USDA Natural Resources Conservation Service

Ecological site R077CY027TX
Playa 16-21" PZ

Last updated: 9/11/2023
Accessed: 11/21/2024

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.

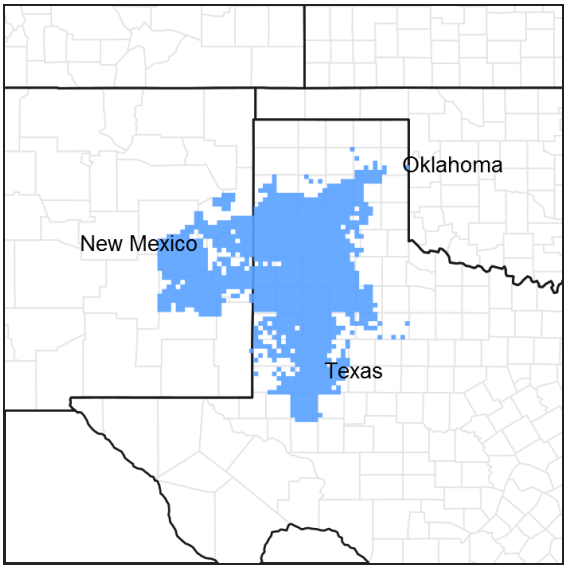


Figure 1. Mapped extent

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): 077C–Southern High Plains, Southern Part

This MLRA is characterized by nearly level plains with numerous playa depressions, moderately sloping breaks along drainageways, and a steep escarpment along the eastern margin. From southwest to northeast, soils grade from coarse-textured to fine-textured. Soils are generally deep and occur in a thermic soil temperature regime and ustic soil moisture regime bordering on aridic. Current land use is dominantly cropland.

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 on poorly drained clay soils in closed depressions. Water is ponded for varying periods of time throughout the year. The reference vegetation includes midgrasses and forbs that can handle wet soil conditions. As the site experiences dry-up the plant community may also shift depending on the duration of the wet/dry cycle.

Associated sites

R077CY022TX	**Deep Hardland 16-21" PZ** The Deep Hardland site is on plains, playa slopes, and playa steps. This site is associated with Playa sites that are on lower landscape positions and collect runoff moisture from surrounding plains. Shortgrasses and Midgrasses dominate on these sites.
R077CY028TX	**Limy Upland 16-21" PZ** The Limy Upland is on plains, interdunes, playa steps, and playa slopes. This site is associated with Playa sites that are on lower landscape positions and collect runoff moisture from surrounding plains. Midgrasses and shortgrasses dominate these sites.
R077CY036TX	**Sandy Loam 16-21" PZ** The Sandy Loam site is on plains, playa slopes, and playa steps. This site is associated with Playa sites that are on lower landscape positions and collect runoff moisture from surrounding plains. Midgrasses and shortgrasses dominate on these sites.
R077CY026TX	**High Lime 16-21" PZ** The High Lime site is on dunes, interdunes, and playa steps. These sites are associated with Playa sites on slightly lower landscape positions. Playa sites are on much lower landscape positions and collect runoff moisture from higher landscape positions. Midgrasses and Shortgrasses dominate these sites.

Similar sites

R077CY689TX	**Wet Saline 16-21" PZ** Wet Saline sites occur on loamy and clayey saline soils in concave drainageways or closed depressions. The reference vegetation consists of saline tolerant shrubs, grasses, and forbs. Vegetative cover may fluctuate due to ponding events and the high saline/sodic content of the soil.
R077AY005TX	**Playa 16-22" PZ** This site occurs on fine textured soils of closed depressions or playa basins. Water is ponded for various lengths of time. Vegetation is variable and may fluctuate because of the duration and depth of ponding.
R077DY041TX	**Lakebed 12-17" PZ** Lakebed sites are similar to playas as they both occur as depressions within surrounding sites. Lakebeds typically occur in rangeland settings with less watershed and flooding. The vegetative cover will typically be short/midgrass and forb species on lakebeds.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Pascopyrum smithii* (2) *Bouteloua dactyloides*

Physiographic features

This site occurs in playa lake basins and immediately adjacent areas. These closed basin depressions occur in a scattered pattern over the Southern High Plains MLRA. There are thousands of these playas and may vary in size from less than one acre to several hundred acres. Over the region, playas average one per square mile. The dominant theory of formation of these features is that dissolution and subsidence in the underlying strata resulted in these circular closed basins at the surface during the Pleistocene period. The playa floors range from a few feet to more than 50 feet below surrounding uplands. They hold water in the more rainy seasons and most of them will go dry in dryer seasons of the year. In the event of drought, playas may be dry for several years. The frequency and duration of inundation is highly variable from playa to playa. Drainage areas are highly variable in size and in character. Storage to drainage ratios vary. The areas surrounding the playas are generally nearly level plains with a gently sloping transitional area immediately upslope from the playa basins.

