



Image: Lane Lefort Photography

UNDERSTANDING BTNEP

Mission, Vision, Goals, and Priority Issues

What is BTNEP?

The Barataria-Terrebonne National Estuary Program (BTNEP) works to protect and preserve the land, water, people, and culture located between the Mississippi and Atchafalaya Rivers in southeast Louisiana. BTNEP is one of the 28 National Estuary Programs throughout the United States and its territories. The National Estuary Program (NEP) was established by Congress through Section 320 of the Clean Water Act (CWA) of 1987. The Barataria-Terrebonne estuarine complex became a National Estuary in 1990. In 1990, BTNEP Management Conference (BTNEP MC) was created to provide direction and oversight of the Comprehensive Conservation Management Plan (CCMP) implementation. The BTNEP MC consists of diverse stakeholders who collaborate to address the preservation and restoration of the estuary through a science-based, collaborative decision making process while addressing and supporting stakeholder interests. The long-term dialogue and continued commitment of this partnership drives the success of BTNEP.

BTNEP was established in recognition of the national significance of this estuary system. An estuary is classified as an area where freshwater from rivers, streams, or bayous meets the saltwater of the sea. The range of habitat types found in estuaries makes them some of the most ecologically productive systems in the world.

This estuary provides a host of resources to the nation. Oysters, shrimp, finfish, goods transported through our ports, oil and gas and their related infrastructure are all integral to our country. Our estuaries also provide for unique cultural experiences and tourism opportunities. BTNEP MC members work to nurture the land and water of this estuary.

BTNEP and the stakeholders of the area have made a concerted effort to improve the estuary and tackle tough environmental problems since the early 1990s. This first revision of the original CCMP keeps the public-private partnership pledge to work together to reestablish a chemical, physical, and biological balance in the estuary and engages future generations to assist with the estuary's recovery. BTNEP and its partners continue to acknowledge the importance of this estuary in our environmental, cultural, and economic well-being. The people living, working, and recreating in the Barataria and



Terrebonne Basins believe that we should have a balanced ecosystem.

Mission


The official mission of BTNEP is to preserve and restore the Barataria-Terrebonne Estuary System (BTES), the 4.2 million-acre region between the Atchafalaya and Mississippi Rivers. BTNEP strives to rebuild and protect the estuary for future generations through the collaborative decision making process of the BTNEP MC to implement a science-based, stakeholder-led, consensus-driven plan using partnerships focused on the estuary's rich cultural, economic, and natural resources.

The people of Louisiana and the Barataria Terrebonne estuarine basins believe that the Barataria-Terrebonne ecosystem is a national treasure which represents a unique multi-cultural heritage. It is further recognized that our communities' ongoing stewardship is critical to its preservation, restoration, and enhancement. This science-based stewardship can be maintained only by the wisdom of the BTNEP MC, the active support of those who live in the basin, and those who use its abundant resources locally, statewide, and throughout the nation.

Acknowledging the importance of this estuary to our environmental, cultural, and economic well-being, the people living and working in these two basins



Volunteers cleaning the beach at Elmer's Island. Image: Lane Lefort Photography



believe that we should have a balanced ecosystem that includes:

- public education and informed citizen participation.
- local, state, and national recognition and support.
- maintained multi-cultural heritage.
- sustained and restored wetlands that support viable fish and wildlife resources.
- pollution abatement to protect the health of plants, animals, and people.
- environmentally-responsible economic activity.
- environmentally-compatible infrastructure (roads, bridges, levees, railroads, etc.).
- comprehensive, integrated watershed planning among all users.
- harmonious use of the resources by many interests and resolution of user conflicts.

Public involvement in the BTNEP process has been extensive and has occurred at two levels. First has been the strategy of inclusion in which individuals from throughout the estuary have been invited to become active members of the BTNEP MC to assist in plan formulation. The second level has been the strategy of information dissemination in which BTNEP has participated; BTNEP Action Plan Teams (APT), volunteer events, education activities, and events have all been instrumental in moving BTNEP forward.

