Ecological site R042AD004NM
Limy, Dry Mixed Prairie

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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.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This site occurs on gently sloping inset fans, alluvial fans, and fan remnant. The soils are drived from eolian sands over calcareous upland alluvium derived from limestone. Slopes range from 1 to 5 percent. Elevatons range from 4700 to 6000 feet above sea level.

Table 2. Representative physiographic features

Landforms	(1) Inset fan (2) Alluvial fan (3) Fan remnant
Flooding frequency	None
Ponding frequency	None
Elevation	4,700–6,000 ft
Slope	0–5%
Aspect	Aspect is not a significant factor

Climatic features

Average precipitation for this site is approximately 12 to 14 inches. Variations of 5 inches are not uncommon. Approximately 75 percent occurs from May through October with most of the rainfall occurring from July to September. Most of the summer precipitation comes in the form of high intensity, short duration thunderstorms. Rain and snow of low intensity characterize the limited winter precipitation.

Temperatures are mild. Freezing temperatures are common at night from December through April, however, temperatures during the day are frequently above 50 degrees F. Occasionally in December to February brief periods of 0 degrees F. temperatures may be expected. During June to August some days may exceed 100 degrees F.

The mean annual precipitation figures are derived from rain gauge data collected by the BLM (1971 to 1990), and NOAA weather maps utilizing prism model estimation techniques. There are no permanent weather stations within

the boundaries of the Land Resource Unit.

Table 3. Representative climatic features

Frost-free period (average)	180 days
Freeze-free period (average)	185 days
Precipitation total (average)	14 in

Influencing water features

This site is not influenced by water from wetland or stream.

Soil features

Soils are deep to very deep. Surface textures are fine sandy loam, and very fine sandy loam. Subsoil textures are fine sandy loam, sandy clay loam, very fine sandy loam, or loam. Underlying layers may bave a gravel content of less than 20 percent. Silt loam, silty clay loam, or sandy clay loam. Fine sandy loam is below 30 inches in some pedons.

There is a calcic horizon within 20 inches of the surface. Permeability is moderately slow and available water holding capacity is high to very high. Because of the high lime content and surface textures, the soils are easily eroded if not protected by adequate vegetation.

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

Characteristic soils:
Armesia

Table 4. Representative soil features

Surface texture	(1) Fine sandy loam (2) Very fine sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately slow to moderate
Soil depth	60–80 in
Surface fragment cover <=3"	0–20%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	6.5–7.1 in
Calcium carbonate equivalent (0-40in)	2–40%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0–2
Soil reaction (1:1 water) (0-40in)	7.9–8.4

Subsurface fragment volume <=3" (Depth not specified)	1–20%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

The Limy ecological site occurs as a component associated with both the Shallow Sandy and Loamy ecological sites. When the Limy site occurs with the shallow sandy site, the Limy site occupies a lower slightly concave or bottom (inset fan) position of the piedmont slope, whereas the Shallow Sandy site is situated on the more convex side slopes or the top position of the piedmont slope. Where the Limy site and the Loamy site occur together, they intergrade and form a mosaic where there is no apparent distinction in landscape position.

The aspect of this site is open grassland sparsely dotted with shrubs. Blue grama and black grama are the dominant species. Forb production and composition can fluctuate widely from year to year. Some of the more common forbs include grassland croton and bladderpod. Characteristic shrubs include winterfat, soaptree yucca, and prickly pear. This site is subject to invasion by mesquite, and also creosotebush and or tarbush. Drought, overgrazing, or a combination of the two can initiate the transition from grassland to a shrub-invaded state. Above average winter precipitation may also favor the encroachment of shrubs4. Seed dissemination by wildlife and livestock can aid in the establishment of mesquite. Fire suppression may also play a part by allowing mesquite seedlings to survive and flourish.1 Creosotebush invasion may be facilitated by proximity to areas where creosotebush is already established. Once mesquite or creosotebush is established, prescribed grazing may be necessary to alter the path to shrub dominance. Continued loss of grass cover, decreased infiltration, and erosion produce conditions conducive to shrub dominance.

