

Ecological site R150AY641TX Lakebed

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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.

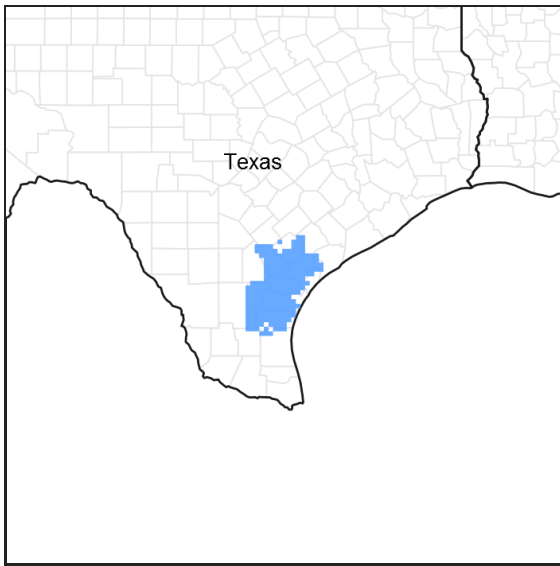


Figure 1. Mapped extent

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.

MLRA notes

Major Land Resource Area (MLRA): 150A–Gulf Coast Prairies

MLRA 150A is in the West Gulf Coastal Plain Section of the Coastal Plain Province of the Atlantic Plain in Texas (83 percent) and Louisiana (17 percent). It makes up about 16,365 square miles (42,410 square kilometers). It is characterized by nearly level plains that have low local relief and are dissected by rivers and streams that flow toward the Gulf of Mexico. Elevation ranges from sea level to about 165 feet (0 to 50 meters) along the interior margin. It includes the towns of Crowley, Eunice, and Lake Charles, Louisiana, and Beaumont, Houston, Bay City, Victoria, Corpus Christi, Robstown, and Kingsville, Texas. Interstates 10 and 45 are in the northeastern part of the area, and Interstate 37 is in the southwestern part. U.S. Highways 90 and 190 are in the eastern part, in Louisiana. U.S. Highway 77 passes through Kingsville, Texas. The Attwater Prairie Chicken National Wildlife Refuge and the Fannin Battleground State Historic Site are in the part of the area in Texas.

Classification relationships

MLRA Notes USDA-Natural Resources Conservation Service, 2006.
-Major Land Resource Area (MLRA) 150A

Ecological site concept

Lakebeds are shallow depressions that support wet soil plant communities. These sites receive water from surrounding upland sites following heavy rainfall events and can remain ponded for long periods. This site is not similar in soils, landscape positions or vegetation to any other sites in MLRA 150A.

Associated sites

R150AY639TX	Clay Loam The Clay Loam ecological site has very deep, well drained, clay loam soils and has high vegetative production.
R150AY526TX	Southern Blackland The Southern Blackland ecological site shows an intact grass community with small clumped dispersal of woody species. The soils are very deep, richly black in color, and characterized by their shrink-swell nature. The sites are widely distributed across the uplands and terraces throughout the region. This site has a heavier surface texture and is higher in the landscape.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) <i>Trichloris crinita</i> (2) <i>Setaria vulpiseta</i>

Physiographic features

The site was formed in clayey over loamy fluvio-marine deposits of Pleistocene age. These nearly level soils are in enclosed depressions on the coastal plain. Slope ranges from 0 to 1 percent. The elevation is 30 to 175 feet.

Table 2. Representative physiographic features

Landforms	(1) Coastal plain > Closed depression
Runoff class	Negligible
Flooding frequency	None
Ponding duration	Very long (more than 30 days)
Ponding frequency	Occasional to frequent
Elevation	5–38 m
Slope	0–1%
Ponding depth	0–61 cm
Water table depth	0–183 cm
Aspect	Aspect is not a significant factor

Climatic features

The climate of MLRA 150A is humid subtropical with mild winters. The average annual precipitation in the northern two-thirds of this area is 45 to 63 inches. It is 28 inches at the extreme southern tip of the area and 30 to 45 inches in the southwestern third of the area. The precipitation is fairly evenly distributed, but it is slightly higher in late summer and midsummer in the western part of the area and slightly higher in winter in the eastern part. Rainfall typically occurs as moderate intensity, tropical storms that produce large amounts of rain during the winter. The average annual temperature is 66 to 72 degrees F. The freeze-free period averages 325 days and ranges from 290 to 365 days, increasing in length to the southwest.

