U.S. Environmental Protection Agency
National Estuary Program

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Information About Estuaries and Near Coastal Waters August 2002 - Issue 12.4

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Phragmites australis:

Background

Phragmites australis, or common reed, is currently the subject of debate and inquiry in the scientific and coastal management communities. Although the plant is known to have existed on this continent for at least the past 3,000 years, its range has expanded greatly in the last hundred years. It now is found in extensive monocultures throughout much of its range in the mid-Atlantic and New England states and in the Mississippi Delta region.

Current research is focusing on the genetics and physical features of Phragmites in order to find out if an aggressive strain of this species has been introduced to North America, which may be at the root of its dramatic expansion. Other researchers are assessing the ecological role played by Phragmites to determine whether or not the plant is actually degrading essential marsh functions, as is widely perceived.

Native or Non-Native? The Genetic Evidence

Scientists have hypothesized that the rapid spread of Phragmites australis could be explained by the introduction of a non-native strain to North America. However, little evidence other than its aggressive growth has been presented to support this idea. A researcher at Yale University recently used DNA from chloroplasts to conduct a genetic analysis of Phragmites worldwide to determine if North American populations differ from Phragmites in other parts of the world. Modern samples from across North America were also compared to herbarium specimens collected in the 1800s and early 1900s. This information was used to evaluate the introduction of Phragmites to North America.

Based on this study, there appear to be 11 native types Phragmites distributed in North America that are genetically distinct from 16 types found elsewhere in the world. This suggests that Phragmites has been present in North America for a very long time. However, another type, called Haplotype M, that is common in Europe and continental Asia, is also the most common type found in North America. It dominates along the Atlantic coast and has spread to the southeast into areas where Phragmites was not found historically. It is also found in the Midwest and West along roadsides and waterways, although native populations persist in these regions as well. Another type, Haplotype I, dominates along the Gulf Coast. The distribution of this type has remained fairly stable over the past 100 years, but because it is also found in other parts of the world, it is not possible to say whether it is native or introduced to North America.

It appears that a Eurasian strain of Phragmites was accidentally introduced to North America, probably during the late 1700s or early 1800s, into harbors along the Atlantic Coast. Today it occupies over 2,000,000 hectares of tidal marshes in North America, and we can only guess at the acreage it occupies in inland marshes.

How Can You Tell the Difference Between Native and Non-Native Phragmites?

Researchers at Cornell University's Non-Indigenous Plant Species Program have recently discovered several morphological traits that can be used to easily distinguish native and introduced strains of Phragmites.

Native populations have a lower stem density and thinner, more flexible stems with

a reddish-purple color (fading into a light chestnut brown in the fall) not present in non-native populations. Ligules of native types are bright purple while ligules of introduced types are green or slightly yellow. Throughout the dormant season, leaf sheaths of native populations largely fall off and stems are smooth and shiny as if polished, while leaf sheaths of introduced strains do not fall off and stems are dull, with a rough, ribbed surface.

Stems of introduced populations are almost perfectly straight while stems of native types often grow crookedly. In the fall and winter, differences in the density of inflorescences are also obvious; introduced types appear to have much denser and larger inflorescences. Observations in New York and Virginia also suggest that native types drop their leaves earlier than introduced types.

In addition, an unidentified stem fungus attacks only native populations, with dark well-defined spots often clustering around internodes. Stems of native types break down and decompose within two years, while stems of introduced strains often remain standing upright for many years. Native stands look open and are easy to walk through, while introduced populations appear solid, with a substantial leaf litter layer and high stem density.

These observations of morphological differences need to be confirmed by examining additional types in the field and by growing them under standardized conditions in a common garden. Researchers at Cornell Universityís Non-Indigenous Plant Species Program welcome rhizome and stem samples from around North America for these purposes; instructions can be found at: www.invasiveplants.net. This program offers a diagnostic service using these morphological characteristics.

Phragmites Impacts on Salt Marsh Ecology

The effects of Phragmites expansion are largely unknown, but have generally been believed to be negative, at least in the United States. Monocultures of Phragmites in many marshes may have at least four effects on marsh function:

1) Phragmites detritus may be of poor quality and lower availability to marsh consumers;
2) The normal hydroperiod of the marsh may be altered due to the density of the stalks;
3) Reduced tidal exchange may allow Phragmites to extend its range into lower elevations and replace other plants by outcompeting them; and
4) Expansion of Phragmites likely results in isolated ìislandsî of Spartina and other native species with diminished function.

On the other hand, some researchers have shown that nutrients from Phragmites are reaching higher levels of the food web. Moreover, similar invertebrate assemblages are common to both Phragmites- and Spartina-dominated marshes. Predation of these invertebrate communities appears to be similar in Phragmites versus Spartina marshes in some studies from Connecticut and New York, although in others (e.g., New Jersey), Phragmites appears to degrade habitat quality for early life history stages of resident swimming animals.

The causes of recent expansions of Phragmites populations are poorly understood. Aggressive strains, disturbance of wetland soils and plant communities, sedimentation, nutrient pollution, and altered hydrology have all been cited as potential causes. The natural functions of this native species are also poorly understood, owing to the logistical difficulties of research in the tall, dense monoculture. There is an urgent need for new scientific information on Phragmites genetic diversity, ecology, role in ecosystems as a native species, and the causes and effects of its recent population expansion, particularly in estuaries.

Where Do We Go From Here?

One problem with setting national priorities for control or prevention of aquatic nuisance species is that we often don't know the true extent of the problem. The extent to which Phragmites australis affects habitat quality for fish and wildlife, alters the marsh landscape and its function, reduces ecological redundancy and contributes nutrients to the food web in coastal marshes, are key areas for future research. Because so much effort is being placed on methods to eradicate this species, including the use of herbicides and prescribed burns on a large scale, the question of Phragmites invasion is both timely and critical to future management decisions. Simply stated, is this plant the "villain" that many believe it to be, or does it have redeeming features worth an adaptive management approach, rather than an all out assault to eliminate it? Are efforts to control this native species, or its introduced relative, justified, and are the causes of expansion being considered? Whether a native species gone awry or if the real culprit is its alien cousin, Phragmites australis certainly qualifies as a plant in need of considerable attention and management planning.

For more information on the ecology of Phragmites, contact Michael Weinstein, Ph.D., Director of the New Jersey Sea Grant College Program, New Jersey Marine Sciences Consortium, Sandy Hook Field Station, Building # 22, Fort Hancock, NJ 07732; Phone: (732) 872-1300 ext. 21; Fax: (732) 872-9573; E-mail: mweinstein@njmsc.org.

