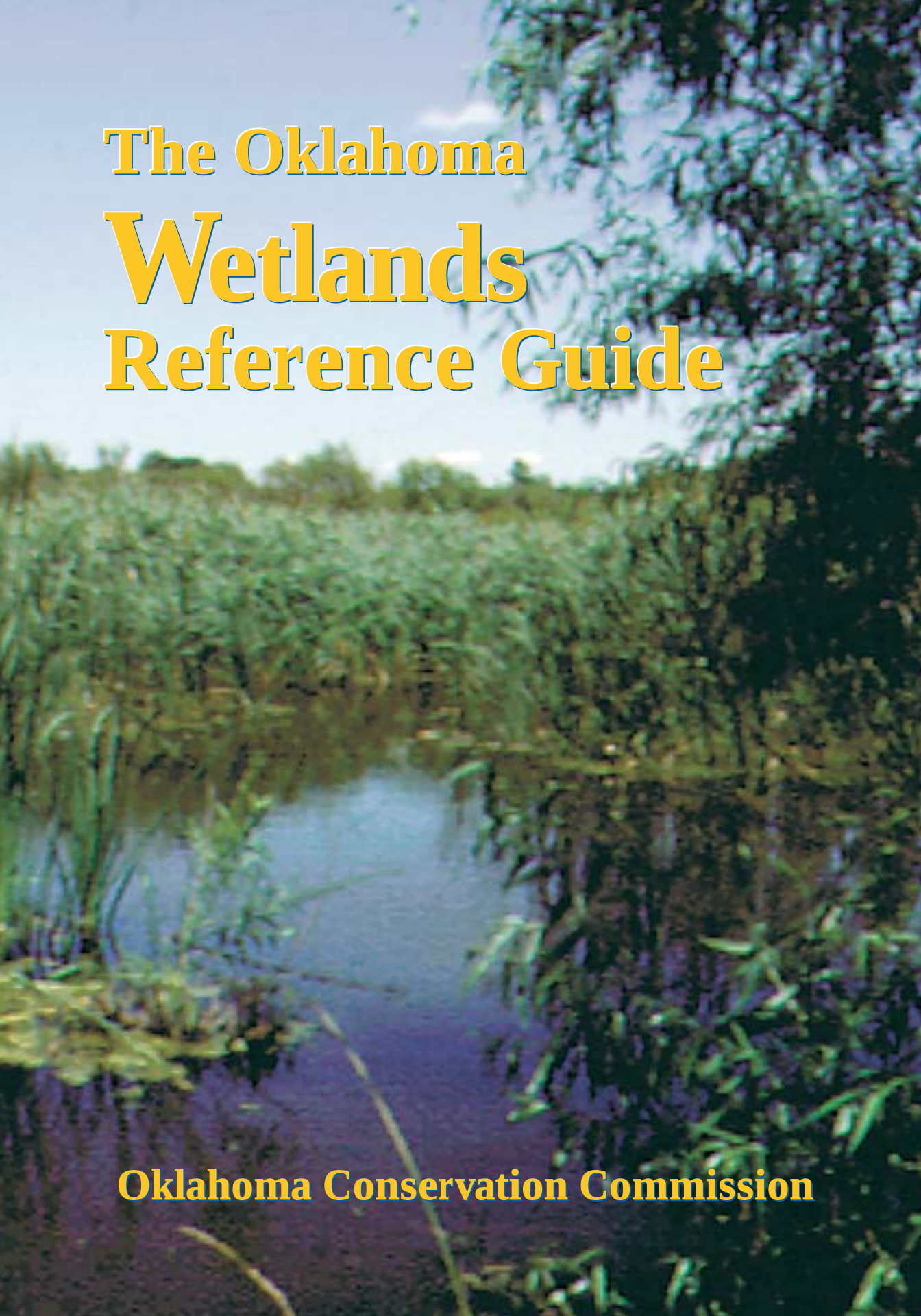

The Oklahoma Wetlands Reference Guide

Oklahoma Conservation Commission

The Oklahoma Wetlands Reference Guide

Oklahoma Conservation Commission
Oklahoma City, Oklahoma

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Suggested citation:

Oklahoma Conservation Commission. 2000. The Oklahoma Wetlands Reference Guide (James E. Henley and Mark S. Harrison, authors). Oklahoma Conservation Commission, Oklahoma City, Oklahoma.

This publication, printed by Heritage Press of El Reno, Oklahoma, is issued by the Oklahoma Conservation Commission as authorized by Executive Director Mike Thralls, with funding through a grant from the U.S. Enviromental Protection Agency. Two thousand copies were prepared at a cost of $10.78 each. Copies have been deposited with the Publications Clearinghouse of the Oklahoma State Department of Libraries. All programs and services of the Oklahoma Conservation Commission and Oklahoma's Conservation Districts are offered on a nondiscriminatory basis without regard to race, color, national origin, religion, gender, marital status or physical disability.

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Acknowledgments

This Wetlands Reference Guide for the State of Oklahoma is published by the Oklahoma Conservation Commission and was made possible through a grant from the U.S. Environmental Protection Agency. An integral collaborator in this endeavor has been the USDA Natural Resources Conservation Service in Oklahoma. Technical descriptions were written by James E. Henley, USDA Natural Resources Conservation Service, and editing, design, layout and all photography was done by Mark S. Harrison, Oklahoma Conservation Commission. Matthew Mercer, Oklahoma Conservation Commission Wetlands Program coordinator, assisted with final gathering of data and resources and grant coordination. All maps for this publication were generated by the Oklahoma Conservation Commission's Geographic Information Systems division.

Other agencies and organizations who have contributed to this publication include the following:

Office of the Secretary of Environment, State of Oklahoma
Oklahoma Biodiversity Task Force
Oklahoma Department of Environmental Quality
Oklahoma Department of Wildlife Conservation
Oklahoma State University Cooperative Extension Service
Oklahoma Water Resources Board
Oklahoma's Wetlands Working Group
University of Oklahoma Biological Survey
U.S. Army Corps of Engineers
U.S. Fish and Wildlife Service

Special acknowledgment is deserved by the following individuals for their assistance in completion of this project:

Bob Springer, Oklahoma Conservation Commission
Shanon Haraughty, Oklahoma Conservation Commission
Derek Johnson, Oklahoma Conservation Commission
Wes Shockley, Oklahoma Conservation Commission
Brooks Tramell, Oklahoma Conservation Commission
Steve Tully, USDA Natural Resources Conservation Service
Dwaine Gelnar, USDA Natural Resources Conservation Service
Jennifer Lee Myers, Office of the Secretary of Environment
Bruce Hoagland, Oklahoma Biological Survey and the University of Oklahoma

And thanks to the staffs of Oklahoma's local conservation districts and NRCS field offices for their assistance in accessing the wetland reference sites.

Introduction

The Oklahoma Wetlands Reference Guide has been developed to help a variety of users in identifying and understanding the ecology of the most common natural wetland types found in Oklahoma. It is the authors' intention that this book provides natural resource professionals, educators and private landowners with a guide that can be used to evaluate changes in similar wetland types, measured against a common standard.

This guide is not intended for use as a wetland delineation manual nor is it a substitute for wetland determinations performed by the U.S. Army Corps of Engineers, U.S. Environmental Protection Agency or USDA Natural Resources Conservation Service.

The term "wetland" is an umbrella term, and includes marshes, swamps, bogs, playas and other areas that are wet enough to support hydrophytic vegetation. Wetlands represent a transitional zone between upland and deep water ecosystems, supporting rich biodiversity and providing unique habitat to many plants and animals (e.g., Odland, 1997; Barry et al., 1996; Bawa and Seidler, 1998). Therefore, wetlands are one of the most important ecological features on the landscape, providing benefits to humans and nature alike (e.g., Wakeley and Roberts, 1996; Killgore and Baker, 1996; Reedy et al., 1996). Wetlands often contain features common to upland and deep water ecosystems, and as a result may be difficult to recognize by the untrained eye.

Wetlands exist in nearly every climatic zone and on every continent, except Antarctica (Mitsch and Gosselink, 1993). Estimates suggest that more than half of the wetlands nationwide have been lost since the mid-1800s, leaving approximately six percent of the Earth covered by wetlands today (Mitsch and Gosselink, 1993). In 1988 the U.S. Department of Interior determined that 87 percent of wetland conversion was due to agriculture, eight percent to urban development and another five percent for various reasons (Steiner et al., 1994). However, the U.S. Department of Agriculture (USDA) has attempted to reverse this trend. The USDA Natural Resources Conservation Service's (NRCS) Wetlands Reserve Program (WRP) restored 915,000 acres of wetlands nationwide between October 1996 and July 2000 (NRCS, 2001).

There are a wide variety of wetland types found across the state of Oklahoma. The climate tends to get warmer and wetter as one moves across the state from northwest to southeast. As a result, the predominant wetland type changes from playas in the panhandle to riparian areas and depressions throughout the prairies to the bald cypress swamps of McCurtain County in the extreme south-eastern corner of the state. In Oklahoma, as in many areas of the country,

wetlands have been drained because of the perception that these lands offered no value. As a result, approximately 67 percent (1.9 million acres) of wetlands were removed from the landscape over the past 200 years (Mitsch and Gosselink, 1993). Both on nationwide basis and in Oklahoma, bottomland hardwood forests (BLH) have been especially hard hit. Estimated decreases in forested wetlands in LeFlore and McCurtain Counties suggest that approximately 84 percent of BLH have been destroyed since 1960 (Brabander et al., 1985).

The Oklahoma Conservation Commission has a variety of ongoing wetland projects to meet the goals and objectives of Oklahoma's Comprehensive Wetlands Conservation Plan, as do other agencies in the state wetland responsibilities or interests. Many of these projects receive funding through the Wetlands Program of the Environmental Protection Agency, Region 6. The ultimate goal of each of the Conservation Commission's projects is to "conserve, protect and restore the quantity and biological diversity of all wetlands in the state" (Oklahoma Conservation Commission, 1996) through education, demonstration and restoration.

Definition of Wetlands

There are many definitions of the term "wetlands" used in the United States, but most are fundamentally alike and generally address three elements — hydrology, hydrophytic vegetation, and hydric soils. This manual follows the definition of wetlands used by the U.S. Environmental Protection Agency and the U.S. Army Corps of Engineers. This definition describes wetlands as:

"Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar activities." (33 CFR 328.3, {b})

The hydrology of a land area is a function of the frequency, duration and volume of saturation by water.

The United States Department of Agriculture's Natural Resources Conservation Service (formerly the Soil Conservation Service) defines hydric soil as:

"A soil that is saturated, flooded or ponded long enough during growing season to develop anaerobic conditions that favor the growth and regeneration of hydrophytic vegetation." (USDA Soil Conservation Service, 1985, as amended by the National Technical Committee for Hydric Soils in 1986.)

Hydrophytic vegetation is defined in the Corps of Engineers' *Wetlands Delineation Manual* as:

"The sum total of macrophytic plant life that occur in areas where the frequency and duration of inundation or soil saturation produces permanently or periodically saturated soils of sufficient duration to exert a controlling influence on the plant species present."

"A hydrophyte is any macrophyte that grows in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content."

To paraphrase, hydrophytic plants are those that grow and thrive in water or in soil that is wet or saturated to the point that it is at least periodically deficient in oxygen.

Functions and Values of Wetlands

Historically, wetlands were considered to be areas that should be drained for farming, residential, or industrial development. Wetlands were not considered valuable resources and their complex ecological and hydrological functions were, for the most part, unrecognized.

Only recently have wetlands been recognized as valuable natural resources that can provide important benefits to the public and the environment. The functions wetlands provide of direct benefit to humans and nature and the value of those functions will, of course, vary according to the type of wetland system and the season of the year. Wetland functions and values include the following:

Water Quality Improvement: Wetlands have been referred to as the "kidneys of the landscape" because they often act as natural filters by decreasing contaminant concentrations in the water column (e.g., White and Burken, 1998; Nairn and Mercer, 2001). Contaminants are removed by a variety of processes, including physical settling resulting from long retention times with low-velocity flows, uptake by hydrophytic vegetation, microbial action and reactions with the atmosphere (e.g., Buchberger and Shaw, 1995; Tanner, 1996). In fact, wetlands are commonly constructed explicitly for treatment purposes. For example, wetlands have been constructed in Oklahoma to treat acidic mine drainages by using bacterial processes to retain metals and increase buffering capacity. After treatment, the water was clean and supported a healthy ecosystem (Nairn et al., 2000).

Flood Protection and Erosion Control: Wetlands can also function like a "sponge", absorbing and retaining relatively large volumes of water, and then releasing it slowly over several weeks or months. By providing temporary storage of storm or snowmelt water, wetlands can decrease peak flows in receiving waters and lower

the energy in streams, resulting in reduced flooding and minimized damage downstream (Kleiss, 1996). In doing so, wetlands help protect adjacent and downstream property and reduce damage to roads, bridges and crops. In riparian areas, trees and other hydrophytic vegetation help slow the speed of flood waters and can absorb and dissipate the force of wave action, reducing erosion along streambanks and shorelines (Kumar et al., 1996).

Groundwater Recharge and Discharge: Although not all wetlands recharge groundwater, some wetlands serve as a source in replenishing groundwater supplies, and vice versa (Gerla, 1999; Mitsch and Gosselink, 1993). For example, approximately 31 percent of water supplied to a constructed wetland in the Florida Everglades recharged the groundwater beneath it (Choi and Harvey, 2000). Water that would otherwise end up in downstream rivers and lakes or evaporate into the atmosphere can percolate through the soil into aquifers. This is called infiltration. Infiltration rates are dependent on the condition of the soil beneath the wetland, the physical characteristics controlling pore space in the soil and the frictional resistance of the soil (Pierce, 1992). Wetlands that intercept an aquifer may serve as a site where groundwater is discharged to the surface. Because water tables can fluctuate with seasonal variations, some wetlands may recharge groundwater during dry periods and receive groundwater during wetter months (Hunt et al., 1999).

Biological Habitat: Wetlands provide habitat for organisms ranging in size from large to microscopic, and contribute to the biological diversity and stability of the landscape as a whole (King and Brazner, 1999; Jurgensen et al., 1997). For example, migrating birds use wetlands as feeding, rearing and stopover sites (e.g., Naugle et al., 2000), while various invertebrates (e.g., Nordstrom and Ryan, 1996), amphibians (e.g., Lehtinen et al., 1999) and fishes (e.g., Faunce and Paperno, 1999) commonly utilize wetlands during all or part of their life cycle. The habitat needs of many wildlife species are found in wetlands, including shallow water for breeding and rearing of young and dense vegetation stands which provide food and shelter.

Education, Recreation, and Aesthetic Values: Wetlands may serve as living, outdoor laboratories where unique plant and animal species can be observed. The principals of ecological systems such as energy flow, recycling, and carrying capacity can be studied first hand. Wetlands are often aesthetically pleasing, capable of evoking in humans a sense of wonder, and stirring an appreciation of nature as one witnesses a flock of ducks taking flight from a playa, a heron stalking its prey in an oxbow lake, or hears the sounds emanating from a swamp on a summer night. Wetlands provide endless opportunities for popular recreational activities such as hiking, canoeing, boating, fishing, hunting, photography, bird watching and swimming.

Economic Values: The economic value of wetlands is substantial. A plethora of natural products of use to humans are to be found in various wetlands. Those with direct economic benefits include timber, fish and shellfish, wildlife, blueberries, cranberries and wild rice. In fact, nearly all commercially harvested fish and shellfish and most recreational fish depend on wetlands for food and habitat during some part of their life cycle (Feierabend and Zelanzy, 1987). While the benefits of wetlands from fisheries and waterfowl are substantial, they pale in comparison to the economic benefits from wetland ecosystem functions such as groundwater recharge, flood control and protection, water quality improvement and erosion control (Costanza et al., 1997).

Organizational Structure of This Guide

This guide is intended to represent Oklahoma's rich diversity of wetland types. The individual reference sites are organized into chapters by those types including riparian corridor wetlands, swamps, oxbow lakes, closed depressions, playa lakes, and forested wetlands. The fringe wetlands that occur along ponds and reservoirs are not included in this guide because they are not considered naturally occurring and are not common to any specific geographic region.

The **location** of each of the selected reference sites is provided at the beginning of the site description chapter. Location is given by latitude and longitude as well as by the legal description. Since over 90 percent of Oklahoma land is privately owned, many of these reference sites are located on private property and permission must be secured from the landowner in order to gain access. That notation, where applicable, is included in the location description paragraph. Other sites are on some type of public land, including federally-, state- or municipally-maintained property.

The narrative provides a **general description** of the geomorphology, or land shape and characteristics. Each reference wetland is also described using indicators based on the jurisdictional wetland definition, i.e., **vegetative community, hydrology** (water sources, frequency and duration) and **soil description**. Photographs of **soil profiles** and important **hydrologic indicators** found both in and on the soil accompany those descriptive paragraphs, as well as a photograph of the stable vegetative community at the beginning of each site description chapter.

Each reference wetland has **classifications** for soil type and wetland type. This section is intended primarily for natural resource professionals who might be called upon to perform wetland delineations, evaluations or inventory. The wetland type classification is from the United States Fish and Wildlife Service *National Wetlands Inventory*, developed by Cowardin et al. (1979), and represents the type of classification one would expect to find in that wetlands inventory.

The soil classification was determined by the USDA-NRCS classification taken from *Soil Taxonomy, Agricultural Handbook 436*, United States Department of Agriculture, Second Edition (1999). An explanation, in lay person's language, of the terminology used in these classifications is not possible within the scope of this publication. Instead, the interested lay person is referred to consult those two resources directly.

Landform descriptions are given using both the Ecoregion and Major Land Resource Area organizational systems. A Major Land Resource Areas (MLRA) is a unit characterized by similar patterns of soil, climate, water resources, land use, geology, elevation and topography. The MLRA classification system is predominantly utilized by the USDA Natural Resources Conservation Service and soil scientists. The Ecoregion approach is a similar regional characterization system based on natural communities, geology and land use, as mapped by J.M. Omernik (1987), and is used primarily by water resource professionals. More detailed descriptions of Ecoregions and MLRAs are to be found in the appendix.

A brief statement is made about **water quality** typically found in the type of site represented, followed by a description of common **landuse**.

Finally, **wetland dependent wildlife communities** common to the ecoregion of each site are listed. Many of the amphibians found in the wetlands described in the text can be found sporadically throughout the wetlands of Oklahoma. At times these amphibians can be found in extremely high densities, typically during the late winter though early spring. However, some species are fall breeders and will congregate during those months before the extreme winter conditions set in. Many species are omitted from the text due to their infrequency in those habitats and the secretive nature of their behavior, making them difficult specimens to find. Assumptions are made about the quality of the habitat. For example, many additional amphibian species may be found if carnivorous fish species are not living in those same waters. Only the most common species found or easily observed, whether through calls or visual observations, are mentioned. Literature relating to the more infrequently found species and their habitats can be found in *A Field Guide to Amphibians of Oklahoma*, published by the Oklahoma Department of Wildlife Conservation.

A partial glossary of terms used in this guide is included at the end of this book along with a list of references for further reading. Tables of common and Latin names for animals and plants — fauna and flora — are included as well.

Wetland Types

Riparian Corridors (Zones) are on low, frequently-inundated flood plains. Riparian corridors are found in the central and western parts of Oklahoma. As they are

frequently flooded, they have saturated soils associated with high water tables. Vegetation is typically composed of rushes and sedges with an overstory of willow, cottonwood, and tamarisk.

Swamps, Bogs, and Marshes are on low, frequently-inundated flood plains, most commonly in the southeastern part of the state. Soils are saturated and surface water stands far into the growing season. The understory vegetation is typically rushes and sedges with an overstory of bald cypress, overcup oak, and willow oak.

Oxbow Lakes are old river and stream channels that have been cut off from the main channel. These oxbows have shallow to deep water that is typically devoid of woody vegetation. Green ash and willow line the banks of these areas, and submergent and floating leaf aquatic plants are found in the water. Unlike closed depressions, these areas are seldom dry.

Closed Depressions are found throughout the state where soil deposited by wind or water has blocked drainage patterns. They often have high water tables and seasonally pond water for long durations, but may not hold water in dry years. The depressions are usually vegetated with cattails, smartweeds, and barnyard grass, with an overstory of willow and buttonbush.

Playa Lakes are found only on the high plains of the Oklahoma Panhandle. These are depressional areas that have no outlets and seasonally pond water for long durations during years with high rainfall. These areas are commonly vegetated with woollyleaf bursage and smart weed.

Forested Wetlands are found on frequently-inundated flood plains in the eastern third of the state. They have soils saturated by high water tables that remain at or near the surface for long periods. Vegetation is typically rushes and sedges with an overstory of pin oak, Shumard oak, bur oak and green ash.

Oklahoma's Comprehensive Wetlands Conservation Plan

Oklahoma's Comprehensive Wetlands Conservation Plan offers an overview of Oklahoma's wetlands and their future conservation. It provides the state with a focused strategy for identifying, understanding, managing, and enjoying one of Oklahoma's most versatile natural resources. The plan identifies issues that are unresolved and the limitations on wetland data and science.

The need for a state wetlands strategy is indicated by an awareness that responsibility for wetland conservation and management in Oklahoma are shared among local, state, tribal and federal agencies, as well as private entities such as

conservation organizations, corporations, landowners and other interest groups. No agency or group has been given either the exclusive mandate or resources to adequately protect wetlands. Wetlands conservation and management may be accomplished only through the continued, cooperative efforts of these groups and individuals. The plan emphasizes that through discussion, information exchange, cooperation and sharing of resources, a coordinated approach to wetland management can be accomplished. The plan recognizes that without willing cooperation from private landowners there is little hope of long-term success for wetland protection. The plan promotes a voluntary approach to wetland management that uses education, technical assistance and incentives to bring the private sector into wetland management as a willing partner.

"The goal of the state of Oklahoma is to conserve, enhance and restore the quantity and biological diversity of all wetlands in the state."

Wetland Type:

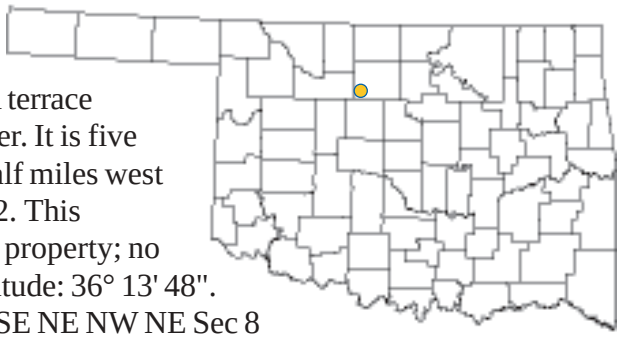
Closed Depression

Closed Depressions **are found throughout the state where soil deposited by wind or water has blocked drainage, or where wind has removed soil forming a depression. They often have high water tables and seasonally pond water for long durations, but may not have standing water in dry years. Closed depressions are usually vegetated with cattails, smartweeds and barnyard grass, with an overstory of willow and buttonbush.**

Ames Closed Depression

Closed Depression Site

Garfield County



Location. The Ames Closed Depression is found on an ancient, wind-reworked alluvial terrace deposited by the Cimarron River. It is five miles south and two and one-half miles west of Drummond on Highway 132. This reference location is on private property; no access without permission. Latitude: 36° 13' 48". Longitude: 98° 04' 24". Legal: SE NE NW NE Sec 8 T20N R8W.

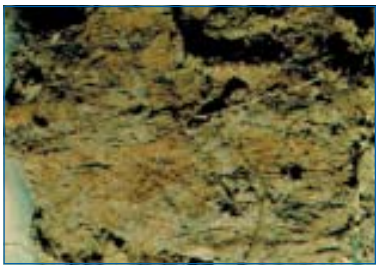
General Description. This reference site represents wetlands typically found in depressional areas within hummocky sandy terraces on major rivers throughout northwestern parts of Oklahoma. These depressions are formed when windblown sediments block the outlets of drainage ways or wind has created blowouts in sandy materials. These wetlands are typically round to oval in shape and range from 0.1 acre to 100 acres in size. These wetlands are cyclical in nature. During wetter cycles they maintain almost permanent water and dry up completely during drought cycles. They are hydrologically influenced by the adjacent surrounding uplands and shallow groundwater that percolates rapidly

through the sandy soils and is perched on the clayey materials at the base of the depressions. These wetlands are often farmed and are an important source of water for livestock and wildlife.

Vegetative Community. These wetlands are associated with seasonal surface and subsurface water, resulting in a mixture of rushes, sedges, shrubby, woody vegetation and annuals that become established as water evaporates along the shoreline zone. Typically vegetation is dominated by a herbaceous layer that consists of sedges, cattail, smartweed, water primrose and bulrush. Cocklebur, curly dock and sumpweed become established as water evaporates and mud flats are exposed. Inland salt grass and alkali sacaton are perennial grasses that become established where groundwater has higher salinity.

Hydrology. This wetland type is influenced by seasonal accumulation of surface water from rainfall and by groundwater perched on clayey subsoil strata and moving laterally through the area. Groundwater tables range from above the surface to 2 feet below the surface. These wetlands typically dry up during late summer months and are recharged in late fall through early spring.

Hydrologic Indicators. Primary hydrologic indicators are a depleted or gleyed matrix and redox concentrations in the form of soft masses in the upper subsoil. This wetland type commonly has a dark surface layer that is high in organic matter and contains few to common redox concentrations. Many of these wetlands have developed under recent changes in hydrologic conditions and may not exhibit any redoximorphic characteristics. This is particularly common to wetlands that develop in soils with red parent materials. Secondary indicators are the presence of thin layer of muck (0.5 to 2 inches) and partially decomposed roots of plants in the upper 20 inches of the soil profile.



