# *The Natural Communities of Louisiana*

*Louisiana Natural Heritage Program*

***Louisiana Department of Wildlife & Fisheries***

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# Natural Communities of Louisiana

Natural communities are composed of groups of plant and animal species that regularly or often occur in association with each other in certain landscapes or physical environments. Nature is seldom divided into discrete units and is characteristically composed of a continuous mosaic of natural communities. The factors that help to define a particular community (i.e. – associated vegetation, soil, substrate, hydrology, topography, climate, fire history) usually exist along gradients, and therefore every occurrence of a natural community will be unique in some way. In developing our classification of the Natural Communities of Louisiana, levels of distinctiveness are defined according to the physical and biotic factors that occur repetitively at various locations.

A system for classifying natural communities is a prerequisite for an inventory of a region's natural resources. Both the classification system and inventory are essential for a complete understanding of the natural resources of that region, and also provide the framework for determining the area's protection priorities and research needs. Protecting natural communities preserves the ecological functions of the area while also providing the added benefit of safeguarding both the rare and common species occurring within that community type.

Natural community data for this classification was initially gathered from secondary sources such as previously existing inventories, scientific literature, and consultation with experts in the field. The resulting classification was then refined through data collected from scores of field surveys conducted throughout Louisiana since 1984 by LNHP staff. While this database is quite extensive, there are still many natural areas in Louisiana that have not been surveyed. New community records are continuously being added to the database, and current records are updated as new information becomes available. Therefore, our natural community classification is a dynamic system and individual categories may be added, preexisting ones may be subdivided or merged, or deletions may occur as additional information comes to light, and updated approximations will be periodically produced.

In the Natural Heritage methodology, classification of natural communities is followed by a continuous inventory for exemplary occurrences of each community type. The communities are prioritized through a ranking system, and strategies for protection of each particular community type are then formulated. Exemplary natural communities include all or any examples of rare types (such as LA coastal prairies) and also the highest quality examples of more common community types (such as bottomland hardwood forests). Typical exemplary forested communities have high species diversity, multiple age classes among the dominant tree species, presence of natural regeneration, standing dead snags and fallen woody debris in various stages of decomposition, an intact and fully functioning soil component, and little evidence of human disturbance.

According to LNHP's current natural community classification, the Louisiana Natural Heritage Program tracks 68 community types within the 6 ecoregions of Louisiana. Some community types are widespread across the state and while others are localized or restricted. Although much of Louisiana is still covered in native vegetation, undisturbed examples of all natural communities are rare, and many are extremely scarce. Essentially no virgin habitat remains. Threats to Louisiana communities exist from coastal erosion and associated coastal disturbance factors, urban expansion, residential and commercial development, land disturbance operations, introduction of exotic species, and many other human and some natural disturbance factors. LHNP has been a beneficial force in helping to identify areas in Louisiana that warrant protection, and through the work of the state, conservation organizations, and concerned private landowners, this has resulted in conservation of places such as the Lake Ramsey Wildlife Management Area, Copenhagen Hills, and Tunica Hills Wildlife Management Area to name a few. Forest landowners and land managers who wish to maintain and enhance the natural communities and associated species in their care can follow recommendations outlined in LNHP's Guidelines for Practicing Forest Environmental Enhancement in Louisiana. Any questions, concerns, information requests concerning LA natural communities, or comments regarding our classification system are welcomed and should be directed to:

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* - Indicates natural community type tracked by the Louisiana Natural Heritage Program.

**NOTE: Added since 2004 revision are Macon Ridge Green Ash Pond and Saline Oak Woodlands**



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NATURAL COMMUNITIES OF LOUISIANA

**FORMAT**

I. NATURAL COMMUNITY SYSTEM

A. Natural Community Type

1. Natural Community

I. MARINE

The Marine System consists of the open Gulf of Mexico overlying the continental shelf and its associated high-energy coastline. Marine habitats are exposed to the waves and currents of the open Gulf and the water regimes are determined by the ebb and flow of the tides. Salinities may exceed 30 ppt, with little or no dilution except outside the mouths of estuaries. Shallow coastal indentations or bays without appreciable freshwater inflow are also considered part of the Marine System because they generally support typical marine biota. The Marine System extends from the outer edge of the continental shelf shoreward to one of three lines: (1) the landward limit of tidal inundation (extreme high water of spring tides) , including the splash zone of breaking waves; (2) the seaward limit of wetland emergents, trees, or shrubs; or (3) the seaward limit of the Estuarine System, where this limit is determined by factors other than vegetation. Deepwater habitats lying beyond the seaward limit of the Marine System are outside the scope of this classification system. The distribution of plants and animals in the Marine System primarily reflects differences in several factors: (1) degree of exposure of the site to waves; (2) texture and physicochemical nature of the substrate; (3) amplitude of the tides; and (4) latitude, which governs water temperature, and the intensity and duration of solar radiation.

A. Marine Subtidal Open Water

Open water bodies with high wave energy.

1. Marine Deepwater

Synonyms: Gulf

Relatively deep, permanently inundated subtidal zone. Consolidated or unconsolidated sand, mud, sediments, shells and other non-living detritus form the bottom. It may be that insufficient light reaches the bottom to allow much biological diversity. Light/depth relationship is probably variable from site to site and may be linked to meteorological and oceanic phenomena. Some plant life in the form of benthic macrophytes may be present. This community grades gulfward into oceanic benthos and landward into unconsolidated marine bottom. S5.

2. Shallow Water

Synonyms: Unconsolidated Coastal Bottom

The relatively shallow, permanently inundated subtidal zone beginning immediately below the lowest tide level mark, subjected to high-energy tidal and wave action. Also includes shallow water unvegetated flats, wash over fans and bars on the bayward side of barrier islands. The bottom is composed of loose sand/sediment/ mud/shell/organic debris mixed in various combinations. Unconsolidated bottoms are characterized by the lack of stable surfaces for plant and animal attachment, and may be very unstable.



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Exposure to wave and current action, temperature, salinity, and light penetration determine the composition and distribution of organisms. Higher plants can successfully root if wave action and currents are not too strong, but vegetative cover is always less than 30 percent. Most animals in unconsolidated sediments live within the substrate. Some, such as the polychaete worm Chaetopterus, maintain permanent burrows. Community grades gulfward into Submergent Algal Vegetation, Submergent Vascular Vegetation and Marine Deepwater and shoreward into Intertidal Sand/Mud/Shell Beach/Bar. S4.

B. Marine Intertidal Beach/Bar

Unconsolidated shore consisting of wave reworked materials on the mainland or the gulfward side of barrier islands.

1. Intertidal Sand/Mud/Shell Beach/Bar

Synonyms: Beach, Sand Strand, Mud/Sand Bar, Mud/Sand Flat

Unconsolidated, regularly inundated sand/shell/mud immediately above water edge (beach) or separated by a short distance from permanently immersed land (bar). Area is subjected to high-energy tide and wave action. A specialized community that is quite harsh in many ways (sun, surf, wind, salt). Faunal distribution is controlled by waves, currents, interstitial moisture, salinity, and grain size. Normally very little vegetation although a few species from adjacent elevated areas may be present in the higher beach zone where tidal inundation is relatively infrequent. Undisturbed or minimally disturbed Beach/Bars are typically very rich in animal life. Large invertebrate assemblages may occur, including molluscs, annelids, and crustaceans. Most of the animals present are "sand-dwellers". The diggers and burrowers collectively form the "endopsammon". Many shore bird species feed on the shore line. S4

C. Marine Aquatic Bed

an aquatic bed of varying species composition in a marine water body.

1. Submergent Algal Vegetation

Synonyms: Marine Algal Bed

These benthic algal beds occur in a relatively shallow marine environment occupying substrates characterized by a wide range of sediment depths and textures. Typical species to be found include Ulva sp. (sea lettuce), Enteromorpha sp. (a green algae), and Polysiphonia sp. (a red algae). Wave action, currents, temperatures, salinity, substrate characteristics, and light penetration determine species composition. Violent storms may disrupt or alter the community. S2S3.

2. Submergent Vascular Vegetation

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

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 penetratation (turbidity) determine species assemblage. Primary community grasses are Thalassia testudina (turtle grass), Cymodocea filiformis (manatee grass), Halophila engelmanii (sea grass), (Halodule beaudettei (shoal grass), and Ruppia maritima (widgeon grass). Violent storms may drastically disrupt or alter



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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 worth of these benthic grass communities is only vaguely understood and is often under-estimated. They are extremely productive communities, often about 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 sedimentation of suspended particulate matter. S1S2.

II. Estuarine

The Estuarine System consists of deepwater tidal habitats and adjacent tidal wetlands that are usually semi-enclosed by land but have open, partly obstructed, or sporadic access to the open Gulf, and in which Gulf water is at least occasionally diluted by freshwater runoff from the land. The salinity may be periodically increased above that of the open Gulf by evaporation. Along some low-energy coastlines there is appreciable dilution of sea water. Offshore areas with typical estuarine plants and animals, such as Avicennia germinans (black mangroves) and Crassostrea virginica (eastern oysters), are also included in the Estuarine System. The Estuarine System extends (1) upstream and landward to where gulf-derived salts measure less than 0.5 ppt during the period of average annual low flow; (2) to an imaginary line closing the mouth of a river, bay, or sound; and (3) to the seaward limit of wetland emergents, shrubs, or trees where they are not included in (2). The Estuarine System also includes off-shore areas of continuously diluted sea water. The Estuarine System includes both estuaries and lagoons. It is more strongly influenced by its association with land than is the Marine System. In terms of wave action, estuaries are generally considered to be low-energy systems. Estuarine water regimes and water chemistry are affected by one or more of the following forces: Gulf tides, precipitation, freshwater runoff from land areas, evaporation, and wind.

A. Intertidal Emergent Vegetation

A wet grassland vegetated by salt-tolerant species. As a rule, plant species diversity is negatively correlated with salinity, i.e., higher salinity has fewer species.

1. Salt Marsh

Synonyms: Smooth Cordgrass Marsh, Saltgrass Marsh, Saline Marsh.

Typically, Salt Marsh is the marsh area closest to the beach rim of the gulf, 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 least plant diversity and the lowest soil organic matter content of any marsh type. The community is often totally dominated by Spartina alterniflora (smooth cordgrass). Significant associate species includes S. patens (wiregrass), Distichlis spicata (salt grass), Juncus roemarianus (black rush), and Batis maritima (salt wort). 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 acts as nursery areas for myriads of larval forms of shrimp, crabs, redfish, seatrout, menhadden, etc., and greatly enhances the production of marine organisms inadjacent water bodies. This fertility is directly related to the enormous



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primary productivity of the 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 tidally transported nutrients. Natural factors negatively impacting salt marsh include prolonged periods of inundation caused by winds, tides, or rain, especially those periods associated with hurricanes; subsidence; and erosion. 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, it can modify the effects of storms and flooding by acting as a buffer and providing storage for large amounts of water. Relative to other marsh types, Salt Marsh typically has the lowest vertebrate species population levels (other than fish). S3S4.

2. Brackish Marsh

Synonyms: Needle Rush Marsh, Edge-Zone Marsh, Middle Estuary.

This community is usually found between Salt Marsh and Intermediate Marsh, although it may occasionally lie adjacent to the gulf. Irregularly tidally flooded, flat, mesohaline zones dominated by salt-tolerant graminoids. Small pools or ponds may be scattered. Plant diversity and soil organic matter content is higher than Salt Marsh. Typically dominated by Spartina patens (wire grass). Other significant associated species include Distichlis spicata (salt grass), Scirpus olneyi (three-cornered grass), S. robustus (salt marsh bulrush), Eleocharis parvula (dwarf spikesedge), and Ruppia maritima (widgeon grass), Paspalum vaginatum (seashore paspalum), Juncus roemanianus (black rush), Bacopa monnieri (coastal water hyssop), Spartina alteriflora (smooth cordgrass), and S. cynosuroides (big cordgrass). Two other major autotrophic groups in Brackish Marsh are epiphytic algae and benthic algae. Generally speaking, vertebrate species population levels increase 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, menhadden etc. (See Salt Marsh for other functions). Brackish Marsh salinity averages about 8 ppt. The community may be changed to another marsh type by shifts in salinity. Intrusion of saline water up the numerous waterways exerts a major influence in the configuration of the various marsh types. The total acreage of Brackish Marsh appears to be increasing due to shifts in marsh salinity levels. S3S4.

3. Intermediate Marsh

This natural community lies between Brackish Marsh and Fresh Marsh, although it infrequently may be adjacent to the Gulf. Intermediate Marsh has an irregular tidal regime, is oligohaline, and is dominated by narrow-leaved, persistent species. Small pools or ponds may be scattered. 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. It is often dominated by Spartina patens (wire grass). Other characteristic species include Phragmites communis (roseau came), Sagittaria lancifolia= S. falcata (bulltongue), Bacopa monnieri (coastal water hyssop), Eleocharis spp. (spikesedge), Scirpus olneyi (three-cornered grass), S. californicus (giant bulrush), S. americnaus (common threesquare), Vigna luteola (deer pea), Paspalum vaginatum (seashore paspalum), Panicum virgatum (switch grass), Leptochloa fascicularis (bearded sprangletop), Pluchea camphorata (camphor-weed), Echinonchloa walteri (walter millet), Cyperus odoratus (fragrant flatsedge), Alternanthora philoxeroides (alligator weed), Najas guadalupensis (southern naiad), Spartina cynosuroides (big cordgrass), and S. spartineae (gulf



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cordgrass). Two other major autotrophic groups in Intermediate Marsh are epiphytic and benthic algae. Intermediate Marsh occupies the least acreage of any of the four marsh types. Salinity averages about 3.3 ppt. This marsh type is very productive of many species of wildlife and is important to larval marine organisms (see Salt Marsh for other functions). The community may be changed to one of the other marsh types by shifts in salinity. The acreage of Intermediate Marsh appears to be decreasing, quite probably due to salt water intrusion. S3S4.

4. Coastal Mangrove/Marsh Shrubland

Synonyms: Intertidal Saltwater Swamp, Saltwater Swamp, Mangrove Swamp

Coastal Mangrove/Marsh Shrubland are estuarine communities dominated by Avicennia germinans (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 much below freezing. Other characteristic vegetation besides black mangrove is Spartina alterniflora (smooth cordgrass). Mixed stands of both species are comparatively frequent in Louisiana. Salt marshes and mangrove habitats are integral parts 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 mangrove swamp as nesting areas. Montz estimated a total of 1600 to 2400 hectares of mangroves in Louisiana found along the fringes of coastal marshes and islands with some more extensive thickets on barrier islands. The hard winters of 1983 and 1984 seriously reduced the extent of the community in coastal Louisiana. Its importance in erosion control is clearly documented by the extreme erosion of Queen Bess Island since this dieback. S3.

B. Subtidal Aquatic Bed

A submerged aquatic bed of varying species composition in an estuarine water body.

1. Submergent Algal Vegetation

Synonyms: Algal Bed

Estuarine Submergent Algal Vegetation is found in brackish areas in coastal Louisiana. Although prevalent, these algal communities are the least studied contributor to the estuarine system in Louisiana. The algal beds are subtidal or intertidal areas along island fringes or intertidal mudflats occupied primarily by attached or mat-forming algae. The dominant filamentous species are member of the classes Cladophoraceae, Vaucheriaceae, Oscillatoriaceae, and Zygnemataceae. Vaucheria and Cladophora are both sessile genera that tend to anchor well to bottom substrate and form extremely cohesive mats. Exposure of the beds may increase productivity but long exposure results in decomposition and breakup of the mat surface upon resubmergence. Controlled primarily by physical factors such as substrate, temperature, and hydrologic regime rather than biological factors such as grazing. Water levels appear to be key in controlling the location and extent of this community. Beds appear in abundance in spring, late summer and fall, and are not necessarily persistent year to year. These algal communities are primary colonizers and may play an important role in the stabilization of mudflats and intertidal island margin sediment. They also contribute significantly to the primary productivity of the larger estuarine system. S4



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2. Submergent Vascular Vegetation

Synonyms: Sea Grass Beds, Grass Beds, Submergent Grass Beds

Estuarine Submergent Vascular Vegetation grass beds in Louisiana are composed primarily of Vallisneria americana (wild celery), Ruppia maritima (widgeon grass), Najas quadalupensis (southern naiad), and Zannichellia palustris (horned pondweed). These brackish water communities of rooted "grasses" grow in shallow, protected waters with low turbidity. Temperature, salinity, 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 basin and Barataria basin. 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. Increased sedimentation occurs creating relatively clear waters in and around these beds. Additionally, these beds are extremely productive and release detritus and nutrients to surrounding waters. The beds lack widespread distribution due to the generally turbidity of most of the estuaries in Louisiana. Activities which increase the turbidity in the waters surrounding the sea grass beds are a serious threat to their viability. S1S2.

C. Intertidal Flat

Generally unvegetated geologic deposit in a low energy, estuarine environment.

