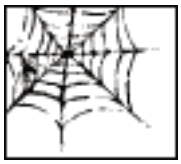


Note: This information is provided for reference purposes only. Although the information provided here was accurate and current when first created, it is now outdated.

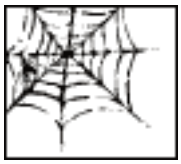
Disclaimer: The information in this website is entirely drawn from issues of newsletters published between 1994 and 2002 and these issues will not been updated since the original publication date. Users are cautioned that information reported at the time of original publication may have become outdated.

Information About Estuaries and Near Coastal Waters
August 2001 - Issue 11.4

Table of Contents

National Estuary Program Financial Resources Pilot Study

Albemarle-Pamlico Estuary Program



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 Although the information provided here was accurate and current when first created, it is now outdated.

Disclaimer: The information in this website is entirely drawn from issues of newsletters published between 1994 and 2002 and these issues will not been updated since the original publication date. Users are cautioned that information reported at the time of original publication may have become outdated.

Protecting "Surfable" Waves as a Natural Resource

In the classic Beach Boys song "Surfing USA," they sing about people surfing along the California coast, including the local favorites, Doheny and Manhattan Beaches. In the 1960's, shortly after that song ruled the airwaves, surfing near Doheny was dealt an enormous blow when the city of Dana Point constructed a boat harbor adjacent to Doheny State Park. Surfers still lament to this day the loss of a beloved surf break known as "Killer Dana" for what amounts to a parking lot for boats.

Fast-forward to 1983, suddenly history is repeating itself, this time surfing at Manhattan Beach is threatened by a proposal by the Chevron Corporation to extend a jetty just north of the beach. Fueled by the memory of the loss of "Killer Dana" and other surf breaks to coastal development, Surfrider Foundation cofounder Tom Pratte, led the fight to get surfable waves recognized as a natural resource worthy of protection.

The story began during the winter of 1982-83, which marked one of the strongest El Niño events in the last century. Associated with the meteorological anomaly was a winter of extreme storms that attacked the California coast with unusually intense wave activity. These storms caused extensive damage to California's coast and left Chevron's El Segundo marine terminal and pipelines without a protective beach. In response to the erosion, Chevron proposed installing a 900-foot rock groin with a renourishment project to fill the area surrounding the groin with approximately 620,000 cubic of sand. Because the construction area included submerged lands, permitting authority was under state control and thus Chevron Corporation applied for a permit with the California Coastal Commission (CCC) in 1983.

The CCC expressed concern about the project's impact on coastal resources and its magnitude. The commission linked its approval of the permit to a number of special conditions.

The most interesting and consequential special condition was imposed in response to objections raised by Pratte and other members of the Surfrider Foundation. Through the public hearing process required by the CCC for all permits, Surfrider Foundation expressed concerns that the groin project had potential to destroy a relatively popular surfing spot in the area. Surfrider convinced the Coastal Commission that any loss to surfing in the area would result in over-crowding elsewhere; in other words, surfing in El Segundo was an irreplaceable resource. In contrast, several coastal process experts predicted that the groin would not negatively affect surfing and might actually improve surfing conditions. These claims were founded on numerous locations where surfing is associated with groins and jetties. Based on these competing theories the CCC allowed construction of the groin, but required monitoring of surf conditions and held Chevron responsible for the surf conditions in the event that the surf degraded.

Several years of post-construction monitoring of the surf conditions in El Segundo by an independent contractor showed that the surf had degraded. Through negotiation and a strong presence on the part of the Surfrider Foundation, the California Coastal Commission determined that, in order to satisfy their permit requirements, Chevron would have to provide mitigation to enhance local surf conditions by constructing an artificial surfing reef.

As a result of the CCC ruling, Chevron entered into a joint effort with the Surfrider Foundation and the California Coastal Commission, agreeing to pay $300,000 for the construction of what has now become known as "Pratte's Reef." After years of research, design and obtaining the various permits, Surfrider Foundation started construction on the nation's first artificial surfing reef on September 19, 2000. Over the course of several days, 110 geotextile bags - weighing about 14 tons each -- were dropped into place to form the reef. This past spring, Surfrider dropped another 82 bags to increase the size of the reef. This additional construction was funded by a $200,000 grant from the California Coastal Conservancy. The reef created some "surfable" waves this spring, and the effect of the reef on the nearby beaches, surfing conditions and marine life will be monitored. Surfrider believes it will take at least one complete cycle of seasons before the conditions that create surf are fully understood. The most important implication of the reef's story is that surfing along the California coast will be protected from now on.

Surfrider will continue to monitor the reef and has already filed two quarterly reports with the California Coastal Commission. To obtain these reports, visit the Surfrider website at www.surfrider.org/artificialreef EXIT disclaimer.

For further information, contact John Hoskinson, Surfrider Foundation, 122 S. El Camino Real #67, San Clemente, CA 92672; Phone: (949) 492-8170.

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.

Disclaimer: The information in this website is entirely drawn from issues of newsletters published between 1994 and 2002 and these issues will not been updated since the original publication date. Users are cautioned that information reported at the time of original publication may have become outdated.

A Scorecard for Local Government Control of Nonpoint Source Pollution

In 1993, the state of New York established Long Island's South Shore Estuary Reserve, encompassing Long Island's south shore bays and the adjacent upland areas draining to them. A 23-member council was also created to prepare and adopt a comprehensive management plan to address the reserve's water quality, living resources, land use and economic issues. The Council's membership includes representatives of state agencies, local governments, water-dependent businesses, academia and citizens of the reserve.

Nonpoint source pollution was identified as the primary water quality concern in the reserve's tributaries and bays. Polluted stormwater runoff alone was responsible for closing more than 34,000 acres of hard clam (Mercenaria mercenaria) beds in the reserve, periodically closing bathing beaches in its estuarine bays and degrading fisheries in numerous tributaries. At the request of local governments in the reserve, the New York State Department of State created a model program for assessing how a municipality's code, standard operating procedures and educational programs can implement best management practices to control nonpoint source pollution.

