USDA Natural Resources Conservation Service

Ecological site F131DY002AR
Clayey Flood Plain

Last updated: 9/22/2023
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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.

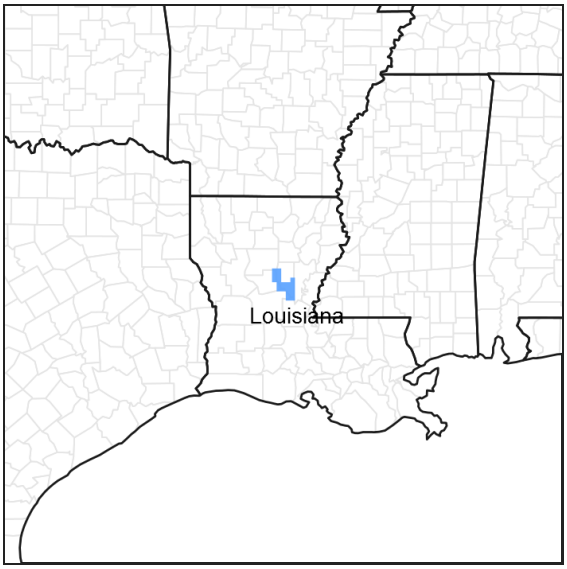


Figure 1. Mapped extent

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): 131D–Southern Mississippi River Terraces

Major Land Resource Area (MLRA) 131D, Southern Mississippi River Terraces, is located in Arkansas (88 percent) and Louisiana (12 percent). It is in two separate areas that together make up about 2,945 square miles. The towns of Lonoke and Stuttgart, Arkansas, are in the northeastern part of the MLRA, which is called the Grand Prairie. Bastrop, Louisiana, is in the southwestern part of the MLRA.

Classification relationships

USDA-Natural Resources Conservation Service, 2006.
-Major Land Resource Area (MLRA) 131D

Ecological site concept

The Clayey Floodplain ecological site has clay-textured, very deep, somewhat poorly to poorly drained soils that are prone to flooding. Sites can flood for prolonged periods, especially during the winter and early spring.

Associated sites

F131DY001AR	**Loamy Flood Plain** Sites on same landform, but have loamy textures.
F131DY006AR	**Clayey Terrace** Sites have similar textures, but are found on a higher terrace landform.

Similar sites

F131CY005LA	**Clayey Flood Plain** Sites are similar, but in a different MLRA.
F131BY006AR	**Clayey Flood Plain** Sites are similar, but in a different MLRA.

Table 1. Dominant plant species

Tree	(1) *Quercus lyrata* (2) *Carya aquatica*
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

These soils are on low terraces or natural levees bordering former channels and tributaries. They are saturated late in winter and early in spring. Water runs off the surface very slowly. Slopes range from 0 to 3 percent.

Table 2. Representative physiographic features

Landforms	(1) Alluvial plain > Flood plain
Runoff class	Negligible to very high
Flooding duration	Brief (2 to 7 days) to long (7 to 30 days)
Flooding frequency	None to frequent
Ponding frequency	None
Elevation	15–76 m
Slope	0–3%
Water table depth	13–38 cm
Aspect	Aspect is not a significant factor

Climatic features

The average annual precipitation is 53 inches, which increases from north to south. Most of the rainfall occurs as frontal storms in spring and early summer. Some high-intensity, convective thunderstorms occur in summer. The average seasonal snowfall is five inches. Temperatures range from highs in the low 90's during the summer to lows in the low 30's during the winter. The frost-free period averages 221 days, while the freeze-free period averages 246 days.

Table 3. Representative climatic features

Frost-free period (average)	221 days
Freeze-free period (average)	246 days
Precipitation total (average)	1,346 mm

Climate stations used

- (1) ARKANSAS POST [USC00030240], Gillett, AR
- (2) SAINT CHARLES [USC00036376], Clarendon, AR
- (3) STUTTGART 9 ESE [USC00036920], Stuttgart, AR
- (4) DES ARC [USC00031968], Des Arc, AR
- (5) CROSSETT 2 SSE [USC00031730], Crossett, AR

Influencing water features

The ecological site is on floodplains and can flood.

Wetland description

Most of the soils correlated to this site are considered hydric, but onsite delineations are needed to confirm wetland status according to the United State Army Corps of Engineers.

Soil features

The ecological site consists of very deep, poorly drained, very slowly permeable to impermeable soils that formed in clayey alluvium. The soils are high in smectite and undergo shrink-swell characteristics in the absence and presence of water. Soils correlated to this site include: Alligator, Forestdale, Jackport, and Lagrue.