State and transition model

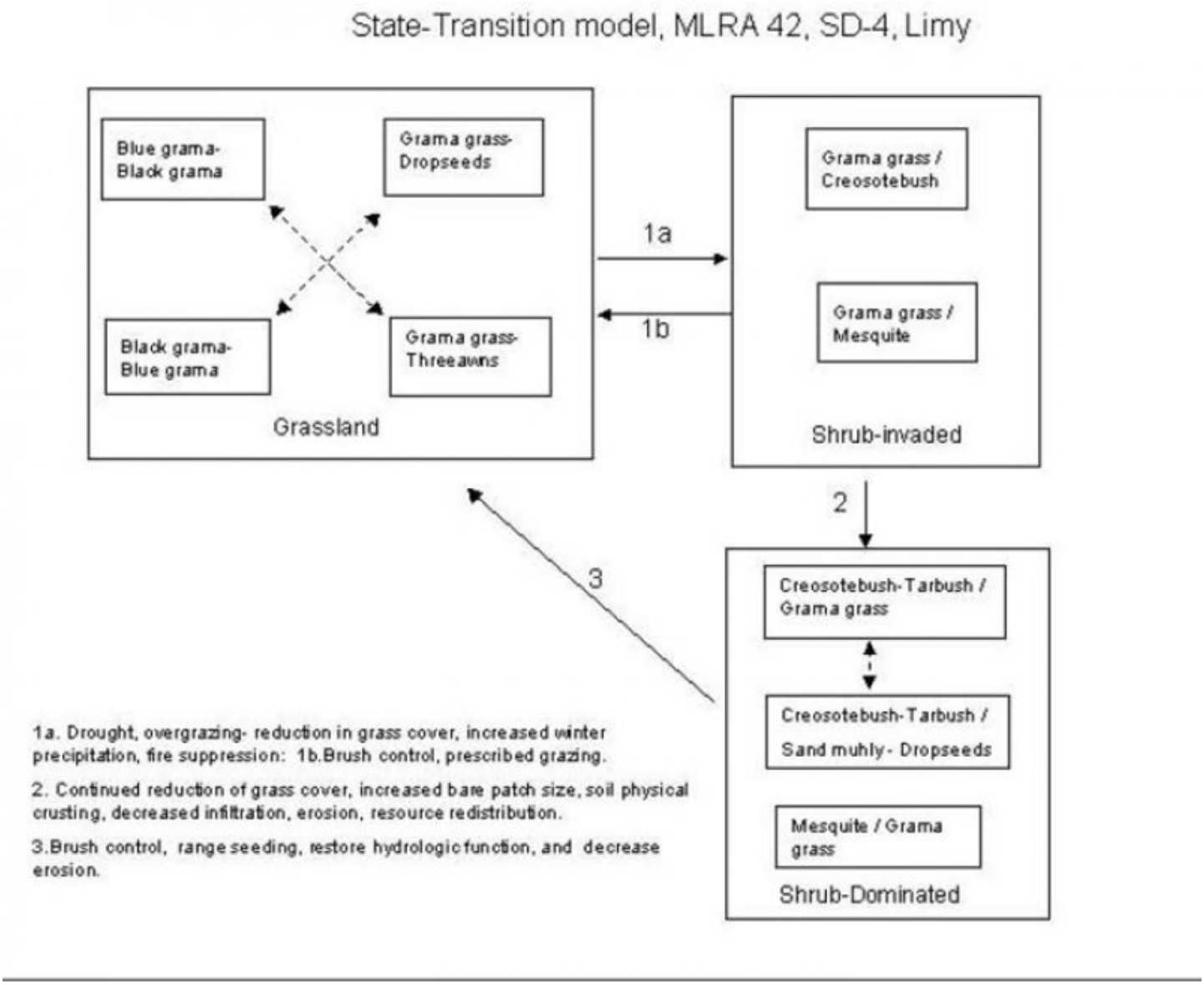

Figure 4. MLRA-42, SD-4, Limy

State 1
HCPC

This state is currently the most common on Limy sites of SD-4. Blue grama and black grama are the dominant species, with a fair amount of sand muhly and vine mesquite distributed throughout the site. Blue grama generally has the highest production with black grama second. Forage preference can shift production in favor of black grama and vice versa depending on factors such a season of use, stocking rate, and livestock distribution. Dropseeds or threeawns species can increase in response to a decrease in grama grass cover. This decrease in cover may be climate or grazing induced. Shrubs associated with this state include winterfat, soaptree yucca, fourwing saltbush, prickly pear and cholla. Winterfat is a signature or key species of the limy site. A lack of or decrease in winterfat is usually grazing induced. Colonies of soaptree yucca appear scattered throughout the Armesa soil series of the Limy site. These groups or heavier densities of yucca may be due to slight soil differences. Broom snakeweed comes and goes in cycles, increasing following increased winter precipitation. This site is susceptible to invasion by mesquite, creosotebush and or tarbush.

