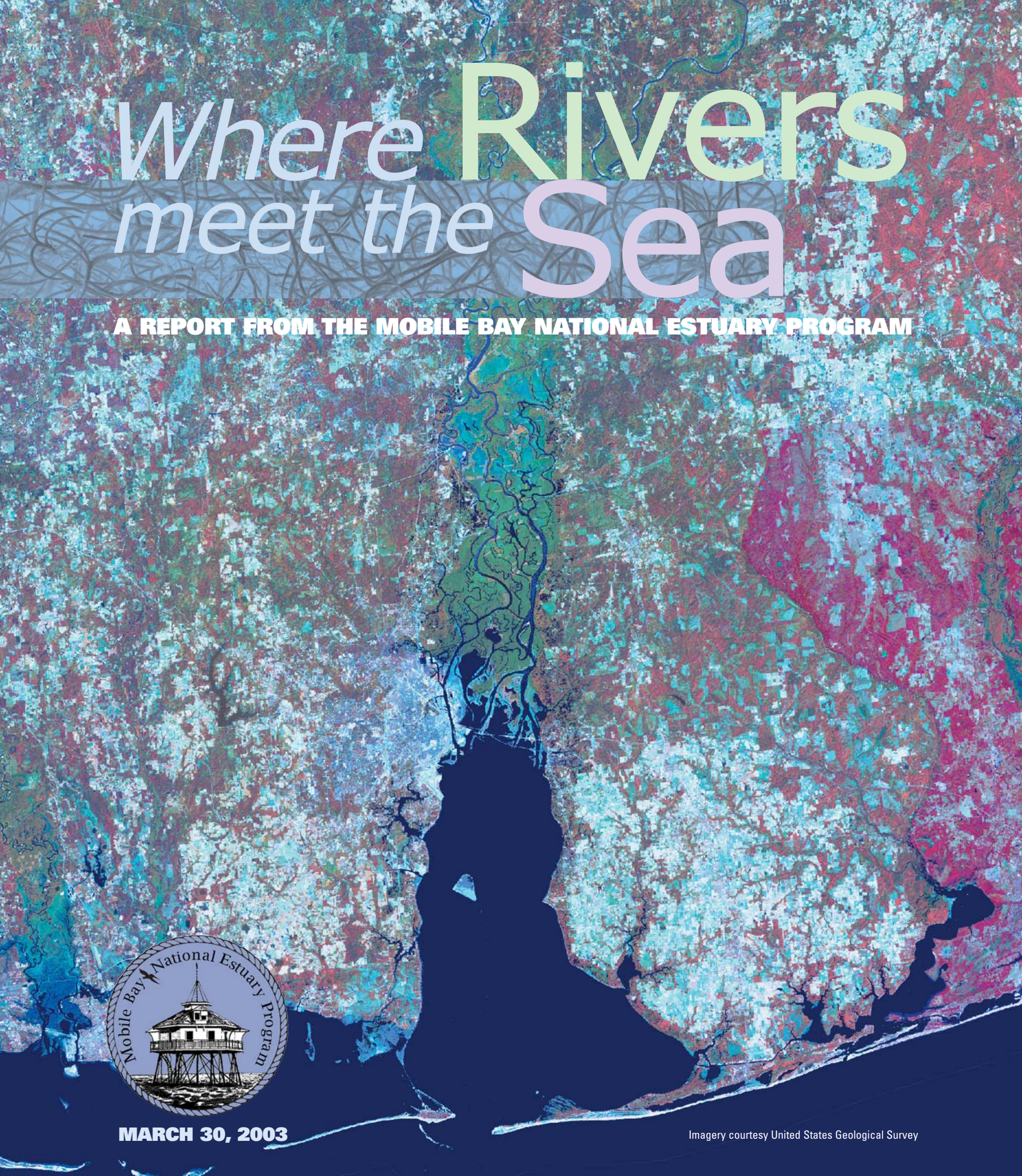
Where Rivers *meet the* Sea

A REPORT FROM THE MOBILE BAY NATIONAL ESTUARY PROGRAM



MARCH 30, 2003

Imagery courtesy United States Geological Survey

Mobile Bay National Estuary Program

Lee Yokel

Randy Sims

Randy Sims

Lee Yokel

Lee Yokel
Randy Sims

WELCOME

Mobile Bay and the Mobile-Tensaw River Delta are two of Alabama's greatest natural resources. We are truly blessed to live in such close proximity to them and enjoy the benefits they provide. Our estuary is incredibly rich in its diversity of plant and animal life.

In 1995, Mobile Bay was deemed an estuary of national significance by the Environmental Protection Agency (EPA). A management conference of diverse interests was convened to create the Mobile Bay National Estuary Program (Mobile Bay NEP). The goal of the program is to promote the wise stewardship of the water quality and living resources of the estuary. An environmental plan was developed to promote this goal and was completed in 2002. Today, the many members of the Mobile Bay NEP work to accomplish the tasks outlined in the plan. All levels of government, environmental interests, business, researchers and citizens are working together.

We hope this insert helps introduce you to environmental stewardship and challenges within the Mobile estuary. We have included information on current and past initiatives that help protect our waters and living resources. Our topics are as diverse as the writers who contributed to this document. Indeed, a healthy Mobile estuary is dependent upon everyone.

Mobile Bay has a major impact on Alabama's economy. Some of us depend on it for our livelihood and others for recreation. All of us depend on the estuary for the quality of life and sense of place it provides. The water and living resources of the Mobile Bay and Delta are important to us all. These waters and living resources are part of our culture, but they do face environmental challenges and pressures.

It has been said we don't own the lands and waters but simply borrow them from future generations. We must act responsibly and as good stewards of these precious resources so our children and theirs benefit from the richness of nature we have known. I hope you enjoy this insert and you find it useful.

David Yeager, Director
Mobile Bay National Estuary Program

Dauphin Island Sea Lab: An Experiment in Science Education

In 2002, the Mobile Bay NEP was pleased to join the Coastal Policy Center of the Dauphin Island Sea Lab (DISL). A natural match, the Coastal Policy Center assists local, government and business interests with comprehensive coastal resource planning. Collaborative partnering efforts of the Mobile Bay NEP with the community, combined with the research and education of DISL, help to span the gaps between science, planning, and concrete projects.

DISL celebrated its 30th anniversary last year, a unique experiment in science education. The 17 founding colleges and universities of Alabama (now 22) established the DISL as an educational summer field program for biology and geology majors. The island location of the former Air Force base was a natural to house programs oriented towards the marine sciences. The summer program was well subscribed from the start, and has grown to accommodate as many as 130 undergraduate and graduate students in each of three sessions. With the addition of programs for K-12 and teacher-training, DISL has become the largest summer marine educational program in the nation. DISL's most visible teaching tool is the Estuarium, a public facility among Alabama's top twenty attractions.

Dr. George Crozier

FAST FACTS

- 1948 – Federal Water Pollution Control Act
- 1969 – National Environmental Policy Act passed by the U.S. Congress
- 1970 – Environmental Protection Agency created
- 1971 – Dauphin Island Sea Lab established
- 1972 – U.S. Congress passed the Clean Water Act and Coastal Zone Management Act
- 1973 – Endangered Species Act passed by U. S. Congress
- 1979 – Alabama Coastal Zone Management Act
- 1987 – Amendments to the Clean Water Act created National Estuary Program
- 1995 – Mobile Bay National Estuary Program (Mobile Bay NEP) established
- 2002 – Mobile Bay NEP Comprehensive Conservation and Management Plan approved

HISTORY OF COASTAL ZONE MANAGEMENT IN ALABAMA

Life as we know it has always been drawn to water. Over the last century, there has been a dramatic expansion of ocean going commerce, commercial fishing, and offshore oil and gas exploration, resulting in population growth along our coasts. Increased demands on our coastal resources through economic development activities have resulted in degraded land and water resources, loss of wildlife habitats, increased pollution, and diminished public access. We have a responsibility to protect our coastal environment for future generations, and to strike an often difficult balance between economic growth and protection of natural resources.

The environmental movement of the 1960s drove the development of several pieces of landmark legislation that emerged in 1972, one of which was the Coastal Zone Management Act. The Act was not strongly regulatory in its language and proposed the development of federal-state partnerships in which federal funds would be made available to states designing *Coastal Zone Management (CZM)* programs for their coastal area that were "consistent" with minimum federal standards. The CZM is administered at the federal level through the *National Oceanic and Atmospheric Administration (NOAA).* The state of Alabama entered the CZM program in 1979 with the development and approval of the *Alabama Coastal Area Management Program (ACAMP).*

The ACAMP defined Alabama's coastal area as the upland continuous ten-foot contour (ten feet above mean sea level) seaward to the limit of the state's territorial waters (three miles offshore). Establishment of the ten-foot contour as the ACAMP management boundary represents one of the first balancing acts of the program, as early proposals ranged from as large as the two county area to as small as the area seaward of the mean high tide line.

Since its initial adoption in 1979, the ACAMP has witnessed an evolution of governing bodies. Today, the duties of administering the ACAMP are split between two state agencies. The Alabama Department of Environmental Management has permitting, regulatory and enforcement authority for the program and has created a Coastal Programs office to fulfill these functions. Administration, education & outreach, planning and overall management responsibilities rest with the State Lands Division of the Alabama Department of Conservation and Natural Resources.

The ACAMP consists of comprehensive management policies and guidance for the protection and enhancement of the quality, quantity and viability of coastal resources and the management of the uses of these resources. The purpose of the program is to promote, improve and safeguard the lands and waters located in Alabama's coastal area through a comprehensive and cooperative program designed to preserve, enhance and develop such valuable resources for the present and future well-being and general welfare of the citizens of this state.

