

2. Aquatic Systems:

a. Freshwater

Louisiana's abundant bayous, rivers, lakes, reservoirs, and wetlands provide unlimited fishing, hunting, boating and recreational opportunities and are a major contributor to the state's wealth and economic growth. Today, aquatic habitats are in high demand as sources of domestic water supplies, irrigation for agriculture, and wastewater treatment. A growing proportion of Louisiana's population is beginning to appreciate the importance of our aquatic habitats as nursery areas for our commercial and sport fisheries. They are beginning to fully understand the problems of balancing biological and recreational uses with agriculture and urban needs, navigation, flood control, and waste water disposal.

Louisiana has more surface water available (84%) than any other state (XU 2004) and contains over 66,294 miles of rivers and streams, 1,078,031 acres (1,684 square miles) of lakes and reservoirs, 5,550,951 acres (9,191 square miles) of fresh and tidal wetlands and 4,899,840 acres (7,656 square miles) of estuaries (LDEQ 2004). The Mississippi River and its major tributary the Red River, along with other major river systems (Ouachita, Black, Calcasieu, Atchafalaya, Sabine, Pearl, and Mermentau), combine to incorporate more than 2,300 miles of navigable waterways.

The Mississippi drainage basin covers approximately 1.2 million square miles which represents 41% of the conterminous United States and 1/8 of North America. Combined with the Atchafalaya River basin, these two river systems are habitat for 195 species of native freshwater fish which represents almost 1/3 of the freshwater fish species in North America (Fremling et al. 1989). In addition, both river systems are habitat for over 40 species of marine fish. They also serve as conduits for the spread of invasive animal species such as the Rio Grande cichlid, Zebra mussel, and five species of Asian carp (LDWF 2004b).

A vast array of levees have been constructed for flood protection and to channelize the water flow in the rivers. Louisiana has more than 2,000 miles of levees as well as other flood control devices along these rivers. The present condition of Red and Pearl Rivers are heavily influenced by the locks and dams constructed for navigation and to control water levels. The Red River has a total of 5 lock and dam systems constructed between the Arkansas line and its outfall at the Mississippi River. The Sabine, Pearl, Atchafalaya, and Black Rivers have all undergone alterations to their natural flow regime.

There are roughly 488 lakes, ponds, and man-made reservoirs in Louisiana. These water bodies account for nearly 1.5 million surface acres of water. The largest of these is Lake Pontchartrain with a surface acreage that covers 621 square miles and totals 397,000 acres. Toledo Bend Reservoir located on the Louisiana/Texas border is the largest man-made body of water in the South and fifth largest in surface acres in the United States. The reservoir covers 186,000 acres and has a controlled storage capacity of 4,477,000 acre-feet (1.4 trillion gallons). The reservoir was formed when the Sabine

River was impounded for hydroelectric purposes, water supply, and recreation. Many of the states lakes are small natural oxbows, which are remnants of rivers after they have altered their course.

b. Water Quality Assessments:

The Louisiana Department of Environmental Quality (LDEQ) completed sampling of all twelve of Louisiana's watershed management basins in 2002. A total of 479 water body management subsegments within the state were monitored once per month for a full year (LDEQ 2004). Designated use categories for the waters of Louisiana are: agriculture, drinking water supply, ecological significance, fish and wildlife propagation, outstanding natural resource, oyster production, and primary and secondary contact recreation. Water quality assessments for fish and wildlife propagation for the 4 major water body categories in Louisiana are listed in Table 2.7. Some of the major causes for water bodies not supporting their designated uses are: fecal coliform, dissolved oxygen, total suspended solids, turbidity, siltation, metals, pesticides, and total dissolved solids. For the water quality assessments given for each basin in Chapter 4, only the three primary designated uses recognized by LDEQ for most waters of the state are addressed. These 3 designated uses are primary contact recreation (swimming), secondary contact recreation (boating), and fish and wildlife propagation (fishing).

Table 2.7. Summary of Fish and Wildlife Propagation assessments for Louisiana's water bodies. (Reported in miles (water body count)).