The model program developed by the Department of State draws from the ìUS Environmental Protection Agency's Guidance for Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters.î The program is broadly organized in terms of existing development, new development, and public and private sector activities. Specifically, the program looks at local controls on new and existing

development and substantial redevelopment; new and existing roads, highways and bridges; new and existing marinas and recreational boating; new and existing hydromodification activities; and onsite wastewater treatment systems. When carefully applied, the program provides a scorecard identifying gaps in a community's nonpoint source pollution control coverage and points out specific opportunities for amending local ordinances and regulations to include additional management practices.

For each of the six towns and two counties in the reserve, Department of State staff conducted a thorough review of the local land use controls - zoning, site plan review, subdivision and other regulations. Department of State staff then met with appropriate local officials to discuss the department's review and to have them identify their community's capital improvements, routine operation and maintenance practices, and outreach programs.

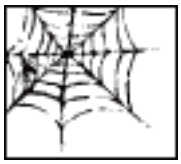
Based on this meeting, the department prepared a checklist of management practices according to major nonpoint source categories and rated the municipality's implementation (fully, partially, or not at all) of practices in each category. This scorecard was accompanied by a draft narrative report that documented the results of the checklist, identified specific gaps in the community's practices to control nonpoint source pollution, and suggested specific amendments to its local regulations to address those gaps.

The results of the completed assessments formed the basis for a suite of actions identified in the Long Island South Shore Estuary Reserve Comprehensive Management Plan (adopted April, 2001), which recommends that local governments in the reserve assume a leadership role in controlling nonpoint source pollution by exercising their legal authority and taking other actions to better manage nonpoint source pollution-generating activities. These actions call on municipalities to complete an inventory of their stormwater conveyance infrastructure and an inventory and analysis of associated stormwater runoff contributing areas. The plan also identifies how each municipality should improve its routine operating procedures and roadway maintenance practices; reduce pollutants associated with new construction, new and redeveloping marinas, and recreational boating; reduce fertilizer, herbicide and pesticide use; minimize the impacts of hydromodification activities; and reduce the environmental impacts of onsite wastewater treatment systems. As a result of the assessments, the actions also identify the different training needs of individuals working in local public service as they relate to implementation of nonpoint pollution management practices.

The completed assessments are also providing local governments with an unanticipated benefit. Now that each municipality has a better idea of how its local regulations address pollutants associated with construction site preparation and pre- and post-construction activities, the municipalities are better prepared to meet the small construction activity component of the US EPA's Storm Water Phase II Final Rule. Assessments still need to be conducted for the reserve's thirty-one villages and one city. But completed assessments are only the first step. Once gaps in municipal management of nonpoint source pollution have been identified, each local government needs to decide how it is going to address those gaps. For most communities, this will involve revising their operating procedures and amending local regulations to incorporate management practices that will more fully control nonpoint source pollution from activities within their jurisdiction.

For further information, contact Dennis Mildner, Coastal Resources Specialist, New York State Department of State/Division of Coastal Resources, 41 State Street, Albany, NY 12231; Phone: (518) 474-4457; E-mail: dmildner@dos.state.ny.us.

An electronic version of the Long Island South Shore Estuary Comprehensive Management Plan, with links to a related technical report series and associated GIS data sets and maps, can be accessed at www.estuary.cog.ny.us EXIT disclaimer.



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.

Disclaimer: The information in this website is entirely drawn from issues of newsletters published between 1994 and 2002 and these issues will not been updated since the original publication date. Users are cautioned that information reported at the time of original publication may have become outdated.

Estuaries Day is September 29, 2001

The thirteenth annual National Estuaries Day will be held on September 29, 2001. The day is set aside to support our nation's estuaries by promoting awareness through educational and informative events. The Coastal Management Branch of the EPA is requesting all National Estuary Programs (NEPs) provide information on their local Estuaries Day events. The information will be posted at www.estuaries.gov. This is a joint effort between NOAA and EPA to raise national visibility for the estuaries.

For further information, contact Noemi Mercado, EPA Office of Wetlands, Oceans and Watersheds, Coastal Management Branch; E-mail: mercado.noemi@epa.gov or Theresa Shearer, Phone: (301)563-7105; E-mail: Theresa.Shearer@noaa.gov or visit the website: www.estuaries.gov EXIT disclaimer.

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.

Disclaimer: The information in this website is entirely drawn from issues of newsletters published between 1994 and 2002 and these issues will not been updated since the original publication date. Users are cautioned that information reported at the time of original publication may have become outdated.

Seagrass Declines in Tampa Bay

Newly released data from Southwest Florida Water Management District scientists working with the Tampa Bay Estuary Program shows that more than 2,000 acres of Tampa Bay's seagrasses have disappeared since 1996.

Some scientists speculate that the losses are largely the result of the El Niño rains of 1997-98, which poured huge volumes of freshwater runoff, sediments and nutrients into Southwest Florida's estuaries. Although seagrasses can withstand a broad range of salinities, the El Niño event transformed parts of Tampa Bay into virtual freshwater pools for an extended period.

Typical annual rainfall in the Tampa Bay area was 46 inches between 1998 and 1999; however, during 1997 rainfall reached 70 inches, which is equivalent to an additional two feet of freshwater falling on the bay. Higher than average rainfall also was recorded for 1998. Additionally, nitrogen loadings for the same time period were elevated throughout the bay, compounded by accidental spills of treated sewage and water used in processing phosphate fertilizers.

Overall, Water Management District scientists estimate that Tampa Bay lost 7.8 percent of its seagrasses between 1996 and 1999.

