USDA Natural Resources Conservation Service

Ecological site R042BB018NM
Bottomland, Desert Shrub

Accessed: 05/11/2025

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.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This site occurs principally on mainly on stream terraces, swales, flood plains alluvial flats or basin floors. Soils are derived from recent alluvium. These landscapes are commonly subject to overflow or flooding (normally more often than once in two years) in which water may stand for several hours or even a day. Deep wetting is the principal feature of this flooding. Slopes range from 1 to 5 percent less than average 3 percent. Elevations range from 3,800 to 5,000 feet.

Table 2. Representative physiographic features

Landforms	(1) Flood plain (2) Draw (3) Swale
Flooding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Flooding frequency	Occasional to frequent
Ponding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Ponding frequency	Rare to occasional
Elevation	3,800–5,000 ft
Slope	1–5%
Aspect	Aspect is not a significant factor

Climatic features

Annual average precipitation ranges from 7.35 to 11.90 inches. Wide fluctuations from year to year are common, ranging from a low of about 2 inches to a high of over 20 inches. At least one-half of the annual precipitation comes in the form of rainfall during July, August, and September. Precipitation in the form of snow or sleet averages less than 4 inches annually. The average annual air temperature is about 60 degree F. Summer maximums can exceed 100 degrees F. and winter minimums can go below zero. The average frost-free season exceeds 200 days and extends from April 1 to November 1. Both the temperature regime and rainfall distribution favor warm-season perennial plants on this site. Spring moisture conditions are only occasionally adequate to cause significant growth during this period of year. High winds from the west and southwest are common from March to June, which further tends to create poor soil moisture conditions in the springtime.

Climate data was obtained from
http://www.wrcc.dri.edu/summary/climsmnm.html

Table 3. Representative climatic features

Frost-free period (average)	205 days
Freeze-free period (average)	227 days
Precipitation total (average)	12 in

Influencing water features

This site is not influenced by wetland or streams.

Soil features

Soils are deep to very deep. Surface textures are clay, silty clay loam, loam or silty clay, . Substratum textures are silt loam, silty clay, or clay. They may be stratified with thin lenses of very find sandy loams or coarse sand.

Minimum and maximum values listed below represent the characteriscit soils for this site.

Characteristic soils:
Armijo
Wessly
Largo
Sotim
reyab
Tome
Verhalen

Table 4. Representative soil features

Surface texture	(1) Silty clay (2) Clay (3) Sandy clay loam
Family particle size	(1) Clayey
Drainage class	Well drained to somewhat poorly drained
Permeability class	Very slow to moderate
Soil depth	24–72 in
Surface fragment cover <=3"	0–3%
Surface fragment cover >3"	0–1%
Available water capacity (0-40in)	4–8 in
Calcium carbonate equivalent (0-40in)	1–10%
Electrical conductivity (0-40in)	0–8 mmhos/cm

Sodium adsorption ratio (0-40in)	0–6
Soil reaction (1:1 water) (0-40in)	7.4–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–3%
Subsurface fragment volume >3" (Depth not specified)	0–1%