	Fully Supporting	Not Supporting	Insufficient Data	Not Assessed	Total Size for Designated Use
Rivers and Streams	2,789 (95)	6,547 (248)	138 (5)	40 (6)	9,514 (354)
Lakes	78,890 (17)	586,298 (48)	0	2,284 (3)	667,472 (68)
Estuaries	3,049 (34)	1,905 (18)	0	0	4,954 (52)
Wetlands	543,360(4)	488,960 (4)	0	3,968 (2)	1,036,288 (10)

Source: Louisiana Department of Environmental Quality (2004)

c. Louisiana's Natural and Scenic Rivers:

Louisiana's Natural and Scenic River System (System) is one of the nation's largest, oldest, most diverse, and unique state river protection initiatives. It encompasses 51 streams or stream segments and is over 3,300 miles in length (Jenkins and Cascio 2000) (Fig. 2.5, Table 2.8). In the early 1970's the Louisiana Natural and Scenic River Act (Act) was passed, creating the System which sets certain requirements for a river to meet for inclusion in the program. The Act also established a regulatory component, and designated the LDWF Secretary to administer the System.

The streams and rivers included in the System are protected through a permitting process and certain prohibitions mandated by the Act. Certain activities which would

drastically alter the natural and scenic qualities of rivers in the System are prohibited. These activities include:

- Channelization
- Channel realignment
- Clearing and snagging
- Impoundment construction
- Commercial clearcutting of timber within 100 feet of the low water mark

Other activities that may have a direct, significant ecological impact on the river must be permitted by LDWF, and the permit application must also be reviewed by LDEQ, Department of Agriculture and Forestry (LDAF), Department of Culture, Recreation and Tourism (CRT), and the Office of State Planning. Activities that must be permitted include, but are not limited to:

- Bridge, pipeline and power line crossings
- Bulkheads, piers, dock and ramp construction
- Waste water discharges
- Land development adjacent to the river

Table 2.8. Area, scenic streams, and percent land use of aquatic basins in Louisiana.

Basin	Area (miles) ²	Scenic Streams		Major Land Uses (%)		
		Number of Streams	Designated Miles	Forested	Agriculture	Urban
Atchafalaya	2,374	0	0	19	15	1
Barataria	2,520	1	45	1	10	3
Calcasieu	4,270	4	566	51	26	3
Mermentau	4,786	0	0	8	57	2
Mississippi	1,886	0	0	20	18	3
Ouachita	7,644	10	751	59	29	2
Pearl	914	7	256	47	24	4
Pontchartrain	7,637	21	1,186	26	12	5
Red	7,500	5	427	54	30	3
Sabine	3,257	1	3	54	14	2
Terrebonne	3,979	0	0	11	14	2
Vermilion – Teche	4,047	1	82	16	47	4

Source: Louisiana Department of Environmental Quality (1993) and LNHP database

d. Management Basins:

Louisiana has twelve water quality management basins delineated on the basis of the natural drainage patterns of the state's major river basins (Fig. 2.11). Each water quality management basin is subdivided into stream segments in which the hydraulic and water quality characteristics are fairly constant. Land use in the basins is dominated by forestry

and agriculture although the percentage of urban use is considerable in the Pontchartrain Basin (Table 2.8). The Pearl and Pontchartrain Basins have the highest aquatic species diversity, relative to their area, in the state and, along with the Ouachita Basin, contain the highest number of species of conservation concern (Table 2.9).

Table 2.9. Aquatic basins and associated aquatic species of conservation concern listed by taxa.

Basin	Crustacean	Freshwater Fish	Mussel	Reptile	Total
Atchafalaya	0	6	0	3	9
Barataria	0	2	0	2	4
Calcasieu	3	3	3	2	11
Mermentau	2	1	0	2	5
Mississippi	1	9	1	3	14
Ouachita	2	4	16	2	24
Pearl	3	13	5	5	26
Pontchartrain	3	6	8	2	19
Red	4	9	2	2	17
Sabine	3	4	4	3	14
Terrebonne	0	1	0	2	3
Vermilion – Teche	4	1	1	2	8