But scientists believe that not even the record-setting rains of El Niño adequately explain the losses calculated for Old Tampa Bay, the area of the bay north of the Gandy Bridge. Although that area

experienced the largest drop, some 24 percent, between 1996 and 1999, seagrasses there have been declining since 1994. Most of the losses have occurred just north and south of the Howard Frankland Bridge on the Pinellas County side, according to monitoring conducted by the Southwest Florida Water Management District (SWFWMD).

David Tomasko, a SWFWMD seagrass scientist, coordinates seagrass mapping of the bay, which is done approximately every two years. The process involves extensive aerial photography of seagrass beds followed by ground-truthing to verify the accuracy of the photos. The results are then plotted on maps using digital imaging.

Tomasko observed that the seagrass declines reported for Old Tampa Bay are more than twice as large as those reported for any other bay segment, and account for two-thirds of the baywide declines observed for the period 1996-1999.

The news isn't all bad. Two bay segments, the Manatee River and Middle Tampa Bay, showed an increase in seagrasses over the 1996-99 period. The Manatee River gained nearly nine acres of seagrass, while Middle Tampa Bay (extending roughly from the MacDill peninsula to Pinellas Point in St. Petersburg) added more than 98 acres.

In fact, the newly reported declines come after several years of seagrass expansion baywide. In the late 1980s and early 1990s, seagrasses were returning at the rate of 500 acres a year as Tampa Bay responded to improving water quality. That expansion slowed to about 350 acres in the mid-1990s. The latest figures show an overall loss of seagrass back to pre-1990 levels.

Seagrasses are nurseries of the bay, sheltering and supporting an amazing variety of juvenile fish and other marine creatures. The Tampa Bay Estuary Program has set a goal of restoring 12,000 acres of seagrasses baywide.

From 1984-1996, progress toward that goal remained on track, with more than 5,000 new acres reported. However, in the last three years, more than 2,000 acres have been lost. Since water quality apparently remains good enough for seagrass expansion to continue, scientists want to explore other potential causes of the recent declines.

Among factors that the Tampa Bay Estuary Program hopes to investigate are the impacts of wave energy on seagrasses, through application of a NOAA-developed computer model that estimates effects of wave energy on seagrass beds and other benthic habitats. Other Southwest Florida estuaries have seen a similar magnitude of setback, including Clearwater Harbor, St. Joseph Sound and Charlotte Harbor, which experienced a decline in seagrass of 6.7% from 1996 to 1999, offering evidence that El Ni-o may have played a role.

The Estuary Program, the City of Tampa Bay Study Group, and Lewis Environmental Services financed additional aerial photography of the bay in November 2000, to assess changes in seagrass coverage in the

bay over the last year. Preliminary results indicate that seagrasses in many areas are rebounding. Comprehensive baywide aerial surveys are due again in Fall 2001.

For more information, please contact Nanette Holland, Public Outreach Coordinator, Tampa Bay Estuary Program, MS I-1/NEP, 100 8th Ave. S.E., St. Petersburg, FL 33701; Phone: (727) 893-2765; Fax: (727) 893-2767; E-mail: nanette@tbep.org

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.

Disclaimer: The information in this website is entirely drawn from issues of newsletters published between 1994 and 2002 and these issues will not been updated since the original publication date. Users are cautioned that information reported at the time of original publication may have become outdated.

Evaluating Cost Effective Methods for Reducing Nitrogen Impacts

Recently the town of Falmouth, Massachusetts completed a study to evaluate the sources of nitrogen entering three coastal estuaries and assess innovative and cost-effective solutions for improving water quality. These long narrow coastal estuaries, which are fed by small fresh water streams and by groundwater, are experiencing algal blooms, low oxygen events, and shellfish bed closures due to declining water quality. Although it was known that water quality in the embayments was declining due to nitrogen loading over the last decade, the impetus for the study came when an $8.5 million settlement reached with the Department of Defense provided funding for the town to offset the negative effects of a plume of contaminated groundwater originating from the former Massachusetts Military Reservation wastewater treatment plant. This plume contains a significant amount of nitrogen and is traveling in the groundwater toward the coastal ponds. While the plume is not expected to impact the embayment immediately, it represents a future nitrogen source to an already stressed system. Thus the town decided to spend a portion of the compensation to:

- Assemble information to characterize existing conditions;
- Establish and calibrate pond flushing and water quality models;
- Develop a clear and concise basis for assessment of current and future water quality;
- Thoroughly screen all available corrective actions;
- Develop a comprehensive set of alternative strategies and recommendations; and
- Identify potential optimum solutions that may be accomplished through additional funding.

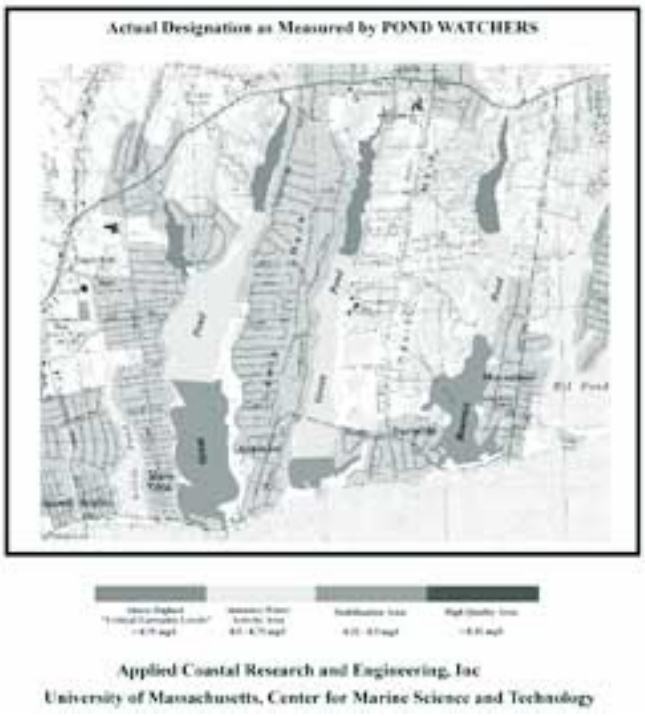
The project was conducted in a highly public and inclusive process, with the town of Falmouth, the US Air Force, a citizens committee, and the public working together to develop solutions that could be implemented with local support.