Table 3. Representative climatic features

Frost-free period (characteristic range)	250-316 days
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Freeze-free period (characteristic range)	365 days
Precipitation total (characteristic range)	813-889 mm
Frost-free period (actual range)	230-365 days
Freeze-free period (actual range)	365 days
Precipitation total (actual range)	787-940 mm
Frost-free period (average)	282 days
Freeze-free period (average)	365 days
Precipitation total (average)	838 mm

Climate stations used

- (1) BEEVILLE CHASE NAAS [USW00012925], Beeville, TX
- (2) KINGSVILLE NAAS [USW00012928], Kingsville, TX
- (3) BISHOP [USC00410805], Bishop, TX
- (4) C C BOTANICAL GARDENS [USC00412013], Corpus Christi, TX
- (5) ROBSTOWN [USC00417677], Robstown, TX
- (6) CORPUS CHRISTI [USW00012924], Corpus Christi, TX
- (7) SINTON [USC00418354], Sinton, TX
- (8) WELDER WILDLIFE FNDN [USC00419559], Sinton, TX
- (9) REFUGIO 3 SW [USC00417530], Refugio, TX
- (10) REFUGIO 2 NW [USC00417533], Refugio, TX

Influencing water features

This site is saturated in the upper horizons and will have reducing conditions for some time during the wet months of the year. This is a moist site receiving water from runoff and seepage from adjacent sites and will pond for long periods in normal years. Depth and breadth of ponding depends on the shape and size of the depression bottom.

Wetland description

The soils associated with this site are hydric. Each site will need to be visited individually to determine wetland criteria.

Soil features

The site consists of very deep, poorly drained, very slowly permeable, and slightly acid to neutral soils. Runoff is negligible. The surface color is black or very dark gray. The soil is ponded from a few days to several weeks during the spring and fall seasons in normal years. Soils correlated to this site include: Edroy.

Table 4. Representative soil features

Parent material	(1) Fluvio-marine deposits—igneous, metamorphic and sedimentary rock
Surface texture	(1) Clay
Family particle size	(1) Fine
Drainage class	Poorly drained
Permeability class	Very slow
Soil depth	203 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-152.4cm)	12.7–20.32 cm

Calcium carbonate equivalent (0-152.4cm)	0%
Electrical conductivity (0-152.4cm)	0–4 mmhos/cm
Sodium adsorption ratio (0-152.4cm)	2–6
Soil reaction (1:1 water) (0-101.6cm)	6.1–7.3
Subsurface fragment volume <=3" (101.6-152.4cm)	0–2%
Subsurface fragment volume >3" (0-152.4cm)	0%

Ecological dynamics

The Lakebed site occupies a very small percentage of the overall landscape of the Gulf Coast Prairie system. This Coastal Prairie system has been described historically as being covered by tall coarse grasses. The land was noted as a level prairie with open grasslands by various travelers in the 1800's. It should be noted that these prairies were not devoid of some tree type vegetation. A typical description of 1839 reads, "Refugio and Goliad Counties have a generally level surface. The prevailing character of the land is open prairie, spotted with islands of wood. Towards the south, the woods are of live oak and mesquite; northward, of white and post oak, elm, hackberry, pecan and mulberry." A traveler in 1854 wrote, "the remainder of the route [from Goliad] to San Antonio is an undulating surface of very rich but light soil covered with close, fine mesquite grass and checkered pleasantly with clumps of mesquite and other shrubs and trees."

