

United States Geological Survey

Programs in Louisiana



The USGS provides maps, reports, and information to help others meet their needs to manage, develop, and protect America's water, energy, mineral, and land resources. We help find natural resources needed to build tomorrow, and supply scientific understanding needed to help minimize or mitigate the effects of natural hazards and environmental damage caused by human activities. The results of our efforts touch the daily lives of almost every American.

Coastal Restoration and Wetlands Monitoring

The coastal marshes and tidal wetlands of Louisiana's coast and the barrier islands that protect them form one of the world's most productive ecosystems. Louisiana has 25 percent of the vegetated wetlands and 40 percent of the tidal wetlands in the 48 contiguous States. However, the gulf coast of Louisiana is eroding faster than any other coastal area of the world. Every year, Louisiana loses as much as 40 square miles of land—an area nearly the size of Washington, D.C. Some of this land loss can be traced to human activity, but much of it can be traced to the forces of nature, including land subsidence caused, in part, by compaction of the Mississippi River Delta sediments and large storms that strike the area about every 5 years (fig. 1).

Since 1984, the U.S. Geological Survey (USGS) has worked closely with various Federal, State, and local agencies to document coastal erosion and wetland loss. USGS studies have included applied research and monitoring of basic

geologic and hydrologic variables to document the causes of and processes responsible for the widespread devastation. Results of these studies are providing basic information in reports, maps, computer data bases, and workshops for coastal managers and engineers. USGS scientists and results of USGS studies are an integral part of the Federal and State Wetlands Task Force, which is spending \$40 million per year in restoring and preserving Louisiana's valuable coastal resources.

USGS scientists play key roles in the design of monitoring programs for the Comprehensive Coastal Wetlands Planning, Protection, and Restoration Act. A USGS scientist was appointed "basin captain"—a person responsible for the review and prioritization of proposed restoration projects in the Vermilion–Mermentau Basin. USGS scientists serve as technical consultants to other U.S. Department of the Interior agencies, the U.S. Army Corps of Engineers, the U.S. Environmental Protection Agency, and the Office of the Governor of Louisiana on matters concerning geologic, water-

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quality, and other hydrologic issues as well as barrier island erosion and wetlands loss.

Lake Pontchartrain/Bonnet Carré Freshwater Diversion

In 1984, the U.S. Army Corps of Engineers was authorized to construct a small diversion of the Mississippi River to allow water to flow through Lake Pontchartrain to enhance oyster production in the Mississippi Sound.

In response to concerns of some citizen groups that the diversion might harm the water quality and ecology of the lake, a multiagency reanalysis committee, which comprises Federal, State, and private representatives, was formed in March 1994. All parties agreed that there is a lack of information on the potential effects of Mississippi River water on the health of the lake. The USGS helped the committee in the design of an experimental release of Mississippi River water into the lake through the existing Bonnet Carré Spillway and provided technical input on determining the potential effects of this release on water quality of the lake.

The USGS collected numerous samples of water and bottom sediments from the lake and river during and after the

