USDA Natural Resources Conservation Service

Ecological site R081AY306TX
Loamy Bottomland 14-19 PZ

Last updated: 9/19/2023
Accessed: 05/12/2025

General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

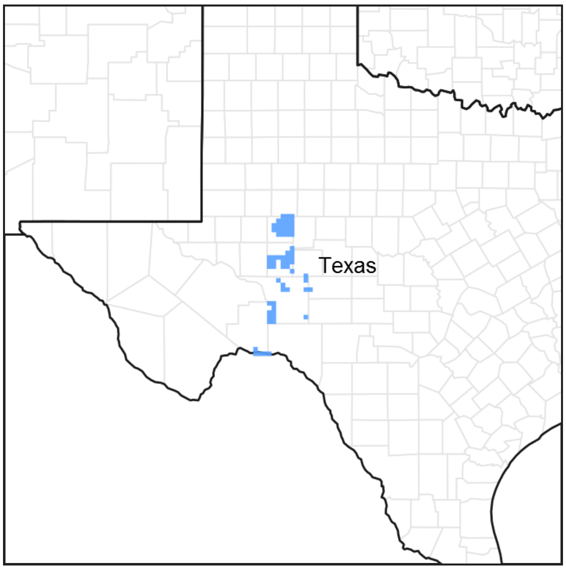


Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

MLRA notes

Major Land Resource Area (MLRA): 081A–Edwards Plateau, Western Part

This area is entirely in Texas. It makes up about 16,550 square miles (42,885 square kilometers). The cities of San Angelo and Fort Stockton and the towns of Big Lake, McCamey, Ozona, and Sheffield are in this MLRA. Interstate 20 crosses the northern part of the area, and Interstate 10 crosses the middle of the area. The eastern part of Amistad National Recreation Area is in this MLRA.

Classification relationships

USDA-Natural Resources Conservation Service, 2006.
-Major Land Resource Area (MLRA) 81A

Ecological site concept

Loamy Bottomlands occupy the lowest setting on the landscape. They are comprised of flood plains formed from loamy alluvium. Flooding can occur on these sites.

Associated sites

R081AY291TX	**Clay Loam 14-19 PZ** The Clay Loam ecological site occurs on the stream terraces above the floodplains.

Similar sites

R081AY291TX	**Clay Loam 14-19 PZ** The Clay Loam ecological site has deep soils on floodplains.

Table 1. Dominant plant species

Tree	(1) *Quercus virginiana*
Shrub	Not specified
Herbaceous	(1) *Bouteloua curtipendula* (2) *Bothriochloa barbinodis*

Physiographic features

These nearly level soils occur on flood plain steps of river valleys or dissected plateaus. Slopes range from 0 to 3 percent.

Table 2. Representative physiographic features

Landforms	(1) Plateau > Flood plain (2) River valley > Flood plain
Runoff class	Very low to medium
Flooding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Flooding frequency	Occasional to frequent
Elevation	900–4,600 ft
Slope	0–3%
Aspect	Aspect is not a significant factor

Climatic features

The climate is semiarid and is characterized by hot summers and dry, relatively mild winters. The average relative humidity in mid-afternoon ranges from 25 to 50 percent. Humidity is higher at night, and the average at dawn is around 70 to 80 percent. The sun shines 80 percent of the time during the summer and 60 percent in winter. The prevailing wind is from the south-southwest. Approximately two-thirds of annual rainfall occurs during the May to October period. Rainfall during this period generally falls during thunderstorms, and fairly large amounts of rain may fall in a short time. The climate is one of extremes, which exert much more influence on plant communities than averages. Timing and amount of rainfall are critical. High temperatures and dry westerly winds have a tremendously negative impact on precipitation effectiveness, as well as length of time since the last rain. Records since the mid-1900's, as well as geological and archaeological findings, indicate wet and dry cycles going back many thousands of years and lasting for various lengths of time with enormous influence on the flora and fauna of the area.

Table 3. Representative climatic features

Frost-free period (characteristic range)	210-240 days
Freeze-free period (characteristic range)	240-280 days
Precipitation total (characteristic range)	15-19 in
Frost-free period (actual range)	210-240 days
Freeze-free period (actual range)	240-280 days
Precipitation total (actual range)	15-23 in

Frost-free period (average)	225 days
Freeze-free period (average)	255 days
Precipitation total (average)	18 in

Climate stations used

- (1) BAKERSFIELD [USC00410482], Iraan, TX
- (2) COPE RCH [USC00411974], Big Lake, TX
- (3) MCCAMEY [USC00415707], Mc Camey, TX
- (4) PAINT ROCK [USC00416747], Paint Rock, TX
- (5) PANDALE 1 N [USC00416780], Comstock, TX
- (6) PANDALE 11 NE [USC00416781], Comstock, TX
- (7) SANDERSON [USC00418022], Dryden, TX
- (8) SHEFFIELD [USC00418252], Sheffield, TX
- (9) BIG LAKE 2 [USC00410779], Big Lake, TX
- (10) GARDEN CITY [USC00413445], Garden City, TX

Influencing water features

Bottomland sites can be flooded occasionally to frequently for varying duration throughout the year. These soils are not classified as hydric, but small areas can meet hydric criteria and an onsite determination should be made.