Soil Description. The Carwile soil series is the hydric soil on this reference wetland. Carwile soils are formed in depressional areas where wind blown sandy material is deposited over clayey soil materials on the highest terrace levels of large river systems in the northwestern part of the state. These soils typically have dark brown loam or fine sandy loam surface layers over gray clay subsoils. The depositional materials that form this soil are generally red sediments from Pleistocene age materials.

Soil Profile

A1: 0 to 10 inches, very dark grayish brown (10YR 3/2) loam; moderately fine granular structure; common (5%) yellowish red (5YR 4/6) redox concentrations in the form of soft masses; many very fine and fine roots.

B1t: 10 to 18 inches, grayish brown (10YR 5/2) clay; moderately fine blocky structure; many (35%) yellowish red (5YR 5/6) redox concentrations in the form of soft masses and many (20%) gray (10YR 5/1) redox depletions; extremely hard, very firm; many fine and medium roots.

B2t: 18 to 20 inches, light yellowish brown (10YR 6/4) sandy clay loam; moderate medium blocky structure; many (30%) yellowish red (5YR 5/6) redox concentrations in the form of soft masses and many (40%) gray (10YR 6/1) redox depletions; coarse roots.

Classifications

Cowardin: PEM1C, PEM1A. **Soil:** Fine, mixed, superactive, thermic. Typic Argiaquoll.

Landform **Ecoregion:** Central Great Plains (27). **MLRA:** Central Rolling Red Prairies (80A).

Water Quality. These wetlands contain water in sufficient quantity for domestic uses, but their shallow depth and runoff from adjacent croplands generally make their water quality unreliable for uses other than for livestock.

Landuse. Because these wetlands typically go dry during some part of the year, most areas have been farmed or retired to improved pasture. When these wetlands are cropped they are typically used for winter wheat production. Many areas have been planted to improved Bermuda grass pasture. In some areas these are the only sources of livestock water available and provide seasonal water usage.

Wetland Dependent Wildlife Species

Mammals: Cave myotis, western pipistrel, eastern pipistrel, big brown bat, red bat, evening bat, raccoon, swamp rabbit, beaver, muskrat.

Birds: Eared grebe, horned grebe, pied-billed grebe, American white pelican, double-crested cormorant, great blue heron, American bittern, green heron, great egret, least bittern, little blue heron, snowy egret, yellow-crowned night heron, black-crowned night heron, white-faced ibis, green-winged teal, American wigeon, northern shoveler, ruddy duck, cinnamon teal, pintail, blue-winged teal, white-fronted goose, gadwall, red-winged blackbird, snow goose, Canada goose, wood duck, mallard, ring-necked duck, lesser scaup, hooded merganser, redhead, canvasback, common goldeneye, bufflehead, common merganser, osprey, bald eagle, marsh hawk/northern harrier, rough-legged hawk, king rail, common gallinule (moorhen), sandhill crane, whooping crane, black-bellied plover, American avocet, solitary sandpiper, lesser yellowlegs, greater yellowlegs, willet, whimbrel, long-billed curlew, Hudsonian godwit, Franklin's gull, black tern, great horned owl, barred owl, short-eared owl, belted kingfisher, red-bellied woodpecker, white-eyed vireo, Bell's vireo, tree swallow, veery.

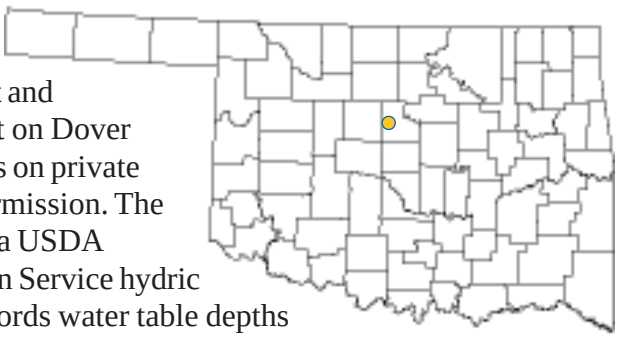
Reptiles: Common snapping turtle, yellow mud turtle, Missouri River cooter, red-eared turtle, midland smooth softshell turtle, spiny softshell turtle, five-lined skink, rough green snake,

blotched water snake, diamondback water snake, western hogsnake, eastern hognose snake, great plains rat snake, speckled kingsnake, Graham's crayfish snake, brown snake, western ribbon snake, western plains garter snake, common garter snake, copperhead, western cottonmouth, western pygmy rattlesnake, timber rattlesnake.
Amphibians: Smallmouth salamander, bullfrog, Woodhouse's toad, Cope's gray treefrog, gray treefrog, Blanchard's cricket frog, western chorus frog, plains leopard frog.
Fish: Mosquitofish, golden shiner, red shiner, yellow bullhead and black bullhead catfish, channel catfish, smallmouth buffalo, common carp and longnose gar, spotted gar, largemouth bass, green sunfish, orange-spotted sunfish, warmouth, black crappie, white crappie, blue gill, redear sunfish.

Cimarron Terrace

Closed Depression Cyclical Wetland Site

Logan County



Location. This reference wetland is found on a sandy alluvial terrace three miles west and one-half mile north of Crescent on Dover Road. This reference location is on private property; no access without permission. The reference site is the location of a USDA Natural Resources Conservation Service hydric soil monitoring station that records water table depths and redox potential over time. Latitude: 35° 57' 57". Longitude: 97° 39' 32". Legal: NW SE SE NE Sec. 7 T17N 4W.

General Description. This site represents wetlands typically found on depressional areas within hummocky sandy terraces on major rivers throughout the central parts of Oklahoma. These depressions are formed when windblown sediments block the outlets of drainage ways or wind has blown out depressions in sandy materials. These wetlands are typically round to a long, narrow oval in shape, ranging from 0.1 acre to 200 acres in size and are cyclical in nature. During wetter cycles they maintain almost permanent water and dry up completely during drought cycles. These wetlands are often farmed and are an

important source of livestock and wildlife water.

Vegetative Community. These wetlands are associated with seasonal surface and subsurface water. Vegetation is a mixture of rushes, sedges and shrubby, woody plants and annuals that become established as the water evaporates in the shoreline zone. Typically, vegetation consists of an overstory of black willow and cottonwood with a shrubby layer of buttonbush. The herbaceous layer consists of sedges, rushes, cattail, bulrush, smartweed, cockle burr, water primrose, curly dock, sumpweed, mud plantain, water hyssop and broadleaf duck potatoes.

Hydrology. This wetland type is influenced by seasonal accumulation of surface water from rainfall and from groundwater that is perched on clayey subsoil strata and moves laterally throughout the area. Groundwater tables range from above the surface to 4.0 feet below the surface. They are hydrologically influenced by surface runoff from the adjacent surrounding uplands and shallow groundwater that percolates rapidly through the sandy soils. These wetlands typically dry up during the later summer months and are recharged in the late fall through early spring.

Hydrologic Indicators. Primary hydrologic indicators are many redox depletions with many redox concentrations in the form of iron stains and coatings on sand grains. This wetland type commonly has a darkened surface layer and contains common to many redox concentrations and depletions within the surface layer. Many of these wetlands have developed under recent changes in hydrologic conditions and may not exhibit any redoximorphic characteristics. This is particularly common to wetlands that develop in soils with red Pleistocene age parent materials. Secondary indicators are the presence of oxidized rhizospheres and partially decomposed roots of plants that give a characteristic charcoal appearance in the upper 20 inches of the soil profile.

Soil Description. The Bocox soil series is the hydric soil on this reference wetland. Bocox soils are formed where wind blown sandy material is deposited in depressional areas blocking drainage outlets. Subsurface water perches on more clayey layers and surface infiltration is slowed. These soils typically have a brown loamy fine sand surface layer and brownish yellow to reddish yellow subsurface and subsoil layers. The depositional materials that form this soil are generally red sediments from Pleistocene age materials.

Soil Profile

A1: 0 to 12 inches: brown (10YR 5/3) loamy fine sand; weak, very fine granular structure; many (20%) strong brown (7.5YR 5/6) redox concentrations in the form of iron stains and coatings, many (40%) grayish brown (10YR 5/2) redox depletions; few very fine and fine roots; slightly hard, very friable; clear wavy boundary.
E: 12 to 20 inches; brownish yellow (10YR 6/6) loamy fine sand; single grain structure; common (10%) strong brown redox concentrations in the form of iron stains and coatings; slightly hard, loose; few fine and medium roots.

Classifications

Cowardin: PEM1C, PEM1A. **Soil:** Loamy, mixed, thermic, aquic. Arenic Hapludalf.

Landform. Ecoregion: Central Great Plains (27). **MLRA:** Central Rolling Red Prairies (80A).

Water Quality. These wetlands contain water in sufficient quantities for domestic uses, but their shallow depth and runoff from adjacent croplands generally make their water quality undependable for domestic uses other than livestock water.

Landuse. This wetland type is typically used for crop production, pasture, rangeland, and livestock water. Because these wetlands typically go dry during some part of the year, most areas have been farmed or planted to improved pasture, often in Bermuda grass. When these wetlands are cropped they are typically used for winter wheat production. Some areas are the only source of livestock water available and provide seasonal usage.

Wetland Dependent Wildlife Species

Mammals: Cave myotis, western pipistrel, eastern pipistrel, big brown bat, red bat, evening bat, raccoon, swamp rabbit, beaver, muskrat.
Birds: Eared grebe, horned grebe, pied-billed grebe, American white pelican, double-crested cormorant, great blue heron, American bittern, green heron, great egret, least bittern, little blue heron, snowy egret, yellow-crowned night heron, black-crowned night heron, white-faced ibis, green-winged teal, American wigeon, northern shoveler, ruddy duck, cinnamon teal, pintail, blue-winged teal, white-fronted goose, gadwall, red-winged blackbird, snow goose, Canada goose, wood duck, mallard, ring-necked duck, lesser scaup, hooded merganser, redhead, canvasback, common goldeneye, bufflehead, common merganser, osprey, bald eagle, marsh hawk/northern harrier, rough-legged hawk, king rail, common gallinule (moorhen), sandhill crane, whooping crane, black-bellied plover, American avocet, solitary sandpiper, lesser yellowlegs, greater yellowlegs, willet, whimbrel, long-billed curlew, Hudsonian godwit, Franklin's gull, black tern, great horned owl, barred owl, short-eared owl, belted kingfisher, red-bellied woodpecker, white-eyed vireo, Bell's vireo, tree swallow, veery.
Reptiles: Common snapping turtle, yellow mud turtle, Missouri River cooter, red-eared turtle, midland smooth softshell turtle, spiny softshell turtle, five-lined skink, rough green snake, blotched water snake, diamondback water snake, western hogsnake, eastern hognose snake, great plains rat snake, speckled kingsnake, Graham's crayfish snake, brown snake, western

ribbon snake, western plains garter snake, common garter snake, copperhead, western cottonmouth, western pygmy rattlesnake, timber rattlesnake.
Amphibians: Bullfrog, Cope's gray treefrog, gray treefrog, Blanchard's cricket frog, plains leopard frog.
Fish: Mosquitofish, largemouth bass, green sunfish, orange-spotted sunfish, warmouth, black crappie, white crappie, blue gill, redear sunfish, golden shiner, fathead minnow, bullhead minnow, red shiner, yellow bullhead and black bullhead catfish, longnose gar, spotted gar, smallmouth buffalo, common carp.

Wetland Type:

Forested Wetlands

Forested Wetlands **are found on frequently-inundated flood plains in the eastern third of the state. They have soils saturated by high water tables that remain at or near the surface for long periods. Vegetation is typically rushes, sedges, parsley leaf hawthorn, spicebush and giant cane with an overstory of oaks, hickory and green ash.**

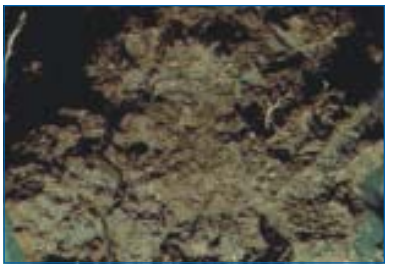
Big Lake
Forested Wetlands Site
Rogers County

Location. This reference wetland is a portion of the Verdigris River system. It is located one-half mile south of Verdigris in Rogers County. This reference location is on private property; no access without permission. Latitude: 36° 12' 47". Longitude: 95° 41' 25". Legal: SW SW NW SW Sec 14 T20N R15E.

General Description. This site represents wetlands that border rivers and streams throughout the northeastern part of Oklahoma. These wetlands typically are on the back side of broad stable flood plains. Sediment loading is limited to large flood events. This wetland land form is characterized by a series of oval to oblong depressional areas between slightly higher (less than 0.5 feet) ridges of less clayey materials. Surface water accumulation is from both out-of-bank flooding and runoff from adjacent uplands. Groundwater tables are near the surface during the winter and early spring.

Vegetative Community. Vegetation typically found on these sites is an overstory of black willow, pin oak, green ash, bitternut hickory and pecan, with an understory of sedges and broadleaf uniola. When disturbed, these areas convert to willow or cottonwood thickets with an understory of smartweed, sumpweed and cockleburs.

Hydrology. The water sources for these wetlands are groundwater tables and frequent floods of variable duration. High water marks and debris lines at a four to six foot height are common on trees near larger rivers. Tree trunks are buttressed and root systems are often fluted. Water tables range in depth from the surface to 1.5 feet below the surface, with the highest levels occurring during the winter and early spring. Subsurface water typically moves through the large cracks and structural components of the clay soils. These areas typically have surface layers of less clayey materials near channel banks that are slightly higher and more well drained. Water-stained leaves are found in the depressional areas that pond water the longest.



Hydrologic Indicators. Because these soils have abundant organic carbon and are dark colored, hydrologic indicators in the soil profile are difficult to observe. Primary hydrologic indicators are 5 to 20 percent redox concentrations (both iron and manganese) in the upper eight inches of the soil profile. The number of redox concentrations increase with depth, ranging from 10 to 30 percent in the 8- to 20-inch zone. Below 20 inches, these soils have a gleyed matrix. Depressional areas have water-stained leaves and the tree trunks are buttressed.

Soil Description. The Osage soils series is the principal hydric soil on this wetland type. Osage soils formed in clay sediments deposited on flood plains from out-of-bank flooding. The depositional materials that form this soil are brown sediments from shales of the Pennsylvanian geologic age. These soils typically form in back slough positions of the flood plains.

Soil Profile

A1: 0 to 9 inches, very dark gray (10YR 3/1) clay; strong fine blocky structure; few to common (5%) dark reddish brown (5YR 3/4) redox concentrations, many fine and medium roots matted at the surface.
B2: 7 to 20 inches, dark gray (10YR 4/1) clay; strong medium blocky structure; common (15%) strong brown (7.5YR5/6) redox concentrations on ped faces; few medium and course roots.

Classifications

Cowardin: PFO1A. **Soil:** Fine, smectic, thermic. Vertic Endoaquoll.

Landform. Ecoregion: Central Irregular Plains (40). **MLRA:** Cherokee Prairies (112).

Water Quality. Shallow groundwater tables do not produce enough water for domestic purposes.

Landuse. This wetland type is used for improved pasture, cropland, and nut production. Many areas are sufficiently drained so that limited row crop production can occur. When adequately drained these areas are considered prime farmland. Areas adjacent to these wetlands are commonly used for cropland, rangeland or improved pasture.

Wetland Dependent Wildlife Species

Mammals: cave myotis, western pipistrel, eastern pipistrel, big brown bat, red bat, evening bat, raccoon, swamp rabbit, beaver, muskrat.
Birds: eared grebe, horned grebe, pied-billed, grebe, American white pelican, double-crested cormorant, great blue heron, American bittern, green heron, great egret, least bittern, little blue heron, snowy egret, yellow-crowned night heron, black-crowned night heron, white-faced ibis, green-winged teal, American wigeon, northern shoveler, ruddy duck, cinnamon teal, pintail, blue-winged teal, white-fronted goose, gadwall, red-winged blackbird, snow goose, Canada goose, wood duck, mallard, ring-necked duck, lesser scaup, hooded merganser, redhead, canvasback, common, goldeneye, bufflehead, common merganser, osprey, bald eagle, marsh hawk/northern harrier, rough-legged hawk, king rail, common gallinule (moorhen), sandhill crane, whooping crane, black-bellied plover, American avocet, solitary sandpiper, lesser yellowlegs, greater yellowlegs, willet, whimbrel, long-billed curlew, Hudsonian godwit, Franklin's gull, black tern, great horned owl, barred owl, short-eared owl, belted kingfisher, red-bellied woodpecker, white-eyed vireo, Bell's vireo, tree swallow, veery.
Reptiles: common snapping turtle, yellow mud turtle, Missouri River cooter, red-eared turtle, midland smooth softshell turtle, spiny softshell turtle, five-lined skink, rough green snake, blotched water snake, diamondback water snake, western hogsnake, eastern hognose snake, great plains rat snake, speckled kingsnake, Graham's crayfish snake, brown snake, western ribbon snake, western plains garter snake, common garter snake, copperhead, western cottonmouth, western pygmy rattlesnake, timber rattlesnake.
Amphibians: Cope's gray treefrog, gray treefrog, Blanchard's cricket frog, plains leopard frog.
Fish: Mosquitofish, largemouth bass, green sunfish, orange-spotted sunfish, warmouth, black crappie, white crappie, blue gill, redear sunfish, blackstripe topminnow, red shiner, yellow bullhead and black bullhead, longnose gar, shortnose gar, spotted gar, bullhead catfish, channel catfish, common carp, smallmouth buffalo, longear sunfish, log perch, slough darter, golden shiner.

Grassy Slough Hill Side Seep
Forested Wetlands Site
McCurtain County

Location. This reference wetland is located one-half mile north and three-quarters of a mile west of Pollard in McCurtain County. This reference location is on private property; no access without permission. Latitude: 33° 48' 06". Longitude: 94° 44' 22". Legal: NE SW SW Sec 6 T9S R25E.

General Description. This site is representative of wetlands bordering small streams throughout the southeastern part of Oklahoma, typically on hill sides adjacent to narrow flood plains. This wetland is characterized by narrow bands of seeps and springs on the toe slopes of steep sandy uplands. Groundwater tables are at the surface during the late fall through early summer. These wetlands are very narrow, but may extend for long distances. Individual areas range from 1 acre to 10 acres in size.

Vegetative Community. Vegetation typically found on these sites is an overstory of willow oak, blue beech, American holly and Hercules club with an understory of several species of fern, jack in the pulpit and sphagnum moss.

Hydrology. The water source for these wetlands is a groundwater table that forms numerous seeps and springs. Tree trunks are buttressed and root systems are fluted. Water tables range in depth from the surface to 1 foot below, with the highest levels occurring during the fall through early summer. Subsurface water typically moves throughout the soils.

Hydrologic Indicators. Primary hydrologic indicators are partially decomposed organic layers up to 16 inches thick and a gleyed matrix. These soils stay so wet they develop few redox concentrations.

Soil Description. There are no recognized soils series for the soil on this wetland type. It is associated with the Iuka soils. These soils formed in loamy sediments deposited through the downward creep of soil materials from the upper slopes of sandy uplands.

Soil Profile

O: 0 to 3 inches, black (10YR 2/1); partially (30%) decomposed organic material; structureless.
A1: 3 to 6 inches, dark gray (10YR 4/1); fine sandy loam; weak, fine granular structure; few, fine (<2%) strong brown (7YR 4/6, 5/6) redox concentrations; weak, fine granular structure; many medium roots in surface matte.
E1: 6 to14 inches, gray (10YR6/1) loamy fine sand; structureless; few (1%) strong brown (7.5YR 5/6) redox concentrations on ped face; few medium course roots.
E2: 14 to 20 inches, light gray (10YR7/1) loamy fine sand; structureless; few strong brown (7.5YR 5/6) redox concentrations.

Classifications

Cowardin: PFO1A, PFO1C, PEM1A. **Soil:** Undetermined

Landform. **Ecoregion:** South Central Plains (35). **MLRA:** West Coastal Plains (133B).

Water Quality. Shallow groundwater tables produce enough water for domestic purposes, but the dependability and quality of water are insufficient for human consumption.

Landuse. This wetland type is often used for woodland or livestock production. Areas are sometimes drained by channelization and pasture grasses established. Areas adjacent to these wetlands are commonly used for improved pasture, cropland or woodland.

Wetland Dependent Wildlife Species

Mammals: Eastern pipistrel, red bat, evening bat, raccoon, swamp rabbit, beaver, muskrat.
Birds: Anhinga, great blue heron, green heron, great egret, little blue heron, snowy egret, yellow-crowned night heron, black-crowned night heron, white ibis, wood stork, red-winged blackbird, king rail, sora, purple gallinule, common gallinule (moorhen), great horned owl, barred owl, belted kingfisher, fish crow, wood duck.
Reptiles: Common snapping turtle, common musk turtle, Mississippi mud turtle, Missouri River cooter, red-eared turtle, midland smooth softshell turtle, spiny softshell turtle, five-lined skink, broadhead skink, rough green snake, yellowbelly water snake, midland water snake, diamondback water snake, broadbanded water snake, eastern hognose snake, great plains rat snake, speckled kingsnake, Graham's crayfish snake, brown snake, western ribbon snake, common garter snake, copperhead, western cottonmouth, western pygmy rattlesnake, timber rattlesnake.
Amphibians: Central newt, marbled salamander, spotted salamander, smallmouth salamander, western slimy salamander, many-ribbed salamander, four-toed salamander, slimy salamander, dwarf American toad, Woodhouse's toad, Cope's gray treefrog, gray treefrog, Blanchard's cricket frog, western chorus frog, bronze frog, green frog, southern leopard frog, complex, green treefrog, bird-voiced treefrog.
Fish: Various catfish, mosquitofish, largemouth bass, green sunfish, orange-spotted sunfish, warmouth, black crappie, white crappie, blue gill, redear sunfish, blackstripe top minnow, bluehead shiner, ribbon shiner, taillight shiner, iron color shiner, spotted bass, grass pickerel.

Little River National Wildlife Refuge

Forested Wetlands Site

McCurtain County

Location. This reference wetland is a portion of the Little River stream system. It is located five miles south and one mile east of Broken Bow in McCurtain County. This reference location is on the Little River National Wildlife Refuge. Latitude: 33° 57' 05". Longitude: 94° 43' 03". Legal: Sec 8 T7S R25E.

General Description. This wetland type borders rivers and streams throughout the southeastern part of Oklahoma. These wetlands typically are on broad, stable flood plains and low terraces. Sediment loading is limited to large flood events. This wetland landform is characterized by depressional areas between slightly higher (less than 0.5 feet) mounds of less clayey materials. Surface water accumulation is from both out-of-bank flooding and runoff from adjacent uplands. Groundwater tables are at the surface during the winter and early spring.

Vegetative Community. Vegetation typically found on these sites is an overstory of overcup oak, Nuttall oak, water oak, willow oak and water hickory with an understory of sedges and rushes.

Hydrology. The sources of water for these wetlands are frequent floods of short to long duration and groundwater. High water marks and debris lines are common on trees near larger rivers. Tree trunks are buttressed and root systems are fluted. Water tables range in depth from above the surface to 1 foot below the surface, with the highest levels occurring during the winter through early summer. Subsurface water typically moves throughout. These wetlands often have areas with surface layers of less clayey materials that are slightly higher and more well drained. Water-stained leaves are found in the depressional areas that pond water the longest. Wind thrown trees are commonly observed in these wetland areas.

Hydrologic Indicators. Primary hydrologic indicators are 25 to 60 percent redox concentration (both iron and manganese) in the upper 15 inches of the soil profile. The manganese usually occurs as large segregations rather than in concretion form. There are common 5 to 20 percent redox depletions within 15 inches of the surface. Secondary indicators are the presence of oxidized rhizospheres and water stained leaves. Redox depletions usually increase with depth ranging up to 60 percent in the 15 to 20 inch layer.

Soil Description. The Guyton soils series is the principal hydric soil on this wetland type. Guyton soils formed in loamy and clayey sediments deposited on flood plains from out-of-bank flooding. The depositional materials that form this soil are sediments of Cretaceous geologic age. These soils developed under closed canopy overstory of bottomland hardwoods.

Soil Profile

O: 0 to 1 inches, dark brown (7.5YR 3/2) silt loam with 60 percent partially (30 percent) decomposed organic matter.
A1: 1 to 5 inches, brown (7.5YR 5/4) silt loam; weak fine granular structure; many (40%) reddish yellow (7.5YR 6/6) and reddish brown (5YR 4/4) redox concentrations and common light gray (7.5YR 6/1) redox depletions; many fine and medium roots.
B1: 5 to 15 inches, reddish brown (5YR 4/4), reddish yellow (7.5YR 6/6) and light gray (7.5YR 6/1) silty clay loam; weak fine granular structure; common to many (15%) manganese concentrations on ped faces; common medium and coarse roots.
B2: 15 to 20 inches, reddish brown (5YR 4/4) silty clay loam;

massive, structureless; few to common (10%) yellowish red (5YR5/6) redox concentrations on ped faces; many partially-decomposed roots below 16 inches having a characteristic charcoal appearance.

Classifications

Cowardin: PFO1A, PFO1C. **Soil:** Fine-silty, siliceous, active, thermic. Typic Glossaqualf.

Landform. **Ecoregion:** Central Oklahoma/Texas Plains (29). **MLRA:** Western Coastal Plains (133B).

Water Quality. Shallow groundwater tables produce enough water for domestic purposes, but the dependability and quality of water are insufficient for human consumption.

Landuse. This wetland type is frequently used for timber production. Areas are sometimes drained by channelization and pasture grasses established. Some areas are sufficiently drained so that limited crop production can occur. Areas adjacent to these wetlands are commonly used for improved pasture or forestland.

