CHAPTER 5. HABITAT CONSERVATION

A. Introduction

This chapter provides information on the wildlife habitats of Louisiana. The information presented here is largely drawn from The Natural Communities of Louisiana (LNHP 2009), which is the latest natural community classification available for the state. Habitats are named and described based on vegetation, landscape position, soils, and ecological processes. The habitat classification employed here is not congruent with the National Vegetation Classification System (NVCS; USNVC 2015). The finest classification level in the NVCS is the Ecological Association. In some cases, habitats presented here are equivalent to an Ecological Association in the NVCS. However, most habitats in this Wildlife Action Plan (WAP) are slightly broader in concept and capture several ecological associations. Appendix J places the habitats presented in this chapter within their respective Groups and Macrogroups of the NVCS. Groups and Macrogroups are mid-level units within the NVCS hierarchy and are defined by criteria pertaining to physiognomy, biogeography, and floristics (USNVC 2015).

In additon to natural habitats, this chapter also addresses anthropogenic (man-made) habitats, which can provide value to wildlife, including Species of Greatest Conservation Need (SGCN). Habitats in this chapter are organized alphabetically within the following broader categories:

Forests – habitats that, in their natural state, are dominated by trees and have a canopy cover of greater than 75%. The herbaceous understory is composed of plants that are shade-loving.

Savannas and Woodlands – habitats that are wooded with trees but whose canopies are naturally open, allowing development of a light-loving, often grassy understory. Savannas typically have a canopy cover of less than 50%. Woodlands are more densely wooded, but are still relatively open, having 50-75% canopy cover. Fire is a key process that historically maintained all of Louisiana's savannas and woodlands.

Shrublands – habitats that are wooded with shrubs and small trees. Also included in this category is Canebrake, which is dominated by a woody grass in the bamboo group.

Grasslands – habitats that are practically treeless, such as prairies, barrens, glades, bogs, beaches, marshes, etc. In most cases, grasses and grass-like plants dominate in these habitats.

Ephemeral Ponds – natural isolated depressions which are seasonally inundated, and often drawn-down completely during dry periods. This category includes wooded and non-wooded ponds.

Lentic Water Bodies – natural lakes (e.g. Oxbows), reservoirs, and natural and man-made ponds.

Submersed Aquatic Vegetation (SAV) – vegetated habitats dominated by submersed plants. Submersed Aquatic Vegetation may occupy a variety of settings such as permanent ponds and lakes, bayous, canals, and estuarine and marine waters.

Subterranean Habitat – this category includes one habitat: Cave.

Geologic Feature – this category captures Barrier Islands, which support several natural communities.

Anthropogenic Habitats – habitats that are a result of human activity, including agricultural fields, aquaculture ponds, and pine plantations (tree farms).

River Basins – the 12 river basins within Louisiana.

Marine Habitats – categorized by substrate type, primarily.

For each habitat treatment, the name, state (S-rank) and global (G-rank) conservation ranks, and ecological system placements are given. Ecological systems are defined as groups of associations (communities) that tend to co-occur in similar ecological settings, and were defined to allow habitat mapping (Comer et al. 2003). Comer et al. (2003) identified 599 Ecological Systems occurring in the United States. These systems are described on NatureServe Explorer. Habitats presented here are, in many cases, finer scale features with narrower concepts than Ecological Systems. Many habitats fall within more than one Ecological System. In each account, the habitat is described and characteristic plants are listed. The geographic distribution of each habitat is expressed as a parish distribution map. Associated SGCN are listed for each habitat. Threats assessments were completed for each habitat using the NatureServe Conservation Status Assessments: Rank Calculator, Version 3.186. Results of threats assessments are summarized. Habitat research needs/conservation actions for each habitat are provided, although these lists are not exhaustive.

This account of habitats is not final and in many cases, knowledge is lacking. On today's landscape, habitat alteration and interruption of natural processes, such as fire and flooding, has made habitat classification a difficult task. Since the arrival of Europeans, many landscape alterations have occurred. Therefore, the landscape is full of ecological "noise", and understanding habitats in the presence of this "noise" is important because we need to understand the factors that drove the evolution of our natural communities, and that are necessary for healthy fish and wildlife populations. Following completion of this planning process and as implementation of the Wildlife Action Plan (WAP) continues, understanding of Louisiana's habitats will improve, and additional threats and needed conservation actions will become evident.

B. Habitat Accounts

1. FORESTS

a. Barrier Island Live Oak Forest

Rarity Ranks: S1/G1Q
Synonyms: Maritime Forest
Ecological Systems: CES203.513 Mississippi Delta Maritime Forest

General Description:

Grand Isle is Louisiana's only Barrier Island that supports a forested community. This forest is restricted to interior portions of Grand Isle, where it is sufficiently buffered from the harsh shoreline environment. Trees in Barrier Island Live Oak Forests can exhibit the effects of saltwater spray and wind, having a stunted appearance and leaning away from the prevailing wind (West 1938, Brown 1930). This community is impacted by development, invasive species, vehicle traffic, clearing of understory vegetation, and habitat fragmentation. Conservation of this system is imperative to the survival of Neotropical migratory birds, which use this habitat for stopover during migration.

Barrier Island Live Oak Forest on Grand Isle, Jefferson Parish.

Barrier Island Live Oak Forest: Characteristic Plant Species	
Live Oak	*Quercus virginiana*
Sugarberry	*Celtis laevigata*
Yaupon	*Ilex vomitoria*
Toothache Tree	*Zanthozylum clava-herculis*

Current Extent and Status:

Barrier Island Live Oak Forest is restricted to Grand Isle where it occupies a small area (approximately 40 acres). This habitat probably occupied less than 1,000 acres, perhaps closer to 500 acres historically. Most of its historical extent has been destroyed by residential and commercial development. The Nature Conservancy's (TNC) Lafitte Woods Preserve protects approximately 40 acres of this forest type.

Barrier Island Live Oak Forest: SGCN (18)	
Non-crustacean Arthropods (1)	
Monarch	*Danaus plexippus*
Reptiles (1)	
Eastern Glass Lizard	*Ophisaurus ventralis*
Birds (16)	
Chuck-will's-widow	*Antrostomus carolinensis*
Chimney Swift	*Chaetura pelagica*
Yellow-Throated Vireo	*Vireo flavifrons*
Warbling Vireo	*Vireo gilvus*
Wood Thrush	*Hylocichla mustelina*
Worm-eating Warbler	*Helmitheros vermivorum*
Louisiana Waterthrush	*Parkesia motacilla*
Golden-winged Warbler	*Vermivora chrysoptera*
Prothonotary Warbler	*Protonotaria citrea*
Swainson's Warbler	*Limnothlypis swainsonii*
Kentucky Warbler	*Geothlypis formosa*
American Redstart	*Setophaga ruticilla*

Hooded Warbler	*Setophaga citrina*
Cerulean Warbler	*Setophaga cerulea*
Yellow-throated Warbler	*Setophaga dominica*
Painted Bunting	*Passerina ciris*

Threats Affecting Habitat:

Historically important threats such as residential and commercial development are of minor importance now as most of the remaining acreage is protected. Remaining examples of this habitat are threatened by disturbance by humans, invasive plants, subsidence, hurricanes, and sea level rise (SLR).

Barrier Island Live Oak Forest Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	Small	Extreme	Low
Agriculture/Aquaculture	N/A	N/A	N/A
Energy Production & Mining	Small	Extreme	Low
Transportation & Service Corridors	Small	Extreme	Low
Biological Resource Use	N/A	N/A	N/A
Human Intrusion/Disturbance	Pervasive	Serious	High
Natural System Modification	Pervasive	Serious	High
Invasive & other Problematic Species	Large	Moderate	Medium
Pollution	Large	Slight	Low
Geological Events	Pervasive	Moderate	Medium
Climate Change & Severe Weather	Pervasive	Slight	Low
Overall Calculated Threat Impact: Medium			

Habitat Research Needs/Conservation Actions:

1. Partner with Non-Governmental Organizations (NGOs), state and federal agencies, industry, and private landowners to promote conservation of remaining Barrier Island Live Oak Forest and to promote and facilitate removal of invasive plant and animal species.
2. Support reforestation on Grand Isle to expand this habitat type.
3. Promote propagation and planting of coastal ecotypes of Live Oak, Toothache Tree, and other native species on Grand Isle.
4. Support Coastal Protection and Restoration Authority (CPRA), Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA), Louisiana Coastal Area Program (LCA), U.S. Army Corps of Engineers (USACE), Louisiana Department of Natural Resources (LDNR), and other partner efforts for shoreline stabilization and habitat restoration.

b. Batture Forest

Rarity Rank: S3/G4G5

Synonyms: Riverfront Pioneer Forest, Cottonwood-Willow Forest

Ecological Systems: CES203.190 Mississippi River Riparian Forest
CES203.512 Lower Mississippi River Bottomland and Floodplain Forest
CES203.489 East Gulf Coastal Plain Large River Floodplain Forest
CES203.065 Red River Large Floodplain Forest
CES203.488 West Gulf Coastal Plain Large River Floodplain Forest

General Description:

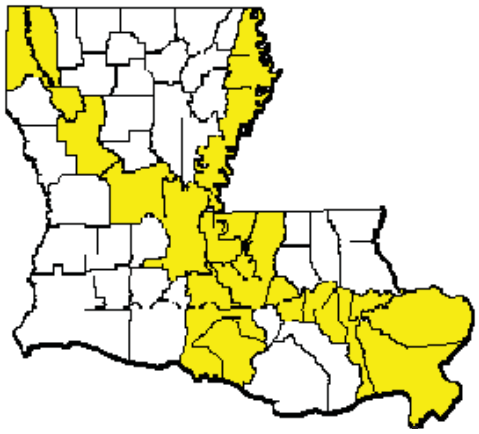
Batture Forest develops on the slope between the natural (or man-made) levee crest and major streams/rivers. Batture areas are periodically scoured when river levels rise, and depending on sediment particle size, new sediment may be deposited when river levels fall. Historically, meandering rivers naturally shifted laterally (a process now inhibited by man-made levees and water control structures) via sediment erosion. As a river shifted course, the distance between the Batture and river channel increased, allowing the Batture Forest to undergo succession into other Bottomland Hardwood Forest associations. In large rivers such as the Mississippi, the area between the man-made levee and the river channel remains unstable and thus supports a Batture Forest containing early successional plant species.

Batture Forest along the Mississippi River, West Feliciana Parish.

Batture Forest: Characteristic Plant Species	
Boxelder	*Acer negundo*
Silver Maple	*Acer saccharinum*
Lead Plant	*Amorpha fruticosa*
Buttonbush	*Cephalanthus occidentalis*
Swamp Privet	*Forestiera acuminata*
American Sycamore	*Platanus occidentalis*
Eastern Cottonwood	*Populus deltoides*
Sandbar Willow	*Salix interior*
Black Willow	*Salix nigra*

Current Extent and Status:

Batture Forest occurs primarily along the Mississippi River but also along the Atchafalaya, Red, Ouachita, Pearl, and other large rivers. The acreage and number of intact sites is unknown. Substantial portions of the Atchafayala Basin may support forest that is referrable to this habitat.



Batture Forest SGCN (34)	
Reptiles (6)	
Alligator Snapping Turtle	*Macrochelys temminckii*
Smooth Softshell	*Apalone mutica*
Ringed Map Turtle	*Graptemys oculifera*
Ouachita Map Turtle	*Graptemys ouachitensis*
Sabine Map Turtle	*Graptemys sabinensis*
Pearl River Map Turtle	*Graptemys pearlensis*
Birds (19)	
Wood Stork	*Mycteria americana*
Little Blue Heron	*Egretta caerulea*
Swallow-tailed Kite	*Elanoides forficatus*
Bald Eagle	*Haliaeetus leucocephalus*

American Woodcock	*Scolopax minor*
Chuck-will's-widow	*Antrostomus carolinensis*
Chimney Swift	*Chaetura pelagica*
Yellow-throated Vireo	*Vireo flavifrons*
Warbling Vireo	*Vireo gilvus*
Wood Thrush	*Hylocichla mustelina*
Worm-eating Warbler	*Helmitheros vermivorum*
Louisiana Waterthrush	*Parkesia motacilla*
Prothonotary Warbler	*Protonotaria citrea*
Swainson's Warbler	*Limnothlypis swainsonii*
Kentucky Warbler	*Geothlypis formosa*
American Redstart	*Setophaga ruticilla*
Hooded Warbler	*Setophaga citrina*
Painted Bunting	*Passerina ciris*
Rusty Blackbird	*Euphagus carolinus*
Mammals (7)	
Southeastern Myotis	*Myotis austroriparius*
Big Brown Bat	*Eptesicus fuscus*
Rafinesque’s Big-eared Bat	*Corynorhinus rafinesquii*
Eastern Pipistrelle	*Perimyotis subflavus*
Bachman’s Fox Squirrel	*Sciurus niger bachmani*
Ringtail	*Bassariscus astutus*
Long-tailed Weasel	*Mustela frenata*
Plants (2)	
Square-stem Monkeyflower	*Mimulus ringens*
Western Umbrella Sedge	*Fuirena simplex var. aristulata*

Threats Affecting Habitat:

Batture Forests occurring along large rivers are restricted to narrow corridors by operation of man-made levees (natural system modification). This habitat is threatened by human-related disturbance from several sources, and by invasive plants and animals.

Batture Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	Small	Serious	Low
Agriculture/Aquaculture	Restricted	Extreme	Medium
Energy Production & Mining	Restricted	Moderate	Low
Transportation & Service Corridors	Restricted	Extreme	Medium
Biological Resource Use	Small	Serious	Low
Human Intrusion/Disturbance	Small	Slight	Low
Natural System Modification	Pervasive	Serious	High
Invasive & other Problematic Species	Pervasive	Moderate	Medium
Pollution	Slight	Pervasive	Low
Geological Events	N/A	N/A	N/A
Climate Change & Severe Weather	N/A	N/A	N/A
Overall Calculated Threat Impact: Medium			

Habitat Research Needs/Conservation Actions:

1. Conduct habitat inventories, especially in the Atchafalya Basin.
2. Work with USACE, local levee boards, city planning commissions and local conservation groups to promote development of Batture Forest reserves to retain natural qualities and to provide education on the importance of this habitat for both resident and migratory wildife.
3. Work with the Louisiana Department of Environmental Quality (LDEQ), the Environmental Protection Agency (EPA), and other federal and state agencies to fill data gaps concerning ecological system processes and water quality/discharge impacts on this habitat.
4. Work with USACE to minimize impacts of dredging and water discharges in Batture Forest.
5. Promote the maintanence and restoration of natural hydrologic regimes.

c. Bayhead Swamp (Including Forested Seep)

Rarity Rank: S3/G3?

Synonyms: Baygall, Reed Brake, Acid Seep Forest, Spring-Head, Green-Head

Ecological Systems: CES203.505 Southern Coastal Plain Seepage Swamp and Baygall
CES203.372 West Gulf Coastal Plain Seepage Swamp and Baygall

General Description:

Bayhead Swamp and Forested Seep are described as distinct communities in LNHP (2009). In this treatment, Forested Seep is included within the concept of Bayhead Swamp. Bayhead Swamps are forested wetlands occupying acidic, often seepage-influenced, areas embedded in pine woodlands and savannas of the coastal plain ecoregions. Soils are often saturated and spongy even during dry periods. The flora of Bayhead Swamps includes several broad-leaved evergreen trees and shrubs such as Sweetbay Magnolia and Red Bay. Several ferns, and living peat moss (*Sphagnum*), are often conspicuous in the understories of Bayhead Swamps. Landscape position can vary from broad depressions or small stream bottoms in flatwoods to narrow stream valleys in hilly terrain, sometimes even occurring on upper slopes. Bayhead Swamps are typically flanked by fire-dependent pine systems and often serve as natural fire breaks. The up-slope edges of Bayhead Swamps historically experienced fire and likely support species to which a fire-frequent edge is important. These forests naturally vary from a few acres to more than 100 acres in size (Brooks et al 1993, Smith 1996).

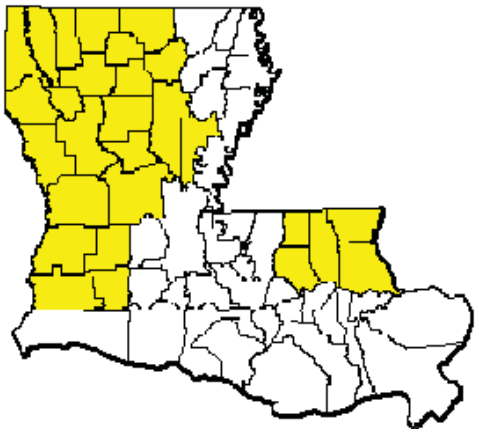
Bayhead Swamp, Schoolhouse Springs Preserve, Jackson Parish.

Bayhead Swamp: Characteristic Plants	
White Titi	*Cyrilla racemiflora*
Fetterbush	*Lyonia lucida*
Sweetbay Magnolia	*Magnolia virginiana*
Swamp Blackgum	*Nyssa biflora*
Cinnamon Fern	*Osmunda cinnamomea*
Royal Fern	*Osmunda regalis*
Red Bay	*Persea palustris*
Laurel Greenbrier	*Smilax laurifolia*
Pondcypress	*Taxodium ascendens* (EGCP)
Baldcypress*	*Taxodium distichum*
Poison Sumac	*Toxicodendron vernix*
Possumhaw	*Viburnum nudum*
Netted Chain Fern	*Woodwardia areolata*

* Baldcypress is characteristic of Bayhead Swamps (Forested Seeps) in the Upper West Gulf Coastal Plain and northern portions of the West Gulf Coastal Plain, where it can occur with seepage on middle and upper slopes. Baldcypress is not a typical component in this habitat elsewhere in the state.

Current Extent and Status:

Bayhead Swamps are associated with geologically older landscapes generally supporting a pine-dominated matrix. Historically these forested wetlands are estimated to have occupied 100,000 to 500,000 acres, with 25-50% of the original cover curently remaining (Smith 1993). High-quality Bayhead Swamps are fairly easy to find on conservation areas and private lands rangewide.



Bayhead Swamp SGCN (52)	
Crustaceans (1)	
Flatnose Crawfish	*Procambarus planirostris*
Non-crustacean Arthropods (12)	
Texas Emerald	*Somatochlora margarita*
Texas Forestfly	*Amphinemura texana*

Louisiana Needlefly	*Leuctra szczytkoi*
Schoolhouse Springs Net-spinning Caddisfly	*Diplectrona rossi*
Morse's Net-spinning Caddisfly	*Cheumatopsyche morsei*
Holzenthal's Philopotamid Caddisfly	*Chimarra holzenthali*
Spring-loving Psiloneuran Caddisfly	*Agarodes libalis*
Schoolhouse Springs Purse Casemaker Caddisfly	*Hydroptila ouachita*
Hydroptilad Caddisfly	*Hydroptila poirrieri*
Pepper and Salt Skipper	*Amblyscirtes hegon*
Arogos Skipper	*Atrytone arogos*
Monarch	*Danaus plexippus*
Amphibians (2)	
Southern Dusky Salamander	*Desmognathus auriculatus*
Gulf Coast Mud Salamander	*Pseudotriton montanus flavissimus*
Birds (9)	
American Woodcock	*Scolopax minor*
Yellow-throated Vireo	*Vireo flavifrons*
Wood Thrush	*Hylocichla mustelina*
Prothonotary Warbler	*Protonotaria citrea*
Swainson's Warbler	*Limnothlypis swainsonii*
Kentucky Warbler	*Geothlypis formosa*
Hooded Warbler	*Setophaga citrina*
Painted Bunting	*Passerina ciris*
Rusty Blackbird	*Euphagus carolinus*
Mammals (8)	
Southeastern Shrew	*Sorex longirostris*
Southeastern Myotis	*Myotis austroriparius*
Big Brown Bat	*Eptesicus fuscus*
Eastern Pipistrelle	*Perimyotis subflavus*
Rafinesque’s Big-eared Bat	*Corynorhinus rafinesquii*
Bachman’s Fox Squirrel	*Sciurus niger bachmani*
Golden Mouse	*Ochrotomys nuttalli*
Long-tailed Weasel	*Mustela frenata*
Plants (20)	
Baygall Caric Sedge	*Carex venusta*
Birdbill Spike Grass	*Chasmanthium ornithorhynchum*
Black Titi	*Cliftonia monophylla*
Bog Moss	*Mayaca fluviatilis*
Bog Spicebush	*Lindera subcoriacea*

Canby's Bulrush	*Schoenoplectus etuberculatus*
Louisiana Quillwort	*Isoetes louisianensis*
Millet Beak Sedge	*Rhynchospora miliacea*
Myrtle Holly	*Ilex myrtifolia*
Northern Burmannia	*Burmannia biflora*
Odorless Bayberry	*Morella inodora*
Rooted Spike Sedge	*Eleocharis radicans*
Sarvis Holly	*Ilex amelanchier*
Sessile-leaf Bellwort	*Uvularia sessilifolia*
Swamp-forest Beak Sedge	*Rhynchospora decurrens*
Texas Screwstem	*Bartonia texana*
Texas Trillium	*Trillium texanum*
Threeway Sedge	*Dulichium arundinaceum*
Tussock Sedge	*Carex stricta*
Yellowroot	*Xanthorhiza simplicissima*

Threats Affecting Habitat:

Soil and canopy disturbances associated with timber harvesting, mineral extraction, and other sources occasionally affect this habitat. The most serious threat comes from invasive species, especially Feral Hogs. Climate change is a potential threat to this habitat, if precipitation decreases, which could lead to drying of some occurrences.

Bayhead Swamp/Forested Seep Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	Small	Slight	Low
Agriculture/Aquaculture	Small	Extreme	Low
Energy Production & Mining	Restricted	Moderate	Low
Transportation & Service Corridors	Restricted	Moderate	Low
Biological Resource Use	Restricted	Serious	Medium
Human Intrusion/Disturbance	Small	Slight	Low
Natural System Modification	Restricted	Slight	Low
Invasive & other Problematic Species	Pervasive	Serious	High
Pollution	Small	Slight	Low
Geological Events	N/A	N/A	N/A
Climate Change & Severe Weather	Large	Slight	Low
Overall Calculated Threat Impact: Medium			

Habitat Research Needs/Conservation Actions:

1. Encourage landowners and managers to utilize Bayhead Swamps as fire breaks and to not install fire lines around them, to expose edges to fire.

2. Provide funding for control of Feral Hogs in Bayhead Swamps, and for control of invasive plants such as Chinese Privet (*Ligustrum sinense*) and Chinese Tallow Tree (*Triadica sebifera*).

d. Bottomland Hardwood Forest

Rarity Rank: S4/G4G5

Synonyms: Mixed Bottomland Hardwoods, Broad Stream Margins, Hardwood Bottoms

Ecological Systems: CES203.512 Lower Mississippi River Bottomland and Floodplain Forest
CES203.489 East Gulf Coastal Plain Large River Floodplain Forest
CES203.065 Red River Large Floodplain Forest
CES203.488 West Gulf Coastal Plain Large River Floodplain Forest

General Description:

Bottomland Hardwood Forests are forested alluvial wetlands occupying broad floodplain areas. These forests are found throughout Louisiana, and are the predominant natural community type of the Mississippi River Alluvial Plain (MRAP) ecoregion. Bottomland Hardwood Forests are characterized and maintained by a natural hydrologic regime of alternating wet and dry periods generally following seasonal flooding events. They are important natural communities for maintenance of water quality, providing a productive habitat for a variety of fish and wildlife species, and regulating flooding and stream recharge (LNHP 2009). Unlike many coastal stopover sites, Neotropical migratory birds utilize Bottomland Hardwood Forests as "full-service hotels", which provide food, water, and shelter during their perilous journey (Mehlman *et al.* 2005). In general, forested floodplain habitats are mixtures of broadleaf deciduous, needleleaf deciduous, and evergreen trees and shrubs. Bottomland Hardwood Forests contain a number of species which can be aggregated into specific associations based on environmental factors such as physiography, topography, soils, and moisture regime (Allen 1997, The Nature Conservancy 2004).

Bottomland Hardwood Forest, Big Lake WMA, Tensas Parish

The following are three associations recognized by the Louisiana Natural Heritage Program (LNHP) in Bottomland Hardwood Forests of Louisiana (LNHP 2009):

1). **Overcup Oak-Water Hickory Bottomland Hardwood Forest**

Overcup Oak and Water Hickory are codominants of this floodplain forest which occurs on low-lying poorly drained flats, sloughs in backwater basins, and on low ridges with clay soils that are subject to inundation. Inundated or saturated soils are generally present for a major portion of the growing season. This community type has a long successional stage.

Overcup Oak-Water Hickory Bottomland Hardwood Forest: Characteristic Plants	
Water Hickory	*Carya aquatica*
Swamp Privet	*Forestiera acuminata*
Waterlocust	*Gleditisia aquatica*
Planertree	*Planera aquatica*
Overcup Oak	*Quercus lyrata*
Nuttall Oak	*Quercus texana*
Red Grape	*Vitis palmata*

2). **Hackberry-American Elm-Green Ash Bottomland Hardwood Forest**

This community occurs in floodplains of major rivers on low ridges, flats and sloughs in first bottoms (portions of floodplains nearest to rivers, immediately behind natural levees). Soils are seasonally inundated or saturated periodically for 1 to 2 months during the growing season.

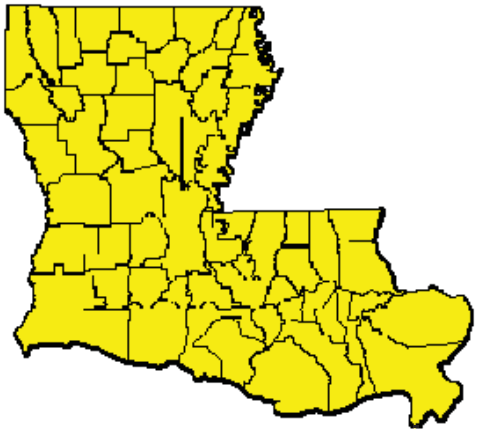
Hackberry-American Elm-Green Ash Bottomland Hardwood Forest: Characteristic Plants	
Water Hickory	*Carya aquatica*
Hackberry	*Celtis laevigata*
Green Ash	*Fraxinus pennsylvanica*
Honeylocust	*Gleditsia triacanthos*
American Elm	*Ulmus americana*

3). **Sweetgum-Water Oak Bottomland Hardwood Forest**

This is the driest Bottomland Hardwood Forest association, occuring often on low ridges. Plant diversity generally increases with shorter hydroperiod, so this type is also the richest in plant species of the Bottomland Hardwood Forest types.

Sweetgum-Water Oak Bottomland Hardwood Forest: Characteristic Plants	
Cherokee Caric Sedge	*Carex cherokeensis*
Caric Sedges	*Carex* spp.
Green Hawthorn	*Crataegus viridis*
Deciduous Holly	*Ilex decidua*
Sweetgum	*Liquidambar styraciflua*
Red Mulberry	*Morus rubra*
Water Oak	*Quercus nigra*
Cherrybark Oak	*Quercus pagoda*
Southern Shield Fern	*Thelypteris kunthii*
Poison Ivy	*Toxicodendron radicans*

Current Extent and Status:



Bottomland Hardwood Forest is a large-scale habitat in Louisiana, having historically occupied an estimated 6 to 8 million acres (Smith 1993). On today's landscape, only 25 to 50% of this original acreage is thought to remain (Smith 1993). Old-growth examples of this habitat type are very rare. In the MRAP, clearing for agricultural production was the primary factor that led to decline of this habitat type. Large tracts of Bottomland Hardwood Forest remain, but most are either second or third growth stands. The USACE oversees the Atchafalaya Basin Spillway Diversion Project which is part of the largest remaining block of floodplain forest and swamp in the U.S, along with Atchafalaya National Wildlife Refuge (NWR) and Sherburne Wildlife Management Area (WMA). Louisiana's East Gulf Coastal Plain (ECGP) still contains extensive areas of Bottomland Hardwood Forest primarily along the Pearl and Bogue Chitto Rivers in St. Tammany and Washington Parishes. Much of this acreage is contained within the Bogue Chitto NWR, managed by the U.S. Fish and Wildife Service (USFWS), and Pearl River WMA, operated by the Louisiana Department of Wildlife and Fisheries (LDWF). While some sizeable blocks of bottomland hardwoods remain, altered hydrology is causing observable shifts in plant species composition (DeWeese et. al. 2007). Reconnecting fragmented forest blocks and restoration of wetland forest functions are the major challenges to reforestation efforts but are essential to providing adequate wildlife habitat in alluvial settings.

Bottomland Hardwood Forest SGCN (61)	
Mollusks (1)	
Flamed Tigersnail	*Anguispira alternata*
Crustaceans (1)	
Javelin Crawfish	*Procambarus jaculus*
Non-crustacean Arthropods (6)	
Cajun Tiger Beetle	*Dromochorus pilatei*
Six-banded Longhorn Beetle	*Dryobius sexnotatus*
Seminole Texan Crescent	*Anthanassa texana seminole*
Creole Pearly-eye	*Lethe creola*
Lace-winged Roadside-Skipper	*Amblyscirtes aesculapius*
Nutmeg Underwing	*Catocala atocala*
Amphibians (5)	
Southern Dusky Salamander	*Desmognathus auriculatus*
Louisiana Slimy Salamander	*Plethodon kisatchie*
Strecker's Chorus Frog	*Pseudacris streckeri*
Eastern Spadefoot	*Scaphiopus holbrookii*
Southern Crawfish Frog	*Lithobates areolatus areolatus*
Reptiles (4)	
Alligator Snapping Turtle	*Macrochelys temminckii*
Eastern Diamond-backed Rattlesnake	*Crotalus adamanteus*
Timber Rattlesnake	*Crotalus horridus*
Pygmy Rattlesnake	*Sistrurus miliarius*
Birds (20)	
Wood Stork	*Mycteria americana*
Roseate Spoonbill	*Platalea ajaja*
Osprey	*Pandion haliaetus*
Swallow-tailed Kite	*Elanoides forficatus*
Bald Eagle	*Haliaeetus leucocephalus*
American Woodcock	*Scolopax minor*
Chimney Swift	*Chaetura pelagica*
Yellow-throated Vireo	*Vireo flavifrons*
Wood Thrush	*Hylocichla mustelina*
Worm-eating Warbler	*Helmitheros vermivorum*
Louisiana Waterthrush	*Parkesia motacilla*
Golden-winged Warbler	*Vermivora chrysoptera*

Prothonotary Warbler	*Protonotaria citrea*
Swainson's Warbler	*Limnothlypis swainsonii*
Kentucky Warbler	*Geothlypis formosa*
American Redstart	*Setophaga ruticilla*
Hooded Warbler	*Setophaga citrina*
Cerulean Warbler	*Setophaga cerulea*
Painted Bunting	*Passerina ciris*
Rusty Blackbird	*Euphagus carolinus*
Mammals (10)	
Southeastern Shrew	*Sorex longirostris*
Southeastern Myotis	*Myotis austroriparius*
Northern Long-eared Bat	*Myotis septentrionalis*
Eastern Pipistrelle	*Perimyotis subflavus*
Rafinesque's Big-eared Bat	*Corynorhinus rafinesquii*
Big Brown Bat	*Eptesicus fuscus*
Louisiana Black Bear	*Ursus americanus luteolus*
Long-tailed Weasel	*Mustela frenata*
Eastern Spotted Skunk	*Spilogale putorius*
Ringtail	*Bassariscus astutus*
Plants (14)	
Broad-leaved Spiderwort	*Tradescantia subaspera*
Bur Oak	*Quercus macrocarpa*
Climbing Bittersweet	*Celastrus scandens*
Cypress-knee Sedge	*Carex decomposita*
Fowl Manna Grass	*Glyceria striata*
Hairy Lipfern	*Cheilanthes lanosa*
Long-sepaled False Dragon Head	*Physostegia longisepala*
Low Erythrodes	*Platythelys querceticola*
Nodding Pogonia	*Triphora trianthophora*
Pondberry	*Lindera melissifolia*
Sink-hole Fern	*Blechnum occidentale*
Snow Melanthera	*Melanthera nivea*
Southern Shield Woodfern	*Dryopteris ludoviciana*
Swamp Thistle	*Cirsium muticum*

Threats Affecting Habitat:

Many Bottomland Hardwood Forests are experiencing drier site conditions due to modifications to hydrology, resulting in changes in species composition. Invasive plants and animals also seriously threaten this habitat. As with other forested wetlands, potential impacts of climate change related to reduced precipitation are of concern.

Bottomland Hardwood Forest Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	Small	Slight	Low
Agriculture/Aquaculture	Pervasive	Moderate	Medium
Energy Production & Mining	Restricted	Slight	Low
Transportation & Service Corridors	Large	Slight	Low
Biological Resource Use	Restricted	Moderate	Low
Human Intrusion/Disturbance	Restricted	Slight	Low
Natural System Modification	Pervasive	Serious	High
Invasive & other Problematic Species	Large	Serious	High
Pollution	Small	Slight	Low
Geological Events	N/A	N/A	N/A
Climate Change & Severe Weather	Pervasive	Slight	Low
Overall Calculated Threat Impact: High			

Habitat Research Needs/Conservation Actions:

1. Promote use of appropriate silvicultural techniques and Best Management Practices (BMPs) (e.g, the Lower Mississippi Valley Joint Venture (LMVJV) desired forest conditions (DFCs) report, *Restoration, Management, and Monitoring of Forest Resources in the Mississippi Alluvial Valley: Recommendations for Enhancing Wildlife Habitat*) to restore and manage Bottomland Hardwood Forests for wildlife.
2. Work with adjoining states to address water management issues that affect bottomland hardwood habitat in Louisiana.
3. Continue to work with partners to promote corridors of Bottomland Hardwood Forests for wildlife species.
4. Work with the Natural Resources Conservation Service (NRCS) to incorporate long-term planning for reforested Conservation Reserve Program (CRP) and Wetland Reserve Program (WRP) sites.
5. Implement floodplain reintroductions and diversions to restore natural hydrology to Bottomland Hardwood Forests.

e. Calcareous Forest

Rarity Rank: S2/G2?Q

Synonyms: Calcareous Hardwood Forest, Dry Calcareous Woodland, Blackland Hardwood Forest, Upland Hardwood Forest, Circum-Neutral Forest

Ecological Systems: CES203.379 West Gulf Coastal Plain Southern Calcareous Prairie
CES203.378 West Gulf Coastal Plain Pine-Hardwood Forest

General Description.

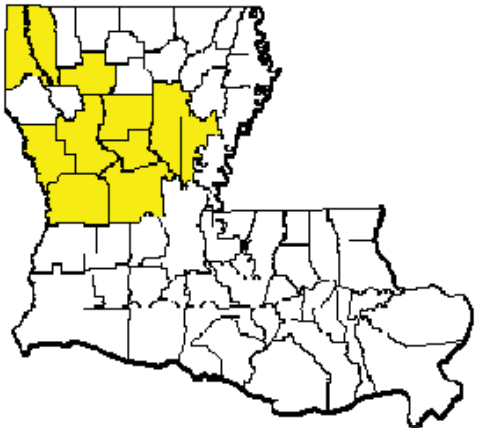
This community occurs on calcareous soils in the uplands of central, western and northwest Louisiana. Most known examples occur on hills and slopes on either side of small creeks, downslope from Calcareous Prairies. Structure likely varies based on slope position, with more mesic examples on steep slopes and in stream valleys having a closed (or nearly so) canopy. Calcareous Forests on upper slopes and ridge tops were likely woodlands, where dry site conditions and fire maintained a more open canopy. Soils are stiff calcareous clays, not quite as alkaline as in the prairies (surface pH ~ 6.5-7.5), with high shrink-swell characteristics.

Calcareous Forest, Bodcau WMA, Bossier Parish.

Calcareous Forest: Characteristic Plants	
Cherokee Caric Sedge	*Carex cherokeensis*
Nutmeg Hickory	*Carya myristiciformis*
Eastern Redbud	*Cercis canadensis*
White Ash	*Fraxinus americana*
Tuberous Puccoon	*Lithospermum tuberosum*
Chinquapin Oak	*Quercus muhlenbergii*
Shumard Oak	*Quercus shumardii*
Post Oak	*Quercus stellata*
Aromatic Sumac	*Rhus aromatica*
Rusty Blackhaw	*Viburnum rufidulum*

***Current Extent and Status*:**

It is estimated that 50,000 to 100,000 acres of Calcareous Forest occurred in Louisiana in pre-settlement times, and that 25 to 50 percent of the original cover remain today (Smith 1993). There are several high quality occurences on conservation areas such as Kisatchie National Forest (KNF; particularly the Winn Ranger District), Barksdale Air Force Base (AFB), Bodcau WMA, and TNC's Copenhagen Hills Preserve. Additional field survey work is needed to more accurately determine the status and extent of Calcareous Forest.



Calcareous Forest SGCN (45)	
Non-crustacean Arthropods (4)	
Six-banded Longhorn Beetle	*Dryobius sexnotatus*
Frosted Elfin	*Callophrys irus*
Wild Indigo Duskywing	*Erynnis baptisiae*
Nutmeg Underwing	*Catocala atocala*
Reptiles (2)	
Western Wormsnake	*Carphophis vermis*
Timber Rattlesnake	*Crotalus horridus*
Birds (9)	
American Woodcock	*Scolopax minor*
Greater Roadrunner	*Geococcyx californianus*

Chuck-will's-widow	*Antrostomus carolinensis*
Chimney Swift	*Chaetura pelagica*
Wood Thrush	*Hylocichla mustelina*
Yellow-throated Vireo	*Vireo flavifrons*
Kentucky Warbler	*Geothlypis formosa*
American Redstart	*Setophaga ruticilla*
Hooded Warbler	*Setophaga citrina*
Mammals (11)	
Northern Long-eared Bat	*Myotis septentrionalis*
Big Brown Bat	*Eptesicus fuscus*
Eastern Pipistrelle	*Perimyotis subflavus*
Rafinesque's Big-eared Bat	*Corynorhinus rafinesquii*
Silver-haired Bat	*Lasionycteris noctivagans*
Southeastern Myotis	*Myotis austroriparius*
Bachman's Fox Squirrel	*Sciurus niger bachmani*
Golden Mouse	*Ochrotomys nuttalli*
Northern Pygmy Mouse	*Baiomys taylori*
Ringtail	*Bassariscus astutus*
Long-tailed Weasel	*Mustela frenata*
Plants (19)	
Atlantic Camas	*Camassia scilloides*
Downy Yellow Violet	*Viola pubescens*
Durand Oak	*Quercus sinuata var. sinuata*
Lanceleaved Buckthorn	*Rhamnus lanceolata*
Northern Prickly-ash	*Zanthoxylum americanum*
Northern Red Oak	*Quercus rubra*
Nuttall's Deathcamas	*Zigadenus nuttallii*
Oglethorpe's Oak	*Quercus oglethorpensis*
Purple Boneset	*Eupatorium purpureum*
Purple Milkweed	*Asclepias purpurascens*
Stiff Tickseed	*Coreopsis palmata*
Tall Bellflower	*Campanulastrum americanum*
Three-flowered Hawthorn	*Crataegus triflora*
Three-lobed Coneflower	*Rudbeckia triloba*
Virginia Strawberry	*Fragaria virginiana*
Wahoo	*Euonymus atropurpureus*
Whiteleaf Leatherflower	*Clematis glaucophylla*
Yellow Pimpernel	*Taenidia integerrima*
Yellow-wood	*Cladrastis kentukea*

Threats Affecting Habitat:

This habitat is threatened mainly by disturbance associated with timber harvesting and oil and gas extraction (including roads and infrastructure). Inadequate fire threatens Calcareous Forests on upper slopes and ridge tops.

Calcareous Forest Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	Restricted	Moderate	Low
Agriculture/Aquaculture	Restricted	Extreme	Medium
Energy Production & Mining	Large	Moderate	Medium
Transportation & Service Corridors	Large	Moderate	Medium
Biological Resource Use	Restricted	Moderate	Low
Human Intrusion/Disturbance	Small	Slight	Low
Natural System Modification	Restricted	Moderate	Low
Invasive & other Problematic Species	Large	Slight	Low
Pollution	Small	Slight	Low
Geological Events	N/A	N/A	N/A
Climate Change & Severe Weather	N/A	N/A	N/A
Overall Calculated Threat Impact: High			

Habitat Research Needs/Conservation Actions:

1. Conduct studies to relate vegetation to landscape position and soil characteristics to further understand processes accounting for and maintaining this habitat type.
2. Conduct zoological inventories to determine utilization of this habitat type.
3. Prioritize the development of management plans and recommendations for this habitat type.
4. Promote prescribed fire as management tool for Calcareous Forests occuring on higher landscape positions.

f. Coastal Live Oak-Hackberry Forest

Rarity Rank: S1/G2

Synonyms: Chenier, Maritime Forest, Chenier Maritime Forest

Ecological Systems: CES203.466 West Gulf Coastal Plain Chenier and Upper Texas Coastal Fringe Forest and Woodland
CES203.503 East Gulf Coastal Plain Maritime Forest

General Description:

Coastal Live Oak-Hackberry Forests, also known as Cheniers (French for "place of oaks"), occur on abandoned beach ridges defining the Chenier Plain of southwest Louisiana and adjacent Texas. Cheniers occur on the Deltaic Plain as well, but are rare there. These ancient beaches were stranded via deltaic sedimentation by the constantly shifting Mississippi River. Composed primarily of fine sandy loams with sand and shell layers or deposits, these ridges are typically 4-5 feet above sea level. Cheniers are important storm barriers limiting saltwater intrusion into marshes. Typically, marshes north of Cheniers are fresher than those Gulf-ward. This community also provides important wildlife habitat and serves as vital resting and foraging habitat for migrating birds (Mueller 1990). Hundreds of thousands of birds (around 100 species) use Cheniers annually as stopover points during migration. Native American shell middens also support this habitat type, which is considered a distinct habitat by NatureServe (2015) called Gulf Coast Shell Midden Woodland (G2G3).

Coastal Live Oak–Hackberry Forest, Marsh Island, Vermilion Parish; photo taken in late 1980s.

Coastal Live Oak-Hackberry Forest: Characteristic Plant Species	
Hackberry	*Celtis laevigata*
Green Ash	*Fraxinus pennsylvanica*
Hairy Gromwell	*Onosmodium molle* (shelly substrate)
Texas Prickly Pear	*Opuntia lindheimeri* (deep sand)
Live Oak	*Quercus virginiana*
Palmetto	*Sabal minor*
Heartleaf Skullcap	*Scutellaria ovata*

Current Extent and Status:

Coastal Live Oak–Hackberry Forests occur in the Chenier Plain from Iberia Parish westward across Vermilion and Cameron parishes, and on a few true cheniers in the Deltaic Plain. This habitat also occurs on Native American shell middens. Since this forest type is found on elevated sites, most examples were developed or highly altered relatively early during European expansion. Many shell middens have been mined for fill material. Of the original 100,000 to 500,000 acres in Louisiana, only 2,000 to 10,000 acres, or 1-5% of pre-settlement extent, are thought to remain today (Smith 1993). True remaining extent is likely much closer to the lower end of this range.

Few examples of this habitat are protected. TNC protects Hollister Chenier Preserve (ca. 50 acres) in Cameron Parish and the Baton Rouge Audubon Society (BRAS) owns and maintains the approximately 40 acre Peveto Woods Sanctuary, also in Cameron Parish. Although privately owned, the Evariste Nunez Woods and Bird Sanctuary (~ 42 acres) is maintained by LDWF through a lease agreement. Establishment of this habitat on an artificial ridge near Fourchon is being carried out by the Barataria-Terrebonne National Estuary Program (BTNEP) using plant materials propagated from nearby Grand Isle. Several Native American shell middens are protected on Jean Lafitte National Historical Park and Preserve.

Coastal Live Oak-Hackberry Forest SGCN (24)	
Non-crustacean Arthropods (2)	
Celia's Roadside-Skipper	*Amblyscirtes celia*
Falcate Orangetip	*Anthocharis midea*
Reptiles (3)	
Ornate Box Turtle	*Terrapene ornata*
Western Slender Glass Lizard	*Ophisaurus attenuatus attenuatus*
Timber Rattlesnake	*Crotalus horridus*

Birds (16)	
Chuck-will's-widow	*Antrostomus carolinensis*
Chimney Swift	*Chaetura pelagica*
Yellow-throated Vireo	*Vireo flavifrons*
Warbling Vireo	*Vireo gilvus*
Wood Thrush	*Hylocichla mustelina*
Worm-eating Warbler	*Helmitheros vermivorum*
Louisiana Waterthrush	*Parkesia motacilla*
Golden-winged Warbler	*Vermivora chrysoptera*
Prothonotary Warbler	*Protonotaria citrea*
Swainson's Warbler	*Limnothlypis swainsonii*
Kentucky Warbler	*Geothlypis formosa*
American Redstart	*Setophaga ruticilla*
Hooded Warbler	*Setophaga citrina*
Cerulean Warbler	*Setophaga cerulea*
Yellow-throated Warbler	*Setophaga dominica*
Painted Bunting	*Passerina ciris*
Plants (3)	
Narrowleaved Puccoon	*Lithospermum incisum*
Saw Palmetto	*Serenoa repens*
Wedgeleaf Whitlow-grass	*Draba cuneifolia*

*Saw Palmetto occurs on several relict Barrier Islands on the Deltaic Plain of southeast Louisiana and on the North Shore of Lake Pontchartrain. The islands predate the formation of the St. Bernard Delta.

Importance to Neotropical Migratory Landbirds:

It should be noted that the Chenier Plain Coastal Live Oak-Hackberry Forests are extremely important as stopover habitat for Neotropical migratory landbirds during spring and fall migration. The majority of migrants fly nonstop for more than 600 miles to cross the Gulf of Mexico each spring. At least 82 species of migratory birds regularly use these wooded habitats to replenish energy reserves necessary to successfully complete their migration. During fall migration Cheniers provide important corridors and staging areas for both trans-Gulf and circum-Gulf migrants, which move along the coast through Texas and around the Gulf of Mexico on their journey to Central and South America.

Threats Affecting Habitat:

This forest type is threatened by potential residential and commercial development, sand and shell mining, and invasive plants and animals. Erosion and subsidence of surrounding coastal marsh will increase the exposure of this habitat to wave action and storm surges.

Coastal Live Oak-Hackberry Forest Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	Large	Extreme	High
Agriculture/Aquaculture	Large	Moderate	Medium
Energy Production & Mining	Large	Moderate	Medium
Transportation & Service Corridors	Large	Slight	Low
Biological Resource Use	N/A	N/A	N/A
Human Intrusion/Disturbance	Restricted	Slight	Low
Natural System Modification	N/A	N/A	N/A
Invasive & other Problematic Species	Large	Slight	Low
Pollution	N/A	N/A	N/A
Geological Events	Pervasive	Slight	Low
Climate Change & Severe Weather	Large	Moderate	Medium
Overall Calculated Threat Impact: Medium			

Habitat Research Needs/Conservation Actions:

1. Partner with state and federal agencies, NGOs, private landowners, and other stakeholders to restore Cheniers.
2. Support CPRA, CWPPRA, LCA, LDNR, USACE, and other partner efforts for shoreline stabilization and habitat restoration.
3. Work with USACE and NRCS to develop better strategies for the placement of dredged materials as a restoration method for this habitat type.
4. Review Texas tax exemption policies regarding livestock. Determine which of these policies may apply to conservation of Cheniers in Louisiana, and work with the legislature to incorporate these policies into the tax code.
5. Develop methods to encourage landowners to remove cattle from Cheniers or promote rotational grazing and manage the land for wildlife conservation.
6. Support protection of high quality examples of this habitat that have the potential for long term sustainability through cooperative agreements or purchase from willing sellers.
7. Construct coastal hammocks by partnering with CPRA, USACE, and other partners to use sediment pipeline delivery or other sediment delivery methods to build land sufficient to support Coastal Live Oak-Hackberry Forests in both the Chenier and Deltaic Plains.
8. Conduct habitat inventories and assessments on Native American shell middens; work with Native American tribes and managers of lands supporting shell middens to accomplish protection of shell middens and enhancement of associated habitat.
9. Support invasive plant and animal control on all expressions of Coastal Live Oak-Hackberry Forest by providing funding for direct control of these species.

g. Cypress-Tupelo-Blackgum Swamps

Rarity Rank: S4/G3G5

Synonyms: Freshwater Swamp, Brake, Swamp Forest

Ecological Systems: CES203.490 Lower Mississippi River Bottomland Depression
CES203.065 Red River Large Floodplain Forest
CES203.384 Southern Coastal Plain Nonriverine Basin Swamp
CES203.459 West Gulf Coastal Plain Near Coast Large River Swamp

General Description:

Baldcypress Swamp (S4), Baldcypress-Tupelo Swamp (S4), Tupelo-Blackgum Swamp (S4), Scrub/Shrub Swamp (S4S5), and Shrub Swamp (S4S5) are described as distinct communities in Natural Communities of Louisiana (LNHP 2009). They are combined here due to their similarity and common conservation needs.

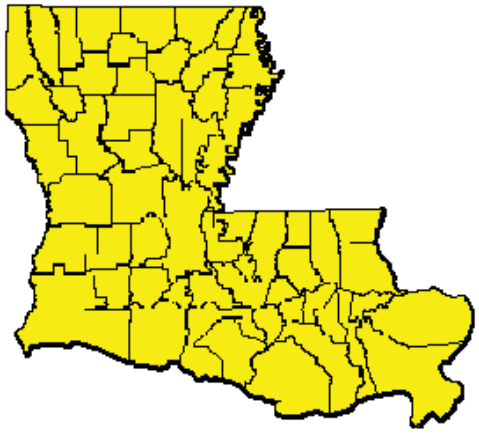
Cypress-Tupelo-Blackgum Swamps are forested, alluvial swamps occuring on intermittently exposed soils, most commonly along rivers and streams but also in backswamp depressions and swales. The soils are inundated or saturated by surface water or ground water on a nearly permanent basis throughout the growing season, except during periods of drought. Even deepwater swamps with almost continuous flooding experience seasonal fluctuations in water levels (LNHP 2009). Baldcypress Swamps generally occur on mucks and clays, but also on silts and sands with underlying clay layers (Conner and Buford 1998). Cypress-Tupelo-Blackgum Swamps have relatively low floristic diversity. The composition of associate species may vary widely from site to site. Undergrowth is often sparse because of low light intensity and a long hydroperiod. Neither Baldcypress nor Tupelo seeds germinate underwater, nor can young seedlings of these trees survive long submergence. Seedling recruitment can only occur during draw-down periods.

Baldcypress Swamp, Caddo Parish

This probably explains why these species tend to occur in even-aged stands since the environmental conditions favorable for germination and establishment of saplings occur infrequently. Near-permananent impoundment of Cypress-Tupelo-Blackgum Swamps is a major threat affecting sustainability of these forests. Those areas dominanted by Tupelo and Blackgum are also alluvial but occur on higher topographic positions than Baldcypress dominated swamps.

Cypress-Tupelo-Blackgum Swamp: Characteristic Plants	
Common Name	**Scientific Name**
Drummond Red Maple	*Acer rubrum* var. *drummondii*
Buttonbush	*Cephalanthus occidentalis*
Carolina Ash	*Fraxinus caroliniana*
Virginia-willow	*Itea virginica*
Tupelogum	*Nyssa aquatica*
Swamp Blackgum	*Nyssa biflora*
Savanna Panicum	*Phanopyrum gymnocarpon*
Lizard's Tail	*Saururus cernuus*
Baldcypress	*Taxodium distichum*

Current Extent and Status:



Cypress-Tupelo-Blackgum Swamps may be found throughout Louisiana, and sizeable areas of swamp still remain, even though the historic extent is considerably reduced. Of the original 2 to 4 million acres, 500,000 to 1 million acres are thought to remain today (50–75% loss). While old individual baldcypress trees are not that difficult to find, old-growth examples of Cypress-Tupelo-Blackgum Swamps are very rare (Smith 1993, The Nature Conservancy 2004). The Atchafalaya Basin Floodway contains the greatest remaining contiguous acreage in the United States with an estimated 595,000 acres of collective Cypress-Tupelo-Blackgum Swamp and Bottomland Hardwood Forest. Large tracts can also be found in the EGCP in areas of the Amite, Tickfaw, and lower Tangipahoa rivers and lands surrounding Lakes Pontchartrain and Maurepas (Governor's Science Working Group on Coastal Wetland Forest Conservation and Use 2005).

All of Louisiana's swamps are threatened by altered hydrology, land loss and encroaching interests; however, the swamps of the lower MRAP in south central and southeastern Louisiana face additional peril from subsidence, coastal erosion, and saltwater intrusion. All of these factors combine to promote rapid loss and prevent adequate regeneration of these swamps.

Cypress-Tupelo-Blackgum Swamp SGCN (37)	
Non-crustacean Arthropods (4)	
Creole Pearly-eye	*Lethe creola*
Seminole Texan Crescent	*Anthanassa texana seminole*
King's Hairstreak	*Satyrium kingi*
Appalachian Brown	*Lethe appalachia*
Amphibians (3)	
Four-toed Salamander	*Hemidactylium scutatum*
Southern Dusky Salamander	*Desmognathus auriculatus*
Ornate Chorus Frog	*Pseudacris ornata*
Reptiles (3)	
Alligator Snapping Turtle	*Macrochelys temminckii*
Western Chicken Turtle	*Deirochelys reticularia miaria*
Eastern Diamond-backed Rattlesnake	*Crotalus adamanteus*
Birds (9)	
Wood Stork	*Mycteria americana*
Roseate Spoonbill	*Platalea ajaja*
Osprey	*Pandion haliaetus*
Swallow-tailed Kite	*Elanoides forficatus*
Bald Eagle	*Haliaeetus leucocephalus*
Chimney Swift	*Chaetura pelagica*
Yellow-throated Vireo	*Vireo flavifrons*
Prothonotary Warbler	*Protonotaria citrea*
Yellow-throated Warbler	*Setophaga dominica*
Mammals (6)	
Southeastern Shrew	*Sorex longirostris*
Southeastern Myotis	*Myotis austroriparius*
Big Brown Bat	*Eptesicus fuscus*
Rafinesque's Big-eared Bat	*Corynorhinus rafinesquii*
Louisiana Black Bear	*Ursus americanus luteolus*
Long-tailed Weasel	*Mustela frenata*
Plants (12)	
Abbeville Red Iris	*Iris X nelsonii*
Apalachicola Doll's-daisy	*Boltonia apalachicolensis*
Cypress-knee Sedge	*Carex decomposita*
Floating Antler Fern	*Ceratopteris pteridoides*

Fowl Manna Grass	*Glyceria striata*
Hall's Pocket Moss	*Fissidens hallii*
Hemlock Water-parsnip	*Sium suave*
Little Floatingheart	*Nymphoides cordata*
Log Fern	*Dryopteris celsa*
Pondspice	*Litsea aestivalis*
Willdenow's Maiden Fern	*Thelypteris interrupta*
Yellow Water-crowfoot	*Ranunculus flabellaris*

Threats Affecting Habitat:

Cypress-Tupelo-Blackgum Swamps are threatened by altered hydrology, specifically complete or partial impoundment which limits tree seedling recruitment. Coastal swamps are also affected by subsidence, resulting in conversion to marsh.

Cypress-Tupelo-Blackgum Swamps Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	Small	Serious	Low
Agriculture/Aquaculture	N/A	N/A	N/A
Energy Production & Mining	Restricted	Slight	Low
Transportation & Service Corridors	Restricted	Slight	Low
Biological Resource Use	N/A	N/A	N/A
Human Intrusion/Disturbance	Restricted	Slight	Low
Natural System Modification	Large	Moderate	Medium
Invasive & other Problematic Species	Pervasive	Moderate	Medium
Pollution	Large	Moderate	Medium
Geological Events	Restricted	Moderate	Low
Climate Change & Severe Weather	Pervasive	Moderate	Medium
Overall Calculated Threat Impact: Medium			

Habitat Research Needs/Conservation Actions:

1. Establish and maintain long-term monitoring sites within coastal wetland forests.
2. Promote use of LMVJV DFCs to restore/manage swamps for wildlife.
3. Continue to work with Louisiana Purchase Cypress Legacy Program and other environmental groups to identify old-growth areas where conservation actions can be implemented.
4. Work with adjoining states to address water management issues that affect Cypress-Tupelo-Blackgum swamps in Louisiana.
5. Work with USACE to manage water levels in the Atchafalaya Basin to benefit this habitat type.

h. Hardwood Flatwoods

Rarity Ranks: Mesic Hardwood Flatwoods: S2S3
Wet Hardwood Flatwoods: S2S3
Prairie Terrace Loess Forest: S1/G2?

Synonyms: Willow Oak Flats, Pin Oak Flats

Ecological Systems: CES203.548 West Gulf Coastal Plain Nonriverine Wet Hardwood Flatwoods
CES203.193 Lower Mississippi River Flatwoods
CES203.476 Southern Coastal Plain Mesic Slope Forest

General Description:

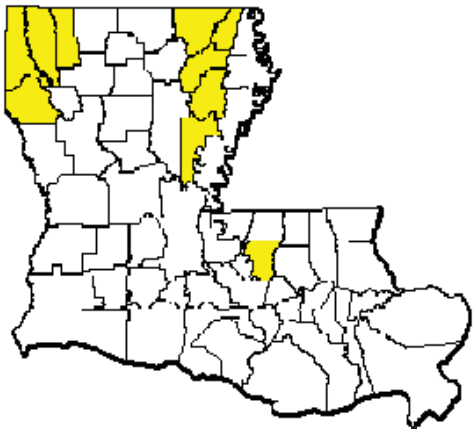
Wet Hardwood Flatwoods and Mesic Hardwood Flatwoods are described as two distinct communities in the LNHP community classification system but are combined here. Also included in this habitat is Prairie Terrace Loess Forest, a mesic flatwoods type which is restricted to East Baton Rouge Parish.

Hardwood Flatwoods occur on flat, poorly drained settings on older (Pleistocene) landscapes. Mesic Hardwood Flatwoods and Prairie Terrace Loess Forest, also a mesic type, occur on slightly higher and better drained sites. While species composition may overlap substantially with various types of Bottomland Hardwood Forest, Hardwood Flatwoods do not occupy floodplains. Hardwood Flatwoods are also found on sodic (alkali) soils.

Hardwood Flatwoods on Macon Ridge, northeast Louisiana.

Hardwood Flatwoods: Characteristic Plants (* wet, ** mesic, + both)	
Devil's Walking Stick	*Aralia spinosa* **
Giant Cane	*Arundinaria gigantea* **
Cherokee Caric Sedge	*Carex cherokeensis* **
Mockernut Hickory	*Carya alba* **
Shagbark hickory	*Carya ovata* *
Hackberry	*Celtis laevigata* +
Leather Flower	*Clematis crispa* *
Flowering Dogwood	*Cornus florida* **
Green Ash	*Fraxinus pennsylvanica* *
Eastern Hophornbeam	*Ostrya virginiana* **
White Oak	*Quercus alba* **
Cherrybark Oak	*Quercus pagoda* **
Willow Oak	*Quercus phellos* *
Delta Post Oak	*Quercus similis* *
Palmetto	*Sabal minor* +
Cedar Elm	*Ulmus crassifolia* *

Current Extent and Status:



Most known occurrences of Hardwood Flatwoods are on the Macon Ridge in northeast Louisiana and on the Prairie Terrace in the northwest part of the state. A small amount of this habitat is captured by Bodcau WMA in Bossier Parish. The Louisiana Army Ammunition Plant in Bossier and Webster Parishes supports high quality Hardwood Flatwoods (McInnis and Martin 1995). In addition to East Baton Rouge, Prairie Terrace Loess Forest may have been present in the adjacent parishes of East Feliciana and Livingston. The historical extent of all types of Hardwood Flatwoods is not known. Prairie Terrace Loess Forest is estimated to have occupied 500,000 to 1,000,000 acres historically, with 1-5 % remaining today (Smith 1993). Ecology of Hardwood Flatwoods is a major knowledge gap in Louisiana.

Hardwood Flatwoods SGCN (38)	
Non-crustacean Arthropods (2)	
Monarch	*Danaus plexippus*
Nutmeg Underwing	*Catocala atocala*
Amphibians (2)	
Southern Dusky Salamander	*Desmognathus auriculatus*
Eastern Spadefoot	*Scaphiopus holbrookii*
Reptiles (4)	
Western Wormsnake	*Carphophis vermis*
Eastern Hog-nosed Snake	*Heterodon platirhinos*
Timber Rattlesnake	*Crotalus horridus*
Pygmy Rattlesnake	*Sistrurus miliarius*
Birds (10)	
American Woodcock	*Scolopax minor*
Chuck-will's-widow	*Antrostomus carolinensis*
Yellow-throated Vireo	*Vireo flavifrons*
Wood Thrush	*Hylocichla mustelina*
Prothonotary Warbler	*Protonotaria citrea*
Swainson's Warbler	*Limnothlypis swainsonii*
Kentucky Warbler	*Geothlypis formosa*
American Redstart	*Setophaga ruticilla*
Hooded Warbler	*Setophaga citrina*
Painted Bunting	*Passerina ciris*
Mammals (11)	
Southeastern Shrew	*Sorex longirostris*
Big Brown Bat	*Eptesicus fuscus*
Eastern Pipistrelle	*Perimyotis subflavus*
Rafinesque’s Big-eared Bat	*Corynorhinus rafinesquii*
Southeastern Myotis	*Myotis austroriparius*
Eastern Chipmunk	*Tamias striatus*
Golden Mouse	*Ochrotomys nuttalli*
Louisiana Black Bear	*Ursus americanus luteolus*
Long-tailed Weasel	*Mustela frenata*
Eastern Spotted Skunk	*Spilogale putorius*
Ringtail	*Bassariscus astutus*
Plants (9)	

Arkansas Caric Sedge	*Carex arkansana*
Canada Enchanter's-nightshade	*Circaea lutetiana ssp. canadensis*
Floating Manna Grass	*Glyceria septentrionalis*
Prairie Evening Primrose	*Oenothera pilosella ssp. sessilis*
Three-lobed Coneflower	*Rudbeckia triloba*
Upland Swamp Privet	*Forestiera ligustrina*
Virginia Anemone	*Anemone virginiana*
Wolf's Spike Sedge	*Eleocharis wolfii*
Yellowleaf Tinker's-weed	*Triosteum angustifolium*

Threats Affecting Habitat:

This habitat faces potential residential and commercial development and conversion to anthropogenic habitat types. Disturbance associated with increased human interface, and invasive plants and animals also threaten this habitat.