For more information on the morphological differences between native and introduced Phragmites, contact Bernard Blossey, Ph.D., Assistant Professor and Director, Biological Control of Non-Indigenous Plant Species Program, Department of Natural Resources, 122E Fernow Hall, Cornell University, Ithaca, New York 14853; Phone: (607) 255-5314; Fax: (607) 255-0349; Email: bb22@cornell.edu; or go to the website at http://www.invasiveplants.net.

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Kayakers Become Ocean Stewards at Monterey Bay National Marine Sanctuary

Like the Serengeti Plain in Africa, the Monterey Bay National Marine Sanctuary on the central California coast offers some of the best wildlife viewing in the world. Among the amazing sights are the harbor seals lolling on mudflats, California sea lions perched on rocks, and sea otters bobbing in kelp beds. These charismatic creatures can be seen daily without even leaving land, but a short spin in an ocean kayak can provide an up-close nature experience. Such experiences, which lead to appreciation of ocean wildlife and enjoyment of the marine environment, are encouraged by the National Marine Sanctuaries.

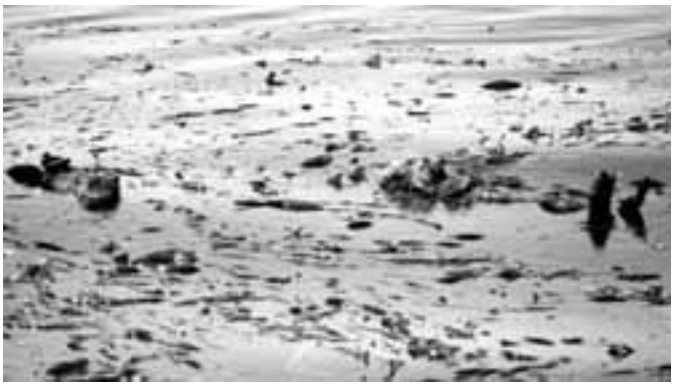
The problem is, sometimes "up-close" becomes "too close," and the animal is alarmed or forced to flee. That is when wildlife-watching becomes wildlife harassment. And in an area with an estimated 30,000 kayak rentals and tours each year, concentrated in the summer months and at a few high-volume locations, there is a high potential (though less than from motorized watercraft) for repeated and harmful disturbance of sensitive wildlife species.

The Monterey Bay National Marine Sanctuary (MBNMS), one of thirteen marine sanctuaries administered by the National Oceanic and Atmospheric Administration

(NOAA), is tackling this growing problem with a proactive educational approach. The sanctuaryís TeamOCEAN Kayaker Outreach Program puts knowledgeable naturalists out on the water to greet and interact with fellow day kayakers. The naturalists serve as stewards for the marine sanctuary, promote respectful wildlife viewing, and protect marine mammals from disturbance.

The TeamOCEAN Kayaker Outreach Program, now entering its second year, is based on the principles that most kayakers care deeply about the ocean environment, and most wildlife harassment is unintentional. Other kayakers are not clear on what an "appropriate" distance is, or that changing a marine mammal's behavior in any way constitutes harassment, regardless of the distance kept. When necessary, the team members ask boaters to back away from animals, and then explain the biology behind the protective regulations and how to recognize behaviors that precede disturbance.

TeamOCEAN staff have no enforcement authority; they do not write tickets or issue warnings. When they observe a potential regulatory violation, they often report it to the Sanctuary's enforcement officer by cell phone or radio. Their communications with land also allow them to report oil slicks and safety-related emergencies. They keep thorough records of their interactions and observations while on the water, collecting valuable information for the Sanctuary about the types of disturbances and problems occurring in some of the sanctuary's heavily used coastal areas. Monterey Bay's TeamOCEAN Kayaker Outreach Program falls under a national umbrella of TeamOCEAN outreach programs implemented by marine sanctuaries around the country. To make the most of a limited budget, the program has focused its efforts on two locations where coastal marine mammals and birds, as well as the kayakers that come to see them, are highly concentrated: Monterey's Cannery Row and Elkhorn Slough, a coastal wetland in central Monterey Bay. TeamOCEAN kayaking staff spend Fridays through Sundays out on the water, six hours per day, from summer through early fall. The program's kayaks were generously provided by Perception, while Kokatat donated paddling gear. While this program relies on a small paid staff, this year the sanctuary is considering expanding it to include volunteer kayakers as well.



Good team training is a critical component of the outreach program, and the first week of the season is devoted to training and team-building. The contract staff hired for the program complete an in-depth class in kayak paddling and rescue skills. Then, they get a thorough overview of MBNMS programs, regulations, resources, and natural history,

with emphasis on the marine mammals and seabirds commonly seen from kayaks. Introductions are made to the local kayak rental shops and relevant organizations such as the Coast Guard, harbormaster offices, marine mammal rescue network, and Elkhorn Slough National Estuarine Research Reserve.

Feedback from the 1,800 kayakers personally contacted by the TeamOCEAN staff in 2001 was resoundingly positive. The great majority of contacts were extremely pleasant, with many people expressing appreciation for the interesting information the team provided, a willingness to "do the right thing," and gratitude for being informed of what the "right thing" is.

Some people even thanked the team for being there, saying it made them feel that the sanctuary was being well protected. This type of comment highlights some of the bonuses of the program: a more tangible presence on the water, and greater Sanctuary visibility to the public, the kayaking community, and the media.

The benefits of the TeamOCEAN Kayaker Outreach Program have come in many forms, including a reduction in the number of disturbances to sensitive and threatened marine mammals and an enhanced public awareness and recognition of the Sanctuaryís active role in marine protection. Ultimately, the program has the power to transform casual kayakers to ocean stewards and passionate marine sanctuary advocates.

For further information, contact Jen Jolly, Public Outreach Specialist; Monterey Bay National Marine Sanctuary, Santa Cruz Office, 55-D Municipal Wharf, Santa Cruz, CA 95060; Phone: (831) 420-1630; E-mail: jen.jolly@noaa.gov or visit the website at www.mbnms.nos.noaa.gov

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Coastal Zone '03

Coastal Zone Management Through Time

The largest conference for the world's coastal resource management community will be held from July 13 - 17, 2003 in Baltimore, Maryland.

For more information, please visit www.csc.noaa.gov/cz2003/. The deadline for abstract submissions is September 16, 2002.

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Are Shellfish Beds in Puget Sound Suffering from Urbanization?