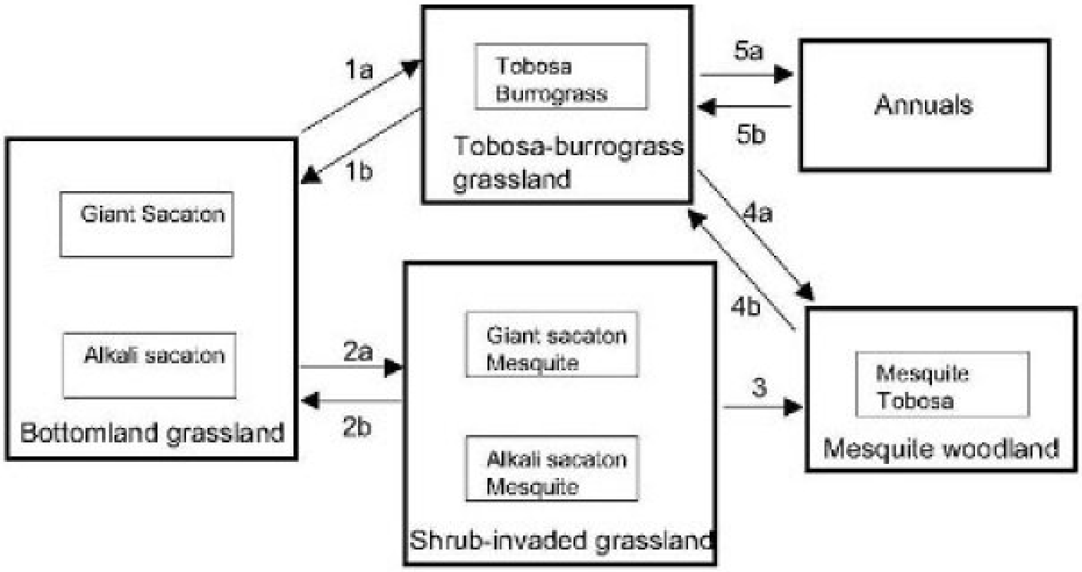
Ecological dynamics

Overview

This site is associated with Draw ecological sites, and often occurs at the downslope ends of draws. The historic plant community type of this site is dominated by either giant sacaton (*Sporobolus wrightii*) or alkali sacaton (*Sporobolus airoides*), the distinction depending upon unknown factors (perhaps salinity). Vine mesquite (*Panicum obtusum*) and sideoats grama (*Bouteloua curtipendula*) may also be common. Reduced cover and hummocking of these grasses characterize initial stages of degradation due to overgrazing, and perhaps due to reductions in soil moisture availability with changes in hydrology. Transitions to first tobosa (*Pleuraphis mutica*) and then to burrograss (*Scleropogon brevifolius*)-dominated states may occur in response to the redistribution of run-in water via overgrazing and subsequent erosion and gullying or changes in hydrology. Shrubs such as mesquite (*Prosopis glandulosa*) and tarbush (*Flourensia cernua*) may invade in response to the loss of run-in water when propagules are available. Gullying with shrub removal, severe disturbance, or severe overgrazing may reduce the vegetation to an annual-dominated state.
No quantitative information exists concerning the causes of transitions among grassland types or to shrublands or annuals. No systematic studies exist regarding the effects of range management on grassland-shrubland/annual community transitions in the lowland ecological site group.

State and transition model

State-Transition model: MLRA 42, SD-2, Nonsaline lowland site group: Bottomland



1a. Soil drying due to blocked water flow, overgrazing, or gullying.
1b. Gully destruction, water redistribution.
2a. Gullying, soil drying, increasing bare patches, reduced fire.
2b. Shrub removal, restored hydrology.
3. Shrub maturation, gullying and persistent erosion, soil degradation and loss.
4a. Shrub encroachment and continued gullying and soil degradation.
4b. Shrub removal with gully destruction, soil modification, and seeding.
5a. Continued soil drying, severe overgrazing, persistent disturbance.
5b. Restored hydrology, soil modification, and seeding.

