AROUND THE BEND

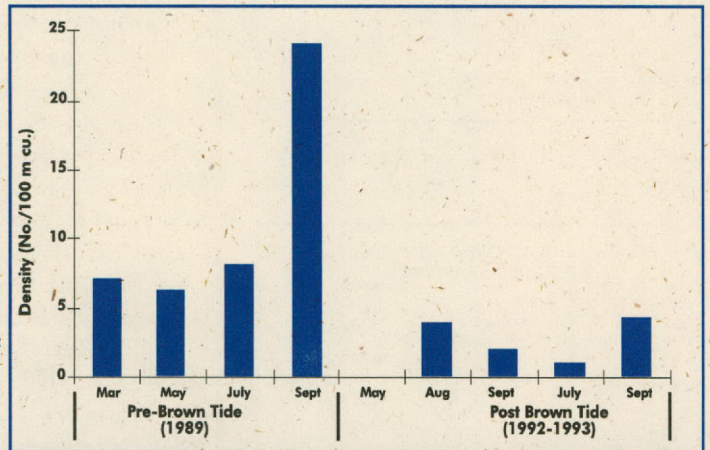
News of the
Coastal Bend's Bays & Estuaries

Vol. 2, No. 4 - Fall 1996

Examining Harmful Algal Blooms in the CCBNEP Study Area

High salinity and two severe freezes in December 1989 and January 1990 likely contributed to the initial bloom of the brown tide in the upper reaches of Baffin Bay. Since the spring of 1990, the brown tide has persisted, impacting both plants and animals that inhabit the upper Laguna Madre, the largest of the three estuaries in the CCBNEP study area and one of three hypersaline lagoon systems in the world.

The CCBNEP's report titled Current Status and Historical Trends of Brown Tide and Red Tide Phytoplankton Blooms in the CCBNEP Study Area has been completed and is now available at the Program office. The purpose of this study was to gather information on the occurrence and extent of brown tide and the more sporadic red tide blooms that have occurred in the area. Other research of bottom-dwelling invertebrates, juvenile fish development, and seagrass ecology gave the overall study an added dimension by characterizing effects of the brown tide on living resources and some habitats.



Impact of brown tide on spotted seatrout during their larval stage.

Brown Tide

Seagrass beds in the upper Laguna Madre cover approximately 200 square miles in area extent representing the second largest undisturbed seagrass habitat on the Texas Coast. These seagrass beds are vital as nursery grounds for fish and shellfish, as well as an essential food source for migratory water fowl. Algal blooms reduce water clarity, thereby reducing light penetration, needed by seagrasses for photosynthesis. Overall, seagrass beds have declined in area extent by 3.6 square miles since the initial brown tide bloom in 1990 (Chris Onuf, in press).

Both laboratory and field studies suggest that the brown tide may adversely affect several species of newly hatched larval fish as evidenced by their reduced densities.

A reduction in the number of bottom-dwelling species and of individual species found inhabiting seagrasses has also been detected, particularly the filter feeding mollusk, Mulinia lateralis. Microscopic zooplankton are typically major consumers of phytoplankton, however, no increase has been seen in populations of zooplankton, as would be expected. This may indicate that the brown tide is a poor food source for these grazers. Other microscopic organisms that feed on brown tide cells have decreased in overall body size and have reduced rates of egg production.

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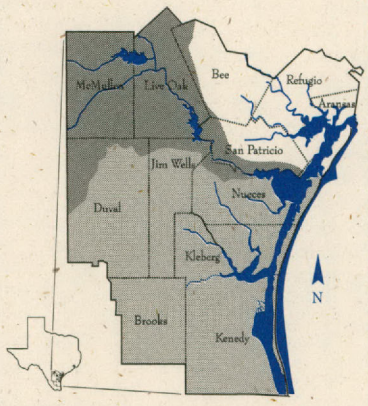


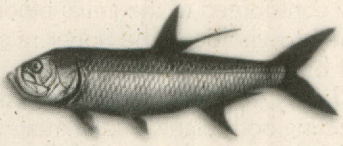
Corpus Christi Bay National Estuary Program Study Area

Understanding the Estuary System Through Ecosystem Models

Models are often constructed to help us understand complicated relationships and processes. By breaking down system components into bite-sized pieces, difficult ideas can be easily digested. Researchers at the University of Texas Marine Science Institute in Port Aransas have recently completed an ecosystem model of the CCBNEP study area. The report provides insight into resource linkages and processes within the estuarine ecosystem. Using illustrations to convey concepts, readers can more easily visualize the interrelationships within the ecosystem.