Hardwood Flatwoods Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	Restricted	Serious	Medium
Agriculture/Aquaculture	Restricted	Extreme	Medium
Energy Production & Mining	Small	Moderate	Low
Transportation & Service Corridors	Restricted	Slight	Low
Biological Resource Use	Restricted	Serious	Medium
Human Intrusion/Disturbance	N/A	N/A	N/A
Natural System Modification	N/A	N/A	N/A
Invasive & other Problematic Species	Large	Moderate	Medium
Pollution	Large	Slight	Low
Geological Events	N/A	N/A	N/A
Climate Change & Severe Weather	Pervasive	Slight	Low
Overall Calculated Threat Impact: Medium			

Habitat Research Needs/Conservation Actions:

1. Implement research on ecology, classification, and extent of this habitat type.
2. Designate this habitat as a high priority for inventory.
3. Seek habitat protection opportunities through conservation easements and land acquisition.

i. Live Oak Natural Levee Forest

Rarity Rank: S1/G2

Synonyms: Natural Levee Forest, Frontland Forest

Ecological Systems: CES203.190 Mississippi River Riparian Forest
CES203.196 Mississippi River High Floodplain (Bottomland) Forest

General Description:

This community occurs principally in southeastern Louisiana on natural levees or frontlands and on islands within marshes and swamps. It is similar in some respects to Coastal Live Oak-Hackberry Forest in that both develop on natural ridges in the coastal zone and overstory dominants are comparable. Palmetto is usually the most conspicuous midstory and understory shrub, often attaining heights of over 13 feet, but a number of other shrubs may be present. The herbaceous layer is often poorly developed. Vines are usually prominent, and epiphytes are significant community members. Several introduced species have become serious invaders of this habitat, including Japanese Climbing Fern (*Lygodium japonicum*), Chinese Tallow Tree, Chinaberry (*Melia azederach*), and Japanese Honeysuckle (*Lonicera japonica*).

Live Oak Natural Levee Forest, Plaquemines Parish

Live Oak Natural Levee Forest: Characteristic Plants	
Hackberry	*Celtis laevigata*
Deciduous Holly	*Ilex decidua*
Sweetgum	*Liquidambar styraciflua*
Red Bay	*Persea palustris*
Water Oak	*Quercus nigra*
Live Oak	*Quercus virginiana*
Palmetto	*Sabal minor*

Muscadine	*Vitis rotundifolia*
White Crownbeard	*Verbesina virginica*

Current Extent and Status:

Louisiana's Live Oak Natural Levee Forests occur in the Deltaic Plain of the southeastern parishes from Orleans and St. Bernard Parishes westward to St. Mary Parish. Since this forest type is found only on natural levees, which are higher and drier than the surrounding swamps and marshes, they were among the first areas to be cleared for agriculture and residential development. Of the original 500,000 to 1,000,000 acres in Louisiana, currently, only 10,000 to 50,000 acres remain, which is 1-5% of pre-settlement extent (Smith 1993). The majority of natural levee forests are in private ownership. A portion of the extant acreage is protected within Jean Lafitte National Historical Park and Preserve and Bayou Sauvage NWR. There are also a few remnant strips of this habitat on Pointe-aux-Chenes and Salvador WMAs. Numerous spoil banks occur within the Live Oak Natural Levee Forest range, and some of these have recruited Live Oak and are supporting habitat referrable to this type.

Live Oak Natural Levee Forest SGCN (20)	
Reptiles (5)	
Western Slender Glass Lizard	*Ophisaurus attenuatus attenuatus*
Eastern Glass Lizard	*Ophisaurus ventralis*
Eastern Hog-nosed Snake	*Heterodon platirhinos*
Timber Rattlesnake	*Crotalus horridus*
Pygmy Rattlesnake	*Sistrurus miliarius*
Birds (18)	
Wood Stork	*Mycteria americana*
Roseate Spoonbill	*Platalea ajaja*
Swallow-tailed Kite	*Elanoides forficatus*
Bald Eagle	*Haliaeetus leucocephalus*
American Woodcock	*Scolopax minor*
Chimney Swift	*Chaetura pelagica*
Yellow-throated Vireo	*Vireo flavifrons*
Wood Thrush	*Hylocichla mustelina*
Worm-eating Warbler	*Helmitheros vermivorum*
Louisiana Waterthrush	*Parkesia motacilla*
Golden-winged Warbler	*Vermivora chrysoptera*

Prothonotary Warbler	*Protonotaria citrea*
Swainson's Warbler	*Limnothlypis swainsonii*
Kentucky Warbler	*Geothlypis formosa*
American Redstart	*Setophaga ruticilla*
Hooded Warbler	*Setophaga citrina*
Cerulean Warbler	*Setophaga cerulea*
Yellow-throated Warbler	*Setophaga dominica*
Mammals (5)	
Southeastern Myotis	*Myotis austroriparius*
Big Brown Bat	*Eptesicus fuscus*
Eastern Pipistrelle	*Perimyotis subflavus*
Rafinesque's Big-eared Bat	*Corynorhinus rafinesquii*
Long-tailed Weasel	*Mustela frenata*

Threats Affecting Habitat:

The majority of remnant Live Oak Natural Levee Forests are altered and fragmented, and destruction and habitat distrubance continues from residential development, and road and utility installation. Invasive plants and animals also threaten this habitat. Subsidence of natural levees results in wetter site conditions which alters forest species composition. Subsidence of surrounding wetlands exposes Live Oak Natural Levee Forests to greater storm impacts.

Live Oak Natural Levee Forest Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	Restricted	Extreme	Medium
Agriculture/Aquaculture	N/A	N/A	N/A
Energy Production & Mining	N/A	N/A	N/A
Transportation & Service Corridors	Restricted	Slight	Low
Biological Resource Use	N/A	N/A	N/A
Human Intrusion/Disturbance	Large	Slight	Low
Natural System Modification	N/A	N/A	N/A
Invasive & other Problematic Species	Pervasive	Serious	High
Pollution	Restricted	Slight	Low
Geological Events	Pervasive	Moderate	Medium
Climate Change & Severe Weather	Pervasive	Serious	High
Overall Calculated Threat Impact: Medium			

Habitat Research Needs/Conservation Actions:

1. Support CPRA, CWPPRA, LCA, LDNR, USACE, and other partner efforts for shoreline stabilization and habitat restoration.
2. Work with LCA, LDNR and CPRA to broaden coastal restoration priorities to include Live Oak Natural Levee Forests.
3. Work with local parish planning commissions and LDNR to change zoning classifications to reduce development within this habitat type.
4. Make this community type a priority for land acquistion, protection, and management efforts.
5. Prioritize surveys for this community type to determine current extent and status.
6. Establish this habitat on artificial elevated land surfaces such as spoil banks.
7. Assess quality of habitats forming on artificial surfaces such as spoil banks; work with managing authorities to preserve high quality forests on spoil banks.
8. Provide funding for control of invasive plants (especially Chinese Tallow Tree and Chinaberry) and Feral Hogs in Live Oak Natural Levee Forests, including examples of this habitat that have developed on dredged materials (spoil banks).

j. Live Oak-Pine-Magnolia Forest

Rarity Rank: S1/G2G3
Synonyms: Maritime Forest, Maritime Mesophytic Forest
Ecological Systems: CES203.503 East Gulf Coastal Plain Maritime Forest

General Description:

This community is known in Louisiana from southern St. Tammany Parish within 2 miles of Lake Pontchartrain where the Pleistocene Prairie Terrace meets the Lake. Soils typically are sandy and are apparently relatively fertile. The community may exhibit site-to-site variation in species composition and physiognomy depending on soil moisture regime, time since canopy distrubance (e.g. from tropical storms), fire history, local relief, proximity to drains, and salt water inundation during very high tides (such as those associated with hurricanes). A number of these factors are related to distance from Lake Pontchartrain. The canopy structure of natural stands is believed to be more open than present-day stands. This natural community may in reality be a transitonal type between mesic Mixed Hardwood-Loblolly Forest and/or Beech-Magnolia Forest and more typical maritime forests that occur in coastal states east of Louisiana. Alternatively, this forest type may be an artificial aggregation, with the original species complement disproportionately represented in extant occurrences. Further field inventories are needed to more fully understand and define this community. Fire, although uncommon, may play an important role in Live Oak-Pine-Magnolia Forest.

Live Oak-Pine-Magnolia Forest, Fontainebleau State Park, St. Tammany Parish

Live Oak-Pine-Magnolia Forest: Characteristic Plants	
Live Oak	*Quercus virginiana*
Yaupon	*Ilex vomitoria*
Longleaf Pine	*Pinus palustris*
Slash Pine	*Pinus elliottii*
Loblolly Pine	*Pinus taeda*
Southern Magnolia	*Magnolia grandiflora*
Willdenow's Sedge	*Carex basiantha*
White Ash	*Fraxinus americana*

Current Extent and Status:

This community is very restricted in its occurrence in Louisiana, and is known only from St. Tammany Parish along the northshore of Lake Pontchartrain. Estimated pre-settlement of this habitat type is from 10,000 to 50,000 acres, with only 10-25% of the original extent remaining today (Smith 1993). Small examples of this habitat are protected at Big Branch Marsh NWR, Fontainebleau State Park, and Northlake Nature Center.

Live Oak-Pine-Magnolia Forest SGCN (27)	
Crustaceans (2)	
Flatwoods Digger	*Fallicambarus oryktes*
Flatnose Crawfish	*Procambarus planirostris*
Reptiles (7)	
Eastern Glass Lizard	*Ophisaurus ventralis*
Eastern Hog-nosed Snake	*Heterodon platirhinos*
Pine Woods Littersnake	*Rhadinaea flavilata*
Southeastern Crowned Snake	*Tantilla coronata*
Harlequin Coralsnake	*Micrurus fulvius*
Timber Rattlesnake	*Crotalus horridus*
Pygmy Rattlesnake	*Sistrurus miliarius*
Birds (9)	
Chuck-will's-widow	*Antrostomus carolinensis*
Chimney Swift	*Chaetura pelagica*

Yellow-throated Vireo	*Vireo flavifrons*
Wood Thrush	*Hylocichla mustelina*
Swainson's Warbler	*Limnothlypis swainsonii*
Kentucky Warbler	*Geothlypis formosa*
American Redstart	*Setophaga ruticilla*
Hooded Warbler	*Setophaga citrina*
Rusty Blackbird	*Euphagus carolinus*
Mammals (7)	
Southeastern Myotis	*Myotis austroriparius*
Big Brown Bat	*Eptesicus fuscus*
Eastern Pipistrelle	*Perimyotis subflavus*
Rafinesque's Big-eared Bat	*Corynorhinus rafinesquii*
Bachman's Fox Squirrel	*Sciurus niger bachmani*
Long-tailed Weasel	*Mustela frenata*
Eastern Spotted Skunk	*Spilogale putorius*
Plants (2)	
Gulf Spikemoss	*Selaginella ludoviciana*
Silky Camellia	*Stewartia malacodendron*

Threats Affecting Habitat:

This habitat occurs in a rapidly developing part of the state and is threatened by this development and disturbance associated with increased human interface. Potential increased tropical storm frequency and severity associated with climate change may also threaten this habitat.

Live Oak-Pine-Magnolia Forest Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	Restricted	Serious	Medium
Agriculture/Aquaculture	N/A	N/A	N/A
Energy Production & Mining	Small	Moderate	Low
Transportation & Service Corridors	Restricted	Moderate	Low
Biological Resource Use	N/A	N/A	N/A
Human Intrusion/Disturbance	Restricted	Slight	Low
Natural System Modification	N/A	N/A	N/A
Invasive & other Problematic Species	Large	Moderate	Medium
Pollution	N/A	N/A	N/A
Geological Events	N/A	N/A	N/A
Climate Change & Severe Weather	Large	Serious	High
Overall Calculated Threat Impact: Medium			

Habitat Research Needs/Conservation Actions:

1. Support and conduct inventory and research to identify general ecological characteristics and processes of this habitat.
2. Support invasive species control in this habitat.

k. Mixed Hardwood-Loblolly Pine/Hardwood Slope Forest

Rarity Rank: Mixed Hardwood-Loblolly Pine Forest- S3/G3G4
Hardwood Slope Forest - S3/G2G3

Synonyms: Mixed Pine Hardwood, Loblolly Pine-Hardwood, Beech-Magnolia Forest, Mixed Hardwood Forest, Hammock, Mixed Mesic Hardwood Forest

Ecological Systems: CES203.476 East Gulf Coastal Plain Southern Mesic Slope Forest
CES203.280 West Gulf Coastal Plain Mesic Hardwood Forest
CES203.378 West Gulf Coastal Plain Pine-Hardwood Forest

General Description:

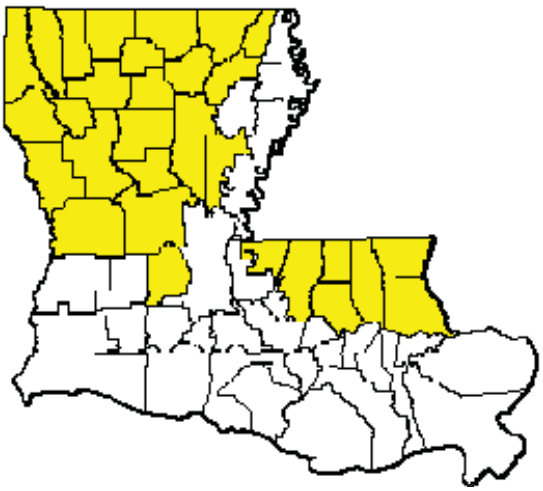
Hardwood Slope Forests and Mixed Hardwood-Loblolly Pine Forests are described as distinct communities in the Natural Communities of Louisiana (LNHP 2009). They are combined here due to their often close spatial proximity, floristic similarity, and similar conservation needs. These two communities differ in topographic position and soil moisture, with Hardwood Slope Forests being more mesic. Both communities are more or less, evenly

Hardwood Slope Forest, Vernon Parish

distributed in uplands statewide. Hardwood Slope Forests occur on slopes (often steep) rising out of stream floodplains. Mixed Hardwood-Loblolly Pine Forests are found upslope and, depending on moisture regime, on low ridge tops. Loblolly Pine may be present but infrequent in a Hardwood Slope Forest, but comprises 20% or more of the overstory, associated with various hardwood species, in a Mixed Hardwood-Loblolly Pine Forest. Without fire, Mixed Hardwood-Loblolly Pine Forest succession is toward hardwood dominance. Given the available pine needle fuel, regular fire was a process maintaining a significant pine component. Other types of disturbances may also allow Loblolly Pine to remain a component of the forest. Fire may have occurred very rarely in Hardwood Slope Forests, but is not a process required to maintain this community. In Hardwood Slope Forests, American Beech and Southern Magnolia are typically conspicuous. However, in north Louisiana, Southern Magnolia may be infrequent or absent. Loblolly Pine may be present sporadically in the overstory, and Spruce Pine (*Pinus glabra*) is an occassional associate in the Florida Parishes.

Mixed Hardwood-Loblolly Pine/Hardwood Slope Forest: Characteristic Plants	
Caric Sedges	*Carex* spp.
Woods Oats	*Chasmanthium laxum* ssp. *laxum*
American Holly	*Ilex opaca*
Sweetgum	*Liquidambar styraciflua*
Blackgum	*Nyssa sylvatica*
Loblolly Pine	*Pinus taeda*
White Oak	*Quercus alba*
Poison Ivy	*Toxicodendron radicans*
Elliott's Blueberry	*Vaccinium elliottii*
Pawpaw	*Asimina triloba*
American Beech	*Fagus grandifolia*
Southern Magnolia	*Magnolia grandiflora*
Christmas Fern	*Polystichum acrostichoides*

Current Extent and Status:



Mixed Hardwood-Loblolly Pine Forest is estimated to have occuppied 500,000 to 1,000,000 acres historically, with an estimated 25-50% still remaining (Smith 1993). Hardwood Slope Forest is estimated to have occupied 100,000 to 500,000 acres historically, with 25-50% estimated to remain today (Smith 1993). Occurrences are scattered in the West Gulf Coastal Plain (WGCP) of central Louisiana and EGCP in the eastern Florida Parishes. There are a few occurences known from Macon Ridge in the MRAP. Mixed Hardwood-Loblolly Pine Forest was probably historically more extensive on the Macon Ridge. A number of occurrences are protected on KNF and Fort Polk Military Reservation and WMA. Hardwood Slope Forests are sometimes completely contained within streamside management zones (SMZs) on industrial forest lands.

Mixed Hardwood-Loblolly Pine/Hardwood Slope Forest SGCN (86)	
Non-crustacean Arthropods (1)	
Lace-winged Roadside-Skipper	*Amblyscirtes aesculapius*
Amphibians (4)	
Louisiana Slimy Salamander	*Plethodon kisatchie*

Southern Red-backed Salamander	*Plethodon serratus*
Southern Red Salamander	*Pseudotriton ruber vioscai*
Eastern Spadefoot	*Scaphiopus holbrookii*
Reptiles (7)	
Coal Skink	*Plestiodon anthracinus*
Western Wormsnake	*Carphophis vermis*
Eastern Hog-nosed Snake	*Heterodon platirhinos*
Harlequin Coralsnake	*Micrurus fulvius*
Eastern Diamond-backed Rattlesnake	*Crotalus adamanteus*
Timber Rattlesnake	*Crotalus horridus*
Pygmy Rattlesnake	*Sistrurus miliarius*
Birds (18)	
American Woodcock	*Scolopax minor*
Chuck-will's-widow	*Antrostomus carolinensis*
Chimney Swift	*Chaetura pelagica*
Swallow-tailed Kite	*Elanoides forficatus*
Bell's Vireo	*Vireo bellii*
Yellow-throated Vireo	*Vireo flavifrons*
Warbling Vireo	*Vireo gilvus*
White-breasted Nuthatch	*Sitta carolinensis*
Brown-headed Nuthatch	*Sitta pusilla*
Wood Thrush	*Hylocichla mustelina*
Worm-eating Warbler	*Helmitheros vermivorum*
Louisiana Waterthrush	*Parkesia motacilla*
Swainson's Warbler	*Limnothlypis swainsonii*
Kentucky Warbler	*Geothlypis formosa*
American Redstart	*Setophaga ruticilla*
Hooded Warbler	*Setophaga citrina*
Prairie Warbler	*Setophaga discolor*
Yellow-throated Warbler	*Setophaga dominica*
Mammals (12)	
Southeastern Shrew	*Sorex longirostris*
Southeastern Myotis	*Myotis austroriparius*
Northern Long-eared Bat	*Myotis septentrionalis*
Big Brown Bat	*Eptesicus fuscus*
Rafinesque’s Big-eared Bat	*Corynorhinus rafinesquii*
Bachman’s Fox Squirrel	*Sciurus niger bachmani*
Eastern Chipmunk	*Tamias striatus*
Golden Mouse	*Ochrotomys nuttalli*

Louisiana Black Bear	*Ursus americanus luteolus*
Long-tailed Weasel	*Mustela frenata*
Eastern Spotted Skunk	*Spilogale putorius*
Ringtail	*Bassariscus astutus*
Plants (44)	
American Alumroot	*Heuchera americana*
American Hazelnut	*Corylus americana*
American Pinesap	*Monotropa hypopithys*
Autumn Coralroot	*Corallorhiza odontorhiza*
Barbed Rattlesnake-root	*Prenanthes barbata*
Bay Starvine	*Schisandra glabra*
Bloodroot	*Sanguinaria canadensis*
Canada Enchanter's-nightshade	*Circaea lutetiana ssp. canadensis*
Canada Horse-balm	*Collinsonia canadensis*
Carpenter's Ground-cherry	*Physalis carpenteri*
Common Shootingstar	*Dodecatheon meadia*
Crested Coralroot	*Hexalectris spicata*
Devil's-bit	*Chamaelirium luteum*
Downy Yellow Violet	*Viola pubescens*
Eastern Leatherwood	*Dirca palustris*
Fire Pink	*Silene virginica*
Granite Gooseberry	*Ribes curvatum*
Green-fringe Orchid	*Platanthera lacera*
Indian Cucumber-root	*Medeola virginiana*
Long-horned Habenaria	*Habenaria quinqueseta*
Louisiana Bluestar	*Amsonia ludoviciana*
Mullein Foxglove	*Dasistoma macrophylla*
Northern Red Oak	*Quercus rubra*
Ozark Chinquapin	*Castanea pumila var. ozarkensis*
Panicled Indigobush	*Amorpha paniculata*
Perfoliate Tinker's-weed	*Triosteum perfoliatum*
Purple Boneset	*Eupatorium purpureum*
Reflexed Trillium	*Trillium recurvatum*
Shadow-witch Orchid	*Ponthieva racemosa*
Sicklepod	*Arabis canadensis*
Silky Camellia	*Stewartia malacodendron*
Single-head Pussytoes	*Antennaria solitaria*
Solomon's-plume	*Maianthemum racemosum ssp. racemosum*
Southern Hairy Woodrush	*Luzula acuminata var. carolinae*
Southern Horse-balm	*Collinsonia serotina*
Southern Lady's-slipper	*Cypripedium kentuckiense*

Staggerbush	*Lyonia mariana*
Starry Campion	*Silene stellata*
Turk's-Cap Lily	*Lilium superbum*
Upland Swamp Privet	*Forestiera ligustrina*
Virginia Saxifrage	*Saxifraga virginiensis*
White Trout-lily	*Erythronium albidum*
Wild Crane's-bill	*Geranium maculatum*
Zigzag Goldenrod	*Solidago flexicaulis*

Threats Affecting Habitat:

Conversion to other forest types, disturbance from human activities, and invasive plants and animals pose substantial threats to these habitats.

Mixed Hardwood-Loblolly Pine Forest Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	Small	Slight	Low
Agriculture/Aquaculture	Restricted	Extreme	Medium
Energy Production & Mining	Restricted	Moderate	Low
Transportation & Service Corridors	Restricted	Moderate	Low
Biological Resource Use	Restricted	Moderate	Low
Human Intrusion/Disturbance	Small	Slight	Low
Natural System Modification	Large	Moderate	Medium
Invasive & other Problematic Species	Pervasive	Serious	High
Pollution	Small	Slight	Low
Geological Events	N/A	N/A	N/A
Climate Change & Severe Weather	N/A	N/A	N/A
Overall Calculated Threat Impact: Medium			

Hardwood Slope Forest Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	N/A	N/A	N/A
Agriculture/Aquaculture	Small	Extreme	Low
Energy Production & Mining	N/A	N/A	N/A
Transportation & Service Corridors	Small	Moderate	Low
Biological Resource Use	Restricted	Serious	Medium
Human Intrusion/Disturbance	N/A	N/A	N/A
Natural System Modification	N/A	N/A	N/A
Invasive & other Problematic Species	Restricted	Moderate	Low
Pollution	Small	Slight	Low
Geological Events	N/A	N/A	N/A
Climate Change & Severe Weather	N/A	N/A	N/A
Overall Calculated Threat Impact: Low			

Habitat Research Needs/Conservation Actions:

1. Develop and implement DFCs for restoration of these habitat types including appropriate herbicide treatments.
2. Encourage use of broader SMZs to protect these habitats.
3. Promote use of fire in Mixed Hardwood-Loblolly Pine Forests, to include discouraging the practice of placing fire lines along stream valleys, allowing prescribed fire to burn into riparian habitats.

l. Pondcypress-Blackgum Swamp
Rarity Rank: S1/G1?
Synonyms: Pondcypress Flooded Woodland
Ecological Systems: CES203.489 East Gulf Coastal Plain Large River Floodplain Forest

Pondcypress-Blackgum Swamps occupy the backwater portions of larger swamplands, in places well removed from active stream channels. This habitat can also occupy isolated depressions in EGCP flatwoods embedded within a matrix of Eastern Longleaf Pine Flatwoods Savanna. This swamp type may grade into Baldcypress-Tupelo-Blackgum Swamps which are more influenced by river flooding. Pondcypress-Blackgum Swamps are acidic and nutrient poor. Floristic diversity is higher than that of Cypress-Tupelo-Blackgum swamps.

Pondcypress-Blackgum Swamp, St. Tammany Parish.

Pondcypress-Blackgum Swamp: Characteristic Plants	
Carolina Ash	*Fraxinus caroliniana*
Drummond Red Maple	*Acer rubrum* var. *drummondii*
Fringed Yellow-eyed-grass	*Xyris fimbriata*
Lizard's Tail	*Saururus cernuus*
Marsh St. John's Wort	*Triadenum walteri*
Pondcypress	*Taxodium ascendens*
Purple Bladderwort	*Utricularia purpurea*
Royal Fern	*Osmunda regalis var. spectabilis*
Swamp Blackgum	*Nyssa biflora*
Virginia-willow	*Itea virginica*
Walter's Greenbrier	*Smilax walteri*
White Titi	*Cyrilla racemiflora*

Current Extent and Status:

Pondcypress-Blackgum Swamps are restricted in Louisiana to the eastern Florida Parishes. No estimates of historical areal extent have been made.

Pondcypress-Blackgum Swamp SGCN (30)	
Non-crustacean Arthropods (4)	
Creole Pearly-eye	*Lethe creola*
Seminole Texan Crescent	*Anthanassa texana seminole*
King's Hairstreak	*Satyrium kingi*
Appalachian Brown	*Lethe appalachia*

Amphibians (3)	
Four-toed Salamander	*Hemidactylium scutatum*
Southern Dusky Salamander	*Desmognathus auriculatus*
Ornate Chorus Frog	*Pseudacris ornata*
Reptiles (3)	
Alligator Snapping Turtle	*Macrochelys temminckii*
Western Chicken Turtle	*Deirochelys reticularia miaria*
Eastern Diamond-backed Rattlesnake	*Crotalus adamanteus*
Birds (9)	
Wood Stork	*Mycteria americana*
Roseate Spoonbill	*Platalea ajaja*
Osprey	*Pandion haliaetus*
Swallow-tailed Kite	*Elanoides forficatus*
Bald Eagle	*Haliaeetus leucocephalus*
Chimney Swift	*Chaetura pelagica*
Yellow-throated Vireo	*Vireo flavifrons*
Prothonotary Warbler	*Protonotaria citrea*
Yellow-throated Warbler	*Setophaga dominica*
Mammals (6)	
Southeastern Shrew	*Sorex longirostris*
Southeastern Myotis	*Myotis austroriparius*
Big Brown Bat	*Eptesicus fuscus*
Rafinesque's Big-eared Bat	*Corynorhinus rafinesquii*
Louisiana Black Bear	*Ursus americanus luteolus*
Long-tailed Weasel	*Mustela frenata*
Plants (5)	
Cypress-knee Sedge	*Carex decomposita*
Pondspice	*Litsea aestivalis*
Bog Moss	*Mayaca fluviatilis*
Sarvis Holly	*Ilex amelanchier*
Myrtle Holly	*Ilex myrtifolia*

Threats Assessment:

Pondcypress-Blackgum Swamps are threatened by introduction of excessive nutrients, which alters species composition of this acidic and oligotrophic habitat.

Pondcypress-Blackgum Swamp Threats Assessment:			
1st Level Threat	**Scope**	**Severity**	**Impact**
Residential/Commercial Development	Small	Slight	Low
Agriculture/Aquaculture	N/A	N/A	N/A
Energy Production & Mining	N/A	N/A	N/A
Transportation & Service Corridors	Restricted	Moderate	Low
Biological Resource Use	Small	Moderate	Low
Human Intrusion/Disturbance	N/A	N/A	N/A
Natural System Modification	Small	Moderate	Low
Invasive & other Problematic Species	Large	Slight	Low
Pollution	Large	Moderate	Medium
Geological Events	N/A	N/A	N/A
Climate Change & Severe Weather	Pervasive	Slight	Low
Overall Calculated Threat Impact: Low			

Habitat Research Needs/Conservation Actions:

1. Conduct field inventories to gain a better understanding of the conservation status of and variation within this habitat.
2. Discourage introduction of partially treated municipal waste water into Pondcypress-Blackgum Swamps; this type of swamp is acidic and oligotrophic and can be degraded by nutrient input.

m. Salt Dome Hardwood Forest

Rarity Rank: S1/G1

Synonyms: None

Ecological Systems: CES203.466 West Gulf Coastal Plain Chenier and Upper Texas Coastal Fringe Forest and Woodland
CES203.513 Mississippi Delta Maritime Forest

General Description:

In the Mississippi Interior Salt Basin, salt domes occur where large, underground salt deposits (deposited by evaporating seas in the Jurassic Period) have risen to or near to the surface (Stern et. al. 2011). Louisiana contains approximately 425 salt domes on the mainland and offshore, varying in depth from the Earth's surface (Beckman and Williamson 1990). In cases such as coastal Louisiana's "Five Islands" (Jefferson Island, Avery Island, Weeks Island, Cote Blanche Island, and Belle Isle), the salt domes have raised the surface, creating ridges that rise up from the surrounding marsh habitat. Soils covering most of the islands are very fertile and loess-derived. The hardwood forests of these islands are hilly with deep, shaded ravines, up to 60 feet deep in some places. Ravines are dominated by ferns and in many areas the canopy supports lianas (woody vine species that utilize trees for support and as a means to reach the canopy), giving these forests a tropical appearance (Reese and Thieret 1966). Typically, the herbaceous layer is sparse and consists of several Caric sedges (*Carex* spp.) and other shade loving herbs.

Salt Dome Hardwood Forest, Cote Blanche Island, St. Mary Parish

Salt Dome Hardwood Forest: Characteristic Plants	
Paw Paw	*Asimina triloba*
Thicket Caric Sedge	*Carex abscondita*
Bitternut Hickory	*Carya cordiformis*
Sweetgum	*Liquidambar styraciflua*
Southern Magnolia	*Magnolia grandiflora*
Cherrylaurel	*Prunus caroliniana*
Water Oak	*Quercus nigra*
Cherrybark Oak	*Quercus pagoda*
Live Oak	*Quercus virginiana*
Palmetto	*Sabal minor*

Current Extent and Status:

Salt Dome Hardwood Forests are only known from five salt domes having surface expression which are located in Iberia and St. Mary parishes. The "Five Islands" are situated in a line extending northwest to southeast. Currently, Cote Blanche and Weeks Islands support some high quality forest. Belle Isle is much smaller with less topographic variation. Habitat on Belle Isle is intact, but is not really comparable to forest on the other islands. Only a small tract of forest remains on Jefferson Island. Avery Island has lost much forest habitat and has issues with exotic invasive species. Remaining forest on Avery Island is in need of survey and evaluation.

Salt Dome Hardwood Forest SGCN (35)	
Non-crustacean Arthropods (2)	
Celia's Roadside-Skipper	*Amblyscirtes celia*
Wild Indigo Duskywing	*Erynnis baptisiae*
Reptiles (3)	
Eastern Hog-nosed Snake	*Heterodon platirhinos*
Timber Rattlesnake	*Crotalus horridus*
Pygmy Rattlesnake	*Sistrurus miliarius*
Birds (18)	
Bald Eagle	*Haliaeetus leucocephalus*

American Woodcock	*Scolopax minor*
Chuck-will's-widow	*Antrostomus carolinensis*
Chimney Swift	*Chaetura pelagica*
Yellow-throated Vireo	*Vireo flavifrons*
Warbling Vireo	*Vireo gilvus*
Wood Thrush	*Hylocichla mustelina*
Worm-eating Warbler	*Helmitheros vermivorum*
Louisiana Waterthrush	*Parkesia motacilla*
Golden-winged Warbler	*Vermivora chrysoptera*
Prothonotary Warbler	*Protonotaria citrea*
Swainson's Warbler	*Limnothlypis swainsonii*
Kentucky Warbler	*Geothlypis formosa*
American Redstart	*Setophaga ruticilla*
Hooded Warbler	*Setophaga citrina*
Cerulean Warbler	*Setophaga cerulea*
Yellow-throated Warbler	*Setophaga dominica*
Painted Bunting	*Passerina ciris*
Mammals (3)	
Southeastern Myotis	*Myotis austroriparius*
Rafinesque's Big-eared Bat	*Corynorhinus rafinesquii*
Louisiana Black Bear	*Ursus americanus luteolus*
Plants (9)	
Bay Starvine	*Schisandra glabra*
Broad-leaved Spiderwort	*Tradescantia subaspera*
Climbing Bittersweet	*Celastrus scandens*
Croomia	*Croomia pauciflora*
Lanceleaved Glade Fern	*Diplazium lonchophyllum*
Snow Melanthera	*Melanthera nivea*
Southern Shield Woodfern	*Dryopteris ludoviciana*
Three-lobed Coneflower	*Rudbeckia triloba*
Woodland Bluegrass	*Poa sylvestris*

Threats Affecting Habitat:

At present, invasive plants and animals pose the most serious threat to this habitat. Disturbance from mineral extraction and other aspects of human intrusion are also threats.

Salt Dome Hardwood Forest Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	Pervasive	Slight	Low
Agriculture/Aquaculture	N/A	N/A	N/A
Energy Production & Mining	Pervasive	Moderate	Medium
Transportation & Service Corridors	N/A	N/A	N/A
Biological Resource Use	N/A	N/A	N/A
Human Intrusion/Disturbance	Pervasive	Slight	Low
Natural System Modification	N/A	N/A	N/A
Invasive & other Problematic Species	Pervasive	Serious	High
Pollution	Restricted	Moderate	Low
Geological Events	N/A	N/A	N/A
Climate Change & Severe Weather	N/A	N/A	N/A
Overall Calculated Threat Impact: Low			

Habitat Research Needs/Conservation Actions:

1. Continue field inventory work for this habitat.
2. Establish conservation servitudes protecting Salt Dome Hardwood Forest.
3. Support aggressive control of invasive species in this habitat, including problematic plants and Feral Hogs.

n. Small Stream Forest

Rarity Rank: S2/G3

Synonyms: Riparian Forest, Small Stream Floodplain Forest, Creek Bottom Forest, Sandy Branch Bottom, Upland Stream Forest, Hammock

Ecological Systems: CES203.559 East Gulf Coastal Plain Small Stream and River Forest
CES203.487 West Gulf Coastal Plain Small Stream and River Forest

General Description:

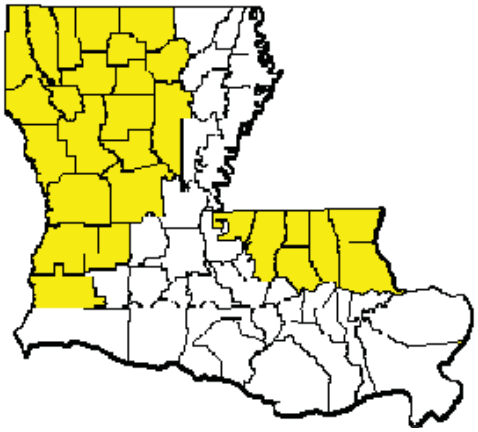
Small Stream Forests are relatively narrow wetland forests occurring along rivers and streams in central, western, southeastern, and northern Louisiana. These forests are seasonally flooded for brief periods. The percentage of sand, silt, calcareous clay, acidic clay, and organic material in the soil is highly variable (depending on local geology) and has a significant effect on species composition. Soils are typically classified as silt loams. At times, the community is quite similar in species composition to Hardwood Slope Forests (Beech-Magnolia Forests). These forested wetlands are critical components of the landscape, filtering surface and subsurface flows, improving water quality, and storing sediment and nutrients (Rummer 2004). Spruce Pine (*Pinus glabra*) is a common associate in the Florida Parishes, and Baldcypress (*Taxodium distichum*) and Loblolly Pine (*Pinus taeda*) are occassional associates statewide.

Small Stream Forest, Fort Polk Military Reservation and WMA, Vernon Parish

Small Stream Forest: Characteristic Plants	
Slender Caric Sedge	*Carex debilis*
Bluebeech	*Carpinus caroliniana*
American Beech	*Fagus grandifolia*
Silverbell	*Halesia diptera*
Sweetgum	*Liquidambar styraciflua*
Southern Magnolia	*Magnolia grandiflora*
Laurel Oak	*Quercus laurifolia*
Cow Oak	*Quercus michauxii*
Water Oak	*Quercus nigra*
Cherrybark Oak	*Quercus pagoda*
Candle Berry	*Sebastiana fruticosa*

Current Extent and Status:

Small Stream Forests are widely distributed in broad uplands. An estimated 25 to 50% of Louisiana's original Small Stream Forest, which is estimated to have been 1 to 2 million acres, is thought to remain intact (Smith 1993). A number of high-quality occurrences are captured by KNF and Fort Polk Military Reservation and WMA.



Small Stream Forest SGCN (100)	
Mollusks (8)	
Rayed Creekshell	*Anodontoides radiatus*
White Heelsplitter	*Lasmigona complanata*
Louisiana Pearlshell	*Margaritifera hembeli*
Southern Hickorynut	*Obovaria jacksoniana*
Louisiana Pigtoe	*Pleurobema riddellii*
Southern Creekmussel	*Strophitus subvexus*
Creeper	*Strophitus undulatus*
Southern Rainbow	*Villosa vibex*
Crustaceans (10)	

Teche Painted Crawfish	*Orconectes hathawayi*
Calcasieu Painted Crawfish	*Orconectes blacki*
Kisatchie Painted Crawfish	*Orconectes maletae*
Ribbon Crawfish	*Procambarus bivittatus*
Twin Crawfish	*Procambarus geminus*
Ouachita Fencing Crawfish	*Faxonella creaseri*
Caddo Chimney Crawfish	*Procambarus machardyi*
Pearl Blackwater Crawfish	*Procambarus penni*
Calcasieu Creek Crawfish	*Procambarus pentastylus*
Southwestern Creek Crawfish	*Procambarus dupratzi*
Non-crustacean Arthropods (9)	
Yellow Brachycercus Mayfly	*Sparbarus flavus*
Hodges' Clubtail	*Gomphus hodgesi*
Southern Snaketail	*Ophiogomphus australis*
Cajun Tiger Beetle	*Dromochorus pilatei*
Little Dubiraphian Riffle Beetle	*Dubiraphia parva*
Masked Springfly	*Helopicus bogaloosa*
Ceraclean Caddisfly	*Ceraclea spongillovorax*
Molson's Microcaddisfly	*Hydroptila molsonae*
Pepper and Salt Skipper	*Amblyscirtes hegon*
Inland Fishes (11)	
American Eel	*Anguilla rostrata*
Central Stoneroller	*Campostoma anomalum*
Ironcolor Shiner	*Notropis chalybaeus*
Bluenose Shiner	*Pteronotropis welaka*
Flagfin Shiner	*Pteronotropis signipinnis*
Bluehead Shiner	*Pteronotropis hubbsi*
Rainbow Darter	*Etheostoma caeruleum*
Gumbo Darter	*Etheostoma thompsoni*
Channel Darter	*Percina copelandi*
Redspot Darter	*Etheostoma artesiae*
Clear Chub	*Hybopsis winchelli*
Amphibians (6)	
Southern Dusky Salamander	*Desmognathus auriculatus*
Southern Red-backed Salamander	*Plethodon serratus*
Webster's Salamander	*Plethodon websteri*
Louisiana Slimy Salamander	*Plethodon kisatchie*
Red River Mudpuppy	*Necturus louisianensis*
Eastern Spadefoot	*Scaphiopus holbrookii*

Reptiles (10)	
Alligator Snapping Turtle	*Macrochelys temminckii*
Stripe-necked Musk Turtle	*Sternotherus minor peltifer*
Razor-backed Musk Turtle	*Sternotherus carinatus*
Coal Skink	*Plestiodon anthracinus*
Western Wormsnake	*Carphophis vermis*
Common Rainbow Snake	*Farancia erytrogramma erytrogramma*
Eastern Hog-nosed Snake	*Heterodon platirhinos*
Harlequin Coralsnake	*Micrurus fulvius*
Timber Rattlesnake	*Crotalus horridus*
Pygmy Rattlesnake	*Sistrurus miliarius*
Birds (16)	
American Woodcock	*Scolopax minor*
Chuck-will's-widow	*Antrostomus carolinensis*
Chimney Swift	*Chaetura pelagica*
Bell's Vireo	*Vireo bellii*
Yellow-throated Vireo	*Vireo flavifrons*
Warbling Vireo	*Vireo gilvus*
Wood Thrush	*Hylocichla mustelina*
Worm-eating Warbler	*Helmitheros vermivorum*
Louisiana Waterthrush	*Parkesia motacilla*
Prothonotary Warbler	*Protonotaria citrea*
Swainson's Warbler	*Limnothlypis swainsonii*
Kentucky Warbler	*Geothlypis formosa*
American Redstart	*Setophaga ruticilla*
Hooded Warbler	*Setophaga citrina*
Yellow-throated Warbler	*Setophaga dominica*
Rusty Blackbird	*Euphagus carolinus*
Mammals (13)	
Southeastern Shrew	*Sorex longirostris*
Big Brown Bat	*Eptesicus fuscus*
Eastern Pipistrelle	*Perimyotis subflavus*
Rafinesque’s Big-eared Bat	*Corynorhinus rafinesquii*
Silver-haired Bat	*Lasionycteris noctivagans*
Southeastern Myotis	*Myotis austroriparius*
Northern Long-eared Bat	*Myotis septentrionalis*
Bachman’s Fox Squirrel	*Sciurus niger bachmani*
Eastern Chipmunk	*Tamias striatus*
Golden Mouse	*Ochrotomys nuttalli*

Long-tailed Weasel	*Mustela frenata*
Eastern Spotted Skunk	*Spilogale putorius*
Ringtail	*Bassariscus astutus*
Plants (17)	
American Bladdernut	*Staphylea trifolia*
Broadleaf Barbaras-buttons	*Marshallia trinervia*
Canby's Bulrush	*Schoenoplectus etuberculatus*
Dwarf Filmy Fern	*Trichomanes petersii*
Florida Hedge-hyssop	*Gratiola floridana*
Green-fringe Orchid	*Platanthera lacera*
Indian Cucumber-root	*Medeola virginiana*
Louisiana Bluestar	*Amsonia ludoviciana*
Louisiana Quillwort	*Isoetes louisianensis*
Mountain Laurel	*Kalmia latifolia*
New York Fern	*Thelypteris noveboracensis*
Nodding Pogonia	*Triphora trianthophora*
Pyramid Magnolia	*Magnolia pyramidata*
Riverweed	*Podostemum ceratophyllum*
White Trout-lily	*Erythronium albidum*
Waxyleaf Meadowrue	*Thalictrum revolutum*
Yellowroot	*Xanthorhiza simplicissima*

Threats Affecting Habitat:

The most impactful threat to this habitat is invasive species. Smaller-scale threats include impoundment of streams for reservoirs and human-related disturbance.

Small Stream Forest Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	N/A	N/A	N/A
Agriculture/Aquaculture	Small	Extreme	Low
Energy Production & Mining	Restricted	Moderate	Low
Transportation & Service Corridors	Small	Moderate	Low
Biological Resource Use	Restricted	Moderate	Low
Human Intrusion/Disturbance	N/A	N/A	N/A
Natural System Modification	Restricted	Moderate	Low
Invasive & other Problematic Species	Large	Serious	High
Pollution	N/A	N/A	N/A
Geological Events	N/A	N/A	N/A
Climate Change & Severe Weather	Pervasive	Slight	Low
Overall Calculated Threat Impact: Low			

Habitat Research Needs/Conservation Actions:

1. Conduct a comprehensive statewide inventory on the status and condition of Louisiana's streams, including ownership patterns, landscape context, and uses.
2. Work with partners to develop guidelines and funding mechanisms for restoration of abandoned gravel mines.
3. Form a committee composed of gravel mining interests, LDEQ, LDNR, and other interested groups to develop BMPs for current and proposed gravel mines to prevent or reduce the impacts to streams and the surrounding forest habitat.
4. Support control of invasive species in this community type.
5. Discourage reservoirs whose footprint would destroy this habitat type, especially those that would affect high-quality streams.

o. Southern Mesophytic Hardwood Forest

Rarity Rank: S2/G1G2

Synonyms: Relict Northern Hardwood Forest, Bluffland Forest, Beech-Magnolia Forest, Upland Hardwood Forest, Mixed Mesophytic Forest

Ecological Systems: CES203.556 East Gulf Coastal Plain Southern Loess Bluff Forest
CES203.476 East Gulf Coastal Plain Southern Mesic Slope Forest

General Description:

Southern Mesophytic Hardwood Forest is currently recognized in Louisiana only in the northwestern Florida Parishes, primarily in the Tunica Hills area. This hardwood forest develops on deep, fertile, circum-neutral to slightly alkaline loessial deposits that have eroded over thousands of years to form a characteristic highly-dissected landscape of high, narrow ridges, steep slopes, and deep ravines (usually with intermittent to permanent streams). These topographic characteristics create a relatively cool, moist micro-climate on the slopes and in the ravines. Thus, these dissected hills have sustained localized populations of some characteristic Appalachian species, principally herbaceous, thought to have originally migrated south ahead of advancing glaciers in the last ice-age.

Ravine in Tunica Hills, West Feliciana Parish.

Southern Mesophytic Hardwood Forest: Characteristic Plants	
Switchcane	*Arundinaria gigantea*
Pawpaw	*Asimina triloba*
Cherokee Caric Sedge	*Carex cherokeensis*
American Beech	*Fagus grandifolia*
American Holly	*Ilex opaca*
Yellow Poplar	*Liriodendron tulipera*
Southern Magnolia	*Magnolia grandiflora*
Red Mulberry	*Morus rubra*
Cherrybark Oak	*Quercus pagoda*
Foetid Trillium	*Trillium foetidissimum*

Current Extent and Status:

Currently only about 25-50% of Louisiana's original 100,000 to 500,000 acres of Southern Mesophytic Forests is thought to remain intact (Smith 1993). Clearing for agriculture, forest type conversion, and development in West Feliciana Parish brought about loss, degradation, and fragmentation of these forests. Southern Mesophytic Forest is extremely susceptible to soil damage, particulary erosion stemming from any form of disturbance, such as logging or road building. In such cases, the very steep slopes and loess-derived soil experience frequent landslides (Quigley and Platt 1996). The largest protected tract of this habitat is found on Tunica Hills WMA which is 5,231 acres.

Southern Mesophytic Hardwood Forest SGCN (50)	
Non-crustacean Arthropods (3)	
Southern Unstriped Scorpion	*Vaejovis carolinianus*
Yellow Brachycercus Mayfly	*Sparbarus flavus*
Yucca Giant-Skipper	*Megathymus yuccae*
Amphibians (2)	
Webster's Salamander	*Plethodon websteri*
Eastern Spadefoot	*Scaphiopus holbrookii*
Reptiles (4)	

Coal Skink	*Plestiodon anthracinus*
Eastern Hog-nosed Snake	*Heterodon platirhinos*
Timber Rattlesnake	*Crotalus horridus*
Pygmy Rattlesnake	*Sistrurus miliarius*
Birds (12)	
American Woodcock	*Scolopax minor*
Chuck-will's-widow	*Antrostomus carolinensis*
Chimney Swift	*Chaetura pelagica*
Yellow-throated Vireo	*Vireo flavifrons*
Wood Thrush	*Hylocichla mustelina*
Worm-eating Warbler	*Helmitheros vermivorum*
Louisiana Waterthrush	*Parkesia motacilla*
Swainson's Warbler	*Limnothlypis swainsonii*
Kentucky Warbler	*Geothlypis formosa*
American Redstart	*Setophaga ruticilla*
Hooded Warbler	*Setophaga citrina*
Yellow-throated Warbler	*Setophaga dominica*
Mammals (11)	
Southeastern Shrew	*Sorex longirostris*
Big Brown Bat	*Eptesicus fuscus*
Eastern Pipistrelle	*Perimyotis subflavus*
Rafinesque’s Big-eared Bat	*Corynorhinus rafinesquii*
Southeastern Myotis	*Myotis austroriparius*
Bachman’s Fox Squirrel	*Sciurus niger bachmani*
Eastern Chipmunk	*Tamias striatus*
Golden Mouse	*Ochrotomys nuttalli*
Louisiana Black Bear	*Ursus americanus luteolus*
Long-tailed Weasel	*Mustela frenata*
Eastern Spotted Skunk	*Spilogale putorius*
Plants (18)	
Allegheny-spurge	*Pachysandra procumbens*
American Alumroot	*Heuchera americana*
American Ginseng	*Panax quinquefolius*
Bay Starvine	*Schisandra glabra*
Canada Enchanter's-nightshade	*Circaea lutetiana ssp. canadensis*
Canada Wild Ginger	*Asarum canadense*
Carolina Gentian	*Frasera caroliniensis*
Carpenter's Ground-cherry	*Physalis carpenteri*
Climbing Bittersweet	*Celastrus scandens*

Crested Coralroot	*Hexalectris spicata*
Glade Fern	*Diplazium pycnocarpon*
Low Erythrodes	*Platythelys querceticola*
Pyramid Magnolia	*Magnolia pyramidata*
Shadow-witch Orchid	*Ponthieva racemosa*
Silver False Spleenwort	*Deparia acrostichoides*
Virginia Saxifrage	*Saxifraga virginiensis*
White Baneberry	*Actaea pachypoda*
Woodland Bluegrass	*Poa sylvestris*

Threats Affecting Habitat:

Conversion of this habitat to anthropogenic forests is expected to continue. Disturbance from several human sources, as well as invasive species, pose threats to this habitat.

Southern Mesophytic Forest Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	Restricted	Extreme	Medium
Agriculture/Aquaculture	Restricted	Extreme	Medium
Energy Production & Mining	Restricted	Moderate	Low
Transportation & Service Corridors	Restricted	Moderate	Low
Biological Resource Use	Restricted	Serious	Medium
Human Intrusion/Disturbance	Restricted	Moderate	Low
Natural System Modification	N/A	N/A	N/A
Invasive & other Problematic Species	Large	Slight	Low
Pollution	N/A	N/A	N/A
Geological Events	N/A	N/A	N/A
Climate Change & Severe Weather	N/A	N/A	N/A
Overall Calculated Threat Impact: Medium			

Habitat Research Needs/Conservation Actions:

1. Invest in protection of this habitat through land acquisition and conservation servitudes.
2. Partner with the Louisiana Office of State Parks (LOSP) to manage this habitat type on Tunica Hills State Preservation Area.
3. Provide funding for the control of invasive species in this habitat type.

p. Spruce Pine-Hardwood Flatwoods

Rarity Rank: S1/G1G2

Synonyms: Pine-Hardwood Flatwoods

Ecological Systems: CES203.557 East Gulf Coastal Plain Southern Loblolly-Hardwood Flatwoods

General Description:

This flatwoods type is a natural mixed forest community endemic to the western Florida Parishes. A wetland variant of this community occupies poorly drained flats, depressional areas and small drainages (sometimes called "slashes") that occur in a mosaic with higher, non-wetland areas. Such higher areas support a mesic Spruce Pine-Hardwood Flatwood forest. Both variants are distinguished by the prevalence of Spruce Pine (*Pinus glabra*) over Loblolly Pine (*Pinus taeda*), although Loblolly Pine is usually present at some level. Hardwoods usually dominate the forest, but Spruce Pine can dominate areas within a stand. Soils are hydric, acidic silt loams including the Encrow, Gilbert and Springfield series. These soils are significantly higher in nutrient levels than those historically supporting the Longleaf Pine (*Pinus palustris*) communities occupying similar hydrologic settings in the eastern Florida Parishes (Smith 1996). This edaphic factor may have precluded Longleaf Pine from this community type. Historically, fire was likely not a major component in this community as the constituent plant species are not fire adapted and fuel conditions are not conducive to fire. Spruce Pine-Hardwood Flatwoods typically have a dense canopy resulting in heavy shading and, usually, a sparse understory. Palmetto is often an understory dominant.

Spruce Pine Hardwood Flatwoods, Frenchtown Road Conservation Area, East Baton Rouge Parish

Spruce Pine-Hardwood Flatwoods: Characteristic Plants	
Switchcane	*Arundinaria gigantea*
Pignut Hickory	*Carya glabra*
Sweetgum	*Liquidambar styraciflua*
Spruce Pine	*Pinus glabra*
Laurel Oak	*Quercus laurifolia*
Cow Oak	*Quercus michauxii*
Cherrybark Oak	*Quercus pagoda*
Willow Oak	*Quercus phellos*
Palmetto	*Sabal minor*

Current Extent and Status:

Spruce Pine-Hardwood Flatwoods are restricted to Louisiana, occupying a narrow range in Livingston, East Baton Rouge and, potentially, Ascension Parishes. Pre-settlement acreage is estimated to have been 50,000 to 100,000 acres, with 10-25% currently remaining (Smith 1993). Protected occurrences of this habitat occur on Tickfaw State Park and Frenchtown Road Conservation Area.

Spruce Pine-Hardwood Flatwoods SGCN (29)	
Crustaceans (1)	
Flatnose Crawfish	*Procambarus planirostris*
Amphibians (3)	
Four-toed Salamander	*Hemidactylium scutatum*
Southern Dusky Salamander	*Desmognathus auriculatus*
Gulf Coast Mud Salamander	*Pseudotriton montanus flavissimus*
Reptiles (5)	
Coal Skink	*Plestiodon anthracinus*
Eastern Hog-nosed Snake	*Heterodon platirhinos*
Pine Woods Littersnake	*Rhadinaea flavilata*
Timber Rattlesnake	*Crotalus horridus*

Pygmy Rattlesnake	*Sistrurus miliarius*
Birds (11)	
American Woodcock	*Scolopax minor*
Chuck-will's-widow	*Antrostomus carolinensis*
Chimney Swift	*Chaetura pelagica*
Yellow-throated Vireo	*Vireo flavifrons*
Wood Thrush	*Hylocichla mustelina*
Prothonotary Warbler	*Protonotaria citrea*
Swainson's Warbler	*Limnothlypis swainsonii*
Kentucky Warbler	*Geothlypis formosa*
American Redstart	*Setophaga ruticilla*
Hooded Warbler	*Setophaga citrina*
Rusty Blackbird	*Euphagus carolinus*
Mammals (9)	
Southeastern Shrew	*Sorex longirostris*
Southeastern Myotis	*Myotis austroriparius*
Big Brown Bat	*Eptesicus fuscus*
Eastern Pipistrelle	*Perimyotis subflavus*
Rafinesque's Big-eared Bat	*Corynorhinus rafinesquii*
Bachman's Fox Squirrel	*Sciurus niger bachmani*
Golden Mouse	*Ochrotomys nuttalli*
Long-tailed Weasel	*Mustela frenata*
Eastern Spotted Skunk	*Spilogale putorius*

Threats Affecting Habitat:

The predominant threat to this habitat type is conversion to commercial and residential developments due to the rapid expansion of urbanization along the Interstate 12 corridor in the Florida Parishes. Other major factors threatening this association include conversion to commercial pine plantations and hydrological alterations. Invasive species further threaten this habitat.

Spruce Pine-Hardwood Flatwood Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	Pervasive	Extreme	Very High
Agriculture/Aquaculture	Large	Extreme	High
Energy Production & Mining	Restricted	Slight	Low
Transportation & Service Corridors	Large	Moderate	Medium
Biological Resource Use	Restricted	Slight	Low

Human Intrusion/Disturbance	Restricted	Slight	Low
Natural System Modification	N/A	N/A	N/A
Invasive & other Problematic Species	Pervasive	Serious	High
Pollution	N/A	N/A	N/A
Geological Events	N/A	N/A	N/A
Climate Change & Severe Weather	N/A	N/A	N/A
Overall Calculated Threat Impact: High			

Habitat Research Needs/Conservation Actions:

1. Continue surveys to determine the current extent and condition of this habitat type.
2. Elevate this habitat as a priority for protection efforts such as conservation servitudes and land acquisition.
3. Provide resources to public and private landowners for invasive species control in this habitat (especially for Chinese Tallow Tree and Chinese Privet).
4. Support production of Spruce Pine seedlings for distribution to landowners interested in restoring this habitat type.

2 . SAVANNAS AND WOODLANDS

a. Eastern Longleaf Pine Flatwoods Savanna

Rarity Rank: S1/G1

Synonyms: Pine Savanna, Pine Flatwood, Grass-Sedge Bog, Pitcher-Plant Prairie, Pitcher-Plant Meadow, Pitcher-Plant Bog, Herbaceous Bog, Flatwood Bog

Ecological Systems: CES203.375 East Gulf Coastal Plain Near-Coast Pine Flatwoods

General Description:

Eastern Longleaf Pine Flatwood Savannas (Pine Savannas) are herb-dominated wetlands that are naturally sparsely stocked with Longleaf Pine. This community is most often dominated by numerous grasses and sedges in the understory, and is noted for very high plant diversity, including insectivorous plants and showy orchids and lilies. Pine Savannas historically dominated the Gulf Coastal Plain flatwoods regions of southeast and southwest Louisiana (Smith 1996).

Pine Savannas are found naturally on broad "flats" occupying poorly drained and seasonally saturated/flooded depressional areas. These communities are subject to a highly fluctuating water table, from surface saturation and shallow flooding in late fall/winter/early spring to growing-season drought. In the EGCP, Pine Savannas are commonly associated with mesic upland pine flatwoods intermingled on low ridges, and typically transition downslope to Slash Pine-Pondcypress/Hardwood Forest, Bayhead Swamp and/or Small Stream Forest (LNHP 2009). Soils in Eastern Longleaf Pine Flatwoods Savannas are hydric, very strongly acidic, nutrient-poor, fine sandy loams and silt loams that are low in organic matter. The surface soils may be underlain by an impeding, slowly permeable subsoil.

Fire, soil conditions, and a seasonally high water table work in concert to control community structure in Eastern Longleaf Pine Flatwood Savannas; however fire is considered the critical element in their maintenance. All of the species indigenous to pine savannas have evolved over millennia within a regime of frequent (once every 1 to 4 years) surface fires, and most depend on fire for perpetuation. Fire stimulates flowering and fruit/seed production of savanna herbs and shrubs, deters invasion by fire-intolerant woody vegetation, and exposes mineral soil for herb and Longleaf Pine seedlings to become established. In the absence of frequent burning, Pine Savannas quickly succeed into shrub/tree thickets, and sun-loving herbs are reduced and eventually eliminated (Smith 1996).

Eastern Longleaf Pine Savanna, Abita Creek Flatwoods Preserve, St. Tammany Parish

Eastern Longleaf Pine Flatwoods Savanna: Characteristic Plants	
Bristleleaf Chaffhead	*Carphephorus pseudoliatris*
Toothache Grass	*Ctenium aromaticum*
Cutover Muhly	*Muhlenbergia expansa*
Switch Grass	*Panicum virgatum*
Longleaf Pine	*Pinus palustris*
Savanna Meadow Beauty	*Rhexia alifanus*
Yellow Meadow Beauty	*Rhexia lutea*
Beak Sedges	*Rhynchospora* spp.
Yellow Trumpet Pitcher Plant	*Sarracenia alata*
Little Bluestem	*Schizachyrium scoparium*
Coastal Plain Yellow-eyed-grass	*Xyris ambigua*
Kral's Yellow-eyed Grass	*Xyris stricta* var. *obscura*

Current Extent and Status:

Today, Eastern Longleaf Pine Flatwoods Savanna remnants are limited in size compared to the broad expanses that once existed. Historically, the eastern Florida Parishes of Louisiana were dominated by extensive stands of this habitat. Now barely 1% of the original estimated 100,000 to 500,000 acres of Eastern Longleaf Pine Flatwoods Savanna remains (Smith 1993). Habitat conversion, development, and timber production were initial factors in this habitat loss. Today there are a few thousand acres in small blocks scattered across this area. TNC protects and manages Eastern Longleaf Pine Flatwoods Savanna on portions of their Abita Creek, Lake Ramsey and Talisheek Pine Wetlands Preserves. LDWF owns and manages Lake Ramsey WMA with 796 acres of savanna. This WMA is adjacent to TNC's Lake Ramsey Preserve. Big Branch NWR, Bogue Chitto NWR, and Pearl River WMA collectively contain "pine flatwoods" with remnants of savanna herbaceous flora, and some of these sites are in the process of being restored to Longleaf Pine systems. Wetland mitigation banking has become a valuable tool for restoring Eastern Longleaf Pine Flatwoods Savannas. Several mitigation banks located in close proximity to TNC preserves are protecting and restoring this habitat.