Wetland Dependent Wildlife Species

Mammals: Eastern pipistrel, red bat, evening bat, raccoon, swamp rabbit, beaver, muskrat.
Birds: Anhinga, great blue heron, green heron, great egret, little blue heron, snowy egret, yellow-crowned night heron, black-crowned night heron, white ibis, wood stork, red-winged blackbird, king rail, sora, purple gallinule, common gallinule (moorhen), great horned owl, barred owl, belted kingfisher, fish crow, wood duck, mallard.
Reptiles: Common snapping turtle, common musk turtle, Mississippi mud turtle, Missouri River cooter, red-eared turtle, midland smooth softshell turtle, spiny softshell turtle, five-lined skink, broadhead skink, rough green snake, yellowbelly water snake, midland water snake, diamondback water snake, broadbanded water snake, eastern hognose snake, great plains rat snake, speckled kingsnake, Graham's crayfish snake, brown snake, western ribbon snake, common garter snake, copperhead, western cottonmouth, western pygmy rattlesnake, timber rattlesnake.
Amphibians: Central newt, Red River mudpuppy, marbled salamander, spotted salamander, smallmouth salamander, western slimy salamander, dwarf American toad, Woodhouse's toad, Cope's gray treefrog, gray treefrog, Blanchard's cricket frog, western chorus frog, bronze frog, green frog, southern leopard frog, green treefrog, four-toed salamander, many-ribbed salamander, bullfrog.
Fish: Mosquitofish, largemouth bass, green sunfish, orange-spotted sunfish, warmouth, black crappie, white crappie, blue gill, redear sunfish, blackstripe topminnow, bluehead shiner, ribbon shiner, taillight shiner, iron color shiner, yellow bullhead and black bullhead catfish, channel catfish, spotted bass, pygmy sunfish, cypress darter.

Red Slough WRP
Forested Wetlands Site
McCurtain County

Location. This reference wetland is a portion of the Pushmatena Creek stream system. It is located three and a half miles east of Harris in McCurtain County. This reference location is on private property. No access without permission. Latitude: 33° 44' 15". Longitude: 94° 40' 10'. Legal: SW, SE, SW, Sec 26 T9S R25E.

General Description. This reference site represents wetlands border rivers and streams throughout the southeastern part of Oklahoma. These wetlands typically are on depressional areas of broad stable flood plains. Sediment loading is limited to large flood events. This wetland land form is characterized by a series of depressional areas between slightly elevated (less than 0.5 feet) ridges of less clayey materials. Surface water accumulation is from both out-of-bank flooding and runoff from adjacent uplands. Groundwater tables are near the surface during winter and early spring.

Vegetative Community. Vegetation typically found on these sites is an overstory of water oak, willow oak, overcup oak, water hickory with an understory of sphagnum moss and dwarf palmetto.

Hydrology. The water sources for these wetlands are frequent floods of short to long duration and groundwater tables. Tree trunks are buttressed and root systems are fluted. Water tables range in depth from the surface to 1 foot below, with the highest levels occurring during winter and early spring. Subsurface water typically moves through the large cracks and structural components of the clay soils. These areas often have surface layers of less clayey materials near channel banks that are slightly higher and more well drained.

Hydrologic Indicators. Primary hydrologic indicators are 15 to 30 percent redox concentration (both iron and manganese) and 25 to 40 percent redox depletions in the upper 6 inches of the soil profile. The abundance of redox concentrations and depletions increase with depth, with redox depletions increasing up to 50 percent in the 6- to 20-inch zone.

Soil Description. The Tuscumbia soils series is the principal hydric soil on this wetland type. Tuscumbia soils formed in clayey sediments deposited on flood plains from out-of-bank flooding. The depositional materials that form this soil are brown sediments from the Pleistocene geologic age.

Soil Profile

A1: 0 to 6 inches, dark grayish brown (10YR 4/2) silty clay loam; strong, fine blocky structure; common (20 to 25%) reddish brown (5YR 4/3, 4/4) redox concentrations and light brownish gray (10YR 6/2) redox depletions; many fine and medium roots.
B: 6 to 20 inches, grayish brown (10YR 5/2) silty clay loam; moderately fine blocky structure; many (30 to 50%) reddish brown (5YR 4/4) redox concentrations and light brownish gray (10YR 6/2) redox depletions on ped faces; few medium to coarse roots.

Classifications

Cowardin: PFO1A, PFO1C, PEM1A. **Soil:** Fine, mixed, nonacid, thermic. Vertic Equiaquert.

Landform. Ecoregion: South Central Plains (35). **MLRA:** Western Coastal Plains (133B).

Water Quality. Shallow groundwater tables do not produce enough water for domestic purposes.

Landuse. This wetland type is often used for timber and many areas are sufficiently drained so that limited crop production can occur. Areas adjacent to these wetlands are commonly used for cropland or pasture.

Wetland Dependent Wildlife Species

Mammals: Eastern pipistrel, red bat, evening bat, raccoon, swamp rabbit, beaver, muskrat.
Birds: Anhinga, great blue heron, green heron, great egret, little blue heron, snowy egret, yellow-crowned night heron, black-crowned night heron, white ibis, wood stork, red-winged blackbird, king rail, sora, purple gallinule, common gallinule (moorhen), great horned owl, barred owl, belted kingfisher, fish crow, wood duck, mallard.
Reptiles: Common snapping turtle, common musk turtle, Mississippi mud turtle, Missouri River cooter, red-eared turtle, midland smooth softshell turtle, spiny softshell turtle, five-lined skink, broadhead skink, rough green snake, yellowbelly water snake, midland water snake, diamondback water snake, broadbanded water snake, eastern hognose snake, great plains rat snake, speckled kingsnake, Graham's crayfish snake, brown snake, western ribbon snake, common garter snake, copperhead, western cottonmouth, western pygmy rattlesnake, timber rattlesnake.
Amphibians: Central newt, Red River mudpuppy, marbled salamander, spotted salamander, smallmouth salamander, slimy salamander, dwarf American toad, Woodhouse's toad , Cope's gray treefrog, gray treefrog, Blanchard's cricket frog, western chorus frog, bronze frog, green frog, southern leopard frog, slimy salamander complex, green treefrog, bird-voiced treefrog, four-toed salamander, many ribbed salamander, bullfrog.
Fish: Mosquitofish, largemouth bass, green sunfish, orange-spotted sunfish, warmouth, black crappie, white crappie, blue gill, redear sunfish, blackstripe topminnow, yellow bullhead and black bullhead catfish, channel catfish, spotted bass, bluehead shiner, ribbon shiner, taillight shiner, iron color shiner, pygmy sunfish, pirate perch.

Wetland Type:

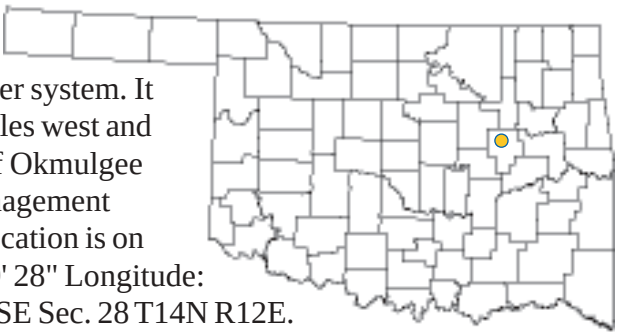
Oxbow Lake

Oxbow Lakes **are old river and stream channels that have been cut off from the main channel. The cutoff channels are most often on large bends, giving the wetland a characteristic oxbow or horseshoe shape. Most of the oxbow lakes in Oklahoma are less than seven feet in depth and, unlike closed depressions, are seldom dry. These wetlands remain stable until new floods force the river to move back to its original course, or cuts out the end that has blocked the drainage.**

Okmulgee Wildlife Management Area

Oxbow Site

Okmulgee County



Location. This reference wetland is on a portion of the Deep Fork of the Canadian River system. It is located three and one-half miles west and two and one-half miles north of Okmulgee on the Okmulgee Wildlife Management Area. This reference wetland location is on state property. Latitude: 35° 39' 28" Longitude: 96° 02' 19". Legal: SE SE NW SE Sec. 28 T14N R12E.

General Description. This site represents wetlands that occurs primarily on river systems like the Deep Fork River where floods have created new river channels, cutting off the original channel. The cut off channels are most often on bends, giving the wetland a characteristic oxbow or horseshoe shape. Most of the oxbows in the Deep Fork system are less than 3 feet in depth and are sometimes dry in late summer. These wetlands are generally stable, but sediment loading from large flood events may decrease their overall depth. The wetland ranges in size from 10 acres to over 100 acres.

Vegetative Community. These wetlands are most often associated with open water and most of the vegetation occurs along the shoreline zone. Typical vegetation consists of an overstory of green ash and black willow.

Hydrology. This wetland receives most of its water from surface runoff. The contributing drainage area has a low slope gradient, and runoff enters the system slowly. Ground water tables are influenced by the level of the river and groundwater moves through large pores that form the faces of the soil structural units.

Hydrologic Indicators. Primary hydrologic indicators are a gleyed matrix below 8 inches and many redox depletions and redox concentrations in the upper 8 inches of the soil profile. Some of these wetlands are recent in age and may not show any redoximorphic characteristics. This is most common to those wetlands that are recent in age or have developed in soils with red parent materials. Secondary indicators are the presence of thin layer of muck (1/2 to 2 inches) and partially decomposed roots of plants in the upper 10 inches of the soil profile.

Soil Description. The Ustibuck soil series is the principal hydric soil on this wetland type. Ustibuck soils are formed in clayey sediments that are deposited on low gradient backwater areas of flood plains on large stream systems. Because water stands nearly motionless for long periods, the clayey sediment has time to settle out in thick layers of clays with thinner strata of loamy and sandy materials. The depositional materials that form this soil are generally red sediments from Pleistocene age materials.

Soil Profile

A: 0 to 8 inches, reddish brown (5YR 3/4) clay; moderate very fine blocky structure; many fine and medium roots; many (40%) medium and coarse yellowish-red (5YR 5/6) redox concentrations and many (45%) coarse gray (5YR 6/1) redox depletions.
B: 8 to 20 inches, gray (5YR6/1) clay; moderate medium blocky structure; common coarse roots; common fine and coarse yellowish-red (5YR 5/8) redox concentrations on ped faces.

Classifications

Cowardin: PEM1C, PFO1C, PFO1A, PEM1A. **Soil:** Fine, smectic, thermic. Ustic Epiaquert.

Land Form **Ecoregion:** Central Oklahoma/Texas Plains (29). **MLRA:** Western Coastal Plains (118B).

Water Quality. These wetlands contain water in sufficient quantity for domestic uses, but their shallow depth and runoff from adjacent cropland generally make their water supply undependable for domestic uses.

Landuse. This wetland type is typically used for livestock water and recreation. The adjacent areas are typically used for woodland or when adequately drained are used for corn or soybean production, improved pasture or alfalfa hay.

Wetland Dependent Wildlife Species

Mammals: Eastern pipistrel, big brown bat, red bat, evening bat, raccoon, swamp rabbit, beaver, muskrat.

Birds: Eared grebe, horned grebe, pied-billed grebe, American white pelican, double-crested cormorant, great blue heron, American bittern, green heron, great egret, little blue heron, snowy egret, yellow-crowned night heron, black-crowned night heron, white-faced ibis, green-winged teal, American wigeon, northern shoveler, ruddy duck, cinnamon teal, pintail, blue-winged teal, white-fronted goose, gadwall, red-winged blackbird, snow goose, Canada goose, wood duck, mallard, ring-necked duck, lesser scaup, greater scaup, hooded merganser, redhead, canvasback, common goldeneye, bufflehead, common merganser, osprey, bald eagle, marsh hawk/northern harrier, red-shouldered hawk, rough-legged hawk, Virginia rail, king rail, sora, purple gallinule, common gallinule (moorhen), American coot, sandhill crane, whooping crane, black-bellied plover, semipalmated plover, American avocet, solitary sandpiper, lesser yellowlegs, greater yellowlegs, willet, long-billed curlew, marbled godwit, Hudsonian godwit, Franklin's gull, black tern, great horned owl, barred owl, short-eared owl, belted kingfisher, red-bellied woodpecker, alder flycatcher, willow flycatcher, white-eyed vireo, Bell's vireo, fish crow, tree swallow, veery.

Reptiles: Common snapping turtle, common musk turtle, yellow mud turtle, Mississippi mud turtle, Missouri River cooter, red-eared turtle, midland smooth softshell turtle, spiny softshell turtle, five-lined skink, broadhead skink, rough green snake, midland water snake, northern water snake, diamondback water snake, broadbanded water snake, western hogsnake, eastern hognose snake, great plains rat snake, speckled kingsnake, Graham's crayfish snake, brown snake, western ribbon snake, common garter snake, copperhead, western cottonmouth, western pygmy rattlesnake, timber rattlesnake.

Amphibians: Bullfrog, barred tiger salamander, smallmouth salamander, dwarf American toad, Woodhouse's toad, Cope's gray treefrog, gray treefrog, Blanchard's cricket frog, green frog, plains leopard frog, southern leopard frog.

Fish: Mosquitofish, smallmouth bass, largemouth bass, green sunfish, orange-spotted sunfish, warmouth, black crappie, white crappie, blue gill, redear sunfish, blackstripe topminnow, yellow bullhead and black bullhead catfish, slough darter, blackstripe topminnow, brook silverside, log perch, longnose gar, shortnose gar, spotted gar, smallmouth buffalo, common carp, river carpsucker, freshwater drum, bullhead minnow, red shiner, golden shiner.

Red River Oxbow

Oxbow Site

McCurtain County

Location. This reference wetland is along the Red River. It is six miles south and three and one-half miles west of Idabel on Highway 259. This reference location is on private property; no access without permission. Latitude: 33° 48' 29.78". Longitude: 94° 53' 19.19". Legal: NE NE NW Sec 3 T9S 23E.

General Description. This reference site represents wetlands occurring primarily on the lower Red River drainage system where floods have created new river channels, leaving the original channel cut off. The cutoff channels are most often on large bends, giving the wetland a characteristic oxbow or horseshoe shape. Most of the oxbow lakes in Oklahoma are less than seven feet in depth. These wetlands remain stable until new floods force the river to move back to its original course, or cuts out the end that has blocked the drainage. The wetland ranges in size from 10 acres to over 100 acres.

Vegetative Community. These wetlands are most often associated with open water and most of the vegetation is found along the shoreline zone. Typically vegetation consists of an overstory of green ash and black willow with an understory of buttonbush, cutgrass, water primrose and hibiscus.

Hydrology. This wetland receives its water from surface runoff. The contributing drainage area has a low gradient and runoff enters the system slowly. Sediment accumulation in this wetland is influenced by the landuse of the adjacent areas. Most areas are row cropped, delivering a large sediment load into these wetlands.

Hydrologic Indicators. Primary hydrologic indicators are gleyed matrix and redox depletions in the upper profile. Many of these wetlands are recent in age and may not exhibit any redoximorphic characteristics. This is most common in those wetland that develop on soils with red parent materials. Secondary indicators are the presence of thin layer of muck (1/2 to 2 inches) and partially decomposed roots of plants in the upper 10 inches of the soil profile.

Soil Description. The Roebuck soil series is the principal hydric soil in this wetland type. Roebuck soils are formed in clayey sediments that are deposited on low gradient backwater areas of flood plains on large river systems. Because water stands nearly motionless for long periods, the clayey sediment has time to settle out in thick layers of clay with thinner strata of loamy and sandy materials. The depositional materials that form this soil are generally red sediments from Pleistocene age materials.

Soil Profile

A1: 0 to 1 inches, very dark reddish gray (5YR 2.5/1) silty clay muck; structureless; many very small fragments of decomposed plant parts.
A2: 1 to 8 inches, dark reddish brown (5YR 3/2) clay; moderate very fine blocky structure; many fine and medium roots.
B: 8 to 20 inches, reddish brown (5YR4/3) clay; moderate medium blocky structure; common coarse roots.

Classifications

Cowardin: PEM1C. **Soil:** Fine, smectic. Aeric Epiaquert.

Landform. Ecoregion: Central Oklahoma/Texas Plains (29). **MLRA:** Western Coastal Plains (133B).

Water Quality. These wetlands contain water in sufficient quantity for domestic uses, but their shallow depth and runoff from adjacent crop lands generally

make their water supply undependable for domestic uses.

Landuse. This wetland type is typically used for livestock water and recreation. The adjacent areas are typically used for corn or soybean production, improved pasture or alfalfa hay.

Wetland Dependent Wildlife Species

Mammals: Eastern pipistrel, red bat, evening bat, raccoon, swamp rabbit, beaver, muskrat.
Birds: Anhinga, great blue heron, green heron, great egret, little blue heron, snowy egret, yellow-crowned night heron, black-crowned night heron, white ibis, wood stork, red-winged blackbird, king rail, sora, purple gallinule, common gallinule (moorhen), great horned owl, barred owl, belted kingfisher, fish crow, wood duck, mallard.
Reptiles: Common snapping turtle, common musk turtle, Mississippi mud turtle, Missouri River cooter, red-eared turtle, midland smooth softshell turtle, spiny softshell turtle, five-lined skink, broadhead skink, rough green snake, yellowbelly water snake, midland water snake, diamondback water snake, broadbanded water snake, eastern hognose snake, great plains rat snake, speckled kingsnake, Graham's crayfish snake, brown snake, western ribbon snake, common garter snake, copperhead, western cottonmouth, western pygmy rattlesnake, timber rattlesnake.
Amphibians: Central newt, Red River mudpuppy, marbled salamander, spotted salamander, smallmouth salamander, slimy salamander complex, dwarf American toad, Woodhouse's toad, Cope's gray treefrog, gray treefrog, Blanchard's cricket frog, western chorus frog, bronze frog, green frog, southern leopard frog, bullfrog, bird-voiced treefrog, green treefrog, four-toed salamander, many-ribbed salamander.
Fish: Mosquitofish, largemouth bass, green sunfish, orange-spotted sunfish, warmouth, black crappie, white crappie, blue gill, redear sunfish, blackstripe topminnow, brook silverside, bluehead shiner, ribbon shiner, taillight shiner, iron color shiner, yellow bullhead and black bullhead catfish, channel catfish, longnose gar, shortnose gar, spotted gar, grass pickerel, pygmy sunfish, pirate perch.

Wetland Type:

Playa Lakes

Playa Lakes are found only on the high plains. They are depressional areas that have no outlets and seasonally pond water for long durations during years with high rainfall. These areas are commonly vegetated with woollyleaf bursage, smartweed, western wheatgrass and curly dock.

High Plains Playa

Playa Site

Texas County

Location. This reference wetland is located one-half mile north and two miles east of Tyrone. This reference wetland is on private property; no admittance without permission. Latitude: 36° 56 ' 09" Longitude: 101° 03' 06". Legal: SW SW Sec. 31, T6N R19E CM.

General Description. This site represents wetlands occurring in depressional basins within broad, nearly level landscapes in the High Plains MLRA. These wetlands are part of very stable hydrologic system that has small amounts of new sediment added to them. These wetlands rely on surface accumulation from rain or snowfall for their source of water. Playa wetlands are generally oval in shape and range from one to several hundred acres in size. Typically water depth is no greater than 60 inches although some may have depth greater than 8 feet at maximum capacity .

Vegetative Community. Vegetation typically found on this wetland type are woollyleaf bursage, smartweed, western wheatgrass and curly dock.

Hydrology. This wetland type is influenced by seasonal accumulations of surface water from rainfall and/or snowfall. Because the climatic conditions are characterized by sporadic precipitation, these wetlands are cyclical in nature. They may function as wetlands for several years and then remain dry for an extended period.

Hydrologic Indicators. Primary indicators are few fine, common redox concentrations and depletions in the upper 12 inches of soil material. The redox depletions are found on the structural faces of the soil peds. These soils are high in organic matter making the indicators difficult to observe.

Soil Description. The Randall series is the principal soil on this wetland type. Randall soils formed in clayey, high plains sediments that were deposited slowly in large depressional areas. The depositional materials that formed this soil are from local sediments deposited slowly over time. These soils have formed on some of the oldest and most stable landscapes in the high plains.

Soil Profile

A: 0-16 inches, black (10YR 2/0) clay; very strong fine and medium blocky structure; common fine (15%) reddish brown (5YR 4/6) redox concentrations, few (3%) coarse white (10YR 7/1) redox depletions on the surface of peds as stripped silt grains; upper 2 inches of horizon have soft consistency while remainder is hard to very hard.
C: 16-20 inches, very dark grayish brown (10YR 4/1) clay; moderate medium blocky structure; few (2%) very fine yellowish red (5YR 5/6) redox concentrations and few (<2%) manganese concentrations.

Classifications

Cowardin: PEM1A, PEM1C. **Soil:** Fine, smectic, thermic. Ustic Epiaquert.

Landform. Ecoregion: Western High Plains (25). **MLRA:** Southern High Plains (77A).

Water Quality. These wetlands are too cyclical in nature and do not contain water in sufficient quality or quantity for dependable domestic usage.

Land Use: These wetlands are typically plowed and planted, most commonly with small grains and grain sorghum. Many of these wetlands have been developed into tail water pits where surplus irrigation water is collected. Although these wetlands have had their vegetation drastically disturbed, minimal impact on their hydrology occurs because of quick recovery of original functions during wet cycles.

Wetland Dependent Wildlife Species

Mammals: Red bat.

Birds: Eared grebe, horned grebe, pied-billed grebe, American white pelican, double-crested, cormorant, great blue heron, American bittern, green heron, great egret, least bittern, little blue heron, snowy egret, yellow-crowned night heron, black-crowned night heron, white-faced ibis, green-winged teal, American wigeon, northern shoveler, ruddy duck, cinnamon teal, pintail, blue-winged teal, white-fronted goose, gadwall, red-winged blackbird, Canada goose, wood duck, mallard, ring-necked duck, lesser scaup, greater scaup, hooded merganser, redhead, canvasback, common goldeneye, bufflehead, common merganser, red-breasted merganser, osprey, bald eagle, marsh hawk/northern harrier, rough-legged hawk, Virginia rail, sora, American coot, sandhill crane, black-bellied plover, semipalmated plover, black-necked stilt, American avocet, solitary sandpiper, lesser yellowlegs, greater yellowlegs, willet, long-billed curlew, marbled godwit, Franklin's gull, black tern, great horned owl, snowy owl, barred owl, short-eared owl, belted kingfisher, red-bellied woodpecker, alder flycatcher, willow flycatcher, white-eyed vireo, Bell's vireo, tree swallow.

Reptiles: Common snapping turtle, yellow mud turtle, red-eared turtle, spiny softshell turtle, blotched water snake, diamondback water snake, western hogsnake, eastern hognose snake, great plains rat snake, speckled kingsnake, western ribbon snake, western plains garter snake, common garter snake.

Amphibians: Barred tiger salamander, Woodhouse's toad, plains leopard frog.

Fish: *Mosquitofish, red shiner, golden shiner, fathead minnow, bullhead minnow.

*The intermittent nature of this wetland type may not provide sufficiently stable hydrologic conditions for a well developed fish community. As a result, existing fish populations may be limited to low succession species, which are typically short lived and highly adaptable to constantly fluctuating water levels.

Wetland Type:

Riparian Corridor

Riparian Corridors ***(zones)*** **are found in the central and western parts of Oklahoma on low, frequently-inundated flood plains. They have saturated soils commonly associated with high water tables. Vegetation is typically rushes and sedges with an overstory of willow, cotton-wood and tamarisk.**

Arcadia Lake
Riparian Corridor Site
Oklahoma County

Location. This reference wetland is on the north side of Arcadia Lake. Built by the U.S. Army Corps of Engineers for flood control, water supply and recreation, the lake area is maintained by the city of Edmond. Latitude: 35° 38' 52". Longitude: 97° 23' 33". Legal: SW NE Sec. 35 T14N R2W.

General Description. This wetland represents sites commonly is found in the sediment-choked, small drainage area, narrow streams in the Cross Timbers MLRA. These wetlands are recent in age, many being less than 100 years old. The influx of sediment keeps the vegetative community in a constant state of regeneration. These wetlands are long and narrow in shape and individual areas range from 5 to over 100 acres in size.

Vegetative Community. The vegetation typically found on these sites are black willow, buttonbush, spike rush, and cattails. When disturbed, these areas quickly convert to willow, green ash or cottonwood thickets with an understory of smart weed, sump weed and cockleburs.

Hydrology. The primary water sources for this wetland type are seasonal floods and subsurface water tables. Most floods last less than one day, with depressional areas ponding water for over a week. Many of the stream channels have been filled with sediment, leaving a characteristic braided-stream pattern. Water tables range in depth from surface level to 3 feet deep, with the highest water tables occurring during early spring months of March, April and May.

Hydrologic Indicators. Primary indicators are common redox concentrations in the upper six inches. These redox concentrations are both iron and manganese and are most commonly observed in close proximity to partially decomposed organic materials. Secondary indicators are the presence of oxidized rhizospheres. Partially decomposed roots and stems that have the appearance of charcoal is frequently seen in this soil. Hydrologic indicators are difficult to observe or may be absent when the sediments have been recently deposited.

Soil Description. The Tribby soil series is the principal soil on this wetland type. Tribby soils formed in loamy to sandy sediments deposited on floodplains from adjacent eroded uplands. The depositional materials that form this soil are red sediments from sandstones and shales of the Permian geologic age.

Soil Profile

A: 0-6 inches, reddish brown (5YR4/3) fine sandy loam; weak granular structure; few (<5%) fine yellowish red (5YR 4/6) redox concentrations; many fine and coarse roots.
C: 6-20 inches, yellowish red (5YR 4/6) fine sandy loam; weak fine granular structure; few (<5%) fine faint yellowish red (5YR 5/6) redox concentrations.

Classifications

Cowardin: PFO1A, PFO1C, PEM1A. **Soil:** Coarse-loamy, mixed, superactive, nonacid, thermic. Oxyaquic Udifluvent.

Landform **Ecoregion:** Central Oklahoma/Texas Plains (29). **MLRA:** Cross Timbers (84A).

Water Quality. Shallow groundwater tables produce enough water for domestic purposes but the quality is insufficient for human consumption.