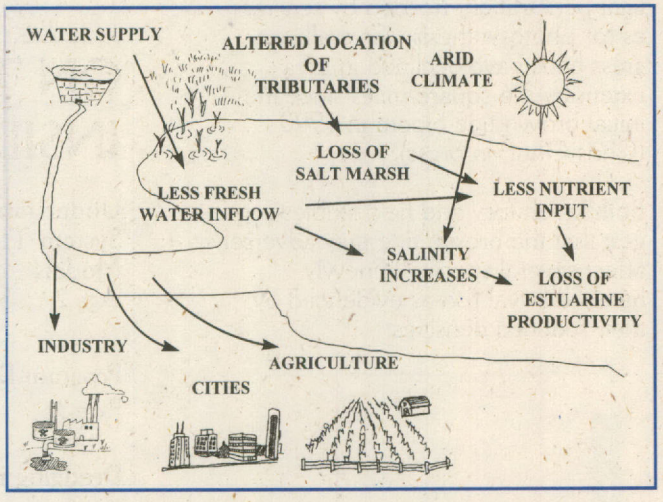
The report, A Conceptual Ecosystem Model of the CCBNEP Study Area, considers the estuarine ecosystem from several perspectives. The estuary is modeled by trophic system, habitat, geographic, and human perspectives. It also addresses environmental issues being considered by the Management Conference for inclusion in the Coastal Bend Bays Plan.

The report is written for both technical and non-technical readers. Non-technical readers will find illustrations and accompanying text revealing. Technical readers will find the energy circuit language familiar. Technical sections show biotic and abiotic components of the ecosystems and functional linkages. The two models below typify non-technical versions of environmental issues addressed in the report.



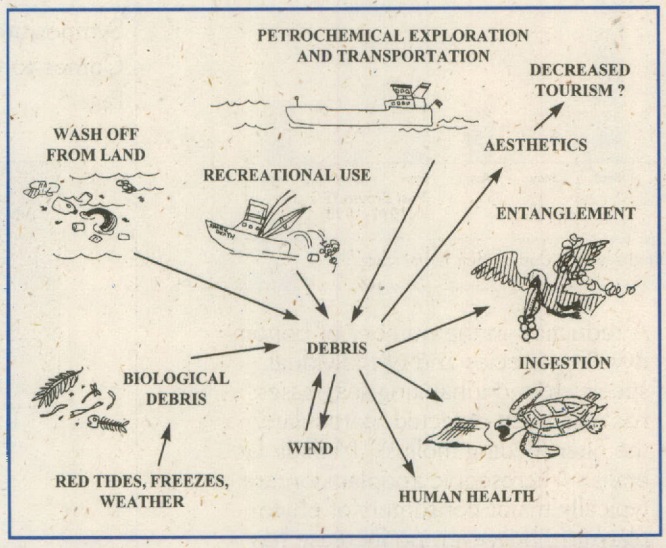
Freshwater Inflows

The report includes a look at the relationship between freshwater and estuarine productivity. In semi-arid regions, such as the Coastal Bend, reservoirs were built to capture water for human use, thereby controlling freshwater inflow into the estuarine system. When freshwater inflows are decreased, fewer nutrients reach the bay. Salinity increases - exasperated by high evaporation - further decrease estuarine productivity. Changes to tributary location decrease salt marsh, restricting the amount of nutrients reaching the bay. This too decreases the overall productivity of the bay.