Wetland description

Wetlands can occur as minor components of this ecological site and onsite determination should be made.

Soil features

The soils are very deep, moderately well drained, slowly to moderately rapid permeable and formed in clayey or silty alluvium derived from limestone. Soil series correlated to this site include: Dev, Iraan, and Rioconcho.

Table 4. Representative soil features

Parent material	(1) Alluvium–limestone
Surface texture	(1) Silty clay loam (2) Silty clay (3) Very gravelly clay loam
Family particle size	(1) Fine (2) Fine-silty (3) Loamy-skeletal
Drainage class	Moderately well drained to well drained
Permeability class	Slow to moderately rapid
Soil depth	60–80 in
Surface fragment cover <=3"	0–5%
Surface fragment cover >3"	0–2%
Available water capacity (0-80in)	1.3–8.7 in
Calcium carbonate equivalent (0-80in)	2–90%
Electrical conductivity (0-80in)	0–2 mmhos/cm

Soil reaction (1:1 water) (0-80in)	7.4–8.4
Subsurface fragment volume <=3" (4-40in)	0–30%
Subsurface fragment volume >3" (4-40in)	0–7%

Ecological dynamics

The plant communities are dynamic entities. In pre-settlement times, the site would most likely be a savannah dotted with mesquite trees, occasional shrubs and, in some areas, live oaks. The surface would be mostly covered by mid-size bunch grasses and perennial forbs. This reference plant community was greatly influenced by grazing, climate (including periodic extended periods of drought) and, to a lesser degree, fire. Reference community plants developed ways to withstand periods of drought. The midgrasses and forbs shaded the ground, reduced soil temperature, improved infiltration of what little moisture might fall and maintained soil moisture longer. Their roots reached deeper into the soil, utilizing deep soil moisture no longer available to short-rooted plants. In extreme cases many species could go virtually dormant, preserving the energy stored in underground roots, crowns and stems until wetter weather arrived. Their seeds could stay viable in the soil for long periods, sprouting when conditions improved.

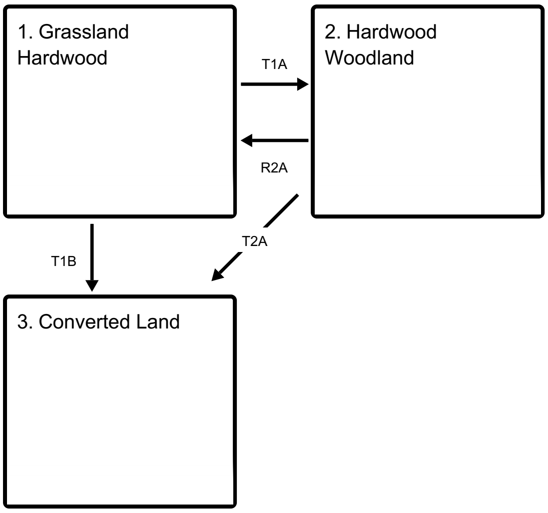
Extensive herds of pronghorns, large towns of black-tailed prairie dogs, as well as smaller populations of elk, white-tailed deer, and desert mule deer were present and had an impact on the plant community. Bison, a migratory herd animal, would come into an area, graze on the move, and not come back for many months or even years. This long deferment period allowed the plants to recover from the heavy grazing. Bison grazing on this site was probably intermittent, occurring during wetter periods. Very few bison were reported in the area after 1830. There were no recorded sightings after 1860. Fire has an influence on plant community structure and was probably a factor in maintaining the original savannah vegetation. Mesquite were present on the site, but not at the level seen today. Periodic fires may have helped keep mesquite as a scattered savannah and other woody species a small part of the composition. Grazing patterns by native herbivores and prairie dog activities were probably more significant factors in maintaining a well-balanced plant community.