Our overarching goal of BTNEP is to maintain multi-level, long-term, comprehensive watershed planning that improves the quality of life for people of the estuary.

The BTNEP MC and the community have pledged to work together to implement a plan to reestablish a chemical, physical, and biological balance in the BTES so that diverse plant and animal communities and human health and welfare can be improved and sustained for present and future generations.

Goals

The intention of BTNEP is the support of activities that sustain:

- the estuary's public water quality.
- shellfish, fish, and wildlife habitat and populations.
- recreational and commercial opportunities for estuary residents.
- the protection and preservation of our unique cultural heritage.

The BTNEP MC delineated the fundamental goals of BTNEP in 1992. These goals provide the basis for all Action Plans found in the CCMP. The goals of BTNEP are to:

- implement comprehensive education and awareness programs that enhance public involvement and maintain cultural heritage.
- preserve and restore wetlands and barrier islands.
- realistically support diverse, natural biological communities.
- develop and meet water quality standards that adequately protect estuarine resources and human health.
- promote environmentally responsible economic activities that sustain estuarine resources.

- generate national recognition and support.
- create an accessible, comprehensive database with interpreted information for the public.
- create clear, fair, practical, and enforceable regulations.
- develop and maintain multi-level, long-term, comprehensive watershed planning.
- be compatible with natural processes.
- forge common-ground solutions to estuarine problems.
- formulate indicators of estuarine ecosystem health and balance estuary use.

BTNEP Priority Issues

BTNEP MC members have identified priority problems in the estuary that are contributing to land loss: habitat modification; the decline in certain animal populations; water quality issues related to fish, shellfish, and humans; and contamination of sediment in the marshes. Each of the priority problems, in some way, affects the next, making the resolution of each of the problems that much more pressing and complex. The Action Plans that are located in the CCMP work to directly address these problems as well as the numerous institutional and societal factors that contribute to them.

In general, the overall health of the Barataria and Terrebonne Basins (BTB) shows signs of years of abuse and neglect. The following seven problems



Levee construction. Image: BTNEP



Aerial view of Larose-Golden Meadow, Louisiana, looking south to the Gulf of Mexico. Degradation of the marsh due to canals and subsidence is evident. Image: Coastal Protection and Restoration Authority

must be overcome to prevent further degradation of the habitats, ecosystems, and cultural heritage that are so unique to the system.

The seven priority problems are:

- Hydrologic Modification
- Sediment Reduction
- Habitat Loss
- Changes in Living Resources
- Eutrophication
- Pathogens
- Toxic Substances

Hydrologic Modification is considered a “linchpin” problem of the basins, indicating that all other problems revolve around it and are often affected by it. When we build levees, dredge canals,

or cut through natural ridges, the natural flow of water is changed. In some cases, such changes accelerate erosion. In other cases, it can result in changed salinity of water bodies. As a result, fresh marsh can be changed to a more “salt tolerant” type. In more extreme cases, marsh can be converted to open water.

Because of flood protection measures demanded by the public and then instituted by Congress following the Great Flood of 1927, in conjunction with those of private landowners and the State of Louisiana prior to the flood, constructed levees now line much of the Mississippi River. The levees’ unintentional consequences prevent sediment and water from being dispersed into the surrounding wetlands through periodic flooding and levee breaks. Concrete mattresses placed along the channel bank have prevented the natural tendency of the River to change course. In fact, the length of the River has been shortened by approximately 150 miles by cutoffs in the central portion of the lower Mississippi River. Both shortening of the River and placement of

concrete mats on the banks have reduced the River area exposed to erosion. In the past, soil from the River's edges was the primary source of sediment that fed the marshes.