The ACAMP and Mobile Bay National Estuary Program go hand-in-hand. In 2002, ADCNR entered into a memorandum of agreement with the Mobile Bay NEP to serve as the state sponsor and champion for the NEP. This partnership ensures that the two programs will continue to work together to strike the critical balance needed in coastal Alabama.

FAST FACTS

- Mobile Bay is a submerged river valley about 31 miles long and ranging from 10 to 23 miles wide
- The Mobile estuary is the sixth largest drainage basin in the Continental U.S.
- Five major rivers empty into Mobile Bay
- The Bay and Delta combined are 285,000 acres of open water
- There are 35 boat ramps that access Mobile Bay
- The first Mobile Bay ship channel was dredged in 1830. The channel today is 45 ft. deep and 400 ft. wide

OUR RICH SHIP BUILDING HERITAGE

More than one hundred years ago, when Dauphin Island was the home port of Mobile, a thriving ship-building business owned by the Collins family built the finest sailing vessels from here to the Florida Keys. The Mobile Shipyard was located on Mon Luis Island and built its sleek, wood vessels until 1954. One of the reasons for the shipyard's success was the standard of work the Collins' put into each vessel. Most of the time, they were not able to keep up with the demand. They built everything from pleasure boats to fishing vessels used to trawl for fish, shrimp and oysters. They even built a 50-foot schooner to aid the Confederate Army as a blockade runner against the Yankees in Mobile Bay during the Civil War. This is just one of the many examples of the richness of the Mobile Bay area, and should serve as a reminder that the Bay needs to be protected to preserve Alabama's history, and its beautiful environment.

Blair Bateman

Randy Sims

Diana Sturm

Water Quality

Randy Sims

Diana Sturm

Debbie Jones

Mobile Bay NEP

WATER QUALITY IN MOBILE BAY?

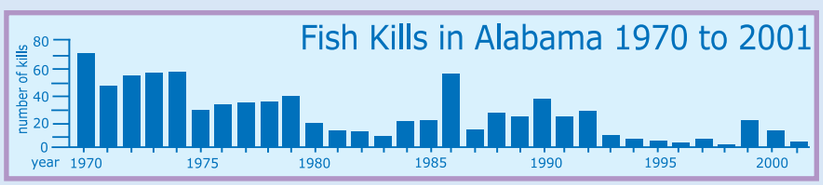
One of the most commonly asked questions the Mobile Bay NEP faces is, *"How clean is the water in the Mobile Bay estuary?"* Unfortunately, such a simple question is difficult to answer.

A recently released National Coastal Condition Report assessed the overall condition of Gulf of Mexico estuaries as between fair and poor based on seven indicators: water clarity, dissolved oxygen, wetland loss, nutrient enrichment, sediment and fish tissue contamination, and diversity of bottom communities. In 1998, a report by the Alabama Department of Environmental Management (ADEM) rated the overall water quality in Mobile Bay as good to fair. Assessing water quality is complex and dependent on the standards used. It may also be affected by season among other factors. Water condition is impacted not only by regulated industrial discharges (point sources) but by harder to control nonpoint sources (see sidebar) Today, ADEM has identified 30 separate stream segments in Mobile and Baldwin Counties that are impaired; chiefly due to low oxygen, pathogens and mercury. However Weeks Bay is listed as an Outstanding National Resource Water and portions of the Tensaw River are classed as an Outstanding Alabama Water. The picture is indeed a mixed bag.

Historically, water quality was relatively unimpaired during early European settlement. An account from a British traveler to the area late in the 19th century described Mobile Bay's "neighboring shores as abounding with immensely large oysters," which, out of the shell, were "quite commonly as long as a man's hand!" Because oysters are good indicators of a healthy environment, we assume the bay's water quality was still very good.

The first "point source pollution" probably emerged with the first paper mill located on Three Mile Creek in 1856. Mobile's abundant water supply was recognized then as an acceptable way of disposing of industrial waste. By the 1940s, pathogen contamination, presumably from sewage, was on the rise. As late as the 1970s, fish kills were common throughout the State but declined to one-half of those values by the 1990s. The vast majority of those kills were almost certainly attributed to low dissolved oxygen in the water as opposed to chemical toxicity. There is seldom an adequate understanding of the fact that there is simply not very much oxygen in water – ever! The "jubilees" of the eastern shore are a naturally occurring manifestation of oxygen depletion.

Dramatic improvements have been made in water quality since the passage of the Clean Water Act in 1970. Initial federal efforts were aimed at point source dischargers on America's waterways and creating financial incentives to municipalities to assist cleaning up domestic sewage and industrial waste. Since the requirement to permit point sources, the number of permittees in Mobile County has risen to over 400, while the level of discharges has decreased substantially. These efforts have been so successful that today the primary threat to water quality is nonpoint source pollution. Land and water use practices, natural processes, coastal population increases, and other human uses can contribute impacts larger than those regulated by discharge permits. We can safely say our water quality is not as good as it was when European settlement began but it is much better than it was in the 1970's. We can also safely say that there are areas of particular concern.



Our challenge in the 21st century is to learn how to control the difficult issues of human activity and habitat alteration directly influencing Mobile Bay water quality.

FAST FACTS

- 1589 – Water closet invented by Sir John Harrington in England but the invention was ignored until 1778
- 1868 – Mobile's first sewer installed in Conti Street
- 1885 – British scientist discovered slow filtration through sand reduces bacteria in drinking water by 98 percent
- 1952 – Alabama State legislature enacted "The Enabling Act" empowering municipalities to create entities that could acquire, purchase, maintain and operate water systems or any part thereof. As a result the Mobile Board of Water and Sewer Commissioners was created
- 1968 – The Mobile Area Water and Sewer System was established as we know it today
- 1977 – Clean Water Act Amendments
- 2002 – Improvements and capital investment in sanitary sewer systems in Mobile, Daphne and Fairhope help reduce introduction of bacteria and pathogens in area waterways. Agreement between the Mobile Area Water and Sewer System and Mobile BayWatch resulted in a $60 million dollar upgrade by MAWSS over the next five years

Randy Sims

WHO IS MONITORING OUR WATER QUALITY?

The condition of the water in a certain place – your swimming pool, your faucet, underground, in the rivers leading to the bay – is measured for healthiness to protect humans and the many species living in our waterways. Just because the water looks clear, is it really clean? Many groups and agencies in South Alabama have made it their mission to monitor the water and educate us on its quality.

THE ENVIRONMENTAL PROTECTION AGENCY (www.epa.gov/emap/nca/) is conducting the National Coastal Assessment, a five-year comprehensive monitoring program to survey the condition of the nation's coastal resources. Types of data collected include water column parameters, sediment chemistry and toxicity, benthic communities, fish, and tissue contaminants.

THE UNITED STATES GEOLOGICAL SURVEY (water.usgs.gov/nawqa/) has a National Water Quality Assessment Program to develop long-term, consistent and comparable information on streams, ground water, and aquatic ecosystems. The Mobile Basin is a primary research site.

ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT (www.adem.state.al.us/FieldOps/Monitoring/monitoring.htm) ADEM regulates discharges to state waters and then monitors waterways throughout the Mobile Bay area. ADEM partners with the other agencies and organizations to manage the collection and integration of data on the water column, sediment, bacteria, macro invertebrates, land use data, topographic characteristics, wetlands and beach monitoring at a number of public recreational areas. These samples are analyzed for bacteriological indicators of potential human pathogens.

THE ALABAMA DEPARTMENT OF PUBLIC HEALTH (www.adph.org) issues Fish and Shellfish Advisories to the public to understand both the benefits and risks of different types of seafood. Sampling of animals and water provides the information needed for issuing advisories.

THE GEOLOGICAL SURVEY OF ALABAMA (www.gsa.state.al.us/), established in 1848, gathers data on a host of scientific parameters, such as shoreline erosion, water well usage, ground-water levels, and surface water quality. Three new conductivity sensors, purchased by the Mobile Bay NEP, monitor wells in Gulf Shores and the Fort Morgan Peninsula for saltwater intrusion.

THE COASTAL ALABAMA CLEAN WATER PARTNERSHIP (www.ag.auburn.edu/dept/faa/aumerc/Extension/clean_water_partnership/Index.htm) is part of a statewide effort working on TMDLs (see side bar). Local stakeholders strive to identify water quality improvement projects through community participation.

THE ALABAMA WATER WATCH (www.alabamawaterwatch.org) is a statewide volunteer network promoting citizen-led water quality monitoring programs and increasing awareness of water resource conditions and trends. Local monitoring is coordinated with the following groups:

THE ALABAMA COASTAL FOUNDATION (www.alcoastalfoundation.org/) is a nonprofit organization with the area's oldest volunteer water monitoring program, Coastwatch. ACF also began monitoring recreational beaches in 2002.

THE DOG RIVER CLEARWATER REVIVAL (dogriver.southalabama.edu) is a grassroots group concerned with environmental issues affecting Dog River. One of their main programs is organizing volunteer water quality monitoring in the Dog River watershed.

THE WEEKS BAY NATIONAL ESTUARINE RESEARCH RESERVE (www.weeksbay.org) has two water monitoring stations continually collecting data such as water temperature, pH, dissolved oxygen and salinity. Connected to the reserve is Weeks Bay Water Watch, an active volunteer group with 34 monitoring sites in the Weeks Bay watershed.

THE MOBILE BAY NEP along with the Dauphin Island Sea Lab and Weeks Bay National Estuarine Research Reserve are establishing long term monitors in Mobile Bay as part of a multi-state network with Louisiana and Texas.