Landuse. This wetland type is typically used for livestock grazing. Areas are sometimes drained by channelization, and improved pasture grasses like

Bermuda grass and fescue are established. The areas adjacent to these soils are mostly forested with a post oak/blackjack oak community. Adjacent areas are also grazed with very little crop production in close proximity.

Wetland Dependent Wildlife Species

Mammals: Eastern pipistrel, big brown bat, red bat, evening bat, raccoon, swamp rabbit, beaver, muskrat.

Birds: Eared grebe, horned grebe, pied-billed grebe, American white pelican, double-crested cormorant, great blue heron, American bittern, green heron, great egret, little blue heron, snowy egret, yellow-crowned night heron, black-crowned night heron, white-faced ibis, green-winged teal, American wigeon, northern shoveler, ruddy duck, cinnamon teal, pintail, blue-winged teal, white-fronted goose, gadwall, red-winged blackbird, snow goose, Canada goose, wood duck, mallard, ring-necked duck, lesser scaup, greater scaup, hooded merganser, redhead, canvasback, common goldeneye, bufflehead, common merganser, osprey, bald eagle, marsh hawk/northern harrier, red-shouldered hawk, rough-legged hawk, Virginia rail, king rail, sora, purple gallinule, common gallinule (moorhen), American coot, sandhill crane, whooping crane, black-bellied plover, semipalmated plover, American avocet, solitary sandpiper, lesser yellowlegs, greater yellowlegs, willet, long-billed curlew, marbled godwit, Hudsonian godwit, Franklin's gull, black tern, great horned owl, barred owl, short-eared owl, belted kingfisher, red-bellied woodpecker, alder flycatcher, willow flycatcher, white-eyed vireo, Bell's vireo, fish crow, tree swallow, veery.

Reptiles: Common snapping turtle, common musk turtle, yellow mud turtle, Mississippi mud turtle, Missouri River cooter, red-eared turtle, midland smooth softshell turtle, spiny softshell turtle, five-lined skink, broadhead skink, rough green snake, blotched water snake, midland water snake, northern water snake, diamondback water snake, broadbanded water snake, western hogsnake, eastern hognose snake, great plains rat snake, speckled kingsnake, Graham's crayfish snake, brown snake, western ribbon snake, common garter snake, copperhead, western cottonmouth, western pygmy rattlesnake, timber rattlesnake.

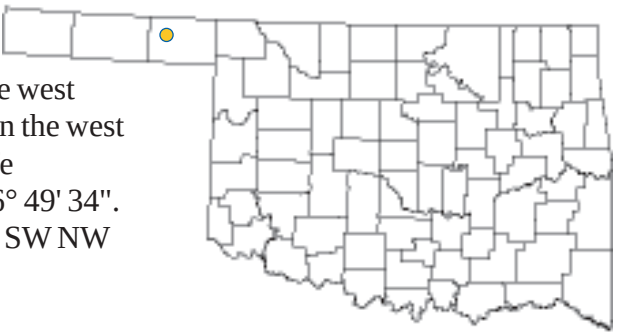
Amphibians: Bullfrog, barred tiger salamander, smallmouth salamander, dwarf American toad, Woodhouse's toad , Cope's gray treefrog, gray treefrog, Blanchard's cricket frog, western chorus frog, green frog, plains leopard frog, southern leopard frog.

Fish: Mosquitofish, largemouth bass, green sunfish, orange-spotted sunfish, warmouth, black crappie, white crappie, blue gill, redear sunfish, blackstripe topminnow, red shiner, golden shiner, bullhead minnow, fathead minnow, brook silverside, inland silverside, freshwater drum, smallmouth buffalo, yellow bullhead and black bullhead catfish, channel catfish, shortnose gar, spotted gar, common carp.

Beaver River Wildlife Management Area

Riparian Corridor Site

Beaver County



Location. This reference wetland is found on the Beaver River. It is located on the west side of the low water crossing on the west side of the Beaver River Wildlife Management Area. Latitude: 36° 49' 34". Longitude: 100° 42' 02". Legal: SW NW Sec. 9 T4N R22E CM.

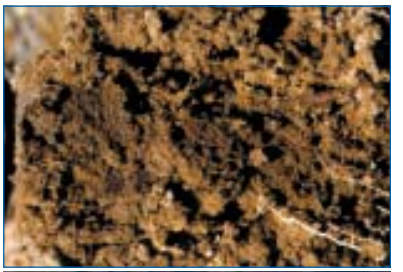
General Description. This site represents wetlands formed under stable fluvial conditions but affected by more intensive land uses since settlement. The removal of the native plants, overgrazing and cultivation have resulted in wind erosion, filling most of the original wetland with over a foot of sandy deposition. The loss of riparian vegetation has also contributed to stream channel erosion that has increased the sediment deposition. The result has been a narrowing of the original wetland areas, often less than 250 feet wide.

Vegetative Community. The vegetation commonly associated with these sites include an overstory of tamarisk, sandbar willow, peach-leaf willow and cottonwood with an understory of three square bulrush, curly dock, pale dock,

western wheatgrass, prairie cordgrass, canary grass, and torrey rush. When disturbed, these sites severely erode, leaving bare sand vegetated by cocklebur, cottonwood and tamarisk.

Hydrology. The hydrologic sources for these wetland are frequent floods and subsurface water. Most flooding is of short duration. The water table is influenced by sandy dune fields typically found on the north side of these stream systems. The depth to the water table ranges from the surface to three feet and is generally present in the late winter through late spring. Stream channels are not well defined and typically exhibit a braided pattern.

Hydrologic Indicators. Primary indicators are common redox concentrations in the upper 6 inches of the soil. These redox concentrations commonly occur as coating on sand grains. Below a depth of 1 foot both redox concentrations and depletions are present and are often associated with buried surface horizons which have higher organic matter concentrations. Secondary indicators observed at the site are partially decomposed roots that have a characteristic charcoal appearance. In areas where the deposition of sediment is recent, hydrologic indicators may be absent. The presence of an apparent water table with a depth less than one foot can be observed at periods throughout the year.



Soil Description. The Sweetwater soil series is the principal soil on these wetland sites. The soil described at the reference site is more similar to the Gracemore soil series. These soils formed in sandy sediments of Pleistocene geologic age, deposited by a combination of wind and water.

Soil Profile

A: 0-5 inches, brown (7.5YR 4/4) loamy fine sand; weak very fine granular structure; many (30%) yellowish red (5YR 5/6) redox concentrations as coatings on sand grains.
C1: 5-12 inches, strong brown (7.5YR 5/6) fine sand; structureless; common (10%) faint reddish yellow (5YR 6/6) redox concentrations as coatings on sand grains; common partially decomposed roots.
C2: 12-20 inches, pale brown (7.5YR 5/2) fine sand; structureless; many (40%) reddish yellow (5YR6/8) redox concentrations as coatings and many (60%) redox depletions as stripped sand grains; water table present at 14 inches; few partially decomposed roots.

Classifications

Cowardin: PEM1A, PEM1C. **Soil:** Fine-loamy over sandy or sandy skeletal, mixed, calcareous, thermic. Fluvaquentic Haplaquoll.

Landform. Ecoregion: Southwestern Tablelands (26). **MLRA:** Southern High Plains (77E).

Water Quality. The water quality on these wetlands is suitable for domestic livestock and wildlife but generally not suitable for human consumption.

Land Use. The principal land use associated with this wetland is livestock grazing. Because during most years these wetlands produce more lush forage than surrounding areas, the concentration of animals can quickly result in overgrazing and severe erosion problems. Some areas of this wetland have been established in improved pasture, but there is very little crop production because of the flood hazard.

Wetland Dependant Wildlife Species

Mammals: Red bat.
Birds: Eared grebe, horned grebe, pied-billed grebe, American white pelican, double-crested cormorant, great blue heron, American bittern, green heron, great egret, least bittern, little blue heron, snowy egret, yellow-crowned night heron, black-crowned night heron, white-faced ibis, green-winged teal, American wigeon, northern shoveler, ruddy duck, cinnamon teal, pintail, blue-winged teal, white-fronted goose, gadwall, red-winged blackbird, Canada goose, wood duck, mallard, ring-necked duck, lesser scaup, greater scaup, hooded merganser, redhead, canvasback, common goldeneye, bufflehead, common merganser, red-breasted merganser, osprey, bald eagle, marsh hawk/northern harrier, rough-legged hawk, Virginia rail, sora, American coot, sandhill crane, black-bellied plover, semipalmated plover, black-necked stilt, American avocet, solitary sandpiper, lesser yellowlegs, greater yellowlegs, willet, long-billed curlew, marbled godwit, Franklin's gull, black tern, great horned owl, snowy owl, barred owl, short-eared owl, belted kingfisher, red-bellied woodpecker, alder flycatcher, willow flycatcher, white-eyed vireo, Bell's vireo, tree swallow.
Reptiles: Common snapping turtle, yellow mud turtle, red-eared turtle, spiny softshell turtle, blotched water snake, diamondback water snake, western hogsnake, eastern hognose snake, great plains rat snake, speckled kingsnake, western ribbon snake, western plains garter snake, common garter snake.
Amphibians: Barred tiger salamander, Woodhouse's toad, Bullfrog, plains leopard frog.
Fish: Largemouth bass, green sunfish, orange-spotted sunfish, red shiner, golden shiner, bullhead minnow, fathead minnow, yellow bullhead and black bullhead catfish, channel catfish, mosquitofish.

Cloud Creek
Riparian Corridor Site
Washita County

Location. The Cloud Creek Riparian Corridor Wetland represents sites on stream systems in southwestern Oklahoma. It is five miles east and four miles south of Cordell on Highway 152. This reference location is on private property; no access without permission. Latitude: 35° 14' 13". Longitude: 98° 54' 44". Legal: NE SW SE Sec 20 T9N R16W.

General Description. This reference site represents wetlands occurring primarily on small drainage systems in erosional uplands in southwestern Oklahoma. The continual influx of sediment results in poorly-defined channels and a vegetative community that is in a constant state of regeneration. Many of these areas have been converted to crop production and/or livestock grazing, but a rising water table, due to channel siltation, tends to convert these areas to a natural wetland state. These wetlands are typically long and narrow in shape, and range from 10 to more than 100 acres in size.

Vegetative Community. Vegetation typically found on these sites is an overstory of black willow, tamarisk and cottonwood with a sparse understory of cattails and sedges. When disturbed by cultivation or sedimentation, these areas convert to willow or cottonwood thickets with an understory of smartweed, sumpweed and cockleburs.

Hydrology. These wetlands receive their water from surface runoff. The contributing drainage area has a low gradient and runoff enters the system slowly. Sediment accumulation in this wetland type is influenced by land use of the adjacent areas. Row crops are typically planted, producing a substantial sediment load into these wetlands.

Hydrologic Indicators. Primary hydrologic indicators are 10 to 40% black (5YR 2.5/1) organic stains on faces of peds and few (5%) yellowish-red (5YR 5/6) redox concentrations (both iron and manganese) in the upper 8 inches of the soil profile. Secondary indicators are the presence of oxidized rhizospheres. Another commonly observed indicator is the presence of many partially-decomposed plant materials (roots and stems) in the lower part of the soil profile having a characteristic charcoal appearance. Where sediment has recently been deposited, hydrologic indicators may be absent or difficult to observe. Non-decomposed plant parts below 6 inches in the soil profile indicate that sediment is recent.

Soil Description. The Retrop soil series is the principal hydric soil on this wetland type. Retrop soils formed in loamy and clayey sediments deposited on flood plains from adjacent erosional uplands. The depositional materials that form this soil are red sediments from sandstones and shales of Permian geologic age. These soils are recent in age, many developed since statehood.

Soil Profile

A1: 0 to 1 inches, dark reddish brown (5YR 3/2) silt loam; weak, very fine granular structure; few (less than 5%) faint yellowish-red (5YR 4/6) redox concentrations; many fine and very fine roots (matted).

A2: 1 to 7 inches, dark reddish brown (5YR 3/2) very fine sandy loam; weak, fine granular structure; many (40%) black (5YR 2.5/1) organic stains on ped faces; few coarse and many medium and fine roots.

B: 7 to 20 inches, reddish brown (5YR4/4) very fine sandy loam; moderate fine subangular blocky structure; few faint dark red (2.5YR) redox concentrations; few medium and coarse roots.

Classifications

Cowardin: PEM1C. **Soil:** Fine-silty, mixed, superactive, calcareous, thermic. Oxyaquic Udifluvent.

Landform. **Ecoregion:** Central Great Plains (27). **MLRA:** Central Rolling Red Plains (78C).

Water Quality. These wetlands contain water in sufficient quantity for domestic uses, but shallow depth and runoff from adjacent crop lands generally make an undependable water supply for domestic uses.

Landuse. This wetland type is typically used for livestock water and recreation. The adjacent areas are typically used for corn, soybean or alfalfa hay production, or as improved pasture.

Wetland Dependent Wildlife Species

Mammals: Cave myotis, western pipistrel, eastern pipistrel, big brown bat, red bat, evening bat, raccoon, swamp rabbit, beaver, muskrat.
Birds: Eared grebe, horned grebe, pied-billed grebe, American white pelican, double-crested cormorant, great blue heron, American bittern, green heron, great egret, least bittern, little blue heron, snowy egret, yellow-crowned night heron, black-crowned night heron, white-faced ibis, green-winged teal, American wigeon, northern shoveler, ruddy duck, cinnamon teal, pintail, blue-winged teal, white-fronted goose, gadwall, red-winged blackbird, snow goose, Canada goose, wood duck, mallard, ring-necked duck, lesser scaup, hooded merganser, redhead, canvasback, common goldeneye, bufflehead, common merganser, osprey, bald eagle, marsh hawk/northern harrier, rough-legged hawk, king rail, common gallinule (moorhen), sandhill crane, whooping crane, black-bellied plover, American avocet, solitary sandpiper, lesser yellowlegs, greater yellowlegs, willet, whimbrel, long-billed curlew, Hudsonian godwit, Franklin's gull, black tern, great horned owl, barred owl, short-eared owl, belted kingfisher, red-bellied woodpecker, white-eyed vireo, Bell's vireo, tree swallow, veery.
Reptiles: Common snapping turtle, yellow mud turtle, Missouri River cooter, red-eared turtle, midland smooth softshell turtle, spiny softshell turtle, five-lined skink, rough green snake, blotched water snake, diamondback water snake, western hogsnake, eastern hognose snake, great plains rat snake, speckled kingsnake, Graham's crayfish snake, brown snake, western ribbon snake, western plains garter snake, common garter snake, copperhead, western cottonmouth, western pygmy rattlesnake, timber rattlesnake.
Amphibians: Smallmouth salamander, dwarf American toad, Woodhouse's toad , Blanchard's cricket frog, plains leopard frog, bullfrog.
Fish: Mosquitofish, largemouth bass, green sunfish, orange-spotted sunfish, warmouth, black crappie, white crappie, blue gill, redear sunfish, red shiner, golden shiner, bullhead minnow, fathead minnow, yellow bullhead and black bullhead catfish, channel catfish.

Fort Cobb State Park

Riparian Corridor Site

Caddo County

Location. This reference wetland is located near Fort Cobb Lake on a golf course. Latitude: 35° 10' 47". Longitude: 98° 26 ' 35". Legal: NE SE Sec 10 T8N R12W.

General Description. This site represents wetlands found in sediment choked, narrow streams with small drainage areas. These wetlands are recent in age, many less than 100 years old. The influx of sediment keeps the vegetative community in a constant state of regeneration. These wetlands are generally long and narrow in shape, and range from 5 to 75 acres in size.

Vegetative Community. Vegetation typically found on these sites is an overstory of black willow with an understory of arrowhead, rice cutgrass, Pennsylvania smartweed and scouring rush. In areas that pond water, the sites may be dominated by cattail and lotus. When disturbed, these areas convert to willow or cottonwood thickets, with an understory of smartweed, sumpweed and cockleburs.

Hydrology. Frequent seasonal floods and subsurface water tables provide water for these wetlands. Most floods are of short duration, often lasting less than 24 hours. Depressions within this wetland type may pond water for greater than a month. Stream channels within this wetland are generally filled with sediment and are characterized by a braided stream pattern. Water tables are present during the late winter, early spring and summer and range in depth from the surface to a depth of 3 feet below the soil surface.

Hydrologic Indicators. Primary hydrologic indicators are 15 to 60% redox concentration (both iron and manganese) in the upper eight inches of the soil profile. Some profiles have few 2 to 5% redox depletions within 20 inches of the surface. Secondary indicators are the presence of oxidized rhizospheres. Another commonly observed indicator is the presence of many partially decomposed plant materials (roots and stems) in the lower part of the soil profile having a characteristic charcoal appearance. Where sediment has recently been deposited, hydrologic indicators may be absent or difficult to observe. Indications that sediment is recent include non-decomposed plant parts below 6 inches in the soil profile.

Soil Description. The Gracemont soil series is the principal hydric soil on this wetland type. Gracemont soils formed in loamy sediments deposited on flood plains from adjacent erosional uplands. The depositional materials that form this soil are red sediments from sandstones and shales of Permian geologic age. These soils are recent in age.

Soil Profile

A1: 0-4 inches, reddish brown (5YR4/4) fine sandy loam; weak fine granular structure; many (60%) reddish yellow (5YR5/6) redox concentrations; many fine and medium roots.
A1: 4-8 inches, dark brown (7.5YR 4/2) fine sandy loam; weak fine granular structure; many (15%) redox concentrations (manganese) on faces of peds; many fine and medium roots.
C: 8-20 inches, brown (7.5YR 4/4) very fine sandy loam; massive; few (<5%) yellowish red (5YR 5/6) redox concentrations on ped faces; many partially decomposed roots below 16 inches having a characteristic charcoal appearance.

Classifications

Cowardin: PFO1A, PFO1C, PEM1A. **Soil:** Coarse-loamy, mixed, superactive, calcareous, thermic. Oxyaquic Udifluvent.

Landform. **Ecoregion:** Central Great Plains (27). **MLRA:** Central Rolling Red Prairies (80A).

Water Quality. Shallow groundwater tables produce enough water for domestic purposes, but the dependability and quality of the water make it insufficient for human consumption.

Land Use This wetland type is usually used for livestock production. In some cases these areas become drained as a result of stream channelization after which pasture grasses are established. Some areas are sufficiently drained to allow limited crop production. Areas adjacent to these wetlands are commonly used for cropland, rangeland or improved pasture.

Wetland Dependent Wildlife Species

Mammals: Cave myotis, western pipistrel, eastern pipistrel, big brown bat, red bat, evening bat, raccoon, swamp rabbit, beaver, muskrat.
Birds: Eared grebe, horned grebe, pied-billed grebe, American white pelican, double-crested cormorant, great blue heron, American bittern, green heron, great egret, least bittern, little blue heron, snowy egret, yellow-crowned night heron, black-crowned night heron, white-faced ibis, green-winged teal, American wigeon, northern shoveler, ruddy duck, cinnamon teal, pintail, blue-winged teal, white-fronted goose, gadwall, red-winged blackbird, snow goose, Canada goose, wood duck, mallard, ring-necked duck, lesser scaup, hooded merganser, redhead, canvasback, common goldeneye, bufflehead, common merganser, osprey, bald eagle, marsh hawk/northern harrier, rough-legged hawk, king rail, common gallinule (moorhen), sandhill crane, whooping crane, black-bellied plover, American avocet, solitary sandpiper, lesser yellowlegs, greater yellowlegs, willet, whimbrel, long-billed curlew, Hudsonian godwit, Franklin's gull, black tern, great horned owl, barred owl, short-eared owl, belted kingfisher, red-bellied woodpecker, white-eyed vireo, Bell's vireo, tree swallow, veery.
Reptiles: Common snapping turtle, yellow mud turtle, Missouri River cooter, red-eared turtle, midland smooth softshell turtle, spiny softshell turtle, five-lined skink, rough green snake, blotched water snake, diamondback water snake, western hogsnake, eastern hognose snake, great plains rat snake, speckled kingsnake, Graham's crayfish snake, brown snake, western ribbon snake, western plains garter snake, common garter snake, western cottonmouth, western pygmy rattlesnake, timber rattlesnake.
Amphibians: Smallmouth salamander, dwarf American toad, Woodhouse's toad , Cope's gray treefrog, gray treefrog, Blanchard's cricket frog, western chorus frog, plains leopard frog, bullfrog.
Fish: Mosquitofish, largemouth bass, green sunfish, orange-spotted sunfish, warmouth, black crappie, white crappie, blue gill, redear sunfish, red shiner, golden shiner, bullhead minnow, fathead minnow, blackstripe topminnow, brook silverside, yellow bullhead and black bullhead catfish, channel catfish, common carp, freshwater drum.

Little Sahara

Riparian Corridor Site

Woods County

Location. This reference wetland is located one-quarter mile north of the Cimarron River bridge on the east side of State Highway 281. This reference wetland is on private property; no access without permission. Latitude: 36° 30' 36". Longitude: 98° 52' 58". Legal: SW SE Sec. 26 T24N R16W.

General Description. This wetland represents those found on large rivers and major tributaries in the Central Rolling Red Plains. These wetlands are recent in age and have formed under unstable conditions. Recent depositions of sediment, by both wind and water erosion, have blocked drainage and created the depressional areas that define these wetlands. These wetlands are characteristically found on the back side of flood plains and are long and narrow in shape.

Vegetative Community. The vegetation on these wetlands are characteristic of recently developed, emergent wetlands with torrey rush, three square bulrush, spike rush, water primrose, buttonbush and switch grass dominating the area.

When overgrazed or disturbed those areas become dominated by spike rush.

Hydrology. The water source for these wetlands are frequent, short duration floods and subsurface water. Flooding fills the depressions while the availability of subsurface water is affected by the degree of stratification of depositional soil materials. The most consistent water tables are associated with clay strata that help perch the water near the surface. Water table depth ranges from the surface to 1 1/2 feet deep with the highest water tables occurring during the early spring months of March, April and May.

Hydrologic Indicators. Primary indicators found in this wetland are common redox concentrations occurring as manganese stains with few faint iron redox concentrations. The surface layer is high in organic matter streaking of organic matter into the underlying horizon is common. Secondary indicators are the presence of oxidized rhizospheres in the upper 4 inches of soil. This wetland commonly ponds water and the water table ranges from 6 to 12 inches below the surface from spring through early summer.

Soil Description. The Ezell series is the principal soil in this wetland type. Ezell soils formed in sandy sediments of the Pleistocene geologic age. These sediments have been deposited by both water and wind on the major river systems through the central rolling red plains. The surface layer of this soil is high in organic matter. These soils have sandy subsurface layers that are often stratified with more clayey textures.

Soil Profile

A: 0 to 5 inches, black (7.5YR 2/1) loamy fine sand; weak very fine granular structure; many (20%) manganese redox concentrations.
C1: 5 to 14 inches, brown (7.5YR 4/6) loamy fine sand; massive; few (2%) yellowish red (5YR 5/6) redox concentrations; water table at 14 inches.
C2: 14-20 inches, strong brown (7.5YR 5/6) fine sand; massive; structureless.

Classifications

Cowardin: PEM1C, PEM1A. **Soil:** Sandy, mixed, thermic. Aeric Fluvaquent.

Landform. Ecoregion: Central Great Plains (27).
MLRA: Central Rolling Red Plains (78C).

Water Quality. The water quality on these sites is insufficient for human consumption, generally containing too many total dissolved solids.

Land Use. This wetland type is typically used for livestock grazing. Some areas have been drained and used for improved pasture and limited crop production, but frequent floods and deposition of sediment makes crop production impractical for most areas.

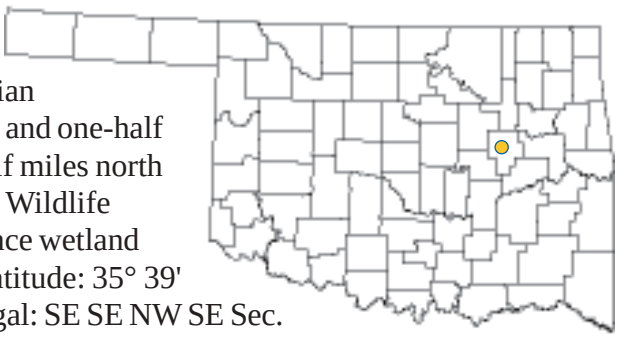
Wetland Dependent Wildlife Species

Mammals: Cave myotis, western pipistrel, eastern pipistrel, big brown bat, red bat, evening bat, raccoon, swamp rabbit, beaver, muskrat.
Birds: Eared grebe, horned grebe, pied-billed grebe, American white pelican, double-crested cormorant, great blue heron, American bittern, green heron, great egret, least bittern, little blue heron, snowy egret, yellow-crowned night heron, black-crowned night heron, white-faced ibis, green-winged teal, American wigeon, northern shoveler, ruddy duck, cinnamon teal, pintail, blue-winged teal, white-fronted goose, gadwall, red-winged blackbird, snow goose, Canada goose, wood duck, mallard, ring-necked duck, lesser scaup, hooded merganser, redhead, canvasback, common goldeneye, bufflehead, common merganser, osprey, bald eagle, marsh hawk/northern harrier, rough-legged hawk, king rail, common gallinule (moorhen), sandhill crane, whooping crane, black-bellied plover, American avocet, solitary sandpiper, lesser yellowlegs, greater yellowlegs, willet, whimbrel, long-billed curlew, Hudsonian godwit, Franklin's gull, black tern, great horned owl, barred owl, short-eared owl, belted kingfisher, red-bellied woodpecker, white-eyed vireo, Bell's vireo, tree swallow, veery.
Reptiles: Common snapping turtle, yellow mud turtle, Missouri River cooter, red-eared turtle, midland smooth softshell turtle, spiny softshell turtle, five-lined skink, rough green snake, blotched water snake, diamondback water snake, western hogsnake, eastern hognose snake, great plains rat snake, speckled kingsnake, Graham's crayfish snake, brown snake, western ribbon snake, western plains garter snake, common garter snake, copperhead, western cottonmouth, western pygmy rattlesnake, timber rattlesnake.
Amphibians: Smallmouth salamander, dwarf American toad, Woodhouse's toad, Blanchard's cricket frog, western chorus frog, plains leopard frog, bullfrog.
Fish: Mosquitofish, largemouth bass, green sunfish, orange-spotted sunfish, warmouth, black crappie, white crappie, blue gill, redear sunfish, red shiner, golden shiner, bullhead minnow, fathead minnow, brook silverside, yellow bullhead and black bullhead catfish, channel catfish, common carp, freshwater drum.