1. Intertidal Sand/Shell Flat

Synonyms: Unconsolidated Substrate, Sand Flat, Sand Bar

Sand/Shell Intertidal Flats are unconsolidated sand and shell deposits that form either "bars" or "flats". A bar is an elongated ridge, bank or mound surrounded by water and typically has a steeper slope to the water than a flat. Also a flat is usually continuous with the shoreline. These bars/flats are created and controlled by currents, wave action, tides, and available sediment. They generally occur in areas of low wave and tidal regimes and can be either regularly or irregularly inundated. When inundated "mega-ripples" and "sandwaves" are often formed. Typically unvegetated except for ephemeral adventives because there is not enough exposure time to allow for rooting. The animal life, both the meiofauna and macrofauna, is rich and diverse. A gram of substrate may include thousands of bacteria, diatoms, algae, nematodes, copepods, amphipods, etc. Polychaetes, molluscs, and crustaceans are the predominant macrofauna. Sandflat fauna are structured vertically thus relieving severe competition. Intense activity of deposit feeders constantly rework the sediment creating a pelletized surface and decreasing compaction. This reworking of sediment is an important component in the nutrient cycling role of intertidal flats in the larger estuarine system. Intertidal Flats serve as a principal feeding ground for shorebirds and waterfowl which exploit the rich invertebrate food supply of the flats. Bars and flats dissipate wave energy thus providing shoreline protection. The degree of protection is dependent on the amount and extent of exposure of the bar/flat, its morphology, sediment mix, and the biota inhabiting the bar/flat. Sand/Shell Intertidal Flats are found throughout coastal Louisiana. S3S4.

2. Intertidal Mud/Organic Flat

Synonyms: Mudflat, Mud Bar

Mud/Organic Intertidal Flats are areas of unconsolidated organic and mud deposits that are flat and irregularly shaped and are regularly or irregularly flooded. Like Sand/Shell Intertidal Flats, these areas are formed and controlled by currents, wave action, tides, and the amount and type of available sediment. Typically they occur in areas of low wave and tidal energy regimes. Although "nonvegetative", mats of algae may form.



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Additionally, benthic macroalgae and microalgae are found in the top few centimeters of sediment. The value of primary productivity occuring in these flats, in some instances, closely rivals that associated with adjacent marshes. Animal life is similar to that of sand/shell intertidal flat with polychaetes, molluscs, and crustaceans predominating. Mudflats, because they drain slower, do not experience the environmental extremes of sand flats. Exposed mudflats support a large population of feeding birds because of their enormous macrobenthic populations. The large collective benthic organisms are usually restricted to the upper 5 cm of sediment enabling birds to forage with little expenditure of time and energy. These habitats play an important function in maintaining the estuarine ecosystem food chains. Like Sand/Shell Intertidal Flats, mudflats are important in nutrient cycling, shoreline protection, and primary productivity. Mud/Organic Intertidal Flats are found throughout coastal Louisiana but are ephemeral communities. S4

3. Vegetated Pioneer Emerging Delta

Synonyms: Delta Flats, Emergent Islands

Vegetated Pioneer Emerging Delta is a dynamic community forming primarily within the actively building delta region at the mouth of the Atchafalaya River. Zonation of species occurs on the newly accreted land. Echinochloa walteri (coast cockspur grass) dominates the higher areas; Sagittaria latifolia (broadleaf bulltongue), S. platyphylla (delta arrowhead), Cyperus difformis (variable flatsedge), Leptochloa uninervia (Mexican sprangletop), and Eleocharis parvula (dwarf spikerush) dominate the lower zones inundated by daily tides; Sagittaria platyphylla (delta arrowhead), Cyperus difformis (variable flatsedge), Leptochloa uninervia (Mexican sprangletop), Eleocharis parvula (dwarf spikerush) and Bacopa monnieri (coastal water hyssop) dominate the intermediate zone. Other characteristic vegetation includes Salix spp. (willow), Typha latifolia (common cattail), Scirpus validus (softstem bulruch), Scirpus americanus (threesquare bulrush), and Juncus effusus (soft rush). The island soils contain a greater percentage of sand and less moisture than marsh soils. The pioneer ridge vegetation is similar to the sand bars and delta of the Mississippi River while the pioneer marsh vegetation is similar to that of fresh marsh areas. The community is very diverse with as many as 241 species. 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. S2S3.

4. Intertidal Mollusc Reef

Synonyms: Oyster Reef, Oyster Bed, Shell Reef, Intertidal Oyster Reef, Clam Reef.

Intertidal Mollusc Reefs are deposits of living or dead mulluscs, primarily Crassostrea virginica (oysters) or Rangia clam, in estuarine environments. The reefs are formed by the living and non-living portions of structures formed by oysters or clams, marine worms, and macrophytic algae. The living assembly exists on top of a dead reef base, all of which occurs on a consolidated surface. Rangia clam reefs also include stocks of the hard clam, Mercenaria campechiensis. Oyster reefs are built primarily by the common oysters but Brachidontes recurvus and Crepidula plana are also present and may form a high percentage of the reef fauna. Green algae can be found in abundance attached to these reefs. The reefs may or may not be exposed at low tides. If unaffected by pollution, the reef biotic population is very diverse including various invertebrate assemblages. Intertidal Mollusc Reefs provide habitat and shelter for many species of small benthic fish and invertebrates. They also serve as regulators of salt water intrusion and aid in shoreline protection. Exposed reefs are utilized by shorebirds for nesting sites. Clam reefs occur in brackish lakes, while oyster reefs are commonly found in waters of bays, lakes and bayous of greater salinity. S3S4.



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5. Intertidal Salt Flat

Synonyms: salt pans.

Typically occurs in the zone between "high" salt marsh and the rear of the coastal dune community on barrier islands. This zone is somewhat depressional in nature and infrequently but regularly flooded. Repetitive seawater flooding and subsequent evaporation after each event, produces hypersaline conditions in salt flats. Vegetation characterized by species adapted to high salinity levels, such as the succulent halophytes Batis maritima (saltwort), and Salicornia virginica (glasswort), and stunted forms of Distichlis spicatata (salt grass), and Spartina alterniflora (smooth cordgrass). S3S4.

D. Subtidal Open Water

1. Bay

A Bay is a natural embayment, lake or pond with fluctuating salinities (0.5 to 30 ppt) in the estuarine environment. Inshore waters of the estuarine bays of Louisiana are generally shallow with high turbidity and thus tend to lack large aquatic plants. Most of the primary production of this community occurs in phytoplankton (diatoms, blue-greens, and green algae), nannoplankton, and ultraplankton. The sediment edge of the bays tend to be highly productive and diverse in detritivores while the sediment at greater depths is not as diverse. Spotted sea trout, mosquito fish, killifish, sea catfish, silversides, and anchovies are characteristic. Tursiops truncatus (bottlenose dolphin) is a top carnivore in the Bay community. The bay/marsh interface serves as a nursery ground area for fish, shrimp, and shellfish. Bays are also the feeding grounds for Pelecanus occidentalis (Brown Pelican), Pandion habiaetus (Osprey), Rhynchops niger (Black Skimmers), Larus spp. (gulls), Sterna spp. (terns), and diving ducks such as Aythya spp. (scaup) and Mergus spp. (mergansers). S5.

2. Tidal Channel/Creek

Synonyms: Tidal Creek, Slough

Louisiana coastal marshes receive water and are drained by an intricate network of tidal channels or creeks. Aquatic beds may be present in these channels (see Estuarine Aquatic Beds for description). A diverse benthic fauna populates the typical mud bottom of these channels, including nematodes, polychaetes, amphipods, Melampus sp., snails, clams, etc. Tidal Channels are the source of exchange between the marshes and bays. Along the edge of the channel, marsh vegetation shows a stimulation of growth due to the "subsidy" of sediment and nutrients deposited by channel overflow. The channels/creeks are also nursery areas of larval shrimp, crabs, and fish which graze and shelter along the edges of this community. S5.

3. Tidal Pass

Synonyms: Deep Migratory Tidal Pass

Tidal Passes are deep tidal channels connecting the bays and marshes with the Gulf of Mexico. The nutrients and detritus derived from the marshes support a phytoplankton community which serves as the basis of the marine/estuarine food web. Many species of marine fish use the passes to move back and forth from the lower bays and the gulf on feeding excursions. The passes are bottlenecks which many species of fish and shellfish utilize creating a rich feeding ground for pelicans, various species of gulls and terns, etc., as well as dolphins. Tidal Passes are generally 50 to 100 feet deep due to tidal scouring and the large volumes of water moving in and out of the estuaries. They serve as important migratory pathways for estuarine dependent organisms. Larval and post larval



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shrimp, fish, and crabs move on tidal currents into the estuarine nursery grounds via the pass, in spring and summer. By fall these species migrate back into the gulf for over-wintering and spawning. Most tidal passes are located between the gulf and the lower ends of the bays. S5.

III. LACUSTRINE:

The Lacustrine System includes wetlands and deepwater habitats with all of the following characteristics: (1) situated in a topographic depression or a dammed river channel; (2) lacking trees, shrubs, or persistent emergents with greater than 30% areal coverage; and (3) total area exceeds 8 ha (20 acres). Similar wetland and deepwater habitats totaling less than 8 ha are also included in the Lacustrine System if the water depth in the deepest part of the basin exceeds 2 m (6.6 feet) at low water. Lacustrine waters may be tidal or nontidal. The Lacustrine System is bounded by upland or by wetland dominated by trees, shrubs, or persistent emergents. Floating and submerged aquatic vegetation which forms aquatic beds may be found throughout. Lacustrine systems formed by damming a river channel are bounded by a contour approximating the normal spillway elevation or normal pool elevation, except where Palustrine wetlands extend lakeward of that boundary. Where a river enters a lake, the extension of the Lacustrine shoreline forms the Riverine-Lacustrine boundary. Typically, there are extensive areas of deep water and there is considerable wave action. Islands of Palustrine wetland may lie within the boundaries of the Lacustrine System.

A. Limnetic Open Water

Large, deep body of fresh water with area greater than 20 acres (8 ha) and greater than 6 ft.

1. Upland Lake

There are several types of upland lakes, including those associated with stream systems, in Louisiana based on origin. These include oxbow lakes, bluff lakes, valley wall lakes, graben lakes, and solution lakes. All are thought to be basically similar biologically. Mesotrophic to eutrophic. S5.

B. Littoral Open Water

Large, shallow body of fresh water with an area greater than 20 acres (8 ha.) and a depth less than 6 ft.

1. Marsh Lake

Marsh Lakes are shallow, open water areas greater than 20 acres and generally less than 6 feet deep surrounded by expanses of marsh. Marsh lakes are mesotrophic to euthrophic and are usually tidally influenced. The size of the lake may increase as surrounding marsh is eroded or subsides, or may decrease as the lake fills in and marsh area increases. Detrital material and dissolved nutrients washed into these lakes generally support large populations of aquatic invertebrates, fishes, and other organisms. Floating and/or submerged aquatic vegetation (including both algae and vascular vegetation) forming aquatic beds may be found throughout. Vegetation present is primarily determined by salinity (see various marsh types for plants that may be present). Waterbirds and waterfowl make extensive use of these shallow, open water areas. Marsh Lake grades into various types of marsh. S4.

2. Swamp Lake

Swamp Lakes are shallow, open water areas greater than 20 acres and generally less than six feet deep surrounded by a swamp basin. Swamp Lakes are mesotrophic to euthrophic, though most often they are turbid, eutrophic systems. Many Swamp Lakes are rapidly filling in with rooted plants and organic sediments in a classic pattern of lake



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succession. Floating and/or submerged aquatic vegetation (including both algae and vascular) forming aquatic beds may be found throughout. Common plants here include Ceratophyllum demersum (coontail), Cambomba caroliniana (fanwort), Lemna spp., Spirodella spp., Wolfia spp., Wolffiella ssp. (duckweeds), Eichhornia crassipes (water-hyacinth), Pistia stratioites (water lettuce), and Azolla caroliniana (mosquito fern). Phytoplankton is an important community constituent that adds significantly to the overall primary productivity of Swamp Lakes. The higher trophic levels within Swamp Lakes are supported primarily by detritus exported from the swamp forest floor. Waterfowl and waterbirds extensively use these shallow, open water areas. Catfish are important consumers in Swamp Lakes. S4.

IV. PALUSTRINE:

The Palustrine System includes all nontidal wetlands dominated by trees, shrubs, or persistent emergents (>30 % aerial coverage), and all such wetlands that occur in tidal areas where salinity due to gulf-derived salts is below 0.5 ppt. It also includes wetlands lacking such vegetation, but with all of the following four characteristics: (1) area less than 8 ha (20 acres); (2) water depth in the deepest part of basin less than 2 m at low water; and (3) salinity due to gulf-derived salts less than 0.5 ppt. The Palustrine System is bounded by upland or by any of the other four systems. The Palustrine System was developed to group the vegetated wetlands traditionally called by such names as marsh, swamp, bog, fen, and prairie, which are found throughout the United States. It also includes the small, shallow, permanent or intermittent water bodies often called ponds. Palustrine wetlands may be situated shoreward of lakes, river channels, or estuaries; on river floodplains; in isolated catchments; or on slopes. They may also occur as islands in lakes or rivers. The erosive forces of wind and water are of minor importance except during severe floods. The emergent vegetation adjacent to rivers and lakes is often referred to as "the shore zone" or the "zone of emergent vegetation", and is generally considered separately from the river itself. There are often great similarities between wetlands lying adjacent to lakes or rivers and isolated wetlands of the same class in basins without open water.

A. Aquatic Bed

1. Submergent Algal Vegetation

Submerged algal vegetation including both phytoplankton and benthic algae, in a freshwater, non-tidal wetland. Phytoplankton are an extraordinarily diverse group of free-floating organisms. Seasonal and spatial population dynamics of this taxonomic group result from constantly changing environmental parameters interacting with physiological characteristics of the organisms. Light, temperature, and water turbidity interact with cycling nutrients, especially nitrogen and phosphorus, to govern the seasonal blooms and successions of phytoplankton populations. Prominent among phytoplankton algal populations are Chlorophytes (green algae), Basillariophytes (diatoms), and Cyanophytes (blue-green algae). Diatoms are often the most abundant and ubiquitous of all phytoplankton. Common phytoplankton species include Spirogyra spp., Oscillitoria spp., and Microspora spp. Epibenthic algae grow completely or partially submerged on a variety of surfaces. As with phytoplankton, these algal communities are subject to complex blooms and succession. Available information indicates that blue-green algae, diatoms, and green algae dominate epibenthic algal communities in Palustrine Submergent Algal Beds. Common attached algae species include the green algae, Chara spp. (musk grass), and Nitella spp. (stonewort), and the blue-green algae Shizothrix spp. and Chromulina spp. Algal beds produce organic matter that serves as an energy source for various heterotrophic organisms, add oxygen to the water through photosynthesis, and supply detrital material and dissolved nutrients to the water. Where



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extensive algal mats form on the water surface, the algae of lower levels die, and the process of decomposition removes oxygen from the water and may cause anoxic conditions that result in the death of fish and other aquatic animals. A complete picture of the real value of this community has not been produced and much additional research is needed. S4.

2. Submerged/Floating Vascular Vegetation

Synonym: Freshwater Aquatic Wetland

Beds of submerged or floating vascular plants in a freshwater, non-tidal wetland. Submerged aquatics occur at all depths within the photic zone. They often occur in sheltered areas where there is little water movement. Some of the submerged rooted vascular species are characterized by floating leaves. Floating vascular plants float freely either in the water or on its surface. They are easily moved about by wind or water currents. Common species in this natural community include Potamogeton spp. (pondweeds), Alternanthera philoxeroides (alligator weed), Najas guadalupensis (southern naiad), Brasenia schreberi (water shield), Nymphaea odorata (water lily), Nuphar luteum (spatterdock), Myriophyllum spp. (water milfoil), Ceratophyllum demursum (coontail), Cabomba caroliniana (fanwort), Utricularia spp. (bladderworts), (Pistia stratioites (water lettuce), Eichhornia crassipes (water-hyacinth), Lemna spp., Spirodella spp., Wolfia spp., Wolfiella spp. (duckweeds), Azolla caroliniana (mosquito fern), and Bacopa caroliniana (lemon bacopa). The community may consist of mixtures of several dominant species along with several associated species, but frequently one or two taxa form a dense stand, excluding other species. As these deep water wetlands fill in with sediments, this community is replaced by Freshwater Marsh and Forested Wetlands. With sufficient sediment accumulation in adjacent open water, the community may expand into waters previously too deep to colonize. Submerged/floating vascular aquatic plant beds supply oxygen, detrital material and dissolved organic nutrients to the water, and produce organic matter that serves as an energy source for various heterotrophic organisms. This community is highly productive and is extremely valuable habitat for fish and wildlife. S4.

B. Emergent Vegetation

1. Freshwater Marsh

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 is entering the bay (e.g., Atchafalaya Bay). Small pools or ponds may be scattered. The floristic composition of these sites is quite heterogeneous and is variable from site to site. Frequency and duration of flooding which are intimately related to microtopography seem to be the primary factors governing 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. It is frequently dominated by Panicum hemitomon (maidencane). Other characteristic species include Eleocharis spp. (spikesedge), Sagittaria lancifolia = S. falcata (bulltongue), Alternanthera philoxeroides (alligator weed), Spartina patens (wire grass), Phragmites communis (roseau cane), Bacopa monnieri (coastal water hyssop), Ceratophyllum demursum (coontail), Cyperus odoratus (fragrant flatsedge), Eichhornia crassipes (water hyacinth), Pontederia cordata (pickerelweed), Peltandra virginica (arrow arum), Hydrocotyle spp. (pennyworts), Lemna minor (common duckweed), Myriophyllum spp. (water milfoils), Nymphaea odorata (white waterlilly), Typha spp. (cattail), Utricularia spp.