Table 2. Representative physiographic features

Landforms	(1) Plateau > Playa > Gilgai (2) Plateau > Depression

Runoff class	Negligible
Ponding duration	Brief (2 to 7 days) to very long (more than 30 days)
Ponding frequency	Occasional to frequent
Elevation	701–1,615 m
Slope	0–1%
Ponding depth	0–89 cm
Water table depth	0–203 cm
Aspect	W, NW, N, NE, E, SE, S, SW

Climatic features

Climate is semi-arid dry steppe. Summers are hot with winters being generally mild with numerous cold fronts that drop temperatures into the single digits for 24 to 48 hours. Temperature extremes are the rule rather than the exception. Humidity is generally low and evaporation high. Wind speeds are highest in the spring and are generally southwesterly. Canadian and Pacific cold fronts come through the region in fall, winter and spring with predictability and temperature changes can be rapid. Most of the precipitation comes in the form of rain and during the period from May through October. Snowfall averages around 15 inches but may be as little as 8 inches or as much as 36 inches. Rainfall in the growing season often comes as intense showers of relatively short duration. Long term droughts occur on the average of once every 20 years and may last as long as five to six years (during these drought years moisture during the growing season is from 50 to 60 percent of the mean). Based on long-term records, approximately 60 percent of years are below the mean rainfall and approximately 40 percent are above the mean. May, June and July are the main growth months for perennial warm season grasses. Forbs make their growth somewhat earlier.

Table 3. Representative climatic features

Frost-free period (characteristic range)	153-189 days
Freeze-free period (characteristic range)	189-208 days
Precipitation total (characteristic range)	483-533 mm
Frost-free period (actual range)	148-198 days
Freeze-free period (actual range)	184-212 days
Precipitation total (actual range)	457-559 mm
Frost-free period (average)	173 days
Freeze-free period (average)	199 days
Precipitation total (average)	508 mm

Climate stations used

- (1) BIG SPRING [USW00023041], Big Spring, TX
- (2) DENVER CITY [USC00412408], Denver City, TX
- (3) FLOYDADA [USC00413214], Floydada, TX
- (4) CAMERON [USC00291332], Grady, NM
- (5) PORTALES [USC00297008], Portales, NM
- (6) AMARILLO [USW00023047], Amarillo, TX
- (7) PANHANDLE [USC00416785], Panhandle, TX
- (8) PLAINS [USC00417074], Plains, TX
- (9) TAHOKA [USC00418818], Tahoka, TX
- (10) PLAINVIEW [USC00417079], Plainview, TX

Influencing water features

This site receives runoff from surrounding areas. The playa sites are generally closed basins with no outlet; therefore runoff collects and may pond from several days to several months. A high water table is present on some of these sites for long periods of time after prolonged rainfall events. Evaporation is high and infiltration very slow due to the heavy clay soils.

The wetland description would apply to the playas that exhibit wetland hydrology, have hydric soils, and have predominantly hydrophytic vegetation. The dryer, grass dominated playas often do not exhibit all three of these characteristics.

Wetland description

Many of these sites have hydric soils and have predominantly hydrophytic vegetation. The dryer, grass dominated playas often do not exhibit all three of these characteristics. Hydric soils need an on-site investigation to confirm.

Soil features

The soils of this site are very deep, very poorly to somewhat poorly drained soils high in silicate clays. Clay content ranges from 40 to greater than 60 percent and are slightly acidic to moderately alkaline. Due to the high shrink/swell potential of the smectite clays present, unplowed playas may exhibit gilgai microrelief. When wet for extended periods, these soils will develop redoximorphic features in the profile. When dry, these soils may crack to a depth of as much as 40 inches. These soils also have aquic and udic moisture regimes. Most of the playa soils are classified as hydric.

Major Soil Taxonomic Units correlated to this site include: Randall clay, Ranco clay, McLean clay, and Sparenberg clay.