Okmulgee Wildlife Management Area

Riparian Corridor Site

Okmulgee County



Location. This reference wetland is on a portion of the of the Deep Fork of the Canadian River system. It is located three and one-half miles west and two and one-half miles north of Okmulgee on the Okmulgee Wildlife Management Area. This reference wetland location is on state property. Latitude: 35° 39' 28" Longitude: 96° 02' 19". Legal: SE SE NW SE Sec. 28 T14N R12E

General Description. This reference wetland is representative of areas bordering the Deep Fork River and its main tributaries in the east central part of Oklahoma. These wetlands typically are on the back side of broad flood plains and on depression or concave surfaces. Sediment loading is limited to large flood events. This wetland land form is characterized by a series of oval to oblong depressions, separated by slightly higher (less than 0.5 feet) ridges of sandy soil materials. Surface water accumulation is from both out-of-bank flooding and runoff from adjacent uplands. Groundwater tables are near the surface during the winter and early spring.

Vegetative Community. Vegetation typically found on these sites is an overstory of green ash, pecan, Shumard oak, pin oak, bur oak, elm, and black willow with an understory of broadleaf uniola, sedges, and wild rye. When disturbed, these areas convert to black willow and green ash with an understory of sedges and annual grasses such as green spangletop. Curly dock and cocklebur are common in abandoned cropland areas.

Hydrology. The water source for these wetlands is provided by frequent floods of short to long duration and ground water tables. Water tables range in depth from above the surface on ponded areas to 2 feet below the surface, with the highest levels occurring during the winter and early spring months. Subsurface water typically moves through the large cracks and between the structural units of the clay soils. These areas often have sandy surface layers near channel banks that are slightly higher and more well drained.

Hydrologic Indicators. These soils have formed in red parent materials from the Permian geologic period. Hydrologic indicators in the soil are often faint or absent. Where visible, the primary hydrologic indicators are 5 to 35 % redox concentrations (both iron and manganese) and redox depletions within 8 inches of the surface. Secondary indicators are the presence of oxidized rhizospheres. Another commonly observed indicator is the presence of partially decomposed plant materials (roots and stems) in the soil profile that have a characteristic charcoal appearance. Other indicators are the presence of water stained leaves in depressional areas that pond water for the longest periods of time, and fluted and buttressed tree trunks. High water marks and debris lines at the four to six foot level are common on trees near larger rivers.

Soil Description. The Ustibuck soil series is the principal hydric soil series that forms this wetland type. Ustibuck soils formed in clay sediments deposited on depressional areas of flood plains where fine silts and clay sediments have had time to filter out. The depositional materials that form this soil are red sediments from sandstones and shales of Permian geologic age. These soils have developed under a steady influx of sediments and are recent in age. They typically have dark, reddish brown clay surface layers and reddish brown subsoils. The presence of redox features depends on the age of the soils and the duration of saturation.

Soil Profile

A1: 0 to 8 inches, dark reddish brown (5YR3/3) clay; strong fine granular structure; hard, firm; many fine and medium roots.
B: 8 to 20 inches, reddish brown (5YR 4/4) clay; moderate medium and fine blocky structure; extremely hard, very firm; many (30%) yellowish red (5YR 5/6) redox concentrations and many (35%) reddish gray redox depletions; common medium and coarse roots.

Classifications

Cowardin: PFO1A, PFO1C, PEM1A, PEM1C. **Soil:** Fine, smectic, thermic. Ustic Eqiaquert.

Landform. Ecoregion: Central Oklahoma/Texas Plains (29). **MLRA:** Arkansas Valley and Ridges (118B).

Water Quality. Shallow groundwater tables do not produce enough water for domestic purposes. Water tables are seasonal and the groundwater often contains excessive salinity.

Landuse. This wetland type is often converted to livestock production. Areas are sometimes drained by channelization and diking, and pasture grasses are established. Some areas are sufficiently drained so that limited crop production can occur. When cleared or diked areas are abandoned, green ash, cottonwood, black willow, curly dock, smartweed and annual grasses predominate. Areas adjacent to these wetlands are commonly used for cropland, rangeland or improved pasture.

Wetland Dependent Wildlife Species

Mammals: Eastern pipistrel, big brown bat, red bat, evening bat, raccoon, swamp rabbit, beaver, muskrat.
Birds: Eared grebe, horned grebe, pied-billed grebe, American white pelican, double-crested cormorant, great blue heron, American bittern, green heron, great egret, little blue heron, snowy egret, yellow-crowned night heron, black-crowned night heron, white-faced ibis, green-winged teal, American wigeon, northern shoveler, ruddy duck, cinnamon teal, pintail, blue-winged teal, white-fronted goose, gadwall, red-winged blackbird, snow goose, Canada goose, wood duck, mallard, ring-necked duck, lesser scaup, greater scaup, hooded merganser, redhead canvasback, common goldeneye, bufflehead, common merganser, osprey, bald eagle, marsh hawk/northern harrier, red-shouldered hawk, rough-legged hawk, Virginia rail, king rail, sora, purple gallinule, common gallinule (moorhen), American coot, sandhill crane, whooping crane, black-bellied plover, semipalmated plover, American avocet, solitary sandpiper, lesser yellowlegs, greater yellowlegs, willet, long-billed curlew, marbled godwit, Hudsonian godwit, Franklin's gull, black tern, great horned owl, barred owl, short-eared owl, belted kingfisher, red-bellied woodpecker, alder flycatcher, willow flycatcher, white-eyed vireo, Bell's vireo, fish crow, tree swallow, veery.
Reptiles: Common snapping turtle, common musk turtle, yellow mud turtle, Mississippi mud turtle, Missouri River cooter, red-eared turtle, midland smooth softshell turtle, spiny softshell turtle, five-lined skink, broadhead skink, rough green snake, midland water snake, northern water snake, diamondback water snake, broadbanded water snake, western hogsnake, eastern hognose snake, great plains rat snake, speckled kingsnake, Graham's crayfish snake, brown

snake, western ribbon snake, common garter snake, copperhead, western cottonmouth, western pygmy rattlesnake, timber rattlesnake.
Amphibians: Barred tiger salamander, smallmouth salamander, dwarf American toad, Woodhouse's toad, Cope's gray treefrog, gray treefrog, Blanchard's cricket frog, western chorus frog, bronze frog, green frog, plains leopard frog, southern leopard frog, bullfrog.
Fish: Mosquitofish, largemouth bass, green sunfish, orange-spotted sunfish, warmouth, black crappie, white crappie, blue gill, redear sunfish, blackstripe topminnow, red shiner, golden shiner, bullhead minnow, common carp, smallmouth buffalo, freshwater drum, river carp sucker, longnose gar, shortnose gar, spotted gar, blackstripe topminnow, brook silverside, slough darter.

Wetland Type:

Swamp

Swamps, Bogs, and Marshes **are forested habitats on low, frequently-inundated flood plains in the southeastern part of the state. Soils are saturated and surface water stands well into the growing season. The understory vegetation is typically rushes and sedges, with an overstory of bald cypress, overcup oak, and willow oak.**

Grassy Slough WRP

Swamp/Emergent Marsh Site

McCurtain County

Location. This reference wetland is located one mile west and one-half mile north of Pollard in McCurtain County. This reference location is on private property that is protected by a permanent easement through the Wetland Reserve Program (WRP); no access without permission. Latitude: 33° 48' 06". Longitude: 94° 44' 22". Legal: NW SE SE NW Sec 6 T9S R25E.

General Description. This site represents wetlands found on small streams in the Western Coastal Plains MLRA in the southeastern part of Oklahoma. They typically are on lower flood plains. These wetlands are very stable when left undisturbed, but any alteration of the vegetation, surface drainage or land use on adjacent areas can quickly affect them by increasing the sediment load and restricting surface and subsurface flow rates. This wetland landform is characterized by narrow bands of flood plains that dissect the adjacent sandy and loamy uplands. Groundwater accumulation is from infiltration through adjacent uplands and low gradient flow through the flood plain itself.

Groundwater tables are at or above the surface during most of the year.

Vegetative Community. Vegetation typically found on these sites is an emergent shrub/scrub community of alder with a herbaceous community of tearthumb, smartweed, rice cutgrass and water primrose. These areas have a shrub layer of buttonbush.

Hydrology. The water sources for these wetlands are surface water that enters the stream system from numerous small local watersheds and ground water that has infiltrated the adjacent upslope areas, and from numerous seeps and springs. Water tables range in depth from 3 feet above the surface to 6 inches below the surface, with the highest levels occurring during the fall through early summer. Subsurface water typically moves throughout the soils.

Hydrologic Indicators. Primary hydrologic indicators are a thin muck surface layer and gleyed subsurface layers with common to many redox concentrations. These soils contain few to many (5 to 30%) redox concentrations in the mineral portion, distributed on structural faces of soil peds.

Soil Description. The Bibb series is the principle hydric soil found on these wetland areas. These soils formed in sandy and loamy alluvial sediments deposited on flood plains from the adjacent erosional uplands. These soils have thin muck layers overlaying dark brown fine sandy loam mineral surface layers and gray fine sandy loam subsoil layers. The alluvial materials that form these soils are brown sediments of the Cretaceous geologic age. These soils are recent in age.

Soil Profile

O: 0 to 1 inch, very dark gray (10YR 3/0) decomposed (>80%) organic material; structureless.
A1: 1 to 14 inches, dark brown (7.5YR3/4) fine sandy loam; weak fine granular structure; many (30%) strong brown (7YR 4/6, 5/6) redox concentrations on structural faces of soil peds; soft, very friable; many fine roots in surface matte.
C1g: 6 to 14 inches, gray (5Y5/1) fine sandy loam; weak coarse subangular blocky structure; common (5%) strong brown (7.5YR 5/6) redox concentrations on faces of soil structural units; soft, very friable; few medium course roots.

Classifications

Cowardin: PEM1C, PEM1A, PFO1C, PFO1A. **Soil:** Coarse-loamy, siliceous, active, acid, thermic. Typic Fluvaquent.

Landform. Ecoregion: South Central Plains (35). **MLRA:** Western Coastal Plains (133B).

Water Quality. Shallow groundwater tables produce enough water for domestic purposes.

Landuse. This wetland type is often used for livestock grazing, timber and wildlife habitat. Areas are sometimes drained by clearing and channelization, and pasture grasses such as Bermuda grass are established. The frequent flooding restricts the use of these soils for crop production. There is some limited pine in areas where there have been adequate drainage measures installed. Areas adjacent to these wetlands are also commonly used for woodland or wildlife habitat.

Wetland Dependent Wildlife Species

Mammals: Eastern pipistrel, red bat, evening bat, raccoon, swamp rabbit, beaver, muskrat.
Birds: Anhinga, great blue heron, green heron, great egret, little blue heron, snowy egret, yellow-crowned night heron, black-crowned night heron, white ibis, wood stork, red-winged blackbird, king rail, sora, purple gallinule, common gallinule (moorhen), great horned owl, barred owl, belted kingfisher, fish crow, wood duck, mallard.
Reptiles: Common snapping turtle, common musk turtle, Mississippi mud turtle, Missouri River cooter, red-eared turtle, midland smooth softshell turtle, spiny softshell turtle, five-lined skink, broadhead skink, rough green snake, yellowbelly water snake, midland water snake, diamondback water snake, broadbanded water snake, eastern hognose snake, great plains rat snake, speckled kingsnake, Graham's crayfish snake, brown snake, western ribbon snake, common garter snake, copperhead, western cottonmouth, western pygmy rattlesnake, timber rattlesnake.
Amphibians: Central newt, Red River mudpuppy, marbled salamander, spotted salamander, smallmouth salamander, slimy salamander complex, dwarf American toad, Woodhouse's toad, Cope's gray treefrog, gray treefrog, Blanchard's cricket frog, western chorus frog, bronze frog, green frog, southern leopard frog, many ribbed salamander, four-toed salamander, green treefrog, bird-voiced treefrog.
Fish: Mosquitofish, smallmouth bass, largemouth bass, green sunfish, orange-spotted sunfish, warmouth, black crappie, white crappie, blue gill, redear sunfish, blackstripe topminnow, red shiner, golden shiner, bullhead minnow, brook silverside, blackspotted topminnow, yellow bullhead and black bullhead catfish, channel catfish, longnose gar, shortnose gar, spotted gar, alligator gar pirate perch, grass pickerel, bowfin.

Little River National Wildlife Refuge

Swamp/Marsh Site

McCurtain County

Location. This reference wetland is a portion of the Little River stream system. It is located on the east side of the Little River National Wildlife Refuge. Latitude: 33° 57' 44". Longitude: 94° 37' 36". Legal: Sec 7 T7S R26E.

General Description. This reference site represents wetlands that border the Little River stream system in McCurtain County. This wetland landform is characterized by long and narrow depressions in broad flood plains and whose origin can be traced to abandoned stream channels. Surface water accumulation is from out-of-bank flooding and/or runoff from adjacent areas. Sediment loading is limited to large flood events. Groundwater tables are 1 to 3 feet above the surface during the winter and early spring. These wetlands range in size from 2 to 80 acres.

Vegetative Community. Vegetation is dominated by an overstory of bald cypress. Understory vegetation is limited to the margins of the ponded water and consists of Hercules club, blue beech and buttonbush. In the ponded water, the sites are dominated by stinkweed and bladderworts. When disturbed by

drainage or filling, these sites convert to water primrose, smartweed, frog fruit and lizard's tail. Tree trunks are buttressed and root systems are fluted.

Hydrology. The water in these wetlands are provided by frequent floods of long duration and/or groundwater. Water tables range in depth from one to three feet above the surface the with the highest levels occurring during the winter through early summer. Subsurface water typically moves through out the soil profile.

Hydrologic Indicators. These soils often have reduced matrices and turn yellow when exposed to air. Other primary hydrologic indicators are 25 to 60 percent redox concentration

Soil Description. The Guyton soils series is the principal soil on this wetland type. Guyton soils formed in loamy and clayey sediments deposited on flood plains from out-of-bank flooding. The depositional materials that form this soil are sediments of Cretaceous geologic age. These soils developed under a closed canopy overstory in narrow depressional areas that are cutoff stream channels or depressional areas ponded by beaver activities.

Soil Profile

A: 0 to 5 inches, dark grayish brown (10YR 4/2) silty clay loam; weak fine granular structure; many (30%) medium and coarse yellowish red (5YR 4/6) redox concentrations; common fine and medium roots.

B1t: 5 to 15 inches, greenish gray (5GY 6/1) silty clay loam; weak coarse blocky structure; common (10%) fine yellowish red (5YR 5/6) redox concentrations; few medium and coarse roots.

B2t: 15 to 20 inches, greenish gray (5GY6/1) silty clay loam; weak coarse blocky structure; few (<5%) fine, strong brown (7.5YR 5/8) redox concentrations; few coarse roots.

Classifications

Cowardin: PFO1A, PFO1C, PEM1A. **Soil:** Fine-silty, siliceous, active, thermic. Typic Glossaqualf.

Landform. Ecoregion: Central Oklahoma/Texas Plains (29). **MLRA:** Western Coastal Plains (133B).

Water Quality. Shallow groundwater tables produce enough water for domestic purposes, but the dependability and quality of water make it insufficient for human consumption.

Landuse. This wetland type is commonly used for timber production. Areas are sometimes drained by channelization and pasture grasses established. Some areas are sufficiently drained so limited crop production can occur. Areas adjacent to these wetland are often used for improved pasture or forestland.

Wetland Dependent Wildlife Species

Mammals: Eastern pipistrel, red bat, evening bat, raccoon, swamp rabbit, beaver, muskrat.
Birds: Anhinga, great blue heron, green heron, great egret, little blue heron, snowy egret, yellow-crowned night heron, black-crowned night heron, white ibis, wood stork, red-winged blackbird, king rail, sora, purple gallinule, common gallinule (moorhen), great horned owl, barred owl, belted kingfisher, fish crow, wood duck, mallard.
Reptiles: Common snapping turtle, common musk turtle, Mississippi mud turtle, Missouri River cooter, red-eared turtle, midland smooth softshell turtle, spiny softshell turtle, five-lined skink, broadhead skink, rough green snake, yellowbelly water snake, midland water snake, diamondback water snake, broadbanded water snake, eastern hognose snake, great plains rat snake, speckled kingsnake, Graham's crayfish snake, brown snake, western ribbon snake, common garter snake, copperhead, western cottonmouth, western pygmy rattlesnake, timber rattlesnake.
Amphibians: Central newt, red river mudpuppy, marbled salamander, spotted salamander, smallmouth salamander, slimy salamander complex, dwarf American toad, Woodhouse's toad, Cope's gray treefrog, gray treefrog, Blanchard's cricket frog, western chorus frog, bronze frog, green frog, southern leopard frog, slimy salamander complex, many ribbed salamander, four-toed salamander, green treefrog, bird-voiced treefrog, bullfrog.
Fish: Mosquitofish, largemouth bass, yellow bullhead catfish, black bullhead catfish, channel catfish, green sunfish, orange-spotted sunfish, warmouth, black crappie, white crappie, blue gill, redear sunfish, blackstripe topminnow, red shiner, golden shiner, bullhead minnow, brook silverside, blackspotted topminnow, longnose gar, shortnose gar, spotted gar, alligator gar, pirate perch, grass pickerel, bowfin.

Ecoregions

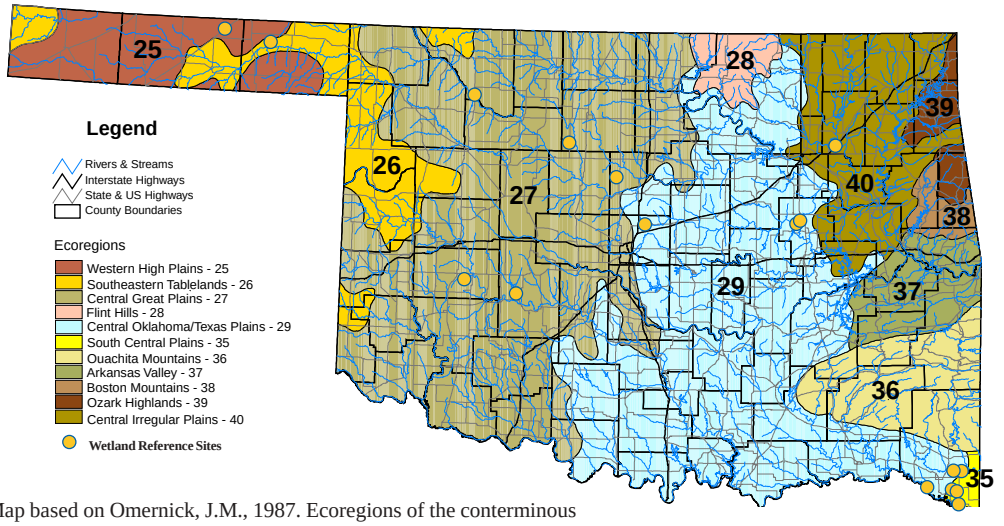
(This discussion of the state's ecoregions is adapted from Oklahoma's Biodiversity Plan: A Shared Vision for Conserving Our Natural Heritage *compiled by the Oklahoma Biodiversity Task Force, edited by Norman L. Murray, and published by the Oklahoma Department of Wildlife Conservation, 1996, and* Riparian Area Management, *produced by the Oklahoma Cooperative Extension Service and the Division of Agricultural Sciences and Natural Resources of Oklahoma State University and the Oklahoma Conservation Commission, published by the Oklahoma Cooperative Extension Service, Oklahoma State University, 1998.)*

Ecoregions are defined as relatively homogenous areas that can be mapped using factors such as land surface form, soils, land use and potential natural vegetation. Ecoregion maps assist individuals and managers in understanding naturally occurring conditions, regional patterns and resource potentials. A Roman numeral hierarchical scheme has been adopted for different levels of ecological regions. Level I and level II divide the North American continent into 15 and 51 regions, respectively. At level III, the continental United States contains 98 regions (United States Environmental Protection Agency, 1996). Explanations of the methods used to define the USEPA's ecoregions are given in Omernik (1995), Griffith et al., (1994), Gallant et al., (1989), and Bryce and Clarke (1996).

Ecoregions of Oklahoma

In this chapter, descriptions are provided for each of Oklahoma's 11 ecoregions.

Ecoregions of Oklahoma (Level III)



Map based on Omernick, J.M., 1987. Ecoregions of the conterminous United States. Annals of the Association of American Geographers 77:(1):118-125. Scale 1:8,000,000.

The division of these regions are based upon species diversity, natural communities and physical geography. The ecoregion discussions are broken into two parts — species diversity and natural communities.

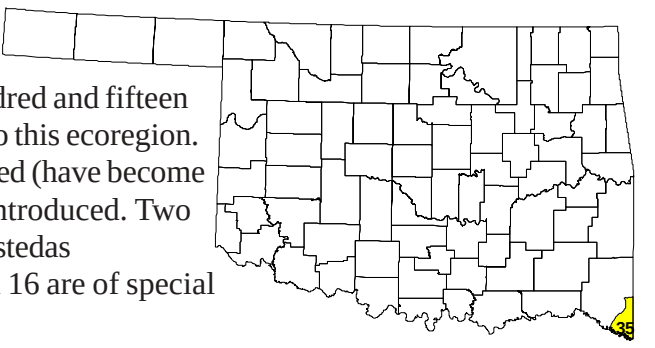
There are 634 native vertebrate species (fish, birds, and mammals) that reside in Oklahoma and many more that migrate through the state during the fall and spring. The total number of invertebrate species (worms, insects, mussels, crayfish, etc.) is not known. There are approximately 2,500 species of vascular plants (ferns, trees, grasses, sedges and various wildflowers) in Oklahoma. The total number of algal, fungal, and moss species is currently unknown.

The species diversity section addresses the number of vertebrates (primarily mammals and birds) found within each ecoregion. It should be noted that vertebrate distributions are not always limited to one ecoregion — in fact few species are found in only one ecoregion. For example, there are 328 vertebrate species listed for the Ouachita Mountains and 312 for the Arkansas Valley. However, most of these species will be found in both ecoregions. Likewise, squirrels are included in a species count for the Ozark Highlands, but are common in the Arkansas Valley and other ecoregions.

Oklahoma is host to a wide variety of natural communities. Biologists name communities based on the most common or characteristic plants present because plants are the most easily observed component of a community.

Although a community is named after characteristic plant species, the physical structure of the community (e.g., number and age of trees, fallen logs, ground cover, water availability, rocks) may be more important for animal survival than the plant species present. For example, wrens will nest in tree cavities regardless of the tree species as long as surrounding habitat is suitable.

South Central Plains (35)



Species diversity. Three hundred and fifteen vertebrate species are native to this ecoregion. Six species have been extirpated (have become extinct) and nine have been introduced. Two species are federally or state listedas endangered or threatened and 16 are of special concern.

Natural Communities. The South Central Plains ecoregion contains some of Oklahoma's most unusual biological communities. Although in Oklahoma these communities are found only in the southeast portion of the state, they are widespread throughout the southeastern United States.

The dominant communities in the South Central Plains are moist upland forests dominated by sweetgum, hickories, blackgum, and/or various species of oak. Stands of loblolly pine may occur on moist soils, but undisturbed examples are rare. These forests are tall with dense canopies. The shade is so dense in some stands that only ferns and other shade-tolerant plants can grow there. In natural stands, trees are of various ages and heights, create layers of vegetation.

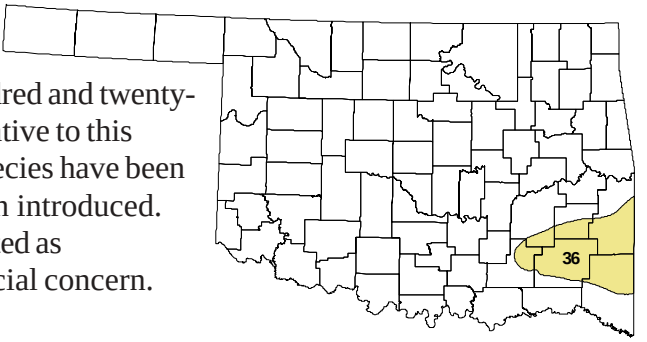
The multilayered nature of these communities actually increases animal diversity. Some animal species occupy the canopy or uppermost strata, while others are adapted to life in the shrubs or on the forest floor. Canopy openings (created by fallen trees, etc.) and forest edges receive increased amounts of light. The result is a profuse growth of shrubs and vines (such as grapes, poison ivy, and greenbrier) and groups of animals adapted for life in disturbed areas. All of these components — multiple vegetation layers, canopy gaps and forest edges — contribute to the structural complexity of a natural community and therefore to species diversity and habitat quality.

Swamps are a prevalent natural community in this ecoregion. They occur in low-lying areas along rivers and streams. Bald cypress, willow oak, overcup oak, water oak, planertree, water hickory and nutmeg hickory form species-rich, multilayered forests in these areas. The tree species present are determined by how long a site remains flooded. For example, bald cypress is most abundant in sites that are flooded for most of the year. Sites that are flooded in the spring but draw down (dry out) by early summer are dominated by mixed oak species.