State 1
Historic Climax Plant Community

Community 1.1
Historic Climax Plant Community

Figure 4. SD-2; Bottomland

Bottomland grasslands: The historic plant community is dominated by giant sacaton and alkali sacaton either alone or in mixture, and harbors several other grass species including vine mesquite, tobosa, burrograss, and sideoats grama. It is not known what conditions or circumstances lead to the differing abundances of the sacaton species among bottomlands, or if shifts in their relative abundances occur over time. Alkali sacaton may dominate on more saline soils. Each of these species has relatively high palatability when compared to tobosa and burrograss during the growing season. Thus, reduction of populations of bottomland grass species due to overgrazing and erosion is a risk. The giant sacaton grasslands have been reduced to 5% of their original extent (Cox 1988), thus there is great interest in preserving the remaining stands. Grazing giant sacaton during dry summers or fall may expose crowns to freezing temperatures and cause grass mortality (Cox 1988). Burning of bottomland grasslands may do more harm than good. Giant sacaton, for example, is relatively slow to recover from fire, taking from 2-3 years. Suitable burning strategies for this site are unknown, but post-fire protection of grasslands from grazing can aid the recovery of grasses. Diagnosis: Giant sacaton and/or alkali sacaton dominates (often more than 50% basal cover) and cover is uniform. Open patches are few and less than 2 m in length, most ground is covered with litter. Mesquite is generally absent. Transition to tobosa-dominated state (1a): Transitions from bottomland communities to tobosa-dominated communities can occur in response to diversion in run-in water flow catalyzed by overgrazing or blockage of surface flow. Removal of grasses may increase the rate of water flow in parts of the bottomland and result in gullying. Channelization of subsequent flood waters into the gully diverts run-in water and reduces the amount of time that areas of the bottomland are submerged. Once the duration of submersion is reduced below an unknown value, tobosa establishment and persistence may be favored at the expense of bottomland grasses, especially in the presence of grazing. It is not known what conditions promote either the transition to shrub-invaded grassland versus a mesquite-free, tobosa-burrograss grassland. Key indicators of approach to transition: Increases in bare ground cover, tobosa, and burrograss cover, increases in the size of bare ground patches, decreases in the cover and reproduction of giant and alkali sacaton, appearance of water flow patterns, rills, gullies, and debris dams associated with open spaces, reduced frequency and duration of flooding. Transition to shrub-invaded state (2a): Overgrazing or poorly-timed grazing, with consequent reduction in grass cover and subsequent gullying and diversion of water may produce changes in the soil moisture regime or fire regime that may facilitate the establishment of mesquite and other shrubs. It is unknown whether increased shrub establishment requires only open space or requires changes in soil moisture or fire frequency. The historic role of fire in bottomlands is unknown, and the absence of fire and reduced soil moisture may act together. Tarbush may also invade. Key indicators of approach to transition: Increases in bare ground cover, increases in the size of bare ground patches, decreases in the cover and reproduction of giant and alkali sacaton, appearance of water flow patterns, rills, and debris dams associated with open spaces, reduced frequency and duration of flooding. Increases in tobosa and burrograss may also accompany this transition. The presence of mesquite seedlings and plants may indicate that a transition is underway.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1620	2385	3150
Shrub/Vine	126	185	245
Forb	54	80	105
Total	**1800**	**2650**	**3500**

Table 6. Soil surface cover

Tree basal cover	0%
Shrub/vine/liana basal cover	0%
Grass/grasslike basal cover	55%
Forb basal cover	0%
Non-vascular plants	0%
Biological crusts	0%
Litter	35%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	10%

Figure 6. Plant community growth curve (percent production by month). NM2509, R042XB018NM-Bottomland Warm Season Plant-HCPC. SD-2 Bottomland HCPC Warm Season Plant Community.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	10	10	25	30	15	5	0	0

State 2
Shrub-Invaded Grasslands

Community 2.1
Shrub-Invaded Grasslands

Additional States: Shrub-invaded grasslands: Honey mesquite and/or other shrubs such as little-leaf sumac are common. Shrub increase is generally associated with declines in the sacaton species and increases in tobosa, burrograss, and bare ground. Plant distributions are often very patchy, with clumps of mesquite occupying drier parts and grasses or perhaps annuals dominating others. The expansion of mesquite may cause further reductions in grass cover, but if sufficient grass remains to control erosion, this situation may be stable. Diagnosis: Medium to large (>50 cm tall) mesquite present. Giant sacaton and/or alkali sacaton cover and litter cover is discontinuous, tobosa, burrograss, or bare ground may dominate many large (>2 m) patches. Transition to mesquite woodland (3): Transitions to a mesquite woodland state may occur in response to continued gully development and lowering of soil moisture, alongside soil surface degradation, either before (transition 4a) or after (3) mesquite have established. This may be caused by continued overgrazing and reduction of grass cover. Key indicators of approach to transition: Increases in bare ground cover and the size of bare ground patches, decreases in grass cover, presence of deep gullies. Transition to bottomland grassland (2b): Mechanical/herbicide removal with restoration of hydrology and grass cover would be needed to restore bottomland grasslands.

State 3
Tobosa-Burrograss Grassland

Community 3.1
Tobosa-Burrograss Grassland

Tobosa-burrograss grassland: This grassland is believed to occur as gullying increases (or flows are blocked by dams) and soil moisture levels during flood periods decline. Tobosa and/or burrograss dominate overall, but giant sacaton may occur along gully margins or in wetter patches. Mesquite is absent or rare, perhaps due to dispersal limitation. Diagnosis: Giant sacaton and/or alkali sacaton restricted to wetter patches. Tobosa and burrograss dominant in large, many large (> 2m) bare patches. Large gullies are present and physical soil crusts and shrink-swell cracking is visible in bare patches. Transition to mesquite woodland (4a): See transition 3 above. Transition to annual-dominated state (5a): The causes, indicators, and reversing practices for this transition are believed to be similar to those for transitions 3 and 4a. In this case, however, the presence of shrink-swell clays causes root destruction of perennials and only annual species occur. Persistent disturbance and soil degradation may produce a similar effect. Transition to bottomland grassland state (1b): Gully destruction and water-spreading to redirect flood waters across the area in conjunction with transplants or seeding of bottomland grasses (especially with vine mesquite and alkali sacaton) may possibly reverse this transition.