The Lakebed is distinct from its surrounding prairie because it periodically ponds water from several days to several months during wet periods. Typically, this is a depressional grassland and ponds water at 2 inches or greater around the periphery to as much as 24 inches in the center of the depression. This site is most likely to be ponded during winter and early spring, but ponding may occur anytime throughout the year. In late spring and summer, the site may be completely dry or only moist at the surface. Lakebeds are highly preferred by all herbivorous animals. When much or most of the surrounding sites are dried out from summer heat, Lakebeds often remain lush, providing the only source of green herbage in the surrounding landscape. As such, it has periodically been heavily overgrazed by wild herbivores and domestic livestock. During extended years of low precipitation cycles, this site may be invaded by woody plants such as mesquite (*Prosopis glandulosa*) and huisache (*Acacia farnesiana*), however as wet cycles return, woody species often die out due to ponded water.

The reference plant community is a mid/tallgrass/sedge dominated depressional grassland heavily influenced by water regimes within the depression, as well as by grazing and fire. During wet cycles, more wet-tolerant species dominate while during dry cycles, species adapted to slightly drier conditions and less ponded water dominate the community. The tallgrass species commonly found include eastern gamagrass (*Tripsacum dactyloides*), Florida paspalum (*Paspalum floridanum*), and switchgrass (*Panicum virgatum*). Midgrasses and sedges are important species, making up as much as 60 to 70 percent of herbaceous production during wet cycles. These include longtom paspalum (*Paspalum denticulatum*), knotroot bristlegrass (*Setaria parviflora*), green flatsedge (*Cyperus virens*), jointed flatsedge (*Cyperus articulatus*), spikerush (*Eleocharis* spp.), and numerous others. Perennial forbs during dry cycles include yellow neptunia (*Neptunia lutea*), bundleflower (*Desmanthus* spp.), common broomweed (*Amphiachyris dracunculoides*), sneezeweed (*Helenium amarum*), and wild petunia (*Ruellia nudiflora*). Wet cycles caused such species as arrowhead (*Sagittaria longiloba*), water clover (*Marsilea macropoda*), dock (*Rumex* spp.), and other wet-tolerant forbs to become more prevalent.

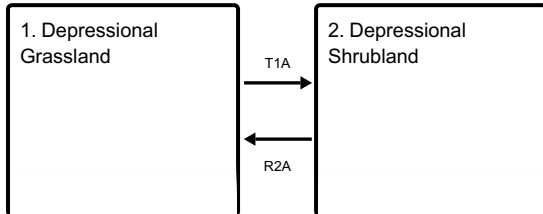
Abusive grazing and loss of fire will totally remove the midgrass component. Midgrasses are replaced by sedges, spikerush, torpedo grass (*Panicum repens*), low panicums, and paspalums. During dry cycles, sumpweed (*Iva annua*), common broomweed, and western ragweed (*Ambrosia psilostachya*) may dominate. Introduced species such as common Bermudagrass (*Cynodon dactylon*), bahiagrass (*Paspalum notatum*), and introduced bluestems (*Bothriochloa* spp. and *Dichanthium* spp.) may occupy the periphery of the site but will die out during wet cycles. Woody species such as mesquite, perennial senna bean (*Sesbania drummondii*), Chinese tallow (*Triadica sebifera*), willow baccharis (*Baccharis salicina*), and huisache encroach during dry cycles. When wet cycles occur,

most of the woody species will die. Huisache may be much slower to die because of its tolerance to extremely wet conditions.

Grassland community trends may possibly be reversed over extremely long periods of time through prescribed grazing and later the use of fire. Because this site is so highly preferred by livestock, fencing may be required for restoration. Because organic matter is totally depleted, compaction layers from livestock are present. Energy, water, and mineral cycles are drastically altered. It may be nearly impossible to attain the reference plant community once the threshold from State 1 to State 2 is crossed.

