

Ecological site R078CY046OK Saline Bottomland

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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): 078C—Central Rolling Red Plains, Eastern Part

MLRA 78C is characterized by moderately dissected, rolling plains with prominent ridges and valleys and numerous terraces adjacent to dissecting streams. Loamy and clayey soils are generally deep, well drained, and developed in calcareous and gypsiferous sediments of Permian age.

LRU notes

NA

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

This site is in areas of level to slightly depressional floodplains. The soils are very deep, somewhat poorly drained and have a saline subsoil. The reference vegetation includes alkali sacaton, inland saltgrass, and lesser amounts of

switchgrass, knotroot bristlegrass, western wheatgrass, and wildrye. The plant community may be highly variable depending on the degree of salinity.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) <i>Sporobolus airoides</i> (2) <i>Distichlis spicata</i>

Physiographic features

These sites are on nearly level flood plains of minor drains of the Central Rolling Red Plains (MLRA-78B, 78C). Slope is 0 to 1 percent.

Table 2. Representative physiographic features

Landforms	(1) River valley > Flood plain
Runoff class	Negligible to high
Flooding duration	Very brief (4 to 48 hours)
Flooding frequency	Occasional to frequent
Ponding frequency	None
Elevation	305–1,097 m
Slope	0–1%
Water table depth	46–183 cm
Aspect	Aspect is not a significant factor

Climatic features

MLRA 78C lies within the subtropical sub-humid climate regime. This regime is characterized by rapid changes in temperature; marked extremes, both daily and annual; and rather erratic rainfall. The weather is alternately influenced by cold dry air from the Arctic Circle, and warm moist air from the Gulf of Mexico.

Seasonal changes are gradual. Spring is a season of variable weather and relatively high precipitation with prevailing winds from the southwest. Summers are generally hot with low humidity. Fall has long periods of pleasant weather interspersed with moderate to heavy rains. Winter is open and moderate to cold with winds from the north and infrequent snows.

Wind speeds average more than eleven miles an hour with prevailing southern winds. Rather strong winds can occur in all months of the year. While strong gusty winds occur, severe dust storms are rare.

Approximately 75 percent of the rainfall occurs during the warm season, and much of it comes in storms of high intensity and short duration in May and June. These rains can be particularly erosive on sites where vegetation is sparse. Occasional droughts are to be expected. Lack of rainfall and hot, dry winds often curtail forage production during July and August.

Table 3. Representative climatic features

Frost-free period (characteristic range)	178-194 days
Freeze-free period (characteristic range)	196-216 days
Precipitation total (characteristic range)	711-787 mm
Frost-free period (actual range)	162-196 days
Freeze-free period (actual range)	195-218 days

Precipitation total (actual range)	711-813 mm
Frost-free period (average)	183 days
Freeze-free period (average)	205 days
Precipitation total (average)	737 mm

Climate stations used

- (1) WATONGA [USC00349364], Watonga, OK
- (2) ALTUS IRIG RSCH STN [USC00340179], Elmer, OK
- (3) FREDERICK [USC00343353], Frederick, OK
- (4) WAYNOKA [USC00349404], Waynoka, OK
- (5) VERNON [USC00419346], Vernon, TX

Influencing water features

NA

Wetland description

NA

Soil features

Soils are mapped for each county within the MLRA. Mapunits are representations of the major soil series component(s) and named accordingly. Each Mapunit is spatially represented on a digital soils map as polygons of different shapes and sizes. Within these Mapunits, there are often minor soil series components included. These minor components are soils that occur within a Mapunit polygon but are of small extent (15% or less of the Mapunit area). However, it is difficult to separate these minor soils spatially due to the scale of soil mapping.

Ecological sites are correlated at the component level of the soil survey. Therefore, a single Mapunit may contain multiple Ecological Sites just as it may contain multiple soil components. This is important to understand when investigating soils and Ecological Sites. A soil survey Mapunit may be correlated to a single Ecological Site based on the major component; however, there may be inclusional areas of additional Ecological Sites which are correlated to the minor components of that particular soil Mapunit.

Representative soil components for this site include:
Beckman & Rups

These soils were formed in calcareous and saline clayey and loamy alluvial deposits. They are very deep, however, vegetation is often sparse due to the high salinity.

Table 4. Representative soil features

Parent material	(1) Alluvium
Surface texture	(1) Silty clay (2) Silty clay loam (3) Clay
Family particle size	(1) Clayey
Drainage class	Somewhat poorly drained to moderately well drained
Permeability class	Very slow to moderately rapid
Soil depth	152–203 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%

Available water capacity (0-101.6cm)	3.05–18.8 cm
Calcium carbonate equivalent (0-101.6cm)	1–15%
Electrical conductivity (0-101.6cm)	4–20 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	1–25
Soil reaction (1:1 water) (0-101.6cm)	7.4–9
Subsurface fragment volume <=3" (Depth not specified)	0–4%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

The information contained in the State and Transition Diagram (STD) and the Ecological Site Description was developed using archeological and historical data, professional experience, and scientific studies. The information presented is representative of a very complex set of plant communities. Not all scenarios or plants are included. Key indicator plants, animals and ecological processes are described to inform land management decisions.