Bay Debris

Far less emotionally charged, but perhaps better understood, bay debris has also been identified as a priority issue within the CCBNEP study area.
Debris may injure wildlife through either consumption or entanglement.
Occasionally, human health may be compromised when medical waste or harmful chemicals are discarded into the estuary system.



The models are intended to assist the Management Conference in developing the Coastal Bend Bays Plan. If you would like more information about this report, contact the Program office at: 512/980-3420.

"Around the Bend" is produced quarterly by the Corpus Christi Bay National Estuary Program with funding from the U.S. Environmental Protection Agency and the Texas Natural Resource Conservation Commission. The newsletter design and layout is done by East Meets West Productions, Inc. For more information about the Program, call 512/980-3420.

Contributors to this issue include: Sandra Alvarado, Doug Baker, Nicole Fisher, Richard Harrington, Craig Hill, Mercedes Salinas, and Richard Volk.

News items, photographs, and letters are welcome and may be submitted to the CCBNEP office, Natural Resources Center, Suite 3300, TAMU-CC , 6300 Ocean Drive, Corpus Christi, Texas 78412. The submission deadline for the next newsletter is October 31, 1996.

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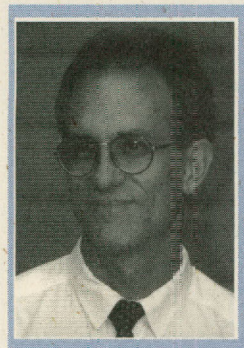
Program Director's Report



A recent report commissioned by the Chesapeake Bay Program contained an insightful observation. The "2020 Report" on population growth and development said this of the result of delaying action: "The households established in the watershed between now and 1999 will contribute a greatly disproportionate amount of all the pollution from development during the next three decades, simply because they are the ones that will be here the longest. In other words, if we wait until halfway to the year 2020 to begin dealing with the impact of development, far more than half of the impact will already have occurred."

Likewise in South Texas, another quarter million people added during the next 30-40 years to the current population of over one-half million, will bring unprecedented growth in housing starts, businesses, and paved roadways and parking lots. While there's certainly no cause for panic, some advanced planning now, along with the development of a set of environmental indicators and a plan for tracking them over time, could pay huge dividends later through proper management of the Coastal Bend's greatest natural resource -- its bays and estuaries.

Although coastal development patterns tend to be characterized by sprawl, it doesn't have to be that way. Unchecked sprawl can destroy wildlife habitat, overrun farmlands, displace valuable streamside vegetation, threaten wetlands, and increase runoff of sediments, nutrients, and toxics. Sprawled development adds to air pollution through a greater dependency on the automobile, which in turn can raise levels of nitrogen oxides and polynuclear aromatic hydrocarbons (PAHs) which can pose serious threat to bay organisms. The collective decisions on how many wetlands to fill for development, or how many farms to replace with shopping malls, or how many acres of lost seagrasses we are willing to accept -- all affect the quality of the bay system and its ability to be resilient, that is, to rebound in the aftermath of more sudden and catastrophic events such as hurricanes or major oil or chemical spills.

Whether regional citizens and their governments will successfully take on the challenge of appropriate development -- by steering growth away from sensitive areas and concentrating it in areas with adequate infrastructure -- remains to be seen. But we can and should begin now to put our knowledge of these bays and estuaries, including the many, competing human demands on these resources, into an ecosystem perspective. Through such perspective we can begin to recognize the complexity and interrelated nature of management issues, and recognize that they are not limited by political boundary or agency jurisdiction.

So what is the role of the Corpus Christi Bay National Estuary Program in all of this? Needed, of course, is the continued development of a scientifically grounded body of knowledge and the coordination of its application. I believe that our most important task, however, is to achieve an informed public -- a citizenry that understands the link between poorly planned growth and its impact on the bay system. Towards this goal, more than 325 individuals, representing more than 100 organizations, are now working to build and maintain this collective relationship between people and the bay. Working to make the bay "come alive" as it were -- through an understanding of its history, geography, ecology, and its role in shaping the cultural heritage of its people.

Richard Volk, CCBNEP Director

Brown Tide continued from page 1...