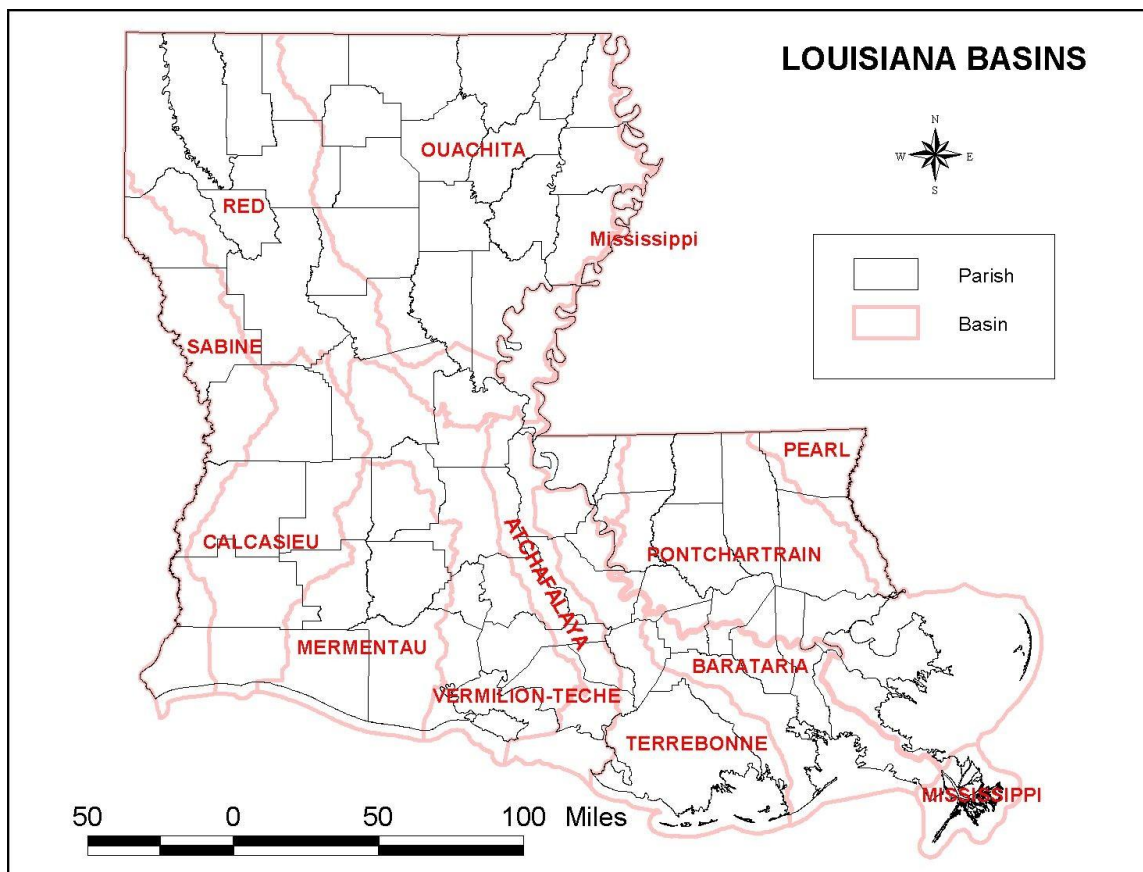


Figure 2.11. Aquatic basins in Louisiana.

1. Atchafalaya Basin

The Atchafalaya River Basin is located in south-central Louisiana. The Atchafalaya River, a distributary of the Red, Black, and Mississippi Rivers, presently carries about 30 percent of the Mississippi's flow. The basin is well-defined by a system of levees which surround it on the north, east, and west. The entire basin serves as a major floodway for the Mississippi River floodwaters. The Atchafalaya Basin is predominantly bottomland hardwoods and cypress-tupelo swamp with some freshwater marshes in the lower distributary area. It constitutes the largest contiguous freshwater swamp in the United States.

2. Barataria Basin

The Barataria Basin lies in the eastern coastal region of the state. This basin is bounded on the north and east by the lower Mississippi River, on the west by Bayou Lafourche, and on the south by the Gulf of Mexico. The major receiving waterbody in this basin is Barataria Bay. The Barataria Basin consists largely of bottomland hardwoods and fresh to brackish marshes, having some saline marsh on the fringes of Barataria Bay. Elevations in this basin range from minus two feet to four feet above sea level.

3. Calcasieu Basin

The Calcasieu River Basin is located in southwestern Louisiana and is aligned in a north-south direction. Headwaters of the Calcasieu River are in the hills west of Alexandria. The river flows south for about 160 miles to the Gulf of Mexico. The mouth of the river is about 30 miles east of the Texas – Louisiana state line. The landscape in this basin varies from pine-forested hills in the upper end to brackish and salt marshes in the lower reaches around Calcasieu Lake.

4. Mermentau Basin

The Mermentau River Basin is located in southwestern Louisiana and encompasses the prairie region of the state and a section of the coastal zone. The Mermentau River Basin is bounded on the north and east by the Vermilion – Teche River Basin, on the west by the Calcasieu River Basin, and on the south by the Gulf of Mexico. Little of the historic prairie habitat remains and the dominant habitat type is agricultural lands. Hardwood forests occur along the Mermentau and its larger tributaries. Fresh, intermediate, and brackish marshes constitute the majority of coastal wetlands with some salt marsh along the Gulf of Mexico.

