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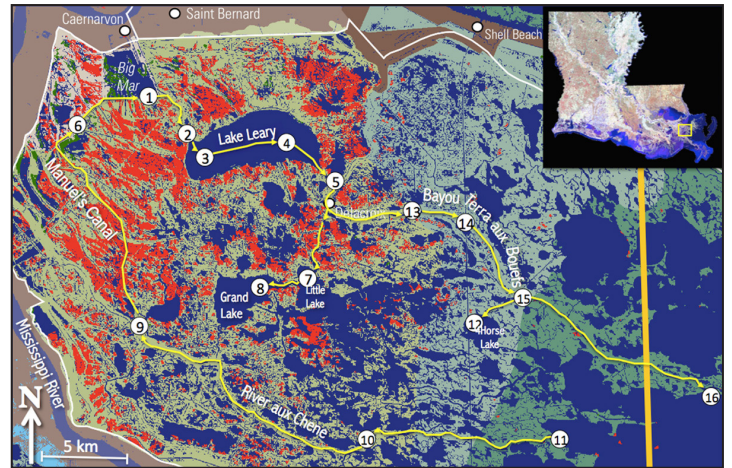
Breton Sound Estuary: Water Quality

The Mississippi River Delta region, including the Breton Sound estuary along the southeastern coast of Louisiana, is both environmentally and economically important. The swamps, bogs and marshes of this region account for 40% of all the wetlands in the lower 48 states. Unfortunately, these habitats were put in harm's way when oil from the Macondo well began washing ashore. Scientists from Louisiana State University closely monitor water quality in the Breton Sound estuary and have expanded their efforts since the oil spill.

The Breton Sound estuary was historically supplied with fresh water from the Mississippi River. Along with the water, *sediment* was transported and deposited in the sound. The supply of sediment from the Mississippi River is in fact what built the delta and surrounding islands. However, since around the time of the colonization of New Orleans, the amount of water entering the Breton Sound has been drastically reduced. The flow of the Mississippi River is now controlled and directed by locks, dams and artificial shores, and flooding is prevented by large earthen levees. The Breton Sound estuary is no longer fed directly by the Mississippi River but by the *Caernarvon River Diversion*, at only a fraction of the historic flow.

Flow from the river diversion was increased during the oil spill to push oil away from the estuary. This effort was largely successful. However, the temporary decrease of salinity in Breton Sound may have had more of an effect than the oil, as chlorophyll production was reduced. Fortunately, chlorophyll activity returned to normal soon after water flow returned to normal. The changes in Breton Sound have led researchers to closely examine the physical

and chemical processes of the altered environment. LSU's Dr. John Day monitors the *water quality* of Breton Sound, and has since 1999. After the oil spill in 2010, he began comparing historical data with data collected after the spill. Specifically, Day is analyzing patterns of nutrients, salinity, *chlorophyll*, and sediments. He is looking at factors that influence phytoplankton, especially light and nutrients, like nitrogen, phosphorus and silicate. Day's team also conducted an oil contamination experiment. They found phytoplankton activity was negatively impacted, at significant levels, when exposed to oil. This research will help determine the potential impacts of oil on phytoplankton in Breton Sound and is of great concern since phytoplankton form the base of the food chain. Major impacts at this level could have dramatic effects higher up in the food chain.



Major lakes and waterways in the Breton Sound estuary. Numbers refer to water testing locations along sampling route. Image: LSU



Drs. Day and Lundberg taking dissolved oxygen measurements of the Breton Sound in DeLacroix, LA Photo: LSU

Education Extension

Key Terms: *environmental monitoring, water quality, Mobile Bay*

Classroom Activity: Water Quality on the Web

The internet is a valuable source for scientific data available to the public. In this lesson, students will access water quality information about Mobile Bay, a body of water that shares similar characteristics with Breton Sound. They will learn how to interpret the data provided and gain a better understanding of how water quality impacts a habitat.

Supplies: *computers with internet access*

Directions: 1) Visit the website www.mymobilebay.com to download environmental monitoring data from a particular location around Mobile Bay. 2) Research the monitoring site chosen to learn more about it and what factors may influence the water quality there. 3) Analyze the data by graphing parameters such as water temperature, salinity or dissolved oxygen. 4) Why do they matter? Are any of them related? Discuss topics such as hypoxia and how it affects aquatic habitats. Keep in mind, this exercise can also be done using any data set that is available to you.

Visit <http://dhp.disl.org/resources.html> for lesson plans and additional marine-related activities.

**Use the key terms above to search for additional lesson plans on the web!*

Ocean Literacy Principles: 1. The Earth has one big ocean with many features, 5. The ocean supports a great diversity of life and ecosystems, 6. The ocean and humans are inextricably interconnected, 7. The ocean is largely unexplored

National Science Standards: A. Science as Inquiry: Abilities necessary to do scientific inquiry; C. Life Science: Populations and ecosystems; G. History and Nature of Science: Science as a human endeavor

Did You Know...

Sediment is carried by rivers to the coast nourishing marshes, beaches and other coastal habitats with sand, silt and nutrients. When rivers are channelized, much of the sediment ends up out in the ocean instead of slowing depositing on coasts.

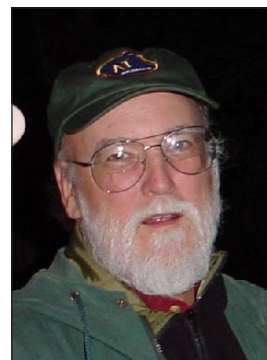
The **Caernarvon River Diversion** was created to divert fresh water, containing vital nutrients and sediments, from the Mississippi River to the bays and marshes of the Breton Sound. Both positive and negative effects of the fresh water diversion are being monitored by scientists.

Water quality is measured and evaluated by examining several different physical, chemical and biological characteristics of water. Standards or limits of water quality relate to the requirements of the plants and animals in an ecosystem, and to human health.

Chlorophyll is the green pigment found in plants, including phytoplankton, and is what allows them to turn sunlight into energy. Measuring the concentration of chlorophyll in samples of water allows scientists to estimate the total amount of algae that is present in a water body.

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