Table 4. Representative soil features

Parent material	(1) Lacustrine deposits–metamorphic and sedimentary rock
Surface texture	(1) Fine sandy loam (2) Sandy clay (3) Clay
Family particle size	(1) Fine-loamy (2) Fine
Drainage class	Very poorly drained to poorly drained
Permeability class	Very slow to slow
Soil depth	203 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	14.48–18.29 cm
Calcium carbonate equivalent (0-101.6cm)	0–50%
Electrical conductivity (0-101.6cm)	0–6 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–3
Soil reaction (1:1 water) (0-101.6cm)	6.1–8.8
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

The Reference Plant Community for this site depends on water regime. Two water associated characteristics affect vegetative composition in playas; frequency and duration of inundation. In addition to these factors, the nature of the drainage area is also very important. If the drainage is from rangeland, as would be the case in the reference plant community, then there are minimal influences from factors such as fertilizers and pesticides that are associated with production agriculture. For many of the playas, even some of those in native vegetation, much of the runoff are from cropland drainage areas. This can affect the nature of the vegetation to some degree. The percentage of exotic plant species and annuals may be much higher. Siltation is increased if the drainage area is from cropland and incidence of contaminants is likely to be higher.

To discuss the nature of playa vegetation, it is necessary to recognize that the water regime varies greatly among the many playas in the region. This site is in a constant state of change. The unpredictable climate of the Southern High Plains dictates this condition. This drying and flooding allows vastly different plant communities to exist on the same playa, increasing the diversity of the site. Studies of vascular plants in the Southern Great Plains indicate that at least 346 species occur in playas. As previously stated, the drainage to storage ratio governs the amount of runoff. With longer periods of inundation, grass species tend to disappear because they cannot stand being covered by water for very long. Most of the grass dominated (50-60 percent) playas in the Midgrass/Forb Community - Dryer State (1.1) are largely western wheatgrass (*Pascopyrum smithii*) with lesser amounts of buffalograss (*Bouteloua dactyloides*) vine mesquite (*Panicum obtusum*), knotgrass (*Paspalum distichum*) and barnyardgrass (*Echinochloa muricata*). Total production of forbs may be equal to the grass species in wetter years. Typical forbs present include frogfruit (Phyla incisa), coreopsis (*Coreopsis lanceolata*), plains ironweed (*Vernonia marginata*), and lambsquarter (*Chenopodium album*). Dryer phase playas generally do not support woody vegetation.

Grazing plays a lesser role than does the water regime. The grazing potential of playas is seasonal and cattle prefer to graze the lakes in the spring and summer when the forage is lush and green. The productive capacity of many playas is quite high and they can provide a good deal of grazing.

It is certainly possible to graze so heavily as to adversely affect vegetation, especially grass vegetation on the dryer phase playas. The general effect of abusive grazing over several years seems to decrease the number of perennials and increase the number of annual species. Along with this comes a decrease in overall plant diversity. If long-term abusive grazing does occur on the dryer phase playas and the frequency of flooding increases, this site tends to move towards the Grass-likes/Forbs/Annuals Community (1.2). Most of the hydrophytic perennials exhibit a surprising ability for their root stocks to go into dormancy when the playas become dry. These roots can live for many months and even years of dry conditions, and then when wet conditions again prevail, the plants quickly sprout and grow rapidly. It is very difficult to state a particular transitional pathway for playa vegetation based on grazing management. The best general statement would be that perennial grasses and forbs are the most susceptible plants to abusive grazing practices and strong perennial grass-likes species are resistant to grazing damage. Overgrazing of playas is very detrimental to the host of wildlife that relies on the playas for habitat. One of the biggest detriments is the reduction of valuable wildlife cover. It is probable that the value for native wildlife exceeds the value for grazing.

As the period of inundation increases with moderate frequency, western wheatgrass and other grass species will disappear as this site moves towards the Grass-likes/Emergent Hydrophytic Plant Community (2.1). Creeping spikerush (*Eleocharis macrostachya*) and sedges (Abildgaardia spp.) will dominate. Dryer phase forbs will be replaced by smartweed (*Polygonum pensylvanicum*), California loosestrife (*Lythrum californicum*), saltmarsh aster (*Symphyotrichum divaricatum*), and curly dock (*Rumex crispus*).

On playas that have frequent inundation with prolonged periods of flooding, the plant community will move towards the Grass-likes/Hydrophytic Plant Community (3.1). Rushes (Juncus spp.), knotgrass (*Paspalum distichum*) and smartweed dominate with lesser amounts of arrowhead (*Sagittaria lancifolia*) and pondweed (Potamogeton spp.) present. Species composition is also affected by the timing of the moisture. Early growing season (May) moisture tends to favor smartweed. This site typically has few shrubs and these generally occur around the periphery of the wetter playa basins. The primary woody shrub is willow (Salix spp.). As a person observes playa after playa on a given day, it becomes obvious that they are all a bit different and it is also difficult to explain the variations. Since rainfall patterns vary so much from year to year and also within the particular growing season, playa vegetation will also vary from year to year and within a given year. If playas are inundated through the growing season and then

dry up in the fall they may be bare during the following winter and early spring and can be subject to wind erosion until plants emerge in the summer. It should be noted that over the long haul (>50 years), playas will probably be dry more than wet. However, in the periods when they are wet, they contribute significantly to the biodiversity of the southern Great Plains.