Community 1.1
Grassland

Figure 5. Grassland

Blue grama and black grama are the dominant species. Grass cover is uniformly distributed with few large bare areas. There is little evidence of active rills and gully formation. Litter movement is limited to smaller size class litter and short distances. Creosotebush, tarbush and mesquite are absent.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	575	930	1120
Forb	55	50	60
Shrub/Vine	20	20	20
Total	**650**	**1000**	**1200**

Figure 7. Plant community growth curve (percent production by month). NM5804, R042XD004NM Limy HCPC Grassland State. R042XD004NM Limy Warm Season Grassland - Average rainfall year..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	3	8	7	18	28	25	6	2	0

State 2
Shrub Invaded

This state is characterized by the invasion of mesquite, creosotebush or tarbush. However, grasses (blue grama and black grama) are still dominant species. Shrub cover varies from just a few widely scattered individuals to approaching co-dominance with grasses. As shrub cover increases herbaceous cover correspondingly decreases, due to resource competition. The majority of mesquite-invaded sites on Armesa soils tend to originate near roads or livestock water facilities. Creosotebush and tarbush are more common on the Armesa soils when they are adjacent to gravelly, loamy or other sites already containing creosotebush or tarbush.

Community 2.1
Shrub Invaded

Figure 8. Shrub Invaded

Production is usually reduced from grassland state. Creosotebush, tarbush or mesquite is present. Grass cover varies from near grassland conditions to patchy, with bare areas present and usually larger around invading shrubs.

State 3
Shrub Dominated

This state is characterized by the dominance of shrubs and loss of grass cover. Grass cover is minimal for the site, and seems to be lowest when dominated by creosotebush. Dropseeds and sand muhly establish readily from seed and may become the dominant grasses. Grasses form small disconnected patches scattered across the site with a few of the hardier individuals occupying otherwise bare areas between shrubs. Shrub cover is variable, but can be very dense. Shrub densities tend to increase along a gradient on some areas; on others shrub densities are fairly uniform.

Community 3.1
Shrub Dominated

Figure 9. Shrub Dominated

Grass production is minimal for site potential. Shrub cover is high, exceeding that of grasses. Erosion is apparent and rills or gullies may be present. Physical crusts are present in bare areas and biotic crusts are present around shrubs and in bare areas.

Transition 1a
State 1 to 2

A reduction in grass cover may facilitate the establishment of shrub seedlings. This reduction in cover may be climate or grazing induced. Drought can reduce forage production by more than 50 percent3. Black grama cover may be reduced during extended periods of drought regardless of grazing intensity, however, increases following

drought are greatest under conservative grazing2. Wildlife and livestock disperse mesquite seed. Creosotebush and tarbush seed is dispersed by wind, wildlife or road maintenance equipment. Periods of climate with above average winter precipitation and dry summers may favor shrub establishment4. Fire suppression may aid shrub seedling establishment.5 Key indicators of approach to transition: Decrease or change in distribution of grass cover and increase in amount of bare ground. Appearance of shrub seedlings. Evidence of litter movement—indicating loss or redistribution of organic matter. Formation of physical crusts—indicating loss of organic matter and decrease in soil aggregate stability and reduced infiltration.

Transition 1b
State 2 to 1

Brush management is necessary to remove shrubs and increase grass cover. Allow natural revegetation. Prescribed grazing will help ensure proper forage utilization, and increase organic matter and infiltration.

Transition 2
State 2 to 3

Extended periods of above average winter precipitation may favor shrub expansion. Continued overgrazing especially when coupled with drought will severely reduce grass cover promoting increased shrub densities. Prescribed fire may be lost as a management option if insufficient grass cover remains to carry a fire. Loss of grass cover in between shrubs and increased soil surface crusts can further resource redistribution favoring shrub expansion. Erosion can transport soil organic matter and surface soil off site. Key indicators of approach to transition: Loss of grass cover and increased size of bare patches. Increases in shrub cover Increase in amount of shrub seedlings. Erosion and soil degradation indicated by the occurrence of pedestalling, soil deposition, litter movement, and loss of surface soil (exposed sub-surface soil) 5. Formation of rills

Transition 3
State 3 to 1

Brush control will be necessary to remove resource competition from shrubs. Pitting and seeding just prior to summer rains will help to break up physical crusts and may aid in seedling germination. Adequate precipitation following seeding is critical and the degree of soil degradation will limit the effectiveness of seedling establishment.