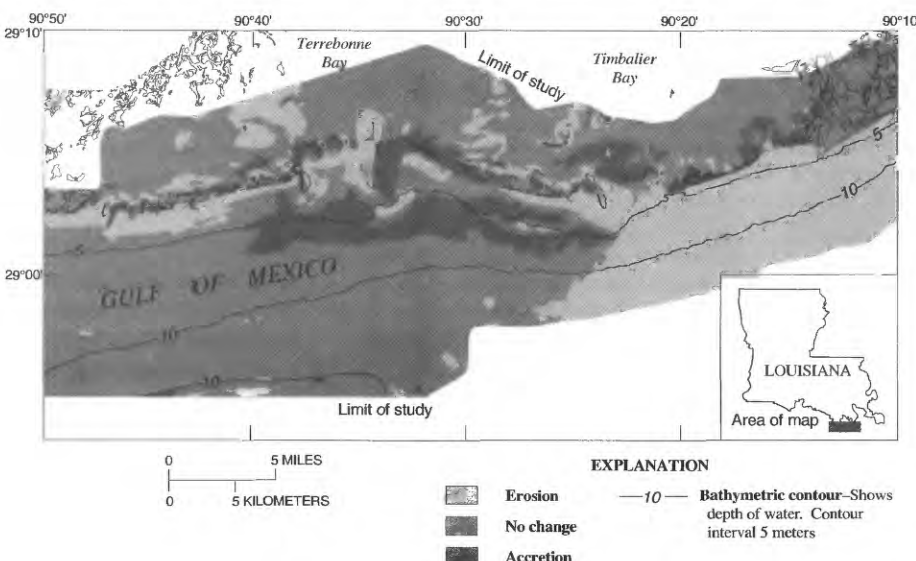


Figure 1. Seafloor change from the 1930's to the 1980's for the region of coastal Louisiana hardest hit by Hurricane Andrew shows historical patterns of seafloor erosion and accretion.

experiment to determine which, if any, toxic chemicals were transported from the river into the lake. Dye studies were conducted and physical conditions of the lake were monitored to determine potential mixing patterns in the lake. The USGS also collected information that was used by Louisiana State University and for predicting possible effects of the diversion on the aquatic health of the lake.

Concurrent with this work, the USGS, at the request of Congress, began an evaluation of the environmental issues facing the region and developed a multiyear strategic plan to collect the geologic information needed to address them. The major environmental issues addressed by the project include contamination of sediment and water by chemicals from urban and agricultural sources, lakeshore erosion and loss of wetlands and grassbeds, intrusion of saltwater from canals and navigation waterways into aquifers, effects of past long-term commercial shell dredging, and potential effects of the Bonnet Carré water diversion.

The USGS, in cooperation with Louisiana State University, is documenting the geologic framework of the lake, shoreline contours, and contaminated sediments; developing a computer circulation model; and providing interim results to the public and the planners involved in efforts to restore and protect the Lake Pontchartrain Basin. This study is an important extension of recent USGS field studies of processes involved in barrier-island erosion and wetland loss in the Mississippi River deltaic plain. Not only does the study address specific issues, but its results, combined with those of previous studies, provide a more comprehensive scientific understanding of processes that affect the entire Mississippi River deltaic plain.

Coastal Monitoring Program

The USGS, in cooperation with the Louisiana Department of Natural Resources, has installed and operates 19 surface-water monitoring sites at key locations along the Louisiana coast. These sites, many of which are linked by satellites, are equipped with instruments that collect real-time information, including stage, velocity, salinity, water temperature, wind speed and direction, and

rainfall. Data collected at these sites provided the State with vital information on Hurricane Andrew as it tracked along the Louisiana coast. The data also are used to manage freshwater-diversion and coastal-restoration projects for the State of Louisiana and the U.S. Army Corps of Engineers.

Mercury in Fish

The USGS, in cooperation with the Louisiana Department of Environmental Quality, began a study in 1994 to determine the presence and concentration of mercury in selected fish, water, and bottom sediments from streams and lakes throughout the State. Spanish moss and tree lichens, which are indicators of atmospheric sources of pollution, also were studied. Study sites were selected jointly by the USGS and the State on the basis of historical water, bottom-sediment, and tissue data in both agencies' data bases and the recreational and financial importance of large commercial fisheries. The sampling of 39 sites was completed in October 1994. Results of sampling as the data become available will be provided to the Louisiana Department of Health and Human Resources for review and possible health advisory consideration.

Mississippi River Water-Quality Studies

Since 1905, the USGS has studied the water quality of the Mississippi River in Louisiana. Since 1967, the USGS, in cooperation with the Louisiana Department of Transportation and Development, has intensively studied travel times, water chemistry, bacterial contamination, and sediment transport characteristics of our Nation's largest river. Results of these studies have been used by industry to evaluate the quantity and suitability of water for industrial use, by State and local governments in response to spills of hazardous chemicals, and by private citizens interested in the health of the river.

More recently, USGS research scientists have completed a 7-year study of the transport of sediments in and the water quality of the Mississippi River from Minneapolis-St. Paul, Minnesota, to Belle Chasse, Louisiana. Results of these studies have been used by various Federal, State, and local agencies and by environmental groups to identify contam-

inants from nonpoint sources in river water and the potential of these contaminants to affect drinking-water supplies and aquatic environments in areas that receive Mississippi River water for coastal restoration.