A partnership has formed to study the impact caused by dams and the Causeway on the Mobile Tensaw Delta. Water temperature, salinity and dissolved oxygen will be monitored to determine the salinity regime, hydrological conditions, and better define habitats for a variety of species. Current partners include ADEM, Alabama Power, the Mobile Register, Mobile Bay Watch, The Nature Conservancy and the Scenic Causeway Coalition. More partners are needed.

Industry, businesses, and municipalities are required to monitor discharges and public water supplies. This information is reported to ADEM on a regular basis.

Mobile Bay Watch, the Dauphin Island Sea Lab, Mobile Bay NEP, and the Coastal Alabama Clean Water Partnership are developing internet accessible databases to house research, monitoring information, industry data, and more.

Diana Sturm, PhD, Program Scientist Mobile Bay NEP

CLEAN WATER ACT

The Clean Water Act (CWA) addresses pollution in waters of the United States through various grants, planning, voluntary and regulatory programs. The Act envisions a cooperative effort between States and the federal government to assure the waters of the United States support fishing and swimming uses. An important part of the CWA is the wastewater discharge permitting program. Technology based treatment levels form the basic permit requirements, set for existing and new dischargers. Greater levels of treatment are required where basic levels are insufficient to meet water quality standards. The Act largely uses voluntary, grant and loan programs to address nonpoint sources of pollution. Use of technology based best management practices is envisioned for nonpoint pollution.

An important new thrust in implementing the Clean Water Act is the requirement for states or EPA to develop total maximum daily loads for streams. (TMDLs, see sidebar). Recent court decisions have required EPA and States to focus great attention on developing these TMDLs.

The CWA also created the 404 wetlands program. Persons wishing to fill wetlands must obtain a permit and meet established criteria. The Corps of Engineers issues permits and EPA oversees the program.

TMDL

THE EPA DEFINES A TOTAL MAXIMUM DAILY LOAD (TMDL) as, "a calculation of the maximum amount of a pollutant that a water body can receive and still meet water quality standards." Water quality standards for Alabama are set by ADEM. They classify water bodies according to use (such as public water supply, recreation, and Outstanding Alabama Waters.) ADEM also sets scientific criteria to ensure the water quality will continue to support that use.

The TMDL program is designed to be locally driven by citizens and businesses. The program follows a four-step process to clean up water quality. First, Alabama must develop a water quality standard for all bodies of water from streams to rivers to lakes. Second, the State determines what bodies of water are not meeting these standards for water quality. Third, these water bodies are prioritized. The State of Alabama, at the forefront, is now working with local citizens, communities and industries to determine the actions required for healthy waters.

NONPOINT SOURCE POLLUTION

Nonpoint source pollution cannot be traced back to a single point location. Water running across the ground picks up pollutants from natural processes and human activity. Material may come from households, marinas, agricultural lands, industrial sites, paved surfaces, or timber operations. The water carrying various pollutants eventually makes its way to streams, rivers and the Bay. Up to 50% of the water pollution in the United States comes from nonpoint source pollution. Controlling nonpoint source pollution is one of the last remaining hurdles to restoring water quality in many impaired bodies of water. The unique aspect of nonpoint source pollution is that everyone contributes to it.

Randy Sims

Habitat Management

THIS PLACE IS FOR THE BIRDS!

The Mobile Bay NEP area is critical habitat to many North American songbirds because it lies between the two major flyways of North America, the Mississippi River and Atlantic Ocean. Dr. Frank Moore, ornithologist at the University of Southern Mississippi, has recently pointed out that the major river basins (Mississippi and Mobile-Tensaw) serve as a natural funnel for songbird migration, providing stopover habitat, and a source for initial re-nourishment after crossing the Gulf of Mexico. The estuary also serves as critical habitat for colonial nesting birds. Many local specialists have identified loss of avian nesting habitat as a matter of some concern.

As the human population has grown along the Gulf of Mexico shoreline within South Alabama, the increase of single and multi-family dwellings has resulted in the loss of trees and low shrubs that support the first landfall for the northward migrating songbirds. Colonial nesting birds, especially the wading birds, are good indicators of the quality of a habitat. These birds require extensive saltwater and freshwater marsh habitat. Industrial and private development within the coastal area has caused habitat loss over the past twenty years. This is particularly critical along the Mobile and Baldwin County shorelines, specifically Dauphin Island and the Fort Morgan Peninsula. Numerous groups including The Friends of the Dauphin Island Audubon Sanctuary, the Nature Conservancy, Bon Secour National Wildlife Refuge, and the Weeks Bay Estuarine Reserve have helped in the procurement of land to be set-aside in its natural state for these trans-Gulf migrants and colonial nesting birds. Critical wetland habitat has been added to the holdings over the past two years. The Mobile Bay NEP has also funded an experimental enhancement of habitat on Dauphin Island in conjunction with the Auburn University Shellfish Laboratory and DISL.

Historically, Cat Island, located near Bayou la Batre, has supported a nesting colony of herons and egrets (average 2500 adult birds). This island has been the site of the only Tri-color Heron and Reddish Egret nesting within the state of Alabama. During Hurricanes Frederic and Elena the vegetation that supports the nesting colony was reduced, but during Hurricane Georges in 1998 the nesting vegetation on Cat Island was almost totally removed by wave activity and overwash. This resulted in only a couple of hundred adult birds nesting the following year, a dramatic and alarming decline.

Through a grant from the National Fish and Wildlife Foundation to DISL, the vegetation on Cat Island has been restored. In a unique effort, cuttings were obtained from the vegetation remaining on the island, grown in a commercial nursery, and then returned to the Island. Over two separate occasions, landscape architecture students from Auburn University participated in the restoration project. In 2002, approximately 1500 adult herons and egrets returned to establish nests on the Island.

There have been other significant changes in the Mobile Bay NEP area that have enhanced avian habitats. Gaillard Island, a U.S. Army Corps of Engineers dredged material disposal site, is the only nesting site of the Brown Pelican in Alabama. It also supports nesting of herons, egrets, and a multitude of gulls and terns. The nesting population of Brown Pelicans is truly one of the amazing stories of species recovery.

The Alabama Department of Conservation and Natural Resources (ADCNR), State Lands Division recently purchased over 40,000 acres of Mobile-Tensaw delta, which added to their other delta holdings, bringing the total to roughly 100,000 acres. Another major habitat acquisition was the 2,300-acre tract in the Grand Bay savannah. Setting this habitat aside via Forever Wild and Wildlife Management Area programs guarantees long-term critical habitat for the abundant avian fauna found in the Mobile estuary.

Dr. John Dindo, Senior Marine Scientist
Dauphin Island Sea Lab

Randy Sims

FAST FACTS

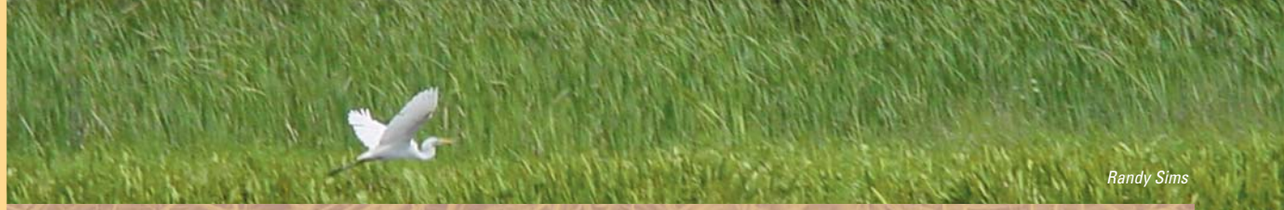
- 1773 – American naturalist William Bartram sets out on a five year journey through the US Southeast to describe wildlife and wilderness from Florida to the Mississippi
- 1874 – Othmar Zeider discovered the chemical formula for the insecticide DDT
- 1903 – President Theodore Roosevelt created first National Bird Preserve, (the beginning of the Wildlife Refuge system), on Pelican Island, Florida
- 1907 – Alabama legislature established the Department of Game and Fish, predecessor of ADCNR
- 1979 – Gaillard Island created as a dredged material disposal area
- 1980 – Bon Secour National Wildlife Refuge established
- 1982 – First Brown Pelican nesting in Alabama on Gaillard Island
- 1986 – Weeks Bay National Estuarine Research Reserve established
- 1996 – ADCNR purchased 2736 acres to form the Grand Bay Savannah Nature Preserve
- 1999 – Collectively Forever Wild, U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, Ducks Unlimited, The Nature Conservancy, Alabama Wildlife Federation, Coastal Land Trust and others begin preservation of, to date, over 100,000 acres of land in Mobile-Tensaw Delta
- 2001 – Gulf State Park expanded to preserve 591 acres of Orange Beach Maritime Forest
- 2002 – Alabama Coastal Birding Trail is established in Mobile and Baldwin Counties
- 2003 – Bartram Canoe Trail is established in the Mobile-Tensaw Delta

Randy Sims

Diana Sturm

Diana Sturm

Mobile Bay NEP



Randy Sims

A HOME TO MANY – DELTA DIVERSITY

While every state has witnessed species extinctions, such losses have not occurred uniformly across the nation. States exhibiting high numbers of extinctions tend to boast high overall numbers of species, fragile ecosystems with at-risk flora and fauna and intense human impact. Unfortunately for Alabama, all three of these scenarios apply. According to data collected by the nation's Natural Heritage programs and The Nature Conservancy, Alabama is the most extinction-prone state of the mainland United States, with 96 extinct species (83% of which are aquatic). Because of its ancient, complex geological terrain and waterways that span four river basins, Alabama is home to more species of animals and plants than any state east of the Mississippi River. An estimated 15% of these species are in peril due to human alteration of the landscape.