Eastern Longleaf Pine Flatwoods Savanna SGCN (83)	
Crustaceans (3)	
Gulf Crawfish	*Procambarus shermani*
Flatwoods Digger	*Fallicambarus oryktes*
Flatnose Crawfish	*Procambarus planirostris*
Non-crustacean Arthropods (9)	
American Bumble Bee	*Bombus pensylvanicus*
Little Metalmark	*Calephelis virginiensis*
Georgia Satyr	*Neonympha areolatus*
Lace-winged Roadside-Skipper	*Amblyscirtes aesculapius*
Arogos Skipper	*Atrytone arogos*
Yucca Giant-Skipper	*Megathymus yuccae*
Monarch	*Danaus plexippus*
Gulf Pine Sphinx	*Lapara phaeobrachycerous*
Brou's Mallow Moth	*Bagisara brouana*
Amphibians (6)	
Eastern Tiger Salamander	*Ambystoma tigrinum tigrinum*
Four-toed Salamander	*Hemidactylium scutatum*

Southern Dusky Salamander	*Desmognathus auriculatus*
Ornate Chorus Frog	*Pseudacris ornata*
Eastern Spadefoot	*Scaphiopus holbrookii*
Dusky Gopher Frog	*Lithobates sevosus*
Reptiles (6)	
Eastern Glass Lizard	*Ophisaurus ventralis*
Eastern Hog-nosed Snake	*Heterodon platirhinos*
Northern Mole Kingsnake	*Lampropeltis rhombomaculata*
Pine Woods Littersnake	*Rhadinaea flavilata*
Southeastern Crowned Snake	*Tantilla coronata*
Harlequin Coralsnake	*Micrurus fulvius*
Birds (18)	
Northern Bobwhite	*Colinus virginianus*
Yellow Rail	*Coturnicops noveboracensis*
American Woodcock	*Scolopax minor*
Common Ground-Dove	*Columbina passerina*
Chuck-will's-widow	*Antrostomus carolinensis*
Chimney Swift	*Chaetura pelagica*
Red-headed Woodpecker	*Melanerpes erythrocephalus*
Red-cockaded Woodpecker	*Picoides borealis*
Southeastern American Kestrel	*Falco sparverius paulus*
Loggerhead Shrike	*Lanius ludovicianus*
Brown-headed Nuthatch	*Sitta pusilla*
Sedge Wren	*Cistothorus platensis*
Prairie Warbler	*Setophaga discolor*
Bachman's Sparrow	*Peucaea aestivalis*
Field Sparrow	*Spizella pusilla*
Grasshopper Sparrow	*Ammodramus savannarum*
Henslow's Sparrow	*Ammodramus henslowii*
Le Conte's Sparrow	*Ammodramus leconteii*
Mammals (5)	
Southeastern Shrew	*Sorex longirostris*
Bachman’s Fox Squirrel	*Sciurus niger bachmani*
Eastern Harvest Mouse	*Reithrodontomys humulis*
Long-tailed Weasel	*Mustela frenata*
Eastern Spotted Skunk	*Spilogale putorius*
Plants (36)	
Bog Flame Flower	*Macranthera flammea*

Boykin's Milkwort	*Polygala boykinii*
Branched Hedge-hyssop	*Gratiola ramosa*
Chapman's Beak Sedge	*Rhynchospora chapmanii*
Chapman's Milkwort	*Polygala chapmanii*
Ciliate Beak Sedge	*Rhynchospora ciliaris*
Coastal False Asphodel	*Triantha racemosa*
Coastal Plain False Foxglove	*Agalinis aphylla*
Death Camas	*Zigadenus leimanthoides*
Flat-fruit Beak Sedge	*Rhynchospora compressa*
Flax-leaf False Foxglove	*Agalinis linifolia*
Goldencrest	*Lophiola aurea*
Hooker's Milkwort	*Polygala hookeri*
Le Conte's Thistle	*Cirsium lecontei*
Leggett's Pinweed	*Lechea pulchella*
Littleleaf Milkwort	*Polygala brevifolia*
Low Nut Sedge	*Scleria verticillata*
Many-flowered Grass-pink	*Calopogon multiflorus*
Michaux's Milkweed	*Asclepias michauxii*
Night-flowering Wild Petunia	*Ruellia noctiflora*
Pale Grass-pink	*Calopogon pallidus*
Parrot Pitcher Plant	*Sarracenia psittacina*
Rough-hair Witchgrass	*Dichanthelium strigosum var. glabrescens*
Savanna Beak Sedge	*Rhynchospora debilis*
Scalloped Milkwort	*Polygala crenata*
Short-beard Plumegrass	*Saccharum brevibarbe var. brevibarbe*
Shortleaf Sneezeweed	*Helenium brevifolium*
Southern Red Lily	*Lilium catesbaei*
Sprawling Hoary-pea	*Tephrosia hispidula*
Spreading Pogonia	*Cleistes bifaria*
Spring Hill Flax	*Linum macrocarpum*
Staghorn Clubmoss	*Lycopodiella cernua var. cernua*
Thread-stem False Foxglove	*Agalinis filicaulis*
Tracy's Sundew	*Drosera tracyi*
Yellow Butterwort	*Pinguicula lutea*
Yellow Fringeless Orchid	*Platanthera integra*

Threats Affecting Habitat:

This habitat occurs in a rapidly developing part of the state, and is threatened by residential and commercial development and disturbance from human interface. This habitat is fire-dependent, and is threatened by fire exclusion and inadequate fire. Invasive species also pose a threat.

Eastern Longleaf Pine Flatwoods Savanna Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	Restricted	Extreme	Medium
Agriculture/Aquaculture	Restricted	Extreme	Medium
Energy Production & Mining	Large	Moderate	Medium
Transportation & Service Corridors	Restricted	Slight	Low
Biological Resource Use	N/A	N/A	N/A
Human Intrusion/Disturbance	Small	Slight	Low
Natural System Modification	Large	Serious	High
Invasive & other Problematic Species	Pervasive	Moderate	Medium
Pollution	Restricted	Serious	Medium
Geological Events	N/A	N/A	N/A
Climate Change & Severe Weather	N/A	N/A	N/A
Overall Calculated Threat Impact: High			

Habitat Research Needs/Conservation Actions:

1. Prioritize this habitat type for inventory to determine extent and condition with a focus on identifying the surrounding landscape context (e.g., residential developments, etc.) that might be affected by prescribed burning.
2. Carry out habitat assessments and botanical and zoological surveys on mitigation banks supporting this habitat; work with USACE and mitigation bank sponsors to maximize ecological value of this habitat on mitigation banks.
3. Educate landowners, adjacent residents, developers, parishes, and the general public about the crucial role of prescribed burning in the management of Longleaf Pine systems and promote the advantages of growing Longleaf Pine and associated herbaceous ground cover.
4. Work with the Longleaf Alliance to incorporate their strategies for Longleaf Pine management and restoration into current restoration efforts.
5. Target this habitat for acquisition from willing sellers, protection (e.g. servitudes), and stewardship implementation. This includes pursuing tracts that are degraded but restorable with timber harvesting and prescribed fire, i.e. recoverable with management, and not requiring re-establishment of herbaceous ground cover plants “from scratch”.

b. Eastern Upland Longleaf Pine Woodland

Rarity Rank: S1/G1G2

Synonyms: Sandhill Pine Forest

Ecological Systems: CES203.496 East Gulf Coastal Plain Interior Upland Longleaf Pine Woodland

General Description:

This community type occurs in the hilly uplands of the central and eastern Florida Parishes of Louisiana. It occurs on acidic sandy loams, loamy sands, and acid clays associated with Pleistocene terraces. This community is characteristically dissected by small to large creek bottoms. Longleaf Pine is the dominant overstory species, and where fire has frequently occurred, it is often the only canopy species. Where fire is less frequent or suppressed, a number of overstory associates may occur. The herbaceous flora may be exceedingly diverse if fire has frequently occurred. Grasses, composites, legumes, and mints are predominant in the ground cover. This community is home to the Gopher Tortoise (*Gopherus polyphemus*), a federally-listed threatened species, which depends on the sandy soils and open herbaceous understory for survival.

Eastern Upland Longleaf Pine Woodland, Sandy Hollow WMA, Tangipahoa Parish

Eastern Upland Longleaf Pine Woodland: Characteristic Plants	
Split-Beard Bluestem	*Andropogon ternarius*
Arrowfeather Threeawn	*Aristida purpurascens* var. *virgata*
Roundhead Lespedeza	*Lespedeza capitata*
Blazing Stars	*Liatris* spp.
Longleaf Pine	*Pinus palustris*
Bracken Fern	*Pteridium aquilinum*
Southern Red Oak	*Quercus falcata*
Blackjack Oak	*Quercus marilandica*
Post Oak	*Quercus stellata*
Little Bluestem	*Schizachyrium scoparium*
Slender Bluestem	*Schizachyrium tenerum*
Pineywoods Dropseed	*Sporobolus junceus*
Goat's Rue	*Tephrosia virginiana*

Current Extent and Status:

Historically, the eastern Florida Parishes of Louisiana were dominated by extensive stands of Longleaf Pine. Now only 1-5% of the original estimated 1 to 2 million acres of Eastern Upland Longleaf Pine Woodland remain (Smith 1993, 1999). Habitat conversion, development, and fire exclusion are factors in this habitat loss. Today there are a few thousand acres in small blocks scattered across this area. LDWF owns and manages Sandy Hollow WMA which is the largest tract of Eastern Upland Longleaf Pine Woodland remaining in Louisiana. LDWF also manages an Eastern Upland Longleaf Pine tract owned by the Tangipahoa Parish School Board. Other areas containing high quality Eastern Upland Longleaf Pine Woodland include Camp Whispering Pines, owned by the Girl Scout Council of Southeast Louisiana and Louisiana State University's (LSU) Lee Memorial Forest. There are several tracts of recoverable habitat on private lands scattered in the eastern Florida Parishes, some of which are enrolled in the NRCS Longleaf Pine Initiative which provides funding for habitat restoration, and some properties have and may continue to receive assistance with prescribed fire through LDWF programs.

Eastern Upland Longleaf Pine Woodland SGCN (59)	
Crustaceans (1)	
Flatwoods Digger	*Fallicambarus oryktes*
Non-crustacean Arthropods (6)	
Florida Harvester Ant	*Pogonomyrmex badius*
American Bumble Bee	*Bombus pensylvanicus*
Mottled Duskywing	*Erynnis martialis*
Dusky Roadside-Skipper	*Amblyscirtes alternata*
Yucca Giant-Skipper	*Megathymus yuccae*
Monarch	*Danaus plexippus*
Amphibians (3)	
Ornate Chorus Frog	*Pseudacris ornata*
Eastern Spadefoot	*Scaphiopus holbrookii*
Dusky Gopher Frog	*Lithobates sevosus*
Reptiles (9)	
Gopher Tortoise	*Gopherus polyphemus*
Eastern Glass Lizard	*Ophisaurus ventralis*
Eastern Hog-nosed Snake	*Heterodon platirhinos*
Northern Mole Kingsnake	*Lampropeltis rhombomaculata*
Black Pinesnake	*Pituophis melanoleucus lodingi*
Southeastern Crowned Snake	*Tantilla coronata*
Harlequin Coralsnake	*Micrurus fulvius*
Eastern Diamond-backed Rattlesnake	*Crotalus adamanteus*
Pygmy Rattlesnake	*Sistrurus miliarius*
Birds (18)	
Northern Bobwhite	*Colinus virginianus*
American Woodcock	*Scolopax minor*
Common Ground-Dove	*Columbina passerina*
Chuck-will's-widow	*Antrostomus carolinensis*
Chimney Swift	*Chaetura pelagica*
Red-headed Woodpecker	*Melanerpes erythrocephalus*
Red-cockaded Woodpecker	*Picoides borealis*
Southeastern American Kestrel	*Falco sparverius paulus*
Loggerhead Shrike	*Lanius ludovicianus*
Brown-headed Nuthatch	*Sitta pusilla*
Sedge Wren	*Cistothorus platensis*
Prairie Warbler	*Setophaga discolor*

Bachman's Sparrow	*Peucaea aestivalis*
Field Sparrow	*Spizella pusilla*
Grasshopper Sparrow	*Ammodramus savannarum*
Henslow's Sparrow	*Ammodramus henslowii*
Le Conte's Sparrow	*Ammodramus leconteii*
Eastern Meadowlark	*Sturnella magna*
Mammals (6)	
Bachman’s Fox Squirrel	*Sciurus niger bachmani*
Southeastern Shrew	*Sorex longirostris*
Big Brown Bat	*Eptesicus fuscus*
Eastern Pipistrelle	*Perimyotis subflavus*
Long-tailed Weasel	*Mustela frenata*
Eastern Spotted Skunk	*Spilogale putorius*
Plants (16)	
Alabama Grape Fern	*Botrychium jenmanii*
Boykin's Milkwort	*Polygala boykinii*
Carolina Fluff Grass	*Tridens carolinianus*
Dwarf Gray Willow	*Salix humilis var. tristis*
Fly-poison	*Amianthium muscitoxicum*
Illinois Pinweed	*Lechea racemulosa*
Incised Groovebur	*Agrimonia incisa*
Lady Lupine	*Lupinus villosus*
Michaux's Milkweed	*Asclepias michauxii*
Narrowleaf Whitetop Aster	*Sericocarpus linifolius*
One-flowered Broomrape	*Orobanche uniflora*
Rough-hair Witch Grass	*Dichanthelium strigosum var. leucoblepharis*
Sand Hickory	*Carya pallida*
Scarlet Oak	*Quercus coccinea*
Thymeleaf Pinweed	*Lechea minor*
Wild Coco Orchid	*Pteroglossaspis ecristata*

Threats Affecting Habitat:

Most of the historical extent of this habitat has already been converted to anthropogenic forests, and much has been lost to residential and commercial development. The most pressing threats to remaining occurrences are inadequate fire and invasive species.

Eastern Upland Longleaf Pine Woodland Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	Restricted	Moderate	Low
Agriculture/Aquaculture	Small	Extreme	Low
Energy Production & Mining	Small	Moderate	Low
Transportation & Service Corridors	Restricted	Moderate	Low
Biological Resource Use	Small	Moderate	Low
Human Intrusion/Disturbance	Small	Slight	Low
Natural System Modification	Large	Serious	High
Invasive & other Problematic Species	Large	Moderate	Medium
Pollution	Small	Slight	Low
Geological Events	N/A	N/A	N/A
Climate Change & Severe Weather	N/A	N/A	N/A
Overall Calculated Threat Impact: Medium			

Habitat Research Needs/Conservation Actions:

1. Educate landowners, adjacent residents, developers, and the general public about the crucial role of prescribed burning in the management of Longleaf Pine systems, the advantages of growing Longleaf Pine and associated herbaceous ground cover, and promote value-added products produced from Longleaf Pine to encourage landowners to replant Longleaf Pine instead of Loblolly Pine.
2. Continue to provide cost share funds through programs such as Prescribed Burn Initiatives (PBI) to reduce or eliminate landowners' costs associated with conducting prescribed burns on their property.
3. Work with the Longleaf Alliance to incorporate their strategies for Longleaf Pine management and restoration into current restoration efforts.
4. Target this habitat for acquisition from willing sellers, protection (e.g. servitudes), and stewardship implementation. This includes pursuing tracts that are degraded but restorable with timber harvesting and prescribed fire, i.e. recoverable with management, and not requiring re-establishment of herbaceous ground cover plants "from scratch".

c. Shortleaf Pine/Oak-Hickory Woodland

Rarity Rank: S1/G2G3

Synonyms: Shortleaf Pine-Oak, Oak-Hickory Forest

Ecological Systems: CES203.378 West Gulf Coastal Plain Pine-Hardwood Forest
CES203.506 East Gulf Coastal Plain Interior Shortleaf Pine-Oak Forest

General Description:

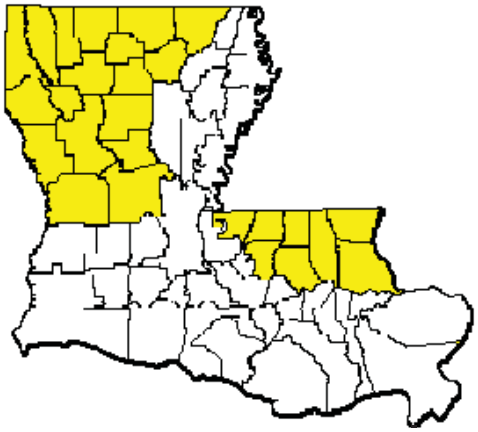
The Shortleaf Pine/Oak-Hickory Woodland community occurs on dry hills, principally in central and northern Louisiana, as well as in the Florida Parishes. In the Upper West Gulf Coastal Plain (UWGCP), this was the most prevalent habitat on the landscape (i.e., it was the matrix community). The overstory is composed of a combination of Shortleaf Pine and various dry-sited hardwood species. The ground cover was historically grassy and similar to that of Longleaf Pine systems. However, the ground cover in Shortleaf Pine/Oak-Hickory Woodlands was likely variable and possessed some shaded areas with associated shade-loving plants, versus large continuous stands of sun-loving plants found in Longleaf Pine grasslands. Fire is an important process in this community, and historical fire frequency is thought to have been 5 to 15 years (Martin and Smith 1993).

Shortleaf Pine/Oak-Hickory Woodland, Lincoln Parish

Shortleaf Pine/Oak-Hickory Woodland: Characteristic Plants	
Mockernut Hickory	*Carya alba*
Black Hickory	*Carya texana*
Woods Oats	*Chasmanthium laxum* var. *sessiliflorum*
Rattlesnake Master	*Eryngium yuccifolium*
Shortleaf Pine	*Pinus echinata*
Southern Red Oak	*Quercus falcata*
Bluejack Oak	*Quercus incana*
Post Oak	*Quercus stellata*
Little Bluestem	*Schizachyrium scoparium*
Tree Huckleberry	*Vaccinium arboreum*

Current Extent and Status:

There was an estimated 4-6 million acres of Shortleaf Pine/Oak-Hickory Forest in Louisiana and, of this original extent, 5-10% is thought to remain today (Smith 1993). Most of this acreage was in northwestern Louisiana in the UWGCP. Shortleaf Pine/Oak-Hickory Forests possessing both the overstory and characteristic herbaceous ground cover are extremely rare.



Shortleaf Pine-Oak-Hickory Woodland SGCN (50)	
Crustaceans (2)	
Flatwoods Digger	*Fallicambarus oryktes*
Pine Hills Digger	*Fallicambarus dissitus*
Non-crustacean Arthropods (1)	
Lace-winged Roadside-Skipper	*Amblyscirtes aesculapius*
Amphibians (4)	
Southern Red-backed Salamander	*Plethodon serratus*
Louisiana Slimy Salamander	*Plethodon kisatchie*
Strecker's Chorus Frog	*Pseudacris streckeri*
Southern Crawfish Frog	*Lithobates areolatus areolatus*
Reptiles (9)	
Western Slender Glass Lizard	*Ophisaurus attenuatus attenuatus*

Eastern Glass Lizard	*Ophisaurus ventralis*
Southern Prairie Skink	*Plestiodon septentrionalis obtusirostris*
Coal Skink	*Plestiodon anthracinus*
Western Wormsnake	*Carphophis vermis*
Eastern Hog-nosed Snake	*Heterodon platirhinos*
Northern Mole Kingsnake	*Lampropeltis rhombomaculata*
Timber Rattlesnake	*Crotalus horridus*
Pygmy Rattlesnake	*Sistrurus miliarius*
Birds (21)	
American Woodcock	*Scolopax minor*
Common Ground-Dove	*Columbina passerina*
Greater Roadrunner	*Geococcyx californianus*
Chuck-will's-widow	*Antrostomus carolinensis*
Chimney Swift	*Chaetura pelagica*
Red-headed Woodpecker	*Melanerpes erythrocephalus*
Red-cockaded Woodpecker	*Picoides borealis*
Yellow-throated Vireo	*Vireo flavifrons*
White-breasted Nuthatch	*Sitta carolinensis*
Brown-headed Nuthatch	*Sitta pusilla*
Wood Thrush	*Hylocichla mustelina*
Worm-eating Warbler	*Helmitheros vermivorum*
Swainson's Warbler	*Limnothlypis swainsonii*
Kentucky Warbler	*Geothlypis formosa*
Hooded Warbler	*Setophaga citrina*
Bachman's Sparrow	*Peucaea aestivalis*
Field Sparrow	*Spizella pusilla*
Grasshopper Sparrow	*Ammodramus savannarum*
Henslow's Sparrow	*Ammodramus henslowii*
Painted Bunting	*Passerina ciris*
Rusty Blackbird	*Euphagus carolinus*
Mammals (13)	
Southeastern Shrew	*Sorex longirostris*
Big Brown Bat	*Eptesicus fuscus*
Eastern Pipistrelle	*Perimyotis subflavus*
Rafinesque’s Big-eared Bat	*Corynorhinus rafinesquii*
Bachman’s Fox Squirrel	*Sciurus niger bachmani*
Eastern Chipmunk	*Tamias striatus*
Oak Ridge Pocket Gopher	*Geomys breviceps breviceps*
Baird's Pocket Gopher	*Geomys breviceps sagittatus*
Golden Mouse	*Ochrotomys nuttalli*

Louisiana Black Bear	*Ursus americanus luteolus*
Long-tailed Weasel	*Mustela frenata*
Eastern Spotted Skunk	*Spilogale putorius*
Ringtail	*Bassariscus astutus*

Threats Affecting Habitat:

Due to prior conversion to anthropogenic forests and fire exclusion, this habitat is extremely rare today. Habitat conversion and inadequate fire continue to threaten remaining occurrences. Habitat destruction, disturbance, and fragmentation from mineral extraction operations also impact this habitat.

Shortleaf Pine/Oak Hickory Woodland Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	Restricted	Serious	Medium
Agriculture/Aquaculture	Restricted	Extreme	Medium
Energy Production & Mining	Large	Serious	High
Transportation & Service Corridors	Large	Slight	Low
Biological Resource Use	Restricted	Moderate	Low
Human Intrusion/Disturbance	N/A	N/A	N/A
Natural System Modification	Large	Moderate	Medium
Invasive & other Problematic Species	Large	Slight	Low
Pollution	N/A	N/A	N/A
Geological Events	N/A	N/A	N/A
Climate Change & Severe Weather	N/A	N/A	N/A
Overall Calculated Threat Impact: Medium			

Habitat Research Needs/Conservation Actions:

1. Continue surveys to determine the current extent and condition of this habitat type.
2. Develop DFCs for restoration of this habitat type including appropriate fire regimes and herbicide uses.
3. Work with the U.S. Forest Service (USFS), Department of Defense (DOD), and Office of State Lands (LOSL) to encourage the conservation and restoration of this habitat where it exists on public lands.
4. Support the production and planting of locally adapted Shortleaf Pine seedlings for restoration efforts.
5. Develop partnerships with federal and state agencies, NGO's, and others to form a Shortleaf Pine Initiative.
6. Prioritize this habitat type for stewardship efforts on private lands; include this habitat in future prescribed burn initiatives.

7. Prioritize this community type for protection efforts such as cooperative agreements and acquisition from willing sellers; in addition to high-quality examples of this habitat, these efforts should target large blocks of land currently not supporting identifiable examples which can then be restored by aggressive harvesting of off-site pine species, replanting of Shortleaf Pine, and prescribed burning.

d. Slash Pine-Pondcypress/Hardwood Woodland

Rarity Rank: S2/G2?

Synonyms: Slash Pine-Hardwood

Ecological Systems: CES203.375 East Gulf Coastal Plain Near-Coast Pine Flatwoods

General Description:

This wetland habitat is restricted to the wet, acidic flatwoods on the far eastern Pleistocene Prairie Terrace of Louisiana's EGCP. Slash Pine-Pondcypress/Hardwood Woodlands are situated in a hydrologic/topographic transitional zone between the higher, "drier" Eastern Longleaf Pine Flatwoods Savannas and the lower, wetter Bayhead Swamps. This habitat may also be present on broad flats that were historically partially protected from frequent surface fires by surrounding Bayhead Swamps. Soils of the Slash Pine-Pondcypress Woodlands are hydric, strongly acidic, and nutrient poor silt loams and fine sandy loams. Two principal soils are Myatt fine sandy loam and Guyton silt loam. Surface soils are typically saturated for much of the year, and shallow water may be present in the late fall, winter, and early spring, and after rains during the growing season.

This habitat seems to vary considerably in structure and somewhat in composition from one site to another, apparently as a consequence of minor variations in topography, soil conditions, hydrology, and fire regimes (LNHP 2009; Teague et al. 1995). Existing examples of this habitat encompass both dense-canopied forested wetlands as well as open sunny savanna-like areas supporting lush grass and sedge dominated understories. Whether woodland or savanna conditions prevail is dependent on fire, disturbance, or other factors that impact tree recruitment and growth.

Slash Pine-Pondcypress/Hardwood Woodlands evolved with recurrent lightning-season ground fires, and regular light surface fire appears critical in maintaining this community. Both Slash Pine and Pondcypress are fire-adapted species and can survive fires once they attain a certain size; however, neither is as fire resistant as Longleaf Pine. The natural fire return interval of this community is difficult to estimate but is tentatively believed to have varied on average between 5 and 20 years. This frequency would periodically allow for the regeneration of Slash Pine, Pondcypress, and associated hardwoods during the longer fire return intervals, as well as preclude complete dominance of the site by hardwoods (Smith 1996).

Slash Pine-Pondcypress/Hardwood Woodland, St. Tammany Parish

Slash Pine-Pondcypress/Hardwood Woodland: Characteristic Plants	
White Titi	*Cyrilla racemiflora*
Big Gallberry	*Ilex coriacea*
Myrtle Holly	*Ilex myrtifolia*
Foxtail Clubmoss	*Lycopodiella alopecuroides*
Sweetbay Magnolia	*Magnolia virginiana*
Swamp Blackgum	*Nyssa biflora*
Slash Pine	*Pinus elliotii*
Broadfruit Horned Beak Sedge	*Rhynchospora careyana*
Yellow Trumpet Pitcher Plant	*Sarracenia alata*
Pondcypress	*Taxodium ascendens*
Fringed Yellow-eyed-grass	*Xyris fimbriata*
Pineland Yellow-eyed-grass	*Xyris stricta* var. *stricta*

Current Extent and Status:

In the EGCP of Louisiana, the Slash Pine-Pondcypress/Hardwood Woodland is primarily associated with Eastern Longleaf Pine Flatwoods Savanna and Bayhead Swamp. Pre-settlement extent of this habitat is estimated at 50,000 to 100,000 acres, with 10-25% currently remaining (Smith 1993, Smith 1999). Protected examples occur on TNC's Talisheek Pine Wetlands and Abita Creek Flatwoods Preserves, as well as several nearby mitigation banks.

Slash Pine-Pondcypress-Hardwood Woodland SGCN (40)	
Crustaceans (1)	
Flatnose Crawfish	*Procambarus planirostris*
Non-crustacean Arthropods (2)	
Arogos Skipper	*Atrytone arogos*
Brou's Mallow Moth	*Bagisara brouana*
Amphibians (7)	
Eastern Tiger Salamander	*Ambystoma tigrinum tigrinum*
Four-toed Salamander	*Hemidactylium scutatum*
Southern Dusky Salamander	*Desmognathus auriculatus*
Gulf Coast Mud Salamander	*Pseudotriton montanus flavissimus*
Ornate Chorus Frog	*Pseudacris ornata*
Eastern Spadefoot	*Scaphiopus holbrookii*
Dusky Gopher Frog	*Lithobates sevosus*
Reptiles (6)	
Eastern Glass Lizard	*Ophisaurus ventralis*
Coal Skink	*Plestiodon anthracinus*
Eastern Hog-nosed Snake	*Heterodon platirhinos*
Pine Woods Littersnake	*Rhadinaea flavilata*
Eastern Diamond-backed Rattlesnake	*Crotalus adamanteus*
Pygmy Rattlesnake	*Sistrurus miliarius*
Birds (10)	
Swallow-tailed Kite	*Elanoides forficatus*
American Woodcock	*Scolopax minor*

Chuck-will's-widow	*Antrostomus carolinensis*
Chimney Swift	*Chaetura pelagica*
Yellow-throated Vireo	*Vireo flavifrons*
Prothonotary Warbler	*Protonotaria citrea*
Kentucky Warbler	*Geothlypis formosa*
American Redstart	*Setophaga ruticilla*
Hooded Warbler	*Setophaga citrina*
Yellow-throated Warbler	*Setophaga dominica*
Mammals (9)	
Southeastern Shrew	*Sorex longirostris*
Southeastern Myotis	*Myotis austroriparius*
Big Brown Bat	*Eptesicus fuscus*
Eastern Pipistrelle	*Perimyotis subflavus*
Rafinesque's Big-eared Bat	*Corynorhinus rafinesquii*
Bachman's Fox Squirrel	*Sciurus niger bachmani*
Golden Mouse	*Ochrotomys nuttalli*
Long-tailed Weasel	*Mustela frenata*
Eastern Spotted Skunk	*Spilogale putorius*
Plants (6)	
Acid-swamp Yellow-eyed-grass	*Xyris serotina*
Georgia Tickseed	*Coreopsis nudata*
Parrot Pitcher Plant	*Sarracenia psittacina*
Pineland Yellow-eyed-grass	*Xyris stricta var. stricta*
Pink Bog Button	*Sclerolepis uniflora*
Spoonleaf Sundew	*Drosera intermedia*

Threats Affecting Habitat:

Conversion to anthropogenic habitats has affected this habitat and is expected to continue, along with fire exclusion and disturbance from human activities.

Slash Pine-Pondcypress/Hardwood Woodland Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	Small	Slight	Low
Agriculture/Aquaculture	Restricted	Serious	Medium
Energy Production & Mining	Restricted	Moderate	Low
Transportation & Service Corridors	Restricted	Moderate	Low
Biological Resource Use	Small	Moderate	Low
Human Intrusion/Disturbance	Small	Slight	Low
Natural System Modification	Restricted	Moderate	Low
Invasive & other Problematic Species	Large	Moderate	Medium
Pollution	Restricted	Slight	Low
Geological Events	N/A	N/A	N/A
Climate Change & Severe Weather	Pervasive	Slight	Low
Overall Calculated Threat Impact: Medium			

Habitat Research Needs/Conservation Actions:

1. Conduct surveys to determine the extent and condition of this habitat type with a focus on identifying the surrounding landscape context (e.g., residential developments, etc.) that might affect prescribed burning.
2. Continue to provide cost share funds for landowners to reduce or eliminate costs associated with conducting prescribed burns on their property.
3. Continue to work with USACE, other mitigation bank regulatory bodies, and mitigation bank sponsors to ensure correct identification and maximal ecological value of this habitat.
4. Create opportunities for acquisition and stewardship of this habitat type, including targeting occurrences that are degraded but recoverable with timber harvesting and prescribed fire.

e. Western Longleaf Pine Flatwoods Savanna

Rarity Rank: Acidic - S2/G2G3; Saline - S1/G1

Synonyms: Open Savanna, Pine Flatwoods, Coastal Meadow, Pine Meadow, Pine Barren

Ecological Systems: CES203.191 West Gulf Coastal Plain Wet Longleaf Pine Savanna and Flatwoods

***General Description*:**

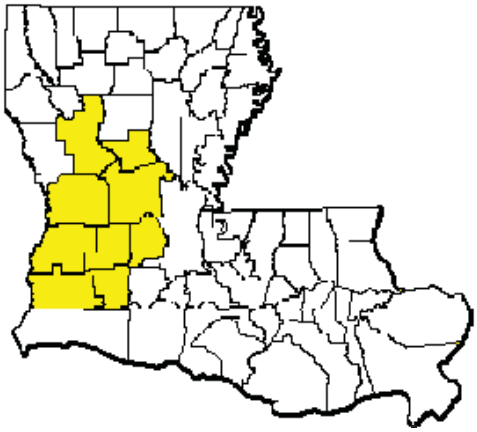
Western Longleaf Pine Flatwoods Savanna includes both acidic (S1S2) and saline (sodic) types (S1). Saline Western Longleaf Pine Flatwoods Savannas occur mainly on Brimstone Silt Loam, which is a sodic or alkali soil. Pine savannas are floristically rich, herb-dominated wetlands that are naturally sparsely stocked with Longleaf Pine (*Pinus palustris*). Pine Savannas historically dominated the Gulf Coastal Plain flatwood regions of southeast and southwest Louisiana. The term "savanna" is classically used to describe expansive grassland areas possessing scattered trees. Wet savannas in the WGCP occupy the poorly drained and seasonally saturated/flooded depressional areas and low flats, whereas the non-wetland flatwoods occupy better drained low ridges. Essentially, Western Upland Longleaf Pine Woodland is found on pimple mounds within the flatwoods. Pimple mounds are small soil mounds resulting from wind deposition of soil during historical droughts (Siefert et al. 2009). Pine Savannas experience a highly fluctuating water table, ranging from surface saturation/shallow flooding in late fall/winter/early spring to growing season drought. Soils are hydric, very strongly acidic, nutrient poor, fine sandy loams and silt loams, and are low in organic matter. The surface soils for both eastern and western types may be underlain by slowly permeable subsoil through which air and water move slowly.

The only known extant Louisiana occurrences of *Schwalbea americana* (American Chaffseed), which is federally-listed as endangered, are found on pimple mounds in Western Longleaf Pine Flatwoods Savannas in Allen and Beauregard Parishes. This species is also known historically from Calcasieu and Rapides Parishes. Various species belonging to the lily family (Liliaceae), sunflower family (Asteraceae), and orchid family (Orchidaceae) are also prominent. Club-mosses (*Lycopodium* spp.) and peat moss (*Sphagnum* spp.) are often conspicuous. Frequent fire is a major factor controlling species occurrence and community structure. Without frequent fire (particularly growing season burns which more accurately mimic historical fire regimes), shrubs and trees, especially Loblolly and Slash Pines, will gain dominance and eventually eliminate the herbaceous flora.

Western Longleaf Pine Flatwoods Savanna, Beauregard Parish

Western Longleaf Pine Flatwoods Savanna: Characteristic Plants	
Acidic	
Cutover Muhly	*Muhlenbergia expansa*
Savanna Meadow Beauty	*Rhexia alifanus*
Yellow Meadow Beauty	*Rhexia lutea*
Beak Sedges	*Rhynchospora* spp.
Little Bluestem	*Schizachyrium scoparium*
Slender Bluestem	*Schizachyrium tenerum* (pimple mounds)
Coastal Plain Yellow-eyed-grass	*Xyris ambig*ua
Carolina Yellow-eyed-grass	*Xyris caroliniana* (pimple mounds)
Saline (Sodic/Alkali)	
Rayless Goldenrod	*Bigelowia nuttallii*
Yellow Puff	*Neptunia lutea*
Silveus Dropseed	*Sporobolus silveanus*
Gulf Cordgrass	*Spartina spartinae*

Current Extent and Status:



Western Longleaf Pine Flatwoods Savannas and embedded habitats are highly threatened and much reduced from their original extent. This habitat is estimated to have occupied 1,000,000 to 2,000,000 acres in pre-settlement times with an estimated 1-5% remaining (Smith 1993).

Most extant Western Longleaf Pine Flatwoods Savannas occur on private land. A combination of factors has favored them during the last 100 years, including utilization as rangeland (involving frequent burning). Several examples are captured by conservation lands owned by TNC, and several sites are protected in wetland mitigation banks. Wetland mitigation banking is emerging as an important tool for conservation of this habitat. Habitat restoration on mitigation banks involves harvesting off-site pine species and prescribed burning. Recovery potential in degraded examples varies depending on the site history. In some cases, much of the diverse herbaceous ground cover has returned with reintroduction of fire.

Western Longleaf Pine Flatwoods Savanna SGCN (54)	
Crustaceans (1)	
Pine Hills Digger	*Fallicambarus dissitus*
Non-crustacean Arthropods (5)	
Texas Brown Tarantula	*Aphonopelma hentzi*
American Bumble Bee	*Bombus pensylvanicus*
Little Metalmark	*Calephelis virginiensis*
Monarch	*Danaus plexippus*
Gulf Pine Sphinx	*Lapara phaeobrachycerous*
Amphibians (2)	
Eastern Tiger Salamander	*Ambystoma tigrinum tigrinum*
Southern Crawfish Frog	*Lithobates areolatus areolatus*
Reptiles (3)	
Western Slender Glass Lizard	*Ophisaurus attenuatus attenuatus*
Eastern Hog-nosed Snake	*Heterodon platirhinos*
Western Chicken Turtle	*Deirochelys reticularia miaria*
Birds (18)	
Northern Bobwhite	*Colinus virginianus*
Yellow Rail	*Coturnicops noveboracensis*

American Woodcock	*Scolopax minor*
Common Ground-Dove	*Columbina passerina*
Greater Roadrunner	*Geococcyx californianus*
Chuck-will's-widow	*Antrostomus carolinensis*
Red-headed Woodpecker	*Melanerpes erythrocephalus*
Red-cockaded Woodpecker	*Picoides borealis*
White-breasted Nuthatch	*Sitta carolinensis*
Brown-headed Nuthatch	*Sitta pusilla*
Sedge Wren	*Cistothorus platensis*
Loggerhead Shrike	*Lanius ludovicianus*
Prairie Warbler	*Setophaga discolor*
Bachman's Sparrow	*Peucaea aestivalis*
Field Sparrow	*Spizella pusilla*
Grasshopper Sparrow	*Ammodramus savannarum*
Henslow's Sparrow	*Ammodramus henslowii*
Le Conte's Sparrow	*Ammodramus leconteii*
Mammals (3)	
Eastern Harvest Mouse	*Reithrodontomys humulis*
Long-tailed Weasel	*Mustela frenata*
Eastern Spotted Skunk	*Spilogale putorius*
Plants (22)	
American Chaffseed	*Schwalbea americana*
Arkansas Leastdaisy	*Chaetopappa asteroides*
Boykin's Milkwort	*Polygala boykinii*
Chapman's Milkwort	*Polygala chapmanii*
Coastal Plain Lobelia	*Lobelia flaccidifolia*
Dotted Gayfeather	*Liatris punctata*
Flat-fruit Beak Sedge	*Rhynchospora compressa*
Rough-hair Witch Grass	*Dichanthelium strigosum var. leucoblepharis*
Branched Hedge-hyssop	*Gratiola ramosa*
Oklahoma Grass-pink	*Calopogon oklahomensis*
Thread-stem False Foxglove	*Agalinis filicaulis*
Rosinweed Sunflower	*Helianthus silphioides*
Rough-hair Witch Grass	*Dichanthelium strigosum var. leucoblepharis*
Savanna Beak Sedge	*Rhynchospora debilis*
Scalloped Milkwort	*Polygala crenata*
Silveus Dropseed	*Sporobolus silveanus*
Pale False Foxglove	*Agalinis skinneriana*
Prairie Evening Primrose	*Oenothera pilosella ssp. sessilis*
Small-fruit Seedbox	*Ludwigia microcarpa*

Spreading Beak Sedge	*Rhynchospora divergens*
Wand Blackroot	*Pterocaulon virgatum*
Wild Coco Orchid	*Pteroglossaspis ecristata*

Threats Affecting Habitat:

Threats include conversion to Slash or Loblolly Pine plantations, residential/commercial development, fire exclusion or inappropriate fire regime, hydrological alterations, contamination by chemicals (herbicides, fertilizers), and physical damage from timber harvesting/planting activities (Smith 1996). Invasive species also threaten this habitat.

Western Longleaf Pine Flatwoods Savanna Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	Large	Moderate	Medium
Agriculture/Aquaculture	Large	Extreme	High
Energy Production & Mining	Large	Moderate	Medium
Transportation & Service Corridors	Large	Moderate	Medium
Biological Resource Use	N/A	N/A	N/A
Human Intrusion/Disturbance	Small	Slight	Low
Natural System Modification	Large	Serious	High
Invasive & other Problematic Species	Pervasive	Serious	High
Pollution	N/A	N/A	N/A
Geological Events	N/A	N/A	N/A
Climate Change & Severe Weather	N/A	N/A	N/A
Overall Calculated Threat Impact: Very High			

Habitat Research Needs/Conservation Actions:

1. Continue surveys to determine the extent and condition of this habitat type.
2. Educate landowners, adjacent residents, developers, and the general public about the crucial role of prescribed burning in the management of Longleaf Pine ecosystems.
3. Target this habitat for acquisition from willing sellers, protection (e.g. servitudes), and stewardship implementation. This includes pursuing tracts that are degraded but restorable with timber harvesting and prescribed fire, i.e. recoverable with management, and not requiring re-establishment of herbaceous ground cover plants “from scratch”.
4. Continue to promote advantages of growing Longleaf Pine and associated herbaceous ground cover by working with the Longleaf Alliance and incorporate their strategies for Longleaf Pine management and restoration into restoration efforts.
5. Continue to work with USACE, other mitigation bank regulatory bodies, and mitigation bank sponsors to ensure correct identification and maximal ecological value of this habitat. This includes discouraging establishment of inappropriate vegetation types on the flatwoods landscape such as Bottomland Hardwood Forest.

f. Western Upland Longleaf Pine Woodland

Rarity Rank: S3/G2G3

Synonyms: Sandhill Pine Forest, Clayhill Pine Forest

Ecological Systems: CES203.293 West Gulf Coastal Plain Upland Longleaf Pine Forest and Woodland

General Description:

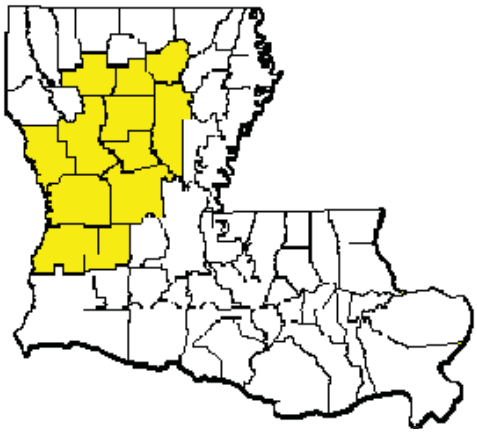
This habitat occurs in the hilly uplands in western and central Louisiana. It occurs on acidic sandy loams to acid clays associated with Pleistocene or Tertiary formations. Soil moisture regimes range from dry-mesic to xeric. The community is characteristically dissected by small to large creek bottoms. Longleaf Pine (*Pinus palustris)* is the dominant overstory species, and in locations where fire has frequently occurred, it is often the only canopy species. Where fire is less frequent or suppressed, a number of overstory associates may occur. The herbaceous flora may be exceedingly diverse if fire has frequently occured. Grasses, composites, and legumes are predominant in the ground layer.

Western Upland Longleaf Pine Woodland, Fort Polk Military Reservation and WMA, Vernon Parish

Western Upland Longleaf Pine Woodland: Characteristic Plants	
Dry-Mesic	
Big Bluestem	*Andropogon gerardii*
Split-beard Bluestem	*Andropogon ternarius*
Roundhead Lespedeza	*Lespedeza capitata*
Blazing Stars	*Liatris* spp.
Pitchfork Crown Grass	*Paspalum bifidum*
Grassleaf Golden Aster	*Pityopsis graminifolia*
Bracken Fern	*Pteridium aquilinum*
Little Bluestem	*Schizachyrium scoparium*
Slender Bluestem	*Schizachyrium tenerum*
Fragrant Goldenrod	*Solidago odora*
Pineywoods Dropseed	*Sporobolus junceus*
Goat's Rue	*Tephrosia virginiana*
Texas Ironweed	*Vernonia texana*
Xeric Sandy Soils	
Curly Threeawn	*Aristida desmantha*
Texas Bullnettle	*Cnidoscolus texana*
Scratch Daisy	*Croptilon divaricatum*
Bristly Flat Sedge	*Cyperus hystricinus*
Plukenet’s Flat Sedge	*Cyperus plukenetii*
Illinois Flat Sedge	*Cyperus grayoides*
Plains Snakecotton	*Froelichia floridana*
Camphorweed	*Heterotheca subaxillaris*
Prickly Pear	*Opuntia* sp.
Bluejack Oak	*Quercus incana*
Downy Spiderwort	*Tradescantia reverchonii*

Current Extent and Status:

Western Upland Longleaf Pine Woodlands historically dominated large areas in the West Gulf Coastal Plain (WGCP). However, much of this area has been converted to other forest types or developed. The estimated pre-settlement acreage of this habitat is 2,000,000 to 4,000,000 acres with an estimated 10-25% remaining (Smith 1993). Currently, the largest tracts of this community are found on KNF and Fort Polk Military Reservation and WMA.



Western Upland Longleaf Pine Woodland SGCN (72)	
Crustaceans (1)	
Pine Hills Digger	*Fallicambarus dissitus*
Non-crustacean Arthropods (17)	
Texas Brown Tarantula	*Aphonopelma hentzi*
American Bumble Bee	*Bombus pensylvanicus*
Little Metalmark	*Calephelis virginiensis*
Monarch	*Danaus plexippus*
Texas Emerald	*Somatochlora margarita*
Comanche Harvester Ant	*Pogonomyrmex comanche*
Frosted Elfin	*Callophrys irus*
Little Metalmark	*Calephelis virginiensis*
Georgia Satyr	*Neonympha areolatus*
Mottled Duskywing	*Erynnis martialis*
Wild Indigo Duskywing	*Erynnis baptisiae*
Dusky Roadside-Skipper	*Amblyscirtes alternata*
Dusted Skipper	*Atrytonopsis hianna*
Meske's Skipper	*Hesperia meskei*
Yucca Giant-Skipper	*Megathymus yuccae*
Strecker's Giant-Skipper	*Megathymus streckeri*
Falcate Orangetip	*Anthocharis midea*
Amphibians (4)	
Eastern Tiger Salamander	*Ambystoma tigrinum tigrinum*
Southern Crawfish Frog	*Lithobates areolatus areolatus*
Southern Red-backed Salamander	*Plethodon serratus*
Hurter's Spadefoot	*Scaphiopus hurterii*

Reptiles (6)	
Western Slender Glass Lizard	*Ophisaurus attenuatus attenuatus*
Eastern Hog-nosed Snake	*Heterodon platirhinos*
Coal Skink	*Plestiodon anthracinus*
Louisiana Pinesnake	*Pituophis ruthveni*
Timber Rattlesnake	*Crotalus horridus*
Pygmy Rattlesnake	*Sistrurus miliarius*
Birds (17)	
Northern Bobwhite	*Colinus virginianus*
American Woodcock	*Scolopax minor*
Common Ground-Dove	*Columbina passerina*
Greater Roadrunner	*Geococcyx californianus*
Red-headed Woodpecker	*Melanerpes erythrocephalus*
Red-cockaded Woodpecker	*Picoides borealis*
White-breasted Nuthatch	*Sitta carolinensis*
Brown-headed Nuthatch	*Sitta pusilla*
Sedge Wren	*Cistothorus platensis*
Loggerhead Shrike	*Lanius ludovicianus*
Prairie Warbler	*Setophaga discolor*
Bachman's Sparrow	*Peucaea aestivalis*
Field Sparrow	*Spizella pusilla*
Grasshopper Sparrow	*Ammodramus savannarum*
Henslow's Sparrow	*Ammodramus henslowii*
Le Conte's Sparrow	*Ammodramus leconteii*
Eastern Meadowlark	*Sturnella magna*
Mammals (8)	
Northern Long-eared Bat	*Myotis septentrionalis*
Big Brown Bat	*Eptesicus fuscus*
Eastern Pipistrelle	*Perimyotis subflavus*
Baird's Pocket Gopher	*Geomys breviceps sagittatus*
Hispid Pocket Mouse	*Chaetodipus hispidus*
Golden Mouse	*Ochrotomys nuttalli*
Ringtail	*Bassariscus astutus*
Long-tailed Weasel	*Mustela frenata*
Plants (19)	
American Chaffseed	*Schwalbea americana*
American Jointweed	*Polygonella americana*
Culver's-root	*Veronicastrum virginicum*
Dwarf Gray Willow	*Salix humilis var. tristis*

Illinois Flat Sedge	*Cyperus grayoides*
Louisiana Squarehead	*Tetragonotheca ludoviciana*
Many-flowered Wild-buckwheat	*Eriogonum multiflorum*
October-flower	*Polygonella polygama*
Oklahoma Grass-pink	*Calopogon oklahomensis*
One-flowered Broomrape	*Orobanche uniflora*
Pale False Foxglove	*Agalinis skinneriana*
Rosinweed Sunflower	*Helianthus silphioides*
Sand Spikemoss	*Selaginella arenicola ssp. riddellii*
Silver Croton	*Croton argyranthemus*
Slender Gayfeather	*Liatris tenuis*
Smooth Twistflower	*Streptanthus hyacinthoides*
Soxman's Milkvetch	*Astragalus soxmaniorum*
Thymeleaf Pinweed	*Lechea minor*
Wild Coco Orchid	*Pteroglossaspis ecristata*

Threats Affecting Habitat:

Most of the historical acreage of this habitat now supports anthropogenic forests. Due to rarity and limited opportunity, habitat conversion is expected to be infrequent but to have severe consequences where it does occur. This habitat is mainly threatened by inadequate fire. Several sources of human disturbance also degrade this habitat.

Western Upland Longleaf Pine Woodland Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	Restricted	Moderate	Low
Agriculture/Aquaculture	Restricted	Extreme	Medium
Energy Production & Mining	Restricted	Moderate	Low
Transportation & Service Corridors	Restricted	Moderate	Low
Biological Resource Use	N/A	N/A	N/A
Human Intrusion/Disturbance	Small	Slight	Low
Natural System Modification	Large	Serious	High
Invasive & other Problematic Species	Pervasive	Slight	Low
Pollution	N/A	N/A	N/A
Geological Events	N/A	N/A	N/A
Climate Change & Severe Weather	N/A	N/A	N/A
Overall Calculated Threat Impact: Medium			

Habitat Research Needs/Conservation Actions:

1. Continue surveys to determine the extent and condition of this habitat.

2. Educate landowners, adjacent residents, developers, and the general public about the crucial role of prescribed burning in the management of Longleaf Pine.
3. Continue to promote advantages of growing Longleaf Pine and associated herbaceous ground cover in cooperation with the Longleaf Alliance and incorporate their strategies for restoration into new and ongoing restoration efforts.
4. Promote value-added products produced from Longleaf Pine to encourage landowners to replant Longleaf Pine instead of off-site pine species.
5. Support and provide cost-share opportunities to offset costs to landowners for management activities such as prescribed burning, brush control, and invasive species control in this habitat.
6. Target this habitat for acquisition, protection (e.g. conservation servitudes), and stewardship implementation. This includes pursuing tracts that are degraded but restorable with timber harvesting and prescribed fire, i.e. recoverable with management, and not requiring re-establishment of herbaceous ground cover plants “from scratch”.

g. Xeric Sandhill Woodland

Rarity Rank: S1/G2G3

Synonyms: Oak-Farkleberry Sandy Lands

Ecological Systems: CES203.056 West Gulf Coastal Plain Sandhill Oak and Shortleaf Pine Forest and Woodland

General Description:

Xeric Sandhill Woodlands develop on deep sandy soils on Tertiary uplands and Pleistocene stream terraces. Most occurrences are in the latter setting. Soils are nutrient-poor, excessively well-drained loamy fine sands. Fire may be an important process maintaining some examples of this community. However, some Xeric Sandhill Woodlands may be isolated by landscape features such as stream bottoms which naturally protect them from fire, or may have sparse fine fuels which will not carry fire well. Drought-related tree and shrub mortality may play a role in creating canopy gaps that allow light-loving herbaceous plants to persist. The vegetation composition of Xeric Sandhill Woodlands overlaps considerably with that of Upland Longleaf Pine Woodlands that occur on deep xeric sandy soils. However, vegetation structure often differs between these two habitats, with Xeric Sandhill Woodlands appearing more “scrub-like”. Xeric Sandhill Woodlands tend to be small-scale, inclusional habitats, while the xeric phase of Upland Longleaf Pine Woodlands is typically more expansive.

Xeric Sandhill Woodland, Caddo Parish

Xeric Sandhill Woodland: Characteristic Plants	
Curly Threeawn	*Aristida desmantha*
Texas Bullnettle	*Cnidoscolus texana*
Bristly Flat Sedge	*Cyperus hystricinus*
Plukenet's Flat Sedge	*Cyperus plukenetii*
Slender Crabgrass	*Digitaria filiformis*
Plains Snakecotton	*Froelichia floridana*
Shortleaf Pine (UWGCP)	*Pinus echinata*
Prickly Pear	*Opuntia* sp.
Bluejack Oak	*Quercus incana*
Sand Post Oak	*Quercus margaretta*
Gray's Beak Sedge	*Rhynchospora grayi*
Louisiana Squarehead	*Tetragonotheca ludoviciana*
Downy Spiderwort	*Tradescantia reverchonii*

Current Extent and Status:

Xeric Sandhill Woodlands are more frequent west of the Mississippi River. A few examples of this habitat are known from stream terraces (e.g. along Pushepatappa Creek). Pre-settlement extent of Xeric Sandhill Woodland habitat west of the Mississippi River is estimated to have been 50,000 to 100,000 acres, with 10-25% remaining today (Smith 1993). Most remaining Xeric Sandhill Woodlands in the WGCP are highly degraded (MacRoberts and MacRoberts 1995). East of the Mississippi River, Xeric Sandhill Woodland is thought to have occupied 2,000 to 10,000 acres, with 5-10 % remaining. A handful of protected occurrences are captured by Ft. Polk, KNF, and TNC's Caddo Black Bayou Preserve, all located in western Louisiana.

Xeric Sandhill Woodland SGCN (80)	
Crustaceans (1)	
Pine Hills Digger	*Fallicambarus dissitus*
Non-crustacean Arthropods (6)	
Florida Harvester Ant	*Pogonomyrmex badius*

Comanche Harvester Ant	*Pogonomyrmex comanche*
American Bumble Bee	*Bombus pensylvanicus*
Cobweb Skipper	*Hesperia metea*
Monarch	*Danaus plexippus*
Texas Brown Tarantula	*Aphonopelma hentzi*
Amphibians (2)	
Strecker's Chorus Frog	*Pseudacris streckeri*
Hurter's Spadefoot	*Scaphiopus hurterii*
Reptiles (8)	
Western Slender Glass Lizard	*Ophisaurus attenuatus attenuatus*
Southern Prairie Skink	*Plestiodon septentrionalis obtusirostris*
Coal Skink	*Plestiodon anthracinus*
Texas Horned Lizard	*Phrynosoma cornutum*
Eastern Hog-nosed Snake	*Heterodon platirhinos*
Louisiana Pinesnake	*Pituophis ruthveni*
Timber Rattlesnake	*Crotalus horridus*
Pygmy Rattlesnake	*Sistrurus miliarius*
Birds (12)	
Northern Bobwhite	*Colinus virginianus*
Common Ground-Dove	*Columbina passerina*
Greater Roadrunner	*Geococcyx californianus*
Chuck-will's-widow	*Antrostomus carolinensis*
Chimney Swift	*Chaetura pelagica*
Loggerhead Shrike	*Lanius ludovicianus*
Bell's Vireo	*Vireo bellii*
Prairie Warbler	*Setophaga discolor*
Field Sparrow	*Spizella pusilla*
Grasshopper Sparrow	*Ammodramus savannarum*
Painted Bunting	*Passerina ciris*
Eastern Meadowlark	*Sturnella magna*
Mammals (7)	
Big Brown Bat	*Eptesicus fuscus*
Eastern Pipistrelle	*Perimyotis subflavus*
Baird's Pocket Gopher	*Geomys breviceps sagittatus*
Hispid Pocket Mouse	*Chaetodipus hispidus*
Golden Mouse	*Ochrotomys nuttalli*
Ringtail	*Bassariscus astutus*
Long-tailed Weasel	*Mustela frenata*

Plants (44)	
American Jointweed	*Polygonella americana*
Arkansas Oak	*Quercus arkansana*
Awl-shaped Scurfpea	*Pediomelum hypogaeum var. subulatum*
Cottony Goldenaster	*Chrysopsis gossypina ssp. hyssopifolia*
Culver's-root	*Veronicastrum virginicum*
Cupleaf Beardtongue	*Penstemon murrayanus*
Drummond's Nailwort	*Paronychia drummondii*
Earleaf Greenbrier	*Smilax auriculata*
Early Goldenrod	*Solidago juncea*
East Texas Greenthread	*Thelesperma flavodiscum*
Golden-wave Tickseed	*Coreopsis intermedia*
Gopher-apple	*Licania michauxii*
Heartleaf Skullcap	*Scutellaria cardiophylla*
Illinois Flat Sedge	*Cyperus grayoides*
Large Clammyweed	*Polanisia erosa*
Longleaved Wild-buckwheat	*Eriogonum longifolium*
Louisiana Squarehead	*Tetragonotheca ludoviciana*
Many-flowered Wild-buckwheat	*Eriogonum multiflorum*
October-flower	*Polygonella polygama*
Oklahoma Plum	*Prunus gracilis*
Pale Umbrella-wort	*Mirabilis albida*
Palm-leaf Scurfpea	*Pediomelum digitatum*
Perennial Sand Grass	*Triplasis americana*
Pineland Scaly-pink	*Stipulicida setacea*
Pinewoods Milkweed	*Asclepias humistrata*
Prairie Fameflower	*Phemeranthus rugospermus*
Prairie Milkvine	*Matelea cynanchoides*
Purple Poppy-mallow	*Callirhoe involucrata*
Sand Spikemoss	*Selaginella arenicola ssp. riddellii*
Sandhills Scorpionweed	*Phacelia strictiflora*
Scarlet Catchfly	*Silene subciliata*
Silky Prairie-clover	*Dalea villosa var. grisea*
Silver Croton	*Croton argyranthemus*
Slimspike Prairie-clover	*Dalea phleoides*
Smooth Twistflower	*Streptanthus hyacinthoides*
Soxman's Milkvetch	*Astragalus soxmaniorum*
Spreading Pygmyleaf	*Loeflingia squarrosa*
Summer Farewell	*Dalea pinnata*
Texas Palafoxia	*Palafoxia texana var. ambigua*
Texas Ragwort	*Senecio ampullaceus*

Turkey Oak	*Quercus laevis*
Viperina	*Zornia bracteata*
Wedgeleaf Whitlow-grass	*Draba cuneifolia*
Woolly Plantain	*Plantago patagonica*

Threats Affecting Habitat:

The main threats to this habitat are destruction by residential and commercial development and conversion to anthropogenic forests, as well as disturbance from several sources including mineral extraction and other human activities. Inadequate fire is also a threat to occurrences which are situated in a position on the landscape where fire was historically important in shaping the habitat.

Xeric Sandhill Woodland Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	Pervasive	Serious	High
Agriculture/Aquaculture	Large	Extreme	High
Energy Production & Mining	Pervasive	Serious	High
Transportation & Service Corridors	Large	Moderate	Medium
Biological Resource Use	N/A	N/A	N/A
Human Intrusion/Disturbance	Pervasive	Slight	Low
Natural System Modification	Pervasive	Moderate	Medium
Invasive & other Problematic Species	Pervasive	Slight	Low
Pollution	Restricted	Serious	Medium
Geological Events	N/A	N/A	N/A
Climate Change & Severe Weather	N/A	N/A	N/A
Overall Calculated Threat Impact: Very High			

Habitat Research Needs/Conservation Actions:

1. Continue surveys to determine the current extent and condition of this habitat type.
2. Identify opportunities for stewardship and protection of this habitat, including cooperative agreements with landowners and land acquisition.

3.SHRUBLANDS

a. Canebrake

Rarity Rank: SX/G2?
Synonyms: Giant Cane Shrubland
Ecological Systems: CES202.705 South-Central Interior Large Floodplain
CES202.706 South-Central Interior Small Stream and Riparian Forest
CES203.066 Southern Atlantic Coastal Plain Large River Floodplain Forest
CES203.190 Mississippi River Floodplain Forest
CES203.196 Mississippi River High Floodplain (Bottomland) Forest
CES203.304 Southern Atlantic Coastal Plain Non Riverine Swamp and Wet Hardwood Forest
CES203.488 West Gulf Coastal Plain Large River Floodplain Forest
CES203.489 East Gulf Coastal Plain Large River Floodplain Forest

General Description:

Canebrake in Tensas Parish near turn of the 20th century

Canebrakes are dense monotypic, thickets of Giant Cane (*Arundinaria gigantea*) that can reach heights of up to 40 feet. This habitat once occurred extensively on fertile alluvial soils across much of the southeastern United States in coastal plain and mountain ecoregions (NatureServe 2015). Early settlers and explorers recorded seeing miles and miles of impenetrable cane thickets (Noss 2013, Brantley and Platt 2001). American Bison, Louisiana Black Bear, Wild Turkey, White-tailed Deer, Cougar, and other wildlife used Canebrakes for shelter and/or food. Giant Cane was used extensively by Native Americans for building materials and as a food source. Native Americans also managed Canebrakes with fire and increased cane extent when their abandoned agricultural fields reverted to cane. This anthropogenic influence is believed to account for the largest and most extensive Canebrakes (Noss 2013, Brantley and Platt 2001). It is hypothesized that the Passenger Pigeon (now an extinct species) also contributed to the establishment and expansion of Canebrakes. Huge flocks of Passenger Pigeons disturbed forests by breaking tree limbs and creating canopy openings. These sunny

openings, plus large amounts of nutrient-rich excrement expelled by the birds, created the fertile conditions suitable for Giant Cane (Noss 2013). Canebrakes began to decline rapidly after European settlement and by the early 1900s they had nearly disappeared throughout the southeastern U.S. The extinction of the Passenger Pigeon, excessive grazing, altered burning regimes, agricultural land clearing, and flood control projects all contributed to the disappearance of the Canebrake ecosystem (Brantley and Platt 2001).

Canebrake: Characteristic Plant Species	
Giant Cane	*Arundinaria gigantea*

Current Extent and Status:

Canebrakes likely occurred statewide on rich alluvial soil in large and small floodplains and were probably most extensive in the Mississippi and Red River valleys. This habitat is now extirpated in Louisiana.