The total annual nitrogen loading from each watershed

or sub-watershed to the receiving salt pond is a combination of nitrogen loading to groundwater and surface water pathways, minus any attenuation that occurs during transport. Current and future annual nitrogen loadings to groundwater within each watershed were calculated from a land-use loading model. Although multiple sources, such as stormwater, atmospheric deposition, and lawn fertilizer contribute to the overall nitrogen loading, the loading model identified the largest source of nitrogen in the watersheds as individual on-site septic systems located in residential areas. Water quality models were developed for each pond considering nitrogen loading and tidal exchange. The water quality modeling results corroborated the results of long-term sampling conducted annually by a citizens monitoring group, the Falmouth Pondwatchers.

Various corrective action scenarios were evaluated with the water quality model to identify appropriate actions to attain water quality goals. Three general categories of nitrogen reduction strategies were assessed:

- Methods to control nitrogen sources,
- Methods to limit or manage nitrogen migration to the estuaries, and
- In-pond control options designed to mitigate the impact of current and future nitrogen loading.



Controlling Nitrogen Sources

Regulatory, management, engineering and public education tools were evaluated to determine how best to control nitrogen sources. A number of recommendations were made, involving changing local regulations that oversee zoning, subdivision controls, health standards, and wetlands regulations. Public education tools included development of environmentally friendly landscape practices to limit use of nitrogen fertilizers. Regulatory changes and public education alternatives were evaluated by direct comparison with established evaluation criteria developed by the committee guiding the process and through discussions with stakeholders.

Because on-site wastewater systems contributed the largest nitrogen load, more effective wastewater treatment alternatives to significantly reduce the nitrogen load were examined. To effectively reduce nitrogen sources, these systems must incorporate processes to denitrify the wastewater by converting nitrate, to inert nitrogen gas, thus reducing the amount of nitrogen in discharged effluent. Several wastewater treatment options were considered:

- Centralized wastewater treatment,
- Neighborhood-scale package wastewater treatment plants,

- Cluster denitrifying systems, and
- Small-scale, on-site (innovative/alternative) denitrifying septic systems.

Water quality models, developed for the project, tested the engineering scenarios and evaluated their potential to improve water quality. Engineering options were then evaluated by cost. Selected engineering scenarios were used as examples to predict potential water quality improvement achieved through implementation of various options. This allowed the town to assess the most cost effective means of reducing the most amount of nitrogen.

Reducing Nitrogen Migration to the Ponds

Management options for control of nitrogen migration to the ponds included controls on runoff, addressing atmospheric nitrogen deposited on roadways, and removal of nitrogen carried by the freshwater Coonamessett River, Backus River, and Bournes Brook draining the upper watershed. Methods to improve nitrogen removal from the fresh water river systems focused on creating wetland systems to enhance natural processes for nitrogen uptake by plants and, where possible, establishing conditions to promote denitrification. Two types of wetland systems were considered for nitrogen removal: surface wetlands and subsurface flow systems. Subsurface flow wetland systems primarily rely on water moving through the root zone of wetland vegetation and may not include open water. Surface wetlands have open water surfaces with emergent vegetation, clear open water areas, floating vegetation, or a combination of all of the above.

In-Pond Options

Coastal engineering and management alternatives were considered, including re-engineering the pond inlets and dredging to improve tidal flushing, wetlands construction along the shoreline of the ponds, in-pond aeration systems, and biomass removal programs to remove algae. However, these systems treat the symptoms, not the cause, of excess nitrogen loading.

Cost-Benefit Analysis

A cost-benefit analysis was conducted to evaluate where the most benefits could be obtained and how cost effective the method was. This analysis and evaluation of engineering scenarios throughout the watershed showed that:

- Larger centralized treatment facilities are the most efficient, based on a cost per kilogram of nitrogen removed, however, the cost is sensitive to the density of the housing in the area to be served due to costs associated with the sewer collection systems.
- Centralized treatment and cluster innovative/alternative systems are more effective and reliable for removal of nitrogen from wastewater than smaller onsite innovative/alternative systems. Large cluster systems can be as cost effective as large conventional wastewater treatment plants.
- Due to pond shape (long and narrow, south to north) and flushing characteristics, collecting and

treating wastewater from neighborhoods around the northern ends of the ponds will result in greater overall water quality improvement in the ponds than comparable systems serving areas to the south, closer to Vineyard Sound, where groundwater discharges to Vineyard Sound or the well-flushed southern sections of the ponds. Treating wastewater from neighborhoods at the heads of the ponds will also result in greater overall water quality improvement than treating areas further up in the watershed, where groundwater mainly discharges to freshwater systems and nitrogen is in part naturally attenuated.

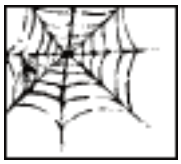
The Plan

Based on the findings of the project, the Citizen's Committee developed the goal of establishing a comprehensive town-wide, long-term plan to solve nutrient loading impacts to the ponds. This plan includes the following elements:

- Construction of centralized wastewater treatment facilities and collection systems to serve densely-populated, nitrogen sensitive areas (treated wastewater should be returned to the originating watershed);
- Construction of predominantly small denitrifying cluster units and individual denitrifying systems elsewhere in the watersheds;
- Educating the public on landscaping practices that minimize the amounts of fertilizers used and areas where they are applied; and
- Construction of wetland treatment systems on rivers feeding the coastal ponds, starting with a demonstration project to evaluate nitrogen removal.

Implementation of recommendations is pending town government approval.