This site occurs on predominantly clayey, saline alluvial soils. The species occupying this site may vary greatly depending on the salinity. In the reference state, the dominant vegetation will consist of alkali sacaton (*Sporobolus airoides*) and inland Saltgrass (*Distichlis spicata*). Other salt tolerant grasses and forbs may also occur on areas of lower salinity.

In many areas, seeds from the honey mesquite tree (*Prosopis glandulosa*) have been introduced and the trees have begun to invade the site. These trees do well on the fine textured soils and are tolerant of the saline soils. Once the mesquite trees have invaded a site, they may be quite difficult to eradicate.

Some areas of this site have been subjected to sever soil disturbance from either farming practices or construction activities. After such disturbance, these areas may be very slow to revegetate due to the salinity of the soils. This can result in a barren landscape for many years.

State and Transition Diagram:

A State and Transition Diagram for the Saline Bottomland (R078CY046OK) site is depicted below. Thorough descriptions of each state, transition, and pathway follow the model. Experts base this model on available experimental research, field observations, professional consensus, and interpretations. It is likely to change as knowledge increases.

Plant communities will differ across the MLRA because of the natural variability in weather, soils, and aspect. The Reference Plant Community is not necessarily the management goal; other vegetative states may be desired plant communities as long as the Range Health assessments are in the moderate and above category.

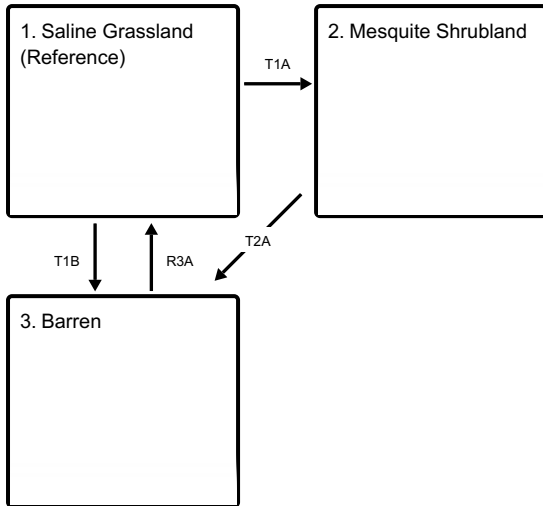
The biological processes on this site are complex. Therefore, representative values are presented in a land management context. The species lists are representative and are not botanical descriptions of all species occurring, or potentially occurring, on this site. They are not intended to cover every situation or the full range of conditions, species, and responses for the site.

Composition by dry weight and percent canopy cover are provided to describing the functional groups. Most observers find it easier to visualize or estimate percent canopy for woody species (trees and shrubs).

The following diagram suggests some pathways that the vegetation on this site might take. There may be other states not shown on the diagram. This information is intended to show what might happen in a given set of circumstances. It does not mean that this would happen the same way in every instance. Local professional guidance should always be sought before pursuing a treatment scenario.

State and transition model

Ecosystem states



T1A - Absence of disturbance and natural regeneration over time

T1B - Extensive soil disturbance

T2A - Extensive soil disturbance

R3A - Adequate rest and presence of native seed source

State 1

Saline Grassland (Reference)

This is the reference or diagnostic community for the site. The description is based on early range site descriptions, clipping data, professional consensus of experienced range specialists, and analysis of field work. The vegetation of the reference state may be highly variable from site to site depending on the degree of soil salinity. Generally, the site will be dominated by alkali sacaton and inland Saltgrass. Other grasses and forbs may occur depending on the level of salinity in the soil. These other plants may include switchgrass, western wheatgrass, Canada wildrye, and vine mesquite. Forbs may include ragweed, aster, and croton species. Rangeland aboveground productivity in this state is estimated between 1,500 and 3,000 pounds per acre.

State 2

Mesquite Shrubland

This state is the result of invasion by mesquite trees. Herbaceous production may not be altered drastically as mesquite do not seem to shade out the herbaceous plant as much as other woodies. However, the presence of mesquite may have management implications depending on the land use and density. Control and or eradication of these trees can be costly. Careful consideration of infestation levels and desired management goals should be considered.

State 3

Barren

In some areas, these sites have been cleared or cultivated. Often once the vegetation is removed, it can take a long time to revegetate. These areas become barren and subject to soil movement during heavy rains. Once some plants recover on the site, it may begin to resemble the original state(1). This process may take many years.

Transition T1A

State 1 to 2

Without brush management, mesquite may invade and eventually dominate the site transitioning it to State 2.

Transition T1B

State 1 to 3

If the soils on these sites are disturbed by cultivation or heavy equipment, they may take a very long time to re-vegetate, transitioning the site to State 3.

Transition T2A

State 2 to 3

If the soils on these sites are disturbed by cultivation or heavy equipment, they may take a very long time to re-vegetate, transitioning the site to State 3.

Restoration pathway R3A

State 3 to 1

If there is an available seed source remaining in the soil, the site may recover to State 1. This may take many years.

Other references

Unpublished draft ESDs from NRCS.

USDA-NRCS (Formerly Soil Conservation Service) Range Site Descriptions (1960s)

USDA-NRCS (Formerly Soil Conservation Service) Ag Handbook 296 (2006)

Contributors

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Approval

Bryan Christensen, 9/15/2023

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)	
Contact for lead author	

Date	05/05/2024
Approved by	Bryan Christensen
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:**

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

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

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

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

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

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:

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:**
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