Canebrake SGCN (12)	
Non-crustacean Arthropods (2)	
Creole Pearly-eye	*Lethe creola*
Lace-winged Roadside Skipper	*Amblyscirtes aesculapius*
Reptiles (1)	
Timber Rattlesnake	*Crotalus horridus*
Birds (5)	
Worm-eating Warbler	*Helmitheros vermivorum*
Louisiana Waterthrush	*Parkesia motacilla*
Swainson's Warbler	*Limnothlypis swainsonii*
Kentucky Warbler	*Geothlypis formosa*
Hooded Warbler	*Setophaga citrina*
Mammals (4)	
Louisiana Black Bear	*Ursus americanus luteolus*
Long-tailed Weasel	*Mustela frenata*
Eastern Spotted Skunk	*Spilogale putorius*
Golden Mouse	*Ochrotomys nuttalli*

Habitat Research Needs/Conservation Actions:

1) Identify historical occurrences of Canebrakes using General Land Office land survey records and plat maps; concentrate search within the MRAP in areas that are currently captured by conservation areas.

2) Initiate research by conducting an experimental habitat restoration project on at least one site on an existing conservation area known to be a Canebrake based on historical evidence and where Giant Cane is still present.
3) Document response by Giant Cane and responses of wildlife species to overstory removal and prescribed fire.

b. Coastal Mangrove-Marsh Shrubland

Rarity Rank: S2/G2?

Synonyms: Intertidal Saltwater Swamp, Saltwater Swamp, Mangrove Swamp

Ecological Systems: CES203.471 Mississippi Delta Salt and Brackish Tidal Marsh

General Description:

Coastal Mangrove- Marsh Shrublands are estuarine communities dominated by Black Mangrove. Although sometimes termed a swamp, the physiognomy of the community in Louisiana more closely resembles a shrub thicket. The coastal region of Louisiana delimits the northern range of this community due to mangrove's inability to tolerate temperatures below freezing. The top-kill caused by winter freezes also limits mangroves to a shrub-like form (10 feet or less in height). Mangrove habitats are an integral part of the Louisiana Barrier Island system. The mangrove shrubland has several important ecological functions: the extensive root systems stabilize the shoreline and reduce erosion; the cover and food they provide create an excellent nursery area for fish and shellfish; the community improves surrounding water quality by filtering nutrients and suspended sediments; and many colonial waterbirds use the mangroves for nesting.

Coastal Mangrove-Marsh Shrubland, Lafourche Parish

Coastal Mangrove-Marsh Shrubland: Characteristic Plant Species	
Black Mangrove	*Avicennia germinans*
Salt-Wort	*Batis maritima*
Salt Grass	*Distichlis spicata*
Glassworts	*Salicornia* spp.
Smooth Cord Grass	*Spartina alterniflora*

Current Extent and Status:

Coastal Mangrove-Marsh Shrublands in Louisiana are found along the fringes of the Deltaic Plain coastal marshes most commonly flanking large bays and on the leeward side of barrier islands. Estimations of areal coverage by this habitat have varied widely. The limitations of past and present aerial photography technology and difficulties associated with ground-truthing can make estimating acreage problematic. Giri et al. (2011) estimated that mangrove shrubland covered ~5,386 acres in 1983. After a severe winter freeze in 1983-1984, acreage was reduced to ~539. Mild winters during the past decade have allowed expansion of this natural community in southeastern Louisiana. In 2010 mangrove coverage was estimated to be ~1,072 acres (Giri et. al. 2011).

Besides freezing weather, other factors affecting mangrove extent are erosion and land subsidence. The mangrove's importance in erosion control was clearly documented by the extreme erosion of Queen Bess Island following the 1983-84 dieback, and today mangrove is often used for marsh stabilization in coastal restoration projects. Large expanses of mangrove can be viewed near the southern terminus of LA Hwy 1 on the eastside of Timbalier Bay near Port Fourchon, with patchy occurrences continuing along the highway to Grand Isle. This community can also be found on Isles Dernieres Barrier Islands Refuge and Breton NWR.

Coastal Mangrove-Marsh Shrubland SGCN (13)	
Non-crustacean Arthropods (2)	
Western Pygmy Blue	*Brephidium exilis*
Louisiana Eyed Silkmoth	*Automeris louisiana*
Reptiles (2)	
Mississippi Diamond-backed Terrapin	*Malaclemys terrapin pileata*
Gulf Saltmarsh Snake	*Nerodia clarkii clarkii*
Birds (9)	
Brown Pelican	*Pelecanus occidentalis*
Little Blue Heron	*Egretta caerulea*
Reddish Egret	*Egretta rufescens*
Glossy Ibis	*Plegadis falcinellus*
Roseate Spoonbill	*Platalea ajaja*
Clapper Rail	*Rallus crepitans*
Marsh Wren	*Cistothorus palustris*
Nelson's Sparrow	*Ammodramus nelsoni*
Seaside Sparrow	*Ammodramus maritimus*

Threats Affecting Habitat:

This habitat is subjected to several sources of human disturbance, as well as subsidence and the effects of increased storm frequency and intensity potentially associated with climate change.

Coastal Mangrove-Marsh Shrubland Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	N/A	N/A	N/A
Agriculture/Aquaculture	N/A	N/A	N/A
Energy Production & Mining	Large	Slight	Low
Transportation & Service Corridors	Restricted	Slight	Low
Biological Resource Use	N/A	N/A	N/A
Human Intrusion/Disturbance	N/A	N/A	N/A
Natural System Modification	N/A	N/A	N/A
Invasive & other Problematic Species	N/A	N/A	N/A
Pollution	N/A	N/A	N/A
Geological Events	Pervasive	Slight	Low
Climate Change & Severe Weather	Large	Slight	Low
Overall Calculated Threat Impact: Low			

Habitat Research Needs/Conservation Actions:

1. Promote the continued planting of mangrove as a soil stabilizer in habitat restoration projects.
2. Support CPRA, CWPPRA, LCA, LDNR, USACE, and other partner efforts for shoreline stabilization and habitat restoration.
3. Work with CPRA and LCA to support coastal restoration projects, specifically targeting important nesting habitat for SGCN.

4. GRASSLANDS

a. Brackish Marsh

Rarity Rank: S3/G4?
Synonyms: Needle Rush Marsh, Edge-Zone Marsh, Middle Estuary
Ecological Systems: CES203.471 Mississippi Delta Salt and Brackish Tidal Marsh
CES203.468 Gulf Coast Chenier Plain Salt and Brackish Tidal Marsh

General Description:

Brackish Marsh is usually found between Salt Marsh and Intermediate Marsh, although it may occasionally lie adjacent to the Gulf of Mexico. This community is irregularly tidally flooded and is dominated by salt-tolerant graminoids. Small pools or ponds may be scattered throughout. Plant diversity and soil organic matter content are higher in Brackish Marsh than in Salt Marsh. Brackish Marsh is typically dominated by Marshhay Cord Grass. Two other major autotrophic groups in Brackish Marsh are epiphytic algae and benthic algae. Vertebrate species population levels are generally higher in Brackish Marsh compared to Salt Marsh. Brackish Marsh is of very high value to estuarine larval forms of marine organisms such as shrimp, crabs, Menhaden, etc. (See Salt Marsh for other functions). Brackish Marsh salinity averages about 8 ppt, however this community may transition to other marsh types by shifts in salinity. Intrusion of salt water from the Gulf of Mexico via numerous waterways, and resulting wetland loss, exert a major influence in the configuration of the various marsh types.

Brackish Marsh, Jefferson Parish

Brackish Marsh: Characteristic Plant Species	
Leafy Bulrush	*Bolboschoenus robustus*
Salt Grass	*Distichlis spicata*
Black Needle rush	*Juncus roemerianus*
Leafy Three Square	*Schoenoplectus americanus*
Marshhay Cord Grass	*Spartina patens*

Current Extent and Status:

Pre-settlement extent of Brackish Marsh was estimated to have been between 500,000 and 1,000,000 acres with 50-75% remaining today (Smith 1993). At present the total acreage of Brackish Marsh appears to be increasing due to shifts in marsh salinity levels (LNHP 2009). However, stable, viable examples of Brackish Marsh are rare in Louisiana.

Federal conservation areas that support Brackish Marsh include Bayou Sauvage, Delta, and Sabine NWRs. Marsh Island and State Wildlife Refuges, managed by LDWF, contain large areas of Brackish Marsh, as does Biloxi WMA. Other LDWF properties containing Brackish Marsh, include Pointe-aux-Chenes WMA and Rockefeller State Wildlife Refuge. Paul J. Rainey Sanctuary, owned by the National Audubon Society, consists largely of Brackish Marsh with a small area of Intermediate Marsh. The management of these sites is largely aimed at preserving and improving wintering waterfowl habitat. This involves the use of water control structures to regulate water levels and salinity input, water/sediment diversions to abate marsh deterioration, and prescribed burning to improve habitat and food quality for wildlife.

Brackish Marsh SGCN (53)	
Crustaceans (1)	
Estuarine Ghost Shrimp	*Lepidophthalmus louisianensis*
Non-crustacean Arthropods (5)	
Bay Skipper	*Euphyes bayensis*
Palatka Skipper	*Euphyes pilatka*
Western Pygmy Blue	*Brephidium exilis*
Eastern Pygmy Blue	*Brephidium pseudofea*
Louisiana Eyed Silkmoth	*Automeris louisiana*
Marine Fish (7)	

Diamond Killifish	*Adinia xenica*
Bayou Killifish	*Fundulus pulvereus*
Opossum Pipefish	*Microphis brachyurus*
Chain Pipefish	*Syngnathus louisianae*
Texas Pipefish	*Syngnathus texanus*
Emerald Sleeper	*Erotelis smaragdus*
Violet Goby	*Gobioides broussonnetii*
Reptiles (2)	
Mississippi Diamond-backed Terrapin	*Malaclemys terrapin pileata*
Gulf Saltmarsh Snake	*Nerodia clarkii clarkii*
Birds (36)	
Mottled Duck	*Anas fulvigula*
Northern Pintail	*Anas acuta*
Canvasback	*Aythya valisineria*
Redhead	*Aythya americana*
Lesser Scaup	*Aythya affinis*
Brown Pelican	*Pelecanus occidentalis*
American Bittern	*Botaurus lentiginosus*
Least Bittern	*Ixobrychus exilis*
Little Blue Heron	*Egretta caerulea*
Reddish Egret	*Egretta rufescens*
Glossy Ibis	*Plegadis falcinellus*
Roseate Spoonbill	*Platalea ajaja*
Osprey	*Pandion haliaetus*
White-tailed Kite	*Elanus leucurus*
Bald Eagle	*Haliaeetus leucocephalus*
Yellow Rail	*Coturnicops noveboracensis*
Black Rail	*Laterallus jamaicensis*
Clapper Rail	*Rallus crepitans*
King Rail	*Rallus elegans*
Whooping Crane	*Grus americana*
Marbled Godwit	*Limosa fedoa*
Dunlin	*Calidris alpina*
Short-billed Dowitcher	*Limnodromus griseus*
Coastal Least Tern	*Sternula antillarum*
Gull-billed Tern	*Gelochelidon nilotica*
Caspian Tern	*Hydroprogne caspia*
Common Tern	*Sterna hirundo*
Forster's Tern	*Sterna forsteri*
Royal Tern	*Thalasseus maximus*

Sandwich Tern	*Thalasseus sandvicensis*
Black Skimmer	*Rynchops niger*
Short-eared Owl	*Asio flammeus*
Loggerhead Shrike	*Lanius ludovicianus*
Le Conte's Sparrow	*Ammodramus leconteii*
Nelson's Sparrow	*Ammodramus nelsoni*
Seaside Sparrow	*Ammodramus maritimus*
Mammals (1)	
West Indian Manatee	*Trichechus manatus*
Plants (1)	
Arrow-grass	*Triglochin striata*

Threats Affecting Habitat:

The main threats to this habitat include subsidence and effects of increased frequency and intensity of tropical storms which may potentially occur with anticipated climate change.

Brackish Marsh Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	N/A	N/A	N/A
Agriculture/Aquaculture	N/A	N/A	N/A
Energy Production & Mining	Small	Medium	Low
Transportation & Service Corridors	Restricted	Moderate	Low
Biological Resource Use	N/A	N/A	N/A
Human Intrusion/Disturbance	Restricted	Slight	Low
Natural System Modification	N/A	N/A	N/A
Invasive & other Problematic Species	Large	Serious	High
Pollution	N/A	N/A	N/A
Geological Events	Pervasive	Slight	Low
Climate Change & Severe Weather	Restricted	Serious	Medium
Overall Calculated Threat Impact: Low			

Habitat Research Needs/Conservation Actions:

1. Develop methods to encourage landowners to utilize rotational grazing in Brackish Marshes and manage the land for wildlife conservation.
2. Work with CPRA, CWPPRA, USACE, LCA, and other organizations to support coastal restoration projects, specifically targeting important waterbird nesting areas and SGCN.
3. Work with USACE and state agencies to ensure water control structures and diversions provide the maximum benefit to Brackish Marsh.

4. Work with NRCS Plant Materials Center and BTNEP to develop viable cultivars for marsh restoration efforts.

b. Calcareous Prairie

Rarity Rank: S1/G1

Synonyms: Barrens, Calcareous Barren, Calcareous Clay Prairie, Keiffer Prairie, Jackson Prairie, Blackland Prairie, Calcareous Glade

Ecological Systems: CES203.379 West Gulf Coastal Plain Southern Calcareous Prairie

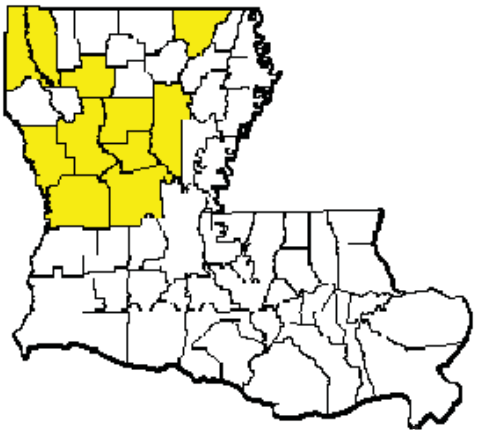
General Description:

Calcareous Prairies are typically small, naturally treeless areas occurring on calcareous substrata in the uplands of central, western, and northwest Louisiana. They range in size from less than one acre to 80 or more acres and occur in a mosaic with Calcareous Forests. Calcareous Prairies have been identified in association with four geological formations: Intermediate Terraces (Pleistocene) associated with old Red River deposits in northwest Louisiana (Morse Clay Prairies), the Fleming Formation (Tertiary-Miocene) in central-western Louisiana, the Jackson Group (Tertiary-Eocene) in central Louisiana, and the Cook Mountain Formation (Tertiary-Eocene) in central and western Louisiana. Soils are stiff calcareous clays (surface pH ~ 7.5-8.0), with high shrink-swell characteristics and range in color from red to olive-tan to gray-black. Various soil inclusions occur (depending on geology) and may include calcareous concretions (limestone nodules), marine mollusk shells, shark teeth, and gypsum crystals. The herbaceous flora is very diverse and dominated by grasses, composites, and legumes. Regularly-occurring fire, alkaline soil, extreme physical soil properties, and drought stress to woody plants are postulated to have acted in concert to generate and perpetuate these upland clay prairies.

Morse Clay Calcareous Prairie, Bienville Parish

Calcareous Prairie: Characteristic Plants	
Big Bluestem	*Andropogon gerardii*
Mead's Caric Sedge	*Carex meadii*
Little Tooth Caric Sedge	*Carex microdonta*
White Prairie Clover	*Dalea candida*
Purple Prairie Clover	*Dalea purpurea*
Rattlesnake Master	*Eryngium yuccifolium*
Tall Blazing Star	*Liatris aspera*
Scaly Blazing Star	*Liatris squarrosa*
Little Bluestem	*Schizachyrium scoparium*
Compass Plant	*Silphium laciniatum*
Western Rough Goldenrod	*Solidago radula*
Stiff Goldenrod	*Solidago rigida*
Indian Grass	*Sorghastrum nutans*

Current Extent and Status:



Historically, there was an estimated 2,000 to 10,000 acres of Calcareous Prairie statewide, but only 5 to 10% of the original extent is thought to remain today (Smith 1993). Currently, protected Calcareous Prairies occur on each formation.

There are 12 known Morse Clay Prairies in Bienville, Bossier, and Caddo Parishes. Two of these prairies are captured by Bodcau WMA (owned by USACE and leased by LDWF), and Barksale AFB. Most of the prairie acreage on Bodacu WMA was at one time plowed and planted in food plots. Currently, management involves fire and brush control, and the prairies are expected to improve in quality in the future. On Barksdale AFB, most of the prairies are of high quality (McInnis 1997). The Barksdale prairies are important intrinsically, but they also present a standard by which the quality of other prairies may be evaluated. The Morse Clay Prairie in Bienville Parish is on private land and is being improved through stewardship by the landowner. Fleming Calcareous Prairies are scattered in Vernon, Rapides, and Natchitoches Parishes. Several occurrences are on Ft. Polk and KNF. Calcareous Prairies found on the Jackson Formation are concentrated near Copenhagen in Caldwell Parish. Many of these are captured by TNC's Copenhagen Hills Preserve. There is a high concentration of Cook Mountain Calcareous Prairies on the Winn Ranger District of KNF (Keiffer Prairies). The USFS has been working to remove invading woody vegetation and expand these prairies to their former extent.

Most Calcareous Prairies are on private land and are likely degraded. Given the small scale, inclusional nature of this habitat, they are frequently site prepared and planted in Loblolly Pine plantations despite their poor capacity to grow timber. Survey work is needed to determine the condition of Calcareous Prairies on private land. Several Calcareous Prairies on industrial forest land are being well-managed and are of high quality, and other opportunities to work with the forest industry to improve examples of this habitat are expected in the future.

Calcareous Prairie SGCN (55)	
Non-crustacean Arthropods (5)	
American Bumble Bee	*Bombus pensylvanicus*
Frosted Elfin	*Callophrys irus*
Wild Indigo Duskywing	*Erynnis baptisiae*
Dusted Skipper	*Atrytonopsis hianna*
Monarch	*Danaus plexippus*
Amphibians (2)	
Strecker's Chorus Frog	*Pseudacris streckeri*
Southern Crawfish Frog	*Lithobates areolatus areolatus*
Reptiles (2)	
Western Slender Glass Lizard	*Ophisaurus attenuatus attenuatus*
Eastern Hog-nosed Snake	*Heterodon platirhinos*
Birds (12)	
Northern Bobwhite	*Colinus virginianus*
American Woodcock	*Scolopax minor*
Common Ground-Dove	*Columbina passerina*
Greater Roadrunner	*Geococcyx californianus*
Loggerhead Shrike	*Lanius ludovicianus*
Smith's Longspur	*Calcarius pictus*
Bachman's Sparrow	*Peucaea aestivalis*
Field Sparrow	*Spizella pusilla*
Grasshopper Sparrow	*Ammodramus savannarum*
Henslow's Sparrow	*Ammodramus henslowii*
Le Conte's Sparrow	*Ammodramus leconteii*
Eastern Meadowlark	*Sturnella magna*
Mammals (2)	
Eastern Harvest Mouse	*Reithrodontomys humulis*
Long-tailed Weasel	*Mustela frenata*

Plants (32)	
Atlantic Camas	*Camassia scilloides*
Barbara's Buttons	*Marshallia caespitosa var. signata*
Coast Indigo	*Indigofera miniata*
Compact Prairie-clover	*Dalea compacta var. pubescens*
Evening Rainlily	*Cooperia drummondii*
Fringed Poppy-mallow	*Callirhoe digitata*
Great Plains Ladies'-tresses	*Spiranthes magnicamporum*
Grooved Yellow Flax	*Linum sulcatum*
Ground-plum	*Astragalus crassicarpus var. trichocalyx*
June Grass	*Koeleria macrantha*
Meadowparsnip	*Thaspium chapmanii*
Mead's Sedge	*Carex meadii*
Missouri Coneflower	*Rudbeckia missouriensis*
Narrow-leaved Milkweed	*Asclepias stenophylla*
Narrowleaved Puccoon	*Lithospermum incisum*
Nuttall's Deathcamas	*Zigadenus nuttallii*
Pale Umbrella-wort	*Mirabilis albida*
Prairie Pleatleaf	*Nemastylis geminiflora*
Prairie Redroot	*Ceanothus herbaceus*
Purple Bluet	*Houstonia purpurea var. calycosa*
Purple Coneflower	*Echinacea purpurea*
Sideoats Grama	*Bouteloua curtipendula*
Slender Heliotrope	*Heliotropium tenellum*
Small-toothed Caric Sedge	*Carex microdonta*
Southern Thimbleweed	*Anemone berlandieri*
Spreading Bladderpod	*Lesquerella gracilis*
Stiff Tickseed	*Coreopsis palmata*
Texas Grama	*Bouteloua rigidiseta*
Texas Yellowstar	*Lindheimera texana*
Tumble Grass	*Schedonnardus paniculatus*
Wedgeleaf Whitlow-grass	*Draba cuneifolia*
Wiry Witch Grass	*Panicum flexile*

Threats Affecting Habitat:

This naturally open habitat is threatened by mineral extraction and associated infrastructure. Afforestation attempts, disturbance by other human activities, inadequate fire, and invasive species all pose additional threats.

Calcareous Prairie Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	Small	Extreme	Low
Agriculture/Aquaculture	Restricted	Serious	Medium
Energy Production & Mining	Large	Extreme	High
Transportation & Service Corridors	Restricted	Moderate	Low
Biological Resource Use	N/A	N/A	N/A
Human Intrusion/Disturbance	Small	Moderate	Low
Natural System Modification	Restricted	Moderate	Low
Invasive & other Problematic Species	Pervasive	Moderate	Medium
Pollution	N/A	N/A	N/A
Geological Events	N/A	N/A	N/A
Climate Change & Severe Weather	N/A	N/A	N/A
Overall Calculated Threat Impact: Medium			

Habitat Research Needs/Conservation Actions:

1. Continue status surveys to determine the extent and condition of this habitat type.
2. Work with land managers/hunting clubs/extension agents, etc. to discourage the placement of food plots within this habitat type.
3. Promote and fund stewardship of this habitat on forest industry lands and on nonindustrial private lands, to include mechanical and chemical brush control and prescribed fire.
4. Work closely with KNF on stewardship (including supplemental prescribed burning) of the Keiffer Prairie Complex, which is enrolled in LDWF's Natural Areas Registry.

c. Coastal Dune Grassland / Coastal Dune Shrub Thicket

Rarity Rank: S1/G2G3

Synonyms: Maritime Grassland, Dune Meadow, Dune Grass

Ecological Systems: CES203.469 Louisiana Beach
CES203.471 Southeastern Coastal Plain Interdunal Wetland
CES203.544 Upper Texas Coast Beach

Ge***neral Description***:

This habitat encompasses Coastal Dune Grasslands and Coastal Dune Shrub Thickets, which are described as distinct communities in Natural Communities of Louisiana (LNHP 2009). They are combined here due to close spatial proximity and successional relationship. Coastal Dune Grassland occurs on beach dunes and relatively elevated backshore areas (ridges) above intertidal beaches. The dunes of Louisiana's Barrier Islands and mainland beaches are poorly developed because of the high frequency of overwash associated with hurricanes and storms and because of a limited amount of eolian sand. The sites are normally xeric, since they are elevated above the highest flood mark (except during hurricanes) and substrates are sandy and excessively well-drained. These sites are exposed to moderate to high amounts of salt spray. In addition, limited nutrient availability and substrate instability also affect coastal dune vegetation. The vegetative cover ranges from sparse to fairly dense and is dominated by salt spray tolerant plants. Dune swales may be extensive and are considered as inclusions in this natural community. Dunes and ridges may be shifted or eroded by storm floods, destroying vegetation. Hypothetically, if dunes remain stable, allowing natural succession to progress, then Coastal Dune Shrub Thickets are formed. These occur on established sand dunes and beach ridges on Barrier Islands and the mainland coast. Coastal Dune Shrub Thickets are of very limited extent in Louisiana due to relatively poor development of coastal dunes. The sites are typically xeric and moderately exposed to salt spray. This community normally appears as a relatively dense stand of shrubs, often covered with a dense growth of lichens and various vine species. This community may be destroyed by sand dune migration or erosion and may be replaced by coastal dune grassland.

Coastal Dune Shrub Thicket, Jefferson Parish

Coastal Dune Grassland, Cameron Parish

Coastal Dune Grassland: Characteristic Plant Species	
Gulf Croton	*Croton punctatus*
Beach Primrose	*Oenothera drummondii*
Bitter Panicum	*Panicum amarum*
Gulf Dune Paspalum	*Paspalum monostachyum*
Marshhay Cord Grass	*Spartina patens*
Virginia Dropseed	*Sporobolus virginicus*
Amberique Bean	*Strophostyles helvula*

Coastal Dune Shrub Thicket: Characteristic Plant Species	
Coastal Scrub Wattle	*Acacia farnesiana*
Marine Vine	*Cissus incisa*
Spotted Bee Balm	*Monarda punctata*
Waxmyrtle	*Myrica cerifera*
Rattlebox	*Sesbania drummondii*
Toothache Tree	*Zanthozylum clava-herculis*

Current Extent and Status:

Coastal Dune Grasslands and Shrub Thickets are each estimated to have occupied less than 2,000 acres in pre-settlement times, with 50-75% thought to remain today (Smith 1993). The only example of well-developed Coastal Dune Grassland in Louisiana occurs in Cameron Parish on the Chenier Plain from Johnson Bayou westward nearly to Sabine Pass. The entire extent of this habitat occurs on private property.

Grand Isle supports extensive Coastal Dune Shrub Thickets, specifically on the east and west ends of the island. A considerable portion of this habitat is captured by Grand Isle State Park.

Coastal Dune Grassland/Coastal Dune Shrub Thicket SGCN (24)	
Non-crustacean Arthropods (2)	
Monarch	*Danaus plexippus*
Louisiana Eyed Silkmoth	*Automeris louisiana*
Reptiles (3)	

Western Slender Glass Lizard	*Ophisaurus attenuatus attenuatus*
Eastern Glass Lizard	*Ophisaurus ventralis*
Mississippi Diamond-backed Terrapin	*Malaclemys terrapin pileata*
Birds (13)	
Brown Pelican	*Pelecanus occidentalis*
White-tailed Kite	*Elanus leucurus*
Wilson's Plover	*Charadrius wilsonia*
Long-billed Curlew	*Numenius americanus*
Common Ground-Dove	*Columbina passerina*
Short-eared Owl	*Asio flammeus*
Crested Caracara	*Caracara cheriway*
Peregrine Falcon	*Falco peregrinus*
Loggerhead Shrike	*Lanius ludovicianus*
Sedge Wren	*Cistothorus platensis*
Marsh Wren	*Cistothorus palustris*
Grasshopper Sparrow	*Ammodramus savannarum*
Nelson's Sparrow	*Ammodramus nelsoni*
Plants (6)	
Gulf Bluestem	*Schizachyrium maritimum*
Mexican Hat	*Ratibida peduncularis*
Nuttall's Milkvetch	*Astragalus nuttallianus*
Roundleaf Scurfpea	*Pediomelum rhombifolium*
Sea Oats	*Uniola paniculata*
Wedgeleaf Prairie-clover	*Dalea emarginata*

Threats Affecting Habitat:

Both Coastal Dune Grasslands and Shrub Thickets are threatened by several sources of habitat distrubance, and may face increased tropical storm frequency and intensity potentially associated with climate change. Inadequate sand supply is a possible long term problem especially for Coastal Dune Grassland. Sand supply is limited by the relatively sediment-impoverished Mississippi River and impediments to longshore deposition of sediments.

Coastal Dune Grassland Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	N/A	N/A	N/A
Agriculture/Aquaculture	Restricted	Serious	Medium
Energy Production & Mining	Restricted	Slight	Low
Transportation & Service Corridors	Restricted	Slight	Low
Biological Resource Use	N/A	N/A	N/A
Human Intrusion/Disturbance	Large	Moderate	Medium
Natural System Modification	Pervasive	Moderate	Medium
Invasive & other Problematic Species	Pervasive	Slight	Low
Pollution	N/A	N/A	N/A
Geological Events	N/A	N/A	N/A
Climate Change & Severe Weather	Restricted	Moderate	Low
Overall Calculated Threat Impact: Medium			

Coastal Dune Shrub Thicket Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	N/A	N/A	N/A
Agriculture/Aquaculture	N/A	N/A	N/A
Energy Production & Mining	Restricted	Slight	Low
Transportation & Service Corridors	Restricted	Slight	Low
Biological Resource Use	N/A	N/A	N/A
Human Intrusion/Disturbance	Large	Slight	Low
Natural System Modification	Pervasive	Slight	Low
Invasive & other Problematic Species	Pervasive	Slight	Low
Pollution	N/A	N/A	N/A
Geological Events	N/A	N/A	N/A
Climate Change & Severe Weather	Restricted	Slight	Low
Overall Calculated Threat Impact: Low			

Habitat Research Needs/Conservation Actions:

1. Support CPRA, CWPPRA, LCA, LDNR, USACE, and other partner efforts for shoreline stabilization and habitat restoration.Work with local governments to recommend limits on off-road vehicle (ORV) use in this habitat.
2. Work with NRCS Plant Materials Center and BTNEP to develop viable cultivars for coastal dune restoration efforts.

3. Review and research the effects of cattle grazing on sand dunes and encourage grazing practices that preserve the integrity of these habitats.
4. Work with partners to acquire and restore existing and historical occurences of this community, as well as identify and acquire areas where such habitats could be created as SLR impacts existing areas.
5. Control the invasive exotic Salt Cedars (*Tamarix* spp.), which pose a serious threat to this habitat.

d. Coastal Prairie

Rarity Rank: S1/G2Q

Synonyms: Great Southwest Prairie, Eastern Coastal Prairie, Gulf Cordgrass Prairie, Cajun Prairie

Ecological Systems: CES203.550 Texas-Louisiana Coastal Prairie
CES203.541 Texas-Louisiana Coastal Prairie Pondshore
CES203.543 Texas-Louisiana Saline Coastal Prairie
CES203.542 West Gulf Coastal Plain Texas-Louisiana Coastal Prairie Slough

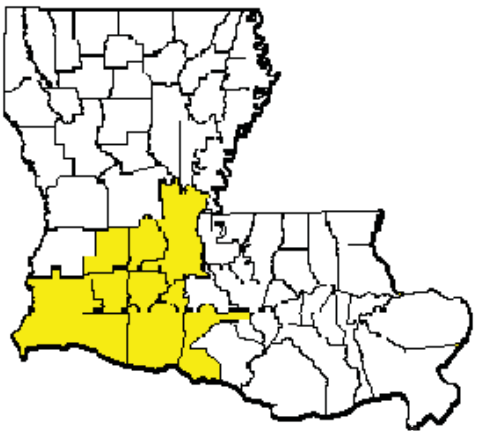
General Description:

Coastal Prairie is an extension of the tall-grass prairie of the eastern Great Plains, and is characterized by a diverse flora consisting of tall grasses and forbs. A combination of historical dry climate intervals, clay-pan soils (which accentuate the effects of drought), and frequent fire are thought to account for the presence of tall-grass prairie in humid Louisiana. Studies of remnant prairies suggest there are three prairie types, based on moisture: wet (marsh-fringing) prairie, wet-mesic prairie, and dry-mesic prairie. Small circular soil mounds known as pimple mounds (possibly formed by deposition of wind-blown soil during historical harsh droughts; Siefert et al. 2009) and embedded marshes and ponds (potholes), add to the habitat diversity of the Coastal Prairie landscape.

Coastal Prairie, Calcasieu Parish

Coastal Prairie: Characteristic Plants	
Indian-plantain	*Arnoglossum ovatum*
False Indigos	*Baptisia alba, B. bracteata, B. sphaerocarpa*
Little Tooth Caric Sedge	*Carex microdonta*
Rattlesnake Master	*Eryngium yuccifolium*
Ashy Sunflower	*Helianthus mollis*
Kansas Gayfeather	*Liatris pycnostachya*
Gulf Coast Muhly	*Muhlenbergia capillaris*
Switch Grass	*Panicum virgatum*
Brownseed Paspalum	*Paspalum plicatulum*
Narrowleaf Mountain Mint	*Pycnanthemum tenuifolium*
Texas Coneflower	*Rudbeckia texana*
Little Bluestem	*Schizachyrium scoparium*
Slender Bluestem	*Schizachyrium tenerum*
Compass Plant	*Silphium laciniatum*
Fragrant Goldenrod	*Solidago odora*
Indian Grass	*Sorghastrum nutans*
Marshhay Cord Grass	*Spartina patens* (wet prairie)
Eastern Gamma Grass	*Tripsacum dactyloides* (wet prairie)

Current Extent and Status:



Coastal Prairie historically occupied about 2.5 million acres in southwest Louisiana. Far less than 1% of the original Coastal Prairie remains today (Smith 1993). The marsh fringing prairie type is represented by several remnants and totals about 500 acres. Sabine NWR and White Lake Wetlands Conservation Area support this wet prairie type. Six confirmed remnants totaling about 2,500 acres represent the wet-mesic prairie type. All of these remnants are on private lands in Calcasieu and Cameron Parishes. LDWF is currently working with owners of most of these sites to implement stewardship. The dry-mesic prairie type, which historically accounted for most of the prairie acreage, is now known only along railroads. All the railroad remnants are in various states of degradation due to woody encroachment and soil disturbance. Combining all types, Louisiana has approximately 3,500 acres of remnant Coastal Prairie, not including possible prairies in the Lake Charles area that have not yet been explored.

Coastal Prairie SGCN (58)	
Crustaceans (1)	
Old Prairie Digger	*Fallicambarus macneesei*
Non-crustacean Arthropods (3)	
American Bumble Bee	*Bombus pensylvanicus*
Celia's Roadside-Skipper	*Amblyscirtes celia*
Monarch	*Danaus plexippus*
Amphibians (1)	
Southern Crawfish Frog	*Lithobates areolatus areolatus*
Reptiles (4)	
Western Chicken Turtle	*Deirochelys reticularia miaria*
Ornate Box Turtle	*Terrapene ornata*
Western Slender Glass Lizard	*Ophisaurus attenuatus attenuatus*
Eastern Hog-nosed Snake	*Heterodon platirhinos*
Birds (27)	
Mottled Duck	*Anas fulvigula*
Northern Pintail	*Anas acuta*
Northern Bobwhite	*Colinus virginianus*
American Bittern	*Botaurus lentiginosus*
Little Blue Heron	*Egretta caerulea*
White-tailed Kite	*Elanus leucurus*
Yellow Rail	*Coturnicops noveboracensis*
Black Rail	*Laterallus jamaicensis*
Sandhill Crane	*Antigone canadensis*
Whooping Crane	*Grus americana*
Upland Sandpiper	*Bartramia longicauda*
Long-billed Curlew	*Numenius americanus*
Buff-breasted Sandpiper	*Calidris subruficollis*
American Woodcock	*Scolopax minor*
Common Ground-Dove	*Columbina passerina*
Short-eared Owl	*Asio flammeus*
Crested Caracara	*Caracara cheriway*
Loggerhead Shrike	*Lanius ludovicianus*
Sedge Wren	*Cistothorus platensis*
Marsh Wren	*Cistothorus palustris*
Sprague's Pipit	*Anthus spragueii*
Field Sparrow	*Spizella pusilla*

Grasshopper Sparrow	*Ammodramus savannarum*
Le Conte's Sparrow	*Ammodramus leconteii*
Nelson's Sparrow	*Ammodramus nelsoni*
Dickcissel	*Spiza americana*
Eastern Meadowlark	*Sturnella magna*
Mammals (4)	
Baird's Pocket Gopher	*Geomys breviceps sagittatus*
Eastern Harvest Mouse	*Reithrodontomys humulis*
Prairie Vole	*Microtus ochrogaster ludovicianus*
Eastern Spotted Skunk	*Spilogale putorius*
Plants (19)	
Berg's Panic Grass	*Panicum bergii*
Coastal Plain Lobelia	*Lobelia flaccidifolia*
Cryptic Flat Sedge	*Cyperus cephalanthus*
Evening Rainlily	*Cooperia drummondii*
Limewater Brookweed	*Samolus ebracteatus*
Lindheimer's Beebalm	*Monarda lindheimeri*
Low Nut Sedge	*Scleria verticillata*
Mead's Sedge	*Carex meadii*
Oklahoma Grass-pink	*Calopogon oklahomensis*
Prairie Evening Primrose	*Oenothera pilosella ssp. sessilis*
Scarlet Indian-paintbrush	*Castilleja coccinea*
Small-fruit Seedbox	*Ludwigia microcarpa*
Small Palafoxia	*Palafoxia callosa*
Small's Beak Sedge	*Rhynchospora globularis var. pinetorum*
Small-toothed Caric Sedge	*Carex microdonta*
Texas Grama	*Bouteloua rigidiseta*
Wand Blackroot	*Pterocaulon virgatum*
Western Horse-nettle	*Solanum dimidiatum*
Wild Coco Orchid	*Pteroglossaspis ecristata*

Threats Affecting Habitat:

Remaining occurrences of this very rare habitat are threatened by inadequate fire, incompatible grazing management, and disturbance from human activities. Lack of fire is particularly acute in railroad prairie remnants, which are being severely encroached upon by brush. Invasive species such as Chinese Tallow Tree and Feral Hogs threaten prairie remnants. Feral Hogs are particularly destructive in wetter prairies.

Coastal Prairie Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	Small	Extreme	Low
Agriculture/Aquaculture	Pervasive	Serious	High
Energy Production & Mining	Restricted	Moderate	Low
Transportation & Service Corridors	Small	Moderate	Low
Biological Resource Use	N/A	N/A	N/A
Human Intrusion/Disturbance	Large	Moderate	Medium
Natural System Modification	Pervasive	Moderate	Medium
Invasive & other Problematic Species	Pervasive	Moderate	Medium
Pollution	Small	Serious	Low
Geological Events	N/A	N/A	N/A
Climate Change & Severe Weather	Small	Extreme	Low
Overall Calculated Threat Impact: Medium			

Habitat Research Needs/Conservation Actions:

1. Partner with NGOs, state and federal agencies, private landowners, etc. to promote protection, restoration, and expansion of Coastal Prairie habitat.
2. Partner with the Gulf Coast Prairie Landscape Conservation Cooperative (GCPLCC) and other stakeholders to develop a conservation strategy map to facilitate functional Coastal Prairie restoration and conservation.
3. Promote fire as an essential management tool by providing funding for prescribed burning on prairie remnants and prairie-like grasslands within the historical range of Coastal Prairie.
4. Support initiatives to develop plant materials to facilitate re-establishment of Coastal Prairies, and help develop partnerships to secure long-term funding for plant materials centers.
5. Support research to determine prairie-compatible grazing schemes on Coastal Prairie rangeland and incorporate the outcomes of that research into BMPs.
6. Continue stewardship actions on Coastal Prairie on White Lake Wetlands Conservation Area.
7. Continue to fund and carry out stewardship actions such as brush control and prescribed fire on private rangelands located within the historical Coastal Prairie region.
8. Support and encourage aggressive Feral Hog control measures on Sabine NWR, which supports marsh-fringing Coastal Prairie.
9. Work with USFWS at Cameron Prairie NWR to move forward with re-establishment of Coastal Prairie and to initiate an aggessive prescribed burning program.
10. Partner with railroad companies to protect and properly manage railroad prairie remnants.
11. Locate opportunities to purchase agricultural lands on the historical prairie landscape from willing sellers for grassland conservation.

12. Work with NRCS to accomplish stewardship actions such as brush control and prescribed fire on sites enrolled in grassland CRP within the historical Coastal Prairie range.
13. Pursue long-term protection of Coastal Prairie remnants through cooperative agreements with landowners (e.g. leases, servitudes) or through land acquisition.
14. Identify minimum patch size and connectivity needed to achieve a fully functional Coastal Prairie landscape.
15. Use LiDAR or other high quality, high precision elevation data to evaluate habitat suitability for SGCN that are sensitive to vertical stratification, and use this information to inform conservation and restoration activities.

e. Eastern Hillside Seepage Bog

Rarity Rank: S1/G2

Synonyms: Pitcher Plant Bog, Herbaceous Bog, Bog, Hillside Seep, Hillside Bog

Ecological Systems: CES203.078 Southern Coastal Plain Herbaceous Seepage Bog

General Description:

Hillside Seepage Bogs are open, mostly treeless, herb-dominated natural wetlands of hilly uplands historically dominated by Longleaf Pine in the EGCP and WGCP of Louisiana. In the EGCP, these bogs occur on the Pleistocene high terraces in Washington and St. Tammany Parishes, arising commonly on mid- to low slopes on saturated, strongly acidic (pH ca. 4.5 - 5.5) and nutrient-poor substrates of fine sandy loams or loamy fine sands with relatively high organic matter content (Smith 1996, Plummer 1963).

These bogs are generally persistently wet from seepage and are variable in size, typically less than one acre and rarely exceeding 10 acres. EGCP bogs are underlain by an impervious clay layer that, when conditions are right, causes groundwater to constantly seep to the soil surface. The herbaceous groundcover is dense, continuous and floristically rich. It is dominated by sedges, grasses, and many kinds of unique forbs, including Pitcher Plants (*Sarracenia* spp.) and a variety of orchid species. Since Hillside Seepage Bogs are embedded in Longleaf Pine woodlands, they are fire-driven systems that evolved with frequent growing-season fires. Frequent fire prevents invasion by shrubs and trees and stimulates growth, flowering, and seed production by bog herbs (Barker 1980). Bogs are extremely sensitive to surrounding land management activities and are easily degraded or destroyed by activities that alter natural hydrologic regimes.

Eastern Hillside Seepage Bog, Abita Creek Flatwoods Preserve, St. Tammany

Eastern Hillside Seepage Bog: Characteristic Plants	
Mohr's Bluestem	*Andropogon mohrii*
Pineland Rayless Goldenrod	*Bigelowia nudata*
Toothache Grass	*Ctenium aromaticum*
Pineland Bog Button	*Lachnocaulon digynum*
Beak Sedges	*Rhynchospora* spp.
Yellow Trumpet Pitcher Plant	*Sarracenia alata*
Parrot Pitcher Plant	*Sarracenia psittacina*
Coastal Plain False Asphodel	*Tofieldia racemosa*
Coastal Plain Yellow-eyed-grass	*Xyris ambigua*
Kral's Yellow-eyed-grass	*Xyris stricta* var. *obscura*

Current Extent and Status:

Eastern Hillside Seepage Bogs are naturally small in size. Pre-settlement extent of seepage bogs in the EGCP of Louisiana is estimated at less than 2,000 acres, with only 10-25% currently remaining in St. Tammany and Washington Parishes (Smith 1993). The actual remaing acreage is probably less than 10%. These present day bogs are most often found surrounded by commercial timberlands and are degraded. Bog plant species can also be seen persisting along powerline and pipeline right-of-ways where management practices such as mowing keep woody vegetation under control (Sheridan et al. 1997). There is currently only minimal protection for remaining bogs. TNC's Abita Creek Flatwoods Preserve in St. Tammany Parish contains a seepage bog of approximately 8 acres. No bogs are known from federal or state public lands in the EGCP. One property capturing a portion of a bog is enrolled in LDWF's Natural Areas Registry.

Eastern Hillside Seepage Bog SGCN (30)	
Crustaceans (2)	
Flatwoods Digger	*Fallicambarus oryktes*
Flatnose Crawfish	*Procambarus planirostris*
Non-crustacean Arthropods (2)	
Arogos Skipper	*Atrytone arogos*
Brou's Mallow Moth	*Bagisara brouana*

Amphibians (2)	
Gulf Coast Mud Salamander	*Pseudotriton montanus flavissimus*
Southern Red Salamander	*Pseudotriton ruber vioscai*
Birds (5)	
Sedge Wren	*Cistothorus platensis*
Field Sparrow	*Spizella pusilla*
Grasshopper Sparrow	*Ammodramus savannarum*
Henslow's Sparrow	*Ammodramus henslowii*
Le Conte's Sparrow	*Ammodramus leconteii*
Mammals (3)	
Southeastern Shrew	*Sorex longirostris*
Long-tailed Weasel	*Mustela frenata*
Eastern Spotted Skunk	*Spilogale putorius*
Plants (16)	
Bog Flame Flower	*Macranthera flammea*
Chapman's Beak Sedge	*Rhynchospora chapmanii*
Coastal False Asphodel	*Triantha racemosa*
Coastal Plain Beak Sedge	*Rhynchospora stenophylla*
Harper's Yellow-eyed-grass	*Xyris scabrifolia*
Large White Fringed Orchid	*Platanthera blephariglottis var. conspicua*
Pale Grass-pink	*Calopogon pallidus*
Parrot Pitcher Plant	*Sarracenia psittacina*
Pineland Bogbutton	*Lachnocaulon digynum*
Purple Pitcher Plant	*Sarracenia purpurea*
Southern Red Lily	*Lilium catesbaei*
Spoonleaf Sundew	*Drosera intermedia*
Spring Hill Flax	*Linum macrocarpum*
Staghorn Clubmoss	*Lycopodiella cernua var. cernua*
Tracy's Sundew	*Drosera tracyi*
Yellow Butterwort	*Pinguicula lutea*

Threats Affecting Habitat:

Eastern Hillside Seepage Bogs are very rare in Louisiana. Most existing occurrences are degraded by woody encroachment due to inadequate fire. Residential development is also a serious threat as such development is occurring in close proximity to several bogs.

Eastern Hillside Seepage Bog Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	Restricted	Serious	High
Agriculture/Aquaculture	Large	Serious	High
Energy Production & Mining	Small	Slight	Low
Transportation & Service Corridors	Restricted	Moderate	Low
Biological Resource Use	Restricted	Slight	Low
Human Intrusion/Disturbance	Small	Slight	Low
Natural System Modification	Large	Serious	High
Invasive & other Problematic Species	Large	Serious	High
Pollution	Large	Slight	Low
Geological Events	N/A	N/A	N/A
Climate Change & Severe Weather	Pervasive	Slight	Low
Overall Calculated Threat Impact: Very High			

Habitat Research Needs/Conservation Actions:

1. Prioritize surveys for this habitat type to determine extent and condition type with a focus on identifying the surrounding landscape context (e.g., residential developments, etc.).
2. Continue to encourage landowners to implement BMPs and adopt Sustainable Forestry Initiative (SFI) standards in the management of this habitat type.
3. Provide cost share funds for landowners to reduce or eliminate costs associated with conducting prescribed burns on their property.
4. Work with forest industry to complete chemical brush control and/or hand clearing of brush in degraded, fire-suppressed bogs, and to apply prescribed fire.

f. Freshwater Floating Marsh

Rarity Rank: S2S3/G2G3

Synonyms: Flotant, Peat Marsh, Prairie Tremblant

Ecological Systems: CES203.470 Mississippi Delta Fresh and Oligohaline Tidal Marsh

General Description:

Freshwater Floating Marsh is an emergent marsh that, along with peat (decomposing organic matter), composes a free-floating mat that rises and falls with water levels. The flotant described herein has a 2-3 ft. thick mat that typically supports the weight of a person. The grass Maidencane (*Panicum hemitomon*) is the dominant plant in this community and is apparently the best species for forming buoyant floating mats due to its prolific root production. Evidence suggests that this Freshwater Floating Marsh developed from detachment of a rooted marsh following formation of a peat zone (Swarzenski et al. 1991; Sasser et al. 1995; Sasser et al. 1996). Buoyancy of the floating mat is affected by the capacity of the vegetation to float (internal air spaces, vegetative characteristics), capacity of the substrate to retain metabolic gases, and low bulk density of the substrate (Swarzenski et al. 1991; Sasser et al. 1995; Sasser et al. 1996). The Maidencane dominated Freshwater Floating Marshes are buoyant year-round, whereas thick-mat Freshwater Floating Marshes dominated by Bulltongue (*Sagittaria lancifolia*) are only seasonally buoyant (Swarzenski et al. 1991). Freshwater Floating Marshes of the type described here are typically rainfall, rather than floodwater-driven (Swarzenski et al. 2005), and the pH is usually acidic (C. Swarzenski, personal communication). Peat moss (*Sphagnum* spp.) is often conspicuous. This habitat supports a number of plants that otherwise occur in acidic seepage wetlands in interior Louisiana, including several showy orchids. As with interior prairies and pine grasslands, Freshwater Floating Marshes are readily colonized by the shrub Waxmyrtle (*Myrica cerifera*). Fire is required to prevent conversion of emergent herbaceous marsh to shrub thicket.

The Maidencane Freshwater Floating Marshes are restricted to fresh water environments. State transitions can occur with environmental changes, such as increases in salinity, sediment input, and nutrient input. With increasing salinity, the plant community may transition to a Bulltongue-dominated community (Sasser et al. 1996, Swarzenski et al. 1991). Key to the sustainability of the Freshwater Floating Marshes is a thick healthy mat. Nutrients and sulfate introduced by seawater can weaken the floating mat by accelerating decomposition of the peat. More than half of the Freshwater Floating Marshes in the Terrebonne Basin have converted to thin unstable mats and open water over the past 50 years (Visser et al. 1996). Concurrently the source of freshwater in the Terrebonne Basin has shifted from rain water to river water (Swarzenski et al. 2008). Eutrophication by introduction of Mississippi River water via diversions may destabilize intact floating marshes (Swarzenski et al., 2008). Salinity pulses, if increasing in persistence and duration, could also destabilize thick mat Freshwater Floating Marsh if the mat is affected.

Colonization of stands of free-floating plants by emergent marsh vegetation can happen. For example, the free-floating invasives Water Hyacinth (*Eichhornia crassipies*) and Common and Giant Salvinia (*Salvinia minima* and S. *molesta*, respectively) can recruit emergent aquatic and wetland plants, eventually forming a well-developed floating mat (Penfound and Earle

1948). Such floating mats are outside of the concept of the Freshwater Floating Marsh discussed here, despite the broad and general application of the term "flotant."

Freshwater Floating Marsh, Salvador WMA, St. Charles Parish

Freshwater Floating Marsh: Characteristic Plants	
Grass Pink	*Calopogon tuberosus*
Swamp Loosestrife	*Decodon verticillatus*
Dwarf Umbrella Sedge	*Fuirena pumila*
Waxmyrtle	*Myrica cerifera*
Royal Fern	*Osmunda regalis*
Rose Pagonia	*Pagonia ophioglossoides*
Maidencane	*Panicum hemitomon*
Snowy Orchid	*Platanthera nivea*
Smallhead Beak Sedge	*Rhynchospora microcephala*
Peat Moss	*Sphagnum* spp.
Southern Marsh Fern	*Thelypteris palustris*
Bog Yellow-eyed-grass	*Xyris difformis* var. *difformis*
Iris-leaf Yellow-eyed-grass	*Xyris laxifolia* var. *iridifolia*

C***urrent Extent and Status:***

Floating marshes of all types are estimated to occupy 375,000 acres (Evers et al. 1996; Sasser et al. 1996) but the current extent of Freshwater Floating Marsh treated here is unknown. Accurate assessments are confounded because almost all low-salinity marshes in the Mississippi River Deltaic Plain are peat-based but only a subset is truly floating. Conservation areas protecting Freshwater Floating Marsh include Salvador and Lake Boeuf WMAs, Jean Lafitte National Historic Park and Preserve, and possibly Mandalay NWR.

Freshwater Floating Marsh SGCN (18)	
Non-crustacean Arthropods (1)	
Dion Skipper	*Euphyes dion*
Reptiles (1)	
Alligator Snapping Turtle	*Macrochelys temminckii*
Birds (13)	
Wood Stork	*Mycteria americana*
American Bittern	*Botaurus lentiginosus*
Least Bittern	*Ixobrychus exilis*
Little Blue Heron	*Egretta caerulea*
Glossy Ibis	*Plegadis falcinellus*
Roseate Spoonbill	*Platalea ajaja*
Osprey	*Pandion haliaetus*
Bald Eagle	*Haliaeetus leucocephalus*
King Rail	*Rallus elegans*
Gull-billed Tern	*Gelochelidon nilotica*
Caspian Tern	*Hydroprogne caspia*
Forster's Tern	*Sterna forsteri*
Loggerhead Shrike	*Lanius ludovicianus*
Mammals (1)	
West Indian Manatee	*Trichechus manatus*
Plants (2)	

Bog Moss	*Mayaca fluviatilis*
Winged Seedbox	*Ludwigia alata*

Threats Affecting Habitat:

Freshwater Floating Marsh is threatened by input of nutrients and salinity, which is hastened by human activities associated with placement of canals, diversions, and other corridors in the marsh landscape. Inadequate fire is also an issue for some occurrences, which allows shrub dominance. This marsh type is highly buoyant, so has some resilience to subsidence, but increases in salinity associated with subsidence of surrounding rooted marshes poses a serious threat to this habitat.

Freshwater Floating Marsh Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	N/A	N/A	N/A
Agriculture/Aquaculture	N/A	N/A	N/A
Energy Production & Mining	Large	Serious	High
Transportation & Service Corridors	Restricted	Serious	Medium
Biological Resource Use	N/A	N/A	N/A
Human Intrusion/Disturbance	Small	Slight	Low
Natural System Modification	Large	Serious	High
Invasive & other Problematic Species	Large	Serious	High
Pollution	Large	Serious	High
Geological Events	Pervasive	Moderate	Medium
Climate Change & Severe Weather	Pervasive	Extreme	Very High
Overall Calculated Threat Impact: Very High			

Habitat Research Needs/Conservation Actions:

1. Accurately assess the amount and condition of Freshwater Floating Marshes (with Maidencane as the dominant).
2. Conduct vegetation and floristic inventories of reference sites including the collection of voucher specimens.
3. Conduct zoological inventories of this habitat.
4. Protect this community from further fragmentation and vigorously prevent further canal development in and around Freshwater Floating Marshes, as canals provide avenues for agents of environmental change (salinity, nutrients).
5. Work with CPRA and other coastal restoration organizations to help them understand the nature and uniqueness of this habitat, and to prevent degradation of this habitat by nutrient and sediment input associated with freshwater diversions.
6. Work within LDWF, and with the National Park Service (NPS) and USFWS to apply appropriate management in this habitat, specifically prescribed burning.

7. Develop outreach materials to increase public awareness of this unique habitat.

g. Freshwater Marsh

Rarity Rank: S2/G3G4

Synonyms: Fresh Marsh, Paille Fine (pronounced "pie feen") Marsh

Ecological Systems: CES203.467 Gulf Coast Chenier Plain Fresh and Oligohaline Tidal Marsh
CES203.470 Mississippi Delta Fresh and Oligohaline Tidal Marsh

General Description:

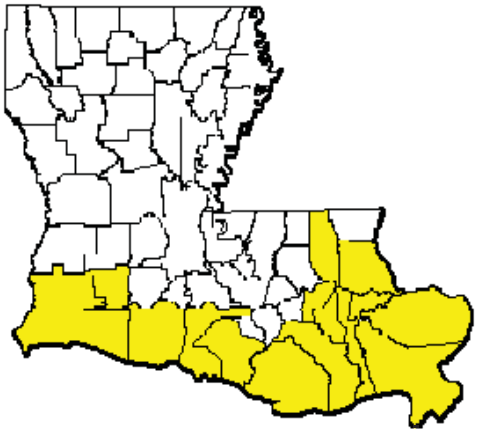
Freshwater Marsh is normally located adjacent to Intermediate Marsh along the northern most extent of the coastal marshes, although it may occur beside coastal bays where freshwater enters (e.g., Atchafalaya Bay). Small pools or ponds may be scattered. The floristic composition of these sites is quite heterogeneous and variable from site to site. Frequency and duration of flooding, which are intimately related to microtopography, seem to be the primary factors governing plant species distributions. Substrate, current flow, salinity, competition, and allelopathy are also important in determining species distribution patterns. Freshwater Marsh has the greatest plant diversity and highest soil organic matter content of any marsh type. Chabreck (1972) reported 92 plant species in Freshwater Marsh versus only 17 in Salt Marsh. Epiphytic and benthic algae are two other major autotroph groups in Freshwater Marsh. Salinities are usually less than 2 ppt and average about 0.5-1 ppt. A significant portion of Louisiana's Freshwater Marsh is Freshwater Floating Marsh which occurs in the Deltaic Plain of Louisiana. Freshwater Floating Marshes are treated as a separate habitat due to their uniqueness.

Wildlife populations are generally highest in Freshwater Marsh, and this habitat supports high numbers of wintering waterfowl. As with the other marsh types, Freshwater Marsh acts as an important nursery area for the young of many marine species, such as Atlantic Croaker, Spotted Seatrout, Black Drum, and flounder. This community may change to a more saline marsh type due to salt water intrusion or may become open water with subsidence.

Pool in expansive Freshwater Marsh at White Lake Wetlands Conservation Area, Vermilion Parish

Freshwater Marsh: Characteristic Plants	
Maidencane	*Panicum hemitomon*
Bull Tongue	*Sagittaria lancifolia*
Gulf Coast Spike Sedge	*Eleocharis cellulosa*
Square-Stem Spike Sedge	*Eleocharis quadrangulata*
Sawgrass	*Cladium mariscoides*
Southern Cut Grass	*Leersia hexandra*
Broadleaf Cattail	*Typha latifolia*

Current Extent and Status:



Freshwater Marsh has undergone the largest reduction in acreage of any of the marsh types over the past 20 years due mainly to salt water intrusion, canal dredging, and commercial, industrial and residential development. Pre-settlement acreage was estimated at 1 to 2 million acres, but has been reduced to 25-50% of this original extent (Smith 1993). The largest contiguous tracts of Freshwater Marsh occur in Terrebonne, St. Mary, Vermillion, Cameron, Lafourche and St. Charles Parishes (Hartley et al. 2000). In the Chenier Plain of southwestern Louisiana, federal lands containing Freshwater Marsh habitat include Sabine, Cameron Prairie, and Lacassine NWRs. White Lake Wetlands Conservation Area captures a substantial amount of Freshwater Marsh. In the Deltaic Plain of southeastern Louisiana, LDWF lands with Freshwater Marsh habitat include the Atchafalaya Delta WMA, Salvador WMA, Timken WMA, Pass-a-Loutre WMA, Pearl River WMA, and to a lesser extent Joyce and Maurepas Swamp WMAs. Federal lands with Freshwater Marsh in the Deltaic Plain include Delta, Bayou Sauvage, Big Branch, and Mandalay NWRs.

Freshwater Marsh SGCN (48)	
Non-crustacean Arthropods (1)	
Dion Skipper	*Euphyes dion*
Marine Fish (4)	
Diamond Killifish	*Adinia xenica*
Saltmarsh Topminnow	*Fundulus jenkinsi*
Bayou Killifish	*Fundulus pulvereus*
Chain Pipefish	*Syngnathus louisianae*
Reptiles (2)	
Alligator Snapping Turtle	*Macrochelys temminckii*

Western Chicken Turtle	*Deirochelys reticularia miaria*
Birds (32)	
Wood Stork	*Mycteria americana*
American Bittern	*Botaurus lentiginosus*
Least Bittern	*Ixobrychus exilis*
Glossy Ibis	*Plegadis falcinellus*
Roseate Spoonbill	*Platalea ajaja*
Mottled Duck	*Anas fulvigula*
Northern Pintail	*Anas acuta*
Canvasback	*Aythya valisineria*
Redhead	*Aythya americana*
Lesser Scaup	*Aythya affinis*
Osprey	*Pandion haliaetus*
White-tailed Kite	*Elanus leucurus*
Bald Eagle	*Haliaeetus leucocephalus*
Yellow Rail	*Coturnicops noveboracensis*
Black Rail	*Laterallus jamaicensis*
King Rail	*Rallus elegans*
Sandhill Crane	*Antigone canadensis*
Whooping Crane	*Grus americana*
Hudsonian Godwit	*Limosa haemastica*
Marbled Godwit	*Limosa fedoa*
Dunlin	*Calidris alpina*
Short-billed Dowitcher	*Limnodromus griseus*
Gull-billed Tern	*Gelochelidon nilotica*
Caspian Tern	*Hydroprogne caspia*
Common Tern	*Sterna hirundo*
Forster's Tern	*Sterna forsteri*
Short-eared Owl	*Asio flammeus*
Loggerhead Shrike	*Lanius ludovicianus*
Sedge Wren	*Cistothorus platensis*
Marsh Wren	*Cistothorus palustris*
Le Conte's Sparrow	*Ammodramus leconteii*
Nelson's Sparrow	*Ammodramus nelsoni*
Mammals (1)	
West Indian Manatee	*Trichechus manatus*
Plants (8)	
Blue Water-lily	*Nymphaea elegans*
Golden Canna	*Canna flaccida*

Grapefruit Primrose-willow	*Ludwigia sphaerocarpa*
Hemlock Water-parsnip	*Sium suave*
Narrow-fruit Horned Beak Sedge	*Rhynchospora inundata*
Rooted Spike Sedge	*Eleocharis radicans*
Slim Spikerush	*Eleocharis elongata*
Swamp Milkweed	*Asclepias incarnata*

Threats Affecting Habitat:

Threats to this habitat include subsidence, salinty input, and invasive species (especially Feral Hogs and Nutria). Increased storm frequency and intensity associated with climate change would subject Freshwater Marshes to greater disturbance and potentially result in higher incidences of salt water intrusion, in concert with SLR.

