-off of seedlings, less drought-tolerant species, and/or some woody species. Droughts also reduce biomass production and create open space, which is colonized by opportunistic species when precipitation increases. Wet periods allow tallgrasses to increase in dominance.

Natural vegetation on the uplands is predominantly tall warm-season perennial bunchgrasses with lesser amounts of midgrasses and shortgrasses. This site occurs as a rocky inclusion within the tallgrass prairie that makes up most of MLRA 85. MLRA 85 was historically dominated by big bluestem (*Andropogon gerardii*), Indiangrass (*Sorghastrum nutans*), switchgrass (*Panicum virgatum*), and little bluestem (*Schizachyrium scoparium*). Midgrasses such as sideoats grama (*Bouteloua curtipendula*), Texas wintergrass (*Nassella*

leucotricha), hairy grama (*Bouteloua hirsuta*), and dropseeds (*Sporobolus* spp.) are also abundant in the region. A wide variety of forbs add to the diverse native plant community. Scattered live oak and hackberry (*Celtis* spp.) trees are also native to the region. The intermittent bottomlands also contain hardwoods including several species of oak (*Quercus* spp.), elm (*Ulmus* spp.), and native pecan (*Carya illinoensis*) trees.

The northernmost portion of the Grand Prairie MLRA is still relatively free from the widespread invasion of brush that has occurred in other parts of the state, including the southern part of the MLRA. Juniper (cedar) (*Juniperus* spp.), honey mesquite (*Prosopis glandulosa*), pricklypear (*Opuntia* spp.), and scrub oak (*Quercus sinuata* var. *breviloba*) have increased to the point of dominance in some locations, especially on shallow, rocky slopes.

Pre-settlement influences included grazing or browsing by endemic pronghorn antelope, and deer, severe droughts, and infrequent, catastrophic fires. Wright and Bailey (1982) reported that there are no reliable records of fire frequency in the Great Plains grasslands because there are no trees to carry fire scars from which to estimate fire frequency. A natural fire frequency of 7 to 10 years seems reasonable for surrounding prairie. Due to its slope and rockiness, the Steep Rocky site burned infrequently. Natural fires were catastrophic fires limited to years with excess fuel loads and/or severe fire conditions. They generally occurred when shrub canopy reached a level sufficient to carry crown fires. Even then, fires tended to be limited to mosaics due to the pattern of the vegetation and occurrence of rock outcrops. Fires exhibited different dynamics on heavily wooded north slopes versus more sparsely vegetated south slopes.

Rangeland and pastureland are grazed primarily by beef cattle. Horse numbers are increasing rapidly in the region, and in recent years goat numbers have increased significantly. There are some areas where sheep are locally important. Whitetail deer, wild turkey, bobwhite quail, and dove are the major wildlife species, and hunting leases are a major source of income for many landowners in this area. The Steep Rocky site does not lend itself to cultivation.

Rangeland Health Reference Worksheets have been posted for this site on the Texas NRCS website (www.tx.nrcs.usda.gov) in Section II of the eFOTG under (F) Ecological Site Descriptions (ESDs).

Plant Communities and Transitional Pathways

A state and transition model for the Steep Rocky ecological site is depicted in Figure 1. Thorough descriptions of each state and associated transition and of each plant community and associated pathway follow the model. This model is based on the available experimental research, field observations, and interpretations by experts, but is likely to change as knowledge increases.

Plant community dynamics vary across the MLRA reflecting the range of variability in conditions (precipitation, elevation, aspect, and soils) and each plant community reflects that natural variability over space and time. ESDs attempt to communicate highly complex biological processes in a land management context. ESDs do not attempt to describe the specific attributes exhibited for each state or community; rather they describe representative values that are important to ecological dynamics.

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 (%)
Grass/Grasslike					
1	Tallgrass			504-1177	
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	504-1177	–
2	Midgrass			252-588	
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	252-588	–
3	Tallgrasses			336-785	
	big bluestem	ANGE	<i>Andropogon gerardii</i>	224-673	–
	Indiangrass	SONU2	<i>Sorghastrum nutans</i>	112-560	–
4	Mid/Shortgrasses			168-392	
	cane bluestem	BOBA3	<i>Bothriochloa barbinodis</i>	0-336	–
	tall grama	BOHIP	<i>Bouteloua hirsuta</i> var. <i>pectinata</i>	0-336	–
	silver beardgrass	BOLAT	<i>Bothriochloa laguroides</i> ssp. <i>torreyana</i>	0-336	–
	composite dropseed	SPCOC2	<i>Sporobolus compositus</i> var. <i>compositus</i>	0-336	–