Fire played a part in the ecology of this site as with all plains sites. The main effect of fire on the playa site was to stimulate growth and reduce old decadent plant cover from previous years. Most hydrophytic perennial species respond well to fire. In the playas, the root systems of these plants are protected by either wet soil or by being in dormancy. Fire helps in the reduction of old growth and stimulates new shoots and helps in breaking down accumulated plant material, thus aiding the nutrient cycle. Fire may have also helped in favoring the perennials over the annual species.

All species of plains wildlife benefit from the playa system. From the predators to small mammals to grassland birds to waterfowl, the playa lakes provide a diversity of habitat that the shortgrass plains upland sites cannot. They are an extremely important part of the shortgrass plains ecosystem. Dozens of species depend on playa vegetation for a home and for a food supply. In pre-settlement times, the buffalo most likely depended on water in the playas in order to graze out on the Llano Estacado. In dryer years without any standing water, the grazing was limited to areas along the major streams.

Playas are very important in their affect on overall hydrological conditions. They receive runoff and in that runoff come certain natural contaminants that are processed and recycled in the playas. Infiltration through the heavy clay soils is very slow but does occur. There is definitely some recharge to the underground aquifer through the playa system. It is difficult to speculate what effect hundreds of playas full or water during the summer months might have on rainfall locally. The evaporation is high and water going into the atmosphere may have some effect on rainfall. Playas act as natural filters and improve the quality of ground water. Because of their scattered presence over the high plains, they play an important part in trapping excess runoff from heavy rainfall events, thus limiting the distance runoff water travels down slope, thereby helping to control erosion.

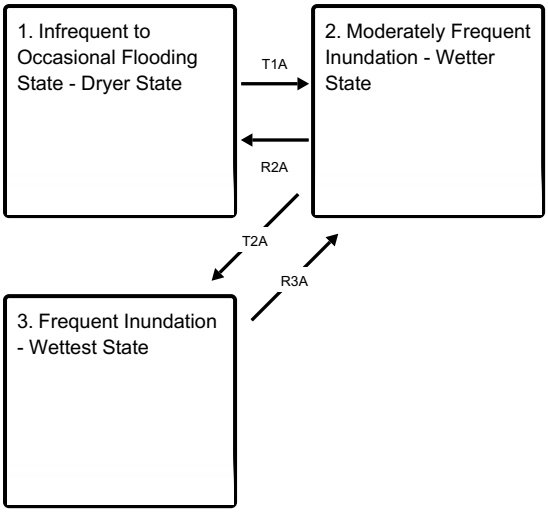
It should be noted that probably 80 percent of the playas on the High Plains have been affected by cultivation in their drainage area and by such structures as roads, culverts, terraces and modifications such as pits or ponds constructed in the playa basin itself. Because of these effects, it is hard to picture what the playas looked like in pristine times. At this point it is worth mentioning that production agriculture which includes the occasional tilling of the playas and adjacent areas tends to promote more annual forb growth and contributes to the spread of noxious species such as woollyleaf bursage (*Ambrosia grayi*), Texas blueweed (Helianthus cilaris) and smallhead sneezeweed (*Helenium microcephalum*).

NOTE: 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.

Plant Communities and Transitional Pathways (diagram):
As previously stated, it is difficult to put forth a predictable state and transitional pathway that applies to playa lakes. Water regime is the biggest influencing factor. Grazing abuse can also affect playa communities but the predictability of that effect is somewhat questionable. Modification of playas by changes in drainage patterns, and structural modifications are the main man induced effects, and are more drastic as to the impact on vegetation than grazing by livestock. In general, the more shallow the playa and less frequently inundated, the more likely grasses such as western wheatgrass will dominate. The greater the depth and the more frequent the inundation, the more likely hydrophytic forbs and grass-likes will dominate. Many of the species now present in many playas that are associated with tillage and/or altered hydrology were probably not present in the natural grassland state of the high plains.