Freshwater Marsh Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	N/A	N/A	N/A
Agriculture/Aquaculture	N/A	N/A	N/A
Energy Production & Mining	Restricted	Moderate	Low
Transportation & Service Corridors	Restricted	Moderate	Low
Biological Resource Use	N/A	N/A	N/A
Human Intrusion/Disturbance	Restricted	Slight	Low
Natural System Modification	N/A	N/A	N/A
Invasive & other Problematic Species	Pervasive	Serious	High
Pollution	N/A	N/A	N/A
Geological Events	Pervasive	Slight	Low
Climate Change & Severe Weather	Pervasive	Moderate	Medium
Overall Calculated Threat Impact: Low			

Habitat Research Needs/Conservation Actions:

1. Support efforts by the NRCS Plant Materials Center and other growers to produce a greater variety of plant species for the restoration of coastal habitats as well as mitigation.
2. Continue to work with USACE to develop better strategies for the placement of dredge materials as a restoration method for this habitat type, particularly in the Mississippi Delta.
3. Work with CPRA, LCA, CWPPRA, USACE, and other stakeholders to broaden coastal restoration projects to include Freshwater Marsh.
4. Utilize sediment pipeline delivery to create Freshwater Marsh.

h. Intermediate Marsh

Rarity Rank: S3/G4

Synonyms: Oligohaline Marsh

Ecological Systems: CES203.467 Gulf Coast Chenier Plain Fresh and Oligohaline Tidal Marsh
CES203.470 Mississippi Delta Fresh and Oligohaline Tidal Marsh

General Description:

Intermediate Marsh is fresh most of the time but is occassionally affected by saltwater inputs associated with tropical storm surges. This marsh type typically lies between Brackish Marsh and Freshwater Marsh and in estuaries, although it infrequently may be adjacent to the Gulf of Mexico. Intermediate Marsh has an irregular tidal regime and is oligohaline (salinity of 3-10 ppt). Small pools or ponds may be scattered throughout the marsh. Plant diversity and soil organic matter content is higher than in Brackish Marsh. This marsh is characterized by a diversity of species, many of which are found in Freshwater Marsh and some of which are found in Brackish Marsh. Chabreck (1972) reported 55 plant species in Intermediate Marsh versus only 17 species in Salt Marsh. Intermediate Marsh is often dominated by Marshhay Cord Grass. Two other major autotrophic groups in Intermediate Marsh are epiphytic and benthic algae. Intermediate Marsh occupies the smallest acreage of any of the four marsh types. This marsh type is important to many bird species including large numbers of wintering waterfowl. Intermediate Marsh is also critical nursery habitat for larval marine organisms. Gradual changes in salinity conditions can cause this habitat to shift towards Brackish Marsh.

Intermediate Marsh, St. Tammany Parish.

Intermediate Marsh: Characteristic Plants	
Walking Spike Sedge	*Eleocharis rostellata*
Southern Cattail	*Typha domingensis*
Marshhay Cord Grass	*Spartina patens*
Hog Cane	*Spartina cynosuroides*
California Bulrush	*Schoenoplectus californicus*
Leafy Three Square	*Schoenoplectus americanus*
Bull Tongue	*Sagittaria lancifolia*

Current Extent and Status:

Acreage of Intermediate Marsh appears to be decreasing due to salt water intrusion, canal dredging, and commercial, industrial, and residential development. Pre-settlement acreage was estimated at 100,000 to 500,000 acres, but has been reduced to 50-75% of this original extent (Smith 1993). The largest contiguous tracts of Intermediate Marsh occur in Cameron, Vermilion, Terrebonne, and Lafourche Parishes (Hartley et al. 2000). In the Chenier Plain of southwestern Louisiana, Rockefeller State Wildlife Refuge and Sabine NWR contain Intermediate to Brackish Marshes. In the Deltaic Plain, Intermediate Marsh can be found on Pointe-aux-Chenes, Pass-a-Loutre, Pearl River, Biloxi, and Manchac WMAs as well as Bayou Sauvage and Big Branch NWRs, and Jean Lafitte National Park and Preserve.

Intermediate Marsh SGCN (47)	
Non-crustacean Arthropods (1)	
Dion Skipper	*Euphyes dion*
Marine Fish (8)	
Gold Brotula	*Gunterichthys longipenis*
Diamond Killifish	*Adinia xenica*
Saltmarsh Topminnow	*Fundulus jenkinsi*
Bayou Killifish	*Fundulus pulvereus*
Opossum Pipefish	*Microphis brachyurus*
Chain Pipefish	*Syngnathus louisianae*
Emerald Sleeper	*Erotelis smaragdus*
Violet Goby	*Gobioides broussonnetii*

Birds (37)	
Mottled Duck	*Anas fulvigula*
Northern Pintail	*Anas acuta*
Canvasback	*Aythya valisineria*
Redhead	*Aythya americana*
Lesser Scaup	*Aythya affinis*
Brown Pelican	*Pelecanus occidentalis*
American Bittern	*Botaurus lentiginosus*
Least Bittern	*Ixobrychus exilis*
Little Blue Heron	*Egretta caerulea*
Reddish Egret	*Egretta rufescens*
Glossy Ibis	*Plegadis falcinellus*
Roseate Spoonbill	*Platalea ajaja*
Osprey	*Pandion haliaetus*
White-tailed Kite	*Elanus leucurus*
Bald Eagle	*Haliaeetus leucocephalus*
Black Rail	*Laterallus jamaicensis*
Clapper Rail	*Rallus crepitans*
King Rail	*Rallus elegans*
Sandhill Crane	*Antigone canadensis*
Whooping Crane	*Grus americana*
American Oystercatcher	*Haematopus palliatus*
Marbled Godwit	*Limosa fedoa*
Dunlin	*Calidris alpina*
Short-billed Dowitcher	*Limnodromus griseus*
Coastal Least Tern	*Sternula antillarum*
Gull-billed Tern	*Gelochelidon nilotica*
Caspian Tern	*Hydroprogne caspia*
Common Tern	*Sterna hirundo*
Forster's Tern	*Sterna forsteri*
Royal Tern	*Thalasseus maximus*
Sandwich Tern	*Thalasseus sandvicensis*
Short-eared Owl	*Asio flammeus*
Loggerhead Shrike	*Lanius ludovicianus*
Sedge Wren	*Cistothorus platensis*
Marsh Wren	*Cistothorus palustris*
Le Conte's Sparrow	*Ammodramus leconteii*
Nelson's Sparrow	*Ammodramus nelsoni*
Mammals (1)	
West Indian Manatee	*Trichechus manatus*

Threats Affecting Habitat:

Aside from various sources of habitat disturbance, subsidence and salt water intrusion threaten this marsh type by converting it to open water, or Brackish or Salt Marsh.

Intermediate Marsh Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	N/A	N/A	N/A
Agriculture/Aquaculture	N/A	N/A	N/A
Energy Production & Mining	Restricted	Moderate	Low
Transportation & Service Corridors	Restricted	Moderate	Low
Biological Resource Use	N/A	N/A	N/A
Human Intrusion/Disturbance	Restricted	Slight	Low
Natural System Modification	N/A	N/A	N/A
Invasive & other Problematic Species	Large	Serious	High
Pollution	Restricted	Moderate	Low
Geological Events	Pervasive	Slight	Low
Climate Change & Severe Weather	Pervasive	Moderate	Medium

Overall Calculated Threat Impact: High

Habitat Research Needs/Conservation Actions:

1. Support efforts by the NRCS Plant Materials Center and other growers to produce a greater variety of plant species for the restoration of coastal habitats and for mitigation.
2. Work with USACE and state agencies to ensure water control structures provide the maximum benefit to Intermediate Marsh.
3. Work with landowners and NRCS to develop Best Management Practices for livestock production in this habitat.
4. Work with CPRA, LCA, CWPPRA, USACE and other stakeholders for protection and restoration of Intermediate Marsh and shoreline stabilization as well as to expand coastal restoration projects to include this habitat.

i. Louisiana Beach

Rarity Ranks*:* S2
Synonyms: none
Ecological System: CES203.469 Louisiana Beach

General Description:

Louisiana's coastal sediments are derived from the Mississippi River. Louisiana Beaches form along the Gulf facing shoreline, and are low in elevation. These beaches are usually composed of fine sands, and are generally less well-developed than beaches along other parts of the Gulf Coast. Beaches composed of shell fragments are found primarily along the low-energy shorelines in the central portion of the Louisiana coast. A distinctive feature of Louisiana Beaches is the replacement of Sea Oats (*Uniola paniculata*), a grass much more characteristic of beaches (especially) to the east, by Marshhay Cord Grass (*Spartina patens*) (Barbour et al. 1987). This habitat includes several ecological associations (NatureServe 2015).

Louisiana Beach, Elmer's Island Wildlife Refuge, Jefferson Parish

Louisiana Beach, Isle Dernieres Barrier Islands Refuge, Terrebonne Parish

Louisiana Beach: Characteristic Plants	
Gregg's Amaranth	*Amaranthus greggii*
Sea Rockets	*Cakile* spp.
Gulf Croton	*Croton punctatus*
Bitter Panicum	*Panicum amarum*
Railroad Vine	*Ipomoea imperati*
Goat Foot Morning Glory	*Ipomoea pes-capre*
Seashore Paspalum	*Paspalum vaginatum*
Camphor Daisy	*Rayjacksonia phyllocephala*
Sea Purslane	*Sesuvium portulacastrum*
Seaside Goldenrod	*Solidago sempervirens*
Marshhay Cord Grass	*Spartina patens*
Virginia Dropseed	*Sporobolus virginicus*
Amberique Bean	*Strophostyles helvula*
Sea Blites	*Suaeda linearis*

Current Extent and Status:

Well-developed Louisiana Beaches occur on the Chenier Plain from the town of Cameron west nearly to Sabine Pass. Shell beaches are found mainly on the central part of the coast in Vermilion and Iberia Parishes. On the Deltaic Plain, this habitat is present on Barrier Islands and portions of the mainland in Lafourche Parish. Several artificial and natural islands at the mouth of the Mississippi River are developing Louisiana Beach habitat. Exemplary Louisiana Beach habitat occurs on Trinity and Timbalier Islands in the Isle Dernieres Barrier Islands Refuge, on Grand Terre Island, along the mainland near Port Fourchon, and in the vicinity of Johnson Bayou in Cameron Parish where Louisiana Beach is situated seaward from Coastal Dune Grassland. Louisiana Beach habitat can also be found on Breton NWR.

Louisiana Beach SGCN (44)	
Crustaceans (3)	
Beach Ghost Shrimp	*Callichirus islagrande*
Carolinian Ghost Shrimp	*Callichirus major*
Peppermint Shrimp	*Lysmata wurdemanni*
Non-crustacean Arthropods (3)	
Eastern Beach Tiger Beetle	*Habroscelimorpha dorsalis venusta*
Bay Skipper	*Euphyes bayensis*
Louisiana Eyed Silkmoth	*Automeris louisiana*
Reptiles (3)	
Mississippi Diamond-backed Terrapin	*Malaclemys terrapin pileata*
Loggerhead Sea Turtle	*Caretta caretta*
Kemp's Ridley Sea Turtle	*Lepidochelys kempii*
Birds (23)	
Lesser Scaup	*Aythya affinis*
Brown Pelican	*Pelecanus occidentalis*
Reddish Egret	*Egretta rufescens*
Snowy Plover	*Charadrius nivosus*
Wilson's Plover	*Charadrius wilsonia*
Piping Plover	*Charadrius melodus*
American Oystercatcher	*Haematopus palliatus*

Long-billed Curlew	*Numenius americanus*
Marbled Godwit	*Limosa fedoa*
Red Knot	*Calidris canutus*
Dunlin	*Calidris alpina*
Short-billed Dowitcher	*Limnodromus griseus*
Sooty Tern	*Onychoprion fuscatus*
Coastal Least Tern	*Sternula antillarum*
Gull-billed Tern	*Gelochelidon nilotica*
Caspian Tern	*Hydroprogne caspia*
Common Tern	*Sterna hirundo*
Forster's Tern	*Sterna forsteri*
Royal Tern	*Thalasseus maximus*
Sandwich Tern	*Thalasseus sandvicensis*
Black Skimmer	*Rynchops niger*
Peregrine Falcon	*Falco peregrinus*
Plants (12)	
Big Sandbur	*Cenchrus myosuroides*
Canada Spike Sedge	*Eleocharis geniculata*
Coastal Ground-cherry	*Physalis angustifolia*
Dune Sandbur	*Cenchrus tribuloides*
Gregg's Amaranth	*Amaranthus greggii*
Gulf Bluestem	*Schizachyrium maritimum*
Inkberry	*Scaevola plumieri*
Sand Dune Spurge	*Chamaesyce bombensis*
Sand Rose-gentian	*Sabatia arenicola*
Sea Oats	*Uniola paniculata*
Southern Hairgrass	*Muhlenbergia capillaris var. filipes*
Woolly Honeysweet	*Tidestromia lanuginosa*

Threats Affecting Habitat:

Many Louisiana Beach occurrences are impacted by vehicle traffic and trash accumulation. The maintenance of Louisiana Beaches is dependent upon sand supply, which is lacking in most cases due to reduced coarse sediment in the Mississippi River, and impediments to longshore sand movement by features such as jetties. Invasive species pose a threat. Potential increased frequency and intensity of tropical storms associated with climate change may also threaten this habitat, in concert with inundation resulting from SLR.

Louisiana Beach Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	Restricted	Moderate	Low
Agriculture/Aquaculture	Restricted	Serious	Medium
Energy Production & Mining	Restricted	Serious	Medium
Transportation & Service Corridors	N/A	N/A	N/A
Biological Resource Use	N/A	N/A	N/A
Human Intrusion/Disturbance	Pervasive	Serious	High
Natural System Modification	Pervasive	Serious	High
Invasive & other Problematic Species	Pervasive	Serious	High
Pollution	Pervasive	Slight	Low
Geological Events	N/A	N/A	N/A
Climate Change & Severe Weather	Pervasive	Moderate	Medium
Overall Calculated Threat Impact: High			

Habitat Research Needs/Conservation Actions:

1. Provide general guidelines for prohibited activities on beaches to be used as a standard by local municipalities and work with local enforcement groups to enforce rules.
2. Close beaches to vehicle traffic by installing signs and vehicle barriers.
3. Assure designated parking areas are available at all beach access points. Advise local municipalities on where to acquire funds to provide such areas and advise on how to install with the least amount of impact to the resource.
4. Where appropriate, install segmented breakwaters and sand fencing to retain sand for development of Louisiana Beach; augment sand supply by depositing sand on or just offshore from beaches.
5. Conduct research to determine impacts of cattle grazing to Louisiana Beach habitat and associated wildlife.

j. Mississippi Terrace Prairie

Rarity Ranks: SX/G2

Synonyms: Macon Ridge Prairie

***Ecological Systems*:** CES203.549 Lower Mississippi Alluvial Plain Grand Prairie

General Description:

Mississippi Terrace Prairie was a tall-grass prairie type of northeastern Louisiana on Pleistocene terraces within the MRAP floodplain. These prairies may have been similar to the Grand Prairie of eastern Arkansas. Frequent fire and soil type would have prevented invasion of woody species. Topographic maps indicate some historical occurrences of Mississippi Terrace Prairies in northeastern Louisiana, such as the Boeuf Prairie in Franklin Parish. This habitat is now extirpated.

Mississippi Terrace Prairie: Characteristic Plants	
Big Bluestem	*Andropogon gerardii*
Switch Grass	*Panicum virgatum*
Indian Grass	*Sorghastrum nutans*
Tall Dropseed	*Sporobolus asper*
Eastern Gamma Grass	*Tripsacum dactyloides*

Current Extent and Status:

Mississippi Terrace Prairie historically occupied less than 2,000 acres (Smith 1993). This habitat was historically known from the MRAP ecoregion in northeast Louisiana. This community was converted primarily to agriculture, but some areas were also converted for housing development. No known examples remain today.

Mississippi Terrace Prairie SGCN (24)	
Non-crustacean Arthropods (3)	
American Bumble Bee	*Bombus pensylvanicus*
Monarch	*Danaus plexippus*
Nutmeg Underwing	*Catocala atocala*

Amphibians (1)	
Southern Crawfish Frog	*Lithobates areolatus areolatus*
Reptiles (4)	
Western Chicken Turtle	*Deirochelys reticularia miaria*
Western Slender Glass Lizard	*Ophisaurus attenuatus attenuatus*
Eastern Hog-nosed Snake	*Heterodon platirhinos*
Timber Rattlesnake	*Crotalus horridus*
Birds (13)	
Northern Bobwhite	*Colinus virginianus*
Short-eared Owl	*Asio flammeus*
Loggerhead Shrike	*Lanius ludovicianus*
Sedge Wren	*Cistothorus platensis*
Sprague's Pipit	*Anthus spragueii*
Field Sparrow	*Spizella pusilla*
Lark Sparrow	*Chondestes grammacus*
Grasshopper Sparrow	*Ammodramus savannarum*
Henslow's Sparrow	*Ammodramus henslowii*
Le Conte's Sparrow	*Ammodramus leconteii*
Painted Bunting	*Passerina ciris*
Dickcissel	*Spiza americana*
Eastern Meadowlark	*Sturnella magna*
Mammals (3)	
Louisiana Black Bear	*Ursus americanus luteolus*
Long-tailed Weasel	*Mustela frenata*
Southeastern Shrew	*Sorex longirostris*

Habitat Research Needs/Conservation Actions:

1. Conduct field surveys within and near areas that historically supported Mississippi Terrace Prairie for grasslands which retain some prairie plants, such as pastures and neglected agricultural land (“go-back” lands).
2. Promote management (e.g. prescribed fire) on prairie-like grasslands in areas where this habitat occurred historically.

k. Saline Prairie

Rarity Rank: S1S2/G1G2
Synonyms: Alkali Flats, Barrens, Salt Barrens, Slicks
Ecological Systems: CES203.291 West Gulf Coastal Plain Saline Glade

General Description:

Saline Prairies are small-scale grasslands, often in complexes of small openings. Saline Prairies range from less than one acre to about 30 acres in size. There are two types of Saline Prairies classified by hydrology and landscape position: Dry-mesic (upland) and wet. Dry-mesic Saline Prairies occur on fluvial terraces adjacent to active small stream floodplains, and their soils formed in Pleistocene alluvium. Wet Saline Prairies occur in stream valleys subject to regular flooding. Wet Saline Prairies sometimes transition upslope into dry-mesic Saline Prairies.

Upland Saline Prairie soils have high levels of exchangeable sodium and sometimes magnesium in the subsoil and near the surface horizons which create extreme conditions for plant growth. Such conditions include relatively high alkalinity, very poor movement of water and air in the soil, resistance to wetting that can induce droughty conditions, resistance to drying once saturated, and a sodic horizon in the subsoil which acts much like a dense claypan that is resistant to root penetration. The principal soils supporting this community in the UWGCP and EGCP are the Bonn and Lafe series. Occurrences in the WGCP are on Brimstone soils. A detailed study of the flora and edaphics of several upland Saline Prairies by Reid et al. (2010) revealed that the soils of upland Saline Prairies are not truly saline (containing high levels of dissolved salts as indicated by electrical conductivity), but are sodic (a.k.a. natric, alkali). The flora of upland prairies studied by Reid et al. (2010) had very few typical salt-tolerant plants and supported plants that are ephemeral, expressing themselves in the early spring when there is adequate moisture, and plants that are very drought tolerant. The upland Saline Prairie flora has substantial overlap with the flora of Sandstone Glades/Outcrops (MacRoberts et al. 2009; Reid et al. 2010). Wet Saline Prairies occur on lower landscape positions than upland prairies and are seasonally flooded. The flora of wet Saline Prairies is entirely different from that of upland prairies and includes several plants that also occur in coastal saline habitats. Wet Saline Prairies also feature large barren patches, and are in need of more detailed study.

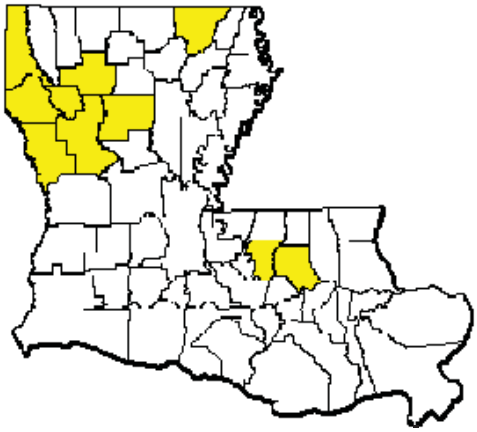
Wet Saline Prairie, Winn Parish

Upland Saline Prairie, De Soto Parish

Saline Prairie: Characteristic Plants	
Dry-Mesic Saline Prairies (fluvial terraces flanking small stream floodplains)	
Slimspike Threeawn	*Aristida longespica*
Nuttall's Rayless Goldenrod	*Bigelowia nuttallii* (northcentral LA)
Silver Dwarf Morning-Glory	*Evolvulus sericeus*
Earth-fruit	*Geocarpon minimum*
Narrowleaf Sumpweed	*Iva angustifolia*
Drummond's Nailwort	*Minuartia drummondii*
Prickly Pear	*Opuntia nemoralis* (northwest LA)
Texas Sunnybell	*Schoenolirion wrightii*
Poverty Dropseed	*Sporobolus vaginiflorus*
Whorled Dropseed	*Sporobolus pyramidatus*
Small-flowered Flame Flower	*Talinum parviflorum*
Wet Saline Prairies (in stream valleys, seasonally flooded)	
Crested Saltbush	*Atriplex cristata*
Salt Grass	*Distichlis spicata*
Pale Spike Sedge	*Eleocharis macrostachya*
Marsh Fimbry	*Fimbristylis castanea*
Seaside Heliotrope	*Heliotropium curassavicum*
Switch Grass	*Panicum virgatum*
Prairie Cordgrass	*Spartina pectinata*
Seaside Goldenrod	*Solidago sempervirens*

Current Extent and Status:

Saline Prairie is estimated to have occupied less than 2,000 acres historically (Smith 1993). It is unclear whether this estimate includes both upland and wet variants. An effort was made during 2006-2008 to locate Saline Prairies in northwestern Louisiana. This work was very successful, revealing about 10 new records and expanding the range of the Saline Prairie to include three additional parishes (Reid et al. 2010). Saline Prairie is likely extirpated in East Baton Rouge and Livingston Parishes, however, small remnants in these parishes may persist in utility corridors that intersect sodic/alkali soils.



Saline Prairie SGCN (47)	
Non-crustacean Arthropods (4)	
Saline Prairie Scarab Beetle	*Ataenius robustus*
Comanche Harvester Ant	*Pogonomyrmex comanche*
American Bumble Bee	*Bombus pensylvanicus*
Monarch	*Danaus plexippus*
Reptiles (5)	
Western Slender Glass Lizard	*Ophisaurus attenuatus attenuatus*
Texas Horned Lizard	*Phrynosoma cornutum*
Southern Prairie Skink	*Plestiodon septentrionalis obtusirostris*
Eastern Hog-nosed Snake	*Heterodon platirhinos*
Western Chicken Turtle	*Deirochelys reticularia miaria*
Birds (10)	
Northern Bobwhite	*Colinus virginianus*
American Woodcock	*Scolopax minor*
Loggerhead Shrike	*Lanius ludovicianus*
Sprague's Pipit	*Anthus spragueii*
Smith's Longspur	*Calcarius pictus*
Field Sparrow	*Spizella pusilla*
Grasshopper Sparrow	*Ammodramus savannarum*
Henslow's Sparrow	*Ammodramus henslowii*
Le Conte's Sparrow	*Ammodramus leconteii*
Eastern Meadowlark	*Sturnella magna*
Mammals (5)	
Eastern Harvest Mouse	*Reithrodontomys humulis*

Northern Pygmy Mouse	*Baiomys taylori*
Baird's Pocket Gopher	*Geomys breviceps sagittatus*
Oak Ridge Pocket Gopher	*Geomys breviceps breviceps*
Long-tailed Weasel	*Mustela frenata*
Plants (23)	
American Bird's-foot-trefoil	*Lotus unifoliolatus*
Arkansas Caric Sedge	*Carex arkansana*
Cotton-rose	*Evax verna*
Dixie Stitchwort	*Minuartia muscorum*
Drummond's Sandwort	*Minuartia drummondii*
Earth-fruit	*Geocarpon minimum*
Elliott's Sida	*Sida elliottii*
Evening Rainlily	*Cooperia drummondii*
Flame Hedgehyssop	*Gratiola flava*
Hall's Panic Grass	*Panicum hallii var. filipes*
Narrowleaf Gumweed	*Grindelia lanceolata var. lanceolata*
Pale Umbrella-wort	*Mirabilis albida*
Prairie Cord Grass	*Spartina pectinata*
Rosemary Rockrose	*Helianthemum rosmarinifolium*
San Saba Pinweed	*Lechea san-sabeana*
Small-flower Flameflower	*Phemeranthus parviflorus*
Smooth Scorpionweed	*Phacelia glabra*
Texas Saxifrage	*Saxifraga texana*
Texas Sunnybell	*Schoenolirion wrightii*
Tumble Grass	*Schedonnardus paniculatus*
Upland Swamp Privet	*Forestiera ligustrina*
Wand Blackroot	*Pterocaulon virgatum*
Wolf's Spike Sedge	*Eleocharis wolfii*

Threats Affecting Habitat:

Saline Prairies are threatened by disturbance associated with mineral extraction, roads and service corridors, as well as afforestation attempts. Feral Hogs pose a serious threat to Saline Prairies.

Saline Prairie Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	Small	Extreme	Low
Agriculture/Aquaculture	Restricted	Moderate	Low
Energy Production & Mining	Pervasive	Extreme	Very High
Transportation & Service Corridors	Restricted	Moderate	Low
Biological Resource Use	N/A	N/A	N/A
Human Intrusion/Disturbance	Large	Moderate	Medium
Natural System Modification	N/A	N/A	N/A
Invasive & other Problematic Species	Pervasive	Moderate	Medium
Pollution	N/A	N/A	N/A
Geological Events	N/A	N/A	N/A
Climate Change & Severe Weather	N/A	N/A	N/A
Overall Calculated Threat Impact: Medium			

Habitat Research Needs/Conservation Actions:

1. Continue surveys to monitor the current extent and condition of this habitat type.
2. Conduct detailed studies of flora and edaphics of Wet Saline Prairies.
3. Conduct surveys to determine inverterbrate assemblages on Saline Prairies.
4. Provide assistance with Feral Hog control in this habitat to landowners; disturbance by hogs is a particular threat since this community is very rare and occurs as small openings.
5. Target occurences of Saline Prairie in northwest Louisiana for permanent protection via servitudes or land acquisition.

l. Salt Marsh

Rarity Rank: S3S4/G5
Synonyms: Smooth Cord Grass Marsh, Saltgrass Marsh, Saline Marsh
Ecological Systems: CES203.468 Gulf Coast Chenier Plain Salt and Brackish Tidal Marsh
CES203.471 Mississippi Delta Salt and Brackish Tidal Marsh

General Description:

Typically, Salt Marsh is the marsh area closest to the beach rim of the Gulf of Mexico, and in general, varies from 1-15 miles in width. These marshes are regularly tidally flooded, flat, polyhaline areas dominated by salt-tolerant grasses and very few other species. Small pools or ponds may be scattered. Salt Marsh has the lowest plant diversity and soil organic matter content of any marsh type. This community is strongly dominated by Smooth Cord Grass. Two other major groups of autotrophs found in Salt Marsh are microscopic algae on the surface of the vascular plants and benthic algae (usually diatoms) living on or in the marsh sediment. Soil and water conditions regulate plant growth, and salinity appears to be the primary factor determining species composition. The mean salinity of Salt Marsh is about 16 ppt. The area of Salt Marsh is increasing, apparently due to salt water intrusion resulting in shifts in marsh salinity levels. Salt Marsh provides nursery areas for larval forms of many species such as shrimp, crabs, Red Drum, Spotted Seatrout, and Gulf Menhaden, and greatly enhances the production of such marine organisms due to the enormous primary productivity of the Salt Marsh vegetation. Factors which promote the growth of Salt Marsh plants include: (1) a long growing season, (2) abundant rainfall, (3) presence of soil nutrients, (4) low tide differential, and (5) tidally transported nutrients. Factors negatively impacting Salt Marsh include prolonged periods of inundation (whether caused by winds, tides, rain, or hurricanes), subsidence, and erosion.

Salt Marsh, St. Bernard Parish

Salt Marsh also functions as a nitrogen and phosphorus sink (at least seasonally), thereby improving the quality of water that passes through it. In addition, Salt Marsh can alleviate the effects of storms and flooding by acting as a buffer and providing storage for large amounts of water. Although Salt Marsh is known for low species diversity overall, a few species are wholly dependent on this habitat. For example, Seaside Sparrow (*Ammodramus maritimus*) is endemic to Salt Marsh, one of only five such Salt Marsh-obligate vertebrate species on Earth (Greenberg *et al.* 2006).

Salt Marsh: Characteristic Plants	
Salt Wort	*Batis maritima*
Sea Ox-Eye	*Borrichia frutescens*
Salt Grass	*Distichlis spicata*
Black Needle Rush	*Juncus roemerianus*
Smooth Cord Grass	*Spartina alterniflora*

Current Extent and Status:

Salt Marsh is estimated to have occupied 500,000 to 1,000,000 acres in pre-settlement times, with an estimated 50-75% remaining (Smith 1993). Salt Marsh is most extensive on the deltaic plain of southeast Louisiana. The area of Salt Marsh is currently increasing, apparently due to salt water intrusion resulting in shifts in marsh salinity levels (LNHP 2009). However, coastal erosion and subsidence are threats because they act to convert marsh to open, shallow water.

Salt Marsh SGCN (49)	
Crustaceans (1)	
Estuarine Ghost Shrimp	*Lepidophthalmus louisianensis*
Non-crustacean Arthropods (5)	
Bay Skipper	*Euphyes bayensis*
Obscure Skipper	*Panoquina panoquinoides*
Western Pygmy Blue	*Brephidium exilis*
Eastern Pygmy Blue	*Brephidium pseudofea*
Louisiana Eyed Silkmoth	*Automeris louisiana*
Marine Fish (3)	
Diamond Killifish	*Adinia xenica*
Bayou Killifish	*Fundulus pulvereus*
Texas Pipefish	*Syngnathus texanus*
Reptiles (3)	
Gulf Saltmarsh Snake	*Nerodia clarkii clarkii*
Kemp's Ridley Sea Turtle	*Lepidochelys kempii*
Mississippi Diamond-backed Terrapin	*Malaclemys terrapin pileata*
Birds (35)	
Mottled Duck	*Anas fulvigula*
Northern Pintail	*Anas acuta*
Canvasback	*Aythya valisineria*
Redhead	*Aythya americana*
Lesser Scaup	*Aythya affinis*
Brown Pelican	*Pelecanus occidentalis*

American Bittern	*Botaurus lentiginosus*
Least Bittern	*Ixobrychus exilis*
Little Blue Heron	*Egretta caerulea*
Reddish Egret	*Egretta rufescens*
Glossy Ibis	*Plegadis falcinellus*
Roseate Spoonbill	*Platalea ajaja*
Osprey	*Pandion haliaetus*
White-tailed Kite	*Elanus leucurus*
Bald Eagle	*Haliaeetus leucocephalus*
Black Rail	*Laterallus jamaicensis*
Clapper Rail	*Rallus crepitans*
Whooping Crane	*Grus americana*
American Oystercatcher	*Haematopus palliatus*
Marbled Godwit	*Limosa fedoa*
Dunlin	*Calidris alpina*
Short-billed Dowitcher	*Limnodromus griseus*
Coastal Least Tern	*Sternula antillarum*
Gull-billed Tern	*Gelochelidon nilotica*
Caspian Tern	*Hydroprogne caspia*
Common Tern	*Sterna hirundo*
Forster's Tern	*Sterna forsteri*
Royal Tern	*Thalasseus maximus*
Sandwich Tern	*Thalasseus sandvicensis*
Black Skimmer	*Rynchops niger*
Short-eared Owl	*Asio flammeus*
Sedge Wren	*Cistothorus platensis*
Marsh Wren	*Cistothorus palustris*
Nelson's Sparrow	*Ammodramus nelsoni*
Seaside Sparrow	*Ammodramus maritimus*
Mammals (1)	
West Indian Manatee	*Trichechus manatus*
Plants (1)	
Key Grass	*Monanthochloe littoralis*

Threats Affecting Habitat:

Salt Marshes are threatened by disturbance from several human sources, subsidence, and potentially by increased tropical storm frequency and intensity associated with climate change. All of these threats act to reduce the extent of Salt Marsh by converting marsh to open water. Of particular concern in this regard are the impacts caused by Feral Hogs and Nutria.

Salt Marsh Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	N/A	N/A	N/A
Agriculture/Aquaculture	Small	Moderate	Low
Energy Production & Mining	Large	Serious	High
Transportation & Service Corridors	Large	Serious	High
Biological Resource Use	N/A	N/A	N/A
Human Intrusion/Disturbance	N/A	N/A	N/A
Natural System Modification	N/A	N/A	N/A
Invasive & other Problematic Species	Pervasive	Extreme	Very High
Pollution	N/A	N/A	N/A
Geological Events	Pervasive	Slight	Low
Climate Change & Severe Weather	Pervasive	Serious	High
Overall Calculated Threat Impact: High			

Habitat Research Needs/Conservation Actions:

1. Support CPRA, CWPPRA, LCA, LDNR, USACE, and other partner efforts for shoreline stabilization and habitat restoration.
2. Work with LCA, CPRA, USACE, CWPPRA, and other groups to support coastal restoration projects, specifically targeting important bird nesting areas and SGCN.
3. Work with USACE and state agencies to ensure water control structures provide the maximum benefit to Salt Marsh.
4. Continue efforts to control invasive species, particularly Nutria and Feral Hogs, in Salt Marsh.

m. Sandbar

Rarity Rank: S2/G4
Synonyms: River Sandbar
Ecological Systems: None

General Description:

A Sandbar is a sand/gravel deposit in or adjacent to permanently flowing freshwater contained within a natural channel. Sandbars are composed of coarse to fine-grained alluvial deposits. The community structure is dependent on the mix and stability of substrate, severity and depth of flooding, and permanence of the particular site. The hydrologic regime ranges from intermittently exposed to intermittently flooded. If present, vegetation is dominated by sparse to dense growth of herbaceous plants, with woody plants such as willows (*Salix* spp.) becoming established when Sandbars are not scoured and re-worked. Due to the early successional nature of Sandbars, they can be invaded by invasive plant species (NatureServe 2015). Sandbars are critical nesting areas for the federally-listed endangered Interior Least Tern (*Sternulla antillarum athalassos*), as well as for many riverine turtles.

Mississippi River Sandbar, West Feliciana Parish

Expansive Sandbar on Red River, Bossier Parish

Sandbar: Characteristic Plants	
Roughfruit Amaranth	*Amaranthus tuberculatus*
Valley Redstem	*Ammannia coccinea*
Winged Pigweed	*Cycloloma atriplicifolia*
Chufa	*Cyperus esculentus*
Bearded Flat Sedge	*Cyperus squarrosus*
Tropical Flat Sedge	*Cyperus surinamensis*
Teal Grass	*Eragrostis hypnoides*
Vahl's Fimbry	*Fimbristylis vahlii*
Camphor Daisy	*Heterotheca subaxillaris*
Amazon Sprangletop	*Leptochloa panicoides*
Water Pimpernel	*Lindernia dubia*
Amberique Bean	*Strophostyles helvula*

Current Extent and Status:

Sandbars occur primarily along the following major rivers: Mississippi, Red, Pearl, Sabine, and Ouachita. Sandbar habitat within the Mississippi River has shown a general decline over the past 50 years. The U.S. Army Corps of Engineers reported a 33% decrease in Sandbar habitat in the lower Mississippi River between Memphis, Tennessee and Baton Rouge, Louisiana from 1948 to 1994 (U.S. Fish and Wildlife Service 2015).

Sandbars SGCN (20)	
Non-crustacean Arthropods (3)	
White Sand Tiger Beetle	*Ellipsoptera wapleri*
Sandbar Tiger Beetle	*Ellipsoptera blanda*
Comanche Harvester Ant	*Pogonomyrmex comanche*
Reptiles (6)	
Alligator Snapping Turtle	*Macrochelys temminckii*
Smooth Softshell	*Apalone mutica*
Ringed Map Turtle	*Graptemys oculifera*
Ouachita Map Turtle	*Graptemys ouachitensis*
Sabine Map Turtle	*Graptemys sabinensis*
Pearl River Map Turtle	*Graptemys pearlensis*
Birds (7)	
Piping Plover	*Charadrius melodus*
Marbled Godwit	*Limosa fedoa*
Dunlin	*Calidris alpina*
Short-billed Dowitcher	*Limnodromus griseus*
Gull-billed Tern	*Gelochelidon nilotica*
Interior Least Tern	*Sternula antillarum athalassos*
Black Skimmer	*Rynchops niger*
Plants (4)	
Bindweed Heliotrope	*Heliotropium convolvulaceum*
Downy Prairie-clover	*Dalea lanata*
Dwarf Bulrush	*Lipocarpha micrantha*
Square-stem Monkeyflower	*Mimulus ringens*

Threats Affecting Habitat:

Sandbars are subject to frequent human intrusion resulting in disturbance and trampling. Large rivers are engineered waterways, and operation of locks and dams as well as levees interrupt the natural development and maintenance of Sandbars. Invasive plants and animals threaten this habitat as well, with Feral Hogs being of particular concern.

Sandbar Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	N/A	N/A	N/A
Agriculture/Aquaculture	Small	Slight	Low
Energy Production & Mining	N/A	N/A	N/A
Transportation & Service Corridors	N/A	N/A	N/A
Biological Resource Use	N/A	N/A	N/A
Human Intrusion/Disturbance	Large	Moderate	Medium
Natural System Modification	Pervasive	Extreme	Very High
Invasive & other Problematic Species	Pervasive	Moderate	Medium
Pollution	Pervasive	Slight	Low
Geological Events	N/A	N/A	N/A
Climate Change & Severe Weather	N/A	N/A	N/A
Overall Calculated Threat Impact: Medium			

Habitat Research Needs/Conservation Actions:

1. Determine ownership/management authority for Sandbars in Louisiana rivers.
2. Work with USACE to develop a Memorandum Of Understanding (MOU) regarding Sandbar management.
3. Work with landowners to develop limits on ORV use of this habitat and to protect Sandbars from negative impacts from cattle.
4. Support and commission a study into the need and economic impact of existing dams on Louisiana rivers.
5. Remove low-impact (unnecessary) structures, particularly on the Red and Ouachita Rivers, to restore natural flow of these rivers.
6. Implement control of invasive species on Sandbars.

n. Sandstone Glade/Barren

Rarity Rank: S1S2/G1G2
Synonyms: Catahoula Barren, Sandstone Outcrop
Ecological Systems: CES203.364 West Gulf Coastal Plain Catahoula Barrens

General Description:

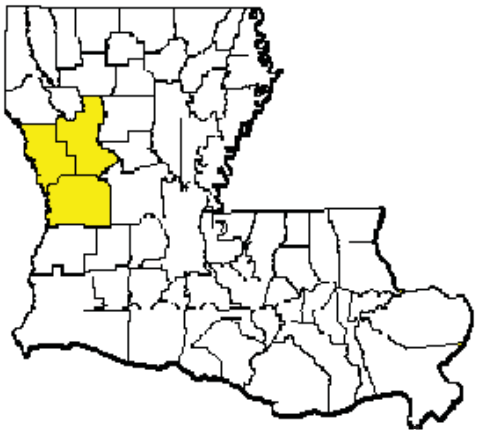
A glade is an open area in an otherwise wooded landscape due to the presence of rock at or near the surface. Sandstone Glades are associated with the Catahoula Formation, which extends as a belt across central Louisiana. Sandstone Glades are embedded in Western Upland Longleaf Pine Woodlands. Soil depth apparently determines development of vegetation. Many glades have portions where rock is at the surface, appearing pavement-like, and areas with very shallow soil. Pavement and shallow soil areas are very resistant to woody encroachment. However, deeper soils support larger grasses and herbaceous plants, as well as trees such as Longleaf Pine. Being embedded in Western Upland Longleaf Pine Woodland, Sandstone Glades would have burned at the same frequency, every one to three years. With deeper-soil glades, fire is essential to maintain open conditions and to prevent establishment of brush thickets. Well-burned glades with relatively deep soil appear prairie-like.

Sandstone Glade, Kisatchie National Forest, Natchitoches Parish

Sandstone Glade/Barren: Characteristic Plants	
Nuttall's Rayless Goldenrod	*Bigelowia nuttallii*
Silver Dwarf Morning-Glory	*Evolvulus sericeus*
Slender Bluestem	*Schizachyrium tenerum*
Texas Sunnybell	*Schoenolirion wrightii*
Sand Spikemoss	*Selaginella arenicola* ssp. *riddellii*
Rock Pink	*Talinum parviflorum*
Tree Huckleberry	*Vaccinium arboreum*

Current Extent and Status:

Sandstone Glades are thought to have occupied less than 2,000 acres in pre-settlement times with an estimated 50-75% remaining today (Smith 1993). Most known occurrences are on the Kisatchie District of KNF in southern Natchitoches Parish. There are a number of Sandstone Glades on private lands in Sabine Parish.



Sandstone Glade Barren SGCN (17)	
Non-crustacean Arthropods (4)	
Texas Brown Tarantula	*Aphonopelma hentzi*
American Bumble Bee	*Bombus pensylvanicus*
Cobweb Skipper	*Hesperia metea*
Monarch	*Danaus plexippus*
Amphibians (1)	
Southern Red-backed Salamander	*Plethodon serratus*
Reptiles (4)	
Western Slender Glass Lizard	*Ophisaurus attenuatus attenuatus*
Coal Skink	*Plestiodon anthracinus*
Eastern Hog-nosed Snake	*Heterodon platirhinos*
Timber Rattlesnake	*Crotalus horridus*
Birds (4)	
Northern Bobwhite	*Colinus virginianus*
Greater Roadrunner	*Geococcyx californianus*

Chuck-will's-widow	*Antrostomus carolinensis*
Field Sparrow	*Spizella pusilla*
Plants (4)	
Hairy Lipfern	*Cheilanthes lanosa*
Sand Spikemoss	*Selaginella arenicola ssp. riddellii*
Small-flower Flameflower	*Phemeranthus parviflorus*
Texas Sunnybell	*Schoenolirion wrightii*

Threats Affecting Habitat:

This habitat is threatened by disturbance and resulting soil erosion. Glades with deeper soil are fire-dependent and are degraded by woody encroachment without adequate fire.

Sandstone Glade/Barren Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	N/A	N/A	N/A
Agriculture/Aquaculture	Restricted	Serious	Medium
Energy Production & Mining	Small	Slight	Low
Transportation & Service Corridors	N/A	N/A	N/A
Biological Resource Use	Small	Moderate	Low
Human Intrusion/Disturbance	Restricted	Slight	Low
Natural System Modification	Restricted	Moderate	Low
Invasive & other Problematic Species	Restricted	Moderate	Low
Pollution	N/A	N/A	N/A
Geological Events	N/A	N/A	N/A
Climate Change & Severe Weather	N/A	N/A	N/A
Overall Calculated Threat Impact: Low			

Habitat Research Needs/Conservation Actions:

1. Continue surveys to determine the current extent and condition of this habitat type and support research on the community classification of Sandstone Glades.
2. Encourage and fund the use of prescribed fire and chemical and mechanical brush control as management tools.

o. Vegetated Pioneer Emerging Delta

Rarity Rank: S2/G3G4

Synonyms: Delta Flats, Emergent Islands

Ecological Systems: CES203.470 Mississippi Delta Fresh and Oligohaline Tidal Marsh

General Description:

Vegetated Pioneer Emerging Delta is a dynamic community forming primarily within the actively building delta region at the mouth of the Atchafalaya and Mississippi Rivers. Substrates contain a greater percentage of sand and less moisture than do marsh soils. The pioneer ridge vegetation is similar to the Sandbars and delta of the Mississippi River, whereas the pioneer marsh vegetation is similar to that of Freshwater Marsh. This community can be floristically diverse, containing many species also found on Sandbars. Rapid invasion by the invasive Torpedo Grass (*Panicum repens*) apparently reduces plant species richness, particulary on higher sandy deposits. The pioneer community is successional in nature and changes rapidly with time. The new delta community's ecological functions are similar in nature to marsh and mudflat systems.

Vegetated Pioneer Emerging Delta, Pass-a-Loutre WMA

Vegetated Pioneer Emerging Delta: Characteristic Plants	
Sprangletops	*Leptochloa* spp.
Arrow Leaf Duck Potato	*Sagittaria latifolia*
Delta Duck Potato	*Sagittaria platyphylla*
Delta Bulrush	*Schoenoplectus deltarum*

Current Extent and Status:

According to Smith (1993) there was an estimated 2,000 to 10,000 acres of Vegetated Pioneer Emerging Delta in pre-settlement times. An estimated 75-100% of this amount is present today. There are two areas of the Louisiana coast supporting this habitat: the actively forming Atchafalaya Delta and the current mouth of the Mississippi River. In the case of the former area, newly accreted delta land is incorporated into Atchafalaya Delta WMA. Pass-A-Loutre WMA near the mouth of the Mississippi River contains natural and constructed crevasses which promote the expansion of this habitat type.

Vegetated Pioneer Emerging Delta SGCN (34)	
Birds (31)	
Mottled Duck	*Anas fulvigula*
Northern Pintail	*Anas acuta*
Canvasback	*Aythya valisineria*
Redhead	*Aythya americana*
Lesser Scaup	*Aythya affinis*
Brown Pelican	*Pelecanus occidentalis*
Least Bittern	*Ixobrychus exilis*
Little Blue Heron	*Egretta caerulea*
Reddish Egret	*Egretta rufescens*
Glossy Ibis	*Plegadis falcinellus*
Roseate Spoonbill	*Platalea ajaja*
Bald Eagle	*Haliaeetus leucocephalus*
Clapper Rail	*Rallus crepitans*
Whooping Crane	*Grus americana*
Snowy Plover	*Charadrius nivosus*
Wilson's Plover	*Charadrius wilsonia*
Piping Plover	*Charadrius melodus*
Red Knot	*Calidris canutus*
Long-billed Curlew	*Numenius americanus*

Marbled Godwit	*Limosa fedoa*
Dunlin	*Calidris alpina*
Short-billed Dowitcher	*Limnodromus griseus*
Gull-billed Tern	*Gelochelidon nilotica*
Caspian Tern	*Hydroprogne caspia*
Common Tern	*Sterna hirundo*
Forster's Tern	*Sterna forsteri*
Royal Tern	*Thalasseus maximus*
Sandwich Tern	*Thalasseus sandvicensis*
Black Skimmer	*Rynchops niger*
Nelson's Sparrow	*Ammodramus nelsoni*
Seaside Sparrow	*Ammodramus maritimus*
Mammals (1)	
West Indian Manatee	*Trichechus manatus*
Plants (2)	
Dwarf Bulrush	*Lipocarpha micrantha*
Square-stem Monkeyflower	*Mimulus ringens*

Threats Affecting Habitat:

The greatest threat to this habitat is invasive species, primarily Feral Hogs and Nutria which denude newly created delta habitat via rooting and wallowing behavior and direct herbivory, respectively.

Vegetated Pioneer Emerging Delta Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	N/A	N/A	N/A
Agriculture/Aquaculture	N/A	N/A	N/A
Energy Production & Mining	Small	Extreme	Low
Transportation & Service Corridors	Small	Extreme	Low
Biological Resource Use	N/A	N/A	N/A
Human Intrusion/Disturbance	Large	Moderate	Medium
Natural System Modification	N/A	N/A	N/A
Invasive & other Problematic Species	Large	Serious	High
Pollution	Pervasive	Slight	Low
Geological Events	N/A	N/A	N/A
Climate Change & Severe Weather	Pervasive	Slight	Low
Overall Calculated Threat Impact: Low			

Habitat Research Needs/Conservation Actions:

1. Identify and protect sensitive delta areas from disturbances, such as by boats or other motorized vehicles.
2. Work with USACE to develop better strategies for the placement of dredge materials as a restoration method for this habitat type and promote appropriate use of dredge spoil to develop new areas for bird nesting sites and stopover sites and to enhance aquatic species habitat.
3. Work with USACE and others to manage water control to create more high quality habitat and benefit existing delta habitat.
4. Work with LCA, CPRA, CWPPRA, USACE, and NRCS to incorporate management objectives for the protection and restoration of emerging delta habitat into future coastal restoration efforts.

p. West Gulf Coastal Plain Muck Bog

Rarity Ranks: G1/S1

Synonyms: Stream Valley Bog

Ecological System: CES203.194 West Gulf Coastal Plain Herbaceous Seep and Bog

General Description:

This habitat type is an herbaceous marsh that occupies the valleys of impeded streams embedded within the sandy uplands of the Sparta Formation. Substrates are high in organic matter (e.g. peat). In some examples, the vegetation appears to form a mat that floats above or rests on top of a layer of organic slurry. The vegetation mat is not thick and well developed, and cannot support the weight of a person, as is the case with coastal Freshwater Floating Marsh. The vegetation mat apparently floats during summer months, and is submersed during winter and spring.

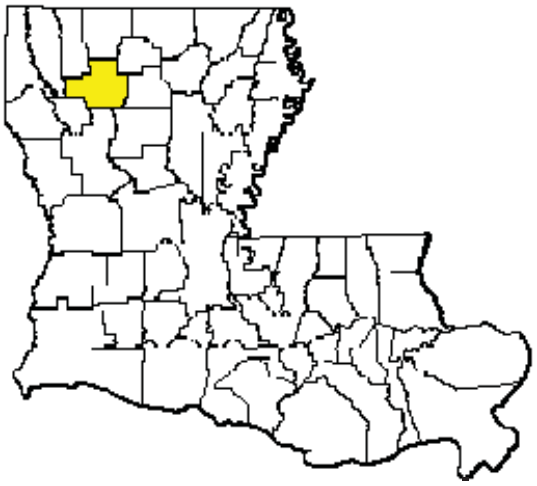
Some West Gulf Coastal Plain Muck Bogs in Texas are very old, on the order of thousands of years (MacRoberts and MacRoberts 1998) and have several plant species not present in the Louisiana examples, notably Yellow Trumpet Pitcher Plant (*Sarracenia alata*) and Saw Grass (*Cladium mariscoides*). Louisiana's muck bogs are hypothesized to be younger than some of the muck bogs in the Post Oak Savanna of Texas. The formation of WGCP Muck Bogs seems similar in Louisiana as in Texas, however. Surrounding deep sandy soils efficiently capture and transmit precipitation as ground water, which converges on stream valleys. Small streams become impeded by Beaver, and constant saturation from seepage leads to peat accumulation. The substrate of WGCP Muck Bogs in Texas is acidic,

West Gulf Coastal Plain Muck Bog, Bienville Parish

with a pH of 4.3-4.8 (MacRoberts and MacRoberts 1998), and Louisiana muck bogs are almost certainly acidic as well. Summer fires sweeping off of the adjacent Longleaf Pine uplands may have historically controlled woody plant growth and prevented conversion to a wooded habitat. Little is known about this habitat in Louisiana.

West Gulf Coastal Plain Muck Bog: Characteristic Plants	
Broomsedge	*Andropogon virginicus*
Snot Plant	*Brasenia schreberi*
Three-way Sedge	*Dulichium arundinaceum*
Yellow Spike Sedge	*Eleocharis flavescens*
Hairy Umbrella Sedge	*Fuirena squarrosa*
Water Spider Orchid	*Habeneria repens*
Virginia-willow	*Itea virginica*
Bog Rush	*Juncus trigonocarpus*
Southern Bog Clubmoss	*Lycopodiella appressa*
Slender Beak Sedge	*Rhynchospora gracilenta*
Long-beak Beak Sedge	*Rhynchospora scirpoides*
Poison Sumac	*Toxicodendron vernix*
Zigzag Bladderwort	*Utricularia subulata*
Bog Yellow-eyed-grass	*Xyris difformis var. difformis*
Iris-leaf Yellow-eyed-grass	*Xyris laxifolia var. iridifolia*

Current Extent and Status:
This habitat is only known in Louisiana from the xeric sandy Upland Longleaf Pine Woodlands on the Sparta Formation in Bienville Parish.



West Gulf Coastal Plain Muck Bog SGCN (12)	
Non-crustacean Arthropods (6)	
Arogos Skipper	*Atrytone arogos*
Little Metalmark	*Calephelis virginiensis*
Georgia Satyr	*Neonympha areolatus*
Pitcher Plant Spiketail	*Cordulegaster sarracenia*
Texas Emerald	*Somatochlora margarita*
Monarch	*Danaus plexippus*
Birds (5)	
American Woodcock	*Scolopax minor*
Sedge Wren	*Cistothorus platensis*
Grasshopper Sparrow	*Ammodramus savannarum*
Henslow's Sparrow	*Ammodramus henslowii*
Le Conte's Sparrow	*Ammodramus leconteii*
Plants (1)	
Threeway Sedge	*Dulichium arundinaceum*

Threats Affecting Habitat:

At this point little is known about this habitat in Louisiana and this lack of knowledge is itself a threat. Despite this overall lack of knowledge, inadequate fire and invasive plants and animals appear to pose the greatest threat to this habitat.

West Gulf Coastal Plain Muck Bog Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	N/A	N/A	N/A
Agriculture/Aquaculture	N/A	N/A	N/A
Energy Production & Mining	N/A	N/A	N/A
Transportation & Service Corridors	Small	Moderate	Low
Biological Resource Use	N/A	N/A	N/A
Human Intrusion/Disturbance	Small	Serious	Low
Natural System Modification	Pervasive	Moderate	Medium
Invasive & other Problematic Species	Large	Moderate	Medium
Pollution	Large	Slight	Low
Geological Events	N/A	N/A	N/A
Climate Change & Severe Weather	N/A	N/A	N/A
Overall Calculated Threat Impact: Low			

Habitat Research Needs/Conservation Actions:

1. Conduct basic botanical and zoological studies, including analyses of substrate and characterization of the floating mat.
2. Address questions regarding development, peat age, and buoyancy of floating mats in this habitat.
3. Document new occurrences of this habitat.
4. Promote fire in this habitat – since the floating mat is submersed during the dormant season, summer or fall burning is necessary.

q. Western Hillside Seepage Bog

Rarity Rank: S1/G2G3

Synonyms: Pitcher Plant Bog, Herbaceous Bog, Bog, Hillside Seep, Hillside Bog

Ecological Systems: CES203.194 West Gulf Coastal Plain Herbaceous Seepage Bog

General Description:

Hillside Seepage Bogs are open, mostly treeless, herb-dominated natural wetlands of hilly, sandy uplands historically dominated by Longleaf Pine (*Pinus palustr*is). This community can be found in the EGCP and WGCP in Louisiana. In the WGCP, these bogs occur on the Pleistocene high and intermediate terraces and on Tertiary uplands (Catahoula, Fleming, and Sparta formations). They occur commonly on mid- to lower slopes, on saturated, strongly acidic (pH ca. 4.5 - 5.5) and nutrient-poor substrates of fine sandy loams or loamy fine sands with relatively high organic matter content (Smith 1996). Soil series names have generally not been assigned to bogs due to the naturally very limited acreage in the state (Smith 1996).

These bogs are generally persistently wet from seepage and are variable in size being most often less than one acre, but rarely exceeding 10 acres. WGCP bogs are underlain by an impervious clay or sandstone layer that, when conditions are right, causes groundwater to constantly seep to the soil surface. The herbaceous ground cover is dense, continuous and floristically rich. It is dominated by sedges, grasses and grass-like plants, and many kinds of unusual forbs, including Yellow Trumpet Pitcher Plants (*Sarracenia alata*) and a variety of orchid species. Many species are restricted to this habitat and closely allied Longleaf Pine Flatwoods Savanna. Patches of shrubs are often present within bogs and can become more prevelant, possibly degrading the habitat, if fire is excluded from the system. This is due to the fact that hillside bogs are embedded in what are now, or historically were, Longleaf Pine Woodlands, which are fire-driven systems. These bogs therefore evolved with frequent growing-season fire events. Among other things, frequent fire deters invasion by shrubs and trees and stimulates growth, flowering and seed production by indigenous bog herbs (Barker 1980).

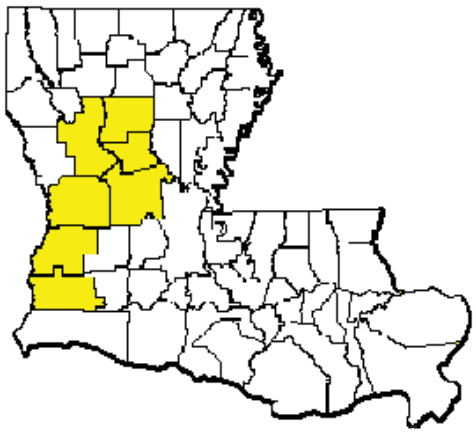
The degree to which a bog remains wet throughout the year depends on the size of the watershed, the soil infiltration rate upslope, the rate of saturated flow in the soil, the topographic position of the bog, the bog's water storage capacity, and the rate of water leaving the bog from evapo-transpiration and through surface and sub-surface flow. In general, the greater the infiltration rate of the watershed soils and the water holding capacity of bog soils, the smaller the recharge area needed to maintain seepage throughout dry periods of the year. Therefore, bogs are extremely sensitive to surrounding land management activities and are easily degraded or destroyed by activities that alter natural hydrologic regimes.

Western Hillside Seepage Bog, Fort Polk, Vernon Parish

Western Hillside Seepage Bog: Characteristic Plants	
Red Milkweed	*Asclepias rubra*
Grass Pink	*Calopogon tuberosus*
Toothache Grass	*Ctenium aromaticum*
Bog Rush	*Juncus trigonocarpus*
Savanna Meadow Beauty	*Rhexia alifanus*
Fringed Meadow Beauty	*Rhexia petiolata*
Featherbristle Beak Sedge	*Rhynchospora oligantha*
Plumed Beak Sedge	*Rhynchospora plumosa*
White-top Sedge	*Rhynchospora latifolia*
Yellow Trumpet Pitcher Plant	*Sarracenia alata*
Nut Sedges	*Scleria* spp.
Coastal Plain Yellow-eyed-grass	*Xyris ambigua*
Harper's Yellow-eyed-grass	*Xyris scabrifolia*
Kral's Yellow-eyed grass	*Xyris stricta var. obscura*

Current Extent and Status:

This is a small-scale habitat, historically thought to have occupied less than 2,000 acres, with an estimated 50-75% remaining today. In the WGCP, Hillside Seepage Bogs are found from Calcasieu north to Natchitoches and Winn Parishes. Most known occurrences are in Vernon and Natchitoches Parishes on KNF and Ft. Polk Military Reservation and WMA. There are possibly many more unknown bogs in these parishes and Beauregard Parish. Beauregard Parish has received relatively little biological inventory.



Western Hillside Seepage Bog SGCN (25)	
Non-crustacean Arthropods (4)	
Pitcher Plant Spiketail	*Cordulegaster sarracenia*
Texas Emerald	*Somatochlora margarita*
Georgia Satyr	*Neonympha areolatus*
Monarch	*Danaus plexippus*
Birds (6)	
Yellow Rail	*Coturnicops noveboracensis*
Sedge Wren	*Cistothorus platensis*
Field Sparrow	*Spizella pusilla*
Grasshopper Sparrow	*Ammodramus savannarum*
Henslow's Sparrow	*Ammodramus henslowii*
Le Conte's Sparrow	*Ammodramus leconteii*
Mammals (1)	
Long-tailed Weasel	*Mustela frenata*
Plants (14)	
Bearded Grass-pink	*Calopogon barbatus*
Black Snakeroot	*Zigadenus densus*
Drummond's Yellow-eyed-grass	*Xyris drummondii*
Harper's Yellow-eyed-grass	*Xyris scabrifolia*
Large Beak Sedge	*Rhynchospora macra*
Large-leaved Grass-of-Parnassus	*Parnassia grandifolia*
Large White Fringed Orchid	*Platanthera blephariglottis var. conspicua*
One-flowered Broomrape	*Orobanche uniflora*

Pineland Bogbutton	*Lachnocaulon digynum*
Red Milkweed	*Asclepias rubra*
Sabine Coneflower	*Rudbeckia scabrifolia*
Staghorn Clubmoss	*Lycopodiella cernua var. cernua*
Swamp Thistle	*Cirsium muticum*
Yellow Fringeless Orchid	*Platanthera integra*

Threats Affecting Habitat:

Fire exclusion or inadequate fire, and invasive species (especially Feral Hogs) are the main threats to this habitat.

Western Hillside Seepage Bog Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	Small	Serious	Low
Agriculture/Aquaculture	Restricted	Serious	Medium
Energy Production & Mining	Small	Serious	Low
Transportation & Service Corridors	N/A	N/A	N/A
Biological Resource Use	Restricted	Moderate	Low
Human Intrusion/Disturbance	Restricted	Moderate	Low
Natural System Modification	Large	Serious	High
Invasive & other Problematic Species	Pervasive	Serious	High
Pollution	N/A	N/A	N/A
Geological Events	N/A	N/A	N/A
Climate Change & Severe Weather	Pervasive	Moderate	Medium
Overall Calculated Threat Impact: Medium			

Habitat Research Needs/Conservation Actions:

1. Continue surveys to determine the extent and condition of this habitat type.
2. Expand the number of data exchanges between LNHP and forest products companies to prevent damage of this habitat due to lack of awareness.
3. Work with staff of KNF and Ft. Polk to implement appropriate management, including optimal fire timing and frequency.
4. Encourage landowners to include this community type in prescribed burning plans, and discourage the placement of firebreaks around bogs.
5. Provide additional cost share funds for landowners to reduce or eliminate the costs associated with conducting prescribed burns on their property.
6. Include the presence of embedded Western Hillside Seepage Bogs as a criterion when scoring properties for LDWF PBIs.
7. Support control of Feral Hogs within and near this habitat type.