Not all wetlands in this ecoregion are forested. Permanently flooded ponds and lakes host open wetland communities with thick canebrakes, southern wild rice, water lilies, lotuses, rushes and cattails. Drier land sites are also dominated by oaks but of different species from those that occur in the wetlands. Such sites may be forests or woodlands intermixed with pines. Understory species consist of blueberries, shrubby St. John's wort, and a variety of wildflowers and grasses. A unique and very rare natural community type in this region is the bluejack oak woodland that occurs on deep, sandy soil.

Grassland communities are also found in this ecoregion. Forest and woodland openings dominated by grass species such as little bluestem, indiangrass and sideoats grama may persist for many years. Pimple prairies, which are associated with mima mound topography, are a unique grassland type. Glades and pimple prairies are dependent on fire to prevent encroachment of trees and other woody species. Some grasslands or old fields in the ecoregion are the product of forest clearing and are dominated by the grass broomsedge, but other tallgrass prairie species may be present. However, these grasslands typically return to forest cover in the absence of repeated disturbance.

Ouachita Mountains (36)



Species diversity. Three hundred and twenty-eight vertebrate species are native to this ecoregion. Four vertebrate species have been extirpated and nine have been introduced. Three species are federally listed as endangered and 17 are of special concern.

Natural Communities. Ridge tops and south-facing slopes in the Ouachita Mountains were once covered by shortleaf pine woodlands, with scattered oaks and black hickory. Farkleberry and other blueberries are the main understory shrubs. Grasses (primarily little bluestem) are the predominant herbaceous cover in these woodlands, which were kept open by periodic fires. Glade and sparsely vegetated rock outcrop communities are also common.

North-facing slopes and ravines often support forests dominated by tree species that cannot tolerate the harsh dry conditions found on ridge tops and south-facing slopes. Mockernut and bitternut hickories, maples, and sweetgum, as well as white, northern red, and chinquapin oaks are common. There are more tree and shrub species in these communities than in the drier pine forests. Therefore, the understory vegetation is well developed, but the ground cover is often sparse and scattered due to dense shade and the thick carpet of leaves. One of the unique communities found in this ecoregion is composed of dwarf white and blackjack oaks which occur on shallow soil along high ridges.

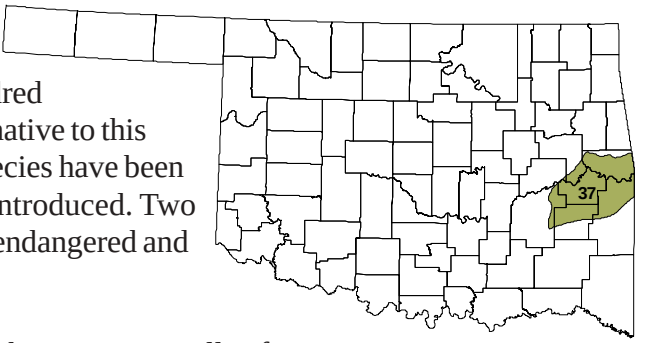
Bottomland forests occur along streams and other bodies of water. Water and willow oaks, hickories, sweetgum, and black gum dominate these forests. Bottomland forests are tall and the canopy may reach 100 feet (30m) in height, with two to four vegetation layers beneath. These communities have a rich diversity of understory trees and shrubs, including flowering dogwood, ironwood, spicebush and buttonbush. American beech and cucumber magnolia are trees common in the eastern United States, but they extend to this part of Oklahoma.

As in other forests when canopy gaps are formed, increased amounts of light reach the ground and a lush growth of herbaceous vegetation and vines result. Grassland communities are fairly rare in this ecoregion and are typically restricted to glades and south-facing slopes. Grasslands composed of broomsedge and some tallgrass prairie species may form when forests are cleared, but they eventually convert to forest vegetation in the absence of disturbance. It is interesting to note that Thomas Nuttall, a naturalist traveling through parts of Oklahoma in the early nineteenth century, reported that

extensive grasslands covered the Kiamichi River Valley.

Another interesting community type in the Kiamichi Mountains is created by rock slides, which produce unique habitats for plants and animals. Trees and shrubs grow among the rocks, but soils are shallow. Mosses grow in moist crevices. Rocky areas provide sunning surfaces for reptiles. The many crevices found in these areas also serve as dens for many mammals, insects, and other animals as well as escape habitat. Larger crevices and rock shelters serve as summer bat roosts.

Arkansas Valley (37)



Species diversity. Three hundred twelve vertebrate species are native to this ecoregion. Four vertebrate species have been extirpated and 11 have been introduced. Two species are federally listed as endangered and 16 are of special concern.

Natural communities. The Arkansas River Valley forms a geological break between the Ozark Highlands to the north and the Ouachita Mountains to the south. Some of the natural communities found in this ecoregion are more common in the Central Oklahoma/Texas Plains to the west.

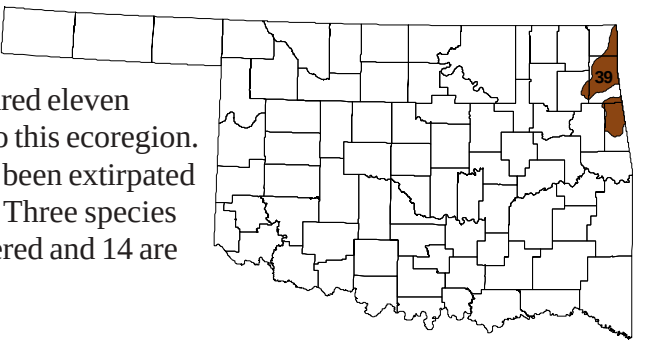
Dry forests and woodlands of post oak, blackjack oak, and black hickories dominate rugged areas and extend into the plains. The trees in these communities are relatively short (approximately 50 feet [15m] tall), and a significant portion of the vegetation cover is provided by grass species. Understory shrubs include blackhaw, farkleberry, and St. Andrew's Cross. Shortleaf pine woodlands may be found on ridge tops of this ecoregion and are structurally similar to the Ouachita Mountains communities. Likewise, north facing slopes and ravines support forests composed of maples, white oak, northern red oak and chinquapin oak.

Tallgrass prairie communities, composed of big and little bluestem, indiangrass, switchgrass and other grasses are common in the broad valleys. A wide variety of wildflowers and other plants also are present. Prairie communities are often scattered between dry upland forests and the bottomland hardwood forests that occur along streams. As in all grasslands, fire discourages the growth and invasion of woody plants and is important for grassland maintenance.

Lush forests of oak, elm, and hackberry occur along streams and rivers. These forests are often taller than those in the uplands (about 100 feet [30m]) and may

have two or three understory layers. Dense mats of dead leaves and other litter accumulate on the forest floor. Scattered clumps of low vegetation thrive in these heavily shaded forests, except in canopy openings, where a lush growth of herbaceous plants and vines is common.

Ozark Highlands (39)



Species diversity. Three hundred eleven vertebrate species are native to this ecoregion. Three vertebrate species have been extirpated and 10 have been introduced. Three species are federally listed as endangered and 14 are of special concern.

Natural Communities. Dry oak-hickory forests and woodlands occur on well--drained soils on slopes, hills and plains. Trees are of medium height, averaging 20 to 60 feet (6 to 18m). The canopy is relatively open and allows for an understory composed primarily of grasses. Exposed rock is common. Blackjack oak, post oak black hickory and winged elm are common in the canopy and coralberry, huckleberry and blackhaw in the understory.

Forest communities on north-facing slopes and ravines grow on moist soils under cooler conditions. The trees here often attain average heights of 60 to 90 feet (18 to 27m). Sugar maple, white oak, chinquapin oak, mockernut hickory, and bitternut hickory are common in the overstory. The canopy is closed and often produces dense shade. Therefore, the forest floor is available only to shade-tolerant shrubs (e.g., flowering dogwood, pawpaw, spicebush and bladdernut), herbaceous plants (e.g., may apple, dogtooth violet and bloodroot), and mosses, ferns and liverworts. These herbaceous species often blanket the forest floor in early spring before tree leaves produce shade.

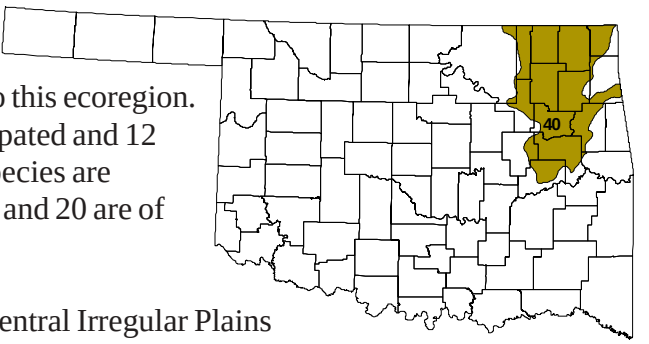
Ridge tops and south-facing slopes support grassland communities. Some of these communities are sparsely vegetated glades and rock outcrops. Prairies may develop on slopes with deeper soils. Big and little bluestem, indiangrass and a variety of wildflowers are characteristic of these tallgrass communities.

Bottomland hardwood forests occur along the flood plains of larger Ozark streams. The overstories of these forests are composed of Shumard oak, sycamore, cottonwood, and elms. Understory vegetation may be sparse due to annual scouring floods. Soils in these forests are often gravelly with sand or a thick layer of humus.

In places, the limestone formations underlying the Ozark Highlands have dissolved, forming sinkholes and caves. These habitats can support remarkably

diverse animal communities. The caves are indeed unique, because no light enters these habitats, and green plants, the base of most terrestrial food chains, are absent. Animals that live in cave streams (blind fish and crayfish) must rely on the guano (droppings) produced by roosting bats and material carried into the caves by floods for energy. Other wildlife species also use the caves for shelter.

Central Irregular Plains (40)



Species diversity. Three hundred twenty-seven vertebrate species are native to this ecoregion. Six vertebrate have been extirpated and 12 have been introduced. Four species are federally listed as endangered and 20 are of special concern.

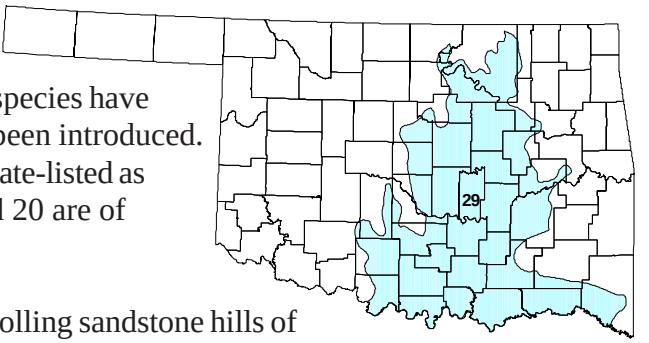
Natural communities. The Central Irregular Plains ecoregion is essentially a band of tallgrass prairie separating the forested Ozark Highlands from the Central Oklahoma/Texas Plains. Tall grasses such as big and little bluestem, indiangrass, and switchgrass are the dominant species. In lowland areas, species such as big bluestem and indiangrass may grow in excess of eight feet (2.5m) in height. Sunflower, Indian blanket, blazing star, and other wildflowers grow among the grasses. The diverse numbers of wildflowers provide nectar for hummingbirds and insects and seeds for small mammals and birds. Fire is important in maintaining these grasslands. In the absence of fire, woody plants such as sumac, blackberries and persimmons invade grassland communities. Dry, shallow soils composed of gravel support glades vegetated by side oats and hairy grama. Dry upland forests and woodlands composed of post oak, blackjack oak and black hickory occur on hilltops and ridge lines. The trees in these forests are short and the canopy is open. Prairie grasses and wildflowers are abundant in unshaded parts of the forest floor. Sumac, coral berry, and persimmon form dense thickets along forest borders.

Broad flood plains support forests of elm, oak, hackberry, cottonwood and sycamore. Because these streams slope gently, the forest floor is not as heavily scoured as bottomlands in the Ozarks. The forest floor is heavily shaded, allowing for limited on understory development. In poorly-drained sites, sedges, willows and buttonbush form thickets along wetland edges.

Caves, like those found in the Ozark Highlands, have formed in areas of limestone outcrops. Bat droppings and debris washed into the caves during floods provide the energy necessary to support the many unique cave species.

Other species able to live outside caves also use caves for shelter and foraging areas.

Central Oklahoma/Texas Plains (29)



Species diversity. Three hundred fifty-one species are native to this ecoregion. Ten species have been extirpated and 13 have been introduced. Four species are federally or state-listed as threatened or endangered and 20 are of special concern.

Natural Communities. The rolling sandstone hills of the Central Oklahoma/Texas Plains support a mosaic of natural communities and are a transition zone between the large eastern forests and the western grasslands. In the more level northern and southern portions of the ecoregion, prairie communities cover most of the landscape, with woodlands on slopes, in draws, and along streams and rivers. Throughout the central pact of the ecoregion, dry upland forests blanket the hills and bottomland forests occur along streams. Prairies are scattered throughout this ecoregion.

Upland forests occurring in this ecoregion are called crosstimbers. The origin of this term is obscure, but the most likely explanation is that when settlers and explorers first crossed Indian Territory, they encountered extensive grasslands after leaving the eastern mountains. On the horizon, they could see a wide belt of *timber* that *crossed* the plains. These open forests consist of short post oaks and blackjacks up to about 40 feet [15m] in height. Black hickories are scattered among the oaks on moist sites. Redbud, roughleaf dogwood, and other small trees and shrubs are common in open areas. In drier, less suitable locations, trees are shorter and more scattered. Blackjack oaks have rounded crowns that may extend to the ground. Understory development is limited. Fire is an important force in this community, reducing shrub cover and burning away low tree limbs. Unburned stands may develop into dense forests of post oak and blackjack oak.

Grasslands composed of big and little bluestem, indiangrass, and switchgrass are predominant in this ecoregion. Scattered pockets of species typical of western shortgrass prairies can be found on dry, shallow soils and interspersed clay layers. The diversity of wildflowers is high, providing nectar for hummingbirds and insects and seeds for a variety of wildlife. Hackberry, American elm, red elm, black walnut, green ash, and cottonwood are common along streams in this ecoregion. Post oaks are also found in bottomlands, but grow taller than

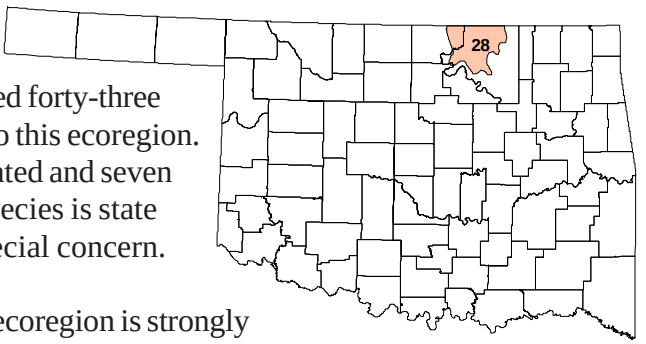
those on upland sites. In more open sites, cottonwoods, willows, sedges, and rushes line rivers and streams.

Bottomland forests of this ecoregion also serve as a transition from eastern to western natural communities. Bottomland forests in eastern Oklahoma, where rainfall is abundant, are very diverse in the number of species. In western areas, where water can be scarce, the plant community is composed of fewer species. Willows and cottonwoods dominate bottomland forests in the west. Eastern bottomland species that require very moist conditions cannot persist in western portions of the ecoregion, and they are replaced on floodplains by eastern species that grow on moist upland sites. Also, more sunlight reaches the forest floor at some western sites, resulting in greater amounts of herbaceous vegetation development.

A few sandstone caves are scattered throughout the ecoregion. They are typically small and support only sporadic populations of bats during the summer months. They are too small to support hibernating bats or other cave life.

The Arbuckle Mountains are a distinct feature within this ecoregion. Although the highest peaks are located in Murray and Carter Counties, the Arbuckle Mountains do extend east into Pontotoc and Johnston Counties. In Murray and Carter Counties, the Arbuckle Mountains are composed of eroded limestone and conglomerate that produces more rugged topography than the surrounding plains. Although most natural communities in the Arbuckle Mountains are similar to others in the ecoregion, unique species and communities do occur in the area. Several species common on the Edward's Plateau of central Texas can be found in the Arbuckle Mountains (e.g., short-lobe oak, Texas ash and Texas oak). The moist bottomland forests have several species common in eastern Oklahoma. Clear, cool, fast-running, spring-fed streams are common. The animal species found in this ecoregion are similar to those found in the eastern part of the state.

Flint Hills (28)



Species diversity. Two hundred forty-three vertebrate species are native to this ecoregion. Five species have been extirpated and seven have been introduced. One species is state threatened and four are of special concern.

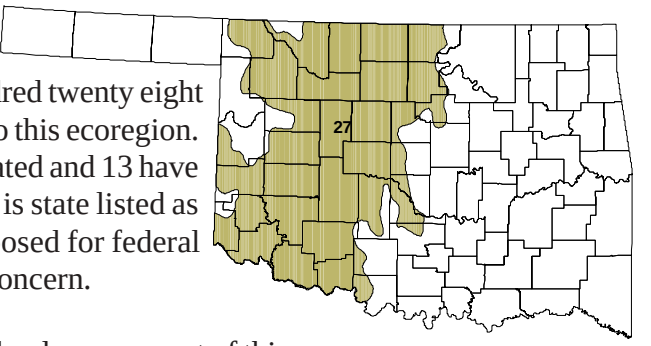
Natural Communities. This ecoregion is strongly associated with lush, tallgrass prairies. They are the products of gently rolling topography, which is conducive to natural fires. Big and little bluestem, indiangrass and switchgrass (the 'big four" prairie grasses) are the

primary grasses. In lowland sites, big bluestem and indiangrass may reach 10 feet (3m) in height. These grasslands are rich in wildflower species. Dry, shallow soils are vegetated by short grass species, such as side oats, blue and hairy gramas. Prickly pear cactus and yucca may also be common. As in all grasslands, fire is essential for prairie regeneration and control of red cedar and other woody plants.

Dry upland forests, dominated by blackjack and post oak, occur in moist areas. These forests are also referred to as crosstimbers. The trees are relatively short (about 40 feet [12m] high) with open canopies. A heavy cover of shrubs sod prairie plants on the forest floor is common. Historically, fire maintained a mosaic of crosstimber forest, woodland, and grassland habitats.

Bottomland forests form narrow borders along streams. Cottonwoods, hackberries, elms and oaks form tall forests (about 100 feet [30m]) with expansive canopies. Because these forests are narrow, light can penetrate beneath the canopy, resulting in lush forest floor vegetation. Dense thickets of grapevine, poison ivy and greenbrier are common.

Central Great Plains (27)



Species diversity. Three hundred twenty eight vertebrate species are native to this ecoregion. Five species have been extirpated and 13 have been introduced. One species is state listed as threatened (but has been proposed for federal listing) and 21 are of special concern.

Natural communities. Grasslands cover most of this ecoregion, with woodlands scattered in ravines and along streams. Narrow bands of crosstimbers vegetation extend into the prairie from the east. Mesquite and shinnery oak woodlands extend into the ecoregion from the west. The Wichita Mountains and, to a lesser extent, the Gypsum Hills provide not only a visual contrast to the plains, but also provide unique habitats that increase the species diversity in the ecoregion.

The grasslands in this ecoregion represent a transition zone between tallgrass and shortgrass prairie communities. These grasslands consist of a mixture of species from both communities and are called the mixed grass prairie. Little bluestem, sideoats grama and dropseeds are the dominant grass species. These grasses average about 20 inches (50 cm) in height. In eastern portions of the ecoregion, little bluestem forms a dense sod similar to that found in tallgrass communities. In more arid western parts of the ecoregion, little bluestem and other grasses occur in isolated bunches, with wildflowers in the spaces between.

Tallgrass prairie communities can be found on deep, moist soils, and shortgrass communities are prevalent on thin soils.

Herbaceous plants occur in areas where grasses do not use all the available moisture. Many plants bloom early in the year before they are shaded by grasses. Other species depend on deep root systems to provide sufficient water for summer and fall growth.

Woody plants are not abundant in many parts of the ecoregion due to insufficient water. Exceptions are the forests found along rivers and streams. Cottonwoods and willows are the most important trees in these forests, but hackberries and elms may be abundant. An interesting feature in this ecoregion are sandstone canyons in Caddo and Canadian Counties, where sugar maple and other eastern species can be found.

Mesquite woodlands extend from Texas into the western Oklahoma counties. Mesquite is a tall shrub or small tree that may attain 8 to 15 feet (2.5 to 4.5m) in height. Prairie vegetation is scattered throughout these woodlands. A diverse community of animals, some of which are more typical further west, can be found in mesquite woodlands.

Salt flats and springs occur throughout the ecoregion, associated with the Gypsum Hills. The largest salt flat is the Great Salt Plains in Alfalfa County, which provides nesting and foraging habitat for shorebirds and the endangered least tern. Salt marsh vegetation, with species characteristic of coastal marshes, is associated with these habitats. The Red River pupfish, found only in Oklahoma and Texas, is adapted to live in the saline waters of streams in southwestern Oklahoma.

The Wichita and Quartz Mountains are granitic remains of a once taller mountain chain. They now appear as low mountains and outcrops that rise abruptly from the surrounding plain. These mountains run from east to west and occur primarily in Comanche, Kiowa and Greer Counties. The Wichita Mountains National Wildlife Refuge and Quartz Mountain State Park provide excellent examples of the habitats found in this area.

Large tracts of crosstimbers occur on mountain slopes, extending into the valleys. Stunted oaks and cedars also grow among the large boulder fields, and some areas are devoid of vegetation. A colorful palette of lichens covers many of the boulders. Reptiles and other animal species live on these dry, rocky slopes. Mixed grass prairie vegetation is abundant, but tallgrass prairie occurs on moist sites. Dry hilltops and overgrazed lowlands contain shortgrass communities typical of drier portions of the ecoregion. Mesquite woodlands are also present.

The rugged terrain of these mountains creates diverse habitats that can support plant communities more characteristic of eastern Oklahoma. For example, sugar maples can be found in some of the canyons in this ecoregion. Lush bottomland forest vegetation grows in the valleys and canyons. These forests are diverse and have many plant species found in eastern Oklahoma. In Oklahoma, the plateau live oak can be found only in the Wichita and Quartz Mountains. It is also common in central Texas.

A few scattered granitic caves support summer populations of bats. Because granite is resistant to weathering, these caves are usually too small to serve as maternity caves or hibernation sites for bats. Other animals enter the caves for shelter.

Gypsum Hills and Redbed Clay Plains - Three gypsum formations are present in this ecoregion. The topography is characterized by mesas and deeply eroded canyons. Many of the plant species found here are adapted to high concentrations of salt in the soil. In Oklahoma, redberry juniper is found only in the Gypsum Hills.

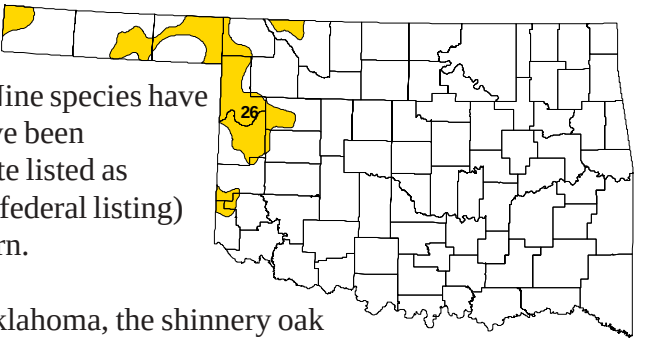
Gypsum is highly erodible and several large caves are found in the Gypsum Hills. Oklahoma's largest bat colonies (primarily Mexican free-tailed bats and cave myotis) are found here. Mexican free-tailed bats form colonies of several million individuals. They use the caves as summer roosts and maternity colonies, and then migrate to Brazil in the fall. In addition to other bat species, cave crickets and invertebrates use the caves year-round. Although gypsum caves do not support as many species as the limestone caves of northeastern Oklahoma, they are nonetheless important shelter and hibernating sites for wildlife.

Rolling redbed plains surround the gypsum hills. The high content of iron in these soils produces the characteristic red color. The soils are derived from Permian sandstone and shale. Mixed grass prairie vegetation is typical of this region.

Western sand dunes - Sand dunes occur along all major rivers in this ecoregion, except the Washita River, and are most extensive on the north banks. Although some are still active (moved by wind and water), most dunes are at least partially stabilized by vegetation. Most of the vegetation is provided by sandsage, a small rounded shrub that grows from two to three feet (1 m) in height. Dense thickets of fragrant sumac and sand plum, which seldom exceed five feet (1.5m) in height, are also common. Sand bluestem, little bluestem and giant sandreed grow among the sandsage. Many wildflowers unique to deep sandy soils, such as spectacle pod and silky prairie clover, are also common. Bare sand and blowouts occur between clumps of vegetation.

Small natural wetlands form between dunes in areas where the water table is high. Various rushes, sedges, cattails and other wetland plants provide the base for wetland communities. These communities are important for many wetland species, including migrating shorebirds and waterfowl.

Southwestern Tablelands (26)



Species diversity. Two hundred thirteen vertebrate are native to this ecoregion. Nine species have been extirpated and seven have been introduced. One species is state listed as threatened (now proposed for federal listing) and eight are of special concern.

Natural Communities. In Oklahoma, the shinnery oak scrub community is found only in this ecoregion. Shinnery oak forms dense, circular clumps called mottes. These trees reproduce by root suckering, so all the trees in a motte may be actually a single plant. Stems in a motte may reach 10 to 15 feet (3 to 4.5m) in height, but stems on the motte edge may only reach 2 feet (0.5m) in height. Woody growth is so dense within the motte that few other plants are to be found. Although they are small, these oaks may produce heavy acorn crops, providing a valuable food source for many wildlife species. Mixed grassland plant species, dominated by little bluestem, are common in spaces between mottes.