The Mobile-Tensaw Delta extends northward from Mobile Bay to the confluence of the Alabama and Tombigbee Rivers, encompassing approximately 250,000 acres. This watershed is considered by many to be the "best" remaining delta ecosystem of its kind in the country and is the second largest delta in the continental U.S. It provides habitat for various invertebrates, fishes, waterfowl, migrant birds, as well as, other game and non-game species.

The biodiversity is rich. Historically, over a hundred species found nowhere else in the world lived in the drainage basin. Because the Delta is a melting pot of freshwater and marine ecosystems, it supports a phenomenal diversity of at least 126 fish species, 40 species of mammals, 69 reptiles, 30 amphibians, and an untold host of insects. The plant life is equally diverse to include ancient pygmy cypress, swamp tupelos, bottomland hardwoods and beautiful swamp lilies. Sightings of formerly rare species such as eagles, ospreys, and brown pelicans have become commonplace. The delta is also attractive to aliens, ecologically destructive exotic species such as nutria, feral hogs, and fire ants.

Despite this knowledge and the obvious importance of the Delta as a natural filter, sedimentation trap, and habitat for rare plant and animal communities, we know very little about the biodiversity that defines this unique ecosystem. Algae and aquatic plants are ecologically important as they support the entire food web and are often sensitive indicators of ecosystem change. Because algae and aquatic plants respond rapidly to a wide range of environmental stressors (such as change in water quality, temperature, and salt concentration), they represent largely ignored warning signals of habitat deterioration and change.

Over the last decade, scientists have become increasingly aware of the negative effects human activities have had on aquatic, estuarine, and coastal ecosystems. Some tell-tale signs of impact include declining biodiversity, occurrence and persistence of harmful algal blooms, disappearance and dying-off of critical habitat (seagrass beds) and accumulation of toxic substances in the food chain. The Mobile Delta, and other watersheds like it, have been impinged upon and plagued by nutrient input from sewage, industrialization and human development. In Alabama alone, an estimated 3.7 million acres of historic wetlands have been destroyed, predominantly, around the coastal areas of the state. Heightened awareness among scientists, politicians and concerned citizens has prompted recent efforts to conserve and protect the Mobile-Tensaw Delta. However, with the exception of harmful phytoplankton blooms and seagrasses, very little attention has been paid to algal and aquatic plant assemblages in this region.

Researchers Kelly and Clinton Major at the University of South Alabama are beginning a project to determine algal and aquatic plant diversity within the Mobile-Tensaw Delta. They are taking note of native, invasive and rare species that may affect the area's productivity. They hope to identify species that are sensitive to environmental stress and then apply the information toward long-term monitoring, management and preservation of coastal regions and the species that inhabit them. The Mobile Bay NEP hopes that information collected by these researchers and others will ultimately support wise policy decisions in the future. To learn more about this project and others funded by funded by the Alabama Center for Estuarine Studies log on to www.southalabama.edu/aces/.

Kelly M. Major and Clinton S. Major,
Department of Biological Sciences,
University of South Alabama

FAST FACTS

- Weeks Bay National Estuarine Research Reserve comprises over 6,000 acres of protected areas (1800 land 4200 water bottoms) some 3000 of which were added in the last ten years
- The Mobile Bay NEP, in cooperation with the ADEM Coastal Program, has undertaken major habitat mapping projects of grass beds and wetlands in the Mobile Bay area
- Over 300 species of birds have been recorded at the 160-acre Audubon Bird Sanctuary on the south side of Bienville Boulevard on Dauphin Island
- The U.S. Fish and Wildlife Service has used recycled Christmas trees to promote shoreline and habitat stabilization. Keep Mobile Beautiful and Baldwin County recycle Christmas trees for mulch
- Coastal wetlands help protect inland areas by absorbing the surge of large storms. All wetlands help protect adjacent properties by absorbing flood waters and heavy rainfall
- Habitat fragmentation and destruction is a primary contributor to species decline and water quality degradation

Randy Sims

EcoKids

UPCOMING EVENTS

April 5 Dauphin Island Sea Lab Discovery Day
April 13 Alabama Environmental Council Bay Area Earth Day Fairhope Pier Park
April 23 Alabama Coastal Foundation Coastal Kids Quiz
May 3 Mobile County Public Schools Environmental Studies Center Open House

CHOOSE FROM:

estuary
nursery
brackish
salt marsh
plankton
rivers
clean
oysters
nets
fiddler crabs
Great Blue Heron
fishing
Gulf of Mexico

ECO CROSSWORD

Across:

1. An estuary is called a _____ to the ocean because baby shrimp, crabs and fish live there.
2. A place like Mobile Bay, where rivers meet the sea, is called an _____.
3. Shrimp boats have large _____ called trawls, which they use to catch shrimp.
4. Tiny plants and animals that live in the waters of estuaries and are food for larger animals are called _____.
5. Many _____ bring thousands of gallons of freshwater into Mobile Bay each day.
6. If you go _____ in the bay you might be lucky enough to catch a flounder, redfish or speckled trout.
7. These crabs "fiddle around" in the salt marsh. The male crab has a giant claw that he waves to attract female crabs.
8. Wetlands _____ the water that runs into the bay.
9. Freshwater and saltwater combine in the bay to make _____water.

Down:

1. Saltwater enters Mobile Bay from the _____.
2. These "large" birds wade through the water and spear fish with their long beaks.
3. These animals live in a "bed" and filter many gallons of water through their bodies each day.
4. A type of grassy wetland that provides food and shelter for animals of the estuary.

CHECK OUT THESE WEBSITES

Dauphin Island Sea Lab
www.disl.org
Project Cate
www.projectcate.com
Mobile County Environmental Studies Center
www.mcpss.com/enviro/enveddep.html
Fairhope K-1 Center Pelican's Nest
www.fairhopeschools.com/K1%20Center/HomePage/k1_home.htm
Gulf Coast Exploreum
www.exploreum.net/
Bellingrath Gardens & Home
www.bellingrath.org/
Bon Secour National Wildlife Refuge, Gulf Shores
southeast.fws.gov/pubs/facts/boncon.pdf
Turtle Point Science Center
dgonza365.tripod.com/turtlepointSC/index.html
High School Aquaculture
www.ag.auburn.edu/dept/faa/aumerc/Extension/Aquaculture/index.html
Alabama Environmental Education Resource Database
www.alenviroed.com/
Legacy, Partners for Environmental Progress
www.legacyenved.org/
Discovering Alabama
www.discoveringalabama.com/
Alabama Wildlife Federation
www.alawild.org/educati.htm
Environmental Education Association of Alabama
www.aces.edu/eeaa/
Auntie Litter
www.auntielitter.org/
Alabama 4-H Foundation, Inc
www.alabama4hfoundation.org/environmental.html
Alabama Environmental Education and Nature Centers
www.epa.gov/region4/water/wetlands/states/alcenters.html
Alabama Museum Of Natural History, Tuscaloosa
www.ua.edu/academic/museums/history/
Alabama State Parks
www.dcnr.state.al.us/parks/parks_1a.html
National Institutes of Health Dept. of Health & Human Services
www.niehs.nih.gov/kids/home.htm
Environmental Explorers Club
www.epa.gov/kids/
Environmental Education for Kids
www.dnr.state.wi.us/org/caer/ce/eek/
Environmental Kidz
www.environmentalpartners.org/Environmentalkids.html
Environmental History Timeline
www.environmentalhistory.org
The Globe Program
www.globe.gov/globe_flash.html
Kids Do Ecology
www.nceas.ucsb.edu/nceas-web/kids/index.html
National Wildlife Federation Kidzone
www.nwf.org/kids/
The Watershed Game
www.bellmuseum.org/mnideals/watershed/watershed2.html
Nonpoint Source Kids Page
www.epa.gov/OWOW/NPS/kids/
The Learning Web
www.usgs.gov/education/
NATURE Puzzles and Fun
www.pbs.org/wnet/nature/fun.html
USGS Water Science for Schools
ga.water.usgs.gov/edu/index.html
Project Wild
www.projectwild.org/
Project Wet
www.projectwet.org/
Project Learning Tree
www.plt.org/
The Green Frog News
thegreenfrognews.com/
Science at NASA
science.nasa.gov/
Discovery Kids
kids.discovery.com/
Earth911
www.earth911.org/master.asp
National Geographic Kids
www.nationalgeographic.com/kids/
Backyard Jungle
www.backyardjungle.org/

MOBILE BAY NATIONAL ESTUARY PROGRAM
4172 Commanders Drive
Mobile, AL 36615

March 30, 2003

We started coloring these special wetland wild flowers for you. You can use crayons or colored pencils to create your own floral masterpiece.

Living Resources

ALABAMA'S SHRIMP: FROM PLANKTON TO PLATE

Shrimp are the most important fishery in the Gulf of Mexico and, historically, have ranked second in value in the US domestic fishery market. While only a few residents of our area shrimp for a living, the local economy relies heavily on processing and wholesale/retail marketing. Three species dominate the Gulf commercial harvest; brown, white and pink shrimp. In Alabama, brown shrimp account for approximately 80% of all shrimp caught while white shrimp comprise 18% and pink shrimp the remaining 2%.

Life History

The overall life cycle is one of adult shrimp spawning offshore followed by a migration of larval forms into the estuaries where they grow and mature. The rates of growth and migration vary among the three species.