The brown tide is the longest documented phytoplankton bloom in the world, persisting for over five years. Why has it stuck around so long? One or more of the following factors are believed to act synergistically causing its persistence in the Laguna Madre-Baffin Bay system:

- Longer time for exchange of water between the Gulf of Mexico and the Laguna Madre;
- Lack of freshwater inflow to the Laguna Madre due to the small number of rivers emptying into the system;
- High competitive ability of the brown tide relative to other algal species;
- The brown tide may possibly have a negative effect on grazers that might otherwise help bring the bloom under control.

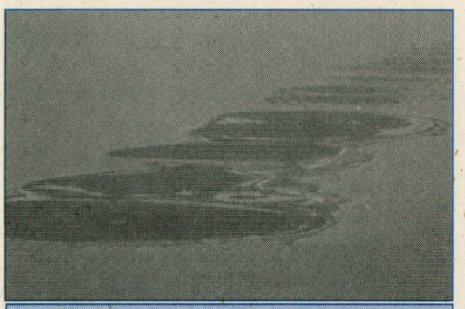
Red Tide

Although infrequent in occurrence along the Texas coast and to a lesser extent within the CCBNEP study area, two toxic algae largely responsible for red tide have caused extensive mortality in fish and invertebrate populations. These toxins have been reported to cause human health problems through Neurotoxic Shellfish Poisoning (NSP) and respiratory irritations. However, only two bays within the CCBNEP study area, Copano Bay and Aransas Bay, have been closed and subsequently reopened to shellfish harvesting in the last 10 years as a result of red tide contamination.

Many factors have been suggested for the initiation and proliferation of the red tide. Interestingly, a correlation between red tide outbreaks and extended periods of heavy rainfall that carry organic nutrients into the bay via rivers, has been noted on the Florida Gulf Coast. Another likely factor is temperature, supported by strong correlations between surface water temperature and the initiation of red tide blooms. Unlike brown tides, red tides appear to have no long term effects on an ecosystem.

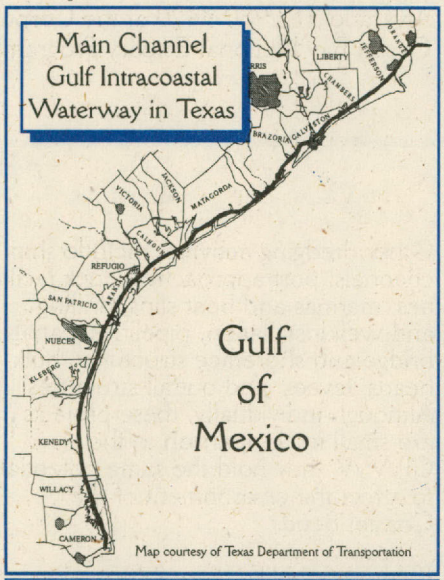
Dredging in the CCBNEP Study Area

Every year the U.S. Corps of Engineers (Corps) removes approximately eight million cubic yards of material to maintain the Gulf Intracoastal Waterway (GIWW). Historically considered "spoil," this material was discarded in the most cost effective manner; usually that meant the creation of spoil islands adjacent to a dredged channel. Known as open-bay disposal, this method has attracted considerable attention because of concern over environmental impacts.



Aerial view of historical open-bay disposal.

The Corps is responsible for the maintenance of all navigable waterways in the U.S. Periodically, channels such as the GIWW must be dredged to maintain their charted depth and allow for the safe passage of vessel traffic. Completed in 1949, the GIWW is maintained to a charted depth of 12 feet and a bottom width of 125 feet. Used primarily for barge traffic, the channel also provides a safe passage for recreational watercraft and commercial fishing boats. Created before the value of coastal wetlands were well understood, the GIWW winds through some of the most biologically productive and sensitive areas in Texas. From Port Isabel to Orange Texas, the GIWW extends 426 miles across many shallow bays and estuaries. These areas provide important habitat, supporting vast numbers of waterfowl, mammals, and reptiles. Estuaries traversed by the GIWW also provide food and shelter for commercially important species such as crab, shrimp, and finfish. The impacts of dredging on these areas is of considerable concern to everyone who values these resources.