Ground-Water Resources in Jefferson Parish and Vicinity

Jefferson Parish, a heavily urbanized area adjacent to New Orleans, obtains most of its drinking water from the Mississippi River. Because of concerns about the reliability of the Mississippi River as a water supply, the USGS, in cooperation with Jefferson Parish, recently completed two studies of the ground-water resources in and near the parish.

The first study concentrated on identifying potential sources of ground water within the parish. Ground-water resources capable of providing water supplies of sufficient quality to be used on an emergency basis were located within the parish. The second study concentrated on areas outside the parish. Results of this study indicated that large quantities of high-quality drinking water were available in the North Shore area of Lake Pontchartrain. These two potential sources of ground water could meet the long-term needs of Jefferson Parish without adverse hydrologic consequences for the foreseeable future.

Toxics Substances in Calcasieu River Estuary

In 1985, the USGS gathered a team of local and national research scientists to study the movement and fate of trace metals and organic compounds in the Calcasieu River estuary. Studies during an 8-year period (1985-93) documented serious contamination by organic compounds in a major tributary to the Calcasieu River.

Data collected during these studies were used by the Louisiana Departments of Environmental Quality and Health and Hospitals when they issued a seafood-consumption advisory and a swimming advisory for parts of the estuary. A study by the USGS, in cooperation with the U.S. Environmental Protection Agency and the Louisiana Department of Environmental Quality, was conducted as part of this program in 1988 to delineate the extent of contamination within

the estuary. USGS scientists have made several presentations to State and local agencies on the results of these studies, including a presentation to the Governor's task force on the Calcasieu River Estuary.

Saltwater Encroachment Near Baton Rouge

Because of large withdrawals from the aquifer system in the Baton Rouge area, historical patterns of ground-water flow have been altered over the years. Saltwater now encroaches into formerly freshwater areas, thus destroying their usefulness for public and most industrial supplies. The aquifers in the Baton Rouge area supply water for about 360,000 people and a large and economically critical industrial base. A recent study by the USGS, in cooperation with the Louisiana Department of Transportation and Development and the Capital Area Ground Water Conservation Commission, showed that the quality of ground water at two public-supply pumping centers will soon be affected by saltwater intrusion (fig. 2). Local officials are concerned about the impending saltwater encroachment and are planning strategies based on results of USGS studies to protect these water supplies.

Real-Time Flood Information Provided to State and Local Officials and to the Public

Louisiana leads the Nation in property damage caused by floods. To alleviate and help reduce future losses, the USGS, in cooperation with several State and local agencies, is operating a flood-monitoring system. Currently (1995), the Amite River Basin between Baton Rouge and Denham Springs is instrumented with 21 river-stage and rain gages. The data collected at these gages are relayed instantaneously by radio to the USGS Office in Baton Rouge and the Louisiana Office of Emergency Preparedness. During times of high river stage, USGS scientists relay complete, up-to-date information on the flooding situation to parish and law enforcement officials and the news media on an hourly basis. A flood-tracking map, modeled after a hurricane-tracking map, has been prepared and distributed through fast-food outlets to the public. People living in potentially affected areas can use these maps and USGS hydrologic information provided through the news media to make decisions about evacuation and protection of personal property.

National Mapping Program

Among the most popular and versatile products of the USGS are its 1:24,000-

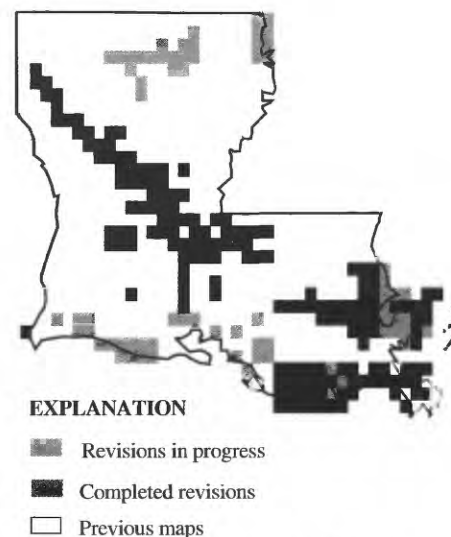


Figure 3. 1:24,000-scale topographic map revision for Louisiana.