State and transition model

Ecosystem states



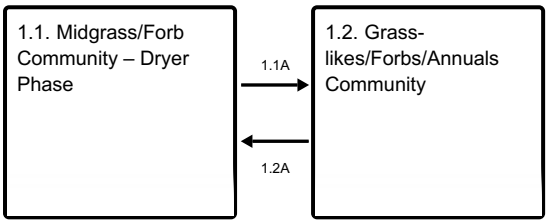
T1A - prolonged inundation

R2A - prolonged drought conditions

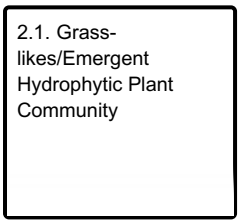
T2A - frequent prolonged inundation

R3A - less frequent inundation

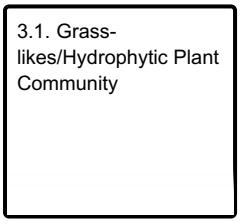
State 1 submodel, plant communities



State 2 submodel, plant communities



State 3 submodel, plant communities



State 1
Infrequent to Occasional Flooding State - Dryer State

The Midgrass/Forb Community – Dryer (1.1) is dominated by western wheatgrass with lesser amounts of buffalograss, vine mesquite, white tridens and barnyardgrass. Grass-like species such as creeping spikerush may occur in micro-depressions on some playas. Grass and grass-like species make up approximately 50-60 percent of the total site production. Forbs common to the dryer phase of the playa include coreopsis and frogfruit with occasional snow-on-the-mountain, curlycup gumweed, primrose species, and silverleaf nightshade. Forb production ranges from 40-50 percent, depending on moisture. Dryer phase playas generally do not support woody vegetation. Total annual production can range from 1,700 to 3,300 pounds per acre depending on rainfall. The Grass-likes/Forbs/Annuals Community (1.2) is the result of long-term overgrazing, no fire (over 10-20 years) and

infrequent flooding. Western wheatgrass, vine mesquite, white tridens and buffalograss will decrease as spike sedges, rushes and barnyardgrass increase. The percent bare ground can increase to >40 percent. Annual forbs and grasses will fill the voids. Overall plant diversity and production has decreased. Total site production is approximately 900 to 1,500 pounds per acre. With careful grazing management, this plant community may be moved towards the reference community (dryer phase).

Dominant plant species

- western wheatgrass (*Pascopyrum smithii*), grass

Community 1.1
Midgrass/Forb Community – Dryer Phase

Figure 8. 1.1 Midgrass/Forb Community - Dryer Phase

The Midgrass/Forb Community – Dryer (1.1) is the interpretive or reference plant community for the the Playa Ecological Site. Western wheatgrass will dominate the site with lesser amounts of buffalograss, vine mesquite, white tridens and barnyardgrass. Grass-like species such as creeping spikerush may occur in micro-depressions on some playas. Grass and grass-like species make up approximately 50-60 percent of the total site production. Forbs common to the dryer phase of the playa include coreopsis and frogfruit with occasional snow-on-the-mountain, curlycup gumweed, primrose species, and silverleaf nightshade. Forb production ranges from 40-50 percent, depending on moisture. Dryer phase playas generally do not support woody vegetation. Total annual production can range from 1,700 to 3,300 pounds per acre depending on rainfall. Grazing plays a lesser role than does the water regime on the plant community. It is certainly possible to over-graze to the point of adversely affecting the plant community, primarily the grass species. The general effect of abusive grazing over several years will decrease the number of perennial grasses and increase the number of annual species. Overall plant diversity will decrease. With long-term grazing pressure, no natural fire (over 10-20 years) and increased frequency of flooding this site will typically move towards the Grass-likes/Forbs/Annuals Community (1.2). Prescribed grazing along with less frequent flooding can return this site to the Midgrass/Forb Community (1.1).

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1121	1737	2354
Forb	785	1065	1345
Microbiotic Crusts	–	–	–
Tree	–	–	–
Shrub/Vine	–	–	–
Total	**1906**	**2802**	**3699**

Figure 10. Plant community growth curve (percent production by month). TX1044, Midgrass/Forbs - Dryer. Midgrasses and forbs dominant..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	3	10	20	22	13	8	4	8	6	6	0

Community 1.2
Grass-likes/Forbs/Annuals Community

Figure 11. 1.2 Grass-likes/Forbs/Annuals Community

The Grass-likes/Forbs/Annuals Community (1.2) is the result of long-term overgrazing, no fire (over 10-20 years) and infrequent flooding. Western wheatgrass, vine mesquite, white tridens and buffalograss will decrease as spike sedges, rushes and barnyardgrass increase. The percent bare ground can increase to >40 percent. Annual forbs and grasses will fill the voids. Overall plant diversity and production has decreased. Total site production is approximately 900 to 1,500 pounds per acre. With careful grazing management, this plant community may be moved towards the reference community (dryer phase).