State and transition model

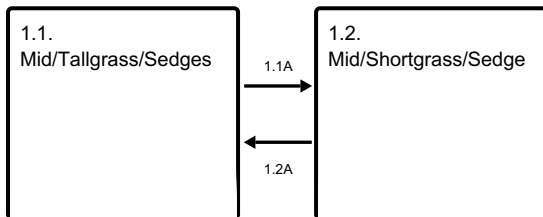
Ecosystem states



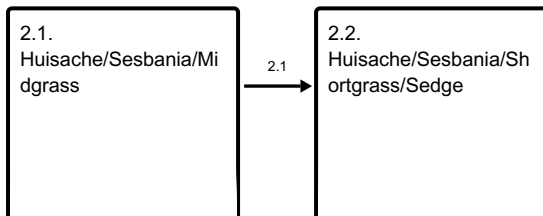
T1A - Absence of disturbance and natural regeneration over time

R2A - Reintroduction of fire and regular disturbance return intervals

State 1 submodel, plant communities



State 2 submodel, plant communities



State 1

Depressional Grassland

Dominant plant species

- eastern gamagrass (*Tripsacum dactyloides*), grass
- Florida paspalum (*Paspalum floridanum*), grass

Community 1.1

Mid/Tallgrass/Sedges

This site is a wet prairie interspersed within the upland prairie on the Coastal Prairie. It is a part of the complex that developed under intermittent grazing by bison and a relatively frequent fire regime (3 to 8 years). The potential plant community varies between wet and dry cycles. During wet cycles, switchgrass, eastern gamagrass, and Florida paspalum waned except around the edges, while longtom paspalum, flatsedge, and knotroot bristlegrass dominated; especially in the deeper portions of the site. Forbs on this site make up less 5 percent of the total herbaceous production, but annual forbs such as sumpweed may be seasonally abundant in response to grazing/drought/rainfall sequences. The reference plant community has no woody plants. Tallgrasses may make up as much as 40 to 50 percent of the total herbaceous production when rainfall cycles cause water to be shallow for

short periods of time. Woody species such as mesquite and huisache may encroach, but a combination of fire and water cause them to cycle out. Heavy, continuous grazing by domestic livestock, loss of fire, altered water regime, and altered energy cycles associated with heavy grazing will cause the loss of tallgrass species. This site is very productive, even when tallgrass species have been lost. Other species that replace the tallgrasses are extremely productive and palatable and provide an abundance of forage for livestock.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	4483	5716	6949
Forb	280	364	476
Shrub/Vine	–	–	–
Tree	–	–	–
Total	4763	6080	7425

Figure 9. Plant community growth curve (percent production by month). TX7611, Mid/Tallgrass/Sedge Community. Warm-season midgrasses, tallgrasses, and sedges occupy the plant community..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2	2	6	10	18	18	3	6	15	10	6	4

Community 1.2 Mid/Shortgrass/Sedge

Heavy continuous grazing removes the tallgrass component from the reference community causing a shift to mid and shortgrasses. Again, wet and dry cycles play a major role in determining the plant community. With wet cycles, longton paspalum becomes the dominant midgrass in the plant community and green flatsedge, jointed flatsedge, and knotroot bristlegrass increase as well. As dry cycles return, the plant community changes again with reduced amounts of longton paspalum and increasing numbers of flatsedge, spikerush, low panicums and paspalums, broomsedge bluestem (*Andropogon virginicus*), bushy bluestem (*Andropogon glomeratus*), and longspike tridens (*Tridens strictus*). Spiny aster may be a strong increaser during the dry cycle as well. If heavy grazing continues during the dry cycle, bare ground will be the result. Once some precipitation occurs, this disturbed bare ground will grow a profusion of annual forbs such as sumpweed, croton (*Croton* spp.), snow-on-the-prairie (*Euphorbia bicolor*), common broomweed, and western ragweed. Removal of herbage by grazing and shifts in composition to shorter, less productive grasses and annual forbs. Heavy continuous grazing can also alter the soil structure, preventing replenishment of organic matter, and removing resiliency. Community dynamics can be reversed, but the threshold to State 2 is nearing.

Pathway 1.1A Community 1.1 to 1.2

Abusive grazing and lack of fire will cause the community to shift to 1.2.

Pathway 1.2A Community 1.2 to 1.1

Prescribed grazing and the return of fire will transition the community back to 1.1.