A tragic story is repeated in coastal areas around the country--quaint watershed loses touch with its rural roots, grows slowly but steadily, suffers insidious and unexpected changes in character and eventually turns indistinctively urban, spoiling the very qualities and resources that once made it special. Not a pretty picture.

The Puget Sound Water Quality Action Team is trying to change this scenario. Puget Sound consists of a beautiful and intricate network of bays and waterways that support some of the finest shellfish habitat in the world. The cool, clean waters of the Pacific Northwest have helped make Washington State the nation's leading producer of farmed shellfish and nurture such prized foods as the diminutive Olympia oyster and the geoduck (pronounced "gooey-duck"), the world's largest burrowing clam.

Despite the good news, shellfish harvesting has an uncertain future in Puget Sound. Like other coastal areas, Puget Sound is rapidly urbanizing. Since 1980, the region's population has grown by over 40 percent and much of the fastest growth is occurring in the Sound's rural, shellfish-rich counties. While many important safeguards have been instituted over the past 20 years to control pollution and manage growth, a number of

difficult issues remain unresolved.

New Directions for Shellfish Protection

Past efforts to protect shellfish have seen their "ups" and "downs." In the 1980s nearly 33,000 commercial shellfish acres were downgraded and taken out of production. In the midst of this trend a number of new programs were instituted to protect and restore the Sound's shellfish growing areas. This work led to an upgrade of 1,400 acres in 1989 - the first encouraging sign that targeted efforts could make a real difference.

In the 1990s, continued downgrades of over 13,000 acres were offset by a large number of successful projects that restored harvesting on more than 10,000 acres. These gains marked a significant turning point, effectively making the case that pollution sources could be controlled and harvest opportunities recaptured.

But this painstaking work has also revealed many stark limits and important lessons. Evidence indicates that pollution problems are surfacing at more sites, are increasingly complex and costly to resolve, and are often exacerbated by population growth and urbanization. In the face of such trends it's clear that shellfish protection strategies anchored in reactive methods will ultimately prove futile.

Restoration efforts are essential, but they also must be complemented by more far-sighted land use plans, pollution controls and behavior changes that address the underlying causes of the problems. This new thinking shifts emphasis away from symptoms and short-term fixes to more meaningful long-term pollution prevention and lasting protection.

Research on Urbanization

As part of this transition the Puget Sound Water Quality Action Team is studying the relationship between urbanization and water quality in shellfish growing areas - attempting to correlate development and landscape changes with fecal contamination of shellfish beds in the Puget Sound region. While significant research in recent years has focused on urbanization and its effects on streams and other aquatic habitats, the research does not automatically translate to shellfish beds. With more information, elected officials, planners and others will be better equipped to address the potential impact of land use activities and development proposals on shellfish growing areas.

The goals of the project are to (1) better understand the relationship between urbanization and fecal contamination in the shoreline environment, (2) raise

awareness of the tradeoffs and consequences associated with pollution, growth and development in shellfish watersheds, and (3) arm decision-makers, planners and citizens with information and tools to more effectively safeguard shoreline waters for shellfish harvesting. The study includes three main components:

- Literature review of research describing the relationship between growth, development and water quality in the shoreline environment, specifically fecal contamination of shellfish beds. To be completed by summer, 2002.

- Case-study research to develop assessment methods, select the study sites, collect and analyze data, and if possible, quantify the relationships and related variables. Assess and compare present-day conditions at all study sites and historical conditions and trends at select study sites. To be completed by spring, 2003.

- Develop shellfish protection guidelines and disseminate the recommendations to decision-makers and other audiences for use in developing and updating local land use, shoreline and pollution control plans and programs. To be completed summer, 2003, and ongoing.

Funding for the $60,000 project is provided by US EPA. A potential follow-up project already on the drawing board, but not yet funded, involves developing a predictive model and partnering with Puget Sound communities to evaluate alternative build-out scenarios and to design locally tailored mitigation measures.

For further information, contact Stuart Glasoe, Puget Sound Water Quality Action Team; Phone: (360) 407-7319; E-mail: sglasoe@psat.wa.gov; or visit the Action Team's website at http://www.wa.gov/puget_sound.

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New NRC Report on Oil in the Sea

The National Research Council announced its new publication: Oil in the Sea III: Inputs, Fates, and Effects. The report is the third in a series of comprehensive looks at marine oil pollution carried out by the National Academy and co-sponsored by the EPA. This report focuses on increasing our understanding of how releases of petroleum associated with petroleum extraction, transportation, and consumption vary in size, frequency and environmental impact. The report includes a number of specific recommendations to federal agencies to help estimate inputs from all sources, determine the fate of the petroleum released, and to ascertain the ecological response of the areas affected.

The full report will also be available on the Internet at http://www.nap.edu/

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Under the Sea

It is rare for state coastal program managers and coastal decision-makers to have maps of the seabed resources located off their shores. The Delaware Coastal Program is currently trying to remedy this situation by mapping its seabed resources, which comprise approximately 20% of the State of Delaware. To do this, the Delaware Coastal Program is using a RoxAnn™ Seabed Classification System.

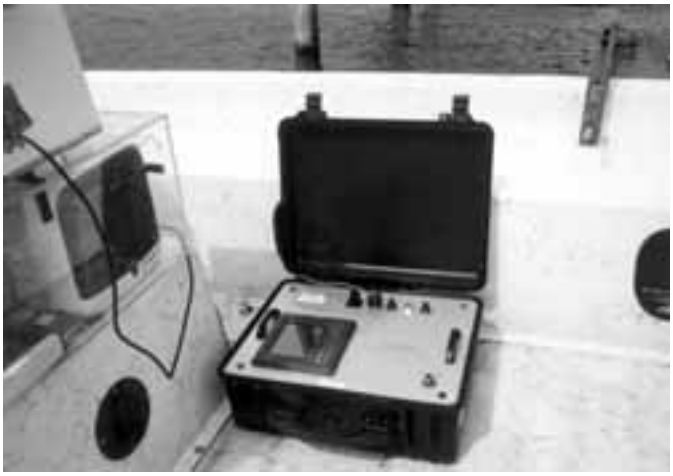
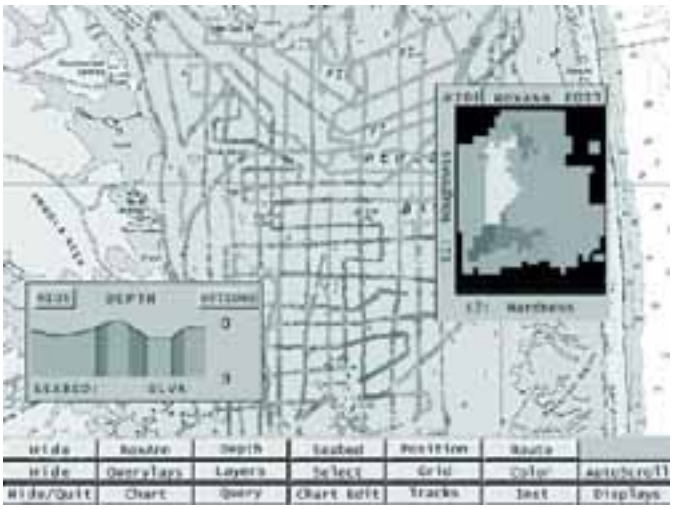