Table 4. Representative soil features

Parent material	(1) Alluvium–igneous and sedimentary rock
Surface texture	(1) Clay (2) Silty clay (3) Silty clay loam
Family particle size	(1) Clayey
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 (0-101.6cm)	17.78 cm
Calcium carbonate equivalent (0-101.6cm)	0%
Electrical conductivity (0-101.6cm)	0 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–5
Soil reaction (1:1 water) (0-101.6cm)	4.5–8.4
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

The information in this ecological site description (ESD), including the state-and-transition model (STM), was developed using archeological and historical data, professional experience, and scientific studies. The information is representative of a 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.

Introduction - The Southern Mississippi River Terrace (MLRA 131D) region is on smooth terraces and floodplains along the Mississippi River and its major tributaries south of its confluence with the Ohio River. The geologic material in the region consists of very thick deposits of sandy to clayey alluvium of Pleistocene to Holocene age. This material was deposited by the rivers with local relief is typically less than 15 feet and elevation ranging from 50 to 250 feet.

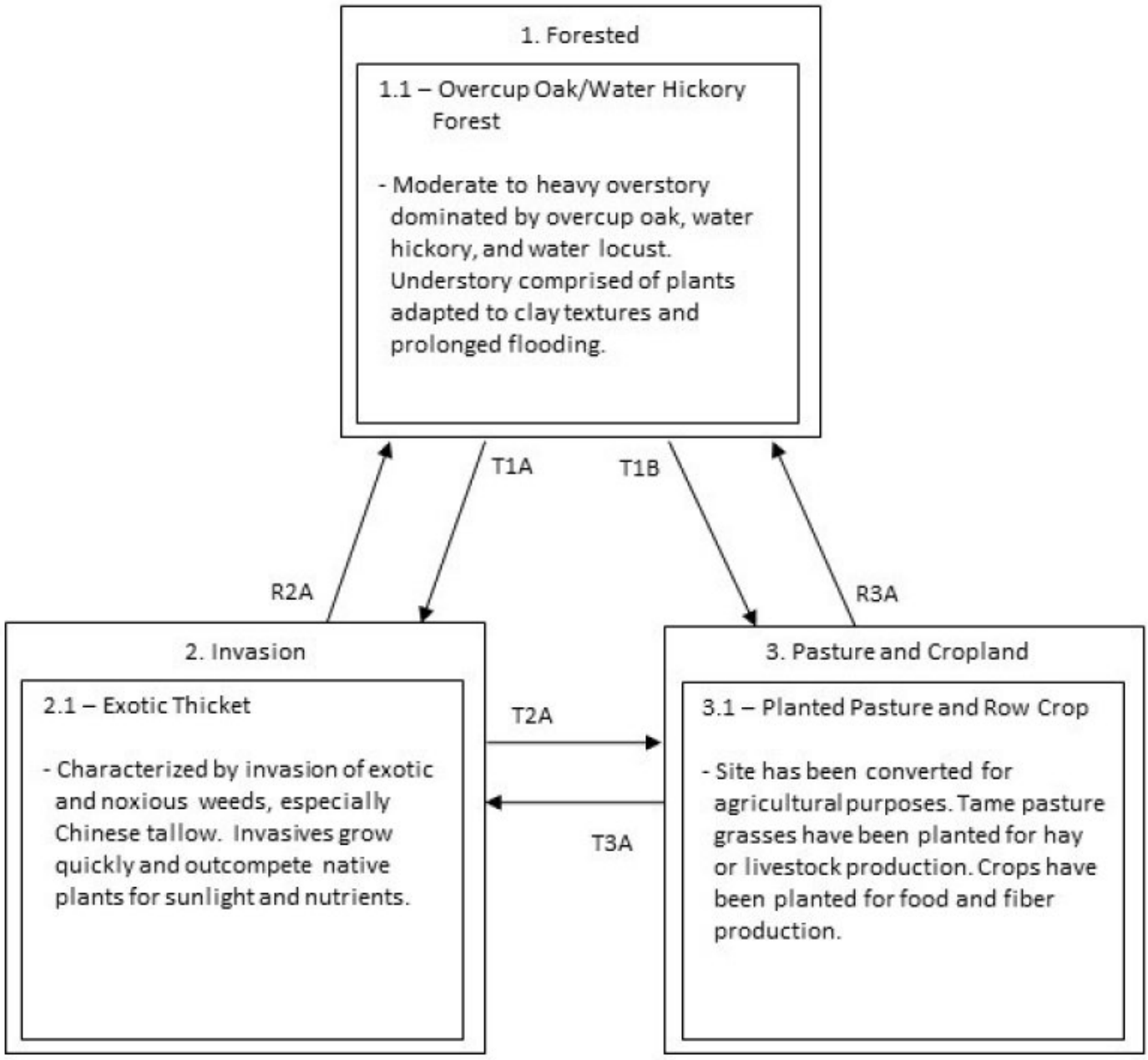
Geology - Bedrock in this area consists of Tertiary and Cretaceous sands formed as beach deposits during the retreat of the Cretaceous ocean from the midsection of the United States. Alluvial deposits from flooding and lateral migration of the rivers crossing this area typically lie above the bedrock. These sediments form Pleistocene-age alluvial terraces. Silty alluvium underlies most of the area. Clayey sediments are in old channel scars. The Pleistocene terraces are part of the Prairie Terrace complex. A minor portion of the area is in the Deweyville and Montgomery terrace formation. These terraces have a base of red alluvium capped by one to several feet of brownish alluvium.