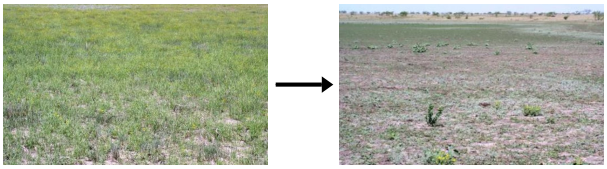
Table 6. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	560	729	897
Forb	448	673	785
Microbiotic Crusts	–	–	–
Tree	–	–	–
Shrub/Vine	–	–	–
Total	**1008**	**1402**	**1682**

Figure 13. Plant community growth curve (percent production by month). TX1011, Dryer Perennial Hydrophtic Grasslikes and Forbs. Grass-likes, forbs, and annuals dominate the site..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	3	10	20	30	10	5	4	8	5	5	0

Pathway 1.1A
Community 1.1 to 1.2

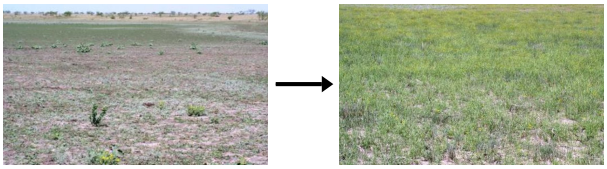


Midgrass/Forb Community – Dryer Phase

Grass-likes/Forbs/Annuals Community

With long-term grazing pressure, no natural fire (over 10-20 years) and increased frequency of flooding this site will typically move towards the Grass-likes/Forbs/Annuals Community (1.2) from the Midgrass/Forb Community (1.1).

Pathway 1.2A
Community 1.2 to 1.1



Grass-likes/Forbs/Annuals Community

Midgrass/Forb Community – Dryer Phase

With careful grazing management, prescribed burning and occasional flooding, this plant community may be moved towards the reference community (dryer phase).

Conservation practices

Prescribed Burning
Prescribed Grazing

State 2
Moderately Frequent Inundation - Wetter State

The Grass-likes/Emergent Hydrophytic Plant Community is a direct result of moderately frequent inundation. Creeping spikerush dominates the wetter phase with lesser amounts of saltmarsh aster, curly dock and smartweed. Western wheatgrass can still be found around the outer edges of the playa. Total site production is approximately 1,700 to 2,800 pounds per acre. Most of the hydrophytic perennials exhibit a surprising ability for their root stocks to go into dormancy when the playas become dry.

Dominant plant species

- western wheatgrass (*Pascopyrum smithii*), grass
- spikerush (*Eleocharis*), other herbaceous

Community 2.1
Grass-likes/Emergent Hydrophytic Plant Community

Figure 14. 2.1 Grass-likes/Emergent Hydrophytic Plant Communi

The Grass-likes/Emergent Hydrophytic Plant Community is a direct result of moderately frequent inundation. Creeping spikerush dominates the wetter phase with lesser amounts of saltmarsh aster, curly dock and smartweed. Western wheatgrass can still be found around the outer edges of the playa. Total site production is approximately 1,700 to 2,800 pounds per acre. Most of the hydrophytic perennials exhibit a surprising ability for their root stocks to

go into dormancy when the playas become dry. These roots can live for many months and even years of dry conditions, and then when wet conditions again prevail, the plants quickly sprout and grow rapidly. As frequency and duration of inundation decreases, the plant community will tend to move towards the Midgrass/Forb Community (1.1) dominated by western wheatgrass. Playas that have moderately frequent inundation near agricultural land that receives occasional to frequent tillage tends to promote annual forb growth. Cultivated watersheds have a much higher sediment loads. This contributes to the spread of noxious species such as woollyleaf bursage, Texas blueweed and smallhead sneezeweed. Many of the playa lakes in the Southern High Plains are now dominated by woollyleaf bursage.