scale topographic maps (1 inch on the map represents 2,000 feet on the ground). These maps depict basic natural and cultural features of the landscape, such as lakes and streams, highways and railroads, boundaries, and geographic names. Contour lines are used to depict the elevation and shape of terrain. Louisiana is covered by 877 maps at this scale, which is useful for civil engineering, land-use planning, natural-resource monitoring, and other technical applications. These maps have long been favorites with the general public for outdoor uses, including hiking, camping, exploring, and back-country fishing expeditions. Revision work in progress to update information shown on selected 1:24,000-scale topographic maps in Louisiana is shown in figure 3.

Earth Observation Data

Through its Earth Resources Observation Systems Data Center near Sioux Falls, South Dakota, the USGS distributes a variety of current and historical aerial photographs and satellite-image data products that cover the entire State. Aerial photographs of some sites were made over 40 years ago. Satellite imagery dating from 1972 is useful to study changes in regional landscapes.

Cooperative Programs

The USGS cooperates with more than 20 local, State, and Federal agencies in Louisiana to provide data and information on water availability, quality, and quantity needed for prudent and effective management of this valuable resource.

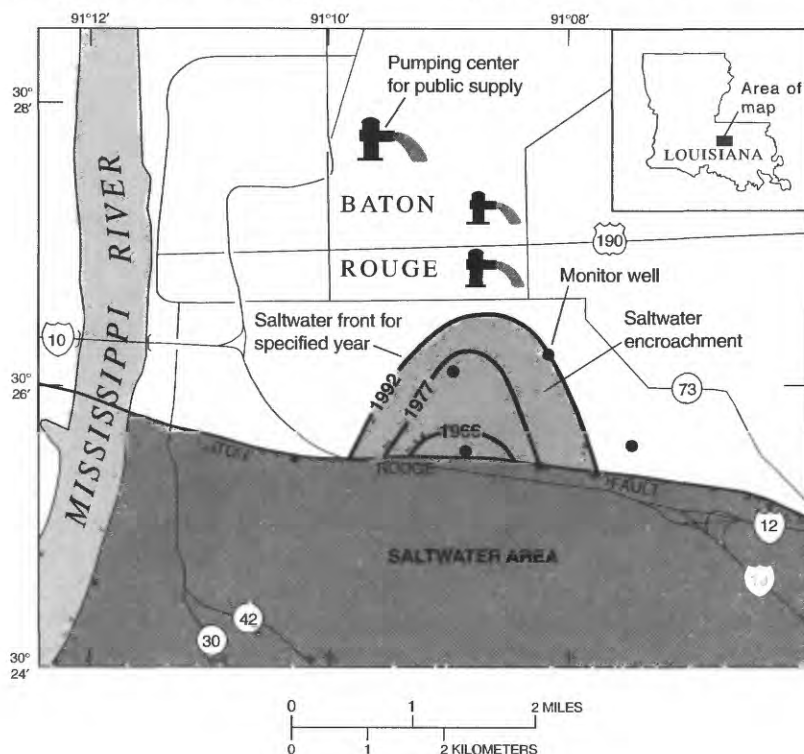


Figure 2. Saltwater encroachment in the "1,500-foot" aquifer, pumping centers, and location of fault, Baton Rouge area, Louisiana.

Cooperators include the Louisiana Department of Transportation and Development, the Louisiana Department of Natural Resources, the Louisiana Department of Environmental Quality, and East Baton Rouge Parish. Cooperative activities consist of two broad categories—water-resources-data collection and interpretive studies and research. When local and State agencies are involved, activities typically are funded on a matching-funds basis.

The USGS provides support to the Louisiana Water Resources Research Institute, which conducts a program of research, education, and information and technology transfer.