Brown shrimp live for approximately one year. At seven months of age, brown shrimp begin to spawn offshore. Young post-larvae enter the estuary beginning in March, and develop utilizing marsh edges and seagrass to hide from predators while feeding on available plankton or decaying material. In the rich estuary, post-larvae grow rapidly, approximately 0.02 inch/day. When shrimp range from 3 - 4 inches long (131 to 58 count) they begin their journey offshore. Adult brown shrimp prefer saltier water and will migrate about 20 miles offshore to spawn, completing their life cycle.

White shrimp have a similar life history but differences include their $1^{1/2}$ year life span. Large numbers of post-larval white shrimp begin to appear in local estuaries in June. Some adult white shrimp even remain in the estuary and spawn. Because pink shrimp are less abundant in Alabama, post-larvae are less common but begin to enter the estuary in April.

Environmental Factors

While predation is a major cause of death in shrimp, environmental factors such as temperature and salinity play a large role in the success of the annual shrimp crop. The white shrimp spawning period is from April through August, while brown and pink shrimp spawn year-round. Brown shrimp have two seasonal peaks of spawning activity, (August through November and April through June) while pink shrimp have a peak in the summer.

Brown shrimp post-larvae appear in marsh areas once temperatures reach 68° F, usually March. Scientists believe that offshore post-larvae shrimp are able to "sense"the temperature change and utilize their ability to move up and down the water column to allow ocean currents to carry them into the estuary. These adaptations permit brown shrimp to take advantage of late spring and early summer water temperatures to optimize survival. White shrimp prefer warmer temperatures than brown shrimp and will spawn later to maximize their growth during the summer. Pink shrimp also prefer warmer waters than brown shrimp. Their limited ability to handle cold temperatures and their preference for hard, sandy bottoms is important to understanding why large numbers are caught off Florida, but far fewer are caught in Alabama.

Salinity preferences vary among shrimp species. As offshore larvae, brown and pink shrimp prefer salty water. Shrimp settling into marshes are not so choosy and may encounter a range of salinities as freshwater and saltwater mix, depending on river discharge, rain or drought conditions in the estuary. As the shrimp age, their preference for saltier water increases and triggers them to move back to the Gulf. White shrimp can tolerate broader salinity ranges throughout their life than brown shrimp but, in general, prefer less salty water than any other commercial shrimp and may be found farther up the Bay.

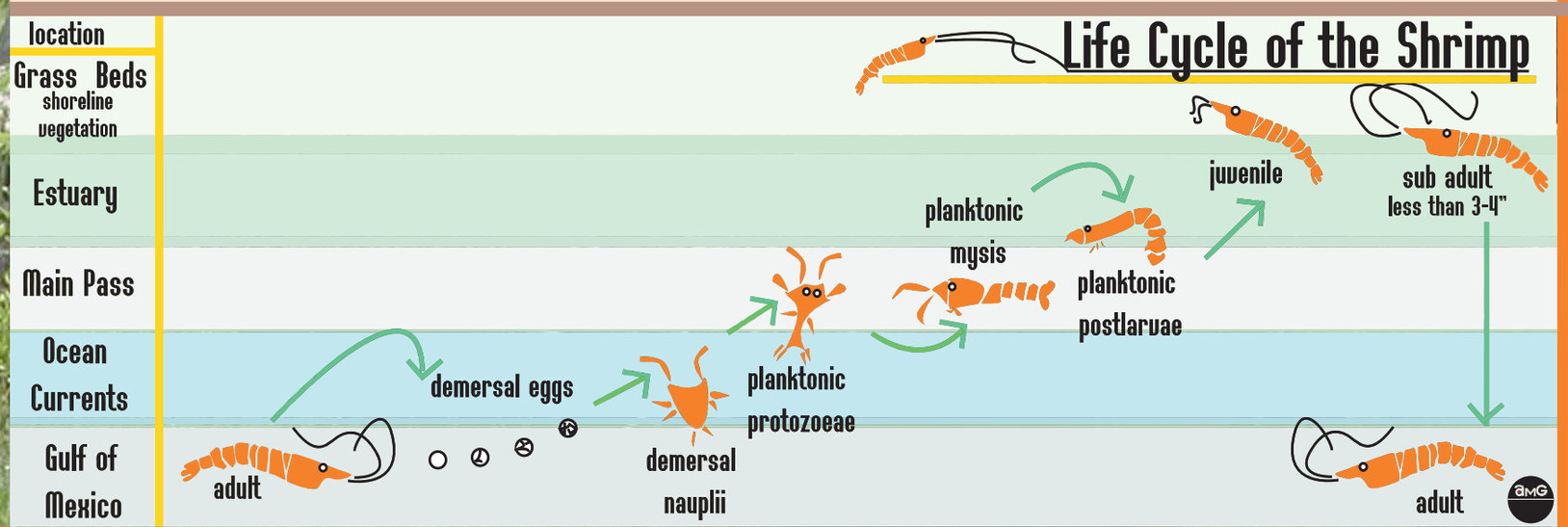
Management

Shrimp management in Alabama is based on the 68-count law. This requires that the Alabama Marine Resources Division (AMRD) prohibit shrimping in waters where shrimp are smaller than 68 whole shrimp to one pound. Given the variety of counts that can be collected at different sites, effective management requires an average legal count be obtained on a regional basis.

To open waters to shrimping, biologists sample throughout the late spring. These data are used to create a growth curve. Like most animals, younger shrimp grow more quickly than older ones resulting in a growth pattern that begins rapidly then decreases in a curve. The regularity of their growth is predictable and actual sample data factors in any weather-induced changes, competition, or food supply. Using the growth curve, the number of days until shrimp become 68 count is predicted. Initially, the day predicted for legal-sized shrimp is fairly rough but with each additional sample, the prediction for opening day is fine-tuned. This method allows AMRD to announce the initial brown shrimp opening, usually June, between one and two weeks in advance.

Unlike farmers, shrimpers are unable to enhance their crop. There is no magical fertilizer or irrigation scheme that will improve Mother Nature's bounty. Experienced shrimp fishermen prepare for all types of seasons. It is the responsibility of biologists to follow accurately the shrimp season to permit the most effective harvesting of the resource.

Leslie D. Hartman, Marine Biologist II, Alabama Marine Resources Division



Jason McAllister

THE HISTORY OF HARVESTING BLUE CRABS

When you dig into a plate of crab claws at your favorite restaurant, you are eating the blue crab Callinectes sapidus. Each year, Alabama's blue crab fishermen catch approximately 3.1 million pounds of crabs. Although Alabama ranks fourth among Gulf Coast states in pounds of crabs landed, Alabama crab shops import and process an estimated 60% of the Gulf of Mexico blue crab catch. This level of processing has made crabs the third most valued marine fishery in Alabama.

As early as prehistoric times, blue crabs were harvested for subsistence living. Evidence suggests Native Americans used spears to gig blue crabs in shallow water and may also have used simple traps. During colonial times, some settlers survived only because of their ability to catch blue crabs. As early as 1850, records exist that indicate a market for soft-shelled crabs on the East Coast of America.

In 1870 L. Cooper Dize patented the first toothless dredge for taking peelers or soft-shelled blue crabs. During this period, fishermen wading with scoop nets or seines harvested hard-shelled crabs. Gulf crab fishermen would wade out at night with a long-handled dip net and a lantern, towing a skiff or burlap sack to hold their catch. Some fishermen would use a drop net - a metal frame covered with netting with bait attached in the middle. This device would be lowered to the bottom to attract crabs to the bait. You can often see some recreational crab fishermen still using this today.

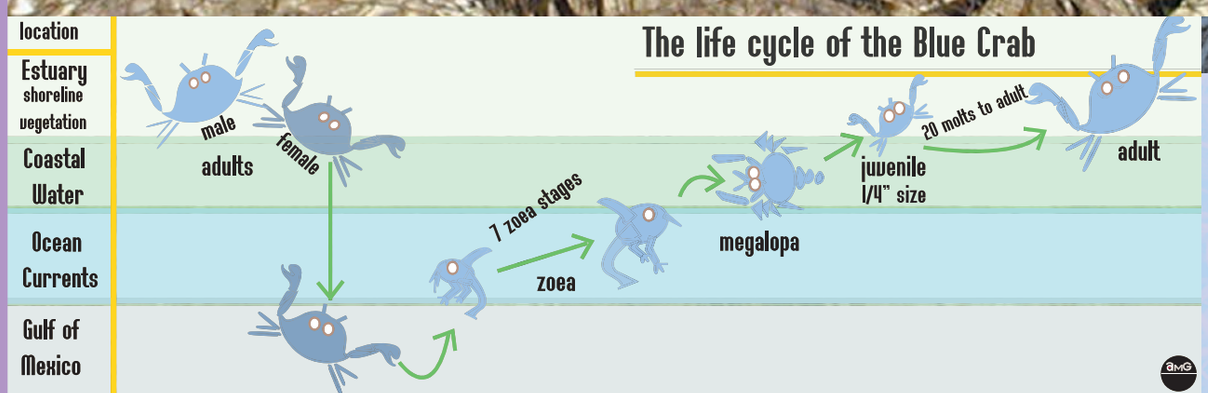
The 1870s saw the evolution of the commercial crabbing industry. Railroads permitted rapid shipping of hard crabs away from the coast. The McMenamin Company of Hampton canned the first crabmeat, and wooden rowboats with fishing trotlines replaced seines and scoop nets as a means of catching crabs. A trotline is a long main line with short lines, called snoods, baited and spaced approximately two feet apart. Upon setting the line, the fisherman would pull his skiff downwind along the line and dip out feeding crabs. With the availability in the early 1900s of motor boats, the use of the snoods was eliminated and the bait tied directly to the main line.