5. Mississippi Basin

The upper Mississippi River forms the boundary between Louisiana and Mississippi, flowing in a southerly direction. The lower Mississippi River flows southeasterly through the southeastern section of Louisiana. The upper stretch of the Mississippi does not get any tributary flow from the Louisiana side, which is leveed. Tributaries do enter from

Mississippi, including the Yazoo, Black, Homochitto, and Buffalo Rivers and Bayou Pierre. Tributary flow is received from Thompson's Creek, Bayou Sara, and Tunica and Monte Sano Bayous between the Old River Control Structure and Baton Rouge. The river is leveed on both the east and west banks from Baton Rouge below Monte Sano Bayou to Venice. This stretch of the river is also heavily industrialized, receiving numerous industrial discharges from Baton Rouge to New Orleans. The birdfoot delta of the Mississippi, where it flows into the Gulf, consists of fresh and intermediate marshes. The habitat of the upper portion of the basin, within the levee-created batture lands, contains mostly bottomland hardwoods and a small amount of agriculture lands.

6. Ouachita Basin

The Ouachita River's source is found in the Ouachita Mountains of west-central Arkansas near the Oklahoma border. The Ouachita River flows south through northeastern Louisiana and joins with the Tensas River to form the Black River, which empties into the Red River. Most of the basin consists of rich, alluvial plains cultivated in cotton and soybeans. The northwest corner of the basin is forested in pine, which is commercially harvested.

7. Pearl Basin

The Pearl River Basin lies along the southeastern Louisiana – southwestern Mississippi border. This basin is bordered on the north by the Mississippi state line, by the Pearl River to the east, and on the west and south by the Lake Pontchartrain Basin. Elevations in the basin range from 350 feet above mean sea level in the northwest portion to sea level at the southern end. Correspondingly, the vegetation varies from pine forests and bottomland hardwoods to fresh and brackish marsh.

Seven Louisiana designated natural and scenic streams lie within the basin. The Pushepatapa Creek, Bogue Chitto River, Holmes Bayou, Bradley Slough, Wilson Slough, Morgan River, and West Pearl River are rich in species diversity. The basin is home to highest concentration of listed species of concern.

8. Pontchartrain Basin

The Lake Pontchartrain Basin, located in southeastern Louisiana, consists of the tributaries and distributaries of Lake Pontchartrain, a large estuarine lake. The basin is bounded on the north by the Mississippi state line, on the west and south by the east bank Mississippi River levee, on the east by the Pearl River Basin, and on the southeast by Breton and Chandeleur Sounds. This basin includes Lake Borgne, Breton Sound, Chandeleur Sound, and the Chandeleur Island chain. The wooded uplands in the northern part of the basin consists of both pine and hardwood forests. The southern portions of the basin consist of cypress-tupelo swamps, bottomland hardwoods, and brackish and saline marshes. The marshes of the southeastern part of the basin constitute the most-rapidly eroding area along the Louisiana coast. Elevations in this basin range from minus five feet at New Orleans to over two hundred feet near the Mississippi border.

9. Red Basin

The Red River has its origin in eastern New Mexico and flows across portions of Texas, Oklahoma, and Arkansas before entering northwestern Louisiana. The river flows southward to Shreveport, where it turns southeastward and flows for approximately 160 miles to its junction with the Atchafalaya River. From the Arkansas state line to Alexandria, the Red River is contained within high banks which range from 20 to 35 feet above low water level. Below Alexandria, the river flows through a flat alluvial plain that is subject to backwater flooding during periods of high water. The Sabine River Basin lies to the southwest of the Red River Basin, and the Ouachita River Basin lies to the east. The Calcasieu, Vermilion – Teche, and Atchafalaya River Basins lie south of the Red River Basin.

10. Sabine Basin

The Sabine River Basin lies along the Texas-Louisiana border. The basin stretches from the Texas state line near Shreveport to the Gulf of Mexico. It is bounded on the east by the Red River Basin and Calcasieu River Basin. Characteristic vegetation ranges from mixed forests in the upper basin to hardwoods in the mid-section and brackish and saline marshes in the lower end.

11. Terrebonne Basin

The Terrebonne Basin covers an area extending approximately 120 miles from the Mississippi River on the north to the Gulf of Mexico on the South. It varies in width from 18 miles to 70 miles. This basin is bounded on the west by the Atchafalaya River Basin and on the east by the Mississippi River and Bayou Lafourche. The topography of the entire basin is lowland, and all the land is subject to flooding except the natural levees along major waterways. The coastal portion of the basin is prone to tidal flooding and consists of marshes ranging from fresh to saline.