State 2 Depressional Shrubland

Dominant plant species

- honey mesquite (*Prosopis glandulosa*), shrub
- sedge (*Carex*), grass

Community 2.1

Huisache/Sesbania/Midgrass

This community has crossed a threshold and significant alterations have taken place. Water cycles have been drastically altered. Compaction layers are present, created by extensive grazing by domestic cattle. Organic matter is severely depleted causing the site to pond water longer than in reference conditions. The fire regime (3 to 8 years) is non-existent in this phase. This site can go back to state 1.2 or 1.1 over extremely long periods of time, provided a seed source is available for tallgrass species and managed accordingly. Fencing will probably be necessary around the site so that grazing can be initially excluded and grazing carefully controlled later. Although this site had no woody vegetation originally, in this state, woody invasion has taken place with huisache, perennial senna bean, and some retama (*Parkinsonia aculeata*) invading during dry cycles. When wet cycles are long enough, these woody species will likely die out. In wet cycles, longtom will be common on the site with increased amounts of torpedograss and vasey grass, and numerous flatsedges. Wetland obligate forbs such as smartweed, arrowhead, dock, and mud plantain may be common. In dry cycles, longtom will decrease and low panicums and paspalums and spike rush will proliferate along with annual grasses and such forbs as sumpweed, croton, sneezeweed, common broomweed, and others.

Community 2.2

Huisache/Sesbania/Shortgrass/Sedge

As the midgrass is grazed out and the community deteriorates, the site is occupied by needlegrass rush (*Juncus roemerianus*), spikerush, some sedges, low panicums, and paspalums. During dry cycles, this site is often grazed so heavily that there will be 60 to 80 percent bare ground. In this condition, when rainfall does occur, annual grasses and forbs will quickly populate. Woody invaders, primarily huisache, or if the site is too wet, rattlebush (*Sesbania drummondii*) will proliferate. In many instances, huisache has attained an 80 to 90 percent canopy.

Pathway 2.1

Community 2.1 to 2.2

Further continued overgrazing, lack of brush management, and lack of fire will transition the site to Community 2.2.

Transition T1A

State 1 to 2

Continued heavy grazing, lack of fire, and no brush management will transition the reference state to State 2.

Restoration pathway R2A

State 2 to 1

Prescribed grazing, brush management, and return of fire can restore State 2 back to the reference state.

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
0	Midgrass			2242–3475	
1	Tallgrasses			1345–2018	
	Florida paspalum	PAFL4	<i>Paspalum floridanum</i>	1345–2085	–
	switchgrass	PAVI2	<i>Panicum virgatum</i>	1345–2085	–
	eastern gamagrass	TRDA3	<i>Tripsacum dactyloides</i>	1345–2085	–
2	Grasses & Sedges			448–695	
	sedge	CAREX	<i>Carex</i>	448–695	–
	jointed flatsedge	CYAR4	<i>Cyperus articulatus</i>	448–695	–
	green flatsedge	CYVI2	<i>Cyperus virens</i>	448–695	–
	spikerush	ELEOC	<i>Eleocharis</i>	448–695	–
	marsh bristlegrass	SEPA10	<i>Setaria parviflora</i>	448–695	–
	gaping grass	STHI3	<i>Steinchisma hians</i>	448–695	–
3	Grasses			224–347	
	panicgrass	PANIC	<i>Panicum</i>	224–347	–
	crowgrass	PASPA2	<i>Paspalum</i>	224–347	–
Forb					
4	Forbs			224–347	
	spiny chloracantha	CHSP11	<i>Chloracantha spinosa</i>	224–347	–
	southern annual saltmarsh aster	SYDI2	<i>Symphyotrichum divaricatum</i>	224–347	–
5	Forbs			252–428	
	Cuman ragweed	AMPS	<i>Ambrosia psilostachya</i>	252–428	–
	bundleflower	DESMA	<i>Desmanthus</i>	252–428	–
	blue mudplantain	HELI2	<i>Heteranthera limosa</i>	252–428	–
	bigfoot waterclover	MAMA9	<i>Marsilea macropoda</i>	252–428	–
	yellow puff	NELU2	<i>Neptunia lutea</i>	252–428	–
	Pennsylvania smartweed	POPE2	<i>Polygonum pensylvanicum</i>	252–428	–
	dock	RUMEX	<i>Rumex</i>	252–428	–
	violet wild petunia	RUNU	<i>Ruellia nudiflora</i>	252–428	–
	longbarb arrowhead	SALO2	<i>Sagittaria longiloba</i>	252–428	–
6	Forbs			27–48	
	prairie broomweed	AMDR	<i>Amphiachyris dracunculoides</i>	27–48	–
	sneezeweed	HEAM	<i>Helenium amarum</i>	27–48	–
	annual marsh elder	IVAN2	<i>Iva annua</i>	27–48	–