Photo 1 RoxAnn Ground Master unit

The data collected by this system offers information on a wide variety of coastal management issues from habitat suitability modeling and dredging impacts to mapping submerged aquatic vegetation (SAV), macroalgae and potentially horseshoe crab distributions. The RoxAnn™ Seabed Classification System (Photo 1) is a remote sensing hydro-acoustic sensor that has the ability to classify seabed bottom type by extracting data on bottom roughness and bottom hardness using echoes measured



on a standard transducer. The system interfaces with a Global Position System (GPS) to provide locations of acoustic signals and a shipboard computer to enable real-time data classification and mapping of the seabed and associated biological communities. Data on time, position, depth, and classification parameters are logged at one-second intervals to a computer file, which can be exported to a geographic information system (GIS) for further spatial analysis. GIS analysis can be used to determine the benthic habitat boundaries and bathymetry, and display differences between successive surveys. Such spatial and time-series analysis is necessary for long-term monitoring and management needs.

Photo 2 Sample of RoxMap software in the field. When connected to the RoxAnn Ground Master unit, the depth box reports depth in meters and seabed type (as created by the user) in real-time on a NOAA Nautical Chart.

Photo 3 Towed underwater camera for field verifications.

Benthic Habitat Characterization of the Inland Bays

From mid-March through early April, 2002, staff from the Delaware Coastal Programs ran the RoxAnn™ system in North-South and East-West transects (Photo 2) across Rehoboth and Indian River Bays on a 19 foot polarcraft, recording the geographically referenced point data. The RoxAnn™ analyzed two acoustic signals, bottom roughness and bottom hardness. The ratio of these two measurements was calibrated in the field to known bottom types. Measurements were ground-truthed in the field using underwater video (Photo 3) and grab samples (Photo 5). The RoxAnn™ system was able to distinguish between sand, mud, macroalgae species, shell, clams (Photo 4) and rock found on the sea bottom.

In the end, the geographically referenced points will be exported into a GIS database and will be used to map bottom substrate contours and bathymetry. The final product will provide detailed bottom substrate data, maps and bathymetry to aid in Delaware's efforts to manage the benthic habitats of the Inland Bays.

Photo 4 Benthic grab sample clam and mud

Photo 5 Petite Ponar benthic grab sampler for field verifications.

For further information, contact Kimberly B. Cole, Environmental Scientist, Delaware Coastal Programs, Division of Soil and Water Conservation, Department of Natural Resources and Environmental Control; 89 Kings Highway, Dover, DE 19901; Phone: (302) 739-3451; E-mail: kcole@state.de.us

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The Coastal Bays of Maryland's Eastern Shore Catch up with Chesapeake Bay

The coastal bays on Maryland's eastern shore are home to more than 300 species of migratory waterfowl, songbirds, and birds of prey. The shallow bays provide habitat for rare plant and animal species, as well as blue crabs, flounder, and clams. Located entirely within Worcester County, the coastal bays host more than 12 million seasonal visitors who contribute to a $2 billion tourism industry. The coastal bays were designated a national estuary in 1996 under the National Estuary Program. The Atlantic Coastal Bays Protection Act of 2002, recently passed by Governor Glendening and the 2002 Maryland General Assembly, is another important step in protecting this beautiful ecosystem.

In 1996, the Maryland Coastal Bays Program was established and the effort to develop a comprehensive plan to restore and protect Marylandís coastal bays began. By 1999, federal, state, and local agencies, citizens, farmers, developers, and other stakeholders had collaboratively developed the Comprehensive Conservation and Management Plan for Maryland's Coastal Bays (CCMP). The new legislation will add to those efforts and provide additional protections to the bays while accommodating room for growth in the region.

The Atlantic Coastal Bays Protection Act was designed to protect the coastal bays by enhancing protection of special habitats, reducing pollutant loads, providing public access, reducing impervious surfaces, and properly siting water dependent facilities. Special attention is given to the "Critical Area" within the coastal bays, which is defined as all land within 1,000 feet of the mean high water line of tidal waters or the landward edge of tidal wetlands and all waters of and lands under the coastal bays and their tributaries.

The concept of "critical area" designation was formally introduced in Maryland in 1984 with the passage of the Chesapeake Bay Critical Areas Act. "Critical areas" are sensitive coastal areas key to the water quality and productivity of the Chesapeake Bay Estuary that can benefit from enhanced protection and land use planning. The Atlantic Coastal Bays Protection Act of 2002 extends the concept of "critical area" designation beyond the Chesapeake Bay to the Eastern Shore of Maryland.

Under the Act, local jurisdictions within the coastal bays watershed will use established guidelines and criteria to develop critical area protection programs by January 1, 2003. While each local jurisdiction is encouraged to design their own plan, specific to its own conditions, the general goals of the Act must be met. These goals are to:

- Minimize adverse effects on water quality that result from pollutants that are discharged from structures or conveyances or that have run off from surrounding lands;
- Conserve fish, wildlife, and plant habitat in the Critical Area; and
- Establish land use policies for development in the Critical Area, to accommodate growth and also manage human activities that can cause adverse environmental effects.

During the development of the 2002 Act, Worcester County requested that legislators include protection for non-tidal streams in the Act, and legislators granted that request. Given the relatively small watershed size, additional protection to non-tidal streams in the watershed may have the most significant effect on improving water quality and habitat.

An innovative conservation approach is being developed to protect non-tidal streams. Local jurisdictions are required to map and establish three land use designations: Intensely Developed Areas (areas of concentrated development where little natural habitat occurs), Limited Development Areas (areas in which development is of a low or moderate intensity), and Resource Conservation Areas (areas characterized by natural environments or by resource-utilization activities).

There are different environmental protections afforded to each of the three land use designations. For example, developers of sites within Intensely Developed Areas must generally provide at least 15% forest or developed woodland cover after development or a fee-in-lieu payment.