Canals for navigation and oil and gas exploration and production are another type of hydrologic modification. When canals are constructed, the excavated material is placed alongside the canal, creating spoil banks. The impact of this type of activity can be threefold. First, the canal itself creates paths of ingress for waters of higher salinity, forcing animals to either adapt or relocate. Native plants have little choice but to adapt to their new environment or die. Second, erosion can occur along the canal banks with the passing of each vessel, converting more land to open water. Third, the dredged material alters the natural flow of water across the estuary landscape, sometimes creating lakes and in other cases, depriving large areas of water, nutrients, and sediments.

Impacts of canals are not, however, all necessarily

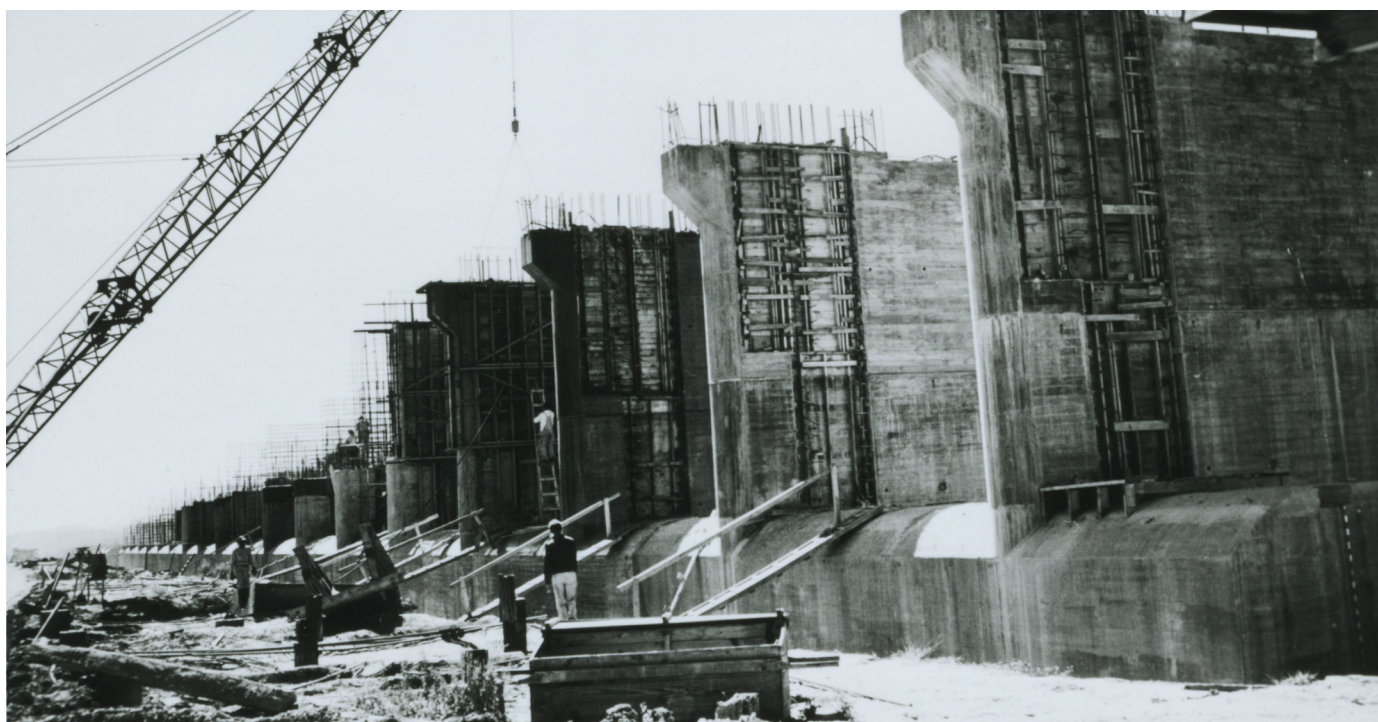
negative. Canal banks do provide some diversity of habitat, especially in coastal areas. Canals provide significant recreational opportunities and aquatic production potential as well.