Table 7. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1569	2074	2578
Forb	336	448	560
Microbiotic Crusts	–	–	–
Tree	–	–	–
Shrub/Vine	–	–	–
Total	**1905**	**2522**	**3138**

Figure 16. Plant community growth curve (percent production by month). TX1012, Emergent Hydrophytic Grass-likes. Emergent Hydrophytic Grass-likes.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	2	8	12	26	30	5	12	3	2	0

State 3
Frequent Inundation - Wettest State

On playas that are frequently inundated for long periods, the plant community will move towards the Grass-likes/Hydrophytic Plant Community (Wettest State) (3.1). This is a very variable plant community with rushes/sedges, knotgrass, curly dock, and California loosestrife typically occurring along the shallow water edge. Pennsylvania smartweed will be the dominant plant species in the deeper water areas. In order for smartweed to germinate and thrive, late spring rains (May) are especially beneficial. Total site production is approximately 1,700 to 3,200 pounds per acre.

Dominant plant species

- sedge (*Carex*), other herbaceous
- rush (*Juncus*), other herbaceous

Community 3.1
Grass-likes/Hydrophytic Plant Community

Figure 17. 3.1 Grass-likes/Hydrophytic Plant Community

On playas that are frequently inundated for long periods the plant community will move towards the Grass-likes/Hydrophytic Plant Community (wettest phase) (3.1). This is a very variable plant community with rushes/sedges, knotgrass, curly dock, and California loosestrife typically occurring along the shallow water edge. Pennsylvania smartweed will be the dominant plant species in the deeper water areas. In order for smartweed to germinate and thrive, late spring rains (May) are especially beneficial. Occasionally woody plants such as willows may occur in small colonies on some playas. Total site production is approximately 1,700 to 3,200 pounds per acre. The wet phase of playa lakes provides a diversity of habitat that the shortgrass plains upland sites cannot. In the periods when they are wet, they contribute significantly to the biodiversity of the southern Great Plains. Playas are an extremely important part of the shortgrass plains ecosystem. Dozens of species depend on playa vegetation for a home and for a food supply. Predators, small and large mammals, grassland birds and waterfowl especially benefit from the playa lakes eco-system. As mentioned earlier, it is probable that the value for native wildlife exceeds the value for livestock grazing. As extended dry periods occur with minimal periods of flooding, the plant community will move towards the Midgrass/Forb Community (dryer phase) (1.1). Once again western wheatgrass will dominate.

Table 8. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1345	1793	2242
Forb	448	785	1121
Shrub/Vine	112	168	224
Tree	–	–	–
Microbiotic Crusts	–	–	–
Total	**1905**	**2746**	**3587**

Figure 19. Plant community growth curve (percent production by month). TX1014, Grass-likes/Hydrophtyic. Grass-likes and hydrophtyic plant community have dominant smartweed and knotgrasses..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	1	2	8	16	24	26	8	10	4	1	0

Transition T1A
State 1 to 2

With moderately frequent inundation, depth of water, and duration of inundation, the Dryer State plant communities (State 1) will transition to the Wetter State plant community.

Restoration pathway R2A

State 2 to 1

With Infrequent Inundation and Shorter Duration of Inundation, the Wetter State will be restored back to the Dryer State.

Transition T2A
State 2 to 3

With Frequent Inundation, Depth of Water and Long Periods of Inundation, the Wetter State will transition to the Wettest State.

Restoration pathway R3A
State 3 to 2

With Infrequent Inundation, Shallow Water Depths, and Short Duration of Inundation, the Wettest State will be restored back to the Wetter State.

Additional community tables

Table 9. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Midgrasses**			897–1905	
	western wheatgrass	PASM	*Pascopyrum smithii*	673–1233	–
	vine mesquite	PAOB	*Panicum obtusum*	224–673	–
2	**Midgrasses**			56–112	
	rough barnyardgrass	ECMUM	*Echinochloa muricata var. microstachya*	28–56	–
	white tridens	TRAL2	*Tridens albescens*	28–56	–
3	**Shortgrasses**			112–224	
	buffalograss	BODA2	*Bouteloua dactyloides*	112–224	–
4	**Grasslikes**			56–112	
	sedge	CAREX	*Carex*	56–112	–
	spikerush	ELEOC	*Eleocharis*	56–112	–
Forb					
5	**Forbs**			785–1345	
	Forb, annual	2FA	*Forb, annual*	78–135	–
	lambsquarters	CHALA	*Chenopodium album var. album*	78–135	–
	lanceleaf tickseed	COLA5	*Coreopsis lanceolata*	78–135	–
	snow on the mountain	EUMA8	*Euphorbia marginata*	78–135	–
	curlycup gumweed	GRSQ	*Grindelia squarrosa*	78–135	–
	common sunflower	HEAN3	*Helianthus annuus*	78–135	–
	spotted evening primrose	OECA3	*Oenothera canescens*	78–135	–
	turkey tangle fogfruit	PHNO2	*Phyla nodiflora*	78–135	–
	silverleaf nightshade	SOEL	*Solanum elaeagnifolium*	78–135	–
	plains ironweed	VEMA2	*Vernonia marginata*	78–135	–