Local programs are approved by a State Critical Area Commission, but are implemented locally. The statewide Critical Area Commission was created under the 1984 legislation to oversee the development and implementation of local land use programs within the Chesapeake Bay watershed. The new Atlantic Coastal Bays Protection Act of 2002 expands the Commission with two new members from Worcester County.

Worcester intends to beat the January 1, 2003 deadline by finishing their critical area plan by mid-summer in 2002. County Commissioners and staff were well prepared to address the requirements of the Coastal Bays Protection Act after having proposed county legislation for similar protection planning at the County level earlier in the year.

While the actual effects of the Atlantic Coastal Bays Protection Act have yet to be ascertained, the Act is a significant accomplishment for Worcester County and the Maryland Coastal Bays Program. The commitments and contributions to the development of this Act by the agencies and stakeholders involved are as critical to the future health of the coastal bays as the Act itself.

For further information, contact Katheleen Freeman, Coastal Planner, Maryland Department of Natural Resources; Coastal Zone Management; Phone: (410) 260-8986; Fax: (410) 260-8739 E-mail: kfreeman@dnr.state.md.us

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Inaugural National Conference on Coastal and Estuarine Habitat Restoration Call for Presentations!

The Inaugural National Conference on Coastal and Estuarine Habitat Restoration will be held April 13-16, 2003, in Baltimore, Maryland. Restore America's Estuaries will host the conference, to be held at the Hyatt Regency Inner Harbor Hotel. This will be the first nationwide forum focused solely on the goals and practices of coastal and estuarine habitat restoration. Incorporating the non-profit, government, business and academic sectors and will address habitat restoration in coastal and estuarine areas of the United States, including the Great Lakes region, as well as transboundary initiatives and issues.

Those who are interested in providing presentations are invited to submit proposals. All conference proposals should relate specifically to one or more of the following conference themes: Best Practices in Restoration, Community Involvement, Planning and Priority-Setting, Science and Technology, Monitoring and Evaluation, and Policy and Funding.

For further conference information, contact Heather Bradley, Conference Coordinator; Phone: (703) 524-0248; E-mail: hbradley@estuaries.org.

For more conference information and full descriptions of conference themes, please see the full "Call For Presentations" on the website at www.estuaries.org. Session proposals are due by September 13, 2002.

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Identifying the Factors that Affect Lobster Health in Long Island Sound

In August 2000, Coastlines reported on the 1999 mass mortality in the lobster fishery in Long Island Sound and the subsequent research to address this disaster. This article is meant to provide an update on the most recent research and monitoring program.

Over the last decade or so, the entire northeastern American lobster fishery experienced increased prosperity. Advances in gear efficiency, coupled with tremendous resource abundance, contributed to both an enhanced catch rate and an expanding fishery throughout much of the 1990's. By the late 1990's, the fishing effort was in the range of over four million traps throughout the entire northeastern seaboard. In Long Island Sound, which represents the southern limit of the American lobster's range, there was a steep increase, by a factor of 3 to 4, in the number of traps and landings in New York, compared to a doubling in Connecticut.

In the fall of 1999, Connecticut and New York lobstermen reported unusual levels of die-off. This was substantiated by records from New York's Department of Environmental Conservation (NYS DEC) and the Connecticut Department of Environmental Protection (CT DEP) that estimated a 55% reduction in lobster

landings for that period, as compared to the previous year. This forced many lobstermen to leave the fishery altogether and resulted in the allocation of federal and State of Connecticut funding to support lobster research in Long Island Sound. By mid-2001, seventeen projects were initiated to try to identify the causes of the mass mortalities, and to strengthen state monitoring programs overseen by CT DEP and NYS DEC. University and federal agency researchers are investigating potential causes, including environment, human, failure of immune and endocrine systems, and shell disease.

Monitoring in Long Island Sound

Current lobster monitoring projects involve tracking lobster movements using tagged lobsters and monitoring lobster catches through onboard electronic recorders and trawl surveys. In 2001, state agency scientists and lobstermen tagged nearly 4,000 lobsters to document their movement within and around the Sound. In Connecticut, preliminary return data show that more than 50% of the recaptured lobsters had moved less than 1 kilometer, and approximately 75% had moved 5 kilometer or less. Only two percent traveled more than 10 kilometer from their release point. Male, female, and egg-bearing females all showed the same tendency to remain near their capture area. Continuing data collection in the spring and summer months will help to show whether this pattern is maintained year-round.

Electronic data recorders purchased by the CT DEP are being installed on 24 commercial lobster vessels. Vessel captains will record biological data from their catch, including the incidence of shell disease, number of dead and dying, size, sex, and egg status. This data will be used to produce a summary report for the harvesters and state on a monthly basis.

Recent trawl surveys conducted by the CT DEP in the Sound have shown that an encouraging number of juvenile females are present, which brings hope for recovery of the population over the long term if they survive to reproduce. However, lobstering currently remains poor in many parts of the Sound and the industry continues to struggle to adjust to the fewer available lobsters.

The Research Effort Continues

Several ongoing studies are examining potential causes of the 1999 die-off event. Researchers are working with healthy lobsters to find out how their health changes under stressful conditions, both in the Long Island Sound estuary, and in water bodies outside the affected region. Scientists induce stress by exposing the lobsters to an array of stressors, including high water temperatures, low oxygen levels, and

a range of salinity. Healthy lobsters are also being exposed to naturally-occurring bacteria, and then held in the Sound to see if they react similarly to those that died in 1999. Evaluating the cumulative effects of stress on lobster immune and endocrine systems is an important goal of these studies.

Researchers are also investigating how the environment in Long Island Sound has changed over time. Water quality and environmental conditions over the last decade are being analyzed for trends. Core samples taken from different areas in the Sound are helping researchers to study changes in the Sound that may have occurred over a much longer time frame (hundreds of years). The results will indicate whether the environmental changes seen are the result of local influences, or are more strongly linked to global climate changes.

Pesticides such as malathion, methoprene, and pyrethoids, which are used for mosquito control in coastal New York and Connecticut, are being studied to determine what effect, if any, they may have on lobster health. Scientists are investigating possible sub-lethal or chronic effects of such pesticides on larval, juvenile, and adult stages, at concentrations that might have been present. The potential for these pesticides to affect the hormones responsible for growth and molting is also the subject of research.

Parasites such as Paramoeba are also a potential suspect of the 1999 die-off event. Scientists are using genetic techniques to more definitively identify the Paramoeba sp. that continues to be detected in lobster samples from Long Island Sound. Complementary work includes developing a probe to more easily detect Paramoeba in the water column and in lobster tissue.