For further information, contact Jim Begley, Horsley & Witten, Inc., 90 Route 6A, Sandwich, MA 02563; Phone: (508) 833-6600; E-mail: jbegley@horsleywitten.com; or Brian Howes, Center for Marine Sciences and Technology, University of Massachusetts, Dartmouth, Phone: (508) 910-6316; E-mail: bhowes@capecod.net, or John Ramsey, Applied Coastal Research and Engineering, Inc.; Phone: (508) 539-3737; E-mail: jramsey@appliedcoastal.com.



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.

Disclaimer: The information in this website is entirely drawn from issues of newsletters published between 1994 and 2002 and these issues will not been updated since the original publication date. Users are cautioned that information reported at the time of original publication may have become outdated.

Watershed Database and Mapping Projects: Decision Support Tools

Decisions regarding protection and restoration of coastal watersheds require balancing an array of complex environmental issues and synthesizing a wide variety of information. Remediating contaminated sites, dredging and disposal of contaminated sediments, and restoring damaged habitats are just a few of the decision challenges facing coastal managers. To improve the evaluation of multiple environmental issues affecting watersheds, NOAA's Coastal Protection and Restoration Division (CPRD) has developed Watershed Database and Mapping Projects for several coastal watersheds affected by contaminant releases from EPA Superfund sites and other sources.

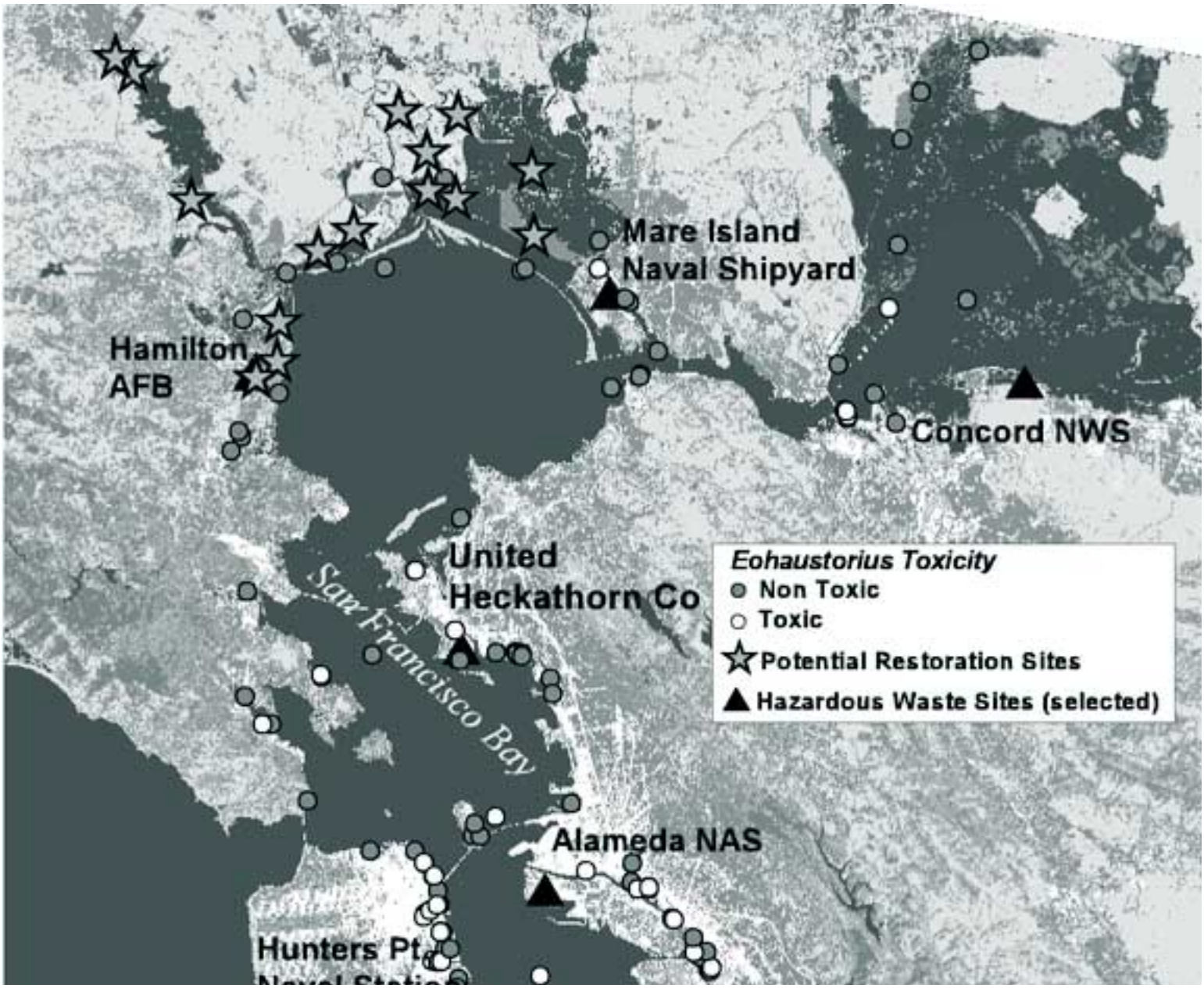
Each watershed project uses standard components, together with site-specific information tailored to the major objectives of each region. Each project combines a database, a database mapping application (Query Manager), and an ArcView Geographic Information System (GIS) project. Data on contaminant concentrations in sediment and tissues of aquatic organisms, sediment toxicity, natural resource distribution, land use, and potential habitat restoration projects are overlaid on a map of the watershed's features. This can be displayed at various scales. Standard map layers include wetlands, Superfund sites, and other regulated industrial facilities, land use, watersheds, and NOAA Environmental Sensitivity Index data. Custom imagery and other spatial data layers also are routinely used with data from the Query Manager database.