Biological Resources - This area as a whole, supports hardwoods and pines. The Grand Prairie originally supported tall prairie grasses interlaced with hardwood timber. Cherrybark oak (*Quercus pagoda*) and Shumard oak (*Quercus shumardii*) are widely distributed. Tuliptree (*Liriodendron tulipifera*), white ash (*Fraxinus americana*), eastern cottonwood (*Populus deltoides*), and black walnut (*Juglans nigra*) are important species on the flood plains. Loblolly pine (*Pinus taeda*) and shortleaf pine (*Pinus echinata*) are on a wide variety of sites, mainly the eroded soils on uplands and ridges. Other hardwood species that commonly grow in this area are white oak (*Quercus alba*), basswood (Tillia sp.), sweetgum (*Liquidambar styraciflua*), water oak (*Quercus nigra*), American elm (*Ulmus americana*), blackgum (*Nyssa sylvatica*), sycamore (Plantanus occidentalis), sassafras (*Sassafras albidum*), southern red oak (*Quercus falcata*), chinkapin oak (*Quercus muehlenbergii*), American beech (*Fagus grandifolia*), and hickory (Carya sp.).

Land Use - Land use varies throughout the MLRA consisting of 42 percent cropland, 4 percent grassland, 47 percent forest, 3 percent urban development, 3 percent water, and 1 percent other. Scattered tracts of forests and farms make up nearly all of this area. Rice, soybeans, and wheat are the main crops. In most areas furrow or flood irrigation is used throughout the growing season. Hardwood timber is harvested on some forested wetlands, and most forested areas are managed for wildlife. Bait fish are produced commercially in ponds that are contained by levees. The area is in a major migratory flight path and hunting waterfowl is a popular recreation activity.

Conservation - The major soil resource concerns are management of soil moisture, erosion control, and maintenance of the content of organic matter and productivity of the soils. Depletion of ground water through excessive pumping is a major concern in the Grand Prairie area. Conservation practices on cropland generally include nutrient management, crop residue management, and alternative tillage systems, especially no-till systems that reduce the need for tillage. In many areas land leveling or shaping optimizes the control of surface water. Other major cropland management practices are control of competing vegetation and insects through aerial or ground spraying of herbicides and insecticides and fertility management programs that make use of chemical fertilizers.

State and transition model



Code	Practice
T1A	Invasion by exotic weed(s).
T1B, T2A	Site is prepared and planted to grass or crops.
T3A	No management and invasion by exotic weed(s).
R2A	Removal of invasive plants through biological, mechanical, or chemical control(s).
R3A	Tree planting and return to natural flooding intervals.

Figure 6. STM

State 1
Forest

The overall state has a high overstory cover of bottomland hardwood species. The dominant overstory species are overcup oak (*Quercus lyrata*), water hickory (*Carya aquatica*), and water locust (Gleditsia aquatic). Flooding is common, varying from brief durations to long durations depending on micro-relief, size of precipitation events, and current saturation of the soil. The most common disturbance is treefall due to windthrow. The rooting systems in the bottoms are oftentimes shallow. In combination with some mortality due to prolonged flooding, downed trees and upright snags are common. A canopy-clearing disturbance, such as hurricanes or tornadoes, can be inhabited by

light-seeded species. If advanced oak reproduction is present at time of disturbance the stand will retain its oak dominance. Oaks will sprout, grow, die-back, and regrow for many years. Otherwise, ash and sweetgum will colonize the canopy due to their rapid growth and ability to grow into the crown early.