	slim tridens	TRMU	<i>Tridens muticus</i>	0-336	–
	slim tridens	TRMUE	<i>Tridens muticus</i> var. <i>elongatus</i>	0-336	–
	green sprangletop	LEDU	<i>Leptochloa dubia</i>	0-336	–
	Texas wintergrass	NALE3	<i>Nassella leucotricha</i>	0-168	–
	fall witchgrass	DICO6	<i>Digitaria cognata</i>	0-168	–
	plains lovegrass	ERIN	<i>Eragrostis intermedia</i>	0-168	–
	Texas cupgrass	ERSE5	<i>Eriochloa sericea</i>	0-168	–
	sedge	CAREX	<i>Carex</i>	0-112	–
	purple threeawn	ARPU9	<i>Aristida purpurea</i>	0-112	–
	Wright's threeawn	ARPUW	<i>Aristida purpurea</i> var. <i>wrightii</i>	0-112	–
	Reverchon's bristlegrass	SERE3	<i>Setaria reverchonii</i>	0-112	–
Forb					
5	Forbs			168-392	
	awnless bushsunflower	SICA7	<i>Simsia calva</i>	0-392	–
	bundleflower	DESMA	<i>Desmanthus</i>	0-392	–
	Engelmann's daisy	ENPE4	<i>Engelmannia peristenia</i>	0-392	–
	Maximilian sunflower	HEMA2	<i>Helianthus maximiliani</i>	0-392	–
	dotted blazing star	LIPU	<i>Liatris punctata</i>	0-392	–
	coastal indigo	INMI	<i>Indigofera miniata</i>	0-336	–
	trailing krameria	KRLA	<i>Krameria lanceolata</i>	0-336	–
	sensitive plant	MIMOS	<i>Mimosa</i>	0-336	–
	smartweed leaf-flower	PHPO3	<i>Phyllanthus polygonoides</i>	0-336	–
	scurfpea	PSORA2	<i>Psoralegium</i>	0-336	–
	snoutbean	RHYNC2	<i>Rhynchosia</i>	0-336	–
	milkpea	GALAC	<i>Galactia</i>	0-336	–
	Dakota mock vervain	GLBIB	<i>Glandularia bipinnatifida</i> var. <i>bipinnatifida</i>	0-336	–
	ticktrefoil	DESMO	<i>Desmodium</i>	0-336	–
	fuzzybean	STROP	<i>Strophostyles</i>	0-336	–
	vetch	VICIA	<i>Vicia</i>	0-336	–
	prairie clover	DALEA	<i>Dalea</i>	0-336	–
	Forb, annual	2FA	<i>Forb, annual</i>	0-280	–
	Cuman ragweed	AMPS	<i>Ambrosia psilostachya</i>	0-280	–
	white sagebrush	ARLUM2	<i>Artemisia ludoviciana</i> ssp. <i>mexicana</i>	0-280	–
	stork's bill	ERODI	<i>Erodium</i>	0-280	–
	plantain	PLANT	<i>Plantago</i>	0-280	–
	blazingstar	MENTZ	<i>Mentzelia</i>	0-280	–
Tree					
6	Trees			168-392	
	Texas live oak	QUFU	<i>Quercus fusiformis</i>	168-392	–
	bastard oak	QUSIB	<i>Quercus sinuata</i> var. <i>breviloba</i>	0-336	–
	Texas red oak	QUBU2	<i>Quercus buckleyi</i>	0-336	–
Shrub/Vine					
7	Shrubs/Vines/Trees			84-196	
	elm	ULMUS	<i>Ulmus</i>	0-196	–
	hackberry	CEITI	<i>Celtis</i>	0-196	–
	ash	FRAXI	<i>Fraxinus</i>	0-196	–

	Ashe's juniper	JUAS	<i>Juniperus ashei</i>	0-140	–
	algerita	MATR3	<i>Mahonia trifoliolata</i>	0-140	–
	plum	PRUNU	<i>Prunus</i>	0-140	–
	bully	SIDER2	<i>Sideroxylon</i>	0-140	–
	saw greenbrier	SMBO2	<i>Smilax bona-nox</i>	0-140	–
	Eve's necklacepod	STAF4	<i>Styphnolobium affine</i>	0-140	–
	black prairie clover	DAFR2	<i>Dalea frutescens</i>	0-140	–
	stretchberry	FOPU2	<i>Forestiera pubescens</i>	0-140	–
	Mexican buckeye	UNSP	<i>Ungnadia speciosa</i>	0-140	–
	Texas yucca	YURU	<i>Yucca rupicola</i>	0-140	–
	eastern redbud	CECA4	<i>Cercis canadensis</i>	0-140	–

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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Animal community

This site provides habitat for a great variety of wildlife. Deer may use the savannah areas and the edges of the shrub mottes. Dove and quail also inhabit this site. Turkey and squirrel from adjacent bottomlands frequent this site and feed extensively on acorns and other mast. Many songbirds and small animals feed, nest, and raise their young on the site; among these is the golden cheeked warbler.