While trotlines remained the standard harvesting method in the Gulf into the 1950s, Benjamin F. Lewis patented the first crab trap as early as 1926. With minimal modifications, this trap resembled those currently in use. Traps are currently constructed of vinyl-covered hexagonal mesh, box-shaped with several funnel-shaped entrances that force crabs to turn sideways to enter. The narrowness of the end of the funnel prevents them from exiting easily. Blue crabs are enticed to enter the trap by the presence of bait, typically pogy.

Currently 98-99% of all crabs caught come from crab traps, with the remaining 1-2% caught in shrimp trawls. Even today, the crabbing industry continues to change. Crabbing has long been a part of the human culture. As the human population has grown, the industry has changed to become more efficient. This efficiency, while a boon to crab fishermen, must always be balanced by the need to sustain a viable blue crab population. Management of the crab industry is a must for sustaining blue crab harvest.

FAST FACTS

- 1640 – Isaac Walton wrote The Compleat Angler about fishing and conservation
- 1783 – U.S. diplomats made fishing rights in waters off Newfoundland a high priority in negotiations over independence from Britain
- 1871 – U.S. Fish Commission formed to study decline of coastal fisheries
- 2001 – Oyster Gardening began, a successful partnership of the Mobile Bay NEP Auburn Marine Extension and Research Center and the MS-AL Sea Grant
- 2002 – The AMRD supported by the Mobile Bay NEP developed a derelict crab trap recovery program. Many organizations and volunteers make this a success
- The seafood industry in Alabama generates $350 million dollars a year at the wholesale level
- The presence of exotic and invasive species such as the Australian Jelly Fish has provided interest in developing plans to deal with aquatic nuisance species. Many organizations are working to identify the presence of nuisance species, develop plans to prevent introduction and study ways to mitigate nuisance species impact



COSTS · THEN & NOW

1883	soft shell crabs	1¢ each, 10¢ per dz
	hard crabs	1¢ dz, 10¢ per bushel
1918	soft shell crabs	30¢ - 80¢ per dz
	hard crabs	$1- $ 6 per barrel
2002	soft shell crabs	$2.50 - $3.00 each $24.00 per dz
	hard crabs	$8.50 per dz

THE LIFE CYCLE OF A BLUE CRAB

Ranging from Nova Scotia to Argentina, the blue crab relies heavily on estuaries to complete its life cycle. This fresh/salty mix of water in estuaries creates an environment high in nutrients and extremely suitable for growth of many marine species. Estuarine marsh and grass beds provide extensive areas for blue crabs to hide from predators and remain safe during molting.

A molting crab is one that has shed its external skeleton and is soft to the touch. Male crabs molt throughout their life. A female crab will molt several times but, at sexual maturity, she will have a final molt. Through pheromones in the water, a male can sense a female is about to shed. He will actively pursue her and will cradle her as she begins to molt. While she is soft, he will transfer a packet of spermatophores to her and continue to carry her until she hardens. This is the female's only mating, although she may have multiple spawnings from this single encounter.

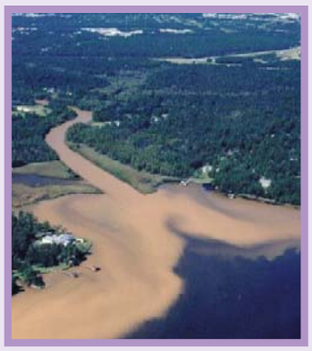
Development from zoeal to first crab stage takes approximately 40 to 70 days. With luck, food, and shelter available in the estuary, a blue crab will molt until it reaches sexual maturity, usually within one year.

Leslie D. Hartman, Marine Biologist II
Alabama Marine Resources Division


Lee Yokel

Erosion

DOG RIVER – A CLASSIC EROSION PROBLEM



Confluence of Moore Creek and Dog River
Photo courtesy of dogriver.southalabama.edu

Old-timers tell stories of a pristine Dog River with white sandbars and deep reddish colored water. After a rain, modern day Dog River resembles chocolate milk sprinkled with floating trash and laden with invisible bacteria. The recent dredging of a portion of the river to remove accumulated sediment from the river has been a costly and controversial project. What happened to Mobile's river? To answer this question we must understand how a river works, and how Mobile's development affects those natural processes.

All of the water in a river comes from its watershed, the land area that it drains. In the case of Dog River, the watershed is about 95 square miles. The upper parts of a river are small streams fed by groundwater and runoff from the land's surface. Whenever it rains, some water seeps into the ground to become part of the water table, and some runs off into the tributaries. Abundant vegetation forces runoff water to move more slowly, so more water seeps into the ground. Naturally vegetated areas like wetlands act like huge sponges that soak up water quickly and release it slowly over time. Vegetation also helps to clean water by filtering out sediment, trash, and removing chemicals like fertilizers. Large intact wetlands are valuable, but wetland strips along the sides of streams are also important.

Wragg Swamp, a huge bottomland hardwood forest, historically absorbed the flow from tributaries and then released it slowly into Eslava, Halls Mill, and Rabbit Creeks. That swamp was the reason the water used to be so reddish in color yet so clear. When the malls and I-65 were built, most of Wragg Swamp was drained, signaling the end of those natural filters and beautiful water. In addition, many streamside wetlands have been lost and Mobile's growth continues to replace vegetated surfaces with impermeable roads, houses, parking lots, and buildings. When it rains, the water hitting them cannot penetrate into the soil to feed the groundwater. Instead, it runs off quickly into man-made ditches carrying water rapidly to the nearest stream.

In the headwaters, where the gradient is steep, water runs faster and has more erosive power. Fast moving water can transport larger particles than slow moving water. Near the mouth of a river, the slope is no longer capable of carrying the material it transported in its upper reaches. Deposition of sediment occurs naturally in the lower part of a stream.

In the Dog River watershed, the steepest tributaries are in west Mobile where development is rampant. Land clearance strips away protective vegetation so that during rains, ditches and streams carry soil away from west Mobile and deposit it when the water eventually slows down in the lower portion of Dog River. This includes anything washing from the streets and parking lots.

The soil carried by stormwater is mostly sand, silt, and clay. Streams carry very small particles of silt and clay farther downstream. Clay, because it stays suspended so long, is carried all the way into the wide part of Dog River where much of the clay settles out, causing the river to get shallow. Clay deposition is made worse by the saltwater that comes in from the bay causing the clay particles to clump together and settle out in larger particles.

It is important to understand that the filling in of an estuary like Dog River is a natural process. Urbanization of the watershed has accelerated the natural filling process by exposing land, increasing runoff and the speed of stream flow. To swim in Dog River today is also to accept the fact that the water has come from gutters throughout the watershed. Each rainfall washes cigarette butts, beverage containers, automobile fluids, yard waste, fertilizer, pesticide, sewage, and sediment into the river.

Wetlands and upland fringes along streams are important buffer zones between developed areas and the water itself. Voluntary conservation easements, establishing wetlands in front of bulkheads, and leaving streamside areas as "wild parks" in new subdivisions are wise investments for future water quality. We can also reduce runoff by choosing permeable surfaces over impermeable ones. The City of Mobile's landscape ordinance requiring a percentage of any new development to be landscaped rather than paved is a positive step in this direction. Wide grassy swales slow and filter water better than rock lined straight-sided ditches. Developers should make every effort to clear the minimal amount of land necessary for construction, to stage large projects so that less land is exposed to erosion, and to implement best management practices to reduce sediment runoff.

Dog River is not the only area stream with erosion problems. Many Mobile Bay tributaries are subject to increased development, habitat removal, and erosion problems. The Mobile Bay NEP encourages the development of watershed groups and management plans to address the many pressures on area waterways.

Mimi Fearn
Associate Professor of Geography, University of South Alabama

FAST FACTS

- 500 BC - forward – Greek coastal cities became landlocked after deforestation, which increased soil erosion. The siltation filled in the bays and mouths of rivers. One river located in Southwestern Greece, the *Maender*, became so silted that its twists and turns came to represent a river wandering or *meandering*
- 1388 AD -– English Parliament passed an act forbidding the throwing of filth and garbage into ditches, rivers and waters
- 1899 – U.S. Congress passed the River and Harbor Act which prohibited constructing structures in navigable waters without first obtaining a permit from the U.S. Army Corps of Engineers
- 1955 – 8% of shoreline around the Mobile estuary is armored
- 1977 – Soil and Water Conservation Act
- 1997 – Research by Douglass and Pickel of the University of South Alabama estimate approximately 29 miles of armored shoreline in the Mobile estuary or 30%

- Local homebuilder associations have developed innovative erosion control mats to control sediment runoff on construction sites
- The cities of Spanish Fort, Daphne, and Fairhope are working together with the Eastern Shore Chamber of Commerce to develop uniform sediment control ordinances
- USA Graduate Student Becky Roland is studying the establishment of fringe wetlands as an environmentally preferable alternative to bulkheads in the Dog River watershed
- At best, silt fences are only 50% effective even when properly installed

Mobile Bay NEP

On a personal level, would you throw trash, paint, oil, leaves, dirt into your own bathtub? If you don't want to swim in it, then don't throw it down on the street either. Those drains along the side of the road don't go to "never-never-land," but downstream into a river. The rivers in the Mobile Bay NEP study area drain into – Mobile Bay and the Tensaw Delta.

Mobile Bay NEP

ARE OUR BAYS BECOMING BATHTUBS?

Everyone agrees an investment of any kind is worth protecting, particularly when the investment is a costly one. We all know how large the price tag can be on land and homes. Yet, who wouldn't want to live in a house overlooking the water? Many people on the water don't consider what steps may be necessary to protect their property from – the WATER! For, with water, often comes erosion.