Community 1.1
Overcup Oak/Water Hickory Forest

Besides the co-dominants overcup oak and water hickory, associate species may include: ash, hackberry (*Celtis laevigata*), swamp dogwood (*Cornus foemina*), and swamp privet (*Forestiera acuminata*). Buttonbush (*Cephalanthus occidentalis*) is a common understory shrub. Sedges (Carex sp.) and other herbaceous vegetation adapted to seasonally prolonged flooding inhabit the forest understory.

State 2
Invasion

Chinese tallow (*Triadica sebifera*) is an undesired, invasive species brought to the United States in 1776 (Randall & Marinelli, 1996). Rapid expansion along the gulf coastal states has allowed the species to invade many ecosystems and consequently reduce diversity. Tallow trees are known to cause gastrointestinal upset, contact dermatitis, and toxicity in livestock and humans. Mechanical and chemicals options exist as a means to control the trees.

Community 2.1
Exotic Thicket

Chinese tallow invade the ecological site via flooding events as nearby waterways transport seeds. Once settled, the seeds produce saplings viable to reproduce seeds in as little as three years. The rapid establishment immediately blocks sunlight to understory species and reduces diversity. Unabated growth quickly allows the saplings to grow into the overstory, thus changing the ecological state entirely. Reductions in size and number of all vegetative species are seen in all canopy tiers.

State 3
Pasture and Cropland

The Pasture and Cropland State is a result of conversion activities. The landowner has maximized agriculture production by planting a monoculture of introduced grass species or agricultural row crops.

Community 3.1
Planted Pasture and Row Crop

Typical perennial warm-season grasses include Bermudagrass, bahiagrass, dallisgrass, and Johnsongrass. Spring and fall forages may include legumes such as clover. The grasses are grown for livestock production through direct grazing or baling hay for later use. Agricultural row crops are grown for food and fiber production. Typical crops include cotton, soybeans, milo, corn, rice, and sugarcane. Many farmers use herbicides to reduce unwanted plant competition which yields a plant community unrepresentative of State 1 or subsequent vegetative states.

Transition T1A
State 1 to 2

The transition from State 1 to State 2 is a result of occupancy by invasive species or other noxious weeds. Invasive plants outcompete, and eventually choke out, all other native species.

Transition T1B
State 1 to 3

The transition is due to the land manager maximizing agricultural production. If present, merchantable timber is harvested by clearcut, then the site is prepared and planted to either a tame grass or row crop.

Restoration pathway R2A
State 2 to 1

The driver for restoration is control of Chinese tallow. Although an option, mechanical removal of the trees is difficult because they readily regrow from roots and seeds. Several chemicals methods are available, including glyphosate for cut-stump treatments, triclopyr for cut-stump and foliar treatments, imazamox for broad spectrum application, and imazapyr as a foliar spray. Many aquatic herbicides have water use restrictions and can potentially kill hardwoods, so labels and restrictions should be read carefully prior to application.

Transition T2A
State 2 to 3

The transition is due to the land manager maximizing agricultural production. Merchantable timber is harvested by clearcut, then the site is prepared and planted to either a tame grass or row crop.

Restoration pathway R3A
State 3 to 1

This restoration pathway may be accomplished by restoring bottomland hardwoods. Restoration efforts for bottomland hardwood forests have proven difficult and much research has been done on these ecosystems. Many times restoring the function of the ecosystem is the most difficult obstacle. Evapotranspiration and hyrdoperiod are closely linked and may never fully be restored until a forested condition exists again (Stanturf et al., 2001). Local tree availability may limit the possibilities of species composition. Careful planning of available species, site design, and further management actions should be conversed with a knowledgeable restoration source. With this in mind, oftentimes late summer and early fall are the best times to begin due to possibly wet conditions during the late fall to early spring. Many detailed guides have been written to assist with restoration, and suggested readings include, “A Guide to Bottomland Hardwood Restoration” (Allen et al., 2001).

Transition T3A
State 3 to 2

The transition is due to the land manager not managing the invasion of exotic weeds. Without proper management, the crops and pastures can become an exotic thicket of invasive species that becomes increasingly harder to control.

Additional community tables

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

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Approval

Bryan Christensen, 9/22/2023

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	11/15/2021
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:**

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6. **Extent of wind scoured, blowouts and/or depositional areas:**

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

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

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

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

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

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12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant:

    Sub-dominant:

    Other:

    Additional:

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

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14. **Average percent litter cover (%) and depth (in):**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if**

their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:

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17. **Perennial plant reproductive capability:**