(bladderworts), Vigna luteola (deer pea), and Zizaniopsis miliacea (southern wildrice). Epiphytic and benthic algae are two other major autotroph groups in Freshwater Marsh. A significant portion of Freshwater Marsh is floating marsh (flotant). Salinities are usually less than 2 ppt. and normally average about 0.5-1 ppt. Wildlife populations are generally highest in this marsh type. As the other marsh types, Freshwater Marsh acts as important nursery areas for the young of many marine species, such as, croaker, seatrout, blackdrum, and flounder (see Salt Marsh for other functions). The community may change to a more saline marsh type with the invasion of salt water or may become open water. Freshwater Marsh has undergone the largest reduction in acreage of any of the marsh types over the past twenty years due to salt water intrusion. S1S2.

2. Coastal Prairie

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

This is the prairie region of southwestern Louisiana, once very extensive (~ 2.5 million acres) but today limited to small, remnant parcels. On the south edge of its range, the community may occur on "islands" or "ridges" surrounded by marsh. The region is underlain by an impervious clay pan 6 to 18 inches below the surface that prevents downward percolation of water and inhibits upward movement of capillary water. Soils are typically circum-neutral to alkaline, saturated in winter, and often very dry in late spring and fall. Historically, trees were confined to the more elevated and better drained stream sides or ridges, forming "gallery forests", and acted to divide the Coastal Prairie into many subunits or "coves". The natural demarcation line between the forest and grassland was (and is) very sharp. Coastal Prairie vegetation is quite diverse and dominated by grasses, including Paspalum plicatulum (brownseed paspalum), Paspalum spp. (paspy grasses), Schizachyrium scoparium and S. tenerum (little and slender bluestem), Andropogon gerardii (big bluestem), Andropogon spp. (broomsedges), Aristida spp. (three-awn grasses), Eragrostis spp. (love grasses), Spartina patens (wire grass, near marshes), Panicum virgatum (switch grass), Panicum spp. (panic grasses), Sorghastrum nutans (Indian grass), Sporobolus spp. (dropseeds), and Tridens spp. (purple-top). Important sedges in the community include Carex spp. (caric sedges), Cyperus spp. (umbrella sedges), Rhynchospora spp. (beaked sedges), and Scleria spp. (nut-rushes). An abundance of forbs is present including Cacalia ovata (Indian platain), Helianthus mollis (sunflower), Liatris spp. (blazing-stars), Asclepias spp. (milkweeds), Silphium spp. (rosin-weeds), Petalostemum spp. (prairie clovers), Baptisia spp. (indigos), Amsonia tabernaemontana (blue star), Rudbeckia spp. (brown-eyed susans), Euphorbia spp. (spurges), Euthamia spp. (flat-topped goldenrods), Hedyotis nigricans (bluets), Ruellia humilis (wild petunia), Ludwigia spp. (water primroses), Coreopsis spp. (tickseeds), Solidago spp. (goldenrods), Agalinis spp. (false foxgloves), and Eupatorium spp. (thoroughworts). Many plants in Coastal Prairie are the same as ones found in the pine savannahs and flatwoods that occur immediately north of the coastal prairie region. These include many of the above, plus Drosera brevifolia (sundew), Polygala spp. (milkworts), Aletris spp. (colic-roots), Rhexia spp. (meadow beauties), and Sabatia spp. (rose-gentians). Fire plays a critical role in this natural community. Certain woody species may invade without periodic fire. The introduced species Sapium sebiferum (Chinese tallow tree) has become especially problematic. The transition zone from coastal prairie to pine savannah is extremely diverse as it contains species from both communities. "Baygols" may be inclusions within coastal prairie. S1.



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3. Mississippi Terrace Prairie

Wet prairie type of northeastern Louisiana on terraces within the Mississippi River alluvial floodplain. These were generally small, pocket prairies of only a few acres in size. Only a very few relicts of this natural community may remain, and therefore very little is known about this prairie type. They may have occurred on saline soils, and as other prairie types lacked trees and woody vegetation, being dominated by grasses. Frequent fire and soil type would have prevented invasion of woody species. These prairies are dominated by Andropogon geradii (big bluestem), Sorghastrum spp. (Indiangrass), Panicum virgatum (switchgrass), Tripsacum dactyloides (Eastern gammagrass), and Sporobolus asper (tall dropseed). S1.

4. Flatwoods Pond

Flatwoods ponds are relatively small, natural depressional wetlands embedded within current or historic longleaf pine flatwoods/savannahs of western Louisiana. They are believed to occupy swales and depressions remaining from ancient Pleistocene stream channels, and are often linear in shape, although circular and elliptic ponds are common. Their size ranges from much less than one acre, up to about 30 or 40 acres, averaging 1 to 5 acres. In general, small ponds are relatively shallow, while larger ponds are deeper. They may range from just a few inches deep relative to surrounding pine flats, to 5 or so feet deep in deeper, larger ponds. Generally treeless, these ponds are vegetated by a variety of obligate and facultative wetland herbaceous species, mainly tall sedges and grasses. Native herbaceous species that usually characterize shallow ponds or edges of deeper ponds include: Andropogon glomeratus var. glaucopsis (bushy beardgrass), Aristida palustris (= A. affinis) (longleaf three-awn grass), Coreopsis linifolia (tickseed), Eleocharis tuberculosa (spikerush), Eriocaulon decangulare (pipewort), the beakrushes - Rhynchospora filifolia, R. gracilenta, R. rariflora, and Dichromena latifolia, Gratiola brevifolia (hyssop), Hypericum galioides (St. John's wort), Hyptis alata (bitter mint), Panicum virgatum (switchgrass), Pluchea rosea (stinkweed), Polygala ramosa (candyroot), Proserpinaca pectinata (mermaid-weed), Hibiscus aculeatus (comfort-root),and Rhexia lutea (meadow beauty). Deep ponds are characterized by a variable mix of herbs, including: Amsonia glaberrima (bluestar), Bacopa caroliniana (blue-hyssop), Carex verrucosa, Dichanthelium, Hibiscus moscheutos ssp. lasiocarpus, Juncus effuses (soft rush), Ludwigia pilosa (evening primrose), Lycopus rubellus (bugleweed), Oxypolis filiformis (hog-fennel), Panicum hemitomon (maidencane), Panicum virgatum (switchgrass), beakrushes – Rhynchospora cephalantha and R. corniculata, and Sagittaria graminea (arrowhead). Trees, often appearing stunted, may be present in deeper, more frequently flooded, and therefore less fire-exposed parts of ponds. Tree and woody species may include: Nyssa biflora (swamp blackgum), Acer rubrum (red maple), Cephalanthus occidentalis (buttonbush), Styrax americanus (small snowbell), Crataegus opaca (mayhaw), and Morella cerifera (waxmyrtle). The hydrologic regime of these ponds is characterized by a seasonally fluctuating water level – dry in summer and flooded the other 3 seasons. 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. Flatwood ponds were historically maintained by frequent lightening generated fires that, every few years, swept the longleaf pine flats in which flatwoods ponds are embedded. Such fires burned the ponds during the late spring/summer dry season, killing back encroaching shrubs and trees and rejuvenating the herbaceous ground cover. S1.



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5. Eastern Hillside Seepage Bog (S2)

6. Western Hillside Seepage Bog (S2)

Synonym: Pitcher Plant Bog, Grass-Sedge Bog, Green-Head, Baygall

Open, continually moist, floristically diverse habitats occurring along slopes of ravines and hills in upland pine forests, primarily in central and western Louisiana, but present sporadically in the eastern Florida Parishes. Bayhead swamps (or shrub thickets in areas that have been logged) are often present along the drain at the base of the boggy slopes. Individual occurrences are usually limited in areal extent, ranging from much less than one acre up to several acres. Frequent fire is essential to preclude invasion and site dominance by woody species. The soils are typically quite sandy and very acid (pH ~ 4.5-5.0). They are underlain by an impervious sandstone or clay layer that, where conditions are right, causes ground water to constantly seep to the soil surface. Sandstones, primarily of the Catahoula Formation, form the impermeable layer in central and western Louisiana, whereas, clays of the high Pleistocene terraces compose the layer in the Florida Parishes. Peat build-up may be considerable (to several inches). The diversity of herbaceous species is extremely high. Recent studies show more than 100 species may be present in a bog. Vegetation is dominated by a large number of graminoids, including Andropogon spp. (bluestems), Aristida spp. (threeawn grasses), Panicum spp. (panic grasses), Ctenium aromaticum (tooth-ache grass), Muhlenbergia capillaris (hairawn muhly), Rhynchospora spp. (beak-rushes), Xyris spp. (yellow-eyed grasses), Eriocaulon spp. (pipeworts), Lachnocaulon spp. (bog buttons), Dichromena latifolia (giant white top sedge), Scleria spp. (nut-rushes), Fuirena spp. (umbrella grasses), and Fimbristylis spp. (fimbry-sedge). Primary forbs include Sarracenia alata (green pitcher plant), Rhexia spp. (meadow beauties), Polygala spp. (milkworts), Liatris spp. (blazing stars), Eupatorium spp. (thorough-worts), Coreopsis linifolia (narrow-leaved tickseed), Drosera spp. (sundews), Pinguicula pumila (butterwort, west LA), and many others. Various orchids, especially Platanthera spp. (fringed orchids), are often conspicuous members of the flora. Ferns (principally Osmunda spp.) and club-mosses (Lycopodium spp.) are usually present and sphagnum moss is often abundant. Minor floristic differences between hillside bogs in southeast Louisiana and those in central/western Louisiana do exist. S2.

7. Interior Salt Flat

A mostly unvegetated, flat possessing sandy soils covered with a thin crust of salt crystals in places. Found in north Louisiana. Flooded in rainy weather due to proximity to streams. Origin appears related to salt domes near the surface. Salt-tolerant plants occur sporadically, often in zoned patterns, with patches of plants frequently being monospecific.. Zonal configurations appear related to micro-relief and consequent moisture patterns. Characteristic species include Eleocharis spp. (spike sedges), Juncus spp. (rushes), Scirpus spp. (bullrushes), Alternanthera sp. (a chaff-flower), Fimbristylis spp. (fimbry-sedge), Portulaca sp. (portulaca), Pluchea sp. (marsh-fleabane), Hibiscus lasicarpus (hibiscus), and Spartina pectinata (prairie cordgrass). S1S2.

C. Scrub/Shrub Wetland Vegetation

1. Scrub/Shrub Swamp

Scrub/Shrub Swamp is a low, flat wetland dominated by woody vegetation less than twenty feet tall. Soils are very poorly drained, surface water present for extended periods, sometimes drying during late summer or during drought. Species include true shrubs, young trees, and shrubs or trees that are stunted due to some environmental



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condition(s). Characteristic species include Cephalanthus occidentalis (buttonbush), Baccharis halimifolia (silvering), Sabal minor (dwarf palmetto), Morella cerifera (wax myrtle), Iva frutescens (marsh-elder), Amorpha fruticosa (lead plant), and Acer rubrum var. drummondii (swamp red maple). All of these will not necessarily be seen together at the same site. Little is currently known about this natural community and further research is needed. Scrub/Shrub Swamps are often associated with newly accreted lands and partially drained wetlands and may be successional in nature. They may be found in transition zones between marsh and higher areas such as chenieres. S4S5.

2. Shrub Swamp

A low, flat freshwater shrub swamp with large shrubs or small trees less than 35 feet in height. The soil is usually water-logged throughout the growing season and often covered with up to six inches of water. Shrub Swamps occur mostly along sluggish streams and occasionally in flood plains in semi-permanent pools associated with depressions, old ox bows, and scour channels. The plant community typically contains one or more of the following: Salix spp (willow), Planera aquatica (water elm), Forestiera acuminata (swamp privet), Crataegus opaca (mayhaw), Morella cerifera (wax myrtle), and Cephalanthus occidentalis (buttonbush). Some scattered larger trees may be present. Although shrub swamps do not usually exhibit vegetative growth typical of a forest, they are interspersed within other forested wetlands and function as a part of the total system. Relatively little is known about Shrub Swamps. Further field investigation will be needed to adequately describe this natural community. S4S5.

D. Forested Wetland

1. Baldcypress-Tupelo Swamp

Synonyms: Freshwater Swamp, Brake, Swamp Forest

Baldcypress-Tupelo Swamps are forested, alluvial swamps growing on intermittently exposed soils. 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 extreme drought. Bayous commonly intersect these wetlands. There is relatively low floristic diversity. Taxodium distichum (baldcypress) and Nyssa aquatica (tupelo gum) are co-dominants. Common associates are Nyssa sylvatica var. biflora (swamp blackgum), Acer rubrum var. drummondii (swamp red maple), Salix nigra (black willow), Fraxinus profunda (pumpkin ash), F. pennsylvanica (green ash), Planera aquatica (water elm), Gleditsia aquatica (water locust), Itea virginica (Virginia willow), and Cephalanthus occidentalis (buttonbush). Composition of associate species may vary widely from site to site. Undergrowth is often sparse because of low light intensity and long hydroperiod. Neither bald cypress nor tupelo gum seeds germinate underwater, nor can young seedlings of these trees survive long submergence. Establishment of young trees can only occur during periods of exceptionally long drought. This probably explains why these species tend to occur in even-aged stands -- the environmental conditions favorable for germination and establishment of saplings occur very infrequently. Due to current problems with coastal zone soil subsidence and predicted sea level rises, some experts are concerned that increased levels and duration of flooding in the cypress swamps will prevent regeneration of this natural community type. Swamps in Louisiana, and elsewhere in the U.S., have been shown to be important nutrient and sediment sinks, improving the quality of water that flows through them. In addition to this function of nutrient assimilation, the swamps serve as nursery areas for many estuarine dependent species, and also act in flood regulation. Many aquatic food webs depend on the input of allochthonous material in the form of leaf litter of other organic debris that the wetland



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forest provides. Decomposition of litter occurs so rapidly that very little buildup of organic matter occurs on the forest floor. Procambarus spp. (crawfish), amphipods, and aquatic insect larvae are probably the most important detritivores in the community. The high net primary productivity of swamp forests seems to be increased by periodic flooding or increased water flow, and decreased by slow water movement or stagnation. Reptiles and amphibians are especially abundant in this community. Heavy cutting of this forest often causes a reversion to almost pure tupelo gum. Bald cypress-tupelo swamp may increase in area by encroaching into adjacent Freshwater Marshes undergoing sediment build-up. Violent storms may convert these swamps to open marsh. The forest may tend toward bald cypress dominance without periodic disturbance. S4.

2. Baldcypress Swamp

Synonyms: Freshwater Swamp, Brake, Swamp Forest

Baldcypress Swamps are forested, alluvial swamps growing on intermittently exposed soils. The soils are inundated or saturated by surface water or groundwater on a nearly permanent basis throughout the growing season except during periods of extreme drought. Bayous commonly intersect these wetlands. There is relatively low floristic diversity. Taxodium distichum (baldcypress) is the dominant overstory species. Common associates are Nyssa spp. (gums), Acer rubrum var. drummondii (swamp red maple), Salix nigra (black willow), Fraxinus profunda (pumpkin ash), F. pennsylvanica (green ash), Planera aquatica (water elm), Gleditsia aquatica (water locust), Itea viriginia (Virginia willow), and Cephalanthus occidentalis (buttonbush). Composition of associate species may vary widely from site to site. Undergrowth is often sparse because of low light intensity and long hydroperiod. Baldcypress seeds cannot germinate underwater, nor can young seedlings survive long submergence. Establishment of young trees can only occur during periods of exceptionally long drought. This probably explains why baldcypress tends to occur in even-aged stands, -- the environmental conditions favorable for germination and establishment of saplings occur very infrequently. Swamps in Louisiana, and elsewhere in the U.S., have been shown to be important nutrient and sediment sinks, improving the quality of water that flows through them. In addition to this function of nutrient assimilation, the swamps serve as nursery areas for many estuarine dependent species, and also are important in flood regulation. Many aquatic food webs depend on the input of allochthonous material in the form of leaf litter or other organic debris that the wetland forest provides. Decomposition of litter occurs so rapidly that very little buildup of organic matter occurs on the forest floor. Procambarus spp. (crawfish) amphipods, and aquatic insect larvae are probably the most important detritivores in the community. Net primary productivity of swamp forests seems to be increased by periodic flooding or increased water flow and decreased by slow water movement or stagnation. Reptiles and amphibians are especially abundant in this community. Heavy cutting of this forest often causes a reversion to almost pure tupelo gum. Baldcypress swamp may increase in area by encroaching into adjacent Freshwater Marshes undergoing sediment build-up. Violent storms may convert these swamps to open marsh. S4.

3. Tupelo-Blackgum Swamp

Synonyms: Freshwater Swamp, Brake, Swamp Forest, Gum Swamp, Gum Pond.