While grazing is a natural component of this ecosystem, overstocking and thus overgrazing by domesticated animals has had a tremendous impact on the site. Early settlers, accustomed to farming and ranching in more temperate zones of the eastern United States or even Europe, misjudged the capacity of the site for sustainable production and expected more than could be delivered. Moreover, there was a gap of time between the extirpation of bison and the introduction of domestic livestock which resulted in an accumulation of plant material. This may have given the illusion of higher production than was actually being produced. Overgrazing and fire suppression disrupted ecological processes that took hundreds or thousands of years to develop. Instead of grazing and moving on, domestic livestock were present on the site most of the time, particularly after the practice of fencing arrived. Another influence on grazing patterns was the advent of wells and windmills. They opened up large areas that were previously unused by livestock due to lack of natural surface water. The more palatable plants were selected repeatedly and eventually began to disappear from the ecosystem to be replaced by lower successional, less palatable species. As overgrazing continued, overall production of grasses and forbs declined, more bare ground appeared, soil erosion increased, and woody and succulent increasers began to multiply. The elimination of fire due to the lack of fine fuel or by human interference assisted the rapid encroachment of mesquite and other woody increasers and a concurrent reduction of usable forage.

Extremes in climate exerted tremendous influence on the site long before European man arrived. Geologic formations, archeological findings, and rainfall records since the mid-1900’s show wide variations in precipitation with cycles of long, dry periods going back thousands of years with corresponding variations in kind and amount of flora and fauna species. The mineral content and reaction of the soils enable the site to produce diverse, highly nutritious forage. Loss of cover and soil robs the site the site of this capability and promotes rapid water shed, erosion and crusting. Pedestalling, terracetes, and water flow patterns are range health indicators that will be present if the site begins to deteriorate.

State and transition model

Ecosystem states



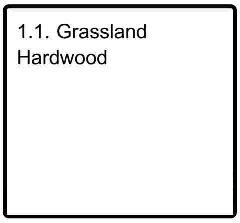
T1A - Absence of wildfire and other disturbance and natural regeneration over time, may be coupled with excessive grazing pressure

T1B - Extensive soil disturbance followed by seeding

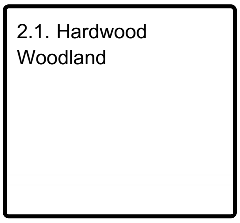
R2A - Reintroduction of natural disturbance regimes, seeding of native species may also be required

T2A - Extensive soil disturbance followed by seeding

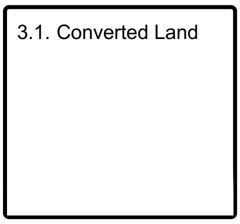
State 1 submodel, plant communities



State 2 submodel, plant communities



State 3 submodel, plant communities



State 1
Grassland Hardwood

Dominant plant species

- live oak (*Quercus virginiana*), tree
- sideoats grama (*Bouteloua curtipendula*), grass
- cane bluestem (*Bothriochloa barbinodis*), grass

Community 1.1
Grassland Hardwood

The Grassland Hardwood Community (1.1) supports woodland species along the edge of the watercourse and a mixture of grasses, forbs, and shrubs on the adjacent terraced areas. Woody species decrease in density and canopy cover as distance from the stream bank increases, taking on a savannah structure. This pattern varies depending on soil series, herbivory, and fire frequency. Grasses have a positive effect on streambank stabilization during flooding events. The deep fertile soils and runoff from adjacent uplands and occasional flooding cause this site to be more productive than the surrounding ecological sites. Primary above ground production is mostly from the grassland component depending on soils and growing-season precipitation.

State 2
Hardwood Woodland

Dominant plant species

- live oak (*Quercus virginiana*), tree

Community 2.1
Hardwood Woodland

The Hardwood Woodland Community (2.1) reflects the effects of heavy abusive grazing on the more palatable species and the result of the suppression of fires. Excessive defoliation is detrimental to the more palatable grasses and forbs and allows more grazing resistant species to increase. The defoliation also reduces standing foliage and litter, thereby creating bare ground susceptible to invasion of woody species previously repressed by competition or fires. Less preferred indigenous and invading woody plants increase in density and stature. The more palatable vegetation is being replaced by less-preferred plants. Nutrient cycling and water use are shifting toward the deeper-rooted woody perennials. Soil organic matter and litter are slightly less than in reference conditions. The grazing disturbance reduces ground cover, litter, and soil organic matter exposing soil to erosion. The transition to the woodland state can be reversed by implementing moderately intensive management practices like prescribed grazing and prescribed burning until the woody component reduces burning effectiveness. The threshold for this transition is generally between 30 and 40 percent woody plant cover. Burning effectiveness declines when there is not enough fine fuel produced by the grassland component to control or suppress the invading species. If this community is not managed, woody canopy cover can near 100 percent.