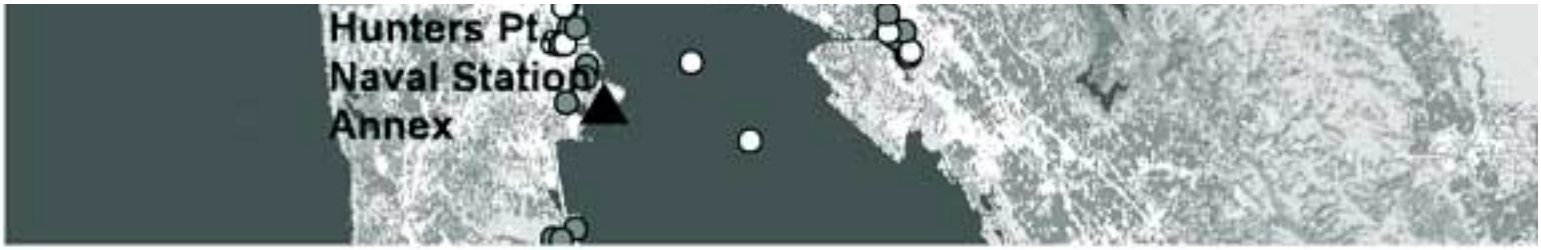
The watershed projects provide a rapid, convenient way to create maps of a watershed that display analyzed, sorted, and summarized data selected from a menu of programmed queries. The cross-platform (PC/MAC) database and mapping application, Query Manager, is an interactive system that rapidly

displays the results of database queries on a map in MARPLOT (a mapping program developed by NOAA). It can also deliver the data in an appropriate form to the ArcView GIS project. Both standard and customized base-maps are developed in ArcView to support all watershed projects. This approach simplifies data analysis and presentation, provides valuable tools for complex decision-making, and improves our understanding of dynamic aquatic ecosystems.

The Watershed Database and Mapping Project allows users to:

- Evaluate multiple data sets within a geographic area,
- Identify chemical concentration and toxicity gradients,
- Prioritize problem areas based on sediment chemistry, sediment toxicity, and/or tissue chemistry,
- Identify and prioritize potential habitats for restoration,
- Inventory planned, ongoing and completed restoration projects,
- Identify important data gaps, and
- Add and share new information.





Watershed Projects in Action

CPRD is currently working on 14 Watershed and Database Mapping projects that focus on a variety of contaminant and environmental issues. The majority of projects are intended to support decision making for remediation and/or restoration project planning.

Calcasieu Estuary, Louisiana

The Calcasieu Estuary is located in southwest Louisiana. Industrialization of the upper portion of the estuary began in the 1940s with oil refineries and petrochemical industries. Because of this history and accidental spills, the upper Calcasieu Estuary is contaminated with hazardous substances. Some areas are severely contaminated, resulting in advisories against fish and shellfish consumption and swimming and water sports.

The Calcasieu Estuary watershed project focuses on remediating historical damage to the environment. The project uses ArcView to map the geographic distribution of contaminant and toxicity test data from several Superfund site investigations, RCRA offsite facility investigations, and other studies. Base maps depict habitat classification, land use, bathymetry, industrial site locations, and other information. Using this interactive tool facilitates

- Rapid comparison of historical information to evaluate historical trends in sediment contamination,
- Selection and evaluation of potential restoration sites needed to develop a natural resources compensation plan for the estuary, and
- Straightforward communication to the public and the various agencies involved in the cleanup regarding contaminant threats, potential impacts of cleanup actions, and the restoration needs in the estuary.

Recently, EPA completed the first phase of a synoptic sediment contaminant sampling plan with cooperative responsible parties (e.g., Conoco and Olin) that combined the CPRD watershed project with EPA's Fully Integrated Environmental Location Decision System (FIELDS) tool for developing sampling designs. These data have been incorporated into the project and were used to determine that approximately 85% of the Calcasieu system requires no further investigation. Additional sampling data will be included in future iterations of the project to determine biological impacts.

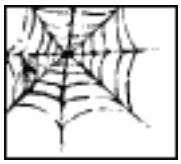
San Francisco Bay, California

The San Francisco watershed project is an example of a project focused on restoration planning. It

examines an extremely diverse and productive ecosystem, where development, land use changes, and related increases in contaminant loading have seriously degraded or destroyed habitat. Coastal managers using the Watershed Project can screen potential restoration sites by identifying those that have a high probability of long-term success for providing habitat and functions needed by targeted species. For example, projects that provide nursery, spawning, and foraging habitat for anadromous fish are given high priority. Other selection criteria include current land ownership, acquisition costs, project feasibility and costs, on-site contamination, and potential for recontamination. Potential habitat restoration projects can be mapped, and site specific data, such as acreage, existing and proposed habitat, and species expected to benefit, can be easily displayed.

As demonstrated by these examples, CPRD Watershed Database and Mapping Projects provide coastal resource managers and communities with an integrated assessment tool that improves evaluation, problem-solving, and setting priorities for future work, as well as data sharing among federal, state, local agencies and communities for a broad spectrum of coastal issues. Some of the watershed projects have been packaged for CDROM distribution and all Query Manager data sets and maps are available for downloading at our website at http://response.restoration.noaa.gov/cpr/watershed/watershedtools.html EXIT disclaimer.

For further information, contact Alyce Fritz, NOAA Coastal Protection and Restoration Division; Phone: (206) 526-6938.



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.

Disclaimer: The information in this website is entirely drawn from issues of newsletters published between 1994 and 2002 and these issues will not been updated since the original publication date. Users are cautioned that information reported at the time of original publication may have become outdated.

Here Today, Here Tomorrow: Student Ocean Conference Focuses on Marine Conservation

While many coastal managers who work daily with marine issues know the plight of coastal and marine environments, the general public may not fully understand why the vast ocean and its inhabitants are in serious danger. Similarly, while most Americans understand the need for national and state parklands, very few are aware of the importance of protecting and managing marine natural resources.