Tupelo-Blackgum Swamps are forested alluvial swamps growing on intermittently exposed soils. The soils are inundated or saturated by surface water or groundwater on a nearly permanent basis throughout the growing season except during periods of extreme drought. Often occurs at topographically higher positions than Baldcypress-Tupelo Swamp or Baldcypress Swamp. Overstory primarily composed of one or more species of



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Nyssa spp. (gums). Common associates are Taxodium distichum (baldcypress), Acer rubrum var. drummondii (swamp red maple), Salix nigra (black willow), Fraxinus profunda (pumpkin ash), Planera aquatica (water elm), Gleditisia aquatica (water locust), Forestiera acuminata (swamp privet), Quercus laurifolia (laurel oak), Leucothoe racemosa (leucothoe), Cyrilla racemiflora (swamp cyrilla), Cornus foemina (swamp dogwood), Itea virginica (Virginia willow), Cephalanthus occidentalis (buttonbush) and various woody vines. Composition of associate species may vary widely from site to site depending primarily on flooding regime. Undergrowth is often sparse because of low light intensity and long hydroperiod. Gum seeds cannot germinate underwater, nor can young seedlings of these trees survive long submergence. Establishment of young trees can only occur during periods of exceptionally long drought. This probably explains why these species tend to occur in even-aged stands -- the environmental conditions favorable for germination and establishment of saplings occur very infrequently. S4.

4. Pondcypress-Blackgum Swamp

This swamp type is known from the Florida Parishes of Louisiana along the northshores of Lake Maurepas and Pontchartrain in depression and flatwoods or other areas where surface water is persistant. The dominant tree species are Taxodium ascendens (pondcypress), Nyssa biflora (swamp blackgum), and Acer rubrum var. drummondii (swamp red maple). Typical understory species include: Carex decomposita (cypress knee sedge), Saururus cernuus (lizard's tail), Lacnanthes caroliniana (red-root), Triadenum walteri (marsh St. John's wort), Pluchea rosea (stinkweed), Osmunda regalis var. spectabilis (royal fern), Cephalanthus occidentalis (buttonbush), Morella cerifera (wax myrtle), Pontederia cordata (pickerel weed), Ludwigia pilosa (marsh primrose), Bidens ssp. (beggar-ticks), and Sagittaria lancifolia (lanceleaf bulltongue). This natural community is poorly documented and there is only one known protected occurrence of this type in Louisiana. S1.

5. Bottomland Hardwood Forest

Synonyms: Mixed Bottomland Hardwoods, Broad Stream Margins, Hardwood Bottoms. Bottomland Forest is a forested, alluvial wetland occupying broad floodplain areas that flank large river systems. They are predominantly associated with the Mississippi, Red, Ouachita, Pearl, Tensas, Calcasieu, Sabine, and Atchafalaya River floodplains. Bottomland Forests may be called a fluctuating water level ecosystem characterized and maintained by a natural hydrologic regime of alternating wet and dry periods. These forests support distinct assemblages of plants and animals associated with particular landforms, soils, and hydrologic regimes. They are important natural communities for maintenance of water quality, providing a very productive habitat for a variety of fish and wildlife, and are important in regulation of flooding and stream recharge. Bottomland hardwoods are extremely productive areas due in part to periodic flood-transported and deposited particulate and dissolved organic matter and nutrients. Relatively extensive stands of Arundinaria gigantea (giant cane) may occur sporadically in some bottomland forests. The distribution of flora in bottomland forests is primarily controlled by anaerobic soil conditions. Anaerobic conditions exist in a gradient dependent on relative soil saturation. It is not the availability of water that regulates plant distributions, but the in availability of oxygen due to the presence of water. The different tolerance levels of individual plant species to anaerobic soil conditions is the crucial selective force responsible for the sorting of species into distinct associations. The anaerobic gradient is intimately related to topographic variation of the floodplain, seasonal flood depth and duration, and drainage rates of the soil. A comprehensive list of known natural factors affecting the distribution of floodplain flora would include soil types and characteristics,



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detrital decomposition rates, soil oxygen availability, soil and water pH, water chemistry, nutrient availibility and turnover rates, wind storms, flood timing, depth, duration and water velocity, siltation, erosion, light intensity, elevation, and relief patterns of the floodplain. Obviously, many of these factors are interrelated. While the complexities of hydroperiod, climate, soils, watershed characteristics, and other factors have produced an often bewildering mosaic of intergrading vegetative associations, bottomland forests contain a number of species which can be aggregated into specific associations or communities based on environmental factors such as physiography, topography, soils, and moisture regime. S4.

Natural communities currently recognized by the Heritage Program in Bottomland Forests are:

a. Overcup Oak - Water Hickory Bottomland Forest
Quercus lyrata (overcup oak) and Carya aquatica (water hickory) are codominants of this floodplain forest which occurs in low-lying poorly drained flats, sloughs in the lowest backwater basins, and on low ridges with clay soils that are subject to inundation. Semi-permanently inundated or saturated soils for major portion of the growing season are generally present. Such conditions typically occur during the spring and summer months with a frequency ranging from 51-100 years per 100 years. Associate species include Fraxinus pennsylvanica (green ash), Celtis laevigata (hackberry), Cornus foemina var. foemina (swamp dogwood), Forestiera acuminata (swamp privet), Planera aquatica (planertree), Cephalanthus occidentalis (buttonbush) and vines. This community type has a long successional stage. S4.

b. Hackberry-American Elm-Green Ash Bottomland Forest
Celtis laevigata (hackberry), Ulmus americana (American elm), and Fraxinus pennsylvanica (green ash) are codominants. This community occurs in floodplains of major rivers on low ridges, flats and sloughs in first bottoms. Soils are seasonally inundated or saturated periodically for 1 to 2 months during the growing season. Such conditions occur with frequency ranging from 51 years to 100 years per 100 years. Common associates are Carya aquatica (water hickory), Quercus nuttallii (nuttall oak), Q. phellos (willow oak), Q. nigra (water oak), Q. lyrata (overcup oak), Liquidambar styraciflua (sweet gum), Acer negundo (box elder), Ulmus alata (winged elm), Acer rubrum (red maple), Gleditsia aquatica (water locust) and Plantanus occidentalis (American sycamore). Understory species include Cornus foemina var. foemina (swamp dogwood), Crataegus spp. (hawthorn), and Morus rubra (red mulberry). Many vines and herbaceous plants are present here. S4.

c. Batture
Synonyms: Riverfront Pioneer, Cottonwood-Willow, Black Willow, Cottonwood.
The Batture community develops on the slope between the natural levee crest and major streams/rivers. It is a pioneer community which is first to appear on newly formed sand bars and river margins. The area receives sands and silts with each flood. The soils are semi-permanently inundated or saturated. Soil inundation or saturation by surface water or groundwater occurs periodically for a major portion of the growing season. Such conditions typically prevail during spring and summer months with a frequency ranging from 51 to 100 years per



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100 years. The total duration of time for the seasonal event(s) normally exceeds 25 percent of the growing season. Salix nigra (black willow) comprises a majority of the stocking, and Populus deltoides (cottonwood) is the primary associate. Secondary consociates may be, depending chiefly on successional stage, Betula nigra (riverbirch), Fraxinus pennsylvanica (green ash), Platanus occidentalis (American sycamore), Carya illinoensis (pecan), Celtis laevigata (hackberry), Acer rubrum (red maple), Forestiera acuminata (swamp privet), Planera aquatica (water elm), Ulmus americana (American elm), Taxodium distichum (baldcypress), Acer negundo (box elder) and Morus rubra (red mulberry). Salix exigua (sandbar willow) may be common in certain sites. Batture is a community undergoing relatively rapid succession. Black willow is a temporary, short-lived pioneer species of very rapid growth. Cottonwood will outgrow willow and become dominant except where frequent and extended growing-season flooding covers the trees and limits the cottonwood. As soils build up in the community and succession progresses, willow and cottonwood become less predominant and secondary associates gain increasing importance in the community. The community often succeeds into Hackberry-American Elm-Green Ash or Sycamore-Sweetgum-American Elm Bottomland Forest. The successional sequence is a function of river meander movement rates and point bar formation. Rivers with swift meander movements over unconsolidated sands produce tapered slopes on point bars which are first colonized by the Batture community. S4S5.

d. Sweetgum-Water Oak Bottomland Forest

The community dominants are Liquidambar styraciflua (sweetgum) and Quercus nigra (water oak). Major associates are Celtis laevigata (hackberry), Fraxinus pennsylvanica (green ash), Ulmus americana (American elm), and Q. texana (Nuttall oak). It occurs in alluvial floodplains, extensively in the Mississippi alluvial valley on well drained first bottom ridges. Associated species are Acer rubrum (red maple), Morus rubra (red mulberry), Smilax spp. (greenbrier), Sabal minor (dwarf palmetto), Ilex decidua (deciduous holly), Crataegus viridis (green hawthorn), Ampelopsis arborea (peppervine), Campsis radicans (trumpet-creeper), and Toxicodendron radicans (poison ivy). Soils seasonally saturated or inundated for 1 to 2 months during growing season. Such conditions typically occur with a freqeuncy ranging from 51 to 100 years per 100 years. S4.

e. Live Oak Forest:

Synonym: Natural Levee Forest, Frontland Forest.

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. Quercus virginiana (live oak) typically dominates the stand, but Q. nigra (water oak), Ulmus americana (American elm), Celtis laevigata (hackberry), Acer rubrum var. drummondii (Drummond red maple), and Fraxinus pennsylvanica (green ash) are usually prominent community members, and may be predominant in areas. Overstory associates may include Q. falcata var. pagodaefolia (cherrybark oak), Q. nuttallii (Nuttall oak), Gleditsia triacanthos (honey locust), Liquidambar syraciflua (sweetgum), and Acer negundo (box-elder). Nyssa aquatica (tupelo gum) and Taxodium distichum (baldcypress) are often present in wet depressions or on edges. Sabal minor (dwarf palmetto) is usually the



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most conspicuous midstory and understory shrub, often attaining heights of up to 4 m, but a number of other shrubs may be present, including Ilex decidua (deciduous holly), Crataegus viridis (green hawthorn), Cornus foemina var. foemina (swamp dogwood), Planera aquatica (water elm), Myrica cerifera (wax myrtle), Sambucus canadensis (elderberry), and Persea borbonia (red bay). The herbaceous layer is often poorly developed, but may contain such species as Tradescantia spp. (spiderworts), Solidago sempervirens (seaside goldenrod), Samolus verlandieri (water-pimpernel), Sanicula canadensis (snakeroot), Arisaema dracontium (green dragon), Nemophylla aphylla (baby blue eyes), Geum canadensis (geum), Hydrocotyle spp. (penny-worts), Eupatorium spp. (thoroughworts), Polygonum spp. (smartweeds), Tovara virginica (jumpseed), Senecio glabellus (yellow-top), Panicum spp. (panic grasses), Oplismenus hirtellus (basket grass), and Thelypteris spp. (marsh ferns). Vines are usually prominent and include Mikania scandens (climbing hempvine), Cocculus carolinianum (Carolina moonseed), Campsis radicans (trumpet creeper), Rhus radicans (poison ivy), Berchemia scandens (rattan vine), and Smilax rotundifolia (common greenbrier). Epiphytes are significant community members and include the highly conspicuous Tillandsia usneoides (Spanish moss), plus Polypodium polypodioides (resurrection fern), and Phoradendron tomentosum (mistle-toe). Several introduced species have become serious invaders of this habitat, including Lygodium japonicum (Japanese climbing fern), Sapium sebiferum (Chinese tallow tree), and Lonicera japonica (Japanese honeysuckle). S1S2.

6. Wet Hardwood Flatwood

Synonym: Hardwood Flats, Flatwoods

This community occurs on Pleistocene Red River Channels in northwest Louisiana and on Pleistocene Valley Train Sediments on Macon Ridge in the northeast part of the state. Soils are poorly drained silt loams to clays. On Macon Ridge the principal soil series that support this community are Calhoun and Gilbert silt loams. Occurrences in the Red River Valley are found on the Acadia series. The topography is flat to gently undulating and occurrences are often isolated and are not directly influenced by over-bank flooding. Several inches of standing water can be found in the winter months and soils may be saturated into early spring. Dominant overstory trees include Quercus phellos (willow oak), Fraxinus pennsylvanica (green ash), Carya ovata (shagbark hickory), Ulmus americana (American elm), Ulmus crassifolia (cedar elm) and Celtis laevigata (hackberry). Other trees that are fairly frequent but not as common locally include Quercus stellata (post oak), Q. pagoda (cherrybark oak), Liquidambar styraciflua (sweetgum), Carya myristiciformis (nutmeg hickory) and Gleditsia aquatica (honeylocust). Ulmus alata (winged elm) and cedar elm are often abundant in the midstory. Sabal minor (palmetto) is usually thick in the understory. Other important shrubs are Ilex decidua (deciduous holly) and Styrax americana (snowbell). Important herbaceous plants include Cardamine bulbosa (bulbous bitter cress), Cynosciadium digitatum (finger dog shade), Tradescantia occidentalis (small-flowered spiderwort), Amsonia tabernaemontana (bluestar), Clematis crispa (curl-flower), Hymenocallis liriosome (spider lily), Carex intumescens (common bladder caric sedge), Trepocarpus aethusae (muskweed), Ranunculus pusillus (low spearwort), and Galium tinctorium (dye bedstraw). Climacium sp. (tree moss) is usually abundant on the forest floor. Bottomland hardwood forests are found down slope in floodplains along drainages or in depressions. Mesic hardwood flatwoods or mixed hardwood-loblolly pine forests occur on higher topographic positions on better drained soils. S2S3.



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7. Macon Ridge Green Ash Pond

Synonym: Spicewood Pond

This extremely rare natural community is found only along the Macon Ridge in northeast Louisiana. The ponds occur in small depressions generally of less than an acre to only a few acres in size, and are considered isolated wetlands since they do not receive alluvial flooding. The majority of original ponds were converted to agricultural production during the mid-19th and early 20th centuries, and the few remaining ponds are surrounded by agricultural fields. Runoff of fertilizers and pesticides, and chemical drift, as well as, continued conversion to other land uses threatens the Macon Ridge green ash ponds. Dominant canopy species include Fraxinus pennsylvanica (green ash), Nyssa biflora (swamp blackgum), and Populus heterophylla (swamp cottonwood). In less flooded pond margins other dominant tree species include Ulmus americana (American elm), Quercus texana (Nuttall oak), Salix nigra (black willow), Acer rubrum var. drummondii (swamp red maple), and Quercus phellos (willow oak). Typical understory trees and shrubs include Styrax americanus ( American snowbell), Diospyros virginiana (persimmon), Planera aquatica (planar tree), Foresteria ligustrina (upland swamp privet), Arundinaria gigantea (switchcane), and Sabal minor (palmetto). These areas are potential habitat for the federally-listed Lindera melissifolia (pondberry). S1.

8. Forested Seep

Synonym: Baygall, Green-head

A very similar community to bayhead swamp but differs primarily by not being so well-developed and swamp-like. It occurs in north, central, western, and southeastern Louisiana, typically in mixed pine-hardwood forests, on hillsides, at the base of slopes, and in the narrow bottoms of small perennial or intermittent streams. It is usually very limited in size, seldom larger than a few acres, and often much smaller. Wooded seeps on slopes are continually moist due to constant seepage forced to the surface by an underlying impervious layer. Soils are characteristically quite sandy and acidic. Species complement is usually very similar to bayhead swamps. Where sufficiently developed, Magnolia virginiana (sweet bay), Nyssa sylvatica (black gum), and Acer rubrum (red maple) usually dominate the overstory. Common shrubs include Itea virginica (Virginia willow), Myrica heterophylla (bigleaf waxmyrtle), Alnus surrulata (hazel alder), Viburnum nudum (swamp blackhaw), Aronia arbutifolia (red chokeberry), Rhus vernix (poison sumac, central and southeastern Louisiana), Lyonia ligustrina (fetterbush), and Vaccinium fuscatum (baygall blueberry). Lyonia mariana (stagger-bush) may rarely occur. In north and central Louisiana, Rhododendron oblongifolium (wild azalea) is often present. In the Florida Parishes of southeast Louisiana, the above species plus Cyrilla racemiflora (swamp titi), Ilex coriacea (sweet gallberry), Lyonia lucida (fetterbush), Leucothoe axillaris and L. racemosa (leucothoes), Clethra alnifolia (summer-sweet), and Rhododendron serrulatum (summer azalea) may be present. Smilax laurifolia (bamboo greenbrier) is usually quite conspicuous in the community. The understory is typically covered with ferns, including Osmunda cinnamomea (cinnamon fern), O. regalis (royal fern), Onoclea sensibilis (sensitive fern), Lorinseria areolata (net-veined chain fern), Woodwardia virginica (Virginia chain fern), and Athyrium felix-femina (southern lady fern). Several orchid species may occur, such as Platanthera clavellata (green rein orchid), P. cristata (yellow fringed orchid), P. ciliaris (yellow fringed orchid), and the state-rare Isotria verticillata (whorled pogonia). Sphagnum moss is often abundant. Additional bog affiliated herbaceous may occur sporadically in the community. With regular fire, this habitat may revert to a hillside bog community. S3.



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9. Bayhead Swamp

Synonyms: Baygall, Acid Seep Forest, Green-head, Streamhead Pocosin, Bay Forest, Bay Swamp, Sweetbay-Swamp Tupelo-Red Bay.