State 4
Mesquite Woodland

Community 4.1
Mesquite Woodland

Mesquite woodland: Communities in this state are largely bare ground but may contain patches of tobosa, burrograss, and perhaps sacaton species. Mesquite cover may be thick. Diagnosis: Large (> 1 m tall) mesquite are numerous. Giant sacaton and/or alkali sacaton either absent or restricted to a few patches. Tobosa and burrograss also restricted to patches. Bare ground extensive and well connected. Large gullies are present and physical soil crusts and shrink-swell cracking is visible in bare patches. Transition to tobosa grassland state (4b): Shrub removal with gully destruction and water-spreading to redirect flood waters across the area, in conjunction with transplants or seeding of tobosa and other grasses, may improve infiltration conditions and facilitate subsequent reintroduction of bottomland grasses. Alternatively, one may attempt to restore bottomland grasses immediately. Neither has been attempted so far as we are aware.

State 5
Annual-Dominated

Community 5.1
Annual-Dominated

Annual-dominated: Most of the area in this state has been reduced to either bare ground or annuals. Patches of giant sacaton, burrograss and tobosa may occur. Deep gullies are a prominent feature of this site. Diagnosis: Bare ground or annual cover is nearly continuous. Giant sacaton and other grasses occur only in isolated patches, sometimes on the fringes of the annual-dominated area, or not at all. Gullies are present or other features obstruct surface flow of water. Physical crusting and shrink-swell cracking of the bare soil surface is extensive. Transition to tobosa grassland state (5b): Same as for 4b without need for shrub removal. Information sources and theoretical background: Communities and states are derived largely from observations by Brandon Bestelmeyer and Jim Powell. Communities are usually defined by the primary and secondary dominant plant species, but sometimes emphasize dominant species of differing life-forms. Transitions are derived from expert opinion and are founded upon two hypotheses (same as in the Draw site). The channelization hypothesis holds that the loss of herbaceous vegetation cover increases erosion and channelization, and that channelization reduces soil moisture availability to grasses across broad areas. Changes in soil moisture availability, in turn, lead directly to changes in the composition of dominant plants (Gile and Grossman 1997). The fire hypothesis holds that vegetation change is limited only by limitations in the dispersal and growth of dominant shrub species. Once shrub propagules are present, vegetation change is inevitable without periodic disturbances such as fire (Brown and Archer 1989). For bottomlands, the historic role of fire is far from clear. Finally, the competition hypothesis holds that sacaton grassland maintenance depends upon the competitive exclusion of shrub seedlings due to limitations in light or nutrients (c.f. Van Auken and Bush 1990). There may be a threshold grass density below which the probability of shrub establishment increases rapidly, leading to a transition to the shrubland type.