Probable Causes of Hydrologic Modification:

- Diking and leveeing of wetlands
- Maintenance dredging; spoil banks
- Excavation of channels and canals for navigation and/or oil, gas, and mineral exploration; particularly those excavations deeper than surrounding waters
- Diversions of freshwater flows and sediment loads for navigation, flood control, or water supply purposes

Probable Impacts of Hydrologic Modification:

- Reduced sediment flows
- Habitat loss/modification



Construction of the Morganza Spillway. Image: U.S. Army Corps of Engineers.

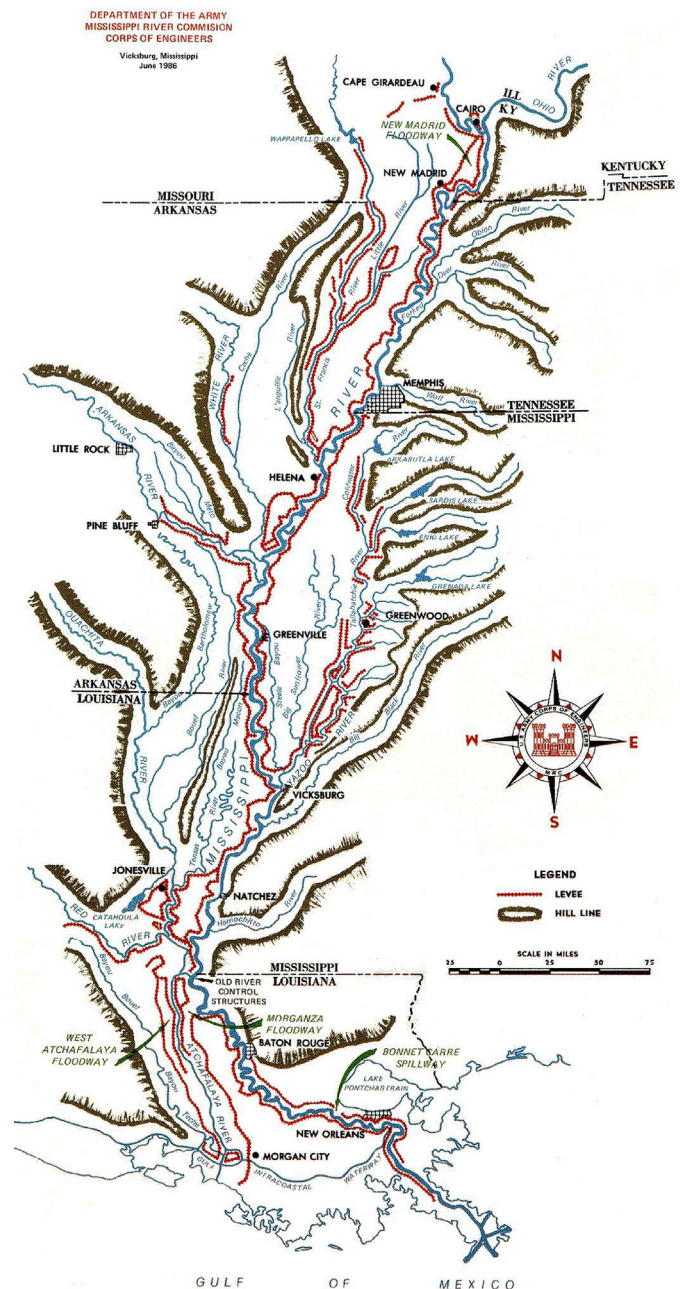
- Changes in living resources
- Eutrophication
- Pathogen contamination
- Toxic substances

Sediment Reduction is tied directly to hydrologic modification. Louisiana marshes need a source of sediment to survive. Historically, the Mississippi River provided the sediment. Now, however, levees confine the sediment to the River thus bypassing the marshes, ultimately depositing it on the continental shelf in the Gulf. Our coastal marshes constantly undergo a natural process called “subsidence” which results in the land slowly sinking. In the past, the rate of sediment building equaled or surpassed the rate of sinking, and the level of the marsh remained about the level of the sea.