To educate the public about these marine issues, Coastal America established a national network of Coastal Ecosystem Learning Centers (See Coastlines, October, 1999, Issue). This network combines the resources of existing educational centers of excellence, namely aquaria and marine research centers, with federal Coastal America partners. The federal partners contribute expertise, equipment, educational material and other forms of expert assistance to the Learning Centers.

Through a grant from the National Geographic Society's Geographic Education Foundation, the Learning Centers are working with the Sustainable Seas Expedition and Coastal America to host an array of Student Ocean Conferences around the country. The conferences aim to educate and empower students to protect the marine environment, and to expose them to the wide variety of marine career opportunities. Student Ocean Conferences will be hosted at the various Learning Centers during the next several years. When appropriate, the local National Marine Sanctuary or National Estuary Program will serve as the conference's focal point, to emphasize marine conservation issues in the student's own backyards.

While each conference will be distinctive, highlights will include such things as interaction with local federal agency professionals involved in marine management and conservation, discussion groups for students to relate their own experiences and insights, and a session with a leader in regional or national marine conservation issues, such as National Geographic Society's Explorer-in-Residence, Dr. Sylvia Earle.

Thus far, three Student Ocean Conferences have been held and have met with great success!

The Seattle Aquarium Student Ocean Conference

On November 6-7, 2000, 55 high school students gathered at the Seattle Aquarium to participate in the first-ever Student Ocean Conference. During the first evening, students participated in three 30-minute sessions where they did the following:

- Simulated the effects of burying CO2 in the deep sea - a potential technique for reducing the amount of CO2 entering the atmosphere (the students found that leaked CO2 would significantly alter the pH of the surrounding ocean water);
- Gathered water samples to investigate and identify local plankton; and
- Observed divers conducting a quadrant sample on the floor of the aquarium's giant fish tank. The evening ended with a behind-the-scenes viewing of sea otters' nighttime feeding.

The next day's activities were highlighted with field trips and an interactive session with Dr. Earle. Representatives of Coastal America's federal partners from the Olympic Coast National Marine Sanctuary, Coast Guard, EPA, the Army Corps of Engineers, and the City of Seattle, led field trips that addressed issues such as:

- preventing and responding to oil spills
- protecting and restoring wetlands
- protecting and restoring salmon populations
- restoring the Duwamish river area
- exploring the Ocean - use of remotely operated ehicles
- marine protected areas discussion and role playing

The New England Aquarium Student Ocean Conference

The second Student Ocean Conference, held on December 1, 2000, at the New England Aquarium, was a similar success. Fifty-two students from grades 7-12, from six schools in the greater Boston area and Providence, Rhode Island, participated in the event.

The interactive film, "Storm Over Stellwagen," highlighted the threats facing the local Gerry E. Studds - Stellwagen Bank National Marine Sanctuary. This video, and the students' pre-conference studies, provided a foundation for the National Marine Sanctuary discussions that were held later in the day.

The students also divided into stakeholder groups to discuss the question of how and whether the Sanctuary should be protected. Professionals from the Sanctuary, Army Corps of Engineers, Coast Guard, the National Geographic Society, the Aquarium, and whale watching and fishing industries facilitated the stakeholder discussion groups. These experts were able to answer questions regarding real-life considerations in protecting marine areas. The stakeholder groups included:

- commercial fishing
- whale watching industry
- conservationists
- resource use, transportation, and waste disposal
- general public

After lunch and a tour of the aquarium, the group reconvened and the stakeholders presented their recommendations to the larger assembly and a panel of professionals. The students did a tremendous job of responding to the questions posed by the panel, and proved their knowledge of the complex issues at hand.

Florida Aquarium Student Ocean Conference

On April 24, 2001, the Florida Aquarium hosted 60 students and 15 teachers for the third Student Ocean Conference. This conference expanded upon the Regional Ocean Conferences for Students held by the Tampa Bay National Estuary Program and focused on issues in Tampa Bay. Activities included a pre-conference workshop for the teachers, and post-conference field trips for the entire class of each teacher.

Future Student Ocean Conferences

Eleven more conferences are being scheduled at Learning Centers around the country.

While each Student Ocean Conference will be unique, each will be aimed at not only bringing marine protection to the attention of students, but also bringing it alive for them. Each conference will offer a chance for our nation's youth to meet the folks who work with the marine environment, and to learn about career opportunities in marine science and management.

For more information, please contact Betsy Salter or Julianna Wyman at Coastal America, (202) 401-9928; Francesca Cava at National Geographic Society's Sustainable Seas Expedition (805) 963-3238; or visit the Coastal America website at www.coastalamerica.gov EXIT disclaimer.

Student Ocean Conference Schedule

Nov 29-30, 2001
Texas State Aquarium - Corpus Christi, Texas

December 2001
Mystic Aquarium - Mystic, Connecticut

January 2002
Hatfield Marine Science Center - Newport, Oregon

January/February 2002
National Aquarium in Baltimore, Maryland

February 2002
South Carolina Aquarium - Charleston, South Carolina

February 2002
Dauphin Island Sea Lab - Dauphin Island, Alabama

April 2002
Alaska SeaLife Center - Seward, Alaska

April 2002
Monterey Bay Aquarium - Monterey, California

May/June 2002
NY Aquarium - Coney Island, New York

2002
Waikiki Aquarium - Honolulu, Hawaii

2002
IGFA Fishing Hall of Fame & Museum - Dania Beach, Florida

COASTLINES
Information About Estuaries and Near Coastal Waters

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.

Disclaimer: The information in this website is entirely drawn from issues of newsletters published between 1994 and 2002 and these issues will not been updated since the original publication date. Users are cautioned that information reported at the time of original publication may have become outdated.

It's a Bird; It's a Plane - No, It's the Coastal Crusader!