Inevitably, living on a shoreline may mean the gradual eroding of the land. This natural process is often exacerbated by human activity. One popular way to prevent soil loss is bulkheading. The U.S. Army Corps of Engineers' Shore Protection Manual defines a bulkhead as, "a vertical structure on a shoreline designed to prevent sliding of the land." Aside from the primary purpose of protecting upland property, many homeowners construct these "walls" for aesthetic purposes or – worse – to keep up with the Joneses.

Bulkheads are normally constructed to stabilize shorelines and protect upland areas from wave damage by completely separating land from water. These retaining walls keep the sand and structures behind them safe from the erosion of tides and waves. For property owners, bulkheading may seem an ideal answer to preserving an investment.

Actually, hard stabilization can accelerate the process of beach erosion. Building a wall along an eroding shoreline almost guarantees the loss of a beach. Dr. Scott Douglass of the University of South Alabama (USA), fears we are turning our bays into "bathtubs," constructing these walls up and down the bay, and leaving behind no intertidal fringe areas where we walk and submerged grasses are often found growing.

Bulkheads may create additional problems. If the structure is not high enough to prevent overtopping (waves overlapping the top) the land behind the structure will erode as if the wall were not even there. The U.S. Army Corps of Engineers warns that groundwater and rain percolating through the soil may build up pressure behind the wall, eventually pushing both soil and wall over.

Seawalls must be made of strong material to withstand the battering of waves and debris. When the bulkheads are attacked by storm waves, sometimes as strong as hurricanes, they can weaken. As the beach narrows and the frequency of wave action increases, the wall must be replaced with even more massive structures to ensure continued protection.

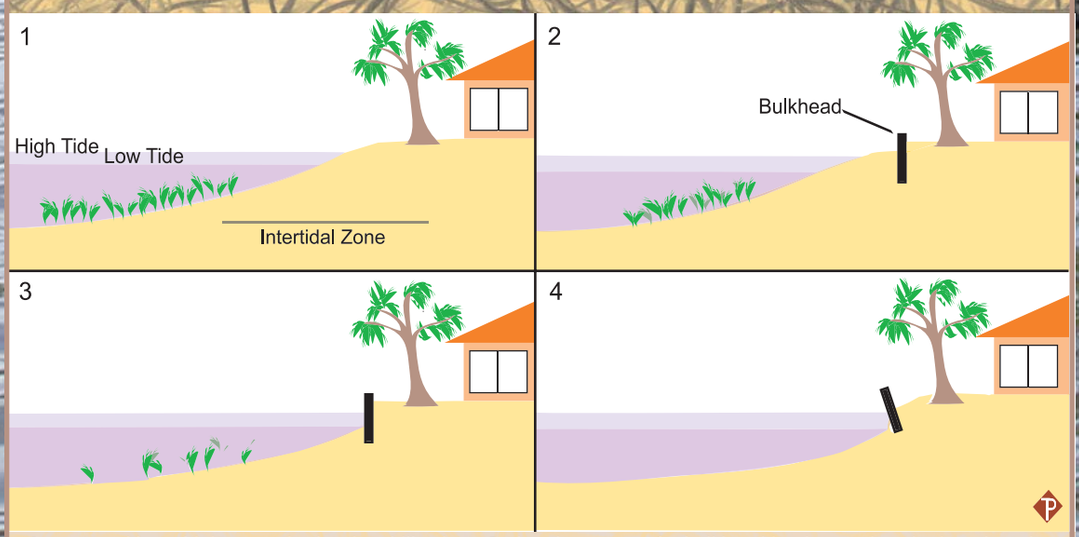
Bulkheads deny adjacent sites the sand naturally eroded and transported from locations landward of the seawall. Bulkheads also alter the natural deposition of new sand traveling in the tidal currents. Aquatic vegetation and many animals thrive in intertidal areas. When we take away from our shoreline, we take away their habitat where many juvenile commercial species develop. Ultimately, the construction of your seawall not only affects you but also adjacent property, lending to a chain reaction of erosion, habitat loss, and bulkheads.

One successful coastal engineering technique has been beach nourishment with headland breakwaters. Breakwaters are fixed or floating structures that protect a shore area by intercepting waves. This method has proven successful locally. In 1998 a headland beach demonstration project was constructed in Mobile at the Gulf Pines Golf Course on the USA's Brookley campus. The purpose of the project was to "determine the minimum engineering factors for design that would protect the upland property while preserving valuable intertidal beach". The two offshore breakwaters were successful in the establishment of vegetation in the intertidal water. The development has withstood continued tests by recent tropical storms. A year and a half into the project, beach sand was accreting in some areas.

Besides bulkheads, what other options are there to protect property investments? There are several other ways to achieve essentially the same result with fewer environmental impacts. Among these are vegetation management, groundwater management, beach nourishment, breakwaters, and appropriate building setbacks. Studies suggest these alternatives often work better and cost less in the long run than traditional approaches. The Mobile Bay NEP has actions within their environmental plan to work with local groups to address alternatives.

Penny Grub

THE STEPS TO BEACH LOSS



1. a natural intertidal zone prior hard stabilization; **2.** the placement of a bulkhead begins to alter the beach and submerged vegetation just offshore; **3.** as erosion continues at the site of the bulkhead, the beach is lost and submerged vegetation suffers; **4.** in extreme cases, the wall begins to fail and erosion occurs behind the bulkhead.

Human Uses

MERCURY FELL ON ALABAMA

What goes up must come down - from air quality to water quality. Various particles are carried into the air by the wind, from smokestacks, exhaust pipes, natural phenomenon, and many other sources. This material can be found in dry air as well as rain which can wash into area waters.

Mercury in the environment has been a major environmental issue for the past 30-plus years. During 2001, the issue of seafood with high levels of methylmercury was raised in a series of articles appearing in the Mobile Register. Several area organizations took the first major step to address mercury concerns organizing The Mercury Forum, held May 2002. The Mississippi-Alabama Sea Grant Consortium (MASGC), Mobile Bay NEP, The Forum: Industrial Partners in Environmental Progress, and Mobile Bay Watch/Mobile BayKeeper sponsored the program. The Mercury Forum demonstrated the ability of partners with diverse interests to work together to provide science-based data for both the public and policy makers. The following are SOME frequently asked questions that resulted from the two day event.

Q. I heard there is mercury in the water and fish/shellfish. Where does the mercury come from?

A. Mercury is released into the environment from natural processes like weathering of mercury bearing rocks and volcanic eruptions. It is also released by man's activities such as incineration of wastes, coal burning, mining and smelting. There are hundreds of other sources ranging from batteries and thermometers to drilling mud and municipal waste water. Most mercury in water and fish is thought to come from atmospheric deposition. After deposition, mercury may be converted by biological processes into methylmercury, which is taken up by living organisms and passed along from microscopic plants and animals to larger organisms.

Q. How does mercury get into fish?

A. Some of the mercury in water or in the water bottom is converted to methylmercury by bacteria and natural chemical processes. Bacteria are eaten by small organisms which are eaten by larger organisms which in turn are eaten by even larger organisms. At each step, the concentration of methylmercury in the organism increases. Concentrations in large predator fish may be 10,000 to 100,000 times greater than in the surrounding water.

Q. Is it safe to eat fish?

A. Fish and shellfish are food sources that are high in protein, low in saturated fats, and are direct sources of beneficial fatty acids. Hundreds of studies have demonstrated the health benefits of eating fish and shellfish. The concentration of mercury in some fish is considered unsafe (depending on the amount consumed) by the Food and Drug Administration (FDA) and EPA. The level of consumption considered safe is a very conservative standard in order to protect those most at risk (primarily unborn and young children).

Q. Will cooking reduce mercury in fish?

A. No. Methylmercury is found throughout the muscle tissue and there are no specific areas of the edible flesh that have more or less. Similarly, there is no known marinade or "soak" that would reduce mercury.

Q. Are some fish or shellfish lower in methylmercury?

A. Yes. The amount of mercury in fish and shellfish is dependent on the age and size of the fish, what it eats and, in some cases, where it lives. Older fish that prey on large amounts of other fish tend to have higher levels. Short-lived fish that feed lower on the food chain tend to have less mercury. Shellfish like shrimp, oysters and crabs tend to be low in mercury as well as younger (and usually smaller fish) of most species. More information is needed on the mercury levels for many kinds of fish and for different ages of the same kinds of fish.

Q. What are the consequences of eating fish with elevated methylmercury levels?

A. Mercury is a heavy metal that affects the human nervous system. Most studies to date have concentrated on the effects on children born to mothers who ate large amounts fish or whale meat during pregnancy. Some of these children scored slightly lower on standard tests and showed delayed development. There is little information on the consequences to adults of eating moderate amounts of fish with mercury levels commonly found in Gulf waters. Clear evidence of nervous system impairment was obtained in a case where large quantities of fish with very high mercury concentrations were consumed in Japan.

Q. I'm pregnant (or trying). Should I eat fish?

A. The FDA advises against eating shark, swordfish, king mackerel and tilefish. The FDA further notes that "seafood can be an important part of a balanced diet for pregnant women and those of childbearing age who may become pregnant." FDA advises that these women can safely eat 12 ounces per week of shellfish, smaller ocean fish or farm-raised fish. The EPA advises to check state consumption advisories.

Q. Are high levels of mercury in fish peculiar to the coastal areas of the Gulf of Mexico?

A. No. Elevated mercury levels in some fish have been known from various locations around the U.S. for over 20 years. Currently there are 2,242 consumption advisories, primarily in specific fresh-water bodies, from 42 states. Most coastal states from Texas to New Hampshire have consumption advisories for fish like large mackerel. There is nothing unusual about local fish or levels of mercury in the Gulf of Mexico compared to other locations around the U.S.