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1				400–500	
	blue grama	BOGR2	*Bouteloua gracilis*	400–500	–
2				200–250	
	black grama	BOER4	*Bouteloua eriopoda*	200–250	–
3				75–100	
	sand muhly	MUAR2	*Muhlenbergia arenicola*	50–75	–
	vine mesquite	PAOB	*Panicum obtusum*	50–75	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	15–30	–
	Hall's panicgrass	PAHA	*Panicum hallii*	15–30	–
4				45–60	
	threeawn	ARIST	*Aristida*	45–60	–
	tobosagrass	PLMU3	*Pleuraphis mutica*	45–60	–
	burrograss	SCBR2	*Scleropogon brevifolius*	45–60	–
	alkali sacaton	SPAI	*Sporobolus airoides*	45–60	–
	plains bristlegrass	SEVU2	*Setaria vulpiseta*	15–30	–
5				0–20	
	New Mexico feathergrass	HENE5	*Hesperostipa neomexicana*	10–20	–
Forb					
6				5–10	
	Forb, annual	2FA	*Forb, annual*	5–10	–
7				5–10	
	Forb, perennial	2FP	*Forb, perennial*	5–10	–
8				10–20	
	croton	CROTO	*Croton*	10–20	–
	bladderpod	LESQU	*Lesquerella*	10–20	–
9				5–10	
	dwarf desertpeony	ACNA2	*Acourtia nana*	5–10	–
	Adonis blazingstar	MEMU3	*Mentzelia multiflora*	5–10	–
	silverleaf nightshade	SOEL	*Solanum elaeagnifolium*	5–10	–
	pricklyleaf dogweed	THAC	*Thymophylla acerosa*	5–10	–
Shrub/Vine					
10				5–10	
	fourwing saltbush	ATCA2	*Atriplex canescens*	5–10	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	5–10	–
11				5–10	
	soaptree yucca	YUEL	*Yucca elata*	5–10	–
	jointfir	EPHED	*Ephedra*	3–5	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	3–5	–
	pricklypear	OPUNT	*Opuntia*	3–5	–

Animal community

This site provides habitat, which supports a resident animal community, characterized by pronghorn antelope, scaled quail, gambel's quail, coyote, badger and black-tailed jackrabbit. This site also provides nesting, hiding and thermal cover for a variety of small rodents, birds and reptiles and their associated predators.

Hydrological functions

This site normally receives approximately 12-14 inches annual precipitation. Most summer rainfall occurs as brief sometimes-heavy thunderstorms.

Soil Name Hydrologic Unit
Armesa B

Recreational uses

This site offers good potential for antelope and predator hunting, wildlife observation and photography. Scenic beauty of this site will especially appeal to those who value wide open prairie grasslands.

Wood products

This site has no significant value for wood products.

Other products

Grazing: This site is suitable for grazing by all kinds and classes of livestock during all seasons of the year. As this site deteriorates there will be an increase in bare ground leaving the exposed soil susceptible to wind erosion. This site responds best to a system of management that rotates the season of use.

Initial starting stocking rates will be determined with the landowner or decision maker. They will be based on past use histories and type and condition of the vegetation. Calculations used to determine initial starting stocking rate will also be based on forage preference ratings.

Inventory data 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. Fort Bliss Soil Survey.

Type locality

Location 1: Otero County, NM	
Township/Range/Section	T21 S. R11 E. S10
General legal description	Otero County, New Mexico; about 300 feet north of county road 506 where it intersects the SW 1/4 of the SW 1/4 of Sec 10, t. 21 S., R. 11 E.

Other references

1. Drewa, P.B., D.P.C. Peters, and K.M. Havstad. 2001. Fire, grazing and honey mesquite invasion in black grama-dominated grasslands of the Chihuahuan Desert: a synthesis. Pages 31-39 in K.E.M. Galley and T.P. Wilson (eds.) Proceedings of the Invasive Species Workshop: the Role of Fire in the Control and Spread of Invasive Species. Fire Conference 2000: the First National Congress on Fire Ecology, Prevention, and Management. Miscellaneous Publication No. 11, Tall Timbers Research Station, Tallahassee, Fl.

2. Paulsen, H. A. and F. N. Ares. 1962. Grazing values and management of black grama and tobosa grasslands and associated shrub ranges of the southwest. USDA, Forest Service, Tech. Bull. 1270.

3. Holechek, J.L., R.D. Pieper, and C.H. Herbel. 1989. Range Management Principles and Practices. Prentice-Hall, Inc. Englewood Cliffs, New Jersey.

4. Moir, W. H. and J. A. Ludwig. 1991. Plant succession and changing land features in desert grasslands. P. 15-18. In P.F. Ffolliott and W.T. Swank (eds.) People and the temperate region: a summary of research from the United States Man and the Biosphere Program 1991. U.S. Dept. State, Publ No. 9839, Nat. Tech. Info. Serv., U.S. Dept. Commerce, Springfield, Illinois. 63 p.

5. Brooks, M.L. and D.A. Pyke. 2001. Invasive plants and fire in the deserts of North America. Pages 1–14 in K.E.M. Galley and T.P. Wilson (eds.). Proceedings of the Invasive Species Workshop: the Role of Fire in the Control and Spread of Invasive Species.

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:**