This community is extremely variable ranging from a shrub dominated swamp to a mature swamp forest with evergreen shrubs forming the primary understory and midstory. Although very similar to wooded seeps, the community is well-developed and swamp-like, and occurrences are relatively sizable (typically at least a few acres). Bayhead Swamps occur in the heads of creeks or branches, at the base of slopes, in acid depressions in pine flatwoods, and borders of swamps in north, central, western, and southeastern Louisiana. Soils are usually very acid, sandy in texture, primarily colluvial in origin, and are saturated, inundated, or at least moist throughout the growing season. They are often deep and "mucky". Magnolia virginiana (sweet bay, often dominant) and Nyssa sylvatica (black gum) are the common overstory trees. Quercus laurifolia (laurel oak), Acer rubrum (red maple), Liquidambar styraciflua (sweet gum), Q. nigra (water oak), Taxodium distichum (baldcypress), T. ascendens (pondcypress, southeast Louisiana), Pinus elliottii (slash pine, southeast Louisiana), and P. palustris (longleaf pine) may be present. A diversity of shrubs or small trees, primarily evergreen, are prevalent in the community. Species that may be present include Persea borbonia (red bay), Cyrilla racemiflora (swamp cyrilla, southeast and southwest Louisiana), M. heterophylla (bigleaf wax myrtle), Morella cerifera (wax myrtle), I. glabra (little-leaf gallberry, southeast Louisiana), I. coriacea (sweet gallberry, southeast and southwest Louisiana), I. opaca (American holly), Lyonia lucida (fetterbush, southeast Louisiana), L. ligustrina (fetterbush), Leucothoe axillaris (leucothoe, southeast Louisiana), L. racemosa (leucothoe), Itea virginica (Virginia willow), Aronia arbutifolia (red chokeberry), Viburnum nudum (possum-haw viburnum), Rhus vernix (poison sumac), Clethra alnifolia (summer sweet, primarily southeastern Louisiana), Alnus serrulata (hazel alder), Styrax americana (American snowbell), Rhododendron serrulatum (summer azalea), R. canescens (wild azalea), Rhododendron oblongifolium (wild azalea, central, western, and north Louisiana), and other species. Smilax laurifolia (bamboo greenbrier) and Decumaria barbara (climbing hydrangea) are often conspicuous community members.

Herbaceous flora is usually sparse but may include ferns, such as Lorinseria areolata (net-veined chain fern), Onoclea sensibilis (sensitive fern), Osmunda cinnamomea (cinnamon fern), and O. regalis (royal fern), and a few orchid species. Sphagnum moss may be abundant and some bog-associated species are often present in open spots. Fire may very infrequently invade in extreme dry periods and can have a significant effect on community structure. S3.

10. Slash Pine-Pondcypress/Hardwood Forest

Synonyms: Slash Pine-Hardwood

This natural community is part of a climax acid swamp complex that occurs in poorly drained or undrained shallow depressions and on pond margins in the pine flatwoods of the far eastern Florida Parishes. Overstory contains Pinus elliottii (slash pine), and often Taxodium distichum (baldcypress) and T. ascendens (pondcypress), with a mixture of hardwoods such as Magnolia virginiana (sweetbay), Nyssa sylvatica (black gum), Acer rubrum (red maple), Liquidambar styraciflua (sweetgum), and Quercus nigra (water oak). The understory is often dense, with Cyrilla racemiflora (swamp cyrilla), Ilex coriacea (sweet gallberry), Lyonia lucida (fetterbush)), I. glabra (littleleaf gallberry), Itea virginica (Virginia willow), Morella heterophylla (bigleaf waxmyrtle), and Morella cerifera (waxmyrtle) characteristic species. Sphagnum spp. (sphagnum moss), Pteridophytes (ferns), and Smilax spp. (greenbriers) are common. Fire may occur in this natural community in extreme drought conditions. The roots of the hardwoods are usually



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undamaged and the trees will resprout if killed back. Mature slash pine is little affected by fire and may be encouraged to seed-in following a burn. S2S3.

11. Pine Flatwood

Synonyms: Longleaf Pine-Slash Pine, Spruce Pine Forest, Flatwoods

Pine Flatwoods occur primarily in the lower Florida Parishes and southwest Louisiana on essentially flat, low-relief areas with a high water table. They may infrequently occur in central Louisiana. Soils are normally mesic but may be saturated in winter and may become dry in summer. Soils are generally strongly acidic and fine sandy or silty. In the eastern Florida Parishes, Pinus palustris (longleaf pine) and Pinus elliottii (slash pine) are often co-dominants and are mixed in various percent composition. In places, one or the other may be almost totally dominant. Pinus taeda (loblolly pine) is often conspicuous in these forests and may be dominant in some areas. In the south-central Florida Parishes, Pinus glabra (spruce pine) is often the dominant overstory species, with longleaf pine totally absent. In southwest Louisiana, only longleaf and loblolly pine are present, the former usually most abundant. Quercus nigra (water oak), Q. laurifolia (laurel oak), Magnolia virginiana (sweetbay), Acer rubrum (red maple), Liquidambar styraciflua (sweetgum), and Nyssa sylvatica (black gum) are often predominant in the community. Taxodium distichum (baldcypress) and Taxodium ascendens (pondcypress, southeastern Louisiana) may be present in lower topographic positions. Important midstory and understory species include Sabal minor (dwarf palmetto), Ilex glabra (littleleaf gallberry, southeastern Louisiana), I. coriacea (sweet gallberry), Cyrilla racemiflora (swamp cyrilla), Lyonia spp. (fetterbush, primarily southeastern Louisiana), Morella spp. (wax myrtles), Clethra alnifolia (summer sweet, southeastern Louisiana), Vaccinium spp. (blueberries), Gaylussacia mosieri and G. dumosa (huckleberries, southeastern Louisiana), Hypericum spp. (St. John's-worts), Liatris spp. (blazing-stars), Rubus spp. (blackberries), Chaptalia tomentosa (sunbonnet), Andropogon spp. (broomsedges), and Panicum spp. (panic grasses). Many species common to Pine Savannahs occur sporadically in this community.

Pine Flatwoods are closely related to Pine Savannahs but differ by having a dense overstory stocking, often thick midstory and understory, and lower floristic diversity. These characteristics are probably due to relatively infrequent fire events. Slash pine is much less resistant to fire than longleaf pine and where mixed stands occur, fire was probably excluded for 5 - 10 years, thus allowing slash pine to grow to a fire-resistant size. Where fire is totally excluded or only very infrequently occurs, hardwood species soon dominate the forest. Sites that are rarely burned are typified by a proliferation of shrubs and hardwood trees. S3.

12. Eastern Longleaf Pine Savannah (S1S2)
13. Western Acidic Longleaf Pine Savannah (S1S2)
14. Western Saline Longleaf Pine Savannah (S1)

Synonyms: Open Savannah, Pine Flatwoods, Coastal Meadow, Pine Meadow, Pine Barren.

Pine Savannahs are floristically rich, herb-dominated wetlands, that are naturally sparsely stocked with Pinus palustris (longleaf pine). They historically dominated the Gulf Coastal Plain flatwood regions of southeast and southwest Louisiana. The term "savannah" is classically used to describe expansive herb-dominated areas with scattered trees. Wet savannahs occupy the poorly drained and seasonally saturated/flooded depressional areas and low flats, while the non-wetland flatwoods occupy the better drained slight rises, low ridges and "pimple mounds" (only southwest LA). Pine savannahs are subject to a highly fluctuating water table, from surface saturation/shallow



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flooding in late fall/winter/early spring to growing-season droughtiness. Soils are hydric, very strongly acidic, nutrient poor, fine sandy loams and silt loams, low in organic matter. There is a western Louisiana variant on saline soil (Brimstone silt loam). The soils for both eastern and western types may be underlain by an impeding layer so that they are only slowly permeable and water runs off the surface gradually. Common woody species include P. palustris (longleaf pine, usually predominant tree species), Pinus elliottii (slash pine, southeastern Louisiana), Magnolia virginiana (sweet bay), Nyssa sylvatica (black gum), Quercus virginiana (live oak), Q. marilandica (blackjack oak), Q. laurifolia (laurel oak), Cyrilla racemiflora (swamp cyrilla), Morella spp. (wax myrtles), Hypericum spp. (St. John's worts), and Styrax americana (littleleaf snowbell). Taxodium ascendens (pondcypress, southeastern Louisiana) may occur but is usually restricted to slightly lower areas within the site. Although past logging has altered the arboreal characteristics of most occurrences of the community (primarily by reducing coverage of longleaf and slash pine), the herbaceous complement is thought to differ little from that present prior to timbering and stumping activities. Herbaceous vegetation of pine savannahs is very diverse, dominated by graminoids, and similar to that occurring in hillside bogs. Graminoids present include Andropogon spp. (broomsedges), Schizachyrium scoparium and S. tenerum (little and slender bluestem), Panicum spp. (panic grasses), Aristida spp. (three-awn grasses), Ctenium aromaticum (toothache grass), Muhlenbergia capillaris (hairawn muhly), Erianthus spp. (plume-grasses), Coelorachis spp. (jointgrasses), Rhynchospora spp. (beak-rushes), Xyris spp. (yellow-eyed grasses), Fuirena spp. (umbrella grasses), Scleria spp. (nut-rushes), Dichromena latifolia (giant white top sedge), Eriocaulon spp. (pipeworts), Lachnocaulon spp. (bog buttons), and Fimbristylis spp. (fimbry-sedge). Some forbs common in the community include Sarracenia spp. (pitcher plants), Agalinis spp. (gerardias), Lobelia spp. (lobelias), Rhexia spp. (meadow beauties), Eryngium integrifolium (bog thistle), Oxypolis filiformis (narrow-leaved hog-fennel), Polygala spp. (milkworts), Liatris spp. (blazing-stars), Sabatia spp. (rose-gentians), Drosera spp. (sundews), Pinguicula spp. (butterworts), Marshallia tenuifolia (thin-leaved barbara's-buttons, southwestern Louisiana), Utricularia spp. (bladderworts), and Platanthera spp. (fringed-orchids). Various additional species belonging to the lily family (Liliaceae), sunflower family (Asteraceae), and orchid family (Orchidaceae) are prominent. Lycopodium spp. (club-mosses) and sphagnum moss are often abundant. Fire frequency is a major factor controlling species occurrence and community structure. Without frequent fire (preferably growing season burns which mimic historic fire regimes), shrubs, and eventually trees, especially hardwoods, would gain dominance and eliminate most of the herbaceous flora. Areas designated previously as flatwood or herbaceous bogs in the eastern Florida Parishes are, in actuality, inclusions within this natural community. No true flatwood bogs have been recognized in Louisiana. True flatwood bogs possess deep peat deposits, remain wet except in driest years, and often shake when walked upon. Additional inclusions in the community in southwestern Louisiana, include "flatwood ponds" and "baygols.

15. Small Stream Forest

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

Riparian Forests are relatively narrow wetland forests occurring along small rivers and large creeks in central, western, southeastern, and northern Louisiana. They 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. This community includes the phase formerly designated as riparian sandy branch



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bottom. At times, the community is quite similar in species composition to hardwood slope forests (beech-magnolia forests). Common trees include Magnolia grandiflora (southern magnolia), Fagus grandifolia (beech), Nyssa sylvatica (black gum), Quercus michauxii (swamp white oak), Q. alba (white oak), Q. nigra (water oak), Q. laurifolia (laurel oak), Q. falcata var. pagodaefolia (cherrybark oak), Liquidambar styraciflua (sweetgum), Platanus occidentalis (sycamore), Acer rubrum (red maple), Betula nigra (river birch), Carya ovata (shagbark hickory), Carya cordiformis (bitternut hickory), Fraxinus americana (white ash), F. caroliniana (water ash), Prunus caroliniana (cherry laurel), Ulmus alata (winged elm), and Liriodendron tulipifera (yellow poplar, southeastern and central Louisiana). Pinus glabra (spruce pine) is a common associate in the Florida Parishes, and Taxodium distichum (bald cypress) and Pinus taeda (loblolly pine) are occassional associates statewide. Magnolia virginiana (sweet bay) and M. macrophylla (bigleaf magnolia) may be present. Primary midstory and understory associates include Halesia diptera (silverbell), Carpinus caroliniana (ironwood), Viburnum dentatum (arrow-wood), Itea virginica (Virginia willow), Symplocos tinctoria (sweetleaf), Alnus serrulata (hazel alder), Rhododendron canescens (wild azalea) and Styrax grandifolia (bigleaf snowbell). Illicium floridanum (starbush) and Sebastiana fruticosa (sebastian bush) are common in the Florida Parishes, the former at times being the dominant understory shrub. Cyrilla racemiflora (swamp cyrilla), Lyonia lucida (fetterbush), Leucothoe axillaris (leucothoe), L. racemosa (leucothoe), and Ilex verticillata (winterberry) are common understory affiliates in the eastern Florida Parishes. Communities possessing physical characteristics and species complement of both riparian forest and bayhead swamp occur in central and northern Louisiana. S3.

V. RIVERINE:

The Riverine System includes all wetlands and deepwater habitats contained within a channel, with two exceptions: (1) wetlands dominated by trees, shrubs, or persistent emergents, and (2) habitats with water containing gulf-derived salts in excess of 0.5 ppt. A channel is "an open conduit either naturally or artificially created which periodically or continuously contains moving water, or which forms a connecting link between two bodies of standing water" (Langbein and Iseri 1960:5). The Riverine System is bounded on the landward side by upland, by the channel bank (including natural and man-made levees), or by wetland dominated by trees, shrubs, or persistent emergents. In braided streams, the system is bounded by the banks forming the outer limits of the depression within which the braiding occurs. The Riverine System terminates at the downstream end where the concentration of gulf-derived salts in the water exceeds 0.5 ppt during the period of annual average low flow, or where the channel enters a lake. It terminates at the upstream end where tributary streams originate, or where the channel leaves a lake. Springs discharging into a channel are considered part of the Riverine System. Water is usually, but not always, flowing in the Riverine System. Upland islands or Palustrine wetlands may occur in the channel, but they are not included in the Riverine System. Palustrine forested wetlands, emergent wetlands, and scrub-shrub wetlands may occur adjacent to the Riverine System, often on a floodplain. Many biologists have suggested that all the wetlands occurring on the river floodplain should be a part of the Riverine System because they consider their presence to be the result of river flooding.

A. Riverine Subtidal Channel

Fresh water, contained within a natural channel, which is influenced by tidal action. (Wicker et al 1980-R1OW).

1. Tidal Mud Flat

Synonyms: Tidal Mud Flat, Mud Flat.

A Riverine Tidal Mud Flat is a mud deposit located in tidally influenced freshwater contained within a channel. The mud deposits are generally too wet, too flooded, and

ephemeral to support trees except for Salix spp. (willow). The hydrologic regime ranges from intermittently exposed to intermittently flooded. Vegetation is dominated by sparse to dense growth of shrubby or herbaceous plants. Cephalanthus occidentalis (buttonbush), Sambucus canadensis (elderberry), and Salix nigra (willow) are common shrubs. Herbs include Scirpus spp. (bulrush), Carex spp. (sedges), and Juncus spp. (rushes). The community is successional in nature but generally remains unforested because of repeated flood disturbance. The community is variable from site to site depending on flooding, age of flat, and stability of the substrate. Like Estuarine Mud Intertidal Flat, these areas may support populations of feeding birds. They may be an important component of the riverine ecosystem. S4S5.

2. Subtidal Open Water
This community is made up of the floating, free-swimming, or sessile organisms in the permanently inundated, tidally influenced part of a freshwater river. It is found near the gulf or near lakes or bays in the coastal zone. S4.

B. Riverine Lower Perennial Channel:
Permanent, non-tidal fresh water, contained within a natural channel. (Wicker et al 1980-R2OW).

1. Sand/Gravel Beach/Bar
Synonyms: Sand Bar, River Sand Bar
A sand/gravel deposit in or adjacent to permanently flowing freshwater contained within a
natural channel. They are formed from coarse to fine-drained alluvial deposits and support a community similar to Riverine Tidal Mud Flat, although some may remain unvegetated. The community structure is dependent on the mix and stability of substrate, severity and depth of flooding, and permanent nature of the particular site. S4S5.

2. Mud Bar
A mud deposit in or adjacent to permanently flowing freshwater contained within a natural channel. This community is similar to Riverine Tidal Mud Flat but is not tidally influenced. S4S5.

3. Lower Perennial Open Water
This community is made up of the floating, free-swimming, or sessile organisms in the permanently inundated, non-tidal part of a freshwater river. It is found statewide. S4.

C. Aquatic Bed

1. Submerged Floating Vascular Vegetation
Riverine Submerged/Floating Vascular Vegetation consists of beds of submerged or floating vascular plants along a stream or river, often in backwater areas. Submerged aquatics occur at all depths within the photic zone, often in sheltered areas where there is little water movement, however, they also occur in flowing water where they may be streamlined or flattened in response to the current. Some of the submerged, rooted vascular species are characterized by floating leaves. Floating vascular plants float freely either in the water or on its surface. They are easily moved about by wind or water currents. Common species include Potamogeton spp. (pondweeds), Ceratophyllum demursum (coontail), Cabomba caroliniana (fanwort), Myriophyllum spp. (water milfoil), Nymphaea ordorata (water lily), Nuphar luteum (spatterdock), Alternanthera philoxeroides (alligator weed), Najas guadalupensis (southern naiad), Utricularia spp.



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(bladderworts), Eichhornia crassipes (water-hyacinth), Pistia stratioites (water lettuce), Lemna spp., Spirodella spp. (duckweeds), and Sparganium americanum (American bur-reed). The community may consist of admixtures of several dominant species along with several associated species, but frequently one or two taxa form a dense stand, excluding other species. Submerged/floating vascular aquatic plant beds supply oxygen, detrital material and dissolved organic nutrients to the water, and produce organic matter that serves as an energy source for various heterotrophic organisms. This community is highly productive and is extremely valuable as habitat for fish and wildlife. S4.