12. Vermilion – Teche Basin

The Vermilion – Teche River Basin lies in south-central Louisiana. The upper end of the basin lies in the central part of the state near Alexandria, and the basin extends southward to the Gulf of Mexico. The basin is bordered on the north and northeast by a low escarpment and the lower end of the Red River Basin. The Atchafalaya River Basin is to the east, and the Mermentau River Basin is to the west. The wooded uplands of the northern part of the basin consists of both pine and hardwood forests. The central and southern portions of the basin consist of agricultural lands and the coastal zone is a mixture of fresh, intermediate, and brackish marsh.

e. Marine

Louisiana's coastal habitats form an intergradation of habitats between upland habitats and open water marine habitats of the Gulf of Mexico. Within that gradation there are a wide variety of processes, both manmade and natural, creating an active landscape, where changes in dominant flora and fauna take place very quickly relative to many other systems. These habitats are utilized for their position on the landscape (e.g., first point of land for migrating neotropical birds), for the shelter they provide for the juvenile stages of many marine species, and as productive habitats for resident species.

Louisiana's estuarine and marine habitats are characterized by dynamic salinity regimes, riverine sedimentation patterns, and high productivity. The Mississippi River and its distributary, the Atchafalaya River are the ecological drivers of these systems, providing sediment and nutrients to coastal estuaries and fueling high productivity. Estuarine systems in southeastern Louisiana represent the remnants of five major cycles of delta building, resulting in large regressive delta formations dominated by organic sedimentation. The coastal marsh component of these estuaries is also experiencing the highest rate of wetland loss in the nation. Southwest Louisiana is dominated by fossil beach ridges with interspersed marshes. Coastal water bodies in this region are enclosed estuaries rather than the big open bays of the southeast. These estuaries are heavily impacted by human marsh management and navigational changes to the landscape. They are also extremely productive estuaries in terms of fisheries.

Marine habitats are generally seaward of the Gulf Intracoastal Waterway (GIWW) and extend out to the 3-mile limit. Louisiana's coastal zone is divided into 7 coastal study areas by LDWF's Marine Fisheries Division (Fig. 2.12).

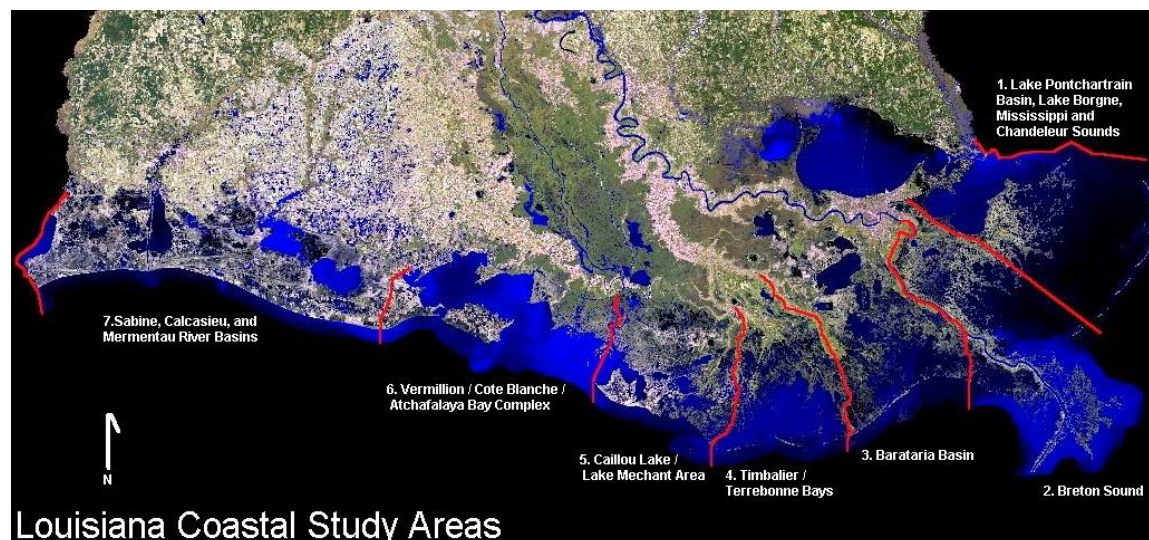


Figure 2.12. Louisiana's coastal study areas.