5. EPHEMERAL PONDS

Ephemeral ponds are isolated depressions that hold water seasonally. They capture rain water and, in some cases, receive laterally-flowing groundwater, but are not connected to streams or other water bodies. Ephemeral ponds occur in several ecoregions, in forest, savanna, and grassland landscapes, and can be open and herb-dominated or wooded. Each of these ephemeral pond types is in need of basic natural history study. Plant species characteristic of each pond type are listed below the general descriptions. SGCN are listed for all combined ephemeral pond types in a single table at the end of this section.

a. Flatwoods Pond (East and West Gulf Coastal Plain)

Rarity Ranks: East Gulf Coastal Plain Flatwoods Pond - S1
West Gulf Coastal Plain Flatwoods Pond - S2

Synonyms: none

Ecological Systems: CES203.547 West Gulf Coastal Plain Flatwoods Pond

General Description:

Flatwoods ponds are embedded in Eastern and Western Longleaf Pine Flatwoods Savannas and are believed to occupy swales and depressions remaining from ancient Pleistocene stream channels. They are often linear in shape, although circular and elliptical ponds do occur. Where surrounding soils are coarser, wind deflation during historical droughts is a potential source of origin. Flatwoods Ponds may range from just a few inches deep relative to surrounding landscape, to approximately 5 feet deep in larger ponds. Generally treeless, these ponds are vegetated by a variety of obligate and facultative wetland herbaceous species, mainly tall sedges and grasses. Deep ponds are characterized by a variable mix of herbs. Trees, often appearing stunted, may be present in deeper, more frequently flooded, and therefore less fire-exposed ponds. The hydrologic regime of these ponds is characterized by a seasonally fluctuating water level–dry in summer and fall and flooded to various depths in winter and early spring. This water level fluctuation causes distinct vegetation zones with species sorting out according to their relative tolerance or competitive adaptations to flooding and saturated soil conditions. Flatwoods Ponds were historically maintained by frequent lightning generated fires that swept the Longleaf Pine Flatwoods Savannas every few years. Such fires burned into the ponds during the late spring/summer dry season, killing back encroaching shrubs and trees and rejuvenating the herbaceous ground cover. Flatwoods Ponds are important breeding habitat for many amphibians, including several SGCN.

WGCP Flatwoods Pond, Beauregard Parish

EGCP Flatwoods Pond: Characteristic Plants	
Southern Waxy Sedge	*Carex glaucescens*
White Titi	*Cyrilla racemiflora*
Myrtle Holly	*Ilex myrtifolia*
Fetterbush	*Lyonia lucida*
Swamp Blackgum	*Nyssa biflora*

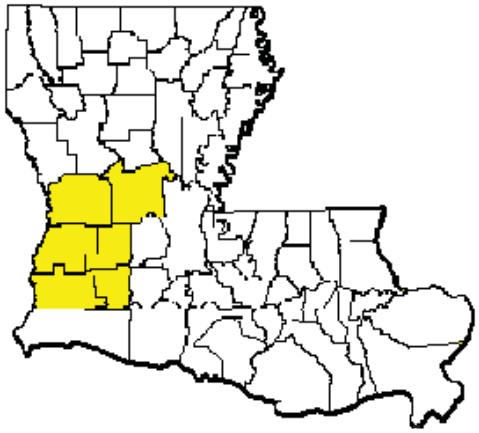
WGCP Flatwoods Pond: Characteristic Plants	
Longleaf Three-Awn	*Aristida palustris*
Mayhaw	*Crataegus opaca*
Swamp Blackgum	*Nyssa biflora*
White-top Sedge	*Rhynchospora latifolia*
Baldwin's Nut Sedge	*Scleria baldwinii*
American Snowbell	*Styrax americanus*
Iris-leaf Yellow-eyed-grass	*Xyris laxifolia* var. *iridifolia*
Pineland Yellow-eyed-grass	*Xyris stricta* var. *stricta*

Current Extent and Status:

Smith (1993) estimated Flatwoods Ponds to have occupied 2,000 to 10,000 acres historically, and that 10 to 25% of the original extent remains today. It is not clear if Smith's estimate is for all Flatwoods Ponds or just those in the WGCP.

EGCP Current Extent:

WGCP Current Extent:



Threats Affecting Habitat:

Flatwoods Ponds in both the EGCP and WGCP are threatened by various sources of disturbance. The most impactful threats to both are inadequate fire and invasive plants and animals.

EGCP Flatwoods Pond Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	Restricted	Serious	Medium
Agriculture/Aquaculture	Large	Moderate	Medium
Energy Production & Mining	Restricted	Moderate	Low
Transportation & Service Corridors	Small	Moderate	Low
Biological Resource Use	Small	Moderate	Low
Human Intrusion/Disturbance	Restricted	Slight	Low
Natural System Modification	Large	Moderate	Medium
Invasive & other Problematic Species	Pervasive	Serious	High
Pollution	Restricted	Moderate	Low
Geological Events	N/A	N/A	N/A
Climate Change & Severe Weather	Pervasive	Slight	Low
Overall Calculated Threat Impact: High			

WGCP Flatwoods Pond Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	Small	Serious	Low
Agriculture/Aquaculture	Pervasive	Serious	High
Energy Production & Mining	Small	Moderate	Low
Transportation & Service Corridors	Small	Moderate	Low
Biological Resource Use	Restricted	Moderate	Low
Human Intrusion/Disturbance	Small	Slight	Low
Natural System Modification	Large	Moderate	Medium
Invasive & other Problematic Species	Pervasive	Serious	High
Pollution	Restricted	Moderate	Low
Geological Events	N/A	N/A	N/A
Climate Change & Severe Weather	Pervasive	Slight	Low
Overall Calculated Threat Impact: High			

Habitat Research Needs/Conservation Actions:

1. Continue surveys to determine the extent and condition of this habitat type in both the EGCP and WGCP.
2. Conduct research to determine whether EGCP Flatwoods Ponds were historically wooded or open.
3. Support restoration of Flatwoods Ponds that have been converted to Bayhead Swamp by mechanical or hand clearing of woody vegetation and restoration of natural fire regimes.
4. Implement a cost-share program to partially offset costs to restore Flatwoods Ponds.
5. Provide education to landowners and managers about Flatwoods Ponds and discourage placement of fire lines around Flatwoods Ponds and modification of pond basins.
6. Include the presence of embedded Flatwoods Ponds as a criterion when scoring properties for the LDWF PBIs.

b. Prairie Pothole

Rarity Rank: S1
Synonyms: Buffalo Wallow
Ecological Systems: none

General Description:

This ephemeral pond type occurs on the Coastal Prairie landscape in southwest Louisiana. Prairie Potholes are small (often < 1 acre) and circular, elliptical, or sinuous when occupying relict drainage channels winding through a prairie. Prairie Potholes can be well-defined and distinct from the surrounding prairie, or more subtle. Hypotheses for the origin of Prairie Potholes include wind deflation during historical periods of harsh drought, wallowing out by animals such as American Bison (*Bos bison*), and fluvial processes. Pothole depth apparently determines vegetation composition, but detailed studies of how vegetation relates to elevation, soils, and hydrology are lacking. Some Prairie Potholes support Freshwater Marsh vegetation, with the grass Maidencane (*Panicum hemitomon*) dominating, while others are rich in sedges and rushes.

Prairie Pothole, Calcasieu Parish

Prairie Pothole: Characteristic Plants	
Small-Fruited Spike Sedge	*Eleocharis microcarpa*
Square-Stem Spike Sedge	*Eleocharis quadrangulata*
Conecup Spike Sedge	*Eleocharis tuberculosa*
Jointed Rush	*Juncus nodatus*
Cutleaf Watermilfoil	*Myriophyllum pinnatum*
Maidencane	*Panicum hemitomon*
Pickerel Weed	*Pontederia cordata*
Mermaid Weeds	*Proserpinaca palustris* and *P. pectinata*
Clustered Beak Sedge	*Rhynchospora glomerata*
Tall Horned Beak Sedge	*Rhynchospora macrostachya*
Pineland Beak Sedge	*Rhynchospora perplexa*

Current Extent:

Nearly all of the historical Coastal Prairie has been land-leveled and plowed. Prairie Potholes are very rare on today's landscape, occurring on Coastal Prairie remnants in the rangelands of Calcasieu and Cameron Parishes.

Threats Affecting Habitat:

Prairie Potholes are threatened by disturbance from several human sources, as well as by invasive species, most notably Feral Hogs.

Prairie Pothole Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	N/A	N/A	N/A
Agriculture/Aquaculture	Pervasive	Moderate	Medium
Energy Production & Mining	Restricted	Serious	Medium
Transportation & Service Corridors	Restricted	Moderate	Low
Biological Resource Use	N/A	N/A	N/A
Human Intrusion/Disturbance	Restricted	Moderate	Low
Natural System Modification	Small	Slight	Low
Invasive & other Problematic Species	Pervasive	Moderate	Medium
Pollution	Pervasive	Slight	Low
Geological Events	N/A	N/A	N/A
Climate Change & Severe Weather	Pervasive	Slight	Low
Overall Calculated Threat Impact: Medium			

Habitat Research Needs/Conservation Actions:

1. Conduct studies documenting vegetation composition and structure, relating vegetation to environmental variables.
2. Conduct zoological inventories of this habitat type.
3. Continue working cooperatively with private ranches to implement stewardship on Coastal Prairie rangelands, especially prescribed fire.

c. Sparta Sand Pond

Rarity Rank: S1
Synonyms: none
Ecological Systems: none

General Description:

Sand ponds are extremely rare in Louisiana, with only a few known records on the Sparta Formation in Bienville Parish. Sparta Sand Ponds may be ancient inter-dune depressions which formed in dry shifting sands during historical dry climate intervals. Known examples are mostly wooded, but it is possible this is an artifact of fire exclusion. Black-fruited Spike Sedge is a sand pond specialist, and its presence at one Louisiana sand pond is strong evidence that it is a natural feature.

Sparta Sand Pond, Bienville Parish

Sparta Sand Pond: Characteristic Plants	
Black-fruited Spike Sedge	*Eleocharis melanocarpa*
Creeping Rush	*Juncus repens*
Swamp Blackgum	*Nyssa biflora*
Warty Panicum	*Panicum verrucosum*
Maryland Meadowbeauty	*Rhexia mariana*
Laurel Oak	*Quercus laurifolia*
Iris-leaf Yellow-eyed-grass	*Xyris laxifolia* var. *iridifolia*

Current Extent and Status:

Sand Ponds are common on sandy formations in Texas, but very rare in Louisiana, where it is restricted to the Sparta Formation. All known occurrences are on industrial forest lands.

Threats Affecting Habitat:

Sparta Sand Ponds are apparently naturally rare in Louisiana. Main threats come from adjacent land uses, and include fire exclusion and woody encroachment on pond margins by planted or volunteering pines. This encroachment likely would have been prevented by frequent fires burning into the edges of Sparta Sand Ponds from adjacent Upland Longleaf Pine Woodland.

Sparta Sand Pond Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	Restricted	Moderate	Low
Agriculture/Aquaculture	Large	Moderate	Medium
Energy Production & Mining	Small	Serious	Low
Transportation & Service Corridors	Small	Moderate	Low
Biological Resource Use	Small	Moderate	Low
Human Intrusion/Disturbance	N/A	N/A	N/A
Natural System Modification	Large	Moderate	Medium
Invasive & other Problematic Species	Pervasive	Serious	High
Pollution	Restricted	Slight	Low
Geological Events	N/A	N/A	N/A
Climate Change & Severe Weather	Pervasive	Slight	Low
Overall Calculated Threat Impact: Medium			

Habitat Research Needs/Conservation Actions:

1. Continue surveys to determine the extent and condition of this habitat type.
2. Encourage stewardship of sand ponds; beneficial management practices include mechanical or hand removal of woody vegetation on pond margins (especially pines, whose needles acidify the water), and prescribed burning, allowing fires to burn into drawn-down pond edges.

d. Macon Ridge Green Ash Pond

Rarity Rank: S1/G2?

Synonyms: Spicewood Pond, Spicewood Brake

Ecological Systems: CES203.196 Mississippi River High Floodplain (Bottomland) Forest

General Description:

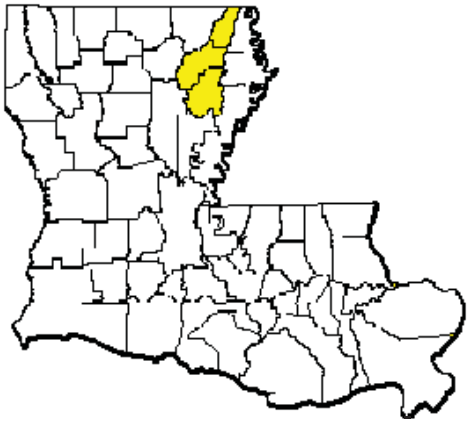
This wooded ephemeral pond type is restricted to Macon Ridge in northeast Louisiana. Macon Ridge Green Ash Ponds are embedded in what was historically Hardwood Flatwoods, and possibly in Mixed Hardwood-Loblolly Pine Forest on higher elevations. On today's landscape, they are often surrounded by agricultural fields. On General Land Office survey records, Macon Ridge Green Ash Ponds are sometimes referred to as spicewood ponds or spicewood brakes, a possible reference to the aromatic shrub Pondberry (*Lindera melissifolia*), which is federally listed as endangered.

Macon Ridge Green Ash Pond, Franklin Parish

Macon Ridge Green Ash Pond: Characteristic Plants	
Cypress-knee Sedge	*Carex decomposita*
Water Hickory	*Carya aquatica*
Persimmon	*Diospyros virginiana*
Green Ash	*Fraxinus pennsylvanica*
Swamp Cottonwood	*Populus heterophylla*
Overcup Oak	*Quercus lyrata*
Willow Oak	*Quercus phellos*
Black Willow	*Salix nigra*

Current Extent and Status:

Macon Ridge Green Ash Ponds were apparently abundant in pre-settlement times. Many have been lost to agriculture. Faint outlines of ponds in cultivated fields are sometimes evident on aerial imagery. Many ponds were also spared apparently because they were too wet to farm, and are now embedded in agricultural fields.



Threats Affecting Habitat:

Macon Ridge Green Ash Ponds are threatened by invasive species, basin alteration and disturbance, and input of agricultural chemicals from adjacent fields.

Macon Ridge Green Ash Pond Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	Small	Slight	Low
Agriculture/Aquaculture	Restricted	Slight	Low
Energy Production & Mining	Small	Moderate	Low
Transportation & Service Corridors	N/A	N/A	N/A
Biological Resource Use	Restricted	Moderate	Low
Human Intrusion/Disturbance	Restricted	Slight	Low
Natural System Modification	Restricted	Serious	Medium
Invasive & other Problematic Species	Pervasive	Serious	High
Pollution	Large	Slight	Low
Geological Events	N/A	N/A	N/A
Climate Change & Severe Weather	Pervasive	Slight	Low
Overall Calculated Threat Impact: Medium			

Habitat Research Needs/Conservation Actions:

1. Continue surveys to determine the extent and condition of this habitat type.
2. Conduct zoological inventories for this habitat.
3. Develop BMPs for this habitat type, such as the use of grassland buffers to filter and reduce agricultural pollutants entering ponds.
4. Work with NRCS to develop conservation initiatives for this ephemeral pond type.

Ephemeral Pond (all types) SGCN (33)	
Crustaceans (11)	
Javelin Crawfish	*Procambarus jaculus*
Flatnose Crawfish	*Procambarus planirostris*
Vernal Crawfish	*Procambarus viaeviridis*
Twin Crawfish	*Procambarus geminus*
Gulf Crawfish	*Procambarus shermani*
Flatwoods Digger	*Fallicambarus oryktes*
Pine Hills Digger	*Fallicambarus dissitus*
Old Prairie Digger	*Fallicambarus macneesei*
Sabine Fencing Crawfish	*Faxonella beyeri*
Ouachita Fencing Crawfish	*Faxonella creaseri*
Caddo Chimney Crawfish	*Procambarus machardyi*
Non-crustacean Arthropods (1)	
Creole Pearly-eye	*Lethe creola*
Birds (1)	
Whooping Crane	*Grus americana*
Amphibians (8)	
Eastern Tiger Salamander	*Ambystoma tigrinum tigrinum*
Four-toed Salamander	*Hemidactylium scutatum*
Ornate Chorus Frog	*Pseudacris ornata*
Strecker's Chorus Frog	*Pseudacris streckeri*
Eastern Spadefoot	*Scaphiopus holbrookii*
Hurter's Spadefoot	*Scaphiopus hurterii*
Dusky Gopher Frog	*Lithobates sevosus*
Southern Crawfish Frog	*Lithobates areolatus areolatus*
Reptiles (1)	
Western Chicken Turtle	*Deirochelys reticularia miaria*
Plants (11)	
Black-fruited Spike Sedge	*Eleocharis melanocarpa*
Coastal Plain Lobelia	*Lobelia flaccidifolia*
Cypress-knee Sedge	*Carex decomposita*
Dwarf Burhead	*Echinodorus tenellus*
Myrtle Holly	*Ilex myrtifolia*
Pineland Yellow-eyed-grass	*Xyris stricta var. stricta*
Pondberry	*Lindera melissifolia*

Sarvis Holly	*Ilex amelanchier*
Small's Yellow-eyed-grass	*Xyris smalliana*
Tracy's Beak Sedge	*Rhynchospora tracyi*
Water-purslane	*Didiplis diandra*

6. LENTIC WATER BODIES

a. Lakes and Reservoirs

Rarity Rank: S3S4
Synonyms: none
Ecological Systems: none

General Description:

Lakes are larger and usually deeper than ponds, but no strict size or depth criteria exist for designating a particular water body as a lake. Natural lakes in Louisiana include Oxbows and other floodplain lakes occupying abandoned river channels. Oxbow lakes form when a river meander is cut off and left as free-standing water body; as a result, Oxbows are typically U-shaped. Oxbows and other naturally occurring lakes provide valuable fish and wildlife habitat.

Reservoirs are man-made lakes created by impounding streams, and can be relatively small, or up to thousands of acres (e.g. Toledo Bend). The Red River Raft lakes (Lake Bistineau, Caddo Lake, and Cross Lake) were formed by damming of the Red River by the "Great Raft", a massive log jam that persisted for centuries. Following clearing of the Raft in the 19th century, water levels in these lakes fluctuated greatly until control structures were installed. Although reservoirs can and do provide habitat that is utilized by native species, including some SGCN, in some cases it would be desirable to remove impoundments and restore natural hydrology and habitat connectivity. Additionally, the impacts of proposed impoundments should be carefully investigated to avoid damage to natural hydrology and wildlife.

Oxbow Lake associated with Tensas River in Concordia Parish.

Current Extent and Status:

Lakes and reservoirs are common on the landscape. Natural lakes such as Oxbows are associated with floodplains of large to moderate-sized rivers. Reservoirs of varying sizes are distributed among all of Louisiana's ecoregions.

Lake and Reservoir SGCN (17)	
Mollusks (1)	
Fat Pocketbook	*Potamilus capax*
Crustaceans (1)	
Teche Painted Crawfish	*Orconectes hathawayi*
Inland Fishes (3)	
Gulf Pipefish	*Syngnathus scovelli*
Paddlefish	*Polyodon spathula*
American Eel	*Anguilla rostrata*
Amphibians (2)	
Gulf Coast Waterdog	*Necturus beyeri*
Red River Mudpuppy	*Necturus louisianensis*

Reptiles (3)	
Alligator Snapping Turtle	*Macrochelys temminckii*
Razor-backed Musk Turtle	*Sternotherus carinatus*
Western Chicken Turtle	*Deirochelys reticularia miaria*
Birds (5)	
Wood Stork	*Mycteria americana*
Little Blue Heron	*Egretta caerulea*
Roseate Spoonbill	*Platalea ajaja*
Osprey	*Pandion haliaetus*
Bald Eagle	*Haliaeetus leucocephalus*
Plants (2)	
Cypress-knee Sedge	*Carex decomposita*
Water-purslane	*Didiplis diandra*

Threats Affecting Habitat:

Lakes and Reservoirs are threatened by residential and commercial development, contamination by agricultural, municipal and industrial effluents, trash dumping, and invasive exotic species such as Giant Salvinia and Hydrilla.

Lakes and Reservoirs Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	Large	Serious	High
Agriculture/Aquaculture	N/A	N/A	N/A
Energy Production & Mining	Restricted	Moderate	Low
Transportation & Service Corridors	N/A	N/A	N/A
Biological Resource Use	N/A	N/A	N/A
Human Intrusion/Disturbance	Large	Moderate	Medium
Natural System Modification	Restricted	Moderate	Low
Invasive & other Problematic Species	Large	Serious	High
Pollution	Large	Serious	High
Geological Events	N/A	N/A	N/A
Climate Change & Severe Weather	Small	Slight	Low
Overall Calculated Threat Impact: Medium			

Habitat Research Needs/Conservation Actions:

1. Work with partners to minimize human impacts, such as nutrient loading and other pollution, affecting lakes.
2. Provide education on the limnology, ecology, and wildlife value of all lake types to the public.
3. Provide education regarding the identification and benefits of native aquatic plants and discourage indiscriminant herbicide application and introduction of non-native carp.
4. Partner with LDEQ to promote practices such as requiring updated sewage systems in communities around lakes
5. Promote retention of riparian buffers, native vegetation mats, and submerged woody debris for fish and wildlife species.

b. Ponds

Rarity Rank: not ranked
Synonyms: none
Ecological Systems: none

General Description:

Ponds are very frequent on the Louisiana landscape. Most ponds are man-made, created by impounding streams or excavating earth. The typical recreational or farm pond is often relatively "sterile", being surrounded by anthropogenic habitats such as lawn or pasture. Beaver ponds are small natural ponds that can support open swamp vegetation and recruit freshwater Submersed Aquatic Vegetation (SAV). Such ponds can provide excellent habitat for both fish and wildlife, including SGCN, and may provide refugia during times of drought when associated streambeds are subject to drying. The origins of some ponds on the landscape are not known.

Devil's Lake in Sabine Parish

Current Extent and Status:

Farm and recreational ponds are scattered across the state probably in the thousands. Beaver ponds are generally common on the landscape, though age and degree of development vary greatly. Putatively natural ponds that originated from wind deflation or some other process are apparently rare in Louisiana, but knowledge is greatly lacking.

Pond SGCN (11)	
Non-crustacean Arthropods (1)	
Creole Pearly-eye	*Lethe creola*
Amphibians (4)	
Eastern Tiger Salamander	*Ambystoma tigrinum tigrinum*
Strecker's Chorus Frog	*Pseudacris streckeri*
Eastern Spadefoot	*Scaphiopus holbrookii*
Southern Crawfish Frog	*Lithobates areolatus areolatus*
Reptiles (1)	
Western Chicken Turtle	*Deirochelys reticularia miaria*
Plants (5)	
Canby's Bulrush	*Schoenoplectus etuberculatus*
Cypress-knee Sedge	*Carex decomposita*
Narrow-fruit Horned Beak Sedge	*Rhynchospora inundata*
Threeway Sedge	*Dulichium arundinaceum*
Water-purslane	*Didiplis diandra*

Threats Affecting Habitat:

Most threats affecting ponds are local in nature, and include modification of natural ponds (removal of Beavers, alteration of basin geometry, etc.) and disturbance and pollution from human sources. Invasive exotic species threaten ponds on a larger scale.

Ponds Threats Assessment:			
1st Level Threat	**Scope**	**Severity**	**Impact**
Residential/Commercial Development	N/A	N/A	N/A
Agriculture/Aquaculture	Restricted	Extreme	Medium
Energy Production & Mining	N/A	N/A	N/A
Transportation & Service Corridors	N/A	N/A	N/A
Biological Resource Use	N/A	N/A	N/A
Human Intrusion/Disturbance	Restricted	Moderate	Low
Natural System Modification	Restricted	Serious	Medium
Invasive & other Problematic Species	Large	Serious	High
Pollution	Restricted	Extreme	Medium
Geological Events	N/A	N/A	N/A
Climate Change & Severe Weather	Small	Slight	Low
Overall Calculated Threat Impact: Medium			

Habitat Research Needs/Conservation Actions:

1. Conduct inventories and research to investigate and identify origins of putatively natural isolated ponds.
2. Conduct inventory and research on ponds of all origins to better understand SGCN use, and physical and biological characteristics.
3. Conduct biological inventories and ecological studies of Beaver ponds varying in age and degree of development.
4. Provide education on the existence and ecological importance of natural ponds to landowners and the general public.

7. SUBMERSED AQUATIC VEGETATION

Submersed Aquatic Vegetation (SAV) encompasses several associations of submersed aquatic vascular plants. These associations occupy different settings including marine, estuarine, coastal freshwater, and inland freshwater habitats. They are described separately. SGCN for all SAV types combined are presented at the end of this section.

a. Marine Seagrass Bed

Rarity Rank: S1

Synonyms: Temperate Grass Flat, Seagrass Bed, Tropical Marine Meadow, Turtlegrass Bed

Ecological Systems: CES203.263 Northern Gulf of Mexico Seagrass Bed

General Description:

This natural community occurs in shallow, relatively clear offshore marine regions with unconsolidated substrate (sand, mud, shell, silt, organic matter). Most benthic "grasses" grow in waters with primarily sand bottoms. Wave action, currents, temperature, salinity, substrate characteristics, and light penetration (turbidity) determine species assemblage. Violent storms may drastically disrupt or alter community structure. Although these grass beds are a relatively small part of the ecosystem in coastal Louisiana, it is believed they play an extremely important role. The actual ecological value of these benthic grass communities is only vaguely understood and may be under-estimated. They are extremely productive communities, often as productive as Salt Marsh. They are known to provide food for a number of animals and act as nursery areas and refugia for the young of many fishes and invertebrates. They support a diverse epiphytic biota, including algae, fungi, bacteria, protozoans, bryozoans, and hydrozoans, thus creating a unique environment that allows for the existence of some indigenous grassbed species. They supply detrital material and nutrients to the water, add oxygen via photosynthesis, and stabilize bottom sediments by increasing deposition of suspended particulate matter.

Marine Seagrass Bed: Characteristic Plants	
Manatee-grass	*Cymodocea filiformis*
Shoal-grass	*Halodule beaudettei*
Sea-grass	*Halophila englemanii*
Widgeon-grass	*Ruppia maritima*
Turtle-grass	*Thalassia testudinum*

Current Extent and Status:

This habitat is restricted to the Chandeleur Islands, where it is extensive in the clear shallows on the leeward side of the islands.

Threats Affecting Habitat:

While the relatively short-term overall calculated threat impact to Marine SAV is low, long-term survival depends on having adequate protection from the Chandeleur Islands, which have degraded in recent decades. Damage to seagrass beds by outboard motors may also threaten this community.

Marine SAV Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	N/A	N/A	N/A
Agriculture/Aquaculture	N/A	N/A	N/A
Energy Production & Mining	Restricted	Extreme	Medium
Transportation & Service Corridors	N/A	N/A	N/A
Biological Resource Use	N/A	N/A	N/A
Human Intrusion/Disturbance	Pervasive	Moderate	Medium
Natural System Modification	N/A	N/A	N/A
Invasive & other Problematic Species	N/A	N/A	N/A
Pollution	N/A	N/A	N/A
Geological Events	N/A	N/A	N/A
Climate Change & Severe Weather	Pervasive	Slight	Low
Overall Calculated Threat Impact: Low			

Habitat Research Needs/Conservation Actions:

1. Determine areal extent of, and map marine SAV at Chandeleur Islands.
2. Conduct inventory and monitoring to determine changes in condition and extent over time and to identify emerging threats.
3. Support incorporation of the Chandeleur Islands into the CPRA Coastal Master Plan; these islands are biologically valuable and should be a priority for protection.
4. Work with CPRA and other agencies to implement measures to nourish the Chandeleur Islands, such as augmenting sand supply.

b. Estuarine Submersed Aquatic Vegetation

Rarity Rank: S1S2; G3G5

Synonyms: none

Ecological Systems Classification: CES203.263 Northern Gulf of Mexico Seagrass Bed
CES203.511 Texas-Louisiana Fresh-Oligohaline Subtidal Aquatic Vegetation

General Description:

These brackish water communities consist of submersed, rooted vascular plants growing in shallow, protected waters with low turbidity. Temperature, salinity (5-10 ppt), substrate, wave action, and light penetration are key factors in determining the composition of the flora and fauna of these beds. Substrate is predominantly sand/mud bottoms. Small scattered beds occur in relative abundance in brackish water ponds throughout coastal Louisiana. More extensive beds are found in the Lake Pontchartrain and Barataria Basins. Although a small component of the larger estuarine ecosystem, these beds play an important ecological role. The beds support a diverse invertebrate and epiphytic population and serve as nursery grounds and shelter for many species of fish and shellfish. Additionally, these beds are extremely productive and release detritus and nutrients to surrounding waters. These beds lack widespread distribution due to the general turbidity of most of the estuaries in Louisiana.

Estuarine Submersed Aquatic Vegetation, Lake Pontchartrain

Estuarine Submersed Vascular Vegetation: Characteristic Plants	
Eurasian Watermilfoil	*Myriophyllum spicatum* (exotic)
Southern Naiad	*Najas guadalupensis*
Widgeon-Grass	*Ruppia maritima*
Eelgrass	*Vallisneria americana*
Horned Pondweed	*Zannichellia palustris*

Current Extent and Status:

Historical extent of this SAV type is unknown (Smith 1993). This SAV type occurs in waters subject to occasional salinity pulses in Lake Pontchartrain and several lakes in the Barataria Basin, such as Lake Salvador.

Threats Affecting Habitat:

This habitat faces some threat from various sources of human disturbance, including damage from outboard motors. Activities which increase the turbidity in the waters surrounding SAV beds threaten the viability of Estuarine SAV. Alteration to salinity levels due to marsh loss also threatens this habitat.

Estuarine SAV Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	N/A	N/A	N/A
Agriculture/Aquaculture	N/A	N/A	N/A
Energy Production & Mining	Restricted	Extreme	Medium
Transportation & Service Corridors	Restricted	Serious	Medium
Biological Resource Use	N/A	N/A	N/A
Human Intrusion/Disturbance	Restricted	Moderate	Low
Natural System Modification	Restricted	Moderate	Low
Invasive & other Problematic Species	N/A	N/A	N/A
Pollution	Large	Slight	Low
Geological Events	N/A	N/A	N/A
Climate Change & Severe Weather	Pervasive	Slight	Low
Overall Calculated Threat Impact: Low			

Habitat Research Needs/Conservation Actions:

1. Continue surveys to determine the extent and condition of this habitat type; re-visit and evaluate existing occurrences in the LNHP database.
2. Protect this SAV type from damage resulting from boat traffic and development of oil and gas infrastructure.

c. River Delta Freshwater Submersed Aquatic Vegetation

Rarity Rank: S3S4

Synonyms: none

Ecological System: CES203.470 Mississippi Delta Fresh and Oligohaline Tidal Marsh

General Description:

Louisiana's two active deltas, the Mississippi and Atchafalaya Deltas, support extensive SAV beds in shallow water areas. Among the submersed species are also included some floating-leaved species (see table below). As sediments accumulate, this SAV type gives way to the Vegetated Pioneer Emerging Delta habitat. Salinities for this community typically range from 0-5 ppt.

River Delta Submersed Aquatic Vegetation, Atchafalaya Delta WMA

River Delta Freshwater Submersed Vascular Vegetation: Characteristic Plants	
Water Star-grass	*Heteranthera dubia*
Eurasian Water Milfoil	*Myriophyllum spicatum* (exotic)
Southern Naiad	*Najas guadalupensis*
Crisped Pondweed	*Potamogeton crispus* (exotic)
Longleaf Pondweed	*Potamogeton nodosus* (floating-leaved aquatic)
Sago Pondweed	*Stuckenia pectinata*

Current Extent and Status:

River Delta SAV beds are associated with the Mississippi and Atchafalaya Deltas. This community can be found on Atchafalaya Delta and Pass-a-Loutre WMAs, as well as Delta NWR.

Threats Affecting Habitat:

This SAV type is threatened by disturbance associated with mineral extraction, canals, and utility corridors including damage from outboard motors. Invasive species pose some threat as well, particularly if native species are excluded. Possible increase in frequency and intensity of tropical storms associated with climate change may impact this habitat. Increased salinity due to altered hydrology, marsh loss, and SLR also threaten this community.

River Delta Freshwater SAV Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	N/A	N/A	N/A
Agriculture/Aquaculture	N/A	N/A	N/A
Energy Production & Mining	Large	Slight	Low
Transportation & Service Corridors	Large	Slight	Low
Biological Resource Use	N/A	N/A	N/A
Human Intrusion/Disturbance	N/A	N/A	N/A
Natural System Modification	N/A	N/A	N/A
Invasive & other Problematic Species	Pervasive	Slight	Low
Pollution	N/A	N/A	N/A
Geological Events	N/A	N/A	N/A
Climate Change & Severe Weather	Pervasive	Moderate	Medium
Overall Calculated Threat Impact: Low			

Habitat Research Needs/Conservation Actions:

1. Conduct studies to determine the areal extent of this SAV type, and address basic ecological questions regarding its development and maintenance.
2. Reduce human disturbance of this habitat type on public and private lands.

d. Coastal Marsh and Bayou Freshwater Submersed Aquatic Vegetation

Rarity Ranks: S3S4
Synonyms: none
Ecological Systems Classification: CES203.467 Gulf Coast Chenier Plain Fresh and Oligohaline Tidal Marsh
CES203.470 Mississippi Delta Fresh and Oligohaline Tidal Marsh

General Description:

Ponds embedded within Freshwater Marsh and bayous and canals that traverse Freshwater Marsh can all have well-developed SAV beds. There is some species overlap in this type of SAV with SAV in estuarine waters, which are fresh or nearly so much of the time (0-5 ppt), and with Interior Freshwater SAV. Floating leaved aquatics such as Water-lilies (*Nymphaea* spp.) are also often conspicuous in Coastal Freshwater SAV.

Current Extent and Status:

This habitat occurs throughout the coastal Freshwater Marshes and interface of Cypress-Tupelo-Blackgum Swamps and Freshwater Marshes. This SAV type develops in natural and man-made water bodies. Exemplary occurrences of this habitat can be found in Lacassine Pool on Lacassine NWR, White Lake Wetlands Conservation Area, and Salvador WMA. Other public lands that support this community include Pass-a-Loutre, Atchafalaya Delta, and Lake Boeuf WMAs, and Delta NWR.

Coastal Marsh and Bayou Freshwater Submersed Aquatic Vegetation: Characteristic Plants	
Snot Plant	*Brasenia schreberi* (floating-leaved aquatic)
Fanwort	*Cabomba caroliniana*
Coontail	*Ceratophyllum demersum*
Hydrilla	*Hydrilla verticillata* (exotic)
Southern Naiad	*Najas guadalupensis*
American Lotus	*Nelumbo lutea*
Water-Lillies	*Nymphaea elegans, mexicana, odorata* (floating-leaved aquatics)
Small Pondweed	*Potamogeton pusillus*
Common Bladderwort	*Utricularia macrorhiza*
Purple Bladderwort	*Utricularia purpurea*
Eelgrass	*Vallisneria americana*

Threats Affecting Habitat:

Several human sources of disturbance, invasive exotic species, and possible effects of climate change, including possible increases in tropical storm frequency and intensity and SLR, potentially threaten this habitat.

Coastal Marsh and Bayou SAV Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	N/A	N/A	N/A
Agriculture/Aquaculture	N/A	N/A	N/A
Energy Production & Mining	Restricted	Slight	Low
Transportation & Service Corridors	Large	Slight	Low
Biological Resource Use	N/A	N/A	N/A
Human Intrusion/Disturbance	Large	Slight	Low
Natural System Modification	Restricted	Moderate	Low
Invasive & other Problematic Species	Large	Moderate	Medium
Pollution	Large	Slight	Low
Geological Events	N/A	N/A	N/A
Climate Change & Severe Weather	Large	Moderate	Medium
Overall Calculated Threat Impact: Low			

Habitat Research Needs/Conservation Actions:

1. Continue biological inventory and research of this SAV type.
2. In impounded marshes, encourage water management regimes that benefit this SAV type and prevent invasion by emergent plant species and conversion to marsh.
3. Protect this SAV type from threats posed by boat traffic and development of oil and gas infrastructure.

e. Interior Freshwater Submersed Aquatic Vegetation

Rarity Ranks: S2S4

Synonyms: none

Ecological Systems Classification: none

General Description:

Freshwater SAV in interior Louisiana is highly variable, and can occupy swamp lakes (e.g. Oxbows), reservoirs (especially upper ends), sluggish bayous, Beaver ponds, and small farm ponds. The benefits of SAV include oxygenation of water, habitat structure for all forms of aquatic life (e.g. shade for fish), and a basis for aquatic food webs that benefits all wildlife associated with a particular SAV occurrence. The details of formal recognition of individual occurrences of this type of SAV have not been determined. For example, a small patch of Coontail in a farm pond does not provide the same quantity and quality of habitat as a floodplain lake supporting abundant SAV consisting of multiple species. Aquatic plants have good dispersal abilities, and can be quickly recruited in a water body lacking aquatic vegetation. Older, better developed, and species rich SAV beds containing native species are of particular interest for conservation and protection.

Interior Freshwater Submersed Aquatic Vegetation: Characteristic Plants	
Snot Plant	*Brasenia schreberi* (floating-leaved aquatic)
Fanwort	*Cabomba caroliniana*
Coontail	*Ceratophyllum demersum*
Hydrilla	*Hydrilla verticillata* (exotic)
American Lotus	*Nelumbo lutea* (floating-leaved aquatic)
White Water-Lily	*Nymphaea odorata* (floating-leaved aquatic)
Waterthread Pondweed	*Potamogeton diversifolius* (floating-leaved aquatic)
Inflated Bladderwort	*Utricularia inflata*

Current Extent and Status:

This habitat occurs statewide in a variety of water bodies. Areal extent, degree of development, and plant species richness vary widely.

Threats Affecting Habitat:

Interior Freshwater SAV is threatened in some cases by habitat instability, and by invasive plants. Climate change poses an additional threat, especially if there are reductions in precipitation.

Interior Freshwater SAV Threats Assessment:			
1st Level Threat	**Scope**	**Severity**	**Impact**
Residential/Commercial Development	N/A	N/A	N/A
Agriculture/Aquaculture	N/A	N/A	N/A
Energy Production & Mining	N/A	N/A	N/A
Transportation & Service Corridors	N/A	N/A	N/A
Biological Resource Use	N/A	N/A	N/A
Human Intrusion/Disturbance	N/A	N/A	N/A
Natural System Modification	Small	Serious	Low
Invasive & other Problematic Species	Large	Moderate	Medium
Pollution	Restricted	Moderate	Low
Geological Events	N/A	N/A	N/A
Climate Change & Severe Weather	Pervasive	Slight	Low
Overall Calculated Threat Impact: Low			

Habitat Research Needs/Conservation Actions:

1. Continue surveys to document and describe exemplary occurrences of this SAV type.
2. Produce literature presenting information on the identification of aquatic plants and explaining the benefits of SAV.
3. Produce and distribute a poster series highlighting Interior Freshwater SAV habitat and associated native and exotic aquatic plants.
4. Continue to invest in cleaning stations at boat ramps to limit the spread of invasive exotic aquatic plants.

Submersed Aquatic Vegetation (all types) SGCN (32)	
Mollusks (5)	
Bay Scallop	*Argopecten irradians*
Sawtooth Penshell	*Atrina serrata*
Half-Naked Penshell	*Atrina seminuda*
Channeled Whelk	*Busycotypus canaliculatus*
Lightning Whelk	*Busycon sinistrum*
Inland Fish (1)	
Gulf Pipefish	*Syngnathus scovelli*
Marine Fish (4)	
Dwarf Seahorse	*Hippocampus zosterae*
Opossum Pipefish	*Microphis brachyurus*
Chain Pipefish	*Syngnathus louisianae*
Texas Pipefish	*Syngnathus texanus*
Reptiles (5)	
Loggerhead Sea Turtle	*Caretta caretta*
Green Sea Turtle	*Chelonia mydas*
Hawksbill Sea Turtle	*Eretmochelys imbricata*
Kemp's Ridley Sea Turtle	*Lepidochelys kempii*
Leatherback Sea Turtle	*Dermochelys coriacea*
Birds (5)	
Mottled Duck	*Anas fulvigula*
Northern Pintail	*Anas acuta*
Canvasback	*Aythya valisineria*
Redhead	*Aythya americana*
Lesser Scaup	*Aythya affinis*
Mammals (1)	
West Indian Manatee	*Trichechus manatus*
Plants (11)	
Marine SAV (4)	
Engelmann's Sea-grass	*Halophila engelmannii*
Manatee-grass	*Syringodium filiforme*
Shoal-grass	*Halodule wrightii*
Turtle-grass	*Thalassia testudinum*

Estuarine SAV (1)	
Claspingleaf Pondweed	*Potamogeton perfoliatus*
Freshwater SAV (6)	
Blue Water-lily	*Nymphaea elegans*
Loose-flowered Water-milfoil	*Myriophyllum laxum*
Nuttall's Pondweed	*Potamogeton epihydrus*
Slim Spikerush	*Eleocharis elongata*
Water-purslane	*Didiplis diandra*
Yellow Water-crowfoot	*Ranunculus flabellaris*

8. SUBTERRANEAN HABITAT

a. Cave

Rarity Rank: S1
Synonyms: none
Ecological Systems: none

General Description:

Caves are large air-filled subterranean cavities with openings to the surface. Caves are very rare in west-central Louisiana where they are associated with sandstone strata of the Catahoula and Cook Formations. Louisiana's caves appear to have been formed through the process of water erosion whereby water is able to penetrate a layer of sandstone and slowly erode a softer layer directly beneath. In their natural state they are very poorly developed and of limited extent, however the majority have been modified or enlarged by humans. In their current state, even the modified caves likely provide similar habitat for SGCN as do natural caves.

Wolf Cave, KNF, Natchitoches Parish, LA

Current Extent and Status:

There are six known natural caves in Louisiana, three of which are found on KNF. Sabine parish also contains Murrell's Caves, which may be natural in origin.

Cave SGCN (2)	
Mammals (2)	
Eastern Pipistrelle	*Perimyotis subflavus*
Northern Long-eared Bat	*Myotis septentrionalis*

Threats Affecting Habitat:

Caves are threatened by vandalism and by human disturbance.

Caves Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	N/A	N/A	N/A
Agriculture/Aquaculture	N/A	N/A	N/A
Energy Production & Mining	N/A	N/A	N/A
Transportation & Service Corridors	N/A	N/A	N/A
Biological Resource Use	N/A	N/A	N/A
Human Intrusion/Disturbance	Restricted	Moderate	Low
Natural System Modification	N/A	N/A	N/A
Invasive & other Problematic Species	N/A	N/A	N/A
Pollution	Restricted	Slight	Low
Geological Events	N/A	N/A	N/A
Climate Change & Severe Weather	N/A	N/A	N/A
Overall Calculated Threat Impact: Low			

Habitat Research Needs/Conservation Actions:

1. Close caves to the public and install gates if warranted
2. Conduct zoological surveys of Louisiana caves, especially for bats and invertebrates.
3. Conduct surveys to determine the extent of Louisiana caves.

9. GEOLOGIC FEATURE

a. Barrier Island

Rarity Rank: S1/N/A

Synonyms: None

Ecological Systems: CES203.469 Louisiana Beach
CES203.513 Mississippi Delta Maritime Forest
CES203.471 Southeastern Coastal Plain Interdunal Wetland

General Description:

Barrier Islands in Louisiana are old shorelines of abandoned, eroding deltas of the Mississippi River. Louisiana's Barrier Islands are important foraging, loafing, breeding, and nesting habitat for migratory shorebirds and colonial nesting waterbirds. The islands are not classified as a single natural community, because they are comprised of several habitat types including: Coastal Dune Grasslands, Coastal Dune Shrub Thickets, Coastal Mangrove-Marsh Shrubland, Barrier Island Live Oak Forest, Salt Marsh, and Louisiana Beach. Marine Seagrass Bed also occurs in Chandeleur Sound immediately behind the Chandeleur Islands. Plant species distribution is determined by elevation gradients and exposure to saltwater spray or tidal overwash. Generally, succulent species and vines are found on the beach fronts, Marshhay Cord Grass on highest dunes, and Black Mangrove and Smooth Cord Grass on the sheltered bayside areas.

Current Extent and Status:

Since deltaic processes have been altered due to leveeing of the Mississippi River, no new barrier islands are expected to form. Major efforts are underway to rebuild and preserve remaining islands. These efforts include using breakwaters to buffer wave action and retain sediment, pumping sand on to beaches and dunes, creating back-barrier marsh platforms, and the use of sand fencing and vegetative planting to anchor sand and stabilize the substrate.

The current major barrier islands include the Chandeleur Island chain, Grand Isle, the Grand Terre Islands, Timbalier Islands, and the Isle Dernieres. Much of the Chandeleur chain is captured by Breton NWR, and the remainder is owned as State Lands and managed by USFWS. East Timbalier Island NWR is managed by USFWS. Isle Dernieres Barrier Islands Refuge, managed by LDWF, includes Wine, Whiskey, Trinity, and Raccoon Islands. Grand Isle is the only inhabited Barrier Island, and as a result, much of the natural habitat has been destroyed, but some extremely valuable habitat remains.

Raccoon Island in the Isle Dernieres Barrier

Brown Pelicans nesting among Black Mangrove on Raccoon Island.

Barrier Island SGCN (61)	
Mollusks (5)	
Bay Scallop	*Argopecten irradians*
Sawtooth Penshell	*Atrina serrata*
Half-Naked Penshell	*Atrina seminuda*
Channeled Whelk	*Busycotypus canaliculatus*
Lightning Whelk	*Busycon sinistrum*
Crustaceans (2)	
Beach Ghost Shrimp	*Callichirus islagrande*
Carolinian Ghost Shrimp	*Callichirus major*
Non-crustacean Arthropods (5)	
Eastern Beach Tiger Beetle	*Habroscelimorpha dorsalis venusta*
Obscure Skipper	*Panoquina panoquinoides*
Eastern Pygmy Blue	*Brephidium pseudofea*
Monarch	*Danaus plexippus*
Louisiana Eyed Silkmoth	*Automeris louisiana*
Reptiles (8)	
Loggerhead Sea Turtle	*Caretta caretta*
Green Sea Turtle	*Chelonia mydas*
Hawksbill Sea Turtle	*Eretmochelys imbricata*
Kemp's Ridley Sea Turtle	*Lepidochelys kempii*
Leatherback Sea Turtle	*Dermochelys coriacea*

Mississippi Diamond-backed Terrapin	*Malaclemys terrapin pileata*
Eastern Glass Lizard	*Ophisaurus ventralis*
Gulf Saltmarsh Snake	*Nerodia clarkii clarkii*
Birds (33)	
Mottled Duck	*Anas fulvigula*
Redhead	*Aythya americana*
Lesser Scaup	*Aythya affinis*
Brown Pelican	*Pelecanus occidentalis*
Little Blue Heron	*Egretta caerulea*
Reddish Egret	*Egretta rufescens*
Glossy Ibis	*Plegadis falcinellus*
Roseate Spoonbill	*Platalea ajaja*
Clapper Rail	*Rallus crepitans*
Snowy Plover	*Charadrius nivosus*
Wilson's Plover	*Charadrius wilsonia*
Piping Plover	*Charadrius melodus*
American Oystercatcher	*Haematopus palliatus*
Long-billed Curlew	*Numenius americanus*
Marbled Godwit	*Limosa fedoa*
Red Knot	*Calidris canutus*
Dunlin	*Calidris alpina*
Short-billed Dowitcher	*Limnodromus griseus*
Sooty Tern	*Onychoprion fuscatus*
Interior Least Tern	*Sternula antillarum athalassos*
Coastal Least Tern	*Sternula antillarum*
Gull-billed Tern	*Gelochelidon nilotica*
Caspian Tern	*Hydroprogne caspia*
Common Tern	*Sterna hirundo*
Forster's Tern	*Sterna forsteri*
Royal Tern	*Thalasseus maximus*
Sandwich Tern	*Thalasseus sandvicensis*
Black Skimmer	*Rynchops niger*
Short-eared Owl	*Asio flammeus*
Peregrine Falcon	*Falco peregrinus*
Marsh Wren	*Cistothorus palustris*
Nelson's Sparrow	*Ammodramus nelsoni*
Seaside Sparrow	*Ammodramus maritimus*
Plants (8)	
Canada Spike Sedge	*Eleocharis geniculata*
Earleaf Greenbrier	*Smilax auriculata*

Inkberry	*Scaevola plumieri*
Sand Dune Spurge	*Chamaesyce bombensis*
Sand Rose-gentian	*Sabatia arenicola*
Saw Palmetto	*Serenoa repens*
Sea Oats	*Uniola paniculata*
Southern Hairgrass	*Muhlenbergia capillaris var. filipes*

Threats Affecting Habitat:

Barrier Islands are threatened by habitat destruction and disturbance from human interface, subsidence, inadequate sand supply, and potentially by increased frequency and intensity of tropical storms associated with climate change.

Barrier Island Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	Restricted	Slight	Low
Agriculture/Aquaculture	N/A	N/A	N/A
Energy Production & Mining	Restricted	Extreme	Medium
Transportation & Service Corridors	Restricted	Extreme	Medium
Biological Resource Use	N/A	N/A	N/A
Human Intrusion/Disturbance	Large	Serious	High
Natural System Modification	Pervasive	Serious	High
Invasive & other Problematic Species	Large	Serious	High
Pollution	Pervasive	Slight	Low
Geological Events	Pervasive	Slight	Low
Climate Change & Severe Weather	Pervasive	Moderate	Medium
Overall Calculated Threat Impact: Very High			

Habitat Research Needs/Conservation Actions:

1. Partner with state and federal agencies, NGOs, private landowners, and other partners to implement the Coastal Master Plan and to promote the protection and restoration of barrier islands (including Isle Dernieres Barrier Islands Refuge and the Chandeleur Islands) to benefit SGCN.
2. Work with local governing boards to recommend limits on vehicle use on undeveloped portions of barrier islands.
3. Work with NRCS Plant Materials Center and other stakeholders to provide native ecotypes for barrier island restoration efforts.
4. Support efforts by CPRA, CWPPRA, LCA, LDNR, USACE, and other partners for shoreline stabilization and habitat restoration.

10. ANTHROPOGENIC HABITATS

a. Agriculture and Improved Pasture (excluding rice)

Rarity Rank: N/A
Synonyms: None
Ecological Systems: None

General Description:

This is a general category encompassing diverse land cover and land use features of altered habitats resulting from human activity. These areas typically are dominated by non-native species. Anthropogenic habitats occur in every ecoregion throughout the state. The land cover types may include all or some of the following:

- Scattered woody and herbaceous vegetation such as orchards (pecan, citrus, etc.), vineyards, experimental plots, plant nurseries, residential areas, and roadway rights-of-way.
- Row and cover crops consisting of various grain crops, cotton, sweet potatoes, soybeans, and sugarcane.
- Fields that have been tilled or untilled containing exposed or partially exposed soil.
- Fallow fields or areas which have been left idle during the growing season.
- Utility rights-of-way.
- Pastures dominated by turf grasses such as Bermuda Grass (*Cynodon dactylon*) used for ungulate grazing, hay fields, or sod farms.
- Rangelands on previously plowed land receiving minimal management inputs and supporting a variable mix of grasses and forbs, usually “low-end” forage grasses such as Old Field Broomsedge (*Andropogon virginicus*) and Smut Grass (*Sporobolus indicus*).

Some species of wildlife benefit from agricultural production. Historically, agricultural practices and the type of crops produced were highly varied, and this provided a habitat diversity that favored numerous species. As this habitat became less diverse with changing agricultural practices (i.e., “clean” agricultural practices), and larger tracts were put in agricultural production, the habitat quality on the landscape declined for many species of wildlife. This is particularly true for both resident and migratory grassland species such as Northern Bobwhite, Eastern Bluebird, Dickcissel, Loggerhead Shrike, and many species of sparrows. Broad-spectrum pesticides that are systemic in plant tissues (e.g. Neonicotinoids) have been implicated in negatively impacting native insects that utilize agricultural lands, including important pollinators such as bees and butterflies as well as other insects that are major constituents of food webs that support SGCN.

Within this habitat type, there may be patches of “natural” habitat such as vegetated streamsides, embedded wetlands, and small blocks of forest which can serve as important breeding, dispersal, and travel corridors for various wildlife species. Farm Bill programs such as CRP and WRP have paid landowners to set aside or retire portions of farmlands from active production. Lands susceptible to erosion or farmed wetlands (lands on which yields

are variable or unreliable) are typically enrolled and are usually planted in native vegetation that was historically indigenous. Young re-planted Bottomland Hardwood Forest (early successional) is heavily used by grassland Neotropical migrants and later by American Woodcock. Although no SGCN are fully dependent upon these habitats for survival, these systems often support high concentrations of these resident and migratory species and will likely become increasingly important for these animals as climate change and urbanization claim otherwise suitable habitat.

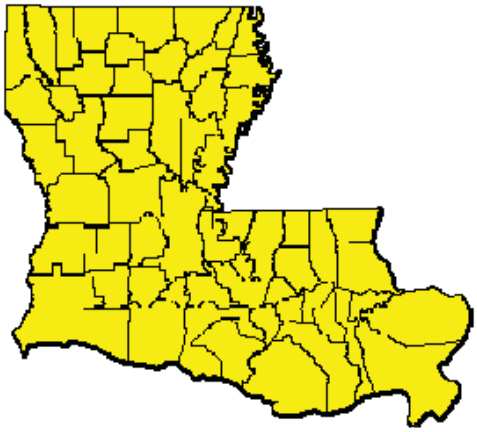
Grain crops can support SGCN such as Northern Bobwhite and wintering sparrows when appropriate field borders are incorporated into farming operations. Rain-flooded (harvested or unharvested) grain fields also provide valuable foraging habitat for wintering waterfowl. Post-harvested or tilled grain fields, where flooded shallowly, are valuable habitat for a variety of shorebirds. Dry harvested fields are primary feeding areas for wintering geese and are also used by SGCN including Sandhill Cranes and several species of raptors.

In fragmented habitats, conservation features on agricultural lands may serve to connect patches of natural habitat. Irrigation ditches are heavily used by birds, mammals, and crustaceans. Fencerows serve as breeding sites for some birds and impaling substrates for Loggerhead Shrikes. Wooded drainages can serve as travel corridors for birds and mammals, especially highly mobile species such as Louisiana Black Bear and Neotropical migratory landbirds.

Cotton field, Rapides Parish

Current Extent and Status:

There are approximately 8.1 million acres of farm land in Louisiana (Farmland Information Center 2013). Working agricultural landscapes can be greatly enhanced for fish and wildlife value with proper planning. The USDA administered Farm Bill programs offer some of the greatest opportunities for these enhancements to occur, because of the sheer magnitude of funding associated with farm programs. Programs such as CRP, WRP, and the Environmental Quality Incentives Program (EQIP) provide cost-share, incentive payments, or both to qualified participants.



Agriculture and Improved Pasture (excluding rice) SGCN (71)	
Crustaceans (10)	
Sabine Fencing Crawfish	*Faxonella beyeri*
Ouachita Fencing Crawfish	*Faxonella creaseri*
Caddo Chimney Crawfish	*Procambarus machardyi*
Gulf Crawfish	*Procambarus shermani*
Twin Crawfish	*Procambarus geminus*
Javelin Crawfish	*Procambarus jaculus*
Flatnose Crawfish	*Procambarus planirostris*
Vernal Crawfish	*Procambarus viaeviridis*
Flatwoods Digger	*Fallicambarus oryktes*
Old Prairie Digger	*Fallicambarus macneesei*
Non-crustacean Arthropods (13)	
Texas Brown Tarantula	*Aphonopelma hentzi*
Florida Harvester Ant	*Pogonomyrmex badius*
Comanche Harvester Ant	*Pogonomyrmex comanche*
American Bumble Bee	*Bombus pensylvanicus*
Wild Indigo Duskywing	*Erynnis baptisiae*
Cobweb Skipper	*Hesperia metea*
Dusted Skipper	*Atrytonopsis hianna*
Yucca Giant-Skipper	*Megathymus yuccae*
Monarch	*Danaus plexippus*
Brou's Mallow Moth	*Bagisara brouana*
Falcate Orangetip	*Anthocharis midea*
Little Metalmark	*Calephelis virginiensis*
Creole Pearly-eye	*Lethe creola*
Amphibians (2)	

Strecker's Chorus Frog	*Pseudacris streckeri*
Southern Crawfish Frog	*Lithobates areolatus areolatus*
Reptiles (6)	
Gopher Tortoise	*Gopherus polyphemus*
Western Slender Glass Lizard	*Ophisaurus attenuatus attenuatus*
Western Wormsnake	*Carphophis vermis*
Common Rainbow Snake	*Farancia erytrogramma erytrogramma*
Eastern Hog-nosed Snake	*Heterodon platirhinos*
Louisiana Pinesnake	*Pituophis ruthveni*
Birds (25)	
Northern Bobwhite	*Colinus virginianus*
Swallow-tailed Kite	*Elanoides forficatus*
White-tailed Kite	*Elanus leucurus*
Sandhill Crane	*Antigone canadensis*
Whooping Crane	*Grus americana*
Upland Sandpiper	*Bartramia longicauda*
Buff-breasted Sandpiper	*Calidris subruficollis*
American Woodcock	*Scolopax minor*
Common Ground-Dove	*Columbina passerina*
Short-eared Owl	*Asio flammeus*
Crested Caracara	*Caracara cheriway*
Southeastern American Kestrel	*Falco sparverius paulus*
Loggerhead Shrike	*Lanius ludovicianus*
Sedge Wren	*Cistothorus platensis*
Sprague's Pipit	*Anthus spragueii*
Smith’s Longspur	*Calcarius pictus*
Field Sparrow	*Spizella pusilla*
Lark Sparrow	*Chondestes grammacus*
Grasshopper Sparrow	*Ammodramus savannarum*
Henslow’s Sparrow	*Ammodramus henslowii*
Le Conte's Sparrow	*Ammodramus leconteii*
Nelson's Sparrow	*Ammodramus nelsoni*
Painted Bunting	*Passerina ciris*
Dickcissel	*Spiza americana*
Rusty Blackbird	*Euphagus carolinus*
Mammals (15)	
Southeastern Shrew	*Sorex longirostris*
Big Brown Bat	*Eptesicus fuscus*
Eastern Pipistrelle	*Perimyotis subflavus*

Rafinesque's Big-eared Bat	*Corynorhinus rafinesquii*
Southeastern Myotis	*Myotis austroriparius*
Northern Long-eared Bat	*Myotis septentrionalis*
Louisiana Black Bear	*Ursus americanus luteolus*
Long-tailed Weasel	*Mustela frenata*
Eastern Spotted Skunk	*Spilogale putorius*
Bachman's Fox Squirrel	*Sciurus niger bachmani*
Oak Ridge Pocket Gopher	*Geomys breviceps breviceps*
Baird's Pocket Gopher	*Geomys breviceps sagittatus*
Golden Mouse	*Ochrotomys nuttalli*
Eastern Harvest Mouse	*Reithrodontomys humulis*
Northern Pygmy Mouse	*Baiomys taylori*

Habitat Research Needs/Conservation Actions:

1. Encourage planting of native species along field borders and filter strips to create habitat and improve connectivity for wildlife species (CRP practice CP33).
2. Encourage the development of "soft or feathered" edges on the agricultural landscape through natural succession, planting of native grasses, legumes and forbs, and small shrubs (plum thickets, blackberry, etc.) when appropriate, and promote management to maintain these habitats.
3. Encourage management of fallow fields to maintain early successional habitat and to prevent invasion of woody vegetation and invasive species.
4. Target permanently fallowed agricultural fields for habitat stewardship opportunities to maintain grassland habitat and prevent dominance by woody vegetation, where appropriate.
5. Encourage management for and/or planting of native grasses and forbs and proper timing of mowing and haying to prevent destruction of burrows and nests in grasslands and rights-of-way. Many utility rights-of-way support native groundcover which is often absent or weak in adjacent densely stocked, often anthropogenic, forests.
6. Encourage use of more pest-specific pesticides, and pesticides that are not systemic in plant tissues.
7. Support and encourage prescribed burning as a routine rangeland management tool.
8. Work with farmers, state (LDEQ, LDNR) and federal (NRCS, U.S. Geological Survey (USGS)) agencies, university extension services, local and parish governments, and the legislature to develop a comprehensive statewide water rights/use plan.
9. Provide landowners with information on federal/state incentive programs through LDWF programs, and NRCS, to promote best management practices on working lands.
10. Continue to coordinate with NRCS on development of practices via the Farm Bill that are beneficial for SGCN.
11. Continue to participate in NRCS State Technical Advisory Committee (TAC) as well as annual meetings with NRCS.

b. Rice Agriculture and Aquaculture

Rarity Rank: N/A
Synonyms: None
Ecological Systems: None

General Description:

Rice field, Cameron Parish

Crawfish Pond, Vermilion Parish

This anthropogenic habitat encompasses rice agriculture, crawfish ponds, and catfish and baitfish ponds. Rice fields are fields of annual grasses and forbs, shallowly flooded for substantial portions of the year, and drawn-down during periods of active rice cultivation and harvest. Both before and during spring rice planting bare fields and mudflats provide foraging grounds for numerous species of wading birds, shorebirds, and other waterbirds. These birds feed on aquatic inverterbrates, rice and weed seed, and green shoots. Fields with growing rice are then flooded where they provide nesting and brood rearing cover for resident waterfowl (Mottled Duck, Black-bellied Whistling Duck and Fulvous Whistling Duck), secretive marshbirds (King and Yellow Rails, Least Bittern, Purple Gallinule, Common Moorhen), and shorebirds (Black-necked Stilt). Flooded rice fields and crawfish ponds are extremely important to shorebirds, wading birds, and waterfowl and are integral components of the LMVJV and Gulf Coast Joint Venture (GCJV) plans for meeting the present and future nutritional needs of these avian guilds. Vegetated rice levees may be used as nest sites by some of these species. The fields are drained in summer for harvest, at which point they are either left fallow, burned, rolled, or disked and sometimes flooded in late fall to suppress weed growth. These flooded fields are also regularly used for waterfowl hunting. Alternatively, after the first harvest, fields in the southern regions may be again flooded to grow a second “ratoon” crop which is harvested later. Preparation for this ratoon crop, most often mid July – early August, including manipulation of harvested stubble and re-flooding, provides valuable habitat for waterbirds as most other water is removed from the landscape. Ratooned crops also increase food available for wintering waterfowl by as much as 15% compared to fields that are not

ratooned. Rice is often cultivated in rotation with soybeans or sorghum or left fallow. Rice can also be rotated with crawfish. For crawfish production, a forage crop is grown during the summer (often rice, sorghum, or volunteer wetland vegetation). Rather than a shallow flood, crawfish production requires deeper water (up to 24 in.) during the winter. These fields are used extensively by wading birds, waterfowl, and other water birds. Bald Eagle, Peregrine Falcon, and other raptors are often associated with crawfish and rice aquaculture landscapes due to the abundance of potential prey. Crawfish ponds typically retain water until harvest ends in June, at this point water is drawn down for summer management and planting. The resulting mudflats are used by resident and migrant shorebirds. These summer drawdowns concentrate aquatic prey into shallow pools that persist due to elevation differences and waterbirds including Roseate Spoonbills, Wood Storks, and other species of wading birds exploit this foraging opportunity. The expansion of sugarcane into the rice (formerly Coastal Prairie) region of southwest Louisiana has reduced the value of much agricultural land in the region for wildlife, particularly waterbirds.