The Gulf Intracoastal Waterway connects 12 deep-draft port channels in Texas, including the Corpus Christi ship channel.

The CCBNEP has identified dredging as one of the priority issues within the study area and is developing a long-range plan for dredging, including methods for dredged material disposal.

Once considered a necessary by-product of dredging, this material is now being considered a useful resource. Ten broad categories for beneficial uses have been identified including:

- habitat development
- beach nourishment
- aquaculture
- parks and recreation
- agriculture
- forestry and horticulture
- strip mine reclamation
- solid waste management
- shoreline stabilization & erosion control, and
- construction and industrial use.

The costs of disposing dredged material in beneficial ways may be greater than traditional open-bay methods. However, the long range benefits associated with maintaining healthy and productive bay systems should offset short-term expenses.

The concept of beneficial use has gained significant support because of its potential for maintaining and improving estuarine ecosystem health. However, design, implementation, and monitoring of these projects is critical for continued success. Richard Harrington, Regional Director of Texas Parks & Wildlife, and member of the Management Conference, eyes beneficial use of dredged material cautiously. In 30 years of work in the Coastal Bend, he has seen some beneficial use projects succeed while others have failed. "It is my hope that beneficial use project designs will be subjected to review before implementation. This will help to avoid repeating mistakes," Harrington said.

Several beneficial use projects are underway in Texas. In the CCBNEP study area, a habitat creation project in the Aransas National Wildlife Refuge is being conducted by the Corps and Mitchell Energy Corp., and near-by, the Corps conducted a shoreline protection project on Long Reef in Aransas Bay. Although beneficial use projects are still in their infancy, these projects demonstrate innovative solutions to help mitigate environmental impacts from dredging in the Coastal Bend.

Whooping cranes are omnivorous, feeding primarily on blue crabs, snails and wolfberrys.

Aransas National Wildlife Refuge - Habitat Creation

The Aransas National Wildlife Refuge in Aransas County is the wintering home to endangered whooping cranes. Adjacent to the GIWW, this critical habitat is being eroded at an alarming rate. Protection and restoration of this area is vital to the recovery of these magnificent birds.

Containment levies built of stiff clay, concrete blocks or geotextile tubing were put in place to prevent dredged material from moving off-site. Dredged material was then placed inside the levees and sprigged with native marsh vegetation in such a way as to mimic the surrounding marsh. Studies are still underway to evaluate the effectiveness

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Hoechst Celanese in Bishop Reducing Waste Disposal

Hoechst Celanese Corp. in Bishop is one of the world's largest manufacturers of a variety of products, from bulk pharmaceuticals used as headache remedies to plastic used in consumer products such as automobiles and kitchen appliances. The Bishop facility is also recognized for a world-class pollution reduction program that by the year 2000 will eliminate deep-well injection entirely and reduce total waste releases by 97 percent from 1988 levels.

Hoechst Celanese's six-acre fabric dome keeps rainwater out of landfill and eliminates polluted runoff.

To achieve these reductions, Hoechst Celanese formed the Waste and Release Reduction Strategy Team (WARR) in 1992 and challenged employees across the board to think 'pollution reduction' in their daily jobs. For example, the question of how to reduce rainwater residue collecting at the bottom of an on-site landfill was answered by the construction of a 6-acre dome of high-quality fabric to keep the rain out. The leachate residue by definition was considered hazardous waste which required disposal in deep wells. The dome has eliminated this waste entirely.

Hoechst Celanese will have reduced the amount of waste disposed of or released to the environment annually by almost seven million pounds by the year 2000. Many of those reductions will result in lower operating costs and a significant portion of those reductions go above and beyond what is required by law.

Last spring, the Bishop facility was recognized by the Texas Natural Resource Conservation Commission (TNRCC) and Governor George W. Bush at the 1996 Governor's Awards for Environmental Excellence in Austin for their facility-wide waste reductions.