## VI. TERRESTRIAL

The Terrestrial System includes natural habitats that are often termed "uplands." A habitat is placed in the Terrestrial System, as opposed to being an aquatic (wetland or deepwater) habitat, if it has all of the following characteristics: (1) vegetative cover that is never (not even periodically) predominantly hydrophytic, (2) soil that is not predominantly hydric, and (3) a surface that is not flooded or saturated at any time during the year. The Terrestrial System extends laterally to the edge of wetland, deepwater, and cultural habitats. It extends downward to the lower limit of normal soil horizons and surface biological activity, including the maximum depth of plant roots and burrowing surface animals.

### A. Grassland

#### 1. Coastal Dune Grassland

Synonyms: Maritime Grassland, Dune Meadow, Dune Grass

This natural community occurs on beach dunes and relatively elevated backshore areas (ridges) above Intertidal Beaches on barrier islands and on the mainland. 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 a limited amount of eolian-transported sand. The sites are normally xeric (excessively drained) owing to the fact that they are elevated above the highest flood mark (except during hurricanes). 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 grasses, which may include Spartina patens (wiregrass, usually present and often dominant), Uniola paniculata (sea oats), Panicum amarum (beach panic), Triplasis purpurea (purple sandgrass), Paspalum vaginatum (jointgrass), Schizachyrium maritimum (seacoast bluestem), Distichlis spicata (saltgrass), Cenchrus spp (sandburs), Chloris petraea (finger grass), Sporobolus virginicus (coast dropseed), Eragrostis oxylepis (red lovegrass), and Andropogon spp. (broomsedges). Forbs are common in this community and may form forb-dominated zones, particularly on the gulfward side of the dune. Forbs include Batis maritime (salt wort), Ipomea stolonifera (beach morning-glory), I. pes-caprae (goat-foot morning-glory), Heliotropium currasivicum (seaside heliotrope), Strophostyles helvola (sand wild bean), Agalinis maritima (seaside false foxglove), Iva imbricata (sumpweed), Solidago sempervirens (seaside goldenrod), sea rockets (Cakile spp.), punctate goatweed (Croton punctatus), large leaf pennywort (Hydrocotyle bonariensis), camphor weed (Heterotheca subaxillaris), sea purselane (Sesuvium portulacastrum), camphor-weed (Pluchea camphorata), seastar rose-gentian (Sabatia stellaris), quelite (Atriplex arenaria), lazy daisy (Aphanostephus skirrobasis), glassworts (Salicornia spp.), annual seepweed (Sueda linearis), butterfly pea (Centrosema virginianum) and common frog-fruit (Lippia nodiflora). Shrubs from adjacent Coastal Dune Shrub Thickets may occur as scattered individuals in this community. These sites are subject to frequent storm overwash with salt water flooding and sand deposition. These events frequently give rise to what are



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called "barrier flats". 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. S1S2.

2. Cook Mountain Calcareous Prairie (S1)
3. Jackson Calcareous Prairie (S1)
4. Fleming Calcareous Prairie (S1)
5. Morse Clay Calcareous Prairie (S1)

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

Typically small, naturally treeless areas occurring on calcareous substrata in the uplands of central, western, and northwest Louisiana. They range in size from much less than one ha, up to 30 or more ha, 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 possibly western Louisiana. Soils are stiff calcareous clays (surface pH ~ 7.5-8.0), with very 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 mollusc shells, shark teeth, and gypsum crystals. The herbaceous flora is very diverse and dominated by grasses, composites, and legumes. Common grass species are Schizachyrium scoparium (little bluestem), Sporobolus spp. (dropseeds), Andropogon glomeratus (bushy broomsedge), Andropogon gerardii (big bluestem), Sorghastrum nutans (Indian grass), Aristida spp. (three-awn grasses), Paspalum spp. (paspy grasses), Panicum spp. (panic grasses), Eragrostis spp. (love grasses), and Setaria spp. (bristle grasses). A number of exotic grass species may occur. Common composites include Aster spp. (asters), Liatris spp. (blazing-stars), Coreopsis spp. (tick-seeds), Solidago spp. (goldenrods), Ambrosia psilostachya (western ragweed), Vernonia spp. (ironweeds), Rudbeckia spp. (brown-eyed susans), Eupatorium spp. (thoroughworts), Echinacea pallida (pale coneflower), E. purpurea (purple coneflower), Silphium spp. (rosin-weeds), Cacalia plantaginea (Indian plantain), Gaillardia aestivalis (blanket flower), and Helenium spp. (sneeze-weeds). Frequently encountered legumes include Acacia angustissima (prairie acacia), Baptisia spp. (indigos), Desmanthus illinoensis (wad o'pods), Galactia volubilis (milk pea), Mimosa strigillosa (sensitive-plant), Neptunia lutea (yellow puff), Petalostemum candidum (white prairie-clover), and P. purpureum (purple prairie-clover). Additional forbs of prominence are Anemone berlandieri (wind flower), Ranunculus spp. (crow-foot), Asclepias spp. (milk-weeds), Callirhoe papaver (poppy-mallow), Delphinium carolinianum (larkspur), Hedyotis nigricans (bluets), Hedyotis purpurea var. calycosa (prairie bluets), Linum spp. (flax), Oenothera speciosa (Mexican evening-primrose), Ruellia humilis (wild petunia), and Salvia azurea (blue sage). Calciphilic woody species that are often present (and that may come to dominate unburned prairies) include Crataegus spp. (hawthorns, often most prominent), Bumelia lanuginosa (chittum-wood), Berchemia scandens (rattan-vine), Diospyros virginiana (persimmon), Cornus drummondii (rough-leaf dogwood), Juniperus virginiana (eastern red cedar), Ilex decidua (deciduous holly), Smilax bona-nox (greenbrier), Fraxinus americana (white ash), and Gleditsia triacanthos). Maclura pomifera (osage-orange) may sporadically occur on edges, especially in northwestern Louisiana. Frequent fire, high soil pH, and extreme physical soil properties are



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postulated to have acted in concert to generate and perpetuate these upland clay prairies. S1.

6. Saline Prairie

Synonyms: Barrens, Salt Barrens, Slicks

Saline prairie is a natural, mostly treeless natural community currently known from a few scattered sites in central and northwestern Louisiana. Typically only a few acres in size, they may be wet, mesic or dry prairies. The wet variants arise on low flat terraces subject to regular flooding adjacent to or near small to intermediate streams. Wet saline prairies usually grade upslope into mesic or dry saline prairies. In aspect, these prairies are usually a mosaic of variably dense herbaceous vegetation (thick to thin), with interspersed bare soil areas ("slicks"). Shrubs are intermixed to a greater or lesser degree, and may in places form saline shrub thickets. The soils for all types have high levels of exchangeable sodium and (at times) magnesium in the subsoil and near surface horizons that have created 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 sodic horizon in the subsoil that acts much like a dense clay hardpan and is very resistant to root penetration. The soil, naturally low in fertility, contains relatively high levels of certain water-soluble salts that are injurious to plants and may produce alkali chlorosis and mortality. The plant community is therefore dominated by halophytic (salt tolerant) forbs, grasses and grass-like plants including: Aster subulatus, Atriplex pentandra (orach), Bacopa monnieri (water hyssop), B. rotundifolia, Carex glaucescens (sedge), Chasmanthium latifolium (spikegrass), Distichlis spicata (alkali grass), Eleocharis spp. (spikerush), Fimbristylis castanea, Geocarpon minimum (earthfruit), Heliotropium curassivicum (heliotropes), Hibiscus moscheutos ssp. lasiocarpus (hibiscus), Iris brevicaulis (lamance iris), Iva angustifolia (marsh elder), Juncus spp. (rushes), Ludwigia spp. (primrose), Lythrum lineare (loosestrife), Panicum virgatum (switchgrass), Phyla nodiflora (frog-fruit), Pluchea camphorata (stinkweed), Polygonum aviculare (knotweed), Proserpinaca pectinata (mermaid-weed), Rhynchospora corniculata (beak rush), Solidago sempervirens (seaside goldenrod), Spartina pectinata (prairie cordgrass), Tradescantia occidentalis (spiderwort), and Tridens strictus (sandgrass). Characteristic tree, shrub and vine species (nearby or very scattered in prairie) include: Ampelopsis arborea (peppervine), Baccharis hamilifolia (saltbush), Berchemia scandens (rattan vine), Cephalanthus occidentalis (buttonbush), Crataegus berberifolia (barberry hawthorn), C. brachyacantha (blueberry hawthorn), C. virdis (green hawthorn), Fraxinus caroliniana (Carolina ash), Morella cerifera (wax myrtle), Pinus taeda (loblolly pine), Quercus lyrata (overcup oak), Q. nigra (water oak), Q. similis (delta post oak), Q. phellos (willow oak), and Ulmus crassifolia (cedar elm). S1.

B. Shrub Thicket

1. Coastal Dune Shrub Thicket

Synonyms: Maritime Shrub, Maritime Thicket, Wax Myrtle Thicket

This community is found on stabilized sand dunes and beach ridges on barrier islands and the mainland coast. It is of very limited extent in Louisiana due to relatively poorly developed coastal dunes. The sites are typically xeric to xeric/mesic and moderately exposed to salt spray. The community normally appears as a relatively dense stand of shrubs. A variety of salt-tolerant shrubs may occur including Morella cerifera (wax myrtle), Ilex vomitoria (yaupon), Iva spp. (marsh elder), Baccharis halimifolia (saltbush), Acacia smallii (acacia), and Zanthoxyllum clava-herculis (toothache tree). The shrubs



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are often covered with a dense growth of lichens. Vines, such as Smilax spp. (greenbriers) and Vitis mustangensis (wild grape), are often present. The community may be destroyed by sand dune migration or erosion and may be replaced by Coastal Dune Grassland. S1.

C. Deciduous Forest

1. Southern Mesophytic Forest

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

This community is currently recognized in Louisiana only in the northwestern Florida Parishes, primarily in the region known as the Tunica Hills. It 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 past ice-age. Overstory species include Fagus grandifolia (beech), Quercus shumardii (shumard oak), Q. alba (white oak), Q. muhlenbergii (chinkapin oak), Q. michauxii (cow oak), Q. nigra (water oak), Liriodendron tulipifera (yellow poplar), Magnolia grandiflora (southern magnolia), M. acuminata (cucumber magnolia), M. pyramidata (pyramid magnolia), Ulmus americana (American elm), U. rubra (slippery elm), Tillia caroliniana (Carolina basswood), Morus rubra (red mulberry), Acer floridanum (Florida sugar maple), Carya glabra (pignut hickory), C. cordiformis (bitternut hickory), Fraxinus americana (white ash), Celtis laevigata (hackberry), and Platanus occidentalis (sycamore). Ilex opaca (American holly) is rarely encountered as a tree, almost always as a shrub. No pine species are thought to be native to this habitat. Shrub species include Lindera benzoin (spice bush), Hydrangea quercifolia (oak-leaf hydrangea), H. arborescens (mountain hydrangea), Asimina triloba (paw-paw), Euonomys americanum (stawberry bush), Halesia diptera (silverbell), Cercis canadensis (red bud), Sambucus canadensis (elderberry), and Ostrya virginiana (hop-hornbeam). Thick stands of Arundinaria gigantea (giant cane) may be present, especially in ravine bottoms. Vines may include Schisandra glabra (smooth woodbine), Vitis spp. (grapes), Bignonia capreolata (cross-vine), Trachelospermum difforme (climbing dogbane), Parthenocissus quinquefolia (Virginia creeper), and rarely Celastrus scandens (climbing bittersweet). The exotic vine Lonicera japonica (Japanese honeysuckle) has become a serious pest in many places. The herbaceous flora is particularly rich in ferns, including Adiantum pedatum (northern maidenhair-fern), Thelypteris spp. (marsh ferns), Athyrium thelypteroides (silver glade-fern), A. pycnocarpon (glade-fern), A. felix-femina (southern lady fern), Cystopteris protrusa (lowland brittle-fern), Polystichum acrostichoides (christmas fern), Botrychium virginianum (rattlesnake fern), B. biternatum (southern grape-fern), Asplenium platyneuron (ebony spleenwort), and Phegopteris hexagonoptera (broad beech-fern). A number of exotic ferns are apparently thriving in the Tunica Hills. Additional herbs of prominence include Sanicula spp. (snakeroots), Actaea pachypoda (bane-berry), Laportea canadensis (nettle), Podophyllum peltatum (may-apple), Trillium foetidissimum (foetid wake-robin), Cynoglossum virginianum (hound's-tounge), Aristilochia serpentaria (dutchman's-pipe), Cryptotaenia canadensis (hone-wort), Lithospermum tuberosum (tuberous puccoon), Lobelia spp. (lobelias), and Pachysandra procumbens (allegheny-spurge). Panax quinquefolius (ginseng) and



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Asarum canadensis (Canadian ginger) rarely occur. Mosses and liverworts are common. S2S3.

2. Mesic Hardwood Flatwood

Currently all known occurrences of this community are on Macon Ridge in West Carroll, Richland, Franklin and Morehouse Parishes in northeast Louisiana. Mesic Hardwood Flatwoods occur on low ridges and knolls on well drained soils. Principal soil series that support this community are Necessity, Egypt, Grenada, and Calloway silt loams. These soils are often found in complex with hydric soils such as Gilbert and Calhoun which support the Wet Hardwood Flatwoods community. Overstory dominants include Carya alba (mockernut hickory), Nyssa sylvatica (blackgum), Quercus alba (white oak), Q. pagoda (cherrybark oak), Q. nigra (water oak), Q. michauxii (cow oak), and Liquidambar styraciflua (sweetgum). Quercus shumardii (Shumard oak) and Q. falcata (southern red oak) are fairly frequent but not usually abundant. Common midstory trees include Cornus florida (flowering dogwood), Ostrya virginiana (eastern hophornbeam), Aralia spinosa (Devil's walking stick), Ulmus alata (winged elm), Sassafras albidum (sassafras), and Acer rubrum (red maple). Important shrubs/small trees are Vaccinium arboreum (tree huckleberry), V. virgatum (large cluster blueberry), Viburnum rufidulum (rusty blackhaw), Crataegus marshallii (parsley hawthorn), Aesculus pavia (red buckeye), Frangula caroliniana (Carolina buckthorn), Asimina triloba (pawpaw), Hypericum hypericoides (St. Andrew's Cross), and Euonymus americana (strawberry bush). Although infrequent, Hamamelis virginiana (witch hazel) can be locally abundant. Important woody vines include Toxicodendron radicans (poison ivy), Parthenocissus quinquefolia (Virginia creeper), Vitis rotundifolia (muscadine), V. aestivalis (summer grape), and Smilax smallii (lance-leaf greenbrier). Poison ivy and Virginia creeper are usually thick on the ground as well as being represented by high climbing individuals. Common and characteristic herbaceous plants include Chasmanthium laxum var. sessiliflorum (woods oats), *Dichanthelium boscii* (panic grass), Podophyllum peltatum (mayapple), Carex cherokeensis (Cherokee caric sedge), Elephantopus carolinianus and E. tomentosus (elephant's foot), Scleria oligantha (littlehead nutsedge), Aristolochia serpentaria (Virginia Dutchman's pipe), Botrychium virginianum (rattlesnake fern), Passiflora lutea (yellow passionflower), Dioscorea villosa (wild yam), Clitoria mariana (Atlantic pigeonwings), Sanicula canadensis (sanicle), Geum canadense (white avens), Galium circaezans (wild licorice), Agrimonia rostellata (woodland agrimony), Spigelia marilandica (Indian pink), Clematis virginiana (virgin's bower), Phryma leptostachya (lopseed), Ruellia caroliniensis (wild petunia), and Smallanthus uvedalia (bear's foot).
S2S3.

3. Calcareous Forest

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

This community occurs on calcareous substrata in the uplands of central, western and northwest Louisiana. It characteristically occurs on hills and slopes on either side of small creeks, at times in a mosaic with calcareous prairies. Associated geological formations so far identified are the same as for calcareous prairie. Soils are stiff calcareous clays, not quite as alkaline as in the prairies (surface pH ~ 6.5-7.5), with very high shrink-swell characteristics. Individual occurrences are usually of limited areal extent. Common overstory species include Quercus stellata (post oak, often predominant), Q. shumardii (shumard oak), Q. alba (white oak), Q. muhlenbergii (chinkapin oak), Carya myristiciformis (nutmeg hickory), C. ovata (shagbark hickory), C. tomentosa (mockernut hickory), Pinus echinata (shortleaf pine), P. taeda (loblolly pine), Fraxinus americana (white ash), Diospyros virginiana (persimmon), Liquidambar styraciflua (sweetgum), Celtis spp. (hackberries), Gleditsia triacanthos (honey locust), Morus rubra (red mulberry), Fagus grandifolia (beech), Ulmus rubra (slippery elm), U.