The Mobile Bay NEP works with area groups and agencies on the mercury issue by providing funding support to initiatives such as the Mercury Forum, local research, and monitoring stations within the South Alabama area.

For fish consumption advisories in AL, log onto www.adph.org/risk/. To learn more on forum recommendations and see the full version of the mercury questions and answers, log onto www.masgc.com. To learn more about mercury log onto www.epa.gov/mercury/index.html.

Questions and answers prepared by the Auburn University Marine Extension (AUMERC) and MASGC.

Mobile Bay NEP

Randy Sims

MONITORING AIR QUALITY

Is anyone testing air quality in Southern Alabama? The answer is a resounding Yes! The following agencies are actively testing the air to find out exactly what is in it every day. Many of these efforts are new so the data hasn't been compiled yet, be patient, we will have the information soon.

The primary monitoring agency for air quality is the Alabama Department of Environmental Management (ADEM). ADEM regulates sources of air emissions and routinely monitors ambient air quality statewide. In Mobile and Baldwin Counties, there are currently 2 mercury and nutrient rainwater deposition monitors, 3 ozone monitors, 1 sulfur dioxide and 11 particulate monitors, and 1 continuous mercury analyzer. The resulting data is used to determine compliance with national and state air quality standards and to produce things like the ozone forecast (ozone, by the way, does not effect water quality).

The Mobile Bay NEP initiated and currently supports sampling of ADEM's four rainwater deposition monitors. This program measures how much mercury and nutrient deposition occurs from rainfall. Our sites were coordinated through the National Atmospheric Deposition Program. Samples are collected weekly and analyzed. To see the data log onto nadp.sws.uiuc.edu/

The Mobile Air Quality Study initiated 5 monitors in Mobile County to sample and analyze toxins deposited from dry air. Particles deposited on the ground during dry weather can wash into the Bay during rainstorms. While ADEM controls the day-to-day operations of the monitors, this project is a partnership comprised of Mobile County, Mobile Bay Watch Inc. /Mobile BayKeeper, The Forum, the Mobile Chamber of Commerce and the City of Mobile. According to study partners, the condition of area air quality is unknown.

Diana Sturm, PhD,
Program Scientist Mobile Bay NEP

THERE'S STILL MORE

It is impossible to note all the contributions being made on a daily basis by so many people. It is also important to know that we all contribute to the integrity of our environment. We would like you to know of projects ongoing in our area.

A Scenic Causeway Coalition consisting of many diverse interests is working to have the Causeway designated a Federal Scenic Byway. The U.S. Army Corps of Engineers and Alabama Department of Transportation have studies underway to examine the feasibility of openings under sections of the roadway. This would help restore the interchange of fresh and saltwater as well as improve biodiversity.

The Cities of Mobile and Fairhope are investigating smart growth concepts and actively promoting the use of permeable paving, rain gardens, and other environmentally friendly development practices. In addition, the Mobile Bay NEP, MASGC, and AUMERC are supporting a Healthy Coastal Communities Initiative to educate local leaders about smart growth concepts.

Household Hazardous Waste Disposal activities sponsored by local business interests, supported by the Alabama Coastal Foundation and Keep Mobile Beautiful, as well as local governments are becoming frequent events in our area and help reduce nonpoint source pollution.

Public access to our water resources is being enhanced as seen in Mobile County with the recent purchase and planned upgrades for Dead Lake Marina. The Village Point Foundation in Daphne has worked steadily to develop Bayfront Park. The Alabama Marine Resources Division has several area boat launches, their most recent project is located on Dauphin Island at Billy Goat Hole.

Area environmental groups support a variety of activities that include recycling, field trips, speakers, and activities that affect our quality of life. Area businesses work with the community to respond to community concerns.

Today, 53% of the population nation wide lives within 50 miles of a coast. This figure is expected to rise to 75% by 2025, placing immense stress on our coastal areas. We must find ways to balance human use of our coastlines and the preservation of their environmental quality and ecosystem integrity. To learn more about the information provided throughout this document and find ways you can help, log onto one of the many websites provided on the back page.

FAST FACTS

- 100 AD – Occupational disease is well known in ancient Rome. Workers in lead and mercury mines and smelters are known to suffer from the metals
- 1886 – First Audubon Society
- 1892 – Sierra Club founded
- 1936 – National Wildlife Federation
- 1951 – The Nature Conservancy
- 1963 – U.S. Congress passed first Clean Air Act
- 1967 – Alabama Environmental Council (formerly Alabama Conservancy) founded
- 1970 – April 22 First Earth Day
- 1972 – First bottle recycling bill passed in Oregon
- 1972– Toxic Substances Control Act required testing for health and environmental effects prior to a chemical's manufacture or distribution

You too can make a difference.

Randy Sims

Randy Sims

Environmental Partners

GET INVOLVED

FIND OUT MORE ABOUT LOCAL CONSERVATION EFFORTS

Federal

Environmental Protection Agency
www.epa.gov/

National Oceanic and Atmospheric Administration
www.noaa.gov/

Natural Resources Conservation Service
www.nrcs.usda.gov/

U.S. Army Corps of Engineers, Mobile District
www.sam.usace.army.mil/

U.S. Fish and Wildlife Service, Daphne Ecological Field Office
daphne.fws.gov/news/news.htm

U.S. Geological Survey
www.usgs.gov/

State

Alabama Department of Conservation and Natural Resources
www.dcnr.state.al.us/

Alabama Department of Environmental Management
www.adem.state.al.us/

Alabama Department of Public Health
www.adph.org/

Alabama State Port Authority
www.asdd.com/

Forever Wild Program
www.dcnr.state.al.us/agfd/forever.html

Geological Survey of Alabama
www.gsa.state.al.us/

Soil and Water Conservation Districts
www.swcc.state.al.us/

Educational

Alabama Center for Estuarine Studies
www.southalabama.edu/aces/

Alabama Cooperative Extension System
www.aces.edu

Auburn University Marine Extension & Research Center
www.ag.auburn.edu/dept/faa/aumerc/

BAMA Environmental News
www.bamanews.com/

Dauphin Island Sea Lab
www.disl.org

Environmental History Timeline
www.environmentalhistory.org

Faulkner State Community College Marine & Estuarine Environmental Education
www.faulknerstate.edu/meer

Legacy, Inc
www.legacyenved.com

Mobile County Public Schools Environmental Studies Center
www.mcpss.com/enviro/enveddep.html

Mississippi-Alabama Sea Grant Consortium
www.masgc.org/

Project Cate Foundation
www.projectcate.com

University of South Alabama
www.usouthal.edu

Get Involved

Alabama Chapter of the Sierra Club
www.alabama.sierraclub.org/

Alabama Clean Water Partnership
www.cleanwaterpartnership.org

Alabama Coastal Foundation
www.alcoastalfoundation.org/

Alabama Environmental Council
www.aeconline.ws

Alabama Ornithological Society
www.bham.net/aos/

Alabama Rivers Alliance
www.alabamarivers.org

Alabama Treasure Forest Association
www.atfa.net/

Alabama Urban Forestry Association
www.aufa.com

Alabama Water Watch
www.alabamawaterwatch.org

Alabama Wildlife Federation
www.alawild.org

Audubon Society
www.audubon.org/

Audubon Bird Sanctuary on Dauphin Island
dauphinisland.org/bird.htm

B.A.S.S.
www.bassmaster.com

Coastal Conservation Association
www.joincca.org/

Dog River Clearwater Revival
dogriver.southalabama.edu

Ducks Unlimited
www.ducks.org

Hummer / Bird Study Group
www.hummingbirdsplus.org/

Keep Mobile Beautiful
www.cityofmobile.org/html/departments/recycle/index.php

Mobile Bay National Estuary Program
www.mobilebaynep.com

Mobile Bay Watch, Inc./Mobile BayKeeper
www.mobilebaywatch.org

South Alabama Birding Association
www.alaweb.com/~kenwood/saba/

The Nature Conservancy
nature.org/wherewework/northamerica/states/alabama/

Waste Reduction and Technology Transfer (WRATT) Foundation
www.wratt.org/

Weeks Bay Reserve Foundation
www.weeksbay.org
www.ocrm.nos.noaa.gov/nerr/reserves/nerrweeks.html

Wolf Bay Watershed Watch
www.wolfbay.org

MOBILE BAY NATIONAL ESTUARY PROGRAM
4172 Commanders Drive
Mobile, AL 36615
March 30, 2003

The staff of the Mobile Bay NEP would like to thank everyone who generously contributed to this document.
For copies and expanded versions of stories go to our website www.mobilebaynep.com.

Cherie Arceneaux
Pete Barber
Blair Bateman
Crystal Browning
Hank Burch
Casi Calloway
John Carey
Bethany Carl
John Carlton
George Crozier
Rose Ellen DeSimone
John Dindo
Robert Dixon
Scott Douglass
Mimi Fearn
Lynn Garris
Larry Goldman
Andree Gonsoulin
Penny Grub
April Gutherie
Leslie Hartman
Phillip Hinesley
Janis Helton
Bob Howard
Neil Johnston
Ron Jones
Debbie Jones
Amy King
Bill Kovarik
Clinton Major
Kelly Major
Jason McAllister
Sam Mead
Barbara Nolan
Steve Perry
Ted Perry
Public Outreach Task Force
Susan Rees
Tim Reid
Jody Scanlan
Randy Sims
Susan Sklenar
Diana Sturm
Rick Wallace
David Yeager
Burrul Yokel
Lee Yokel
William Yokel
Lisa Young

Publication design • Janden Richards
JandenDesign