Under the direction of the Waste Reduction Policy Act of 1991, the TNRCC's Office of Pollution Prevention and Recycling initiated the Governor's Awards for Environmental Excellence in 1993 to honor the state's most outstanding waste reduction and pollution prevention projects.

Symposium on Texas Seagrasses Comes to Corpus Christi

Seagrass researchers, coastal resource managers, and concerned citizens will convene November 4-5, 1996 in Corpus Christi to discuss and review recent environmental developments that pose threats to lush seagrass meadows of the Texas Coast. Seagrass meadows of the CCBNEP study area cover about 43 percent of all Texas seagrasses.

The two-day meeting will begin with a plenary session that will provide direction for seagrass research needs in Texas, and will evaluate effective educational tools to produce environmental awareness of this sensitive habitat. A "brainstorming" session will follow to develop these strategies. The end result of this symposium is to draft a Seagrass Conservation Plan for Texas.

The symposium is sponsored by Texas Parks & Wildlife, Texas General Land Office, Corpus Christi Bay National Estuary Program, Galveston Bay Estuary Program, and the Coastal Bend Bays Foundation. For more information, contact Leland Roberts 512/912-7095, Warren Pulich 512/912-7014 Resource Protection Division, Texas Parks & Wildlife Department, Austin, Texas, or Sandra Alvarado 512/980-3420 at the Corpus Christi Bay National Estuary Program.

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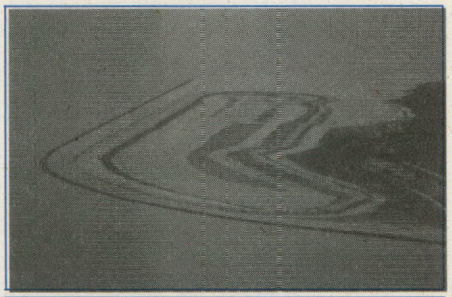
of these projects. It is certain however, that the information learned will contribute to the future success of habitat creation and beneficial use projects. As part of a long-term plan to protect whooping cranes, this is a promising step in the right direction.



Aerial view of beneficial use site near the Aransas National Wildlife Refuge.

Long Reef - Shoreline Protection and Erosion Control

A chain of natural islands, Long Reef in Aransas Bay is adjacent to the GIWW. The northernmost island in the chain provides three acres of colonial waterbird nesting habitat for herons, egrets, gulls, terns, and black skimmers. To help protect these areas from erosion, approximately 114,000 cubic yards of dredged material was placed along the island's entire shoreline. Appropriate precautions were taken to avoid disruption of nesting birds by this activity.

Other Dredge Activities

Other dredging activities include ship channels, port approaches, dock facilities, marinas and boat slips, drilling and well installation, pipelines, canals, bridge and shoreface structures, bulkheads, levees, and outfall structures. Although individually, these projects are small in comparison to the GIWW, they hold the same potential to affect the environment of the Coastal Bend.

If you would like more information about how you can get involved with dredging issues, contact Sandra Alvarado, at the Program office 512/980-3420.

Calendar of Upcoming Events

October 3	Science and Technical Advisory Committee
October 7	Citizens Advisory Committee
October 10	Management Committee
October 20-22	Gulf of Mexico Program/Data & Information Transfer Workshop
November 4-5	Symposium on Texas Seagrasses
November 7	Science and Technical Advisory Committee
November 12	Citizens Advisory Committee
November 14	Management Committee

For More Information Call: 512/980-3420

FUN FACT SEARCH

The CCBNEP is always looking for "fun facts" or information on various environmental topics that can be used in developing outreach materials such as newsletter articles, fact sheets, bulletins, etc. If you would like to contribute any tidbits of information, please mail them to Mercedes Salinas at the Program Office. Don't forget to cite your source!

Next Newsletter

- A Review of the Bay Summit
- Study on the Economic Valuation of Selected Recreational Uses within the CCBNEP Study Area
- A Look at the Inventory and Analysis of Bay Management Structure

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CCBNEP
Natural Resources Center, Suite 3300
TAMU-CC
6300 Ocean Drive,
Corpus Christi, TX 78412