Additional community tables

Table 7. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Warm Season**			1855–2120	
	alkali sacaton	SPAI	*Sporobolus airoides*	1855–2120	–
	big sacaton	SPWR2	*Sporobolus wrightii*	1855–2120	–
2	**Warm Season**			27–133	
	tobosagrass	PLMU3	*Pleuraphis mutica*	27–133	–
3	**Warm Season**			80–133	
	vine mesquite	PAOB	*Panicum obtusum*	80–133	–
4	**Warm Season**			80–133	
	Graminoid (grass or grass-like)	2GRAM	*Graminoid (grass or grass-like)*	80–133	–
	threeawn	ARIST	*Aristida*	80–133	–
	feather fingergrass	CHVI4	*Chloris virgata*	80–133	–
	mat muhly	MURI	*Muhlenbergia richardsonis*	80–133	–
	burrograss	SCBR2	*Scleropogon brevifolius*	80–133	–
5	**Warm Season**			80–133	
	cane bluestem	BOBA3	*Bothriochloa barbinodis*	80–133	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	80–133	–
	Arizona cottontop	DICA8	*Digitaria californica*	80–133	–
	plains lovegrass	ERIN	*Eragrostis intermedia*	80–133	–
Shrub/Vine					
6	**Shrub**			27–133	
	fourwing saltbush	ATCA2	*Atriplex canescens*	27–133	–
	longleaf jointfir	EPTR	*Ephedra trifurca*	27–133	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	27–133	–
	crown of thorns	KOSP	*Koeberlinia spinosa*	27–133	–
	littleleaf sumac	RHMI3	*Rhus microphylla*	27–133	–
	soaptree yucca	YUEL	*Yucca elata*	27–133	–
Forb					
7	**Forb**			27–133	
	dwarf desertpeony	ACNA2	*Acourtia nana*	27–133	–
	milkvetch	ASTRA	*Astragalus*	27–133	–
	croton	CROTO	*Croton*	27–133	–
	buckwheat	ERIOG	*Eriogonum*	27–133	–
	bladderpod	LESQU	*Lesquerella*	27–133	–
	Russian thistle	SAKA	*Salsola kali*	27–133	–
8	**Forb**			27–133	
	Forb (herbaceous, not grass nor grass-like)	2FORB	*Forb (herbaceous, not grass nor grass-like)*	27–133	–

Animal community

This site provides habitats which support a resident animal community that is characterized by pronghorn antelope, coyote, black-tailed jackrabbit, sparrow hawk, scaled quail, meadow lark, hognose snake, and Woodhouse’s toad.

Where large yucca is present, this site serves as a breeding area for Scott’s oriole, mockingbird and mourning dove.

Hydrological functions

The runoff curve numbers are determined by field investigations using hydraulic cover conditions and hydrologic soil groups.

Hydrologic Interpretations
Soil Series Hydrologic Group
Armijo D
Wessly B
Largo B
Sotim B
Marconi C
reyab B
Tome B
Verhalen D

Recreational uses

There may be some hazard from flooding which limits suitability for camping and picnicking. Hunting is fair for pronghorn antelope, quail, dove, small game, and waterfowl where seasonal open water occurs. Photography and bird watching can be fair to good, especially during migration seasons. Most small animals of the site are nocturnal and secretive, seen only at night, early morning or evening.

Wood products

This site has no significant value for wood products.

Other products

This site is suitable for seasonal use by cattle during the period of July through September. It is generally suitable for all classes of cattle. This site is especially suitable for livestock when grasses are at their greenest, following summer flooding. Cows with calves big enough to take a substantial amount of milk would benefit greatly for increased forage nutrition during this time of year.

Although site deterioration may be caused by inadequately managed grazing, it is frequently the result of gullying and draining. This condition is at its extreme when represented by an abundance of bare ground and annuals, coupled with remnant stands of sacaton or tobosa suited so as to receive overflow from side drainages. The site is not, at this stage, recoverable through grazing management alone.

Other information

Guide to Suggested Initial Stocking Rate Acres per Animal Unit Month
Similarity Index Ac/AUM
100 - 76 2.0 – 3.0
75 – 51 2.8 – 3.7
50 – 26 3.5 – 6.8
25 – 0 6.8 - +

Other references

Other References:
Data collection for this site was done in conjunction with the progressive soil surveys within the Southern Desertic Basins, Plains and Mountains, Major Land Resource Areas of New Mexico. This site has been mapped and correlated with soils in the following soil surveys. Sierra County Dona Ana County Grant County Hidalgo County

Luna County Otero County

Characteristic Soils Are:
Oscura silty clay
Mimbres loam, sandy clay loam, sandy loam (as mapped in NM)
Anapara silty clay loam and clay loam
Gila fine sandy loam, loam
Harkey loam, sandy clay loam, fine sandy loam
Anthony sandy loam, fine sandy loam
Belen sandy clay loam, clay loam
Armijo sandy clay, clay

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)	
Contact for lead author	
Date	
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

2. **Presence of water flow patterns:**

3. **Number and height of erosional pedestals or terracettes:**

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

5. **Number of gullies and erosion associated with gullies:**

6. **Extent of wind scoured, blowouts and/or depositional areas:**

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7. **Amount of litter movement (describe size and distance expected to travel):**

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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):**

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

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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):**

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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:

    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):**

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14. **Average percent litter cover (%) and depth (in):**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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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:

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17. **Perennial plant reproductive capability:**