Some research funds are also being used to investigate the growing incidence of shell disease in American lobsters. Shell disease should not be confused with the Paramoeba infection. It is a bacterial infection that causes darkening and pitting of the shell. The appearance in affected lobster prevents them from being sold for the "live" market (although the meat is safe to consume). Instead, the meat from these lobsters is canned, a less profitable product. The disease currently affects lobsters from New York to Massachusetts, and the states are collaborating to record data regarding the diseased lobsters. This disease differs from red tail disease (Gaffkemia) that resulted in economic losses during the early 1990s. Lobster diseases are reviewed in a fact sheet, available on the website described below.

Shell diseases may be caused by chitinolytic bacteria that break down shell components. Ongoing work includes determining which bacteria are common to the infected animals, what causes them to attack the exoskeleton, and whether these infections can spread through pre-existing breaches in the shell (e.g., wounds

resulting from fights).

Lobster research and resource monitoring efforts are ongoing, and everyone is eagerly awaiting their completion. The information that is being gathered will increase our understanding of the vulnerability of the lobster fishery and other important marine resources, and provide better information on how we can safeguard it for future generations.

For further information, contact Antoinette Clemetson, Lobster Outreach Specialist, New York Sea Grant Extension; 30 Sound Avenue, Riverhead New York, 11901-1098; Phone: (631) 727-3910; Fax: (631) 369-5944; E-mail: aoc5@cornell.edu or Nancy Balcom, Extension Program Leader, Connecticut Sea Grant College Program, 1080 Shennecossett Road, Groton, Connecticut, 06340-6097; Phone: (860) 405-9127; Fax: (860) 405-9109; E-mail: nancy.balcom@uconn.edu

Please visit the website http://www.seagrant.sunysb.edu/LILobsters/LILobsters.htm for additional information. To review the earlier Coastlines article visit http://www.epa.gov/owow/estuaries/coastlines/aug00/lobster.html.

Long Island Sound Lobster Research Initiative is a joint collaboration of National Oceanic and Atmosphere Administration's (NOAA) National Marine Fisheries Service, Atlantic States Marine Fisheries Commission, EPA Long Island Sound Study, Connecticut Department of Environmental Protection, New York State Department of Environmental Conservation, and the Sea Grant College Programs in Connecticut and New York.

Note: This information is provided for reference purposes only. Although the information provided here was accurate and current when first created, it is now outdated.

Conflicting Values and Uses Draw Attention to Small Motorized Watercraft in New Jersey

Recently, two workshops were held on the Impacts of Small Motorized Boats on Shallow Water Systems to address the rapid increase in the number of small boats and personal watercraft in New Jersey coastal waters. Conflicts regarding competing uses and values of water are increasing among recreationalists, waterfront residents, and environmentalists. In recent years, as their use has increased, small motorized watercraft have become a critical source of conflict along New Jersey's shorelines.

Small Motorized Watercraft

Small motorized watercraft include both jet-driven and propeller-driven boats, less than about six meters long, that can access shallow water. Personal watercraft (PWCs) are vessels less than about five meters long, that are propelled by water-jets. PWCs are capable of operating in very shallow water and even in the narrowest tidal marsh channels. Propeller-driven watercraft are propelled by one or more blades (screws) that create a backward thrust of water.

These small motorized watercraft can cause significant negative effects on water and sediment quality, benthic habitats, and biotic communities. Contaminants such as metals and hydrocarbons can leach from boat engines and hulls into the water column, and bottom sediments are commonly resuspended into the water column

from the turbulence caused by the propulsion of watercraft. Hydrocarbon compounds and trace metals released from two- and four-cycle engines and boat hulls tend to accumulate in bottom sediments. The resuspension of bottom sediment increases turbidity levels, re-introduces nutrient and chemical contaminants into the water column, and reduces light transmission through the water column.

Propeller wash and propeller cutting directly impact benthic habitats by damaging submerged aquatic vegetation (SAV), scarring the substrate, and eroding sediments. The impacts of scarring are particularly critical due to the time needed (3-7 years or more) for natural recovery by seagrasses. Deep propeller cutting also creates steep topographical depressions in the substrate that may remain uncolonized and barren for as much as 10-20 years.

PWCs have also had documented impacts. The high speeds and audible sounds of water jet-driven vessels have been shown to adversely affect the behavior, reproduction, and distribution of colonial nesting birds (e.g., common terns) in coastal environments. PWCs also may affect nearshore habitats by accelerating sediment resuspension and eroding shoreline areas. The scarring impacts of PWC use, however, has not been sufficiently documented in New Jersey or elsewhere. Additional data collection will help to formulate effective environmental management strategies.

The Workshops

The two recent workshops were organized by the Jacques Cousteau National Estuarine Research Reserve (JCNERR) and the New Jersey Coastal Zone Management Program (NJCZMP), who are partnering to identify and address coastal management concerns at state, regional, and local levels. The JCNERR, located in Tuckerton, New Jersey, is one of 26 national reserves dedicated to the education, research, and stewardship of estuaries and coastal systems. The workshops are part of a larger series of Coastal Decision-Maker Workshops (CDMW) of the National Estuarine Research Reserve System, which are aimed at providing information, resources, and networking opportunities to individuals whose decisions affect the health and integrity of coastal resources.

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National Estuaries Day

Mark your calendars for October 3 - 5, 2002! This year's celebration of National Estuaries Day marks the beginning of a new partnership between NOAA's National Estuarine Research Reserve System and EPA's National Estuary Program. For the first time EPA and NOAA will co-produce Estuary Live! on October 3 ñ 4. This web based broadcast will provide classrooms and the general public around the world with the opportunity to take a "virtual" live tour of some of the nation's most valued estuaries.

NEPs and NERRs will be partnering locally to raise public awareness about estuaries in both programs, for exampled six of the estuaries will be highlighted through educational videos. Live estuary tours will be hosted by the following National Estuarine Research Reserves (NERR) and National Estuary Programs (NEP): Padilla Bay NERR and Puget Sound NEP in WA; South Slough NERR and Tillamook Bay NEP in OR and the Lower Columbia River NEP in OR and WA; Barataria-Terrebonne NEP, LA; Charlotte Harbor NEP and Rookery Bay NERR in FL; North Inlet-Wynah Bay NERR in SC; North Carolina NERR and Albemarle Pamlico Sounds NEP in NC; Jacques Cousteau NERR and Barnegat Bay NEP in NJ; and Chesapeake Bay NERR in MD, EPA's Chesapeake Bay Program, and, one of 15 Coastal Ecosystem Learning Centers designated by the Coastal America partnership, the National Aquarium in Baltimore will highlight their Chesapeake Bay Conservation program.