Currently, subsidence is caused by cumulative natural and human-induced factors. As the Mississippi River has changed course over thousands of years, the ancient, abandoned deltas sank due to lack of sediment input. Additionally, natural sediment compaction, sediment loading, geochemical processes, and underlying geological growth faults also contribute to subsidence.

The construction of extensive human-made levees throughout the estuary have also starved the wetlands from receiving annual nourishment from riverine waters filled with nutrients and sediments. New sediment deposition no longer keeps up with subsidence. Also, forced drainage for flood control accelerates subsidence by removing pore water and accelerating oxidation of organic matter in soils. Removal of underground oil and gas has also contributed to subsidence and land loss.

In a 2017 study conducted by Tulane University, subsidence rates as high as 10.6 millimeters per year were determined using surface elevation change and vertical accretion. This coastal subsidence causes land loss and degrades the integrity of infrastructure and wetland services.



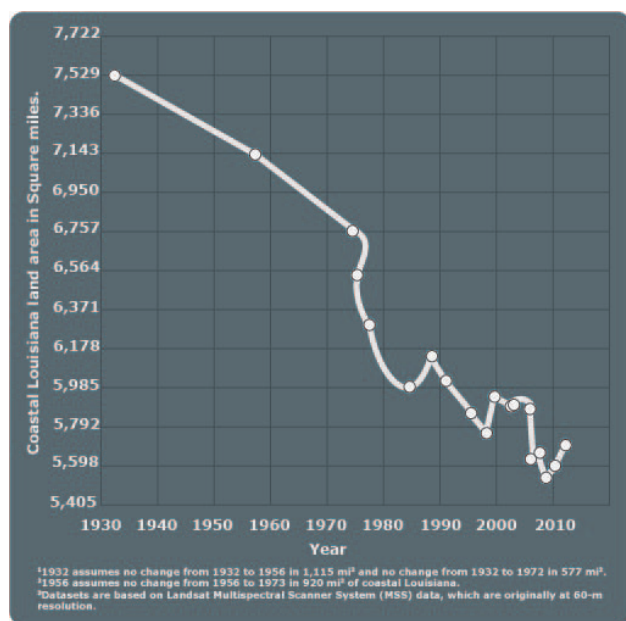
Principal Tributary Basin Improvements of Mississippi River. Image: U.S. Army Corps of Engineers.

Today, the River carries up to 80 percent less sediment than it did a century ago. Dams, reduction in land, clearing and tilling, and implementation of conservation measures that reduce erosion upriver are the major causes of the reduction. Thus, even if all of the levees along the Mississippi River were removed today, the marshes would still receive significantly less sediment than they did in the 1800s.

Still, some sediment does move into coastal marshes during hurricanes and winter cold fronts when wind-driven waves stir mud on the bottom of shallow bays. The volume of the sediment, however, is usually inadequate to counter the effects of subsidence. The existence of levees, canal banks, roadbeds, railroad embankments, and changes upriver all contribute to the problem of inadequate sediment distribution in our coastal marshes.

Probable Causes for Sediment Reduction:

- Navigation and oil/gas extraction canals
- Levees



Land area in coastal Louisiana, 1932–2010. Coastwide, net land area decrease from 1932 to 2010 was 1,883 mi². Image: USGS.