State 3
Converted Land

Dominant plant species

- Bermudagrass (*Cynodon dactylon*), grass

Community 3.1
Converted Land

Some acres have been converted to cropland and pastureland in the past. Historically, most were cut for timber, posts, poles, or firewood. Cropping small acreages is still practiced for grain, hay, or winter small grain, either for livestock grazing, grain harvesting, or planting for wildlife food plots. Irrigation is practiced where water is available. Abandoned cropland areas, or cleared areas, are often seeded to introduced species, such as bermudagrass (Cynodon spp.) or Kleingrass (*Panicum coloratum*). Herbage production on those seeded to adapted introduced grasses or native grasses reach peak production within a few years, if a full stand is established. In this case, herbage production will equal reference conditions if species such as big bluestem or switchgrass are seeded. The practice of including adapted legumes or other forbs will enhance productivity and usefulness, especially for wildlife. Irrigation will boost forage production where available. Invasion of the seeded fields by brush species such as mesquite, pricklypear (Opuntia spp.), condalia (Condalia spp.), willow baccharis (Baccharis spp.), Texas persimmon and juniper are common. Drought and reduced soil cover due to cropping or grazing coupled with a nearby seed source trigger the invasions. The shrubs are established by seeds brought in by animals, water, or wind. The invading brush must be controlled with grazing management, prescribed burning, or other brush management methods. Many fields, however, have been abandoned and let go back to native range or planted to introduced grasses for pasture. Without grazing management and brush management, brush species such as mesquite and juniper will dominate before a reference grass community can be established. Brush management and grazing management are required if the goal is restoration of the reference community. Without management inputs to control woody plants, most of the herbage produced in early stages of succession is from annual grasses and forbs, while in the latter stages of succession by woody invaders.

Transition T1A
State 1 to 2

Heavy abusive grazing, no brush management, and no fires contribute to the shift from the Grassland Hardwood State to the Hardwood Woodland State. Woody canopy cover above 40 percent signals the transition.

Transition T1B
State 1 to 3

Brush management, pasture planting, range planting, and crop cultivation speeds up the shift from the Grassland Hardwood State to the Converted Land State.

Restoration pathway R2A
State 2 to 1

Prescribed grazing, brush management, range planting, and prescribed burning are various conservation practices to revert back to Grassland Hardwood State from the Hardwood Woodland State. Full restoration may be unattainable due to irreversible changes in soils and site dynamics.

Transition T2A
State 2 to 3

Brush Management, pasture planting, range planting, and crop cultivation can shift from the Hardwood Woodland State to the Converted Land State.

Additional community tables

Animal community

This site is suitable for the production of domestic livestock and to provide habitat for native wildlife. Cow-calf, stocker cattle, sheep, and goats can utilize this site. Carrying capacity has declined drastically over the past 100 years due to deterioration of the reference plant community. An assessment of vegetation is needed to determine the site’s current carrying capacity. Calculations used to determine livestock stocking rate should be based on forage production remaining after determining use by resident wildlife, then refined by frequent and careful observation of the plant community’s response to animal foraging.

A large diversity of wildlife is native to this site. In the historic plant community, migrating bison, grazing primarily during wetter periods, resident pronghorns, and smaller populations of white-tailed deer, desert mule deer, quail and prairie chickens were the more predominant species. With the subsequent transformation of the plant community, due primarily to the influence of man and climate change, the kind and proportion of wildlife species have been altered.

With the eradication of the screwworm fly, increase in woody vegetation, and man-suppressed natural predation, deer numbers have increased and are often in excess of carrying capacity. Where deer numbers are excessive, overbrowsing and overuse of preferred forbs causes deterioration of the plant community. Progressive management of deer populations through hunting can keep populations in balance and provide an economically important ranching enterprise. Achieving a balance between brushy cover and more open plant communities on this and adjacent sites is important to deer management. Competition among deer, sheep, and goats must be a consideration in livestock and wildlife management to prevent damage to preferred vegetation.

Smaller mammals include many kinds of rodents, jackrabbit, cottontail rabbit, raccoon, skunks, possum and armadillo. Mammalian predators include coyote, red fox, gray fox, bobcat, and mountain lion. Wolves were common in earlier times, bears resided in some areas and an occasional jaguar was encountered. Many species of snakes and lizards are native to the site.

Many species of birds are found on this site including game birds, songbirds and birds of prey. Major game birds that are economically important are bobwhite quail, scaled (blue) quail and mourning dove. Quail prefer a combination of low shrubs, bunch grass (critical for nesting cover), bare ground and low successional forbs. Turkeys visit the site to feed. The different species of songbirds vary in their habitat preferences. Habitat on this site that provides a large diversity of grasses, forbs and shrubs will support a good variety and abundance of songbirds. Birds of prey are important to keep the numbers of rodents, rabbits and snakes in balance.

Inventory data references

Information provided here has been derived from limited NRCS clipping data, and from field observations of range trained personnel.

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Approval

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Acknowledgments

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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	05/12/2025
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:

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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:**