Schools, science centers, aquariums and other educational facilities that have KU-Band satellite dishes will be recruited to provide classes or the general public the opportunity to participate in Estuary Live! Anyone with Internet access can be part

of this state-of-the-art exploration of the nation's estuaries from their home or office. Participants can email questions that will be answered by the estuary guides as they take viewers on tour of their estuary.

Estuary Live! will kick-off local National Estuaries Day events to be celebrated on October 5th. The purpose of National Estuaries Day is to promote the importance of estuaries and the need to protect them.

For more information, please check out the www.estuaries.gov website that will provide links to the Estuary Live! program and local National Estuaries Day events around the country or call Betsy Salter, U.S. EPA at (202) 566-1244 or Theresa Eisenman (ext. 105) and Becky Weidman (ext. 145), NOAA at (301) 713-3155.

U.S. Environmental Protection Agency

National Estuary Program

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Coastal Bend Bays & Estuaries Program

United States Environmental Protection Agency

Office of Water (4504F)

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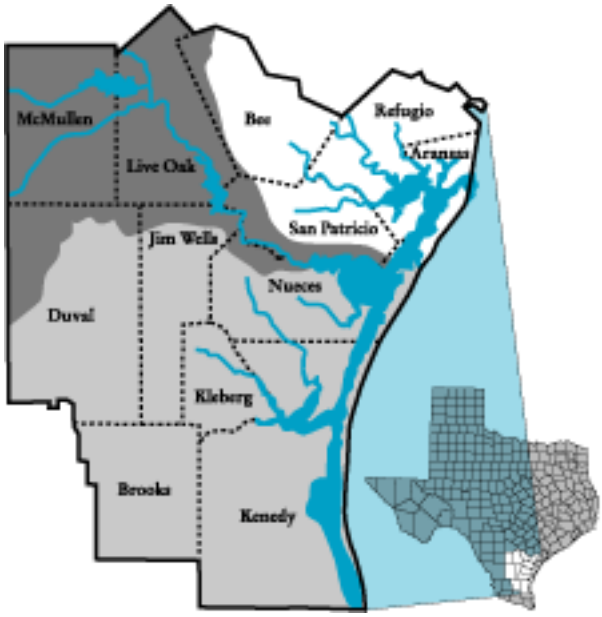
Coastal Bend Bays & Estuaries Program

Neuces Bay Island Habitat Restoration Project

INTRODUCTION

The Coastal Bend Bays & Estuaries Program (CBBEP) project area lies along the south central Texas Gulf coast. The Texas Coastal Bend project area encompasses, 12 counties, 11,500 square miles of land and 515 square miles of bays and estuaries. Three of the seven major estuaries along the Texas coast are within the Coastal Bend, each exhibits a wide variety of highly productive habitats, including oyster reefs, seagrass meadows, open bay bottoms, coastal marshes, wind tidal flats, barrier islands, and freshwater marshes. Among the major riverine systems that flow into the estuaries are the Mission, Aransas and Nueces Rivers.



The composition and distribution of the habitats and biota of the Coastal Bend are greatly influenced by climate and their geographic setting. More than 3,200 known species of animals and plants live in the Coastal Bend bays and estuaries. Habitat loss is a priority issue for the CBBEP as identified in the Coastal Bend Bays Plan. The Bays Plan identifies approximately 50 actions that are intended to benefit the bay system while supporting continued economic growth and public use of the bays.

The Coastal Bend Bays & Estuaries Program, a local non-profit, was established in 1994 with the goal of developing and implementing the Bays Plan. The CBBEP supports and develops management solutions with a focus on public health issues, altered freshwater inflow into bays and estuaries, condition of living resources, loss of wetlands and estuarine habitats, degradation of water quality, altered estuarine circulation, and bay debris.

The National Estuary Program

Estuaries and other coastal and marine waters are national resources that are increasingly threatened by pollution, habitat loss, coastal development, and resource conflicts. Congress established the National Estuary Program (NEP) in 1987 to provide a greater focus for coastal protection and the demonstrate practical, innovative approaches for protecting estuaries and their living resources.

As part of the demonstration role, the NEP offers funding for member estuaries to design and implement Action Plan Demonstration Projects that demonstrate innovative approaches to address priority problem areas, show improvements that can be achieved on a small scale, and help determine the time and resources needed to apply similar approaches basin-wide.

The NEP is managed by the U.S. Environmental Protection Agency (EPA). It currently includes 28 estuaries: Albemarle-Pamlico Sounds, NC; Barataria-Terrebonne Estuarine Complex, LA; Barnegat Bay, NJ; Buzzards Bay, MA; Casco Bay, ME; Charlotte Harbor, FL; Columbia River, OR and WA; Corpus Christi Bay, TX; Delaware Estuary, DE, NJ, and PA; Delaware Inland Bays, DE; Galveston Bay, TX; Indian River Lagoon, FL; Long Island Sound, CT and NY; Maryland Coastal Bays, MD; Massachusetts Bays, MA; Mobile Bay, AL; Morro Bay, CA; Narragansett Bay, RI; New Hampshire Estuaries, NH; New York-New Jersey Harbor, NY and NJ; Peconic Bay, NY; Puget Sound, WA; San Francisco Bay-Delta Estuary, CA; San Juan Bay, PR; Santa Monica Bay, CA; Sarasota Bay, FL; Tampa Bay, FL; and TIllamook Bay, OR.

Background

In the early 1800's, Nueces Bay was a destination of choice for many outdoor enthusiasts attracted by its rich resources. Collectors traveled from the East to collect birds for their museums, plume hunters visited to gather bird feathers and oystermen harvested the largest oyster reefs in South Texas.

At the end of the 1800's, natural islands existed in Nueces Bay. All of these were populated by different species of colonial waterbirds. Dams were built on the Nueces River and many of the natural islands disappeared. When oil and gas were discovered, access channels were built to establish oil and gas pipelines. The dredge spoils from these manmade activities led to the creation of additional shallow bay islands. The islands were largely populated by colonial waterbirds and wading birds. Interestingly, records show that bald eagles once nested on the islands during this time.