Table 10. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Grass-likes**			1345–2130	
	sedge	CAREX	*Carex*	1121–1681	–
	spikerush	ELEOC	*Eleocharis*	1121–1681	–
	chairmaker's bulrush	SCAM6	*Schoenoplectus americanus*	224–448	–
2	**Midgrasses**			224–448	
	knotgrass	PADI6	*Paspalum distichum*	224–448	–
Forb					
3	**Forbs**			336–560	
	woollyleaf bur ragweed	AMGR5	*Ambrosia grayi*	56–112	–
	California loosestrife	LYCA4	*Lythrum californicum*	56–112	–
	Pennsylvania smartweed	POPE2	*Polygonum pensylvanicum*	56–112	–
	curly dock	RUCR	*Rumex crispus*	56–112	–
	bulltongue arrowhead	SALA	*Sagittaria lancifolia*	56–112	–
	southern annual saltmarsh aster	SYDI2	*Symphyotrichum divaricatum*	56–112	–

Animal community

A variety of animals utilize this site. Small mammals use the site for food and cover. Frogs and salamanders are found in abundance during wet periods. Predators such as skunks, coyotes and snakes find food and cover there. Pronghorn and deer will sometimes graze around the perimeter of playas. Raptors such as hawks (especially harriers) favor the site as hunting areas. Many species of shorebirds, herons, egrets and waterfowl utilize the lakes in wetter seasons. Estimates suggest that some 2 million waterfowl winter on High Plains playas, making these sites the second largest wintering site in interior North America for ducks and geese.

Vegetative cover provided by playas is very valuable during the nesting season. In the fall and winter the playas can provide thermal and escape cover for many species of wildlife. The abundance and diversity of mammals in dry or moist playas, however, can be quite high. No fish naturally occur in playas but many have been introduced.

Hydrological functions

Playas receive runoff and in that runoff come certain natural contaminants that are processed and recycled in the playas. Infiltration through the heavy clay soils is very slow but does occur. There is definitely some recharge to the underground aquifer through the playa system. It is difficult to speculate what effect hundreds of playas full or water during the summer months might have on rainfall locally.

Recreational uses

Hunting, wildlife watching, and photography are some recreational uses for this site.

Wood products

None.

Other products

None.

Other information

None.

Inventory data references

NRCS FOTG – Section II of the FOTG Range Site Descriptions and numerous historical accounts of vegetative conditions at the time of early settlement in the area were used in the development of this site description. Vegetative inventories were made at several site locations for support documentation.

Inventory Data References (documents):
NRCS FOTG – Section II - Range Site Descriptions
NRCS Clipping Data summaries over a 20 year period

Other references

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Reviewers and Contributors:

Kelley Attebury, RSS, NRCS, Lubbock, Texas
J.R. Bell, USDA-NRCS Rangeland Management Specialist (retired)
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Texas A&M Exp. Station, College Station, Texas
Texas Tech University – Department of Natural Resources Management, Lubbock, Texas
Will Moseley, Biologist, Noble Foundation Inc., Ardmore, Oklahoma

Contributors

Clint Rollins, RMS, NRCS, Amarillo, Texas
J.R. Bell, Range Conservationist, SCS, Amarillo, Texas
T. Craig Byrd

Approval

Bryan Christensen, 9/11/2023

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)	Stan Bradbury, Zone RMS, NRCS, Lubbock, Texas
Contact for lead author	806-791-0581
Date	05/13/2005
Approved by	Bryan Christensen
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

2. **Presence of water flow patterns:** None to slight.

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

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 20-25% bare ground.

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):** None to slight.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of**

values): Moderate to high resistance to erosion.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Moderate medium subangular blocky structure with moderate to high soil organic matter.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Basal cover and density with small interspaces should make rainfall impact minimal. This site is poorly drained, permeability is very slow to moderately slow, and available water holding capacity is high to moderately high.

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

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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: Warm-season midgrasses > Forbs >

    Sub-dominant: Warm-season shortgrasses > Rushes/Sedges >

    Other:

    Additional: This functional group is for the dryer playa conditions. Wetter playa conditions would have more grass-likes/midgrasses and forbs.

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Minimum mortality and decadence.

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

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 1,700 - 3,300 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:** Willows.

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17. **Perennial plant reproductive capability:** All plant species should be capable of reproduction except during heavy

continuous grazing, intense wildfires or extended drought conditions.