- Diking and leveeing of wetlands
- Spoil banks from dredging activities
- Upstream diversions of the Mississippi River into other basins resulting in less water and sediments available for the estuarine complex
- Locks and dams on the Missouri, Ohio, and upper Mississippi rivers

Probable Impacts of Sediment Reduction:

- Sedimentation rate becomes less than the rate of apparent water level rise (subsidence and sea level rise)
- Submergence and mortality of wetland vegetation
- Internal fragmentation of wetlands
- Lowered productivity of wetland vegetation

Habitat Loss is a function of hydrologic modification and sediment reduction. What is known about the rate of habitat conversion, and ultimately land loss in the coastal areas of the BTB, is that it is alarmingly high. According to a U.S. Geological Survey (USGS) study completed in 2010, “Land Area Change in Coastal Louisiana from 1932 to 2010,” the BTES has lost a total of 865.57 square miles since 1935.

The BTB continue to have the highest land loss rate in Louisiana. Subsidence and sea level rise are major factors in the land loss. Episodic events such as hurricanes and severe winter storms have significantly contributed to land loss. The hurricanes of 2005 (Katrina and Rita) caused storm induced stress. Since 1935, the two basins have lost 865.37 square miles of land or 287,724 acres.

Land loss is not evenly distributed across the BTB. Hot spots of land loss can be seen at the southernmost tip of the basins near the mouth of the Mississippi River in the Barataria basin, moving northward in a narrow band following the river and extending



Work on the Algiers Lock in New Orleans. Workers descend on the dewatered structure to complete repairs. U.S. Army Corps of Engineers. Image: Kirk Dietrich.

westward to Bayou Perot and Rigolettes. A second hot spot occurs along western Barataria Bay to the Gulf. In Terrebonne Parish, the area of greatest marsh loss occurs in the marshes north of Terrebonne Bay, extending south along the western edge of Terrebonne Bay.

Habitat loss can occur due to many activities. As noted earlier, sediment loss, in conjunction with the natural sinking of marsh, is by far the most significant problem in the estuary. Sea level rise and erosion also contribute to the problem, as can human activities such as canal dredging and construction of navigation channels. Additionally, overgrazing by mammals, such as nutria and hogs, destroy plant communities that hold soil in place. Studies have indicated that hurricane damage is increased in marshes that have been heavily grazed by nutria or wild hogs.

Storm surges and winds associated with severe tropical storms and winter fronts are additional

natural forces that account for significant habitat alteration and land loss in the estuary. During storms or periods of floods, habitats are subjected to changes in water chemistry and extended periods when they are totally submerged. When a wetland plant experiences sustained and deep flooding, growth suffers. If the flooding stress is sufficient, the plant dies. In the case of saltwater intrusion from the Gulf, some plant species have adapted and exclude salt from their tissues, but their tolerance of salt varies widely. Most fresh marsh species, however, are unable to survive exposure to high salinity waters. When fresh marsh plants die quickly from salt-water exposure, their roots can no longer hold the soil, and massive soil loss can occur.

Probable Causes of Habitat Loss:

- Hydrological modifications and wetland subsidence resulting in saltwater intrusion

- Spoil banks and diking or leveeing of wetlands resulting isolation, submergence, and mortality of wetlands
- Wetland erosion and internal fragmentation
- Shoreline erosion by commercial and recreational boat wakes
- Filling of wetland for agriculture and other development
- Invasive Species
- Development

Probable Impacts from Habitat Loss:

- Decreases in sport and commercial fish and shellfish populations
- Changes in fur-bearing and waterfowl populations with sport and commercial value

- Reduced recreation and commercial value of wetlands and estuaries
- Decreased acreage available to treat pollution inputs resulting in increased levels of eutrophication, pathogen contamination, and toxic substances
- Decreased capacity to buffer storm energy
- Decreased habitat for neotropical migratory birds and other species such as the black bear

Changes in Living Resources are monitored by BTNEP and BTNEP MC members. Living Resources are considered animals that live in the estuary. Living resources use the diverse habitats of the estuary. Approximately 735 species of birds, finfish, shellfish, reptiles, amphibians, and mammals spend all or part of their life cycle in the BTE. Several of the species are categorized either as threatened or



Blue crabs, fresh from the Gulf of Mexico. Image: Louisiana Sea Grant.