Hydrological functions

Site-specific data indicated that rills, if present, are very short (5 feet). Some gullies may be present on side drains into perennial and intermittent streams. Gullies are vegetated and stable. Water flow patterns are common but are short (5-10 feet) due to interruption by rocks or plant bases. Deposition or erosion is uncommon for normal rainfall conditions but may occur during intense rainfall events. Pedestals or terracettes are uncommon for this site. Even under normal rainfall conditions, litter movement would be expected. Under moderate rain events, litter will move across large fragments and outcrops until interrupted by plants and large rocks. Litter of all sizes may move long distances during intense storm events due to the steepness of the site. Soil surface is resistant to erosion; stability class range is expected to be 4-6 where large fragments permit sampling. The understory of tallgrasses, midgrasses, and forbs creates adequate litter and includes little bare ground, which provides for maximum infiltration and little runoff under normal rainfall events.

Recreational uses

Recreational uses include recreational hunting, hiking, camping, equestrian, and bird watching. In the fall, this site usually produces a pleasing show of colors.

Wood products

Honey mesquite, eastern redcedar, and some oak are used for posts, firewood, charcoal, and other specialty wood products.

Other products

Jams and jellies are made from many fruit bearing species, such as agarito. Seeds are harvested from many plants for commercial sale. Many grasses and forbs are harvested by the dried-plant industry for sale in dried flower arrangements. Honeybees are utilized to harvest honey from many flowering plants, such as honey mesquite.

Inventory data references

Information presented was derived from the revised Steep Rocky Range Site, NRCS clipping data, literature, field observations, and personal contacts with range-trained personnel. Reviewers: Lem Creswell, RMS, NRCS, Weatherford, Texas Acknowledgements: Special thanks to the following personnel for assistance and/or guidance with the development of this ESD: Justin Clary, NRCS, Temple, TX; Mark Moseley, NRCS, San Antonio, TX; Ricky Marks, NRCS, Brownwood, TX.; Rhett Johnson, Granbury, TX; Michael and Susannah Wisenbaker, Dallas, TX; Rancho Hielo Brazos, Glen Rose, TX; and Dr. Ricky Fain, Chalk Mountain, TX.

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Approval

Bryan Christensen, 9/21/2023

Acknowledgments

Site Development and Testing Plan: Future work, as described in a Project Plan, to validate the information in this Provisional Ecological Site Description is needed. This will include field activities to collect low, medium and high intensity sampling, soil correlations, and analysis of that data. Annual field reviews should be done by soil scientists and vegetation specialists. A final field review, peer review,

quality control, and quality assurance reviews of the ESD will be needed to produce the final document. Annual reviews of the Project Plan are to be conducted by the Ecological Site Technical Team.

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)	Lem Creswell, Zone RMS, NRCS, Weatherford, Texas
Contact for lead author	817-596-2865
Date	04/14/2008
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** None.

2. **Presence of water flow patterns:** Water flow patterns are common and follow old stream meanders. Deposition or erosion is uncommon for normal rainfall but may occur during intense rainfall events.

3. **Number and height of erosional pedestals or terracettes:** Pedestals or terracettes would have been uncommon for this site.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Expect no more than 30% bare ground randomly distributed throughout in small and non-connected areas.

5. **Number of gullies and erosion associated with gullies:** Some gullies may be present on side drains into perennial and intermittent streams. Gullies should be vegetated and stable.

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

7. Amount of litter movement (describe size and distance expected to travel): Under normal rainfall, little litter movement should be expected; however, litter of all sizes may move long distances during intense storm events. Minimal and short.

8. Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values): Soil surface is resistant to erosion. Stability class range is expected to be 5-6.

9. Soil surface structure and SOM content (include type of structure and A-horizon color and thickness): Soil surface is 0-4 inches of pale brown gravelly loam, moderately fine and very fine subangular blocky and granular structure on the surface. SOM is approximately 0-3%. See soil survey for specific soils.

10. Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff: The savannah of tallgrasses, midgrasses, forbs and trees having adequate litter and little bare ground can provide for maximum infiltration and little runoff under normal rainfall events.

11. Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site): No evidence of compaction.

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 tallgrasses >>

Sub-dominant: Warm-season midgrasses > Trees >

Other: Cool-season grasses > Forbs > Shrubs

Additional:

13. Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence): Grasses due to their growth habit will exhibit some mortality and decadence, though very slight.

14. Average percent litter cover (%) and depth (in): Litter is dominantly herbaceous.

15. Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production): 1500-3500 pounds per acre

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: Ashe Juniper, Honey mesquite, Prickly pear, Bermudagrass, Johnsongrass, King Ranch bluestem
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17. **Perennial plant reproductive capability:** All perennial plants should be capable of reproducing, except during periods of prolonged drought conditions, heavy herbivory, and intense wildfires.
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