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americana (American elm), U. alata (winged elm), U. crassifolia (rock elm), and Acer rubrum (red maple). Quercus durandii (Durand oak) and Q. oglethorpensis (Oglethorp oak) may rarely be present. Trees, especially pines, are often stunted and/or crooked due to extreme physical soil properties. Midstory and understory shrubs typically include Viburnum rufidulum (rusty blackhaw), Crataegus spp. (hawthorns), Prunus mexicana (Mexican plum), Cercis canadensis (red bud), Chionanthus virginicus (fringe-tree), Asimina triloba (paw-paw), Ilex decidua (deciduous holly), Vaccinium arboreum (winter huckleberry), Rhamnus caroliniana (Indian cherry), Rhus copallina (flame-leaf sumac), Ostrya virginica (hop-hornbeam), and Aesculus pavia (red buckeye). Maclura pomifera (osage-orange) may occur sporadically, especially in northwest Louisiana. The herbaceous layer may contain Aster drummondii (Drummond's aster), Solidago auriculata (auricled goldenrod), Cynoglossum virginianum (hound's-tounge), Antennaria plantaginifolia (plantain-leaf pussy-toes), Lithospermum tuberosum (tuberous puccoon), Pedicularis canadensis (Canadian lousewort), Podophyllum peltatum (may-apple), Phlox divaricata (phlox), Elephantopus spp. (elephant-foot), Viola spp. (violets), Chasmanthium spp. (spangle-grasses), Bromus spp. (brome grasses), Onosmodium hispidissimum (false-gromwell), Sanicula canadensis (snakeroot), Zizia aurea (golden alexanders), Tipularia discolor (crane-fly orchid), Agrimonia spp. (agrimony), Galium spp. (bedstraws), and others. Fire is thought to have played a minor role in the dynamics of this community. S2.

4. Hardwood Slope Forest

Synonyms: Beech-Magnolia Forest, Mixed Hardwood Forest, Beech-Mixed Hardwoods, Upland Hardwood Forest, Hammock, Mixed Mesic Hardwood Forest.

This is a variable mixed hardwood forest, usually occurring on slopes rising out of small stream floodplains that dissect pinelands in northern, western, central, and southeastern Louisiana, and on salt domes ("islands") near the coast. the community is similar to southern mesophytic forest and riparian forest. Soils are characteristically mesic, acidic, and vary from quite sandy to clayey. Soil moisture increases downslope. Fagus grandifolia (beech) and Magnolia grandiflora (southern magnolia) are typically canopy dominants. However, in north Louisiana, southern magnolia is often infrequent or absent. Other primary overstory species include Quercus alba (white oak), Q. shumardii (shumard oak), Q. michauxii (swamp white oak), Q. nigra (water oak), Q. laurifolia (laurel oak), Q. velutina (black oak), Magnolia acuminata (cucumber tree), M. macrophylla (big-leaf magnolia), M. pyramidata (pyramid magnolia, rarely), Liriodendron tulipifera (tulip tree), Liquidambar styraciflua (sweetgum), Carya tomentosa (mockernut hickory), C. cordiformis (bitternut hickory), and C. glabra (pignut hickory). Pinus taeda (loblolly pine) may be present sporadically in the overstory, and Pinus glabra (spruce pine) is an occassional associate in the Florida Parishes. Significant midstory and understory associates are Oyxdendrum arboreum (sourwood), Halesia diptera (silverbell), Styrax grandifolia (bigleaf snowbell), Cornus florida (flowering dogwood), Symplocos tinctoria (sweetleaf), Prunus caroliniana (cherry-laurel), Stewartia malacodendron (silky camelia), Amelanchier arborea (downy service-berry), Ilex ambigua (holly), Illicium floridanum (starbush, southeastern Louisiana), Carpinus caroliniana (ironwood), Ostrya virginiana (eastern hophornbeam), Vaccinium arboreum (winter huckleberry), V. elliottii (Elliott's blueberry), and Erythrina herbacea (red coral bean). Herbaceous species include Hexastylis arifolia (wild ginger, southeast Louisiana), Trillium spp. (wake-robbins), Polygonatum biflorum (smooth solomon's seal), Uvularia perfoliatum (bellwort), Tipularia discolor (crane-fly orchid), Viola spp. (violets), Spigelia marilandica (Indian pink), Podophyllum peltatum (may-apple), Sanicula spp. (snakeroots), Polymnia uvedalia (bear-paw), Chamaelirium luteum (devil's-bit), Lilium



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michauxii (Carolina lily), Arisaema spp. (jack-in-the-pulpits), Prenanthes altissima (tall rattlesnake root), Polystichum acrostichoides (Christmas fern), Athyrium felix-femina (southern lady fern), and Phegopteris hexagonoptera (broad beech-fern). On salt domes in the coastal zone, the natural community lacks beech, but includes live oak (Q. virginiana), various elms (Ulmus spp.), and other species not typical of hardwood slope forests above the coastal zone. This is a stable community burning only very rarely. S3S4.

5. Prairie Terrace Loess Forest

This is a loess forest found on flat to gently rolling Pleistocene prairie terraces of the western Florida Parishes in Louisiana. It is restricted to slowly permeable, relatively poorly drained, somewhat acid to circumneutral, silt loam soils overlying loess deposits associated with the Mississippi River. Once more widespread, intact occurrences of the Prairie Terrace Loess Forest have now become relatively rare, following initial conversion to agricultural uses and then more recent clearing for residential, commercial and industrial development. The overstory is typically dominated by Quercus pagoda (cherrybark oak), Liquidambar styraciflua (sweetgum), and Q. nigra (water oak), with primary associates including Platanus occidentalis (American sycamore), Magnolia grandiflora (Southern magnolia), Fagus grandifolia (American beech), Ulmus Americana (American elm), and Q. michauxii (swamp chestnut oak). Other canopy species include Liriodendron tulipifera (yellow poplar), Q. shumardii (Shumard oak), Tilia americana var. caroliniana (basswood), Morus rubra (red mulberry), Acer rubrum (red maple), Carya glabra (pignut hickory), and Celtis laevigata (hackberry). Some common shrubs and understory tree species include Sabal minor (palmetto), Lindera benzoin (spicebush), Asimina triloba (pawpaw), Euonymus americana (strawberry bush), Halesia diptera (silverbell), Carpinus caroliniana (ironwood) and Ostrya virginiana (bluebeech). A variety of vines is typically present including Vitis spp. (wild grapes), Toxicodendron radicans (poison ivy), Berchemia scandens (rattan vine), Bignonia capreolata (crossvine), Campsis radicans (trumpet creeper), Smilax spp. (greenbriars), and Parthenocissus quinquefolia (Virginia creeper). The exotic vine Lonicera japonica (Japanese honeysuckle) has become a serious pest, along with Ligustrum sinense (Chinese privet). The herbaceous component is distinctive, but not particularly diverse, some including Thelypteris spp. (Southern shield ferns), Athyrium filix-femina ssp. asplenioides (Southern lady fern), Polystichum acrostichoides (Christmas fern), Botrychium virginianum (grape fern), Polygonum virginianum (smartweed), Trillium foetidissimum (wake robin), and Tillandsia usneoides (Spanish moss). Mosses, lichens and liverworts are common to abundant. S2.

D. Mixed Evergreen/Deciduous Forest

1. Salt Dome Hardwood Forest

This is a upland forest type on loess-derived silt loams of salt domes in coastal Louisiana. Area of occurrence is very restricted. The canopy is dominated by Quercus virginiana (live oak), Magnolia grandiflora (Southern magnolia), Quercus pagoda (cherrybark oak), Ulmus americana (American elm), Celtis laevigata (hackberry), Liquidambar styraciflua (sweetgum), Tilia americana var. caroliniana (basswood), Quercus nigra (water oak), and Carya glabra (pignut hickory). A sparse shrub layer of Sabal minor (dwarf palmetto), Vitis rotundifolia (muscadine grape), Smilax rotundifolia (common greenbriar), and invasive exotic Parathesis crenulata (=Ardisia crenulata) is present. The epiphyte Pleopeltis polypodioides (=Polypodium polypodioides, resurrection fern) is quite common in canopy trees. The patchy to dense understory consists of Prunus caroliniana



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(cherrylaurel), Ilex vomitoria (yaupon), Callicarpa americana (french mulberry), and Aesculus pavia (red buckeye). The herb layer is typically sparse and includes Oplismenus hirtellus ssp. setarius (=Oplismenus setarius, bristle basketgrass ), Sanicula Canadensis (blacksnakeroot) , Malvaviscus arboreus var. drummondii (wax mallow), and Elephantopus carolinianus (Carolina elephant's foot). Common woody vines include Parthenocissus quinquefolia (Virginia creeper), Toxicodendron radicans (poison ivy), Rubus spp. (blackberry), Ampelopsis arborea (peppervine), and Smilax bona-nox (saw greenbriar). S1.

2. Coastal Live Oak-Hackberry Forest

Synonyms: Cheniere, Maritime Forest, Chenier Maritime Forest.

Coastal Live Oak-Hackberry Forest or Cheniere (French for "place of oaks") is the natural community which formed on abandoned beach ridges primarily in Southwest Louisiana. These ancient beaches were stranded via deltaic sedimentation by the constantly shifting Mississippi River. Composed primarily of sand and shell, these ridges are mostly 4 to 5 feet above sea level. Quercus virginiana (live oak) and Celtis laevigata (hackberry) are the dominant canopy species. Other characteristic species are Acer rubrum var. drummondii (swamp red maple), Liquidambar styraciflua (sweet gum), Quercus nigra (water oak), Fraxinus pennsylvanica (green ash), and Ulmus americana (American elm). Sabal minor (palmetto) and Opuntia spp. (prickly pear cactus) are common in the understory. Abandoned natural stream levees and beach ridges in southeastern Louisiana are also locally known as chenieres. The chenieres are important storm barriers limiting salt water intrusion. Typically, marshes north of chenieres are fresher than those gulfward. This community also functions as important wildlife habitat and serves as vital resting habitat for trans-gulf-migrating birds. Hundreds of thousands of birds (hundreds of different species) use chenieres as a stop-over point on their way north. S1S2.

3. Barrier Island Live Oak Forest

This barrier island community is apparently restricted to Grande Isle, Jefferson Parish, Louisiana, where is occupies a small area (less than 1,000 acres). All known occurrences are degraded by development, exotics, clearing of understory, and fragmentation. This community appears to be distinct from other Quercus virginiana (live oak) communities occurring to the east and west, but little is known about this type. More research is needed. It is dominated by Quercus virginiana, with a minor component of Celtis laevigata (hackberry). S1.

4. Shortleaf Pine/Oak-Hickory Forest

Synonyms: Shortleaf Pine-Oak, Oak-Hickory Forest.

Community occurs on dry hills, principally in central and northern Louisiana, although it may occur sporadically in the Florida Parishes. Principle overstory species include Pinus echinata (shortleaf pine), Pinus taeda (loblolly pine), Quercus falcata (southern red oak), Q. stellata (post oak), Q. marilandica (blackjack oak), Q. velutina (black oak), Q. alba (white oak), Q. falcata var. pagodaefolia (cherrybark oak), Q. shumardii (shumard oak), Carya tomentosa (mockernut hickory), C. texana (black hickory), C. cordiformis (bitternut hickory), Ulmus alata (winged elm), Fraxinus americana (white ash), Nyssa sylvatica (black gum), Liquidambar styraciflua (sweetgum), and Acer rubrum (red maple). Midstory and understory shrubs may include Vaccinium arboreum (winter huckleberry), Vaccinium virgatum (bunch blueberry), Bumelia lanuginosa (chittum-wood), Callicarpa americana (french mulberry), Viburnum rufidulum (rusty blackhaw), Ilex decidua (deciduous holly), Crataegus spp. (hawthorns), and Prunus mexicana



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(Mexican plum). Herbaceous flora is usually sparse but may consist of Aster spp. (asters), Solidago spp. (goldenrods), Silphium spp. (rosin-weeds), Antennaria plantaginifolia (plantain-leaf pussy-toes), Desmodium spp. (beggar-ticks), Trillium spp. (wake-robbins), Chasmanthium spp. (spangle-grasses), Viola spp. (violets), Mitchella repens (partridge-berry), Helianthus spp. (sunflowers), Liatris spp. (blazing-stars), and Panicum spp. (panic grasses). Oak-hickory forest is the theoretical climax forest stage beyond shortleaf pine/oak-hickory forest in central and north Louisiana. However, no occurrences of oak-hickory forest lacking shortleaf pine have been observed, probably because disturbance has been frequent enough to allow perpetuation of shortleaf pine in the community. It is thought species composition would be essentially similar to that of shortleaf pine/oak-hickory forests. At times, this community may take on the aspect of what has been termed loblolly-shortleaf pine forest. S2S3.

5. Mixed Hardwood-Loblolly Forest

Synonyms: Mixed Pine-Hardwood, Loblolly Pine-Hardwood

This community is found state-wide in the uplands and is variable depending on elevation and consequent moisture regime. Pinus taeda (loblolly pine) comprises 20 percent or more of the overstory in a mixture with a number of hardwood species. On moist sites Liquidambar styraciflua (sweetgum), Fagus grandifolia (beech), Quercus nigra (water oak), Q. pagoda (cherrybark oak), Q. michauxii (swamp white oak), Q. alba (white oak), Liriodendron tulipifera (yellow poplar), Ulmus americana (American elm), Magnolia grandiflora (Southern magnolia), Acer rubrum (red maple), and pignut hickory (Carya glabra) are important hardwood components. On dryer upland sites protected from fire, overstory dominants in addition to loblolly are Quercus falcata (southern red oak), Q. stellata (post oak), Q. nigra (water oak), Q. marilandica (blackjack oak), Nyssa sylvatica (black gum), red maple, and Carya tomentosa (mockernut hickory). The community occurs infrequently on sandy, xeric sites and here, Q. incana (bluejack oak) and Q. hemispherica (upland laurel oak) are frequent associates. Shrubs and understory species may include, depending on moisture regime, Ilex glabra (gallberry), Callicarpa americana (french mulberry), Cornus florida (flowering dogwood), Crataegus spp. (hawthorns), Oxydendrum arboreum (sourwood), Vaccinium elliottii (Elliott's blueberry), V. arboreum (winter huckleberry), Rhus copallina (winged sumac), Toxicodendron radicans (poison ivy), Morella cerifera (wax myrtle), Ilex vomitoria (yaupon), Rubus spp. (blackberries), I. decidua (deciduous holly), Pyrus angustifolia (crab apple), and Gelsemium sempervirens (yellow jessamine), Mitchella repens (partridge-berry), and Viola spp. (violets). Succession in this community is strongly toward hardwood dominance, and it may be considered transitional to various hardwood types. Frequent fire maintains pine dominance. Many occurrences of this community today are not natural and it is often difficult to discern artificial examples. S4.

6. Slash Pine/Post Oak Forest

Stands in the eastern Florida Parishes dominated by Pinus elliottii (slash pine), with Quercus stellata (post oak) and Q. virginiana (live oak) as primary associates. Very little is known about this natural community and a detailed treatment will be forthcoming after further field inventories are made. S2?.

7. Live Oak-Pine-Magnolia Forest

Synonyms: Maritime Forest, Maritime Mesophytic Forest.

This community is known in Louisiana from southern St. Tammany Parish, and occurs in a zone within two miles of Lake Pontchartrain where the Pleistocene prairie terrace meets the lake. Soils typically are sandy in nature. The community may exhibit site to site



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variation in species composition and physiognomy depending on soil moisture regime, age, fire history, relative exposure to salt spray, local releif, 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 the lake. Overstory species include Quercus virginiana (live oak), Pinus palustris (longleaf pine), Pinus elliottii (slash pine), Pinus taeda (loblolly pine), and Magnolia grandiflora (southern magnolia). Significant canopy associates may include Quercus nigra (water oak), Q. alba (white oak), Q. michauxii (swamp white oak), Q. laurifolia (laurel oak), Q. falcata var. pagodaefolia (cherybark oak), Liquidambar styraciflua (sweetgum), Fraxinus spp. (ashes), Acer rubrum (red maple), Magnolia virginiana (sweet bay), Liquidambar styraciflua (sweetgum), Celtis laevigata (hackberry), and Nyssa sylvatica (black gum). Principal midstory and understory plants include Sabal minor (dwarf palmetto), Ilex opaca (American holly), Ilex vomitoria (yaupon), Vaccinium spp. (blueberries), Osmanthus americanus (devil-wood), Carpinus caroliniana (iron wood), Ostrya virginiana (hophornbeam), Symplocos tinctoria (sweetleaf), Asimina parviflora (dwarf pawpaw), Oxydendrum arboreum (sourwood), Aralia spinosa (devil's walking stick), Persea borbonia (red bay), Rhus copallina (winged sumac), Morella cerifera (wax myrtle), Callicarpa americana (french mulberry), Sassafras albidum (sassafras), Thelypteris palustris (southern marsh-fern), Osmunda cinnamomea (cinnamon fern), and Lorinseria areolata (net-veined chain-fern). Many vine species are present. 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. Or it may be an artificial aggregation, with the original species complement disproportionately represented in today's forests. 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. S2.