Mixed grass prairie dominates other upland areas in most of the ecoregion, but gives way to shortgrass prairie in the Panhandle. The species composition of these grasslands is similar to those in surrounding ecoregions. Little bluestem dominates mixed grass sites, while blue grama and buffalograss dominate shortgrass communities.

Cottonwoods and willows dominate bottomland forests occurring along rivers and streams. Some areas have elms and hackberries scattered among the cottonwoods. In some areas, cottonwoods are thinly scattered with thick stands of shrubby willows underneath.

Western sand dunes - Except for the Washita River, sand dunes occur along all major rivers in this ecoregion, especially along their northern banks. Community structure and species composition is very similar to that described in the Central Great Plains section.

Western High Plains (25)

Species diversity. One hundred eighty-seven vertebrate species are native to this ecoregion. Seven species been extirpated and 10 have been introduced. One species is state listed as threatened (now proposed for federal listing) and seven are of special concern.

Natural Communities. The shortgrass prairie community forms much of the Western High Plains ecoregion. Gramagrass and buffalograss are dominant. They form dense sods and grow from three to five inches (7.6 to 12.7cm) in height. Short grass species are adapted to drought conditions and grow rapidly during the spring, becoming dominant during periods of drought. Various wildflowers, such as plants zinnia and plains blackfoot occur among the grasses. Prickly pear and other cacti are also present. Due to the lack of water, trees and woody shrubs are uncommon. In wetter areas with deep soils, small mixed grass prairie communities typical of the Central Great Plains are present.

The Western High Plains contain a unique wetland community known as playa lakes. These shallow, circular depressions fill with water draining from the surrounding plain. Because the evaporation rate in the area greatly exceeds the precipitation, these wetlands are wet for relatively short periods of time. Ranging from less than one acre to several hundred acres in size, the communities offer the most significant wetlands in the southern pact of the Central Flyway, the migration route of waterfowl and shorebirds in Midwestern North America. Playas are vital wintering or stopover places for migrating waterfowl and other wetland birds. The wet/dry cycle that occurs every year may result in high levels of productivity. Wheat grass and vine mesquite are common grasses in playas. Smartweed grows in playas that remain wet for longer periods.

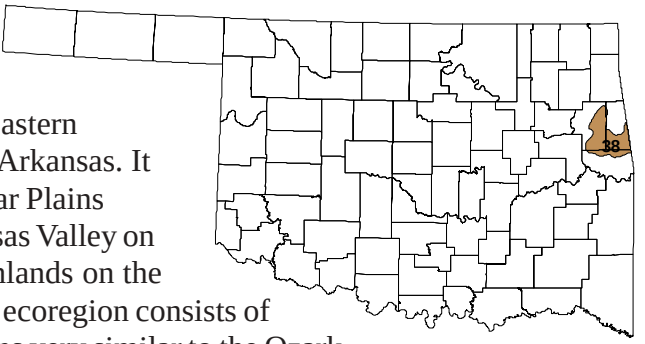
Narrow strips of open cottonwood forests are present along some streams. A dense cover of shrubby willows often grows under the cottonwoods. Herbaceous plants and grasses grow taller in these areas due to more available water. These riparian forests are communities that are important to forest wildlife species occurring in the ecoregion.

This ecoregion contains the largest prairie dog towns in Oklahoma. Although greatly reduced in size and number, these towns support a unique community. By digging burrows, prairie dogs create an additional component of physical structure in the community. Burrows, which may be 15 to 20 feet (4.5 to 6m) deep, serve as shelters for many wildlife species, including burrowing owls, foxes and a variety of reptiles and amphibians. Soil excavated during the tunnel

building is deposited as mounds at entrances, providing suitable conditions for species requiring disturbed soil. The resulting vegetation associated with these towns provides important nesting habitat for several bird species, including the long-billed curlew.

Western sand dunes - Narrow belts of sand dunes occur along the Cimarron and North Canadian (Beaver) Rivers in the northeastern portion of this ecoregion. Community structure and species composition is similar to that of the Central Great Plains ecoregion.

Boston Mountains (38)



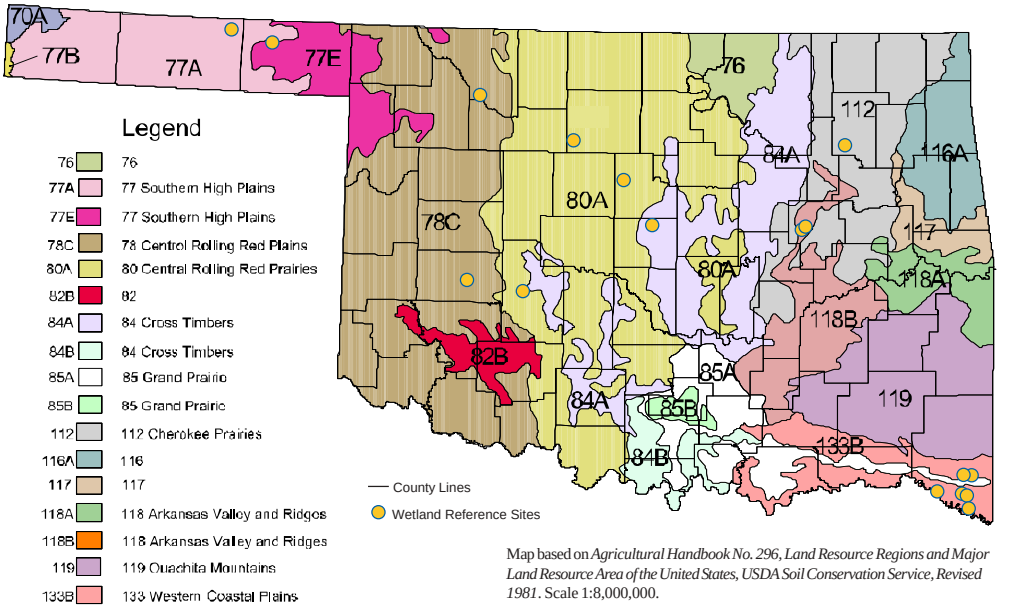
The Boston Mountains ecoregion is located in northeastern Oklahoma and northwestern Arkansas. It neighbors the Central Irregular Plains ecoregion on the west, Arkansas Valley on the south and the Ozark Highlands on the north. The topography of this ecoregion consists of rugged hills and low mountains very similar to the Ozark Highlands. However, the Boston Mountains are composed of Pennsylvanian sandstone, as opposed to the Mississippian limestones of the Ozark Plateau. Land use is forest and grazed woodlands. Soils are primarily ultisols.

Natural communities. The potential natural vegetation is characterized by an oak/ hickory mixture and is very similar to that of the Ozark Highlands. Refer to the Ozark Highlands for a more detailed description.

Major Land Resource Areas

(This description of Major Land Resource Areas is derived from the Agricultural Handbook No. 296, Land Resource Regions and Major Land Resource Area of the United States, USDA Soil Conservation Service, Revised 1981.)

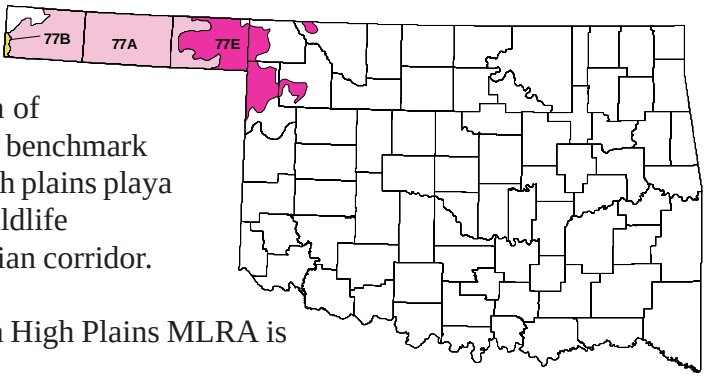
Major Land Resource Areas of Oklahoma



Map based on *Agricultural Handbook No. 296, Land Resource Regions and Major Land Resource Area of the United States, USDA Soil Conservation Service, Revised 1981*. Scale 1:8,000,000.

A Major Land Resource Areas (MLRA) is a unit characterized by similar patterns of soil, climate, water resources, land use, geology, elevation and topography. The MLRA classification system is predominantly utilized by the USDA Natural Resources Conservation Service and soil scientists. The ecoregion approach is a similar regional characterization system used primarily by water resource professionals.

Southern High Plains (77)



The Southern High Plains MLRA is located in the northwest portion of Oklahoma. Examples of benchmark wetlands include the high plains playa and the Beaver River Wildlife Management Area riparian corridor.

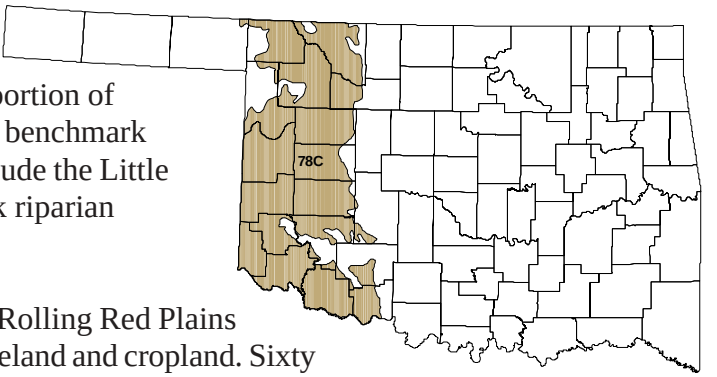
Landuse in the Southern High Plains MLRA is

primarily farming and ranching. Forty percent is native grass and shrub rangeland grazed by cattle. Thirty-three percent of the area is cropped to winter wheat, grain sorghum and cotton. A short grass community such as blue grama and buffalograss dominates vegetation in this MLRA.

The area is characterized by gently sloping plains with elevation ranging from 800 to 2000 meters. Along major rivers such as the Cimarron and Canadian, breaks may be very steep and flood plains may have a dunelike topography. Rainfall within the Southern High Plains is approximately 375 to 550 mm, with a freeze-free period of 130 to 220 days.

The soils of the Southern High Plains MLRA are generally deep and fine, medium or coarse textured. The general soil profile includes sandy areas along the major waterways, loamy areas in the southwest and clayey areas of the playa lake basins.

Central Rolling Red Plains (78)



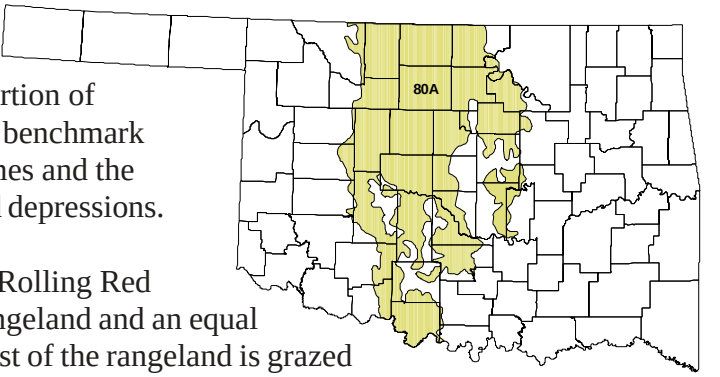
The Central Rolling Red Plains MLRA is located in the western portion of Oklahoma. Examples of benchmark wetlands in the area include the Little Sahara and Cloud Creek riparian corridor wetlands.

Land use in the Central Rolling Red Plains MLRA is primarily rangeland and cropland. Sixty percent of the area is rangeland grazed by beef cattle while 35 percent is cropped with winter wheat and grain sorghum. The dominant vegetation type consists of mid-size and tall grasses such as sand bluestem and little bluestem.

Dissected plains with gently sloping divides characterize the area. Valleys may be bordered with dunelike topography. The elevation in the area ranges from 500 to 900 meters. The average precipitation in the Central Rolling Red Plains is approximately 500 to 750 mm with a freeze-free period of 185 to 230 days.

Soils in the area are characterized by being generally level to gently sloping, well drained, deep, and either sandy or loamy but with a loamy subsoil.

Central Rolling Red Prairies (80)



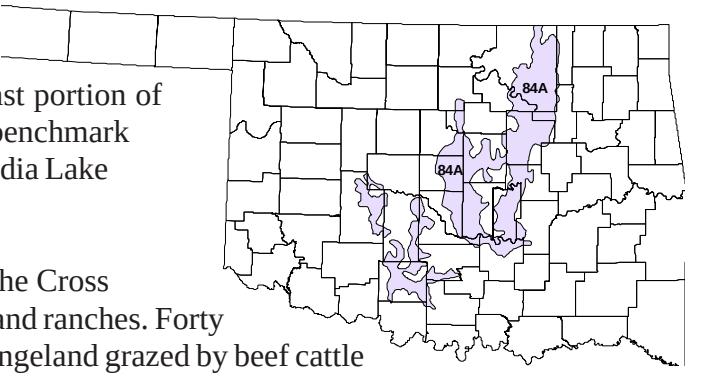
The Central Rolling Red Prairie MLRA is located in the central portion of Oklahoma. Examples of benchmark wetlands include the Ames and the Cimarron Terrace closed depressions.

Land use in the Central Rolling Red Prairies is 40 percent rangeland and an equal amount of cropland. Most of the rangeland is grazed by beef cattle, however, dairy cattle operations also exist. Mixed prairie vegetation is dominant. Cropland is primarily sowed with winter wheat. A major land management concern in the area is soil erosion due to intensively cultivated or overgrazed areas.

Along the plains the area is characterized by gently rolling divides with hilly and steep valley sides. The elevation ranges from 300 to 500 meters. Precipitation in the Central Rolling Red Prairies averages approximately 625 to 900 mm with a freeze-free period of 190 to 230 days.

The area consists of nearly level to sloping, well drained or moderately well drained, deep or moderately deep loamy or clayey soils.

Cross Timbers (84A)



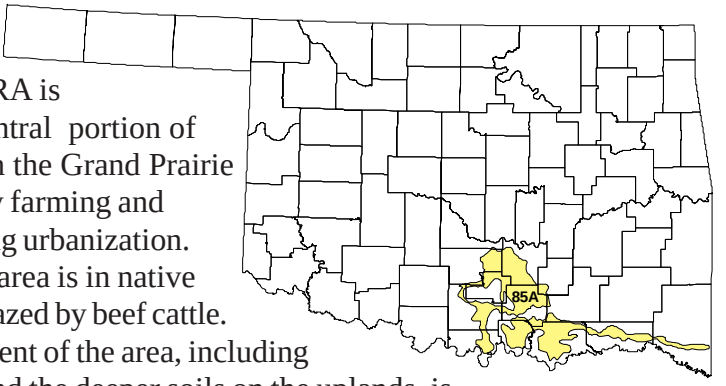
The Cross Timbers MLRA is located in the south central and northeast portion of Oklahoma. Examples of benchmark wetlands include the Arcadia Lake riparian corridor wetland.

The primary land use in the Cross Timbers MLRA is farms and ranches. Forty percent of the area is in rangeland grazed by beef cattle and 30 percent is woodland. Vegetation consists of open stands of trees such as post oak and blackjack oak, with an understory of midsize and tall grasses, forbs and low, woody plants.

The area is characterized by rolling to hilly uplands with nearly level ridge tops. The elevation ranges from 300 to 400 meters. Average precipitation ranges from 625 mm to 900 mm, with a freeze-free period of 190 to 240 days.

The soils of the Cross Timbers MLRA are characterized by well-drained, gently sloping, deep soils. The area consists of generally loamy to clayey soils.

Grand Prairie (85)

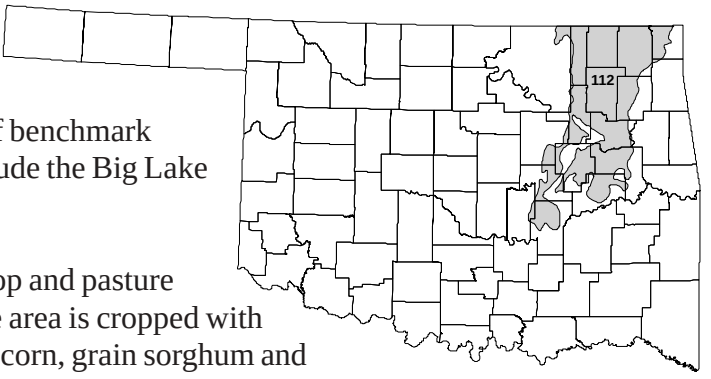


The Grand Prairie MLRA is located in the south central portion of Oklahoma. Land use in the Grand Prairie MLRA is dominated by farming and ranching with increasing urbanization. Over 40 percent of the area is in native rangeland, primarily grazed by beef cattle. Approximately 25 percent of the area, including valleys, bottomlands and the deeper soils on the uplands, is cropland. The principle crops include oats, wheat, grain sorghum, forage, cotton, corn and hay. The natural vegetation in the area consists of prairie grasses with scattered live oaks.

The area is characterized by gently rolling to hilly plateaus and the Arbuckle Mountains. Stream valleys are generally shallow and narrow near their headwaters but deepen and broaden in the eastern portions of the area. Elevation ranges from 200 to 500 meters with the greatest elevations around the Arbuckle Mountains. Precipitation in the Grand Prairie area ranges from 700 to 1,025 mm, with a freeze-free period of between 200 and 260 days.

The soils in the area are generally well drained and fine textured. The general soils profile is sandy to stony with rock outcrops near the Arbuckle Mountains.

Cherokee Prairies (112)



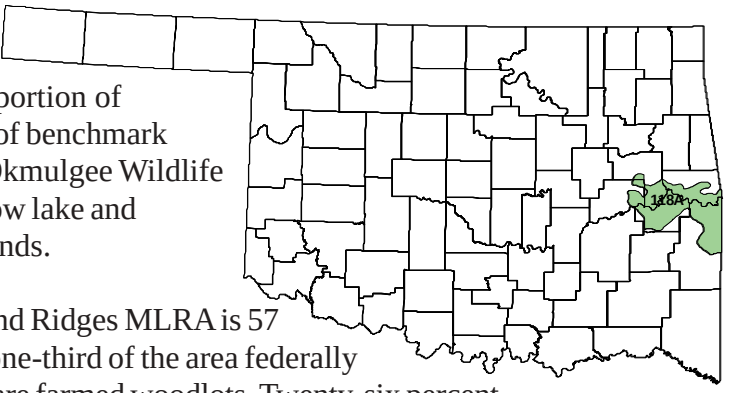
The Cherokee Prairie MLRA is located in the north east portion of Oklahoma. Examples of benchmark wetlands in the area include the Big Lake forested wetland.

Land use is primarily crop and pasture land. Fifty percent of the area is cropped with winter wheat, soybeans, corn, grain sorghum and other feed grains. Pasture grasses and legumes make up about one-third of the area. The dominant natural vegetation types include both tall grasses such as big bluestem, little bluestem, indiangrass, and switchgrass as well as trees such as red oak, white oak and shagbark hickory.

Gently sloping plains are underlain by sandstone, shale and limestone. The elevation of the Cherokee Prairies ranges from 100 to 400 meters. The average precipitation ranges from 900 to 1,050 mm with an average freeze-free period of 190 to 235 days.

The soils of the Cherokee Prairie MLRA are shallow to deep, and medium to moderately textured.

Arkansas Valley and Ridges (118)



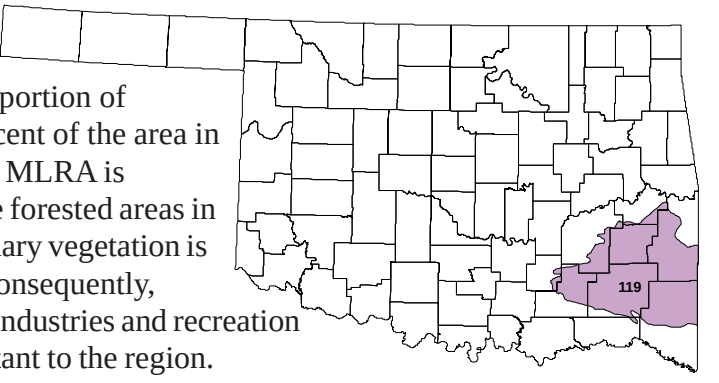
The Arkansas Valley and Ridges MLRA is located in the eastern portion of Oklahoma. Examples of benchmark wetlands include the Okmulgee Wildlife Managment Area oxbow lake and riparian corridor wetlands.

The Arkansas Valley and Ridges MLRA is 57 percent forested with one-third of the area federally owned and two-thirds are farmed woodlots. Twenty-six percent of the area is grazed pastures of tame and native grasses and legumes. The primary vegetation of the area is hardwood forest with overstory species including red oak, white oak and hickory.

Ridges and valleys characterize the area with elevations ranging from 900 m to 100 meters. Precipitation ranges from 1,125 to 1,275 mm with a freeze-free period of 200 to 240 days.

The soils of the Arkansas Valley and Ridges MLRA are stony to non-stony and medium textured.

Ouachita Mountains (119)



The Ouachita Mountains MLRA is located in the southeast portion of Oklahoma. Over 75 percent of the area in the Ouachita Mountains MLRA is forested with most of the forested areas in farm woodlots. The primary vegetation is hardwood pine forest. Consequently, lumbering, wood-using industries and recreation are economically important to the region.

Steep mountains characterize the area, as well as valleys underlain by folded and faulted shale, slate, quartzite, sandstone and chert. Elevation ranges from 800 meters at the mountain tops to 100 m at the lowest valleys. The average precipitation ranges from 1,225 to 1425 mm with an average freeze-free period of 200 to 240 days.

The soils of the Ouachita Mountains MLRA are generally stony and non-stony and medium textured.

Glossary

(These terms, as defined in this glossary, are to assist users of this document and are not intended to add to or replace definitions in the referenced materials.)

Alluvium - Sediment deposited by flowing water, as in a riverbed, flood plain, or delta. Also called alluvion. *pl* **Alluviums** or **alluvia**. *adj* **Alluvial**.

Annual - A plant that completes its life cycle in one year or less.

Buttressed - The broadened base of a tree trunk or a thickened vertical part of it. Swelling of the base of the trunk of Taxodium and Nyssa species, usually occurring within several meters of the soil surface where flooding may occur. Size is a function of duration, depth and frequency of flooding.

Clayey - *adj* 1. Consisting of or characterized by the presence of clay; abounding in or being clay; like clay. 2. Covered, daubed or soiled with clay. 3. Resembling that of clay (e.g., color).

Closed Depression - A low-lying area surrounded by higher ground with no natural outlet for surface drainage

Coated Sand Grains - Sand grains coated, covered, or masked with organic matter, silicate clay, iron, aluminum, or some combination of these.

COE - *acronym* U.S. Army Corps of Engineers.

Concretion - A local concentration of chemical compounds (e.g. calcium carbonate, iron oxide) in the form of a grain or nodule of varying size, shape, hardness, and color. Concretions of significance in hydric soils are usually iron and/or manganese oxides occurring at or near the soil surface, which develop under conditions of prolonged soil saturation.

Cowardin - Citation where the National Wetlands Inventory classification system was outlined. (*Classification of Wetlands and Deepwater Habitats of the United States*. U.S. Department of the Interior, Fish and Wildlife Service, FWS/OBS-79/31, December 1979, L.M Cowardin, V. Carter, F. Golet, and E. LaRoe.)

Cretaceous - The third and last period of the Mesozoic Era, characterized by the development of flowering plants and the disappearance of dinosaurs.

Depleted Matrix - A depleted matrix refers to the volume of a soil horizon or subhorizon from which iron has been removed or transformed by processes of reduction and translocation to create colors of low chroma and high value. A, E and calcic horizons may have low chromas and high values and may therefore be mistaken for a depleted matrix; however, they are excluded from the concept of depleted matrix unless common or many distinct or prominent redox concentrations as soft masses or pore linings are present. In some places the depleted matrix may change color upon exposure to air (reduced matrix), this phenomena is included in the concept of depleted matrix. The following combinations of value and chroma identify a depleted matrix:

1. - Matrix value 5 or more and chroma 1 or less with or without redox concentrations as soft masses and/or pore linings; or

2. Matrix value 6 or more and chroma 2 or less with or without redox concentrations as soft masses and/or pore linings; or

3. Matrix value 4 or 5 and chroma 2 and has 2% or more distinct or prominent redox concentrations as soft masses and/or pore linings; or 4. Matrix value 4 and chroma 1 and has 2% or more distinct or prominent redox concentrations as soft masses and/or pore linings.

Distinct - Readily seen but contrast only moderately with the color to which they are compared; a class of contrast intermediate between faint and prominent. In the same hue or a hue change (e.g. I OR to 7.5 YR or I OR to 2.5Y) a change of 2 or 3 units in chroma and/or a change of 3 units of value, or a change of 2 or 3 units of value and a change of 1 or 2 units

of chroma, or a change of 1 unit of value and 2 units of chroma. With a change of 2 hues (e.g. 1 OR to 5Y or 1 OR to 5YR) a change of 0 to 2 units of value and/or a change of 0 to 2 units of chroma is distinct.

Drained - A condition in which ground or surface water has been reduced or eliminated from an area by artificial means.

Duration (inundation/soil saturation) - The length of time during which water stands at or above the soil surface (inundation), or during which the soil is saturated. As used herein, duration refers to a period during the growing season.

Echoic conditions - Conditions in the soil represented by: saturation (endosaturation, episaturation, anthric saturation), degree of reduction, and redoximorphic features.

Emergent plant - A rooted herbaceous plant species that has parts extending above a water surface.

EPA - *acronym* U.S. Environmental Protection Agency.

Epipedon - A horizon that has developed at the soil surface.

Faint - Evident only on close examination. In the same hue, or 1 hue change (e.g. 1 OR to 7.5 YR or 1 OR to 2.5Y), a change of 1 unit in chroma, or 1 to 2 units in value, or 1 unit of chroma and 1 unit of value.

Fe - The symbol for the element iron.

Fe/Mn concretions - Firm to extremely firm irregularly shaped bodies with sharp to diffuse boundaries. When broken in half, concretions have concentric layers.