Current Extent and Status:

In 2013, Louisiana had 405,220 acres of rice, as well as over 100,000 acres of ratoon crop rice. Louisiana has about 120,000 acres of crawfish ponds.

Rice Agriculture and Aquaculture SGCN (42)	
Amphibians (1)	
Southern Crawfish Frog	*Lithobates areolatus areolatus*
Reptiles (1)	
Western Chicken Turtle	*Deirochelys reticularia miaria*
Birds (40)	
Mottled Duck	*Anas fulvigula*
Northern Pintail	*Anas acuta*
Canvasback	*Aythya valisineria*
Redhead	*Aythya americana*
Lesser Scaup	*Aythya affinis*
Wood Stork	*Mycteria americana*
American Bittern	*Botaurus lentiginosus*
Least Bittern	*Ixobrychus exilis*
Little Blue Heron	*Egretta caerulea*
Glossy Ibis	*Plegadis falcinellus*
Roseate Spoonbill	*Platalea ajaja*
Osprey	*Pandion haliaetus*
Bald Eagle	*Haliaeetus leucocephalus*
White-tailed Kite	*Elanus leucurus*

Yellow Rail	*Coturnicops noveboracensis*
King Rail	*Rallus elegans*
Sandhill Crane	*Antigone canadensis*
Whooping Crane	*Grus americana*
Upland Sandpiper	*Bartramia longicauda*
Hudsonian Godwit	*Limosa haemastica*
Dunlin	*Calidris alpina*
Buff-breasted Sandpiper	*Calidris subruficollis*
Short-billed Dowitcher	*Limnodromus griseus*
Interior Least Tern	*Sternula antillarum athalassos*
Gull-billed Tern	*Gelochelidon nilotica*
Caspian Tern	*Hydroprogne caspia*
Forster's Tern	*Sterna forsteri*
Common Ground-Dove	*Columbina passerina*
Short-eared Owl	*Asio flammeus*
Crested Caracara	*Caracara cheriway*
Peregrine Falcon	*Falco peregrinus*
Loggerhead Shrike	*Lanius ludovicianus*
Sedge Wren	*Cistothorus platensis*
Marsh Wren	*Cistothorus palustris*
Sprague's Pipit	*Anthus spragueii*
Field Sparrow	*Spizella pusilla*
Grasshopper Sparrow	*Ammodramus savannarum*
Le Conte's Sparrow	*Ammodramus leconteii*
Nelson's Sparrow	*Ammodramus nelsoni*
Dickcissel	*Spiza americana*

Habitat Research Needs/Conservation Actions:

1. Encourage planting of native prairie species along field borders and filter strips to create habitat and improve connectivity for wildlife species.
2. Encourage management of ditches and canals associated with rice and aquaculture that favors development of emergent aquatic and wetland plants, as opposed to herbiciding ditches and canals to bare mud.
3. Encourage use of more pest-specific pesticides, and pesticides that are not systemic in plant tissues.
4. Pursue acquisition of large areas of rice and crawfish aquaculture from willing sellers within the coastal prairie region, including abandoned or unproductive land, for re-establishment of native grassland/wetland complexes.
5. Assist rice/crawfish producers in replacement of degraded infrastructure projects (levees/water control structures) to ensure working wetlands persist as opposed to being converted to dry land row crops (e.g., sugarcane).
6. When possible, encourage the provision of mudflat habitat in crawfish ponds for some period of time in late summer (July-September) for migrating shorebirds. This can be

accomplished by either delaying the drawdown of water until later or disking and shallowly flooding dry fields during this time; these activities may be conducted using NRCS programs such as the Migratory Bird Habitat Initiative (MBHI), EQIP, and Conservation Stewardship Program (CSP).

7. Work with partners to promote the continued presence of rice acreage on the landscape to benefit native birds, including the use of incentive programs where available.
8. Promote the use of traditional rice production methods over dry-seeding techniques.

c. Pine Plantation

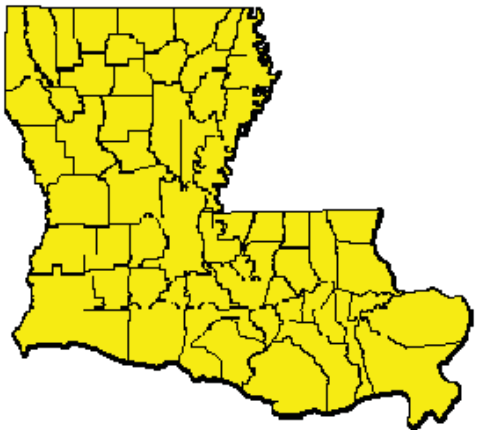
Rarity Rank: N/A
Synonyms: Loblolly Pine Plantation, Slash Pine Plantation
Ecological Systems: None

General Description:

Pine plantation is a general category encompassing single species or homogenous plantings typically for the purposes of commercial timber production. In Louisiana, both Loblolly Pine (*Pinus taeda*) and Slash Pine (*Pinus elliotii*) plantations are common, depending on geographic location. Loblolly Pine is planted most often by industrial and non-industrial private landowners throughout the WGCP and EGCP for timber production due to its productivity and adaptability to a wide range of site conditions. Slash Pine is better suited for wetter site conditions and is usually grown in southwest Louisiana. Most pine plantations are managed similarly for production of various wood products. These include many types of paper and packing products, fuel wood pellets, utility poles and piling, structural lumber, and engineered wood products. Demand for these products over the last several decades have driven the expansion of pine plantations to replace many other habitat types on private lands across the state. Pine plantation management generally includes intensive site preparation, high planting densities, one or more herbicide treatments, and multiple thinnings. Stands are usually regenerated by clear-cut harvest and re-planting at a rotation age of 25-30 years.

While some species of wildlife utilize pine plantations, overall this habitat type is not as beneficial as other habitat types in the Gulf Coastal Plain such as more open, grassy Longleaf Pine and Shortleaf Pine savannas and woodlands that historically dominated the landscape. Pine plantations have less plant species diversity in both the forest canopy and understory as a result of single species planting, high stocking (dense shading), more intensive use of herbicides, and exclusion of prescribed fire. Species diversity and diverse habitat structure are important for numerous species of birds and other wildlife. Habitat quality in pine plantations can greatly be improved by a few modifications to management regimes. Implementing site specific herbicide prescriptions for site preparation and mid-rotation treatments can help maintain structure and plant diversity for wildlife while decreasing competition and controlling invasive species. Thinning at regular intervals and implementing prescribed burning programs on many of these sites will provide improved understory conditions for many wildlife species.

Current Extent and Status:



Pine plantations can be found throughout the Gulf Coastal Plain of Louisiana. In addition, some portions of the Macon Ridge have been afforested to this habitat type. Over the years, Farm Bill programs such as the CRP have incentivized the establishment of pine plantations as a soil conservation measure. This habitat type is also preferred by forest industry and non-industrial private landowners as a means to maximize commercial timber production and derive revenue from their lands. There are also numerous programs which cost-share management activities such as site preparation, tree planting, invasive species control, and prescribed burning in pine plantations for private landowners.

Pine Plantation SGCN (80)*	
Crustaceans (2)	
Flatwoods Digger	*Fallicambarus oryktes*
Pine Hills Digger	*Fallicambarus dissitus*
Non-crustacean Arthropods (21)	
Texas Brown Tarantula	*Aphonopelma hentzi*
American Bumble Bee	*Bombus pensylvanicus*
Florida Harvester Ant	*Pogonomyrmex badius*

Comanche Harvester Ant	*Pogonomyrmex comanche*
Wild Indigo Duskywing	*Erynnis baptisiae*
Cobweb Skipper	*Hesperia metea*
Dusted Skipper	*Atrytonopsis hianna*
Meske's Skipper	*Hesperia meskei*
Yucca Giant-Skipper	*Megathymus yuccae*
Strecker's Giant-Skipper	*Megathymus streckeri*
Falcate Orangetip	*Anthocharis midea*
Monarch	*Danaus plexippus*
Brou's Mallow Moth	*Bagisara brouana*
Little Metalmark	*Calephelis virginiensis*
Creole Pearly-eye	*Lethe creola*
Yellow Brachycercus Mayfly	*Sparbarus flavus*
Texas Emerald	*Somatochlora margarita*
Frosted Elfin	*Callophrys irus*
Georgia Satyr	*Neonympha areolatus*
Mottled Duskywing	*Erynnis martialis*
Dusky Roadside-Skipper	*Amblyscirtes alternata*
Amphibians (7)	
Eastern Tiger Salamander	*Ambystoma tigrinum tigrinum*
Ornate Chorus Frog	*Pseudacris ornata*
Strecker's Chorus Frog	*Pseudacris streckeri*
Southern Crawfish Frog	*Lithobates areolatus areolatus*
Eastern Spadefoot	*Scaphiopus holbrookii*
Hurter's Spadefoot	*Scaphiopus hurterii*
Dusky Gopher Frog	*Lithobates sevosus*
Reptiles (14)	
Gopher Tortoise	*Gopherus polyphemus*
Western Slender Glass Lizard	*Ophisaurus attenuatus attenuatus*
Eastern Glass Lizard	*Ophisaurus ventralis*
Western Chicken Turtle	*Deirochelys reticularia miaria*
Eastern Diamond-backed Rattlesnake	*Crotalus adamanteus*
Coal Skink	*Plestiodon anthracinus*
Northern Mole Kingsnake	*Lampropeltis rhombomaculata*
Black Pinesnake	*Pituophis melanoleucus lodingi*
Louisiana Pinesnake	*Pituophis ruthveni*
Pine Woods Littersnake	*Rhadinaea flavilata*
Southeastern Crowned Snake	*Tantilla coronata*
Harlequin Coralsnake	*Micrurus fulvius*
Eastern Hog-nosed Snake	*Heterodon platirhinos*

Timber Rattlesnake	*Crotalus horridus*
Birds (26)	
Northern Bobwhite	*Colinus virginianus*
Swallow-tailed Kite	*Elanoides forficatus*
White-tailed Kite	*Elanus leucurus*
Bald Eagle	*Haliaeetus leucocephalus*
American Woodcock	*Scolopax minor*
Common Ground-Dove	*Columbina passerina*
Greater Roadrunner	*Geococcyx californianus*
Chuck-will's-widow	*Antrostomus carolinensis*
Chimney Swift	*Chaetura pelagica*
Red-headed Woodpecker	*Melanerpes erythrocephalus*
Red-cockaded Woodpecker	*Picoides borealis*
Southeastern American Kestrel	*Falco sparverius paulus*
Loggerhead Shrike	*Lanius ludovicianus*
Brown-headed Nuthatch	*Sitta pusilla*
Sedge Wren	*Cistothorus platensis*
Prairie Warbler	*Setophaga discolor*
Bachman's Sparrow	*Peucaea aestivalis*
Field Sparrow	*Spizella pusilla*
Lark Sparrow	*Chondestes grammacus*
Grasshopper Sparrow	*Ammodramus savannarum*
Henslow's Sparrow	*Ammodramus henslowii*
Le Conte's Sparrow	*Ammodramus leconteii*
Nelson's Sparrow	*Ammodramus nelsoni*
Painted Bunting	*Passerina ciris*
Dickcissel	*Spiza americana*
Rusty Blackbird	*Euphagus carolinus*
Mammals (10)	
Southeastern Shrew	*Sorex longirostris*
Bachman’s Fox Squirrel	*Sciurus niger bachmani*
Oak Ridge Pocket Gopher	*Geomys breviceps breviceps*
Baird's Pocket Gopher	*Geomys breviceps sagittatus*
Golden Mouse	*Ochrotomys nuttalli*
Eastern Harvest Mouse	*Reithrodontomys humulis*
Louisiana Black Bear	*Ursus americanus luteolus*
Long-tailed Weasel	*Mustela frenata*
Eastern Spotted Skunk	*Spilogale putorius*
Ringtail	*Bassariscus astutus*

*****This SGCN list includes many species that would only be expected in high-quality, well-managed examples of Pine Plantation

Habitat Research Needs/Conservation Actions:

1. Promote multiple-use management (wildlife and timber) within this habitat type.
2. Provide education/outreach opportunities to landowners on the benefits and methods of managing these habitat types for wildlife.
3. Promote site specific herbicide prescriptions for site preparation and mid-rotation treatments that can maintain structure and plant diversity for wildlife while decreasing competition and controlling invasive species.
4. Promote thinning at regular intervals followed by application of prescribed fire within these habitat types.
5. Promote federal/state incentive programs such as EQIP, CRP, CSP, Working Lands for Wildlife Program, Forest Productivity Program, and others that provide cost-share assistance for management activities in pine plantations.
6. Consider targeting areas at high risk of urban development with conservation easements to maintain these areas in working forestlands.

11. River Basins

Louisiana has over 66,000 miles of rivers and streams, which support diverse assemblages of crustaceans, mussels, fishes, turtles, and other wildlife, including many SGCN. Many of Louisiana's most diverse and productive wildlife habitats are associated with, or maintained by, these waterbodies. Rivers and streams are also important for agriculture, transportation and stormwater drainage, and they provide a livelihood for trappers and fishermen. Many streams are used for recreation, including fishing, hunting, paddling, boating, swimming, wildlife watching and wildlife photography.

However, in our water-rich state, we sometimes take streams for granted. According to the EPA, 76% of Louisiana's rivers and streams are impaired, meaning that because of poor water quality, the streams do not support all of their intended uses. Designated uses may include recreation (e.g., swimming and boating), fish and wildlife propagation (e.g., fishing and fish consumption), drinking water supply, and irrigation. Furthermore, impaired water quality is a significant threat to fish and wildlife populations and their supporting habitats.

Figure 5.1. Major waterbodies and river basins of Louisiana

***Threats to River Basins*:**

Threats to rivers and streams are similar between basins and include ten of the eleven 1st level threats identified by Salafsky et al. (2008). Detailed accounts of which threats

apply to each basin and to what extent, are presented in the individual basin treatments below. A brief discussion of each of the applicable 1st level threats is given here, as this information will be similar across basins.

- Residential/Commercial Development – this includes direct impacts to riparian areas and wetlands by clearing, draining, and filling.
- Agriculture/Aquaculture –silvicultural activities that do not follow BMPs may directly impact riparian areas, and clearing or draining and filling of riparian or wetland areas may also directly impact river basins.
- Energy Production & Mining – sand and gravel mining within river floodplains and within streambeds poses a direct threat to habitat for many SGCN, and can alter ecosystems.
- Transportation & Service Corridors – clearing of land for such corridors may have watershed level impacts and may also lead to increased sedimentation of waterbodies, resulting in reduced water quality.
- Human Intrusion & Disturbance – this includes the use of ORVs within streams, which negatively impacts habitats, water quality, and SGCN.
- Natural System Modification – one of the biggest threats to our rivers and streams is hydromodification (e.g., dredging, forced drainage, flow alterations, sediment re-suspension, and water withdrawals).
- Invasive Species – the introduction and proliferation of numerous invasive plant and animal species has had negative impacts within most aquatic systems in Louisiana.
- Pollution – as illustrated by the water quality information presented for each basin, pollution of rivers and streams affects all systems in the state and comes from many sources. These sources include but are not limited to: wastewater from residential and industrial sources, anthropogenic mercury, litter and illegal dumping, and sedimentation resulting from numerous human activities.
- Geological Events – subsidence can lead to shifts in salinities within the coastal reaches of rivers and streams, in turn causing habitat shifts and reducing habitat suitability for SGCN.
- Climate Change & Severe Weather – decreases in precipitation may result in reductions in freshwater input. Changes in the frequency and intensity of tropical storms may also lead to shifts in salinities and habitat composition within coastal portions of river basins.

Many of these threats result in reduced water quality. In turn, poor water quality adversely affects fish and other aquatic life inhabiting streams and rivers and also limits opportunities to enjoy these diverse natural resources.

General Research Needs/Conservation Actions:

The Louisiana Wildlife Action Plan identifies the following actions for the conservation of riverine and riparian systems, including those contained within the Natural and Scenic Rivers System:

1. Provide technical assistance to federal, state and local regulatory agencies, private landowners, and commercial/residential developers for the purposes of conserving stream habitat, riparian corridors and SGCN, as well as improving stream water quality and quantity.
2. Consult with federal, state, and local government and NGOs in the development and/or revision of BMPs for sand and gravel mining, water withdrawals, timber harvesting, stream bank stabilization, pesticide application, general construction, and stormwater runoff.
3. Collaborate with Southeast Aquatic Resources Partnership (SARP) to conserve aquatic resources.
4. Investigate the possibility of providing incentives to protect and restore riparian forest to provide habitat for SGCN and improve water quality.
5. Promote existing funding programs (e.g., USDA NRCS Farm Bill programs) that support re-establishment of forested/vegetated SMZs.
6. Continue efforts to conserve aquatic habitat and improve water quality through educational outreach and enforcement of Scenic Rivers laws and regulations.
7. Coordinate with enforcement agencies at all levels to prevent or ameliorate damage to aquatic systems, including Scenic Rivers.
8. Support and strengthen LDWF's Scenic Rivers program by conducting regular monitoring and surveying of system streams as well as contributing data, expertise, and, if appropriate, State Wildlife Grant funding for the development of Scenic River Management Plans and regulatory programs.
9. Preserve and restore riparian corridors for SGCN on existing conservation lands and private lands.
10. Conduct scientifically defensible stream assessments that characterize water quality, gradient, in-stream flow, substrate composition, in-stream habitat, and stressors to inform management and regulatory decisions by federal and state regulators, including the Scenic Rivers Program.
11. Partner in efforts to eradicate or control invasive exotic species known to adversely affect native flora and fauna, including SGCN.
12. Address non-point source pollution and loss of riparian habitat through collaboration with state and federal agencies, NGOs, and the public.
13. Use GIS to analyze information such as stream migration patterns, land use changes, broad scale stressors, climate variability, species and habitat distributions, and water quality and quantity to inform management and regulatory decision-making.
14. Promote oil spill prevention (Spill Prevention Control, SPC) regulations and natural resource response mechanisms (Natural Resource Damage Assessments, NRDA).
15. Work with the Louisiana Aquatic Nuisance Species Task Force (LANSTF) to identify and address threats related to invasive species.

16. Develop partnerships with regulatory agencies to share data on habitat threats and to ensure compliance with existing regulations.
17. Continue LDWF involvement in the environmental review process of all river related projects. Identify potential impacts and recommend appropriate mitigation.
18. Prepare educational material on potential impacts of invasive species to the aquatic basins.
19. Develop programs to eliminate entanglement gear in all basins.
20. Encourage alternative bridge and culvert designs to lessen impacts to aquatic habitats and organisms.
21. Promote public awareness concerning soil erosion problems resulting from construction activities. Provide the public with contact information (e.g., hotline number) to report violations/problem sites.

a. Atchafalaya Basin

General Description:

The Atchafalaya Basin, at approximately 1 million acres, is the nation's largest river-swamp system (Demas et al. 2001), consisting primarily of Bottomland Hardwood Forest and Cypress-Tupelo-Blackgum Swamp. Located in south-central Louisiana, the system stretches from the river's origin near Simmesport to its terminus at the Atchafalaya Bay. It is contained on its east and west borders by flood protection levees. Water flow into the Atchafalaya Basin is controlled at the Old River control structure, which diverts 30% of the combined Red and Mississippi River flow down through the Atchafalaya Basin (LDEQ 1993). A unique feature of the Atchafalaya Basin system is that it supplies sediment to the Atchafalaya and Wax Lake Deltas, which currently have the most significant accretion of land on the Louisiana coast (LCWCRTF 1993). Also contributing to land formation is the beneficial use of dredge material resulting from maintaining navigation channels. Much of this newly created land is contained within the 137,000 acre Atchafalaya Delta WMA, which consists primarily of tidal riverine Freshwater Marsh.

The Atchafalaya Basin has many commercial uses including fishing, trapping, logging, oil and gas exploration and production, nature tours, and limited shipping. Recreational activities include fishing, hunting, camping, bird watching, swimming, and boating. The Atchafalaya Basin contains a diversity of habitats, from Bottomland Hardwood Forests in the upper basin to coastal marshes, oyster reefs, and Vegetated Pioneer Emerging Delta in the lower portions of the basin. Much of the Atchafalaya Basin consists of public lands, including Sherburne WMA, Atchafalaya NWR, and multiple USACE properties (e.g. Bayou des Ourses and Indian Bayou).

There are roughly 100 species of freshwater fishes (W. Kelso, personal communication), 22 species of mussels (Vidrine 1993), and ten species of crawfish (J. Walls, personal communication) found within the Atchafalaya Basin. For more information about this basin see the LDWF Inland Fisheries Management plan for the Atchafalaya Basin (www.wlf.louisiana.gov/fishing/waterbody-management-plans-inland).

Water Quality:

The 2012 Water Quality Inventory Report (LDEQ 2012) indicated that only 50% of the 12 waterbody subsegments within the basin were fully supporting their designated use for fish and wildlife propagation. The causes of water quality issues in the other 50% of subsegments include: fecal coliform bacteria, suspended solids, mercury, turbidity, non-native aquatic invasive plants, and low concentration of dissolved oxygen.

Atchafalaya Basin SGCN (36)	
Mollusks (2)	
Round Pearlshell	*Glebula rotundata*
Fawnsfoot	*Truncilla donaciformis*
Crustaceans (1)	
Estuarine Ghost Shrimp	*Lepidophthalmus louisianensis*
Inland Fish (8)	
Pallid Sturgeon	*Scaphirhynchus albus*
Shovelnose Sturgeon	*Scaphirhynchus platorynchus*
Paddlefish	*Polyodon spathula*
American Eel	*Anguilla rostrata*
Shoal Chub	*Macrhybopsis hyostoma*
Bluehead Shiner	*Pteronotropis hubbsi*
Blue Sucker	*Cycleptus elongatus*
Saddleback Darter	*Percina vigil*
Marine Fish (14)	
Diamond Killifish	*Adinia xenica*
Saltmarsh Topminnow	*Fundulus jenkinsi*
Bayou Killifish	*Fundulus pulvereus*
Opossum Pipefish	*Microphis brachyurus*
Chain Pipefish	*Syngnathus louisianae*
Emerald Sleeper	*Erotelis smaragdus*
Frillfin Goby	*Bathygobius soporator*
Violet Goby	*Gobioides broussonnetii*
Broad Flounder	*Paralichthys squamilentus*
Southern Puffer	*Sphoeroides nephelus*
Large-scaled Spinycheek Sleeper	*Eleotris amblyopsis*
Lemon Shark	*Negaprion brevirostris*
Smalltooth Sawfish	*Pristis pectinata*
Tarpon	*Megalops atlanticus*
Reptiles (11)	
Loggerhead Sea Turtle	*Caretta caretta*
Green Sea Turtle	*Chelonia mydas*
Hawksbill Sea Turtle	*Eretmochelys imbricata*
Kemp's Ridley Sea Turtle	*Lepidochelys kempii*
Alligator Snapping Turtle	*Macrochelys temminckii*
Leatherback Sea Turtle	*Dermochelys coriacea*

Western Chicken Turtle	*Deirochelys reticularia miaria*
Mississippi Diamond-backed Terrapin	*Malaclemys terrapin pileata*
Ouachita Map Turtle	*Graptemys ouachitensis ouachitensis*
Razor-backed Musk Turtle	*Sternotherus carinatus*
Gulf Saltmarsh Snake	*Nerodia clarkii clarkii*

Threats Affecting Basin:

The following table illustrates the threats identified for the Atchafalaya Basin and the scope and severity of those threats. Primary threats to this basin include natural system modification, which is largely related to changes in natural hydrology, as well as the negative impacts of invasive plants such as Common and Giant Salvinia.

Atchafalaya Basin Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	Small	Moderate	Low
Agriculture/Aquaculture	Restricted	Moderate	Low
Energy Production & Mining	Restricted	Moderate	Low
Transportation & Service Corridors	Small	Moderate	Low
Biological Resource Use	N/A	N/A	N/A
Human Intrusion/Disturbance	Small	Moderate	Low
Natural System Modification	Pervasive	Serious	High
Invasive & other Problematic Species	Pervasive	Serious	High
Pollution	Large	Moderate	Medium
Geological Events	Small	Slight	Low
Climate Change & Severe Weather	Restricted	Slight	Low
Overall Calculated Threat Impact: Low			

Basin Research Needs /Conservation Actions:

1. Restore historical flow regimes within the Atchafalaya Basin.
2. Work with LDEQ and USGS to increase monitoring of nutrient inputs and overall water quality within the Atchafalaya Basin.
3. Coordinate with Atchafalaya Basin Program (LDNR) and BTNEP to address threats to this basin.
4. Complete a comprehensive survey of oyster reef/hard bottom habitat acreage within the system.

b. Barataria Basin

General Description:

The upper Barataria Basin was formed approximately 3,500-4,000 years ago as part of the Lafourche Delta complex. Encompassing approximately 300,000 acres, this basin is bordered on the north and east by the levees of the Mississippi River, which were constructed after the flood of 1927, on the west by Bayou Lafourche and the south by the Gulf of Mexico. The basin is mainly comprised of the following four terrestrial habitat types: agriculture/improved pasture (primarily sugarcane), Bottomland Hardwood Forests, Cypress-Tupelo-Blackgum Swamps, and coastal marshes which range from fresh to saltwater. Freshwater Floating Marsh is known from this basin and may occupy a substantial area. Freshwater input sources include local precipitation, minor inflow from the Greater Intracoastal Waterway (LaCoast 2005), and when possible, freshwater diverted from the Mississippi River at sites such as Davis Pond and Naomi freshwater diversions. Wetland loss due to coastal erosion is a major environmental issue affecting the basin, although many coastal restoration projects have been planned to address land loss in the area (CPRA 2012). LDWF properties in this basin include Pointe-aux-Chenes and Salvador WMAs and Elmer's Island Refuge. These sites are composed of Freshwater, Freshwater Floating, Intermediate, and Brackish Marshes that are threatened by subsidence and erosion from storms. This basin also includes Grand Isle, Elmer's Island, and Queen Bess Island, which is a highly productive island for colonial nesting waterbirds.

Approximately 60 species of freshwater fishes (W. Kelso, personal communication) and nine species of crawfish (J. Walls, personal communication) are found within the Barataria Basin. The basin supports many commercial activities ranging from sugarcane production and aquaculture to commercial fishing, trapping, logging, and oil and gas production. This basin is one of the most productive coastal Louisiana areas for commercial shrimp and oyster harvest. Recreational activities include fishing, hunting, bird watching, swimming, and boating.

For more information about this basin, see the LDWF Inland Fisheries management plan for the Barataria Basin (www.wlf.louisiana.gov/fishing/waterbody-management-plans-inland).

Water Quality:

The 2012 Water Quality Inventory Report (LDEQ 2012) indicated that 11% of the 27 water body subsegments within the basin fully support their designated use for fish and wildlife propagation. Causes of water quality issues include: nitrates and nitrites, non-

native aquatic invasive plants, fecal coliform bacteria, low concentration of dissolved oxygen, dissolved and suspended solids, and turbidity. The suspected sources of these water quality problems include: crop production, pastureland, urban runoff, septic tanks, spills, minor industrial point sources, petroleum activities, highway runoff, hydromodification, and dredging.

Barataria Basin SGCN (31)	
Mollusks (1)	
Round Pearlshell	*Glebula rotundata*
Crustaceans (4)	
Beach Ghost Shrimp	*Callichirus islagrande*
Carolinian Ghost Shrimp	*Callichirus major*
Peppermint Shrimp	*Lysmata wurdemanni*
Estuarine Ghost Shrimp	*Lepidophthalmus louisianensis*
Inland Fish (3)	
Paddlefish	*Polyodon spathula*
American Eel	*Anguilla rostrata*
Alabama Shad	*Alosa alabamae*
Marine Fish (15)	
Diamond Killifish	*Adinia xenica*
Saltmarsh Topminnow	*Fundulus jenkinsi*
Bayou Killifish	*Fundulus pulvereus*
Dwarf Seahorse	*Hippocampus zosterae*
Opossum Pipefish	*Microphis brachyurus*
Chain Pipefish	*Syngnathus louisianae*
Lemon Shark	*Negaprion brevirostris*
Smalltooth Sawfish	*Pristis pectinata*
Tarpon	*Megalops atlanticus*
Large-scaled Spinycheek Sleeper	*Eleotris amblyopsis*
Emerald Sleeper	*Erotelis smaragdus*
Frillfin Goby	*Bathygobius soporator*
Violet Goby	*Gobioides broussonnetii*
Broad Flounder	*Paralichthys squamilentus*
Southern Puffer	*Sphoeroides nephelus*
Reptiles (8)	
Loggerhead Sea Turtle	*Caretta caretta*
Green Sea Turtle	*Chelonia mydas*
Hawksbill Sea Turtle	*Eretmochelys imbricata*
Kemp's Ridley Sea Turtle	*Lepidochelys kempii*

Alligator Snapping Turtle	*Macrochelys temminckii*
Leatherback Sea Turtle	*Dermochelys coriacea*
Mississippi Diamond-backed Terrapin	*Malaclemys terrapin pileata*
Gulf Saltmarsh Snake	*Nerodia clarkii clarkii*

Threats Affecting Basin:

The following table illustrates the threats identified for the Barataria Basin and the scope and severity of those threats. Primary threats to this basin include changes to the natural hydrology of the system, negative impacts of invasive plants, and subsidence.

Barataria Basin Threats Assessment:

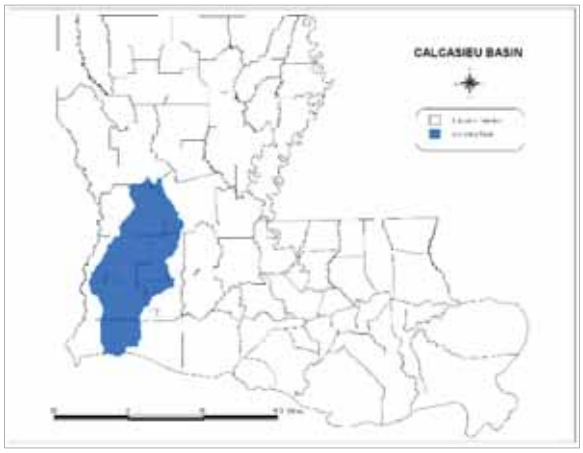
1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	Restricted	Moderate	Low
Agriculture/Aquaculture	Restricted	Moderate	Low
Energy Production & Mining	Restricted	Serious	Medium
Transportation & Service Corridors	Restricted	Moderate	Low
Biological Resource Use	N/A	N/A	N/A
Human Intrusion/Disturbance	Small	Moderate	Low
Natural System Modification	Large	Serious	High
Invasive & other Problematic Species	Pervasive	Serious	High
Pollution	Pervasive	Moderate	Medium
Geological Events	Large	Serious	High
Climate Change & Severe Weather	Large	Moderate	Medium
Overall Calculated Threat Impact: Medium			

Basin Research Needs/Conservation Actions:

1. Maintain existing freshwater diversion canals from the Mississippi River into the Barataria Basin.
2. Inform other agencies (e.g. CPRA) and the public about the uniqueness of Freshwater Floating Marsh; protect such marshes from disturbance from canal development, and from input of nutrients and sediment.
3. Work with BTNEP and other partners to abate threats to this basin.
4. Promote coastal restoration and protection initiatives to maintain or enhance coastal marsh and Barrier Island habitat critical to SGCN.

c. Calcasieu Basin

General Description:



The Calcasieu Basin, located in southwest Louisiana, comprises approximately 4,105 square miles of drainage area and represents 8% of the area of the state. Headwaters of the river are found in the hills west of the city of Alexandria. Flow is in a southerly direction for about 215 miles to the Gulf of Mexico where it empties at a point 30 miles east of the Louisiana-Texas state line. From the upland hills with elevations ranging from 260-400 feet above mean sea level, the river flows through the Coastal Prairie and coastal marshes, which have an elevation ranging from one to two feet above mean sea level. The flood plains are extremely flat with little relief and average two to three feet above mean sea level. The river flows through the following major lakes: Prien Lake, Moss Lake and Calcasieu Lake. Dominant features include Oxbow Lakes, natural levees, and the surrounding Pleistocene Uplands (Weston 1974). The city of Lake Charles lies in the southern portion of the basin and this area has been heavily industrialized by petro-chemical plants.

The Calcasieu River varies from a small fast flowing stream in the headwaters to a broad, sluggish estuary from the latitude of Lake Charles to its entrance into the Gulf of Mexico. Flows in the upper basin may range from a high of 180,000 cubic feet per second in the winter and spring to zero during the summer and fall. The lower portion of the river is subject to tidal variation. A semidiurnal tide extends 65 miles upstream and has mean tidal ranges of 1.7 feet at the river mouth and 0.7 foot at Lake Charles. An existing saltwater barrier across the Calcasieu River at Lake Charles divides the upper and lower basins and prevents saltwater intrusion from degrading this major source of irrigation for rice production. Navigation improvements have modified the Calcasieu from its mouth to approximately 52.6 river miles inland(Weston 1974).

Similar to other basins, saltwater intrusion and coastal land loss are significants threat to the southern portion of this basin, most notably the Brackish Marshes surrounding Calcasieu Lake. The dredging of the Calcasieu Ship Channel is the likely source behind a general increase in salinities in this area over the last half-century. Numerous water control structures have been constructed on bayous that connect Calcasieu Lake with surrounding marshes for salinity control, thereby decreasing ingress and egress opportunities for marine species which spend critical portions of their life history in coastal marshes. A variety of hydrologic restoration projects have been proposed for this area by the coastal restoration community in an attempt to address this threat (CPRA 2012).

Approximately 90 species of freshwater fishes (Maxwell 2012, LDWF unpublished data, B. Reed, personal communication), 30 species of mussels (Vidrine 1993), and 16 species of crawfish (J. Walls, personal communication) are found within the Calcasieu Basin. At the southern terminus, Calcasieu Lake supports a small but viable commercial fishing industry, which includes the harvest of crabs, shrimp, and oysters. Unlike the estuarine area of most basins however, oyster harvests occur solely from public oyster areas (Calcasieu Lake) as no state-issued oyster leases exist within the basin. For more information about this basin, see the LDWF Inland Fisheries management plan for the Calcasieu River (www.wlf.louisiana.gov/fishing/waterbody-management-plans-inland).

Water Quality:

The 2012 Water Quality Inventory Report (LDEQ 2012) indicated that 31% of the 39 waterbody subsegments within the basin fully support their designated use for fish and wildlife propagation. The suspected causes for water quality problems include: metals, nutrients, fecal coliform bacteria, low concentration of dissolved oxygen, dissolved and suspended solids, turbidity, elevated levels of mercury, elevated water temperatures, and low pH. The suspected sources of the water quality problems include: home sewage systems, agriculture, silviculture, urban storm water runoff, and dredging.

Calcasieu Basin SGCN (45)	
Mollusks (7)	
Texas Pigtoe	*Fusconaia askewi*
Round Pearlshell	*Glebula rotundata*
Sandbank Pocketbook	*Lampsilis satura*
Southern Hickorynut	*Obovaria jacksoniana*
Louisiana Pigtoe	*Pleurobema riddellii*
Southern Creekmussel	*Strophitus subvexus*
Fawnsfoot	*Truncilla donaciformis*
Crustaceans (8)	
Calcasieu Painted Crawfish	*Orconectes blacki*
Pine Hills Digger	*Fallicambarus dissitus*
Old Prairie Digger	*Fallicambarus macneesei*
Calcasieu Creek Crawfish	*Procambarus pentastylus*
Beach Ghost Shrimp	*Callichirus islagrande*
Carolinian Ghost Shrimp	*Callichirus major*
Peppermint Shrimp	*Lysmata wurdemanni*
Estuarine Ghost Shrimp	*Lepidophthalmus louisianensis*
Non-crustacean Arthropods (2)	
Yellow Brachycercus Mayfly	*Brachycercus flavus*
Pitcher Plant Spiketail	*Cordulegaster sarracenia*

Inland Fish (6)	
Paddlefish	*Polyodon spathula*
American Eel	*Anguilla rostrata*
Shoal Chub	*Macrhybopsis hyostoma*
Redspot Darter	*Etheostoma artesiae*
Gumbo Darter	*Etheostoma thompsoni*
Bigscale Logperch	*Percina macrolepida*
Marine Fish (10)	
Diamond Killifish	*Adinia xenica*
Saltmarsh Topminnow	*Fundulus jenkinsi*
Bayou Killifish	*Fundulus pulvereus*
Opossum Pipefish	*Microphis brachyurus*
Chain Pipefish	*Syngnathus louisianae*
Large-scaled Spinycheek Sleeper	*Eleotris amblyopsis*
Frillfin Goby	*Bathygobius soporator*
Violet Goby	*Gobioides broussonnetii*
Broad Flounder	*Paralichthys squamilentus*
Southern Puffer	*Sphoeroides nephelus*
Amphibians (1)	
Gulf Coast Waterdog	*Necturus beyeri*
Reptiles (11)	
Loggerhead Sea Turtle	*Caretta caretta*
Green Sea Turtle	*Chelonia mydas*
Hawksbill Sea Turtle	*Eretmochelys imbricata*
Kemp's Ridley Sea Turtle	*Lepidochelys kempii*
Alligator Snapping Turtle	*Macrochelys temminckii*
Leatherback Sea Turtle	*Dermochelys coriacea*
Sabine Map Turtle	*Graptemys sabinensis*
Western Chicken Turtle	*Deirochelys reticularia miaria*
Mississippi Diamond-backed Terrapin	*Malaclemys terrapin pileata*
Razor-backed Musk Turtle	*Sternotherus carinatus*
Gulf Saltmarsh Snake	*Nerodia clarkii clarkii*

Threats Affecting Basin:

The following table illustrates the threats identified for the Calcasieu Basin and the scope and severity of those threats. Among the primary threats to this basin are changes in the natural hydrology of the Calcasieu River, invasive plants, and pollution of many water bodies from multiple sources, including run-off from extensive agricultural lands.

Calcasieu Basin Threats Assessment:

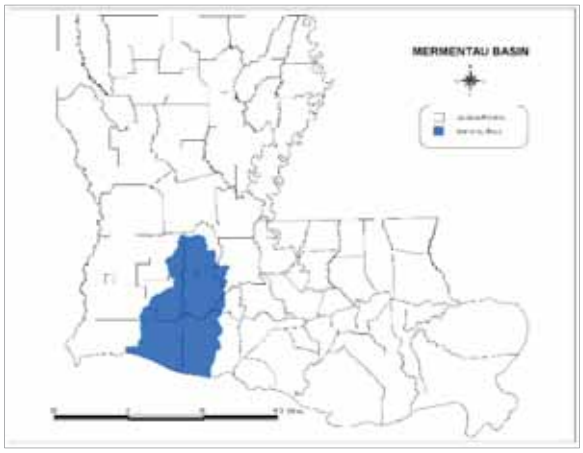
1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	Restricted	Serious	Medium
Agriculture/Aquaculture	Large	Serious	High
Energy Production & Mining	Restricted	Serious	Medium
Transportation & Service Corridors	Restricted	Serious	Medium
Biological Resource Use	N/A	N/A	N/A
Human Intrusion/Disturbance	Small	Moderate	Low
Natural System Modification	Large	Serious	High
Invasive & other Problematic Species	Pervasive	Serious	High
Pollution	Large	Serious	High
Geological Events	Restricted	Serious	Medium
Climate Change & Severe Weather	Restricted	Moderate	Low
Overall Calculated Threat Impact: High			

Basin Research Needs/Conservation Actions:

1. Support current initiatives and develop new programs where necessary that help reduce siltation and sedimentation, including the use of BMPs, throughout the Calcasieu Basin.
2. Support practical initiatives that will help address saltwater intrusion into and erosion of coastal marshes surrounding Calcasieu Lake while also allowing for adequate connectivity between the lake and marsh habitats.

d. Mermentau Basin

General Description:



The Mermentau Basin is located in the southwestern part of Louisiana and drains an area of approximately 6,730 square miles. This basin, located between the Vermilion-Teche and Calcasieu Basins, comprises a controlled system for the drainage of Mermentau River and its tributaries. Catfish Point and Schooner Bayou Control Structures and Calcasieu and Leland Bowman Locks control the impoundment of winter runoff for irrigation use in the summertime and function to restrict inflow of waters from surrounding estuarine waters and the Gulf of Mexico (USACE 1998).

The basin is composed of three different and distinctive land forms which are arranged in broad bands from north to south. The northern part of the basin is a flatwoods area which gives way to an undulating landscape extending northward into the drainage basins of the Calcasieu and Red Rivers. To the south of the flatwoods area lies the Coastal Prairie region which extends from west, near Vinton, Louisiana (located in the Calcasieu Basin), to east, ending at Bayou Teche. This region is characterized by large expanses of flat grassland dissected by the numerous tributaries of the basin and dotted with “islands” of oak trees and other mixed hardwoods. The Coastal Prairie region, which is extensively cultivated, gives way to a band of marshland which extends along Louisiana’s entire coastline. This marsh region is further subdivided into Freshwater Marsh, which borders the Coastal Prairie to the north, Intermediate and Brackish Marshes, and finally Salt Marsh which forms the coastline adjacent to the Gulf of Mexico and its bays (Domingue, Szabo & Assoc. Inc. 1975).

The lower portion of the basin is bounded on the east by Freshwater Bayou Channel, on the south by the Gulf of Mexico, on the west by Louisiana Highway 27, and on the north by the Gulf Intercoastal Waterway (GIWW). This portion of the basin contains about 450,000 acres of wetlands, consisting of 190,000 acres of Freshwater Marsh, 135,000 acres of Intermediate Marsh, and 101,000 acres of Brackish Marsh. A total of 104,380 acres of marsh converted to open water from 1932-2005, a loss of 19% of the historical wetlands in Mermentau Basin. This represents 9% of wetland loss in Louisiana over that time period (LaCoast 2005).

Approximately 75 species of freshwater fishes (Tulane 2008, LDWF unpublished data), 22 species of mussels (Vidrine 1993), and 13 species of crawfish (J. Walls, personal communication) are found within the Mermentau Basin.

Water Quality:

The 2012 Water Quality Inventory Report (LDEQ 2012) indicated that 11% of the 18 water body subsegments within the basin fully support their designated use for fish and wildlife propagation. Causes of water quality issues include: metals, nutrients, fecal coliform bacteria, low concentration of dissolved oxygen, pesticides, dissolved and suspended solids, sedimentation and siltation, and turbidity. The suspected sources of the water quality problems include: home sewage systems, agriculture, silviculture, urban stormwater runoff, and dredging.

Mermentau Basin SGCN (32)	
Mollusks (1)	
Round Pearlshell	*Glebula rotundata*
Crustaceans (5)	
Teche Painted Crawfish	*Orconectes hathawayi*
Old Prairie Digger	*Fallicambarus macneesei*
Carolinian Ghost Shrimp	*Callichirus major*
Peppermint Shrimp	*Lysmata wurdemanni*
Estuarine Ghost Shrimp	*Lepidophthalmus louisianensis*
Non-crustacean Arthropods (1)	
Yellow Brachycercus Mayfly	*Brachycercus flavus*
Inland Fish (3)	
Paddlefish	*Polyodon spathula*
American Eel	*Anguilla rostrata*
Gumbo Darter	*Etheostoma thompsoni*
Marine Fish (10)	
Diamond Killifish	*Adinia xenica*
Saltmarsh Topminnow	*Fundulus jenkinsi*
Bayou Killifish	*Fundulus pulvereus*
Opossum Pipefish	*Microphis brachyurus*
Chain Pipefish	*Syngnathus louisianae*
Large-scaled Spinycheek Sleeper	*Eleotris amblyopsis*
Frillfin Goby	*Bathygobius soporator*
Violet Goby	*Gobioides broussonnetii*
Broad Flounder	*Paralichthys squamilentus*
Southern Puffer	*Sphoeroides nephelus*
Amphibians (1)	
Gulf Coast Waterdog	*Necturus beyeri*

Reptiles (11)	
Loggerhead Sea Turtle	*Caretta caretta*
Green Sea Turtle	*Chelonia mydas*
Hawksbill Sea Turtle	*Eretmochelys imbricata*
Kemp's Ridley Sea Turtle	*Lepidochelys kempii*
Alligator Snapping Turtle	*Macrochelys temminckii*
Leatherback Sea Turtle	*Dermochelys coriacea*
Sabine Map Turtle	*Graptemys sabinensis*
Western Chicken Turtle	*Deirochelys reticularia miaria*
Mississippi Diamond-backed Terrapin	*Malaclemys terrapin pileata*
Razor-backed Musk Turtle	*Sternotherus carinatus*
Gulf Saltmarsh Snake	*Nerodia clarkii clarkii*

Threats Affecting Basin:

The following table illustrates the threats identified for the Mermentau Basin and the scope and severity of those threats. As with the neighboring Calcasieu Basin, two of the primary threats to this basin are invasive plants (e.g., Common and Giant Salvinia, Water Hyacinth, Hydrilla) and alterations to the natural hydrology of the system.

Mermentau Basin Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	Small	Slight	Low
Agriculture/Aquaculture	Pervasive	Serious	High
Energy Production & Mining	Small	Moderate	Low
Transportation & Service Corridors	Small	Moderate	Low
Biological Resource Use	N/A	N/A	N/A
Human Intrusion/Disturbance	Small	Moderate	Low
Natural System Modification	Pervasive	Serious	High
Invasive & other Problematic Species	Pervasive	Serious	High
Pollution	Pervasive	Serious	High
Geological Events	Large	Serious	High
Climate Change & Severe Weather	Restricted	Moderate	Low
Overall Calculated Threat Impact: High			

Basin Research Needs/Conservation Actions:

1. Partner with USDA NRCS to develop an initiative to improve water quality through conservation practices on working lands.

2. Partner with and support the Mississippi River Basin Initiative (www.la.nrcs.usda.gov/programs/MRBI/index.html) and the Gulf of Mexico Initiative (www.la.nrcs.usda.gov/programs/GOMI/index.html) to address the causes of habitat impairment within the Mermentau Basin.

e. Mississippi Basin

General Description:

The portion of the Mississippi River which occurs in Louisiana is part of the Lower Missisippi Drainage Basin, which extends from Cairo, Illinois to Head-of-Passes at the Gulf of Mexico. Within Louisiana, the Mississippi Basin is comprised of the Mississippi River along with West Feliciana Parish, portions of East Feliciana Parish east of Redwood Creek, portions of East Baton Rouge Parish east of the Comite River and the city of Baton Rouge, and the Mississippi River delta. The river is completely leveed on its western side from the Arkansas line to Venice, Louisiana and on its eastern side from Baton Rouge to Venice.

The primary habitat types within the basin are Batture, Bottomland Hardwood Forests, and Sandbars. This basin also contains nearly all of the Southern Mesophytic Forest found in Louisiana. The delta is characterized by river channels with attendant channel banks, natural bayous, and man-made canals which are interspersed with Intermediate and Freshwater Marshes.

The Mississippi River contains at least 260 species of fish which comprises 25% of all fish species in North America (NPS 2004). Approximately 50 species of freshwater fishes (W. Kelso, personal communication), three species of mussels (Vidrine 1993), and 13 species of crawfish (J. Walls, personal communication) are found within the Mississippi Basin in Louisiana.

Water Quality:

The 2012 Water Quality Inventory Report (LDEQ 2012) indicated that 43% of the 17 waterbody subsegments within the basin support their designated use for fish and wildlife propagation. Causes of water quality issues include: metals, nutrients, polychlorinated biphenyls (PCBs), hexachlorobenzene, fecal coliform bacteria, organic enrichment and low concentration of dissolved oxygen, oil and grease, non-native aquatic plants, and turbidity. The suspected sources of the water quality problems include: home sewage systems, agriculture, silviculture, urban storm water runoff, and dredging.

Mississippi Basin SGCN (65)	
Mollusks (13)	
Butterfly	*Ellipsaria lineolata*
Elephant-ear	*Elliptio crassidens*

Ebonyshell	*Fusconaia ebena*
Round Pearlshell	*Glebula rotundata*
Plain Pocketbook	*Lampsilis cardium*
Fatmucket	*Lampsilis siliquoidea*
White Heelsplitter	*Lasmigona complanata*
Southern Hickorynut	*Obovaria jacksoniana*
Pyramid Pigtoe	*Pleurobema rubrum*
Fat Pocketbook	*Potamilus capax*
Rabbitsfoot	*Quadrula cylindrica*
Southern Creekmussel	*Strophitus subvexus*
Fawnsfoot	*Truncilla donaciformis*
Crustaceans (5)	
Vernal Crawfish	*Procambarus viaeviridis*
Beach Ghost Shrimp	*Callichirus islagrande*
Carolinian Ghost Shrimp	*Callichirus major*
Peppermint Shrimp	*Lysmata wurdemanni*
Estuarine Ghost Shrimp	*Lepidophthalmus louisianensis*
Inland Fish (20)	
Pallid Sturgeon	*Scaphirhynchus albus*
Shovelnose Sturgeon	*Scaphirhynchus platorynchus*
Paddlefish	*Polyodon spathula*
American Eel	*Anguilla rostrata*
Alabama Shad	*Alosa alabamae*
Central Stoneroller	*Campostoma anomalum*
Bluntface Shiner	*Cyprinella camura*
Steelcolor Shiner	*Cyprinella whipplei*
Sturgeon Chub	*Macrhybopsis gelida*
Shoal Chub	*Macrhybopsis hyostoma*
Sicklefin Chub	*Macrhybopsis meeki*
Longjaw Minnow	*Notropis amplamala*
Ironcolor Shiner	*Notropis chalybaeus*
Chub Shiner	*Notropis potteri*
Blue Sucker	*Cycleptus elongatus*
Gulf Pipefish	*Syngnathus scovelli*
Redspot Darter	*Etheostoma artesiae*
Rainbow Darter	*Etheostoma caeruleum*
Bigscale Logperch	*Percina macrolepida*
Saddleback Darter	*Percina vigil*
Marine Fish (15)	

Diamond Killifish	*Adinia xenica*
Saltmarsh Topminnow	*Fundulus jenkinsi*
Bayou Killifish	*Fundulus pulvereus*
Opossum Pipefish	*Microphis brachyurus*
Chain Pipefish	*Syngnathus louisianae*
Goliath Grouper	*Epinephelus itajara*
Large-scaled Spinycheek Sleeper	*Eleotris amblyopsis*
Frillfin Goby	*Bathygobius soporator*
Violet Goby	*Gobioides broussonnetii*
Broad Flounder	*Paralichthys squamilentus*
Southern Puffer	*Sphoeroides nephelus*
Lemon Shark	*Negaprion brevirostris*
Smalltooth Sawfish	*Pristis pectinata*
Tarpon	*Megalops atlanticus*
Dwarf Seahorse	*Hippocampus zosterae*
Reptiles (12)	
Loggerhead Sea Turtle	*Caretta caretta*
Green Sea Turtle	*Chelonia mydas*
Hawksbill Sea Turtle	*Eretmochelys imbricata*
Kemp's Ridley Sea Turtle	*Lepidochelys kempii*
Alligator Snapping Turtle	*Macrochelys temminckii*
Smooth Softshell	*Apalone mutica*
Leatherback Sea Turtle	*Dermochelys coriacea*
Western Chicken Turtle	*Deirochelys reticularia miaria*
Mississippi Diamond-backed Terrapin	*Malaclemys terrapin pileata*
Ouachita Map Turtle	*Graptemys ouachitensis ouachitensis*
Razor-backed Musk Turtle	*Sternotherus carinatus*
Gulf Saltmarsh Snake	*Nerodia clarkii clarkii*

Threats Affecting Basin:

The following table illustrates the threats identified for the Mississippi Basin and the scope and severity of those threats. Among the most serious threats to this basin are the impacts of invasive plants and animals, as well as modifications to the natural hydrology of the Mississippi River. Due to the high level of commercial use of the river, pollution is also a serious threat to water quality.

Mississippi Basin Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	Small	Moderate	Low
Agriculture/Aquaculture	Large	Moderate	Medium
Energy Production & Mining	Small	Moderate	Low
Transportation & Service Corridors	Large	Moderate	Medium
Biological Resource Use	N/A	N/A	N/A
Human Intrusion/Disturbance	Small	Moderate	Low
Natural System Modification	Pervasive	Extreme	Very High
Invasive & other Problematic Species	Pervasive	Extreme	Very High
Pollution	Large	Serious	High
Geological Events	Restricted	Moderate	Low
Climate Change & Severe Weather	Small	Serious	Low
Overall Calculated Threat Impact: High			

Basin Research Needs/Conservation Actions:

1. Develop a comprehensive biological survey methodology for the Mississippi River and its tributaries.
2. Explore the possibility of reconnecting the Mississippi River with portions of its floodplain by using controlled diversions, in order to restore the natural hydrology of forested wetlands.

f. Ouachita Basin

General Description:

The Ouachita River system is the principal drainage for south Arkansas and northeast Louisiana, draining an approximate area of 26,000 square miles. The source of the river is in the Ouachita Mountains of west-central Arkansas, near the Oklahoma border. The river flows south through northeast Louisiana and joins with the Tensas River north of the town of Jonesville to form the Black River, which empties into the Red River. The total length of the river is 542 miles. In Louisiana, the Ouachita Basin covers 10,000 square miles of drainage area (LDEQ 1993) which mostly consists of rich alluvial plains cultivated in soybeans, cotton, and corn. The northwest corner of the basin is cultivated in Loblolly Pine plantations. Bayou Bartholomew and Bayou D'Arbonne are the major tributaries of the Ouachita River. Bayou Bartholomew is home to one of the most diverse assemblages of freshwater mussels and fishes in Louisiana.

There are two lock and dams on the Ouachita River in Louisiana. The Jonesville and Columbia lock and dams were constructed by the USACE and opened to navigation in 1972. Each structure impounds a slack-water pool approximately 100 miles long. The Catahoula Diversion Channel and Control Structure and the Little River Closure Dam are located in the Jonesville Lock and Dam pool southwest of Jonesville. The diversion channel diverts flows from Catahoula Lake into Black River, downstream from the lock and dam. The control structure is used to regulate the flow entering the diversion channel from the lake. The closure dam is located on Little River. These features allow for regulation of stages in the lake to permit its continued use as a resting and feeding area for migratory waterfowl (USACE 1998).

Approximately 120 species of freshwater fishes (W. Kelso, personal communication), 49 species of mussels (Vidrine 1993), and 19 species of crawfish (J. Walls, personal communication) are found within the Ouachita Basin.

Water Quality:

The 2012 Water Quality Inventory Report (LDEQ 2012) indicated that 15% of the 60 water body subsegments within the basin fully support their designated use for fish and wildlife propagation. Causes of water quality issues include: metals, pesticides, nutrients, fecal coliform bacteria, organic enrichment and low concentration of dissolved oxygen, oil and grease, non-native aquatic plants, sedimentation/siltation, and turbidity. The suspected sources of the water quality problems include: home sewage systems, agriculture, silviculture, urban storm water runoff, surface mining, and dredging.

Ouachita Basin SGCN (60)	
Mollusks (23)	
Mucket	*Actinonaias ligamentina*
Western Fanshell	*Cyprogenia aberti*
Round Pearlshell	*Glebula rotundata*
Butterfly	*Ellipsaria lineolata*
Spike	*Elliptio dilatata*
Ebonyshell	*Fusconaia ebena*
Pink Mucket	*Lampsilis abrupta*
Sandbank Pocketbook	*Lampsilis satura*
Plain Pocketbook	*Lampsilis cardium*
Southern Pocketbook	*Lampsilis ornata*
Fatmucket	*Lampsilis siliquoidea*
White Heelsplitter	*Lasmigona complanata*
Black Sandshell	*Ligumia recta*
Southern Hickorynut	*Obovaria jacksoniana*
Hickorynut	*Obovaria olivaria*
Pyramid Pigtoe	*Pleurobema rubrum*
Fat Pocketbook	*Potamilus capax*
Ouachita Kidneyshell	*Ptychobranchus occidentalis*
Rabbitsfoot	*Quadrula cylindrica*
Monkeyface	*Quadrula metanevra*
Creeper	*Strophitus undulatus*
Fawnsfoot	*Truncilla donaciformis*
Silty Hornsnail	*Pleurocera canaliculata*
Crustaceans (4)	
Vernal Crawfish	*Procambarus viaeviridis*
Elegant Creek Crawfish	*Procambarus elegans*
Ouachita Fencing Crawfish	*Faxonella creaseri*
Pine Hills Digger	*Fallicambarus dissitus*
Non-crustacean Arthropods (10)	
Texas Emerald	*Somatochlora margarita*
Texas Forestfly	*Amphinemura texana*
Louisiana Needlefly	*Leuctra szczytkoi*
Little Dubiraphian Riffle Beetle	*Dubiraphia parva*
Yellow Brachycercus Mayfly	*Brachycercus flavus*
Schoolhouse Springs Net-spinning Caddisfly	*Diplectrona rossi*
Morse's Net-spinning Caddisfly	*Cheumatopsyche morsei*

Holzenthal's Philopotamid Caddisfly	*Chimarra holzenthali*
Ceraclean Caddisfly	*Ceraclea spongillovorax*
Schoolhouse Springs Purse Casemaker Caddisfly	*Hydroptila ouachita*
Inland Fish (17)	
Shovelnose Sturgeon	*Scaphirhynchus platorynchus*
Paddlefish	*Polyodon spathula*
American Eel	*Anguilla rostrata*
Central Stoneroller	*Campostoma anomalum*
Steelcolor Shiner	*Cyprinella whipplei*
Shoal Chub	*Macrhybopsis hyostoma*
Bigeye Shiner	*Notropis boops*
Ironcolor Shiner	*Notropis chalybaeus*
Bluehead Shiner	*Pteronotropis hubbsi*
Blue Sucker	*Cycleptus elongatus*
River Redhorse	*Moxostoma carinatum*
Western Sand Darter	*Ammocrypta clara*
Crystal Darter	*Crystallaria asprella*
Redspot Darter	*Etheostoma artesiae*
Channel Darter	*Percina copelandi*
Stargazing Darter	*Percina uranidea*
Saddleback Darter	*Percina vigil*
Amphibians (1)	
Red River Mudpuppy	*Necturus louisianensis*
Reptiles (5)	
Alligator Snapping Turtle	*Macrochelys temminckii*
Smooth Softshell	*Apalone mutica*
Western Chicken Turtle	*Deirochelys reticularia miaria*
Ouachita Map Turtle	*Graptemys ouachitensis ouachitensis*
Razor-backed Musk Turtle	*Sternotherus carinatus*

Threats Affecting Basin:

The following table illustrates the threats identified for the Ouachita Basin and the scope and severity of those threats. Invasive species, including carp of several species and Common Salvinia, are one of the most pressing threats to this basin. As with most river systems in Louisiana, changes to natural hydrological regimes within this basin are of concern. Finally, due to the large amount of agricultural land within this basin, sedimentation and agricultural runoff impact many waterbodies within this basin.

Ouachita Basin Threats Assessment:			
1st Level Threat	**Scope**	**Severity**	**Impact**
Residential/Commercial Development	Small	Moderate	Low
Agriculture/Aquaculture	Large	Moderate	Medium
Energy Production & Mining	Restricted	Serious	Medium
Transportation & Service Corridors	Small	Moderate	Low
Biological Resource Use	N/A	N/A	N/A
Human Intrusion/Disturbance	Small	Moderate	Low
Natural System Modification	Large	Serious	High
Invasive & other Problematic Species	Pervasive	Serious	High
Pollution	Pervasive	Serious	High
Geological Events	Small	Slight	Low
Climate Change & Severe Weather	Small	Serious	Low
Overall Calculated Threat Impact: Medium			

Basin Research Needs/Conservation Actions:

1. Improve partnerships with LDEQ, NRCS, TNC, LSU Co-op Extension Service, and others to share data on threats to this watershed and participate in the development of future strategies to abate these identified threats.
2. Partner with USDA NRCS to reduce impacts from agriculture sediments within the Ouachita Basin, particularly in Bayou Bonne Idee.
3. Address the impacts of adjacent agricultural practices on Bayou Bartholomew SGCN.
4. Address the impacts of habitat alteration and development in Bayou DeSiard.

g. Pearl Basin

General Description:

The Pearl Basin's drainage area covers about 7,800 square miles (Storm 2005) and lies within two states, Mississippi and Louisiana. Land use within the basin is predominately agriculture, including industrial timberland. Urbanization is steadily increasing as residents from the metropolitan area of New Orleans continue to immigrate into St. Tammany and Washington Parishes.