Animal community

The Coastal Prairie communities support a wide array of animals. Cattle and many species of wildlife make extensive use of the site. White-tailed deer may be found scattered across the prairie and are found in heavier concentrations where woody cover exists. Feral hogs are present and at times abundant. Coyotes are abundant and fill the mammalian predator niche. Rodent populations rise during drier periods and fall during periods of inundation. Attwater's pocket gophers are abundant and have an important impact on the ecology of the site. The badger is present but not abundant in locations at the southern extent of the site. Locally unique species alligators

and bullfrogs.

The region is a major flyway for waterfowl and migrating birds. Hundreds of thousands of ducks, geese, and sandhill cranes abound during winter. Two important endangered species occur in the area, the whooping crane and Attwater's prairie chicken. Many other species of avian predators including northern harriers, ferruginous hawks, red-tailed hawks, white-tailed kites, kestrels, and, occasionally, swallow-tailed kites utilize the vast grasslands. Many species of grassland birds use the site, including blue grosbeaks, dickcissels, eastern meadowlarks, several sparrows, including, vesper sparrow, lark sparrow, savannah sparrow, grasshopper sparrow, and Le Conte's sparrow.

Hydrological functions

This site which is a part of the extensive wetland systems of the Gulf Coast Prairie functions in both flood control and removal of pollutants. These sites, when dry, serve as reservoirs to capture excessive precipitation during high intensity rainfall events. When in pristine condition, with high organic matter content, this site may have been important in aquifer recharge. In its current impaired condition (low organic matter, compaction layers) the site loses more water through evaporation and transpiration than it delivers to aquifer recharge.

Recreational uses

The site is frequently used for bird-watching and during wet cycles in the winter may harbor large numbers of ducks and geese making for popular hunting spots.

Inventory data references

This site description was developed as part of the provisional ecological site initiative using historic soil survey manuscripts, available range site descriptions, and low intensity field sampling.

Other references

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Contributors

Stan Reinke, RMS, NRCS, Victoria, TX

Approval

Bryan Christensen, 9/22/2023

Acknowledgments

Technical Reviewers:

Jamey Douglas, SS, NRCS, Temple, TX

Shanna Dunn, RSS, NRCS, Corpus Christi, TX

Mike Stellbauer, RMS, NRCS, Bryan, TX

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)	Stan Reinke, RMS, NRCS, Victoria, TX
Contact for lead author	
Date	08/15/2007
Approved by	Bryan Christensen
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 should not be evident on this depressional site.

3. **Number and height of erosional pedestals or terracettes:** None.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Less than 15 percent bare ground randomly distributed throughout.

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

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

7. **Amount of litter movement (describe size and distance expected to travel):** This is a depressional site and little movement can be expected.

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. Soil stability class range is expected to be 5 to 6.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** About 12 inches of dark gray clay. Fine and medium granular and sub-angular blocky structure; very hard, very firm plastic and sticky; many fine roots; few cracks; neutral, clear, smooth boundary. SOM is 1 to 4 percent

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Little effect in this depressional landscape position.

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

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 midgrasses

Sub-dominant: Warm-season tallgrasses Grasslikes

Other: Forbs

Additional: No trees or shrubs expected.

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Some plant mortality can be expected on perennial warm-season grasses (FACU, UP) or perennial warm-season forbs (FAC, FW, OB) depending on length of ponding during the growing season.
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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):** 4,250 to 6,625 pounds per acre
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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:** Woody invaders to this site include huisache, retama, senna bean, and mesquite.
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17. **Perennial plant reproductive capability:** Perennial plants should be capable of reproduction, except during periods of prolonged drought conditions, heavy continuous herbivory and fires.
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