Fe/Mn nodules - Firm to extremely firm irregularly shaped bodies with sharp to diffuse boundaries. When broken in half nodules do not have visible organized internal structure.

Flooded - A condition in which the soil surface is temporarily covered with flowing water such as streams overflowing their banks, runoff from adjacent or surrounding slopes, inflow from high tides, or any combination of sources.

Fluted - Distinctly pronounced root systems extending from ground level up (usually less than 1 meter) the trunks of mature trees. Typically found on the trunks of trees growing in saturated conditions or soils ponded with water.

Frequency (inundation or soil saturation) - The periodicity of coverage of an area by surface water or soil saturation. It is usually expressed as the number of years (e.g., 50 years) the soil is inundated or saturated at least once each year during part of the growing season per 100 years or as a l-, 2-, 5-year, etc., inundation frequency.

Frequently flooded - A flooding class in which flooding is likely to occur often under normal weather conditions (more than 50 percent chance of flooding in any year or more than 50 times in 100 years).

Geomorphology - The science that addresses the land and submarine relief features of the earth's surface and seeks a genetic interpretation of them through the principles of physiography in its descriptive aspects and of dynamic and structural geology in its explanatory aspects; of or relating to the form of the earth and its surface and submarine features.

Gleyed - A soil condition resulting from prolonged soil saturation by which iron is reduced permanently to the ferrous state, and is manifested by the presence of bluish or greenish colors through the soil mass or in mottles (spots or streaks) among other colors (US Army Corps of Engineers 1987 Wetland Delineation Manual). Gleying occurs under reducing soil conditions resulting from soil saturation, by which iron is reduced predominantly to the ferrous state.

Gleyed Matrix - Soils with a gleyed matrix have the following combinations of hue, value, and chroma and the soils are not glauconitic:

1. 5GY, 10GY, 1OG, 5BG, 1OBG, 5B, 10B. or 5BP with value 4 or more and chroma is 1; or
2. 5G with value 4 or more and chroma is 1 or 2; or
3. N with value 4 or more.

In some places the gleyed matrix may change color upon exposure to air (reduced Matrix), this phenomena is included in the concept of gleyed matrix.

Groundwater - That portion of the water below the ground surface that is under greater pressure than atmospheric pressure.

Herbaceous - 1. Relating to or characteristic of an herb as distinguished from a woody plant. 2. Green and leaflike in appearance or texture.

Herbaceous layer - Any vegetative stratum of a plant community that is composed predominantly of herbs.

Horizon - A layer, approximately parallel to the surface of the soil, distinguishable from adjacent layers by a distinctive set of properties produced by soil-forming processes.

Hummock - 1. A low mound or ridge of earth; a knoll. 2. Also hammock; A tract of forested land that rises above an adjacent marsh in the southern United States. *adj* **Hummocky**.

Hydric soil - A soil that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions that favor the growth and regeneration of hydrophytic vegetation. Hydric soils that occur in areas having positive indicators of hydrophytic vegetation and wetland hydrology are wetland soils.

Hydrologic regime - The sum total of water that occurs in an area on average during a given period.

Hydrologic zone - An area that is inundated or has saturated soils within a specified range of frequency and duration of inundation and soil saturation.

Hydrology - The science dealing with the properties, distribution, and circulation of water. *adj* **Hydrologic**.

Hydromorphic - Features in the soil caused or formed by water.

Hydrophyte - Any macrophyte that grows in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content; plants typically found in wet habitats

Infiltration - To cause (as a liquid) to permeate something by penetrating its pores or interstices or to pass into or through (a substance) by filtering or permeating.

Inundation - A condition in which water from any source temporarily or permanently covers a land surface.

Loam - Soil composed of a mixture of sand, clay, silt and organic matter.

Long duration (flooding) - A flooding class in which the period of inundation for a single event ranges from seven days to one month.

Macrophyte - Any plant species that can be readily observed without the aid of optical magnification. This includes all vascular plant species and mosses as well as large algae. *adj*

Macrophytic - A term referring to a plant species that is a **Macrophyte**.

Matrix - The dominant soil volume which is continuous in appearance and envelops microsites. When three colors exist, such as when a matrix, depletions, and concentrations are present, the matrix may represent less than 50 percent of the total soil volume.

Major Land Resource Areas - A land unit characterized by similar patterns of soil, climate, water resources, land use, geology, elevation and topography. Geographically associated divisions of Land Resource Regions as defined in *Agricultural Handbook No. 296, Land Resource Regions and Major Land Resource Area of the United States*, USDA Soil Conservation Service, Revised 1981. *abbr* **MLRA**, *pl* **MLRAs**.

Mn - The symbol for the element manganese. A gray-white or silvery brittle metallic element, occurring in several allotropic forms, found worldwide.

Muck - A sapric organic soil material in which virtually all of the organic material is decomposed not allowing for identification of plant forms. Bulk density is normally 0.2 or more and muck has <1/6 fibers after rubbing and sodium pyrophosphate solution extract color is lower chroma and value than 511, 6/2, and 7/3. Dark, fertile soil containing decaying vegetable matter.

Mucky modified texture - A USDA soil texture modifier i.e. mucky sand. Mucky modified mineral soils with 0% clay has between 5 and 12 percent organic carbon. Mucky modified mineral soils with 60 percent clay has between 11 and 18 percent organic carbon. Soils with an intermediate amount of clay have an intermediate amount of organic carbon.

Nodules - See Fe/Mn nodules.

NRCS - *acronym* Natural Resources Conservation Service, a division of the U.S. Department of Agriculture; known as the U.S. Soil Conservation Service until 1994.

Organic matter - Material derived from matter containing carbon; derived from living organisms.

Oxbow - a. A "U"-shaped bend in a river. b. The land within such a bend of a river.

Oxidation-reduction process - A complex of biochemical reactions in soil that influences the valence state of component elements and their ions. Prolonged soil saturation during the growing season elicits anaerobic conditions that shift the overall process to a reducing condition.

Parent material - The unconsolidated and more or less weathered mineral or organic matter from which a soil profile develops.

Ped - A unit of soil structure (i.e., aggregate, crumb, prism, block or granule) formed by natural processes.

Pennsylvanian - Of, relating to, or being the period of the Paleozoic Era in North America between the Mississippian and Permian, or the corresponding system of rocks.

Percolate - 1. To cause (e.g., liquid) to pass through a porous substance or small holes; filter. 2. To pass or ooze through.

Permian - Of, belonging to, or designating the geologic time, system of rocks, and sedimentary deposits of the seventh and last period of the Paleozoic Era.

Pleistocene - Of, belonging to, or designating the geologic time, rock series, and sedimentary deposits of the earlier of the two epochs of the Quaternary Period, characterized by the alternate appearance and recession of northern glaciation and the appearance of the progenitors of human beings.

Ponded - A condition in which water stands in a closed depression. Water may be removed only by percolation, evaporation, and/or transpiration.

Ponding - Standing water in a closed depression and is removed only by percolation, evaporation, or transpiration.

Poorly drained - Soils that commonly are wet at or near the surface during a sufficient part of the year that field crops cannot be grown under natural conditions. Poorly drained conditions are caused by a saturated zone, a layer with low hydraulic conductivity, seepage, or a combination of these conditions.

Pore linings - Zones of accumulation that may be either coatings on a pore surface or impregnations of the matrix adjacent to the pore.

Prominent - Contrast strongly with the color to which they are compared. In the same hue or a 1 hue change (e.g. 1 OR to 2.5Y or 1 OR to 7.5YR) a change of 4 units in chroma and/or 4 units in value. With a change of 2 hues (e.g. 1 OR to 5Y or 1 OR to 5YR) a change of 3 or more units of value and/or a change of 3 or more units of chroma is prominent.

Redox concentrations - Bodies of apparent accumulation of Fe/MN oxides. Redox concentrations include soft masses, pore linings, nodules, and concretions. For the purposes of the indicators, nodules and concretions are excluded from the concept of redox concentrations unless otherwise specified by specific indicators.

Redox potential - A measure of the tendency of a system to donate or accept electrons, which is governed by the nature and proportions of the oxidizing and reducing substances contained in the system.

Redox depletions - Bodies of low chroma (2 or less) having values of 4 or more where Fe-Mn oxides alone have been stripped out or where both Fe-Mn oxides and clay have been stripped out.

Redoximorphic features - Features formed by the processes of reduction, translocation, and oxidation of Fe and Mn oxides. Formerly called mottles and low chroma colors.

Reduced matrix - Soil matrices that have low chroma and high value in situ, but whose color changes in hue or chroma when exposed to air.

Reduction - For the purpose of the indicators, when the redox potential (Eh) is below the ferric/ferrous iron threshold, as adjusted for pH. In hydric soils, this is the point when the transformation of ferric iron (Fe^{+3}) to ferrous iron (Fe^{+2}) occurs.

Rhizosphere - The zone of soil in which interactions between living plant roots and microorganisms occur.

Riparian - Geographically delineated areas with distinct resource values that occur adjacent to streams, lakes, ponds, wetlands and other specified water bodies.

Root zone - The portion of a soil profile in which plant roots occur,

Rushes - a. Any of various stiff marsh plants of the genus Juncus, having pliant hollow or pithy stems and small flowers with scalelike perianths. b. Any of various similar, usually aquatic plants.

Saturation - When the soil water pressure is zero or positive. That is when most all the soil pores are filled with water.

SCS - *acronym* U.S. Soil Conservation Service, former name of the federal agency now called the USDA Natural Resources Conservation Service.

Sedges - Any of numerous grasslike plants of the family Cyperaceae, having solid stems, leaves in three vertical rows, and spikelets of inconspicuous flowers, with each flower subtended by a scalelike bract.

Shrub - A woody plant of relatively low height, having several stems arising from the base and lacking a single trunk; a bush. *adj* shrubby, shrubbier, shrubbiest. 1. Consisting of, planted with, or covered with shrubs. 2. Of or resembling a shrub.

Soft masses - Referring to redox concentrations, soft bodies, frequently within the matrix, whose shape is variable.

Soil structure - The combination or arrangement of primary soil particles into secondary particles, units, or peds.

Soil series - A group of soils having horizons similar in differentiating characteristics and arrangement in the soil profile, except for texture of the surface horizon.

Soil permeability - The ease with which gases, liquids, or plant roots penetrate or pass through a layer of soil.

Soil profile - A vertical section of a soil through all its horizons and extending into the parent material.

Soil pore - An area within soil occupied by either air or water, resulting from the arrangement of individual soil particles or peds.

Soil matrix - The portion of a given soil having the dominant color. In most cases, the matrix will be the portion of the soil having more than 50 percent of the same color.

Soil surface - The upper limits of the soil profile. For mineral soils, this is the upper limit of the highest (Al) mineral horizon. For organic soils, it is the upper limit of undecomposed, dead organic matter.

Soil horizon - A layer of soil or soil material approximately parallel to the land surface and differing from adjacent genetically related layers in physical, chemical, and biological properties or characteristic (.e.g. -color-, structure, texture, etc.),

Soil texture - The relative proportions of the various sizes of particles in a soil. The weight proportion of the separates for particles less than 2 mm.

Somewhat poorly drained - Soils that are wet near enough to the surface or long enough that planting or harvesting operations or crop growth is markedly restricted unless artificial drainage is provided. Somewhat poorly drained soils commonly have a layer with low hydraulic conductivity, wet conditions high in the profile, additions of water through

seepage, or a combination of these conditions.

Strata - *n* A plural of stratum. 1. A horizontal layer of material, especially one of several parallel layers arranged one on top of another. 2. Geology. A bed or layer of sedimentary rock having approximately the same composition throughout.

Vegetative community - All of the plant populations occurring in a shared habitat or environment.

Very poorly drained - Soils that are wet to the surface most of the time. These soils are wet enough to prevent the growth of common agricultural crops (except rice) unless artificially drained.

Water table - The upper surface of ground water or that level below which the soil is saturated with water. It is at least 6 inches thick and persists in the soil for more than a few weeks.

Watermark - A line on a tree or other upright structure that represents the maximum static water level reached during an inundation event,

Watershed - The region draining into a river, river system, or other body of water.

Wetland(s) - Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. An area that has hydrophytic vegetation, hydric soils, and wetland hydrology. Wetlands generally include swamps, marshes, bogs, and similar areas.

Wetland delineation - The process or procedure by which the boundaries of a wetland are defined.

Wetland determination - The process or procedure by which an area is adjudged a wetland or nonwetland.

Wetland hydrology - The sum total of wetness characteristics in areas that are inundated or have saturated soils for a sufficient duration to support hydrophytic vegetation.

Wetland Reserve Program - A voluntary program to restore and protect wetlands on private property. It offers landowners an opportunity to receive financial incentives to enhance wetlands in exchange for retiring marginal agricultural land. Authorized by Congress under the Food Security Act of 1985, as amended by the 1990 and 1996 Farm Bills. The U.S. Department of Agriculture's Natural Resources Conservation Service administers the program in consultation with the Farm Service Agency and other federal agencies. Funding comes from the Commodity Credit Corporation. *acronym* WRP.

Wetland soil - A soil that has characteristics developed in a reducing atmosphere, which exists when periods of prolonged soil saturation result in anaerobic conditions. Hydric soils that are sufficiently wet to support hydrophytic vegetation are wetland soils.

Wetland vegetation - The sum total of Macrophytic plant life that occurs in areas where the frequency and duration of inundation or soil saturation produce permanently or periodically saturated soils of sufficient duration to exert a controlling influence on the plant species present. As used herein, hydrophytic vegetation may be properly referred to as wetland vegetation if it occurs in areas that also have hydric soils and wetland hydrology.

Woody - 1. Forming or consisting of wood; ligneous. 2. Marked by the presence of wood or xylem. 3. Characteristic or suggestive of wood. 4. Abounding in trees; wooded.

WRP - *acronym* Wetland Reserve Program (see).

Fauna

Common and scientific nomenclature

Fish

Common	Latin
bass, largemouth	*Micropterus salmoides*
bass, smallmouth	*Micropterus dolomieu*
bass, spotted	*Micropterus punctulatus*
bowfin	*Amia calva*
buffalo, smallmouth	*Ictiobus bubalus*
carp, common	*Cyprinus carpio*
carpsucker, river	*Carpriodes carpio*
catfish, black bullhead	*Ameiurus melas*
catfish, channel	*Ictalurus punctatus*
catfish, yellow bullhead	*Ameiurus natalis*
crappie, black	*Pomoxis nigromaculatus*
crappie, white	*Pomoxis annularis*
darter, cypress	*Etheostoma proeliare*
darter, slough	*Etheostoma gracile*
drum, freshwater	*Aplodinotus grunniens*
gar, alligator	*Atractosteus spatula*
gar, longnose	*Atractosteus osseus*
gar, shortnose	*Atractosteus platostomus*
gar, spotted	*Atractosteus oculatus*
logperch	*Percina caprodes*
minnow, bullhead	*Pimephales vigilax*
minnow, fathead	*Pimephales promelas*
mosquitofish	*Gambusia affinis*
perch, pirate	*Aphredoderus sayanus*
pickerel, grass	*Esox americanus*
shiner, bluehead	*Pteronotropis hubbsi*
shiner, golden	*Notemigonus crysoleucas*
shiner, iron color	*Notropis chalybaeus*
shiner, red	*Cyprinella lutrensis*
shiner, ribbon	*Lythrurus fumeus*
shiner, taillight	*Notropis maculatus*
silverside, brook	*Labidesthes sicculus*
silverside, inland	*Menidia beryllina*
sunfish, bluegill	*Lepomis macrochirus*
sunfish, green	*Lepomis cyanellus*
sunfish, longear	*Lepomis megalotis*
sunfish, orange-spotted	*Lepomis humilis*
sunfish, pygmy	*Elassoma zonatum*
sunfish, redear	*Lepomis microlophus*
topminnow, blackstripe	*Fundulus notatus*
warmouth	*Lepomis gulosus*

Mammals

Common	Latin
bat, big brown	*Eptesicus fuscus*
bat, evening	*Nycticeius humeralis*
bat, red	*Lasiurus borealis*
beaver	*Castor canadensis*
muskrat	*Ondatra zibethicus*
myotis, cave	*Myotis velifer*
pipistrel, eastern	*Pipistrellus subflavus*
pipistrel, western	*Pipistrellus hesperus*
rabbit, swamp	*Sylvilagus aquaticus*
raccoon	*Procyon lotor*

Reptiles

Common	Latin
cooter, Missouri river	*Pseudemys concinna*
copperhead	*Agkistrodon contortrix*
cottonmouth, western	*Agkistrodon piscivorus*
hogsnake, western	*Heterodon nasicus*
kingsnake, speckled	*Lampropeltis getula*
rattlesnake, timber	*Crotalus horridus*
rattlesnake, western pygmy	*Sistrurus miliarius*
skink, broadhead	*Eumeces laticeps*
skink, five-lined	*Eumeces fasciatus*
snake, blotched water	*Nerodia erthyrogaster transversa*
snake, broadbanded water	*Nerodia fasciata*
snake, brown	*Storeria dekayi*
snake, common garter	*Thamnophis sirtalis*
snake, diamondback water	*Nerodia rhombifer*
snake, eastern hognose	*Heterodon platirhinos*
snake, Graham's crayfish	*Regina grahamii*
snake, great plains rat	*Elaphe guttata*
snake, midland water	*Nerodia sipedon pleuralis*
snake, northern water	*Nerodia sipedon sipedon*
snake, rough green	*Opheodrys aestivus*
snake, western plains garter	*Thamnophis radix*
snake, western ribbon	*Thamnophis proximus*
snake, yellowbelly water	*Nerodia erthyrogaster flavigastor*
turtle, common musk	*Sternotherus odoratus*
turtle, common snapping	*Chelydra serpentina*
turtle, midland smoothe softshell	*Apalone mutica*
turtle, Mississippi mud	*Kinosternon subrubrum*
turtle, red-eared	*Trachemys scripta*
turtle, spiny softshell	*Apalone spinerifa*
turtle, yellow mud	*Kinosternon flavescens*

Birds

Common	Latin
anhinga	*Anhinga anhinga*
avocet, American	*Recurvirostra americana*
bittern, American	*Botaurus lentiginosus*
bittern, least	*Ixobrychus exilis*
black, tern	*Childonias nigra*
blackbird, red-winged	*Agelaius phoeniceus*
bufflehead	*Bucephala albeola*
canvasback	*Aythya valisineria*
coot, American	*Fulica americana*
cormorant, double-crested	*Phalacrocorax auritus*
crane, sandhill	*Grus canadensis*
crane, whooping	*Grus americana*
crow, fish	*Corvus ossifragus*
curlew, long-billed	*Numenius americanus*
duck, ring-necked	*Aythya collaris*
duck, ruddy	*Oxyura jamaicensis*
duck, wood	*Aix sponsa*
eagle, bald	*Haliacetus leucocephalus*
egret, great	*Ardea alba*
egret, snowy	*Egretta thula*
flycatcher, alder	*Empidonax alnorum*
flycatcher, willow	*Empidonax traillii*
gadwall	*Anas strepera*
gallinule, common (moorhen)	*Gallinula choropus*
gallinule, purple	*Porphyrula martinica*
godwit, Hudsonian	*Limosa haemastica*
godwit, marbled	*Limosa fedoa*
goldeneye, common	*Bucephala clangula*
goose, Canada	*Branta canadensis*
goose, Ross's	*Chen rossii*
goose, snow	*Chen caerulescens*
goose, white-fronted	*Anser albifrons*
grebe, eared	*Podiceps nigricollis*
grebe, horned	*Podiceps auritus*
grebe, pied-billed	*Podilymbus podiceps*
gull, Franklin's	*Larus pipixcan*
harrier, northern	*Circus cyaneus*
hawk, marsh	*Circus cyaneus*
hawk, red-shouldered	*Buteo lineatus*
hawk, rough-legged	*Buteo lagopus*
heron, black-crowned night	*Nycticorax nycticorax*
heron, great blue	*Ardea herodias*
heron, green	*Butorides virescens*
heron, little blue	*Egretta caerulea*
heron, yellow-crowned night	*Nycticorax violacea*
ibis, white	*Eudocimus albus*
ibis, white-faced	*Plegadis chihi*
kingfisher, belted	*Ceryle alcyon*

mallard	*Anas platyrhynchos*
merganser, common	*Mergus meranger*
merganser, hooded	*Lophodytes cucullatus*
merganser, red-breasted	*Mergus serrator*
ospry	*Pandion haliaetus*
owl, barred	*Strix varia*
owl, great horned	*Bubo virginianus*
owl, short-eared	*Asio flammeus*
owl, snowy	*Nyctea scandiaca*
pelican, American white	*Pelecanus erythrorhynchos*
pintail	*Anas acuta*
plover, black-bellied	*Pluvialis squatarola*
plover, semipalmated	*Charadrius semipalmatus*
rail, king	*Rallus elegans*
rail, Virginia	*Rallus limicola*
redhead	*Aythya americana*
sandpiper, solitary	*Tringa solitaria*
scaup, greater	*Aythya marila*
scaup, lesser	*Aythya affinis*
shoveler, northern	*Anas clypeata*
sora	*Porzona carolina*
stilit, black-necked	*Himantopus mexicanus*
stork, wood	*Mycteria americana*
swallow, tree	*Trachycineta bicolor*
teal, blue-winged	*Anas discours*
teal, cinnamon	*Anas cyanoptera*
teal, green-winged	*Anas crecca*
veery	*Catharus fuscescens*
vireo, Bell's	*Vireo belii*
vireo, white-eyed	*Vireo griseus*
whimbrel	*Numenius phaeopus*
wigeon, American	*Anas americana*
willet	*Catoptophorus semipalmatus*
woodpecker, red-bellied	*Melanerpes carolinus*
yellowlegs, greater	*Tringa melanoleuca*
yellowlegs, lesser	*Tringa flavipes*

Amphibians

Common	**Latin**
bullfrog, common	*Rana catesbeiana*
frog, Blanchard's cricket	*Acris crepitans blanchardi*
frog, bronze	*Rana clamitans clamitans*
frog, green	*Rana clamitans melanota*
frog, plains leopard	*Rana blairi*
frog, southern leopard	*Rana utricularia utricularia*
frog, western cricket	*Pseudacris triseriata*
mudpuppy, Red River	*Necturus masculosus louisianensis*
newt, central	*Notophthalmus viridescens louisianensis*
salamander, barred tiger	*Ambystoma tigrinum mavortium*
salamander, four-toed	*Hemidactylium scutatum*
salamander, many-ribbed	*Eurycea multiplicata*

salamander, marbled	*Ambystoma opacum*
salamander, smallmouth	*Ambystoma texanum*
salamander, southern redback	*Plethodon ouachitae*
salamander, spotted	*Ambystoma maculatum*
salamander, slimy complex	*Plethodon glutinosus*
toad, dwarf American	*Bufo americanus charlessmithi*
toad, Woodhouse's	*Bufo woodhousii woodhousii*
treefrog, bird-voiced	*Hyla avivoca*
treefrog, Cope's gray	*Hyla chrysoscelis*
treefrog, gray	*Hyla versicolor*
treefrog, green	*Hyla cinerea*

Common and scientific nomenclature

Common	Latin
alder	*Alnus spp.*
arrowhead	*Sagittaria latifolia*
ash, green	*Fraxinus pennsylvanica*
bald cypress	*Taxodium distichum*
barnyard grass	*Echinochloa crusgalli*
beech, blue	*Carpinus caroliniana*
bladderwort	*Utricularia vulgaris*
bulrush	*Scirpus spp.*
bulrush, three-square	*Scirpus pungens*
buttonbush	*Cephalanthus occidentalis*
cattail, common	*Typha latifolia*
club, hercules	*Zanthoxylum clava-herculis*
cocklebur	*Xanthium spp.*
cordgrass, prairie	*Spartina pectinata*
cottonwood	*Populus deltoides*
cutgrass, rice	*Leersia oryzoides*
dock, curly	*Rumex crispus*
dock, pale	*Rumex altissimus*
duck potato, broadleaf	*Sagittaria latifolia*
elm	*Ulmus spp.*
fern	*Osmunda spp.*
frog fruit	*Phyla ianceolata*
grass, canary	*Phalaris spp.*
hibiscus	*Hibiscus spp.*
hickory, bitternut	*Carya cordiformis*
hickory, water	*Carya aquatica*
holly, American	*Ilex opaca*
jack-in-the-pulpit	*Arisaema triphyllum*
lizard's tail	*Saururus cernuus*
lotus, water	*Nelumbo lutea*
moss, sphagnum	*Sphagnum palustre*
mud plantain	*Heteranthera dubia*
oak, bur	*Quercus macrocarpa*
oak, Nuttall	*Quercus nuttallii*
oak, overcup	*Quercus lyrata*
oak, pin	*Quercus palustris*
oak, Shumard	*Quercus shumardii*
oak, water	*Quercus nigra*
oak, willow	*Quercus phellos*
palmetto, dwarf	*Sabal minor*
pecan	*Carya illinoensis*
rush, scouring	*Equisetum hyemale*
rush, torrey	*Juncus torreyi*
rushes	*Juncus spp.*
rye, wild	*Elymus spp.*

sedges	*Carex spp.*
smartweed, Pennsylvania	*Polygonum pensylvanicum*
smartweed, water	*Polygonum punctatum*
spikerush	*Eleocharis spp.*
spangletop, green	*Leptochloa dubia*
stinkweed	*Pluchea camphorata*
sumpweed	*Iva spp.*
tamarisk	*Tamarix chinensis*
tearthumb	*Polygonum sagittatum*
uniola, broadleaf	*Chasmanthium latifolium*
water hyssop	*Bacopa spp.*
water primrose	*Ludwigia hexapetala*
wheatgrass, western	*Agropyron smithii*
willow, black	*Salix nigra*
willow, peachleaf	*Salix amygdaloides*
willow, sandbar	*Salix exigua*
woollyleaf bursage	*Ambrosia grayi*

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