Prior to 1980 there were more than fifty-six islands in Nueces Bay. Islands in Nueces Bay have suffered from severe erosion due to waves, currents, and storm events. In addition, extensive shell mining occurred as late as the 1970's, which caused exaggerated subsidence. An estimated 24 million cubic yards of shell was mined from Nueces Bay for use in construction activities. Since 1980, the loss of hard reef habitat from shell mining and island erosion due to waves, currents and

storm events has greatly reduced the available habitat for nesting birds and other marine life.

While the loss of oyster reefs and associated emergent islands has greatly reduced habitat for marine life and birds in Nueces Bay, it has also resulted in increasing shoreline erosion along the shoreline of the delta area and the north shoreline of the bay. Average erosion rates of 3 feet per year are common in the area. In some areas erosion approaches 5 feet per year. The shoreline retreat is causing habitat loss, decreasing diversity of marine life, more frequent and severe impacts on shorelines, loss of public and private property and deterioration of water quality because of the loss of filtering wetlands.

Project Overview

The vision of the CBBEP is to maintain healthy bays and estuaries so that residents and visitors may enjoy their aesthetic, recreational, and commercial values. One of the CBBEP's most unique projects to date is the Nueces Bay Island Habitat Restoration Project. The purpose of this project is to both restore lost island habitat and protect existing rookery (bird nesting) islands. The Texas General Land Office and the CBBEP partnered in this $1.5 million construction project that took over a year in planning and four months to complete, ending in time for the 2002 bird nesting season (March - September).

The Texas Colonial Waterbird Coordinating Board identified the need for habitat protection and restoration in Nueces Bay, and partnered with the CBBEP to create a Colonial Waterbird Management Plan for the Coastal Bend area. The Nueces Bay Island Habitat Restoration Project was identified as part of the management plan to restore lost island habitat and protect existing rookery islands. The CBBEP took on the challenge and identified funding partners to restore island habitat in Nueces Bay. The CBBEP worked closely with the Texas General Land Office through their Coastal Erosion Protection Response Act (CEPRA) Program. The Texas General Land Office provided matched funding and managed the entire project.

25 Square Feet Transformed to 5 Acres

As a result of the shell mining, very little hard substrate habitat remained in Nueces Bay. A small fragment of one of the original 56 islands was enlarged and restored to almost 5 acres. Biologists took core samples to determine the most viable and productive island for restoration. This island was selected because of its available hard substrate and its immediate approximation to the mainland. This allowed access through the temporary use of a bridge to complete the project.

Dredged material from the bay was used to restore the island and the shoreline was stabilized with limestone rock that serves as a reef and protective barrier. This is now the largest island in Nueces Bay and is an important part of the solution to restoring the nesting sites and colonial waterbird populations that were once found in Nueces Bay. To decrease erosion at the five remaining islands, sediment-filled geotextile tubes were placed along the high-energy shoreline of the islands.

The project was challenging because Nueces Bay is a shallow bay system, averaging 3-feet in depth, with numerous pipeline crossings. Another challenge was locating suitable substrate material for the restoration project. Fortunately, sandy shell material was identified within the bay and used to restore the island. A hydraulic dredge was used to pump the material to the restoration site. The shoreline was then stabilized using 5,000 tons of limestone rock that doubles as reef habitat and erosion protection.

This project also provided erosion protection for the five remaining islands by placing sediment-filled geotextile tubes along the high-energy shoreline of the

islands. On some of the islands, the geotextile tubes were placed slightly back from the existing shoreline in the hope that a future project may allow nourishment of the island using dredged material.

Rookery Success Observed

Rookery islands in Nueces Bay have historically supported eight species of nesting birds such as Great Blue Herons, Great Egrets, Snowy Egrets, Roseate Spoonbills, Reddish Egrets, Caspian Terns, and Black Skimmers.

Biologists are discovering that the Nueces Bay Island Habitat Restoration Project provides a much- needed undisturbed bird sanctuary that is attracting different species of colonial shorebirds. The proof of this is in the weekly surveys now showing over 350 black skimmers, 60 gull-billed terns, and 2 least terns nesting on the restored habitat. Of particular importance are the black skimmers and least terns; both species are experiencing sharp declines, according to the annual Texas Colonial Waterbird Census. In 2003, biologists are looking to manage the island by planting native species of thorn scrub to attract wading birds like Reddish Egrets, Roseate Spoonbills, and Great Blue Herons. This will provide an educational opportunity to document the island's vegetational succession and the diversity of bird life.

For further information, contact:

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Previous Publications in the Demonstration Projects Series

Report Title	National Estuary Program	Date	Publication #
The National Estuary Program: A Ten-Year Perspective	General NEP Discussion	1998	EPA842-F-98-003K
Rock Barbs In Oregon's Tillamook Bay Watershed	Tillamook Bay, Oregon	1998	EPA842-F-98-003L
The Weeks Bay Shoreline & Habitat Restoration Project	Mobile Bay, AL	1998	EPA842-F-98-003M
Evaluation of Shrimp Bycatch Reduction Devices in Texas Coastal Bend Waters	Corpus Christi, TX	1998	EPA842-F-98-003N
Evaluating Simple, Cost Effective Solutions for Reducing Stormwater and Urban Runoff	Santa Monica, CA	1999	EPA842-F-99-0040
Bay Scallop Restoration Project in Chincoteague Bay	Annapolis, MD	1999	EPA842-F-99-004P
Clear Creek Wetland Restoration Project	Galveston Bay, TX	1999	EPA842-F-99-004Q
The Tampa Bay Watch High School Wetland Nursery Program	Tampa Bay, FL	1999	EPA842-F-99-004R
Punta Gorda Waterfront Juvenile Fisheries Habitat Project	Punta Gorda, FL	2000	EPA842-F-00-005S
Indian River Lagoon National Estuary Program	Indian River Lagoon, FL	2000	EPA842-F-00-005T
Tillamook Bay National Estuary Project	Tillamook County, OR	2000	EPA842-F-00-005U
Broad Marsh River Stormwater Remediation Project	Buzzards Bay, MA	2000	EPA842-F-00-005V
Morro Bay National Estuary Program	Morro Bay, CA	2001	EPA842-F-01-006W
Santa Monica Bay, Innovations in Treating Urban Runoff	Santa Monica, CA	2001	EPA842-F-01-006X
Albemarle-Pamlico Estuary Program	Washington, NC	2001	EPA842-F-01-006Y
San Juan Bay National Estuary Program	San Juan, Puerto Rico	2001	EPA842-F-01-006Z
Galveston Bay Estuary Program	Galveston Bay, TX	2002	EPA842-F-02-007A

Eelgrass Restoration in Delaware's Inland Bays	Delaware Inland Bays	2002	EPA842-F-02-007B