8. Spruce Pine-Hardwood Flatwood

This flatwoods type is a natural mixed forest community indigenous to the western Florida Parishes in southeast Louisiana. A wetland variant of this community occupies poorly drained flats, depressional areas and small drainages (sometimes called "slashes") that lie in a mosaic with higher, non-wetland areas. Such higher areas support a mesic spruce pine-hardwood flatwoods forest. Both variants are distinguished by the prevalence of Pinus glabra (spruce pine) over P. taeda (loblolly pine), although loblolly is usually present at some level. Hardwoods usually dominate the forst, but spruce pine can dominate areas within the 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 P. palustris (longleaf pine) communities occuping similar hydrologic settings immediately to the east. This edaphic factor may have precluded longleaf from this community type. Historically fire was probably very rare as the component plant species are not fire adapted and fuel conditions are not conducive to fire. Additional characteristic native tree, shrub and vine species include: Acer rubrum (red maple), Ampelopsis arborea (peppervine), Berchemia scandens (rattan vine), Brunnichia cirrhosa (ladies' eardrops), Campsis radicans (trumpet creeper), Carya glabra (pignut hickory), Cephalanthus occidentalis (buttonbush), Cornus foemina (swamp dogwood), Crataegus opaca (mayhaw), C. viridis (greenhaw), Diospyros virginiana (persimmon), Fraxinus caroliniana (Carolina ash), F. pennsylvanica (green ash), Ilex decidua (deciduous holly), I. opaca (American holly), Itea virginica (Virginia willow), Liquidambar styraciflua (sweetgum), Magnolia grandiflora (Southern magnolia), Morella cerifera (wax myrtle), Nyssa biflora (swamp blackgum), N. sylvatica (blackgum), Quercus laurifolia (laurel oak), Q. michauxii (swamp chestnut oak), Q. nigra (water oak),

Q. pagoda (cherrybark oak), Q. phellos (willow oak), Toxicodendron radicans (poison ivy), Salix nigra (black willow), Sambucus canadensis (elderberry), Smilax glauca, S. rotundifolia, Styrax americanus (snowbell), Viburnum dentatum (arrowwood), and Vitis rotundifolia (muscadine). Spruce pine-hardwood flatwoods typically have a dense canopy resulting in heavy shading and usually a sparse understory. Sabal minor (dwarf palmetto) is often an understory dominant. Other understory natives include: Arundinaria gigantea (switchcane), Boehmeria cylindrica (hempweed), Carex spp. (sedges), Chasmanthium spp. (spikegrasses), Cyperus spp. (flatsedges), Gratiola virginiana (roundfruit hedgehyssop), Hygrophila lacustris (Gulf swampweed), Hypericum spp. (St. Andrew's cross), Juncus spp. (rushes), Justicia ovata (waterwillow), Ludwigia spp. (primrose willow) , Lycopus rubellus (taperleaf horehound), L. virginicus (water horehound), Lysimachia radicans (trailing yellow loosestrife, Onoclea sensibilis (sensitive fern), Osmunda regalis (royal fern), Panicum gymnocarpon (savannah panicgrass), Polygonum spp. (smartweed), Rhynchospora spp. (beaksedge), Sabatia calycina (coastal rose gentian), Saururus cernuus (lizard's tail), Schoenoplectus spp. (bullrushes), Solidago gigantea (goldenrod), Thelypteris palustris (Southern shield fern), Triadenum walteri (greater marsh St. John's wort), Vernonia gigantean ssp. gigantean (giant ironweed), and Woodwardia areolata (netted chain fern). S1.

E. Evergreen Forest

1. Eastern Upland Longleaf Pine Forest (S1S2)
2. Western Upland Longleaf Pine Forest (S2S3)

Synonyms: Sandhill Pine Forest, Clayhill Pine Forest.

Community occurs in the hilly uplands of the central and eastern Florida Parishes and in western and central Louisiana. It occurs on acidic loamy sands to acid clays associated with Pleistocene or Tertiary formations. The community is characteristically dissected by small to large branch or creek bottoms. Pinus palustris (longleaf pine) 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, including Pinus echinata (shortleaf pine), Pinus taeda (loblolly pine), Nyssa sylvatica (black gum), Liquidambar styraciflua (sweetgum), Quercus falcata, Q. stellata (post oak), Q. marilandica (blackjack oak), Q. shumardii (shumard oak), Q. alba (white oak), Q. nigra (water oak), Prunus serotina (black cherry), Carya tomentosa (mockernut hickory), C. texana (black hickory, central Louisiana), Acer rubrum (red maple), Diospyros virginiana (persimmon), and Sassafras albidum (sassafras). In sandy soils, Q. incana (bluejack oak) and Q. hemisperica (upland laurel oak) are frequent associates. Significant shrub species include Cornus florida (flowering dogwood), Vaccinium arboreum (winter honeysuckle), V. elliottii (elliott's blueberry), V. stamineum (deer berry), V. darrowii (dwarf blueberry, southeast Louisiana), Gaylussacia dumosa (dwarf huckleberry, southeast Louisiana), Callicarpa americana (French mulberry), Myrica cerifera (wax myrtle), Bumelia lanuginosa (chittum-wood), Ilex vomitoria (yaupon), I. opaca (American holly), Rubus spp. (blackberries), and Rhus copallina (winged sumac). Common vines include Vitis spp. (grapes), Smilax spp. (greenbriers), Parthenocissus quinquefolia (Virginia creeper), and Gelsemium sempervirens (yellow jessamine). The herbaceous flora may be exceedingly diverse if fire has frequently occured. Grasses, composites, and legumes are predominant in the gound layer. Andropogon spp. (broomsedges) and Schizachyrium spp. (bluestems) are usually the dominant grasses, but several other genera are usually present, including Aristida (three-awn grasses), Sporobolus (dropseeds), Panicum (panic grasses), Anthaenantia (silky scales), Ctenium aromaticum (toothache grass), Digitaria (crab



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grasses), Eragrostis (love grasses), Erianthus (plume grasses), Gymnopogon (skeleton grasses), Muhlenbergia
(muhly grasses), Paspalum (paspy grasses), and Setaria (bristle grasses). Composites include Aster spp. (asters), Carphephorus odoratissimus (vanilla plant), Chrysopsis spp. (golden asters), Heterotheca spp. (golden asters), Elaphantopus spp. (elephant-foot), Eupatorium spp. (thoroughworts), Euthamia spp. (flat-topped goldenrods), Gnaphalium spp. (rabbit tobaccos), Helenium spp. (sneeze-weeds), Helianthus spp. (sunflowers), Liatris spp. (blazing-stars), Rudbeckia spp. (brown-eyed susans), Solidago spp. (goldenrods), and Vernonia spp. (ironweeds). Prominent legumes are Baptisia spp. (indigos), Cassia spp. (partridge-peas), Centrosema virginianum (butterfly pea), Clitoria mariana (pigeon wings), Crotolaria spp. (rattle pods), Desmodium spp. (beggar's ticks), Lespedeza spp. (bush clovers), Stylsanthes biflora (pencil-flower), Rhynchosia spp. (snout beans), and Tephrosia spp. (hoary peas). Additional frequent forbs include Oenothera spp. (evening primroses), Polygala spp. (milkworts), Lobelia spp. (lobelias), Callirhoe papaver (poppy-mallow), Ruellia spp. (wild petunias), Hypoxis spp. (yellow-eyed grasses), Asclepias spp. (mildweeds), Lechea spp. (pinweeds), Euphorbia spp. (spurges), Sabatia spp. (rose-gentians), Agalinis spp. (false foxgloves), and Rhexia spp. (meadow beauties). The fern Pteridium aquilinum (bracken fern) is often conspicuous in large colonies.

F. Woodland

1. Western Xeric Sandhill Woodland

Synonyms: Oak-farkleberry Sandy Lands

A variable natural community occurring principally in the uplands of central and northwestern Louisiana, but found very infrequently in the eastern Florida Parishes. It develops on deep, sandy soils associated with Tertiary formations in central and northwestern Louisiana (particularly the Sparta formation), and Pleistocene intermediate terraces in southeastern Louisiana. Trees are often stunted because of extreme site conditions. The community may have the appearance of a scrubby shrub-woodland. Small, natural openings may be scattered. Overstory species may include Pinus echinata (shortleaf pine), Pinus taeda (loblolly pine), Quercus stellata (post oak), Q. marilandica (blackjack oak), Q. incana (bluejack oak), Q. stellata var. margaretta (sand post oak), and Q. hemispherica (upland laurel oak). Q. laevis (turkey oak) rarely occurs in southeastern Louisiana. Shrub species may include Asimina parviflora (dwarf paw-paw), Vaccinium arborescens (winter huckleberry, may be dominant), Bumelia lanuginosa (chittum-wood), Ilex vomitoria (yaupon), Chionanthus virginicus (fringe-tree), Rhamnus caroliniana (Indian cherry), Polygonella spp. (jointweeds), Stillingia sylvatica (stillingia), and Hamamelis virginiana (witch-hazel). The herbaceous layer is sparsely developed, but may include Opuntia humifusa (prickly-pear cactus), Andropogon spp. (broomsedges), Asclepias spp. (milkweeds), Aristida spp. (three-awn grasses), Smilax pumila (sarsaparilla vine), Cnidoscolous spp. (bull-nettles), Tephrosia virginiana (goat's-rue), and Tradescantia spp. (spider-worts). Foliose lichens (especially those in the genera Cladina and Cladonia) may occur in profusion. Many state-rare species are indigenous to this habitat, including Astragalus soxmaniorum (soxman's milk-vetch), Zornia bracteata (viperina), Streptanthus hyacinthoides (smooth twistflower), Polanisia erosa (large clammy-weed), Penstemon murrayanus (cupleaf beardtounge), Eriogonum spp. (wild buckwheats), Silene subcilliata (scarlet catchfly), Tetragonotheca ludoviciana (Louisiana square-head), Prunus gracilis (sandhill plum), Triplasis americana (American sandgrass), and several others. S1-Florida Parishes: S2S3.



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2. Cedar Woodland

This open woodland occurs naturally in a very restricted range on the Jackson Formation of northcentral Louisiana over calcareous soils, where it is associated with calcareous prairie openings in a fairly rugged, fire-protected landscape. The canopy is dominated by Juniperus virginiana (redcedar), Pinus taeda (loblolly pine), Quercus sinuate (Durand oak), and Fraxinus americana (white ash). Small openings within this woodland support many species typical of Jackson Calcareous Prairie vegetation including the grasses: Schizachyrium scoparium (little bluestem), Andropogon gerardii (big bluestem), Danthonia spicata (poverty oatgrass), Sporobolus spp. (dropseed), Bouteloua curtipendula (side-oats grama), Paspalum floridanum (Florida paspalum), and Sorghastrum nutans (indiangrass). Some characteristic forbs include: Dalea candida (white prairie clover), Ruellia humilis (wild petunia), Desmanthus illinoensis (wad o'pods), Koeleria macrantha (prairie junegrass), Silphium integrifolium (wholeleaf rosinweed), Arnoglossum plantagineum (Indian plaintain), Asclepias tuberosa (butterfly milkweed), Baptisia nuttalliana (Nuttall's wild indigo), Callirhoe papaver (woodland poppymallow), Coreopsis lanceolata (tickseed), Gaillardia aestivalis (blanket flower), Houstonia purpurea var. calycosa (Venus' pride), Brickellia eupatorioides (false boneset), Manfreda virginica (false aloe), Neptunia lutea (yellow puff), Salvia lyrata (lyreleaf sage), Echinacea purpurea (purple coneflower), Delphinium carolinianum (Carolina larkspur), and Ratibida pinnata (pinnate prairie coneflower). S1.

3. Saline Oak Woodland

Synonyms: Saline Flatwood

This community is known from the Upper West Gulf Coastal Plain of northwest Louisiana and possibly into the Lower West Gulf Coastal Plain of north central Louisiana. It is also known from Texas and possibly southwestern Arkansas. It occurs on secondary terraces of the Pleistocene Prairie Terrace associated with small streams of the region, and is a known to occur in a mosaic with saline prairies of the area. Soils are Natraqualfs, high in salt content, and can include Guyton, Diboll, and Fuller soil series. Small isolated depressional ponds, as well as, pimple mounds are commonly scattered throughout the woodland giving it an interesting micro-topography and increasing plant diversity of these sites. The canopy of these woodlands are dominated by Quercus stellata (post oak), Q. similis (delta post oak), Q. phellos (willow oak), Ulmus crassifolia (cedar elm), and Gleditisia triacanthos (honeylocust). The understory of this community is sparse and patchy with a grassy ground layer dominated by Chasmanthium laxum (inland seaoats). Several species of Crataegus (hawthorn) dominate the understory and also form dense thickets at the interface of woodland and saline prairie. These Crataegus species include Crataegus viridis (green hawthorn), C. opaca (mayhaw), C. marshallii (parsley hawthorn), C. spathulata (little hip hawthorn), and C. brachyacantha (blueberry hawthorn). Pinus taeda (loblolly pine) is frequently found along the periphery or on higher mounds and ridges within this community, and can become a significant component in disturbed woodlands. S1.

G. Glade

1. Sandstone Glade/Barren:

Synonyms: Sandstone Outcrop

This natural community develops on outcropping sandstone in pine forests, chiefly in a belt running from northeast to southwest across central Louisiana, and is primarily associated with the Catahoula formation. The community appears as a complex of



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sandstone boulders, intermixed with shrubs and trees occurring as individuals or in patches. Associated soils are characteristically acidic and are highly erodable, often eroding to form an irregular, sandstone-studded landscape of gullies, bluffs, and miniature gorges and buttes. Much of the soil and rock is unvegetated. Tree species present may include Pinus palustris (longleaf pine), P. echinata (shortleaf pine), P. taeda (loblolly pine), Quercus stellata (post oak), Q. incana (bluejack oak), Q. marilandica (blackjack oak), and Liquidambar styraciflua (sweetgum). Shrubs may include Ilex vomitoria (yaupon), Vaccinium arboreum (winter huckleberry), V. elliottii (Elliott's blueberry), Bumelia lanuginosa (chittum-wood), and Crataegus spp. (hawthorns). Common herbaceous species are Bigelowia virgata (rayless goldenrod, often the dominant herb), Andropogon spp. (broomsedges), Eragrostis spp. (love grasses), Liatris spp. (blazing-stars), and Aster spp. (asters). Talinum parviflorum (small-flowered flame-flower) may rarely be present. Saxicolous mosses and lichens abound. S1S2.

2. Fleming Glade

This sparse woodland is dominated by a scattered, somewhat stunted Pinus palustris (longleaf pine) canopy with Quercus marilandica (blackjack oak) forming a patchy stunted subcanopy. P. taeda (loblolly pine) may be abundant in fire suppressed examples. This woodland is an extremely rare community with a restricted distribution, being known only from northern Rapides Parish, Louisiana. The Fleming glade contains a highly unusual combination of species, primarily due to the distinct soil and hydrologic conditions that reflect the mixed geological character of the habitat. The Kisatchie and Anacoco soils present in this woodland are very strongly acidic silt loams over clay or sometimes underlain by siltstone. This community ranges from dry with a patchy herbaceous layer and foliose lichens, to more commonly mesic or wet-mesic with Muhlenbergia expansa (muhly grass) and Rhynchospora spp. (beaksedge) as codominants. The historical fire frequency is estimated to be 3 to 4 years, and along with edaphic conditions including rock layers near but not at the soil surface, fire is believed to play a role in maintaining the open physiognomy. The P. palustris (longleaf pine) canopy is typically 8 to 15 meters tall and approximately 10 to 25 % cover. Other tree species may include Q. marilandica (blackjack oak), Q. stellata (post oak), or Nyssa sylvatica (blackgum). Scattered shrubs, typically less than 10 % cover, include Ilex vomitoria (yaupon) and Chionanthus virginicus (fringetree). Schizachyrium tenerum (slender little bluestem) and Schizachyrium scoparium (little bluestem) are dominant graminoids in this usually dense to continuous stratum. Herbaceous vegetation typical of both upland and flatwood longleaf pine communities occur. On the predominantly acidic to very acidic silty clays Bigelowia nuttallii (rayless goldenrod), Liatris acidota (sharp blazing star), Ionactis linariifolius (flaxleaf whitetop aster), Euphorbia corollata (flowering spurge), Hedyotis nigricans var. nigricans (diamond flowers), and Spiranthes magnicamporum (Great Plains ladies'-tresses) are found. On calcareous clay inclusions scattered calciphilic species such as Neptunia lutea (yellow puff) and Delphinium carolinianum (Carolina larkspur) may occur. S1.

VII. SUBTERRANEAN

1. Cave

Large air-filled cavities, with openings to the surface. Very rare in central Louisiana, associated with sandstone strata, e.g., Catahoula formation. However, known caves are very poorly developed and of limited extent. S1.



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**STATE ELEMENT RANKS**

S1 = Critically imperiled in Louisiana because of extreme rarity (5 or fewer known extant populations) or because of some factor(s) making it especially vulnerable to extirpation.
S2 = Imperiled in Louisiana because of rarity (6 to 20 known extant populations) or because of some factor(s) making it very vulnerable to extirpation
S3 = Rare and local throughout the state or found locally (even abundant at some of its locations) in a restricted region of the state, or because of other factors making it vulnerable to extirpation (21 to 100 known extant populations).
S4 = Apparently secure in Louisiana,with many occurences (100-1000 known extant populations).
S5 = Demonstrably secure in state (1000+ known extant populations).
SA = Accidental in state,including species (usually birds or butterflies) recorded once or twice or only at great intervals, hundreds or even thousands of miles outside their usual range.
SH = Of historical occurrence in Louisiana but no recent records verified within the last 20 years; formerly part of the established biota, possibly still persisting.
SR = Reported from Louisiana, but without conclusive evidence to accept or reject the report.
SU = Possibly in peril in Louisiana but status uncertain; need more information
SX = Believed to be extirpated from Louisiana



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