Trash deposit near a water body. Image: Lane Lefort Photography

endangered. Many factors contribute to declines in animal populations.

Change in habitat is a significant factor for most of the organisms. Pollution can also have a negative impact on the health of species and their ability to reproduce. Additionally, over-harvesting by fishermen, hunters, and trappers can harm animal populations.

In spite of threats that face animal species throughout the BTB, data indicate that many have not experienced continuous declines in population over the past thirty years. This is true for all estuarine dependent finfish and shellfish and for most of the wading birds and raptors.

For some species that have seen significant declines in population over time, there have been success stories. At the same time, some species of concern have recovered. Alligators, the Louisiana black bear, and birds, such as the American bald eagle and the brown

pelican, have recovered following near extinction in the area due to reproductive failure caused by pesticides or over hunting. Recovery efforts have made a significant increase in the numbers and health of these animals. Several species have been removed from the U.S. Fish and Wildlife Service (USFWS) threatened and endangered species list. Migratory waterfowl that winter in the region are monitored to help track continental trends.

New concerns about overfishing of blue crabs remind residents of the need for conservation. In February 2017, Louisiana hosted the first blue crab fishing closure to identify if this technique might have an effect on crab populations. Additionally, female crabs should not be harvested if they are immature (those with triangular aprons on their bellies) or if they are in the “berry” stage (carrying the eggs of the young on the abdomen – locally called pom-pom crabs).

Hunters and fishers are reminded to check the Louisiana Department of Wildlife and Fisheries (LDWF) site, <http://www.wlf.louisiana.gov/>, annually for changes to the regulations.

Probable Causes for Concern in Changes in Living Resources:

- Historic habitat loss/modification
- Commercial fishing (over-fishing)
- Historic wildlife hunting (over-harvesting)
- Aquaculture
- Water pollution (eutrophication, pathogens, toxins)
- Conflicts between recreational and commercial fisheries
- Introduction of exotic species

Probable Impacts from Changes in Living Resources:

- Decreases in sport and commercial fish and shellfish populations
- Changes in furbearing and waterfowl populations with sport and commercial value
- Reduced recreation and commercial value of wetlands and estuaries
- Decreased populations or extinction of some native species

Eutrophication occurs when too many nutrients, such as phosphorus and nitrogen, enter the water. The process begins with an accelerated growth of algae with the result being that oxygen in the water is depleted as plant matter decays, killing fish and shellfish.

All of these affects combined can select for only certain species of fish that are low-oxygen tolerant species and decrease fish diversity.

Probable Causes of Eutrophication:

- Malfunctioning sewage treatment plants
- Malfunctioning septic tanks
- Urban runoff
- Agricultural runoff
- Mississippi River diversions
- Channelization of runoff directly into the estuary
- Channel dredging and loss of wetlands resulting in reduced capacity of the estuary to filter out nutrients

Probable Impacts of Eutrophication:

- Algal blooms, floating masses of algae and noxious odors
- Reduced recreational value of beaches and water bodies
- Anoxic conditions resulting in fish kills
- Changes in species composition and population
- Decreases in wildlife populations with sport and commercial value
- Reduced recreational and commercial value of wetlands and the estuaries

Pathogens are disease-producing organisms such as bacteria and viruses. The sources of these organisms are human waste, pasture runoff from animal waste, and waste products of marsh animals such as nutria and birds. Examples are described below. Bacteria commonly found in sewage pollution can be of serious concern as it causes infection, rashes, and other serious diseases. *Vibrio* bacteria can cause both food borne and wound related illnesses.

Physical contact with natural marine pathogens while swimming or eating raw seafood can harm people who are predisposed to liver, blood, or stomach problems or are in other ways immunocompromised. Eating



Aerial view of an algae bloom. Image: Eutrophication&hypoxia.org

shellfish contaminated by human fecal pathogens can also cause illness such as gastroenteritis, salmonellosis, and hepatitis A, and, in more severe cases, death for people suffering from certain immune system disorders or who are immunocompromised.