The East Pearl River system is one of Louisiana and Mississippi's principal rivers, draining an area of 8,760 square miles. The river divides into two distinct channels west of Picayune, Mississippi where the main stream is known as the West Pearl River. The East Pearl River is formed by a confluence of the Hobolochitto Creek and Farrs Slough, and forms the boundary between Mississippi and Louisiana. The East Pearl River drains into Lake Borgne and eventually into the Mississippi Sound.

The Pearl Basin is among the most unaffected of all the state's basins; however, future development pressures and changes in land use practices could seriously degrade the habitat in this basin. Main channel and side channel habitats throughout the basin are threatened by the operation of dams and creation of reservoirs. The headwater dam (Ross Barnett Reservoir) at Jackson, Mississippi has changed normal historic flow patterns in the lower Pearl Basin. Future proposals for new or expanded reservoirs could further compound the interruption of normal flow patterns to the river below such reservoirs, with unknown impacts to coastal species within the Lake Borgne/Mississippi Sound receiving waters. Degradation of other habitats (tributaries, backwaters, and swamps) has been less severe primarily due to a lack of accessibility to most of these areas. Erosion and sedimentation, exacerbated by agricultural practices, are the prime contributors to non-point source pollution. Historic mining practices on the Pearl and Bogue Chitto Rivers have interfered with the spawning cycle of the Alabama Shad, as removal of sand and gravel has greatly reduced the available substrates necessary for reproduction.

The USACE project "Pearl River Navigation Channel" completed in the 1950's has had a lasting impact on the habitat of the basin. The placement of two low water sills and three navigation locks on the Pearl River have altered the historic migration routes and the overall life cycles of the Gulf Sturgeon. Other species affected include the Alabama Shad, which has experienced significant declines in the last century due to these structures blocking spawning routes, and the Paddlefish, whose spawning and rearing areas have been altered.

With the decline of commercial traffic in the 1970's, maintenance dredging was suspended, and the locks were placed in caretaker status. A request by local business interests in Slidell and Bogalusa to reevaluate the economic and environmental feasibility of maintaining the locks and navigation channel was submitted to the USACE in the 1980's, and dredging of the river began in 1989. However, dredging was discontinued due to environmental concerns, and the project is currently awaiting concurrence from federal and state regulators before it will continue (USACE 1998).

Construction of Interstate-10 had an impact on the forested wetlands located along the Pearl River north of the highway. The ground-level sections of the highway act as a dam and have altered the natural hydrology and have substantially increased sedimentation in many areas, including within Pearl River WMA.

Approximately 100 species of freshwater fishes (W. Kelso, personal communication), 20 species of mussels (Vidrine 1993), and 15 species of crawfish (J. Walls, personal communication) are found within the Pearl Basin. For more information about this basin, see the LDWF Inland Fisheries management plan for the Pearl River (www.wlf.louisiana.gov/fishing/waterbody-management-plans-inland).

Water Quality:

The 2012 Water Quality Inventory Report (LDEQ 2012) indicated that 26% of the 23 water body subsegments within the basin fully support their designated use for fish and wildlife propagation. Causes of water quality issues include: metals, nutrients, fecal coliform bacteria, organic enrichment and low concentration of dissolved oxygen, low pH levels, and turbidity. The suspected sources of the water quality problems include: home sewage systems, agriculture (particularly pasturelands), silviculture, urban stormwater runoff, and surface mining.

Pearl Basin SGCN (70)	
Mollusks (14)	
Rayed Creekshell	*Anodontoides radiatus*
Elephant-ear	*Elliptio crassidens*
Ebonyshell	*Fusconaia ebena*
Round Pearlshell	*Glebula rotundata*
Southern Pocketbook	*Lampsilis ornata*
White Heelsplitter	*Lasmigona complanata*
Black Sandshell	*Ligumia recta*
Southern Hickorynut	*Obovaria jacksoniana*
Alabama Hickorynut	*Obovaria unicolor*
Mississippi Pigtoe	*Pleurobema beadleianum*
Inflated Heelsplitter	*Potamilus inflatus*
Southern Creekmussel	*Strophitus subvexus*
Fawnsfoot	*Truncilla donaciformis*

Southern Rainbow	*Villosa vibex*
Crustaceans (7)	
Flatnose Crawfish	*Procambarus planirostris*
Pearl Blackwater Crawfish	*Procambarus penni*
Pontchartrain Painted Crawfish	*Orconectes hobbsi*
Gulf Crawfish	*Procambarus shermani*
Ribbon Crawfish	*Procambarus bivittatus*
Flatwoods Digger	*Fallicambarus oryktes*
Estuarine Ghost Shrimp	*Lepidophthalmus louisianensis*
Non-crustacean Arthropods (2)	
Molson's Microcaddisfly	*Hydroptila molsonae*
Southern Snaketail	*Ophiogomphus australis*
Inland Fish (20)	
Gulf Sturgeon	*Acipenser oxyrinchus desotoi*
Paddlefish	*Polyodon spathula*
American Eel	*Anguilla rostrata*
Alabama Shad	*Alosa alabamae*
Clear Chub	*Hybopsis winchelli*
Shoal Chub	*Macrhybopsis hyostoma*
Longjaw Minnow	*Notropis amplamala*
Ironcolor Shiner	*Notropis chalybaeus*
Flagfin Shiner	*Pteronotropis signipinnis*
Bluenose Shiner	*Pteronotropis welaka*
Southeastern Blue Sucker	*Cycleptus meridionalis*
River Redhorse	*Moxostoma carinatum*
Frecklebelly Madtom	*Noturus munitus*
Crystal Darter	*Crystallaria asprella*
Redspot Darter	*Etheostoma artesiae*
Pearl Darter	*Percina aurora*
Channel Darter	*Percina copelandi*
Freckled Darter	*Percina lenticula*
Gulf Logperch	*Percina suttkusi*
Saddleback Darter	*Percina vigil*
Marine Fish (13)	
Diamond Killifish	*Adinia xenica*
Saltmarsh Topminnow	*Fundulus jenkinsi*
Bayou Killifish	*Fundulus pulvereus*
Opossum Pipefish	*Microphis brachyurus*

Chain Pipefish	*Syngnathus louisianae*
Frillfin Goby	*Bathygobius soporator*
Violet Goby	*Gobioides broussonnetii*
Broad Flounder	*Paralichthys squamilentus*
Southern Puffer	*Sphoeroides nephelus*
Large-scaled Spinycheek Sleeper	*Eleotris amblyopsis*
Lemon Shark	*Negaprion brevirostris*
Smalltooth Sawfish	*Pristis pectinata*
Tarpon	*Megalops atlanticus*
Amphibians (1)	
Gulf Coast Waterdog	*Necturus beyeri*
Reptiles (13)	
Loggerhead Sea Turtle	*Caretta caretta*
Green Sea Turtle	*Chelonia mydas*
Hawksbill Sea Turtle	*Eretmochelys imbricata*
Kemp's Ridley Sea Turtle	*Lepidochelys kempii*
Alligator Snapping Turtle	*Macrochelys temminckii*
Smooth Softshell	*Apalone mutica*
Leatherback Sea Turtle	*Dermochelys coriacea*
Ringed Map Turtle	*Graptemys oculifera*
Pearl River Map Turtle	*Graptemys pearlensis*
Mississippi Diamond-backed Terrapin	*Malaclemys terrapin pileata*
Stripe-necked Musk Turtle	*Sternotherus minor peltifer*
Razor-backed Musk Turtle	*Sternotherus carinatus*
Gulf Saltmarsh Snake	*Nerodia clarkii clarkii*

Threats Affecting Basin:

The following table illustrates the threats identified for the Pearl Basin and the scope and severity of those threats. Although this basin is not as threatened as many other systems in Louisiana, there are still threats that need to be addressed. One of the primary threats to the Pearl Basin is the modification of the natural flow regime described above. Sedimentation associated with transportation infrastructure construction has also impacted water quality within this basin.

Pearl Basin Threats Assessment:			
1st Level Threat	**Scope**	**Severity**	**Impact**
Residential/Commercial Development	Small	Moderate	Low
Agriculture/Aquaculture	Large	Moderate	Medium
Energy Production & Mining	Restricted	Moderate	Low
Transportation & Service Corridors	Restricted	Moderate	Low
Biological Resource Use	N/A	N/A	N/A
Human Intrusion/Disturbance	Small	Moderate	Low
Natural System Modification	Pervasive	Serious	High
Invasive & other Problematic Species	Pervasive	Serious	High
Pollution	Pervasive	Serious	High
Geological Events	Small	Moderate	Low
Climate Change & Severe Weather	Restricted	Moderate	Low
Overall Calculated Threat Impact: Low			

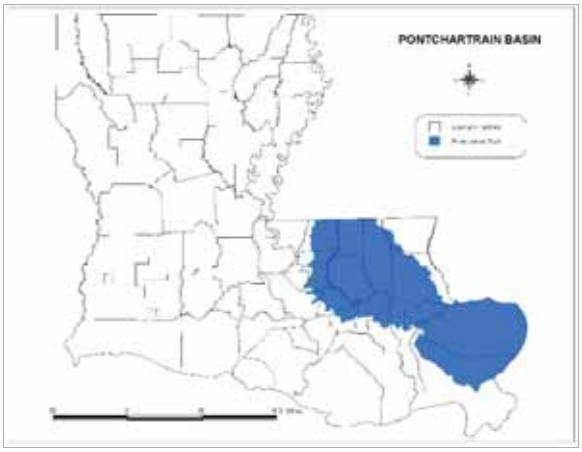
Basin Research Needs/Conservation Actions:

1. Coordinate with USACE, Mississippi Department of Wildlife, Fisheries, and Parks (MDWFP), Mississippi Department of Environmental Quality (MDEQ), LDEQ, USDA NRCS, TNC, and others to develop a comprehensive management strategy for the entire Pearl Basin, to include plans for restoring, to the extent possible, historic flow patterns in the lower Pearl River.
2. Work with LDEQ, the Lake Pontchartrain Basin Foundation (LPBF), TNC, and other partners to address water quality issues in the Pearl Basin.
3. Support establishing levee breaks or set-backs to develop or replenish backwater areas.

h. Pontchartrain Basin

General Description:

The Pontchartrain Basin is a 4,700 square mile watershed in southeast Louisiana and southwest Mississippi. The topography of the basin ranges from more than 300 feet above sea level in the rolling hills along the Louisiana and Mississippi state line to sea level throughout the coastal wetlands to more than 10 feet below sea level in some areas of New Orleans.



The northern half of the basin is commonly referred to as the Florida Parishes and contains all or portions of seven parishes: East Baton Rouge, East Feliciana, Livingston, St. Helena, St. Tammany, Tangipahoa, and Washington. Many rivers drain the Florida Parishes, introducing freshwater into Lakes Maurepas, Pontchartrain, and Borgne. The largest of these, the Pearl and Amite Rivers, have headwaters in Mississippi. The rivers of this basin have eroded and incised the uplands to form distinct river valleys. Lakes Maurepas, Pontchartrain, and Borgne form a shallow brackish receiving basin for freshwater from the Amite, Tickfaw, Blind, Tangipahoa, Tchefuncte, and Pearl Rivers, as well as Bayou Lacombe and Bayou Bonfouca. Freshwater is also introduced through regional drainage and diversion canals, whereas salt water enters these lakes from the Gulf of Mexico via the Mississippi Sound, Mississippi River Gulf Outlet (MRGO), Chef Menteur Pass, and Rigolets Pass. The Mississippi River Deltaic Plain lies to the south of these lakes. The extreme eastern edge of the basin is bordered by thin ribbons of sand and marsh known as the Chandeleur Islands. These islands are the headland remnants of the St. Bernard delta of the Mississippi River, but have undergone extensive erosion through the years, most recently due to strong hurricanes such as Katrina, Gustav, and Isaac. These islands are of critical importance to a number of SGCN, including many species of birds.

Land use within this basin is varied, ranging from high-density urban areas that drain metropolitan Baton Rouge and New Orleans to rural pastures in the Florida Parishes. In 1995, the LPBF released a comprehensive management plan for the basin that details management strategies to address sewage and agricultural runoff, stormwater runoff, and saltwater intrusion/wetland loss. Additionally, numerous coastal restoration projects, including marsh creation and shoreline protection, have been proposed for this basin to address coastal wetland loss (CPRA 2012).

The Pontchartrain Basin contains some of the greatest aquatic species diversity in the state. Approximately 100 species of freshwater fishes (W. Kelso, personal

communication), 35 species of mussels (Vidrine 1993), and 13 species of crawfish (J. Walls, personal communication) are found within the Pontchartrain Basin. Additionally, the Chandeleur Islands likely provide the only existing habitat in Louisiana for certain species of saltwater invertebrates and seagrasses. If erosion continues and the islands are lost, SGCN such as Bay Scallops may be extirpated from Louisiana waters. For more information on this basin, see the LDWF Inland Fisheries management plan for the lower Ponchartrain Basin (www.wlf.louisiana.gov/fishing/waterbody-management-plans-inland).

Water Quality:

The 2012 Water Quality Inventory Report (LDEQ 2012) indicated that 31% of the 86 waterbody subsegments within the basin fully support their designated use for fish and wildlife propagation. The suspected causes of water quality issues include: metals, nutrients, fecal coliform bacteria, non-native aquatic plants, organic enrichment and low concentration of dissolved oxygen, oil and grease, dissolved and suspended solids, pH levels, sedimentation/siltation, elevated water temperatures, and turbidity. The suspected sources of the water quality problems include: home sewage systems, agriculture (particularly pasturelands), silviculture, urban development, urban storm water runoff, industry, and sand and gravel mining.

Pontchartrain Basin SGCN (61)	
Mollusks (16)	
Rayed Creekshell	*Anodontoides radiatus*
Elephant-ear	*Elliptio crassidens*
Round Pearlshell	*Glebula rotundata*
Southern Pocketbook	*Lampsilis ornata*
Southern Hickorynut	*Obovaria jacksoniana*
Alabama Hickorynut	*Obovaria unicolor*
Mississippi Pigtoe	*Pleurobema beadleianum*
Inflated Heelsplitter	*Potamilus inflatus*
Southern Creekmussel	*Strophitus subvexus*
Fawnsfoot	*Truncilla donaciformis*
Southern Rainbow	*Villosa vibex*
Bay Scallop	*Argopecten irradians*
Sawtooth Penshell	*Atrina serrata*
Half-Naked Penshell	*Atrina seminuda*
Channeled Whelk	*Busycotypus canaliculatus*
Lightning Whelk	*Busycon sinistrum*
Crustaceans (6)	
Flatnose Crawfish	*Procambarus planirostris*

Gulf Crawfish	*Procambarus shermani*
Ribbon Crawfish	*Procambarus bivittatus*
Pontchartrain Painted Crawfish	*Orconectes hobbsi*
Flatwoods Digger	*Fallicambarus oryktes*
Estuarine Ghost Shrimp	*Lepidophthalmus louisianensis*
Non-crustacean Arthropods (3)	
Hodges' Clubtail	*Gomphus hodgesi*
Southern Snaketail	*Ophiogomphus australis*
Molson's Microcaddisfly	*Hydroptila molsonae*
Inland Fish (11)	
Gulf Sturgeon	*Acipenser oxyrinchus desotoi*
Paddlefish	*Polyodon spathula*
American Eel	*Anguilla rostrata*
Alabama Shad	*Alosa alabamae*
Clear Chub	*Hybopsis winchelli*
Longjaw Minnow	*Notropis amplamala*
Ironcolor Shiner	*Notropis chalybaeus*
Flagfin Shiner	*Pteronotropis signipinnis*
Broadstripe Topminnow	*Fundulus euryzonus*
Gulf Logperch	*Percina suttkusi*
Saddleback Darter	*Percina vigil*
Marine Fish (14)	
Diamond Killifish	*Adinia xenica*
Saltmarsh Topminnow	*Fundulus jenkinsi*
Bayou Killifish	*Fundulus pulvereus*
Dwarf Seahorse	*Hippocampus zosterae*
Opossum Pipefish	*Microphis brachyurus*
Chain Pipefish	*Syngnathus louisianae*
Frillfin Goby	*Bathygobius soporator*
Violet Goby	*Gobioides broussonnetii*
Broad Flounder	*Paralichthys squamilentus*
Southern Puffer	*Sphoeroides nephelus*
Large-scaled Spinycheek Sleeper	*Eleotris amblyopsis*
Lemon Shark	*Negaprion brevirostris*
Smalltooth Sawfish	*Pristis pectinata*
Tarpon	*Megalops atlanticus*

Amphibians (1)	
Gulf Coast Waterdog	*Necturus beyeri*
Reptiles (10)	
Loggerhead Sea Turtle	*Caretta caretta*
Green Sea Turtle	*Chelonia mydas*
Hawksbill Sea Turtle	*Eretmochelys imbricata*
Kemp's Ridley Sea Turtle	*Lepidochelys kempii*
Alligator Snapping Turtle	*Macrochelys temminckii*
Smooth Softshell	*Apalone mutica*
Leatherback Sea Turtle	*Dermochelys coriacea*
Mississippi Diamond-backed Terrapin	*Malaclemys terrapin pileata*
Razor-backed Musk Turtle	*Sternotherus carinatus*
Gulf Saltmarsh Snake	*Nerodia clarkii clarkii*

Threats Affecting Basin:

The following table illustrates the threats identified for the Pontchartrain Basin and the scope and severity of those threats.

Pontchartrain Basin Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	Restricted	Serious	Medium
Agriculture/Aquaculture	Large	Moderate	Medium
Energy Production & Mining	Large	Serious	High
Transportation & Service Corridors	Restricted	Serious	Medium
Biological Resource Use	N/A	N/A	N/A
Human Intrusion/Disturbance	Small	Moderate	Low
Natural System Modification	Pervasive	Serious	High
Invasive & other Problematic Species	Pervasive	Serious	High
Pollution	Large	Serious	High
Geological Events	Large	Serious	High
Climate Change & Severe Weather	Large	Moderate	Medium
Overall Calculated Threat Impact: Very High			

Basin Research Needs/Conservation Actions:

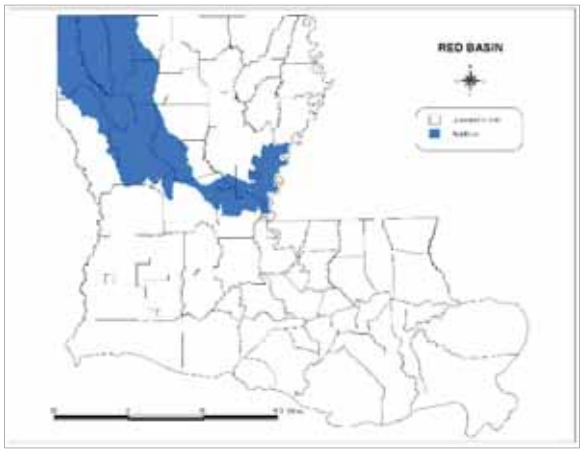
1. Develop a comprehensive stream survey methodology for the Pontchartrain Basin.

2. Work with LPBF and NRCS to promote conservation efforts within this basin and address water quality issues. Implement habitat conservation strategies presented in LPBF plan.
3. Complete a comprehensive inventory of marine invertebrates at the Chandeleur Islands.
4. Promote coastal restoration and protection initiatives to maintain or enhance coastal marsh and Barrier Island habitat critical to SGCN.

i. Red Basin

General Description:

The headwaters of the Red River begin in Curry County, New Mexico, and the river ends 1,360 miles downstream at the Mississippi River. The Red River watershed is 69,200 square miles (44,287,823 acres) (Ken Guidry, personal communication) and receives drainage from five states including New Mexico, Texas, Oklahoma, Arkansas, and Louisiana. The Red River drains approximately 7,760 square miles within Louisiana (USACE 1998).



The Red River enters Louisiana from Arkansas in the northwest corner of the state and follows a southeasterly course, passing through or forming the boundary of ten parishes, until it reaches its terminus at the Mississippi River. Shreveport and Alexandria are the principle cities located along the river. The Red River received its name from the high concentration of red soil present in the river following flood periods. Much of the basin is wooded, and significant agricultural lands are located within the Red River's historic floodplain.

Navigational improvements on the Red River began in the early part of the 19th century. The most recent improvements, part of the $1.9 billion Red River Waterway Project (RRWP) authorized by Congress with the Rivers and Harbors Act of 1968, consisted of dredging a channel nine feet deep and 200 feet wide and adding a series of five lock and dam complexes to improve navigation from the Mississippi River to Shreveport. Other improvements within the RRWP consisted of developing a comprehensive plan for bank stabilization from the Denison Dam on the Texas/Oklahoma border to the Mississippi River.

Approximately 100 species of freshwater fishes (W. Kelso, personal communication), 36 species of mussels (Vidrine 1993), and 18 species of crawfish (J. Walls, personal communication) are found within the Red Basin.

Water Quality:

The 2012 Water Quality Inventory Report (LDEQ 2012) indicated that 23% of the 70 waterbody subsegments within the basin fully support their designated use for fish and wildlife propagation. Causes of water quality issues include: metals, nutrients, polychlorinated biphenyls (PCBs), fecal coliform bacteria, non-native aquatic plants, organic enrichment and low concentration of dissolved oxygen, dissolved and suspended solids, low pH levels, sedimentation/siltation, and turbidity. The suspected sources of the water quality problems include: silvicultural activities, crop production, pasture lands,

home sewage systems, land development and urban runoff, channelization or dredging of streams, removal of riparian vegetation, and road construction.

Red Basin SGCN (51)	
Mollusks (11)	
Spike	*Elliptio dilatata*
Texas Pigtoe	*Fusconaia askewi*
Ebonyshell	*Fusconaia ebena*
Round Pearlshell	*Glebula rotundata*
Louisiana Pearlshell	*Margaritifera hembeli*
Southern Hickorynut	*Obovaria jacksoniana*
Pyramid Pigtoe	*Pleurobema rubrum*
Louisiana Pigtoe	*Pleurobema riddellii*
Southern Creekmussel	*Strophitus subvexus*
Creeper	*Strophitus undulatus*
Fawnsfoot	*Truncilla donaciformis*
Crustaceans (8)	
Kisatchie Painted Crawfish	*Orconectes maletae*
Twin Crawfish	*Procambarus geminus*
Javelin Crawfish	*Procambarus jaculus*
Flatwoods Digger	*Fallicambarus oryktes*
Pine Hills Digger	*Fallicambarus dissitus*
Sabine Fencing Crawfish	*Faxonella beyeri*
Ouachita Fencing Crawfish	*Faxonella creaseri*
Caddo Chimney Crawfish	*Procambarus machardyi*
Non-crustacean Arthropods (11)	
Texas Emerald	*Somatochlora margarita*
Texas Forestfly	*Amphinemura texana*
Louisiana Needlefly	*Leuctra szczytkoi*
Little Dubiraphian Riffle Beetle	*Dubiraphia parva*
Yellow Brachycercus Mayfly	*Brachycercus flavus*
Pitcher Plant Spiketail	*Cordulegaster sarracenia*
Schoolhouse Springs Net-spinning Caddisfly	*Diplectrona rossi*
Morse's Net-spinning Caddisfly	*Cheumatopsyche morsei*
Holzenthal's Philopotamid Caddisfly	*Chimarra holzenthali*
Ceraclean Caddisfly	*Ceraclea spongillovorax*
Schoolhouse Springs Purse Casemaker Caddisfly	*Hydroptila ouachita*
Inland Fish (15)	

Pallid Sturgeon	*Scaphirhynchus albus*
Shovelnose Sturgeon	*Scaphirhynchus platorynchus*
Paddlefish	*Polyodon spathula*
American Eel	*Anguilla rostrata*
Shoal Chub	*Macrhybopsis hyostoma*
Ironcolor Shiner	*Notropis chalybaeus*
Chub Shiner	*Notropis potteri*
Suckermouth Minnow	*Phenacobius mirabilis*
Bluehead Shiner	*Pteronotropis hubbsi*
Blue Sucker	*Cycleptus elongatus*
River Redhorse	*Moxostoma carinatum*
Western Sand Darter	*Ammocrypta clara*
Crystal Darter	*Crystallaria asprella*
Redspot Darter	*Etheostoma artesiae*
Saddleback Darter	*Percina vigil*
Amphibians (1)	
Red River Mudpuppy	*Necturus louisianensis*
Reptiles (5)	
Alligator Snapping Turtle	*Macrochelys temminckii*
Smooth Softshell	*Apalone mutica*
Western Chicken Turtle	*Deirochelys reticularia miaria*
Ouachita Map Turtle	*Graptemys ouachitensis ouachitensis*
Razor-backed Musk Turtle	*Sternotherus carinatus*

Threats Affecting Basin:

The following table illustrates the threats identified for the Red Basin and the scope and severity of those threats. As with several other basins in Louisiana, invasive plants such as Hydrilla and Common Salvinia threaten the Red Basin in several ways. Also, the presence of significant agricultural lands within this basin has led to sedimentation issues within some waterbodies. Finally, changes to the natural flow regime of the Red River have caused impacts to both the system and SGCN that utilize it.

Red Basin Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	Small	Moderate	Low
Agriculture/Aquaculture	Large	Moderate	Medium
Energy Production & Mining	Large	Serious	High
Transportation & Service Corridors	Restricted	Moderate	Low
Biological Resource Use	N/A	N/A	N/A
Human Intrusion/Disturbance	Small	Moderate	Low
Natural System Modification	Large	Serious	High
Invasive & other Problematic Species	Pervasive	Serious	High
Pollution	Pervasive	Serious	High
Geological Events	Small	Slight	Low
Climate Change & Severe Weather	Small	Slight	Low
Overall Calculated Threat Impact: Medium			

Basin Research Needs/Conservation Actions:

1. Develop a comprehensive biological stream survey methodology for the Red Basin.
2. Conduct a detailed inventory of the Red River above Shreveport that focuses on habitats and SGCN.
3. Implement education, outreach, and cost-share programs with USDA NRCS and other partners to reduce sediments and nutrient loading within the Red Basin.

j. Sabine Basin

General Description:

The Sabine River arises in northern Hunt County and eastern Collin and Rockwall counties in north central Texas, and flows in an easterly direction to the Texas and Louisiana boundary near Logansport, Louisiana. The Sabine flows as boundary waters between the two states for some 270 river miles to the Gulf of Mexico, and drains an area of approximately 9,700 square miles, 7,190 square miles of which are above the Toledo Bend Reservoir (A.I.D. Associates 1981). Roughly 2,510 square miles of drainage are situated below the dam which is located at river mile 200. The entire basin drains 3,257 square miles within the state. The Toledo Bend Reservoir was constructed in the 1960s and became operational in 1969. Operation of a hydroelectric plant on the Sabine River has affected water flows on the lower portions of the river since that time. However, as part of the Federal Energy Regulatory Commission (FERC) relicensing process in 2013, several new requirements were incorporated into plant operations. Intended to benefit fish and wildlife in the system, those new operating license requirements included eliminating hypo-limnetic releases, enabling passage of American Eels past the dam, and changes to generating schedules that will reduce impacts to fishes.

The northern and central portions of the basin are primarily wooded with scattered agricultural lands throughout. Most of the basin supports cultivated and ruderal pinelands, with the majority of hardwoods located along principle drainages. Along the coastal zone, almost all Freshwater Marsh was converted to Intermediate and Brackish Marsh by the late 1970s as a result of saltwater intrusion and increased tidal influence (LaCoast 2005). Within lower Sabine Lake, one of the largest unharvested oyster reefs in the world exists, estimated at ten square kilometers (Moore 2008; Nevins et al. 2014). This reef habitat has received extensive interest in recent years as the state of Texas and coastal protection/restoration advocates in Louisiana have pushed strongly for the continuance of a commercial harvest prohibition. To date, the Louisiana Wildlife and Fisheries Commission has resisted oyster industry requests to open the lake to commercial oyster harvest.

Approximately 100 species of freshwater fishes (Texas State University 2013), 33 species of mussels (Vidrine 1993), and 13 species of crawfish (J. Walls, personal communication) are found within the Sabine Basin. For more information on this basin, see the LDWF Inland Fisheries management plan for the Sabine River (www.wlf.louisiana.gov/fishing/waterbody-management-plans-inland).

Water Quality:

The 2012 Water Quality Inventory Report (LDEQ 2012) indicated that 63% of the 19 waterbody subsegments support their designated use for fish and wildlife propagation. Causes of water quality issues include: mercury, fecal coliform bacteria, non-native aquatic plants, organic enrichment and low concentration of dissolved oxygen, and turbidity. The suspected sources of the water quality problems include: major industrial point sources, silvicultural activities, surface mining, agriculture, and urban runoff.

Sabine Basin SGCN (51)	
Mollusks (9)	
Texas Pigtoe	*Fusconaia askewi*
Round Pearlshell	*Glebula rotundata*
Sandbank Pocketbook	*Lampsilis satura*
Southern Hickorynut	*Obovaria jacksoniana*
Louisiana Pigtoe	*Pleurobema riddellii*
Texas Heelsplitter	*Potamilus amphichaenus*
Southern Creekmussel	*Strophitus subvexus*
Creeper	*Strophitus undulatus*
Fawnsfoot	*Truncilla donaciformis*
Crustaceans (7)	
Calcasieu Painted Crawfish	*Orconectes blacki*
Southwestern Creek Crawfish	*Procambarus dupratzi*
Pine Hills Digger	*Fallicambarus dissitus*
Beach Ghost Shrimp	*Callichirus islagrande*
Carolinian Ghost Shrimp	*Callichirus major*
Peppermint Shrimp	*Lysmata wurdemanni*
Estuarine Ghost Shrimp	*Lepidophthalmus louisianensis*
Non-crustacean Arthropods (1)	
Yellow Brachycercus Mayfly	*Brachycercus flavus*
Inland Fish (10)	
Paddlefish	*Polyodon spathula*
American Eel	*Anguilla rostrata*
Shoal Chub	*Macrhybopsis hyostoma*
Ironcolor Shiner	*Notropis chalybaeus*
Suckermouth Minnow	*Phenacobius mirabilis*
Blue Sucker	*Cycleptus elongatus*
Western Sand Darter	*Ammocrypta clara*
Redspot Darter	*Etheostoma artesiae*

Gumbo Darter	*Etheostoma thompsoni*
Bigscale Logperch	*Percina macrolepida*
Marine Fish (11)	
Diamond Killifish	*Adinia xenica*
Saltmarsh Topminnow	*Fundulus jenkinsi*
Bayou Killifish	*Fundulus pulvereus*
Texas Pipefish	*Syngnathus texanus*
Opossum Pipefish	*Microphis brachyurus*
Chain Pipefish	*Syngnathus louisianae*
Large-scaled Spinycheek Sleeper	*Eleotris amblyopsis*
Frillfin Goby	*Bathygobius soporator*
Violet Goby	*Gobioides broussonnetii*
Broad Flounder	*Paralichthys squamilentus*
Southern Puffer	*Sphoeroides nephelus*
Amphibians (1)	
Gulf Coast Waterdog	*Necturus beyeri*
Reptiles (12)	
Loggerhead Sea Turtle	*Caretta caretta*
Green Sea Turtle	*Chelonia mydas*
Hawksbill Sea Turtle	*Eretmochelys imbricata*
Kemp's Ridley Sea Turtle	*Lepidochelys kempii*
Alligator Snapping Turtle	*Macrochelys temminckii*
Smooth Softshell	*Apalone mutica*
Leatherback Sea Turtle	*Dermochelys coriacea*
Western Chicken Turtle	*Deirochelys reticularia miaria*
Sabine Map Turtle	*Graptemys sabinensis*
Mississippi Diamond-backed Terrapin	*Malaclemys terrapin pileata*
Razor-backed Musk Turtle	*Sternotherus carinatus*
Gulf Saltmarsh Snake	*Nerodia clarkii clarkii*

Threats Affecting Basin:

The following table illustrates the threats identified for the Sabine Basin and the scope and severity of those threats. As with many other systems in Louisiana, invasive species and changes to the natural hydrology of the Sabine River pose the greatest threats within this basin. Also, as discussed previously, historically there have been negative impacts from operation of the Toledo Bend dam, but recent changes in requirements may reduce those impacts.

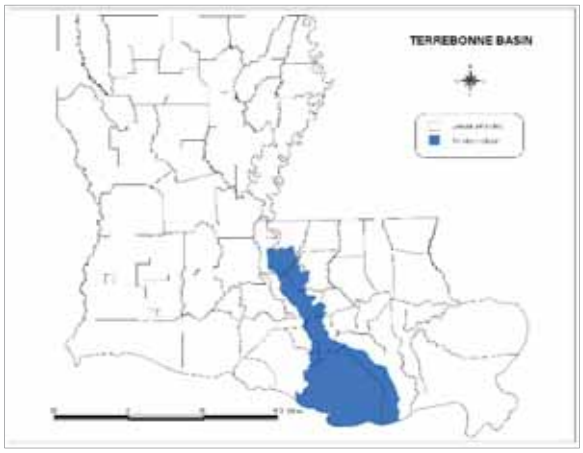
Sabine Basin Threats Assessment:			
1st Level Threat	**Scope**	**Severity**	**Impact**
Residential/Commercial Development	Small	Slight	Low
Agriculture/Aquaculture	Large	Moderate	Medium
Energy Production & Mining	Large	Serious	High
Transportation & Service Corridors	Restricted	Moderate	Low
Biological Resource Use	N/A	N/A	N/A
Human Intrusion/Disturbance	Small	Moderate	Low
Natural System Modification	Large	Extreme	High
Invasive & other Problematic Species	Pervasive	Serious	High
Pollution	Large	Moderate	Medium
Geological Events	Small	Serious	Low
Climate Change & Severe Weather	Restricted	Moderate	Low
Overall Calculated Threat Impact: Medium			

Basin Research Needs/Conservation Actions:

1. Support initiatives and programs that help reduce siltation and sedimentation throughout the Sabine Basin.
2. Continue LDWF participation in Sabine River Aquatic Resource Working Group to provide input to the Sabine River Authority (SRA) in regards to reducing impacts of power generation on fish and wildlife propagation below Toledo Bend Dam.

k. Terrebonne Basin

General Description:



The Terrebonne Basin covers approximately 1,712,500 acres in south-central Louisiana (LCWRCTF 1993), bordered by Bayou Lafourche to the east, the Atchafalaya Basin floodway to the west, the Mississippi River to the north, and the Gulf of Mexico to the south. It includes all of Terrebonne Parish and parts of Lafourche, Assumption, St. Martin, St. Mary, Iberville, and Ascension Parishes.

The extreme northern portion of the basin is primarily agricultural lands which continue south along its eastern edge within the historic floodplains of the Mississippi River and Bayou Lafourche. The western half of the basin consists of Bottomland Hardwood Forests and Cypress-Tupelo-Blackgum Swamps. The coastal zone consists of Freshwater, Freshwater Floating, and Intermediate Marshes inland, and Brackish and Salt Marshes near the bays and Gulf (LaCoast 2005). Approximately 729,000 acres of the Terrebonne Basin are wetlands, which consist of about 21% freshwater swamp and 79% marsh (LaCoast 2005). The two primary water sources that enter this system are rain water and flood water from the Atchafalaya River containing nutrient-rich sediments which inundate the southwestern coastal marshes (LaCoast 2005). As is the case in other basins, however, coastal land loss is a significant threat, and numerous projects have been proposed to address the issue (CPRA 2012). The lower Terrebonne estuary is separated from the open Gulf by the Isles Dernieres and Timbalier barrier island chains. Water exchange with the Gulf of Mexico is accomplished through numerous tidal inlets and passes. The Barrier Islands of the Terrebonne Basin are considered some of the most rapidly deteriorating barrier shorelines in the United States. These islands, including the Isle Dernieres Barrier Islands Refuge and East Timbalier Island NWR, are critically important for multiple bird SGCN, which makes maintenance and restoration of these areas of the utmost importance. Many of these islands have received restoration/nourishment through state and federal projects, but will continue to need attention to remain emergent and buffer mainland marshes from the tidal processes of the Gulf. The southeastern coastal marshes are isolated from any type of riverine input and with high rates of subsidence, show the highest incidence of wetland loss within the basin.

Approximately 60 species of freshwater fishes (W. Kelso, personal communication), 12 species of mussels (Vidrine 1993), and ten species of crawfish (J. Walls, personal communication) are found within the Terrebonne Basin.

Water Quality:

The 2012 Water Quality Inventory Report (LDEQ 2012) indicated that 22% of the 58 waterbody subsegments within the basin fully support their designated use for fish and wildlife propagation. Causes of water quality issues include: metals, nutrients, fecal coliform bacteria, non-native aquatic plants, organic enrichment and low concentration of dissolved oxygen, dissolved and suspended solids, low pH levels, sedimentation/siltation, and turbidity. The suspected sources of the water quality problems include: non-irrigated crop production, pasture land, urban runoff, hydromodification, combined sewers and unsewered areas, surface runoff, and spills.

Terrebonne Basin SGCN (31)	
Crustaceans (4)	
Beach Ghost Shrimp	*Callichirus islagrande*
Carolinian Ghost Shrimp	*Callichirus major*
Peppermint Shrimp	*Lysmata wurdemanni*
Estuarine Ghost Shrimp	*Lepidophthalmus louisianensis*
Inland Fish (2)	
Paddlefish	*Polyodon spathula*
American Eel	*Anguilla rostrata*
Marine Fish (15)	
Diamond Killifish	*Adinia xenica*
Saltmarsh Topminnow	*Fundulus jenkinsi*
Bayou Killifish	*Fundulus pulvereus*
Dwarf Seahorse	*Hippocampus zosterae*
Opossum Pipefish	*Microphis brachyurus*
Chain Pipefish	*Syngnathus louisianae*
Large-scaled Spinycheek Sleeper	*Eleotris amblyopsis*
Emerald Sleeper	*Erotelis smaragdus*
Frillfin Goby	*Bathygobius soporator*
Violet Goby	*Gobioides broussonnetii*
Broad Flounder	*Paralichthys squamilentus*
Southern Puffer	*Sphoeroides nephelus*
Lemon Shark	*Negaprion brevirostris*
Smalltooth Sawfish	*Pristis pectinata*
Tarpon	*Megalops atlanticus*
Reptiles (10)	
Loggerhead Sea Turtle	*Caretta caretta*
Green Sea Turtle	*Chelonia mydas*

Hawksbill Sea Turtle	*Eretmochelys imbricata*
Kemp's Ridley Sea Turtle	*Lepidochelys kempii*
Alligator Snapping Turtle	*Macrochelys temminckii*
Smooth Softshell	*Apalone mutica*
Leatherback Sea Turtle	*Dermochelys coriacea*
Mississippi Diamond-backed Terrapin	*Malaclemys terrapin pileata*
Razor-backed Musk Turtle	*Sternotherus carinatus*
Gulf Saltmarsh Snake	*Nerodia clarkii clarkii*

Threats Affecting Basin:

The following table illustrates the threats identified for the Terrebonne Basin and the scope and severity of those threats. Subsidence is a major threat to this basin, and is of particular concern with regard to the important islands contained within Terrebonne Bay. As with many other basins, changes in natural hydrology and invasive plants are also among the primary threats.

Terrebonne Basin Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	Restricted	Moderate	Low
Agriculture/Aquaculture	Large	Moderate	Medium
Energy Production & Mining	Restricted	Serious	Medium
Transportation & Service Corridors	Restricted	Moderate	Low
Biological Resource Use	N/A	N/A	N/A
Human Intrusion/Disturbance	Small	Moderate	Low
Natural System Modification	Large	Serious	High
Invasive & other Problematic Species	Pervasive	Serious	High
Pollution	Pervasive	Moderate	Medium
Geological Events	Large	Serious	High
Climate Change & Severe Weather	Large	Moderate	Medium
Overall Calculated Threat Impact: High			

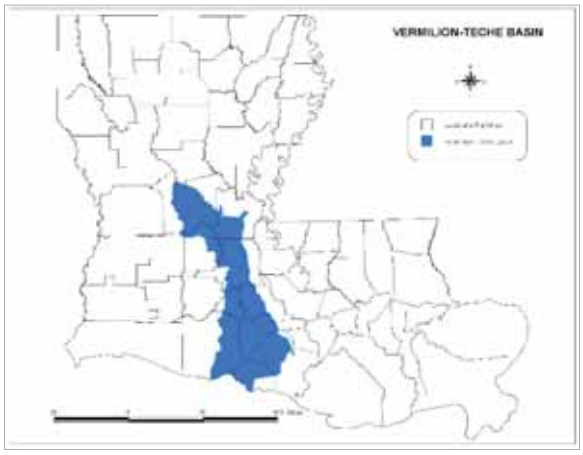
Basin Research Needs/Conservation Actions:

1. Restore historical flow regimes within the Terrebonne Basin.
2. Work with LDEQ and USGS to increase monitoring of nutrient inputs and overall water quality within the Terrebonne Basin.
3. Coordinate with the Atchafalaya Basin Program (LDNR) and BTNEP to abate identified threats from invasive flora and fauna to this basin.
4. Promote coastal restoration and protection initiatives to maintain or enhance coastal marsh and Barrier Island habitat critical to SGCN.

5. Conduct field inventory to determine the amount and condition of Freshwater Floating Marsh in this basin; publish results and educate agencies and the public about this unique marsh type.
6. Discourage river diversion projects that would introduce nutrients and sediment into these oligotrophic marshes.

l. Vermilion-Teche Basin

General Description:



The Vermilion-Teche Basin's drainage area covers approximately 4,047 square miles. Land-cover within the basin ranges from upland pine woodlands northwest of Alexandria and corn and soybean agriculture in the northern portion of the basin to rice and sugarcane in the central and southern basin. The coastal zone is primarily Freshwater Marsh from Bayou Cypremort east to LA Hwy 317. Intermediate and Brackish Marsh occupy all of the coastal zone west of Bayou Cypremort with small areas of Salt Marsh on Marsh Island WMA and Paul J. Rainey Wildlife Sanctuary.

Authorized by the Flood Control Act of 1966, supplemental freshwater from the Atchafalaya River upstream of Krotz Springs is diverted to the head of Bayou Teche at Port Barre. The supplemental freshwater is distributed among Bayou Teche, the Vermilion River, and the west side borrow pit along the Atchafalaya Basin protection levee for municipal, industrial, irrigation, and water-quality control uses (USACE 1998). Coastal land loss is a significant threat, most notably on Marsh Island, and numerous projects have been proposed to address this issue (CPRA 2012).

Approximately 60 species of freshwater fishes (W. Kelso, personal communication), 30 species of mussels (Vidrine 1993), and 17 species of crawfish (J. Walls, personal communication) are found within the Vermilion-Teche Basin. Many marine fish species exist within the southern portion of the basin supporting both commercial and recreational fishing industries. Commercial crabbing, shrimping and oystering occur both within the coastal bay system and in waters offshore of Marsh Island.

Water Quality:

The 2012 Water Quality Inventory Report (LDEQ 2012) indicated that 11% of the 44 waterbody subsegments within the basin fully support their designated use for fish and wildlife propagation. Causes of water quality issues include: metals, pesticides, nutrients, fecal coliform bacteria, non-native aquatic plants, organic enrichment and low concentration of dissolved oxygen, dissolved and suspended solids, sedimentation/siltation, and turbidity. The suspected sources of the water quality problems include: crop production, aquaculture, urban runoff, petroleum activities, hydromodification, surface mining, construction, and dredging.

Vermilion-Teche Basin SGCN (35)	
Mollusks (4)	
Round Pearlshell	*Glebula rotundata*
Louisiana Pearlshell	*Margaritifera hembeli*
Louisiana Pigtoe	*Pleurobema riddellii*
Fawnsfoot	*Truncilla donaciformis*
Crustaceans (5)	
Teche Painted Crawfish	*Orconectes hathawayi*
Javelin Crawfish	*Procambarus jaculus*
Old Prairie Digger	*Fallicambarus macneesei*
Peppermint Shrimp	*Lysmata wurdemanni*
Estuarine Ghost Shrimp	*Lepidophthalmus louisianensis*
Inland Fish (2)	
Paddlefish	*Polyodon spathula*
American Eel	*Anguilla rostrata*
Redspot Darter	*Etheostoma artesiae*
Marine Fish (14)	
Diamond Killifish	*Adinia xenica*
Saltmarsh Topminnow	*Fundulus jenkinsi*
Bayou Killifish	*Fundulus pulvereus*
Opossum Pipefish	*Microphis brachyurus*
Chain Pipefish	*Syngnathus louisianae*
Large-scaled Spinycheek Sleeper	*Eleotris amblyopsis*
Emerald Sleeper	*Erotelis smaragdus*
Frillfin Goby	*Bathygobius soporator*
Violet Goby	*Gobioides broussonnetii*
Broad Flounder	*Paralichthys squamilentus*
Southern Puffer	*Sphoeroides nephelus*
Lemon Shark	*Negaprion brevirostris*
Smalltooth Sawfish	*Pristis pectinata*
Tarpon	*Megalops atlanticus*
Reptiles (10)	
Loggerhead Sea Turtle	*Caretta caretta*
Green Sea Turtle	*Chelonia mydas*
Hawksbill Sea Turtle	*Eretmochelys imbricata*
Kemp's Ridley Sea Turtle	*Lepidochelys kempii*
Alligator Snapping Turtle	*Macrochelys temminckii*
Leatherback Sea Turtle	*Dermochelys coriacea*

Western Chicken Turtle	*Deirochelys reticularia miaria*
Mississippi Diamond-backed Terrapin	*Malaclemys terrapin pileata*
Razor-backed Musk Turtle	*Sternotherus carinatus*
Gulf Saltmarsh Snake	*Nerodia clarkii clarkii*

Threats Affecting Basin:

The following table illustrates the threats identified for the Vermilion-Teche Basin and the scope and severity of those threats. Primary threats to the Vermilion-Teche Basin are similar to those of neighboring basins and include natural system modifications, invasive plants (e.g. Hydrilla and Common Salvinia), and sedimentation from agricultural lands.

Vermilion-Teche Basin Threats Assessment:

1st Level Threat	Scope	Severity	Impact
Residential/Commercial Development	Restricted	Moderate	Low
Agriculture/Aquaculture	Large	Serious	High
Energy Production & Mining	Restricted	Moderate	Low
Transportation & Service Corridors	Restricted	Moderate	Low
Biological Resource Use	N/A	N/A	N/A
Human Intrusion/Disturbance	Small	Moderate	Low
Natural System Modification	Pervasive	Serious	High
Invasive & other Problematic Species	Pervasive	Serious	High
Pollution	Pervasive	Serious	High
Geological Events	Restricted	Serious	Medium
Climate Change & Severe Weather	Restricted	Moderate	Low
Overall Calculated Threat Impact: Medium			

Basin Research Needs/Conservation Actions:

1. Develop a comprehensive stream survey methodology for the Vermillion-Teche Basin.
2. Conduct a detailed inventory of the Vermillion-Teche Basin that focuses on habitats and SGCN.
3. Work with USDA NRCS to develop a watershed initiative to address water quality issues associated with agriculture and water management practices.
4. Promote methods to restore historical flow regimes within the Vermillion-Teche Basin.
5. Promote coastal restoration and protection initiatives to maintain or enhance coastal marsh habitat critical to marine SGCN.
6. Complete a comprehensive survey of oyster reef/hard bottom habitat acreage within the system.

12. Marine Habitats

Synonyms: Coastal, Estuarine

General Description:

The following marine habitats are all submerged, primarily non-vegetated habitats and are described based on characteristics such as seafloor composition and the presence of seagrass beds. Although listed as "marine" habitats the following substrates, except *State Territorial Open Water*, can be found adjacent to all marsh types and across all salinity regimes; thus, it is the prevailing hydrology above these substrates that will determine the species using these habitats.

SGCN:

The table below lists SGCN for all of the following marine habitats combined.

Marine SGCN (39; All substrate types and open water)	
Mollusks (5)	
Bay Scallop	*Argopecten irradians*
Sawtooth Penshell	*Atrina serrata*
Half-Naked Penshell	*Atrina seminuda*
Channeled Whelk	*Busycotypus canaliculatus*
Lightning Whelk	*Busycon sinistrum*
Crustaceans (4)	
Beach Ghost Shrimp	*Callichirus islagrande*
Carolinian Ghost Shrimp	*Callichirus major*
Peppermint Shrimp	*Lysmata wurdemanni*
Estuarine Ghost Shrimp	*Lepidophthalmus louisianensis*
Inland Fish (2)	
Gulf Sturgeon	*Acipenser oxyrinchus desotoi*
American Eel	*Anguilla rostrata*
Marine Fish (18)	
Lemon Shark	*Negaprion brevirostris*
Smalltooth Sawfish	*Pristis pectinata*
Tarpon	*Megalops atlanticus*
Gold Brotula	*Gunterichthys lonigpenis*
Diamond Killifish	*Adinia xenica*
Saltmarsh Topminnow	*Fundulus jenkinsi*
Bayou Killifish	*Fundulus pulvereus*
Dwarf Seahorse	*Hippocampus zosterae*
Opossum Pipefish	*Microphis brachyurus*

Chain Pipefish	*Syngnathus louisianae*
Texas Pipefish	*Syngnathus texanus*
Goliath Grouper	*Epinephelus itajara*
Large-scaled Spinycheek Sleeper	*Eleotris amblyopsis*
Emerald Sleeper	*Erotelis smaragdus*
Frillfin Goby	*Bathygobius soporator*
Violet Goby	*Gobioides broussonnetii*
Broad Flounder	*Paralichthys squamilentus*
Southern Puffer	*Sphoeroides nephelus*
Reptiles (7)	
Loggerhead Sea Turtle	*Caretta caretta*
Green Sea Turtle	*Chelonia mydas*
Hawksbill Sea Turtle	*Eretmochelys imbricata*
Kemp's Ridley Sea Turtle	*Lepidochelys kempii*
Leatherback Sea Turtle	*Dermochelys coriacea*
Mississippi Diamond-backed Terrapin	*Malaclemys terrapin pileata*
Gulf Saltmarsh Snake	*Nerodia clarkii*
Mammals (3)	
West Indian Manatee	*Trichechus manatus*
Bottlenose Dolphin	*Tursiops truncatus*
Sperm Whale	*Physeter macrocephalus*

Threats Affecting Habitats:

Marsh loss and associated changes in wetland, estuarine, and marine habitats have occurred at extraordinary rates across the Louisiana coast within the last 50 years, and such changes are expected to continue for the foreseeable future. Additionally, as human populations continue to utilize these areas for transportation, industry, commercial and recreational harvest of natural resources, and other uses, increased and new stresses will be placed on these environments.

General Marine Habitat Research Needs/Conservation Actions:

1. Initiate new research and monitoring projects for all marine habitats to identify their locations, assess their current condition and extent, and develop management recommendations.
2. Develop conservation plans for all marine habitats and incorporate BMPs for restoration activities into such plans.
3. Conduct additional research and monitoring to rigorously assess impacts of navigation and access canals.
4. Map distribution and community composition of SAV of all types to inform conservation and restoration.

5. Conduct basin-wide sampling of larval fishes to determine if SGCN are utilizing different habitats during different portions of their life cycle and determine the value of those habitats to those life cycle stages.
6. Estimate recruitment and retention rates of fishes within the estuaries before and after diversion influence.
7. Include additional monitoring before and after implementation of projects involving hydrological modifications. Those monitoring efforts should extend for an adequate duration to assess habitat changes associated with those hydrological changes. Before hydrologic projects are implemented, a system-wide model of the basin (above and below the proposed footprint of the project) should be developed which includes direct and indirect impacts to existing hydrologic flows and barriers (e.g., levees, floodgates, CWPPRA projects) in the system.
8. Optimize the statistical power of current biological and environmental sampling designs.
9. Develop and implement workshops in cooperation with partner agencies for identification of estuarine/marine species in life history stages when they inhabit estuarine/nearshore territorial sea waters in order to enhance data quality, and develop a species ID guide to marine SGCN to supplement these efforts.
10. Evaluate the distribution of existing sampling locations, especially with regard to habitat type, and develop and implement a process to ensure sampling coverage of habitats over time. Consider using Barataria Bay as a pilot study area for implementation.
11. Evaluate existing data to identify surrogate species for monitoring secretive species.
12. Work with university researchers to verify and monitor status of secretive species.
13. Use existing project review process to minimize impacts to marine habitats and SGCN, and require mitigation where applicable.
14. Through the authority of the Fish and Wildlife Coordination Act, LDWF will continue to provide recommendations to federal regulators aimed at preventing loss of and damage to wildlife resources from federally permitted activities that impound, divert, or otherwise control or modify waters of any stream or other body of water.
15. Review pre-permitted marsh management plans to determine their impacts and coordinate with LDNR and USFWS refuges to allow for tidal exchange.
16. Review proposed structures that require Coastal Use Permit (CUP) and USACE permits.
17. Support installation of low sill, raised berm, or other structure development on channel bottoms to slow salinity encroachment in estuarine areas where hypoxia is exacerbated by stratification.
18. Continue to work with state coastal zone regulators, as outlined in a 2005 MOU between LDNR and LDWF, to ensure that proposed water control structures are designed and operated in a manner that provide adequate aquatic organism ingress and egress.
19. Promote upstream BMPs in riparian zones to reduce nutrient loading and sedimentation in coastal waters.

20. Manage man-made structures to mimic natural hydrologic systems. Conduct a review of established structures to ensure they are meeting permit requirements. Recommend appropriate changes as needed.
21. LDWF will continue to coordinate with federal and state regulators (i.e., USACE and LDNR) to ensure that authorizations for bulkheads are properly justified. Furthermore, when appropriate, LDWF will recommend alternatives to bulkheads that will not result in the loss of shallow-water spawning, rearing and foraging habitat as well as cover for aquatic species.
22. In areas where there are local zoning laws, coordinate with local governments to identify alternative means of shoreline stabilization.
23. Support appropriate river diversion projects where sediment deposition in coastal marshes can be achieved and/or where there is a high likelihood of increase in coastal marsh biomass.
24. Support research to identify alternative diversion techniques where needed.
25. Support education of upstream agricultural and landscape users regarding the effects of fertilization runoff and its effects on the Gulf of Mexico and its estuaries.
26. Support development of methods to reduce discharge of excess nutrients into waters off coastal Louisiana, including floodplain management, freshwater diversions through wetlands, and regulatory measures for fertilizer users.

a. Soft Mud Bottom

General Description:

Soft Mud Bottoms are estuarine water bottoms dominated by fine, relatively unconsolidated sediments. In lower salinity regimes, these bottoms may be vegetated by Water Milfoils (*Myriophyllum* spp.), Bladderworts (*Utricularia* spp.), Widgeon Grass (*Ruppia maritima)*, Southern Naiad (*Najas guadalupensis*), and other SAV. The presence of SAV provides additional structure, shelter, and food sources to the animals dependent upon these habitats. SAV is more likely to be abundant in smaller, sheltered areas of soft mud bottoms and less likely to be present or abundant in areas where wave action or other factors causing turbulence and turbidity are persistent.

Typically high in organic matter, soft mud bottoms also form a substrate that is suitable for easy burrowing. Animals may use this substrate both as a refuge from predators and as a food source. Productivity of animal biomass may be related to allochthonous or autothonous sources, depending upon the productivity of SAV, adjacent marshes, and phytoplankton.

Soft mud bottoms of open lakes, bayous and bays tend to have higher levels of large predatory species (vertebrate and invertebrate) than do the more cryptic habitats of the soft mud bottoms of small ponds, marsh creeks, and similar habitats. Such habitats therefore provide a more suitable area as nursery grounds for postlarval or young juveniles. Predation within these cryptic habitats tends to be more from terrestrial sources (e.g., wading birds, shorebirds, and mammals) than in open-water habitats. One of the major issues associated with the ongoing changes to the geomorphology in the coastal zone is the loss of these cryptic habitats as waterbodies expand and merge into larger areas less suitable for nursery habitat.

Habitat Research Needs/Conservation Actions:

1. Adopt coastal restoration strategies when developed/finalized.
2. Recommend maximum boat horsepower uses in particularly sensitive areas such as shallow SAV beds, and provide education about methods for boaters to reduce negative, unintentional impacts.
3. Establish marked channels or no wake zones in sensitive areas.
4. Improve zoning laws on the northshore of Lake Pontchartrain to address water quality issues.
5. Generate greater public awareness of the importance of SAV.

b. Shell/Shell Hash Bottom

General Description:

Shell/Shell Hash Bottoms are estuarine water bottoms with significant coverage of mollusk shells. These bottoms have high potential for settlement of oysters, barnacles, or other invertebrate larvae that require hard substrates and also serve as shelter for many fish species, including several SGCN. These relatively hard substrates may reduce shoreline erosion along shallow, sloped shorelines, providing physical protection for the adjacent marshlands. They also may cause changes in currents, creating environments that are beneficial for many species of fish and invertebrates. In very low-salinity environments, relatively fewer species utilize shell as a settlement substrate, but the other values of the habitat remain.

Eastern Oysters (*Crassotrea virginica*) provide the majority of the shell substrate in Louisiana and are also a major commercial fishery resource. Mussels, barnacles, worms, fishes, and a variety of other animals are either found in increasing abundance around oyster reefs or are dependent upon these types of bottoms to survive. Other shell bottoms include Rangia Clam (*Rangea cuneata*) and mixed shell hash. Extensive Rangia beds are found in Lakes Maurepas and Pontchartrain, in the more northern areas of the Vermilion/East & West Cote Blanche/Atchafalaya bays, and in mid to northern Sabine Lake. A number of bivalve mollusk species can co-exist in a single area, providing a variety of food sources and substrates to the animal communities. Shell and shell hash bottoms tend to be more resistant to erosion than mud bottoms. They create relief to the bottom and modify tidal currents, especially near passes.

An assumption among fishery managers in the Gulf of Mexico is that estuarine hard bottoms support more diverse, complex communities than adjacent soft bottoms. This assumption has recently led to the proliferation of recreational low profile artificial reefs. This has prompted several NGOs, in conjunction with LDWF, to construct low profile artificial reefs from limestone, shell, and reef balls.

Habitat Research Needs/Conservation Actions:

1. Identify activity windows appropriate for resource extraction to minimize impacts to wildlife. Use existing process of project reviews to identify issues during pre-application meetings.
2. Develop shell budget models to help better manage the volume of shell removed during commercial harvest activities.
3. Prior to large investments and efforts to create and restore historical shell reefs, acquire a better understanding of the real value and functionality of these hard bottom habitats to aquatic species.

c. Hard Mud/Clay Bottom

General Description:

Hard Mud/Clay Bottoms are estuarine and territorial seawater bottoms dominated by fine or coarse sediments, often relatively low in organic matter. These habitat types are often widely represented in larger lakes and bays, especially in areas where the sediments of the surrounding marshes are dominated by mineral materials, and are typically remnants of eroded or submerged shorelines. Productivity in these areas tends to be derived from terrestrial (marshland) allochthonous sources and phytoplankton.

Habitat Research Needs/Conservation Actions:

1. Use existing project review process to document miles of Hard Mud/Clay Bottoms impacted, and coordinate with partners to assure proper mitigation.
2. Determine the value of this substrate type to marine SGCN fishes.

d. Sandy Bottom

General Description:

Sandy Bottoms are estuarine and seawater bottoms dominated by coarse sediments, often relatively low in organic matter. These habitats are usually maintained by relatively high energy influences (waves, currents, etc.) that remove or prevent the deposition of finer sediment fractions. As such, there is a continuum of sediment types ranging from nearly pure sand to silt or clay bottoms with a relatively small fraction of sand. High energy sand bottoms are limited to the foreshore environments of Barrier Islands, and to a lesser extent, to beaches of the Chenier plain. They are also often found in association with Marine Seagrass Beds at the Chandeleur Islands. Other sandy bottoms may be found in submerged sandbars, remnants of former Barrier Islands, and offshore shoals. High-energy beaches are nursery areas for a unique suite of marine organisms, including the Florida Pompano (*Trachinotus carolinus*), Gulf Kingfish (*Menticihhrus littoralis*) and Broad Flounder (*Paralichthys squamilentus*).

Habitat Research Needs/Conservation Actions:

1. Support the Barrier Island Comprehensive Monitoring program (BICM) with CPRA and promote barrier shoreline restoration projects through partnerships with CWWPRA and other coastal restoration organizations.

e. State Territorial Open Water

General Description:

This comprises all open waters from the beach shoreline to the limit of state jurisdiction. Habitats range from sandy beaches and shoals in relatively high-energy environments to soft mud bottoms in low-energy environments. Oyster reef environments are found in the central area of the state offshore of Marsh Island, one of the few areas where significant offshore oyster reefs occur in the eastern United States. Generally, moderate slopes prevail from the beachline outward, but very steep bottom slopes are found near the mouth of the Mississippi River. Conversely, very shallow slopes are found in the area between Vermilion Bay and Caillou Bay.

Salinities vary widely by location and by season. Near-freshwater conditions may be found near the mouths of the major rivers in high-water conditions, especially during the spring, whereas salinities above 30 ppt may be regularly found in the waters along the Chandeleur and Timbalier Islands. Other areas of the state may have similarly high salinities in years with drier conditions.

Habitat Research Needs/Conservation Actions:

1. Fill data gaps regarding status of species and habitats in existing open water areas.
2. Develop a better understanding of potential future impacts of mariculture, Liquid Natural Gas (LNG) development, and other industrial impacts in this habitat.
3. Continue with coastal research and monitoring to increase our understanding of the processes of hypoxia and anoxia development and their effects on vertebrate and invertebrate species populations and movements.

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