Collection of Hydrologic Data

Louisiana has many large river systems within the State, including the largest river in the United States, the Mississippi. Other major river systems include the Atchafalaya, the Red, the Ouachita, the Sabine, and the Pearl. These rivers not only supply water to users within Louisiana, but also provide interstate and intrastate transportation routes. The USGS, in cooperation with more than 13 Federal, State, and local agencies, collects streamflow, water-quality, and ground-water data at sites throughout the State (fig. 4). These data are critical for the day-to-day administration and management of water resources, determining the extent and severity of droughts, characterizing and predicting floods, and monitoring the effects of human activities on streamflow, ground water, and water quality. These data also

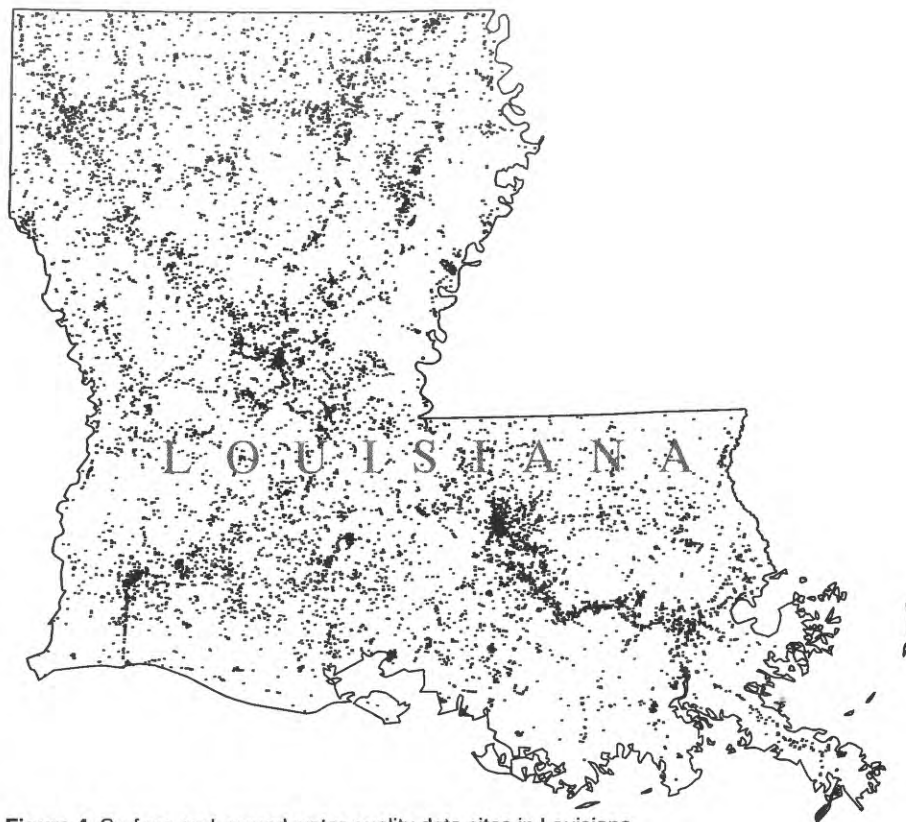


Figure 4. Surface and ground water-quality data sites in Louisiana.

are essential to interpretive studies, the results of which are used to make decisions about water issues that affect millions of people.

Center for Coastal Geology

In 1988 after an extensive competition among universities along the east and Gulf coasts, the USGS Center for Coastal Geology and Regional Marine Studies was established in cooperation with the University of South Florida (USF). The center occupies a 25,000 square foot historic building on the St. Petersburg campus of USF and another

25,000 square foot building is under construction.

The Center conducts a wide variety of research on coastal and regional marine problems in States bordering the Gulf of Mexico including coastal erosion, climate change, wetlands deterioration, coastal pollution, and hard mineral resources. With increased understanding of these problems, we will be able to predict more accurately future coastal erosion, the fate of wetlands, where polluted sediments accumulate, and the location of economically valuable hard minerals.

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Additional earth science information

can be found by accessing the USGS
"Home Page" on the World Wide Web at
"<http://www.usgs.gov>".

For more information on all USGS reports
and products (including maps, images, and
computerized data), call 1-800-USA-MAPS.