To reduce the risk of illness associated with consumption of shellfish contaminated by pathogens, state agencies have been forced to close oyster beds where tests have indicated high fecal coliform levels in the water.

In spite of the development of plans for a parish-wide sewage treatment facility and regional efforts to prevent direct dumping of sewage at camps, fecal coliform continues to be a persistent problem.

Probable Causes of Pathogens:

- Community and municipal sewage plants

- Failing septic tanks and individual home sewage treatment plants
- Hunting and fishing camps
- Urban runoff
- Agricultural runoff
- Naturally occurring pathogens, particularly in warm water with high salinity
- Illegal disposal of medical waste

Probable Impacts from Pathogens:

- Food poisoning
- Closure of oyster beds
- Loss of revenue and employment

Toxic Substances exist in the BTB. Water, animal tissue, and sediment testing have identified a variety of toxic substances in the BTB. Some of the substances are known cancer-causing agents while others affect reproduction. When some animals consume contaminated food, the toxic concentration is magnified. Human consumption of highly contaminated seafood poses health risks. Toxics found throughout the system come from point sources, such as industry, and non-point sources, such as urban runoff.

Numerous potential sources of these toxicants exist within the BTB. The toxic substances include: herbicides used in aquatic weed control, inputs from a variety of petrochemical and chemical industries along the Mississippi River, light industry and domestic inputs from population centers, storm and urban runoff, atmospheric deposition, recreational and commercial boats/ships, drilling fluids and produced waters from oil and gas production, runoff and leachate from hazardous waste sites, and

pesticides and herbicides from agriculture

The greatest inputs of toxic substances into the BTB are from discharges along the eastern margins of the basins because of heavy industries, large urban centers, and agricultural areas along the river corridor.

The factors which determine a pollutant's risk to people and the ecosystem include toxicity concentration, bioavailability (the extent to which an organism can take up these pollutants), and persistence. Environmental contaminants may be very stable, toxic at low concentrations, and bioavailable. Moreover, several may have carcinogenic effects. These characteristics increase the likelihood of toxic effects in the environment itself as well as on human health.

Probable Causes of Toxic Substances:

- Emission of toxic material from hazardous waste, recycling, and disposal facilities
- Drilling fluids and produced waters



Shucking oysters fresh from the Louisiana coast. Image: Louisiana Sea Grant



High school students participating in BTNEP Youth Marine Debris Prevention and Education Program. Image: Lane Lefort Photography

- Illegal dumping of toxic, industrial, and commercial wastes
- Agricultural runoff with pesticides and herbicides
- Sewage plants
- Aquatic weed control
- Mississippi River diversions
- Atmospheric deposition
- Accidental spills including oil spills
- Leachates from hazardous waste in landfills and inactive hazardous waste dumps
- Storm and urban runoff
- Outfalls of industrial effluents containing heavy metals, PCBs, and other toxins
- PCBs from leakages of petrochemical pipelines and storage facilities

Probable Impacts from Toxic Substances:

- Poisoning of wildlife and fish and the reduction of reproduction
- Decrease in wetland vegetation
- Contamination of oyster beds
- Decreases in submerged aquatic vegetation



Nicholls State University Science Camp. Image: Lane Lefort Photography

- Loss or reduction of commercial and sport fish and wildlife populations
- Contaminations and closure of commercial and recreational fisheries

will certainly improve the health and well-being of the BTES and its residents.

Priority Problems Addressed through the CCMP

The value of having a CCMP is that these priority problems can be addressed in a comprehensive manner that includes all of the BTNEP stakeholders. The CCMP takes the interactions of the problems into account and identifies solutions.

The health of the BTES and the quality of its bayous, bays, fish, and wildlife are critical to our regional economy and the substance of our nationally-unique culture. Addressing these priority problems directly

Protect and Preserve BTNEP