As coastal managers are faced with the prospect of conducting more comprehensive beach monitoring in their state, it may behoove them to take a lesson from others who have been doing this for a long time. As early as 1977, the US EPA's Region 2 office recognized that there was a need for more comprehensive water quality sampling to be conducted, both spatially and temporally. But how to do this in a timely, cost effective manner? The solution was found in an unlikely candidate for monitoring coastal water quality - a helicopter! This is the twenty-fifth year of monitoring New York and New Jersey coastal waters using a helicopter, affectionately dubbed the "Coastal Crusader."

The EPA uses the helicopter under an inter-agency agreement with the US Department of the Interior. Using the helicopter and a minimal amount of personnel, sampling is conducted weekly from late May through early September at more than 120 ocean stations, covering 120 miles of New Jersey beaches and 80 miles of Long Island beaches.

The monitoring program is composed of three separate networks: a beach station sampling network, a perpendicular station sampling network, and a floatable surveillance network. Sampling is conducted through a specially modified hole in the floor of the aircraft, which enables sampling equipment to be lowered into the water while the helicopter hovers. Water samples are taken to EPA's Edison, New Jersey, laboratory, where they are analyzed for fecal coliform and enterococcus bacteria and for dissolved oxygen.

The beach station network is sampled to gather bacteriological water quality information on swimmability for public health protection. Samples are collected one meter below the surface once per week at 44 stations off the New Jersey coast from Sandy Hook to Cape May, and at 26 stations off the Long Island coast from Rockaway Point to Shinnecock Inlet. With the exception of four inlet stations in New Jersey (Shark River Inlet, Absecon Inlet, Hereford Inlet, and Cape May Inlet), stations are located in the surf zone of major beaches. The sampling results are shared with federal, state and local agencies to help determine if beach closures are necessary. The data assist the regulatory agencies in their daily decision making process regarding the quality of bathing beaches and swimmers' potential risk of exposure to harmful bacteria.

The perpendicular station network is sampled to monitor bottom dissolved oxygen and temperature for early detection of anoxic conditions and for trend analysis. The perpendicular station network consists of ten New Jersey transects. Grab samples, one meter off the ocean floor, are collected once during June, twice in July, and five times during August at the stations, which range from one to nine nautical miles off the coast. The northernmost stations are historical locations around the former Dredged Material Dump Site and the former Sewage Sludge Dump Site, located six miles off of Sandy Hook. The samples are analyzed for dissolved oxygen and temperature.

The floatable surveillance network is monitored to protect the marine environment and prevent beach closures due to floatable debris. Floatable debris is any waterborne waste material that is buoyant, including wood, household waste, street litter and medical debris. In the late 1980s, large amounts of debris washed up on southern Long Island and New Jersey ocean beaches. These beach closings lasted for varying time periods from several hours to several days and had significant economic and social impacts.

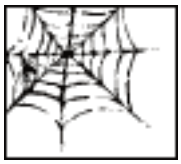
In response to the beach closures, an inter-agency "Floatables Action Plan" was developed in 1989 by EPA, U.S. Army Corps of Engineers, U.S. Coast Guard, New Jersey Department of Environmental Protection, New York State Department of Conservation, New York City Department of Environmental Protection and the New York City Department of Sanitation. The Floatables Action Plan includes helicopter and vessel surveillance, a communications network to report floatable "slick" sightings and to coordinate clean-ups of the floatable debris before it has a chance to impact bathing beaches, and a network of skimmer vessels that conduct routine cleanups. Flyovers of the New York/New Jersey Harbor Complex are conducted on a daily basis to observe for floatable debris and oily sheens. Slick type, location, size, density, and contents are recorded and reported to the Regional Floatables Coordinator, who contacts the appropriate agency to conduct clean-ups as necessary. Since its inception, the plan has significantly reduced the amount of floating debris escaping the harbor. There has not been a single New Jersey ocean beach closure caused by floatable debris for the past ten years, and only a handful of New

York ocean beaches have closed for short periods of time.

In addition, the helicopter is used to respond to environmental emergencies, and to conduct cooperative sampling with the New Jersey Department of Environmental Protection and the New York State Department of Environmental Conservation for the National Shellfish Sanitation Program. As a side benefit, the helicopter promotes public awareness of EPA and the environment, establishes good community relations, and is used as an educational tool.

The latest Coastal Crusader report, entitled, "The Helicopter Monitoring Report: a Report of the New York Bight Water Quality, Summer of 1997 and 1998," can be found on the Region 2 website at http://www.epa.gov/region02/desa/nybight.

For further information on the Helicopter Monitoring Program, contact Helen Grebe, Regional Coastal Monitoring Coordinator, Region 2 USEPA, 2890 Woodbridge Ave., Edison, NJ 08837; Phone: (732) 321-6797; or E-mail: Grebe.Helen@epa.gov



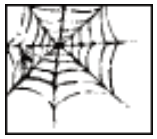
Note: This information is provided for reference purposes only. Although the information provided here was accurate and current when first created, it is now outdated.

Disclaimer: The information in this website is entirely drawn from issues of newsletters published between 1994 and 2002 and these issues will not been updated since the original publication date. Users are cautioned that information reported at the time of original publication may have become outdated.

National Estuary Program Financial Resources Pilot Study

The EPA Coastal Management Branch of the Office of Wetlands, Oceans and Watersheds has begun a pilot project to identify funding sources for a pilot National Estuary Program (NEP) and the extent to which NEP's Section 320, Clean Water Act federal funds can leverage additional funding. It is hoped that the project will demonstrate the importance of Section 320 funds to NEP leveraging efforts. The project is also expected to provide a better understanding of the different funding opportunities that support Comprehensive Conservation and Management Plan (CCMP) implementation efforts. To carry out the pilot, EPA will obtain data on implementation funding from the Coastal Bend Bays Estuary Program (CBBEP), in Texas, and from the entities involved in that NEP's CCMP implementation efforts. Upon completion of the pilot, an assessment of the methodology, the level of effort required to conduct the pilot, and the quality and value of information obtained will be completed and will result in any necessary revisions to the methodology. A draft report on the pilot is expected this fall.

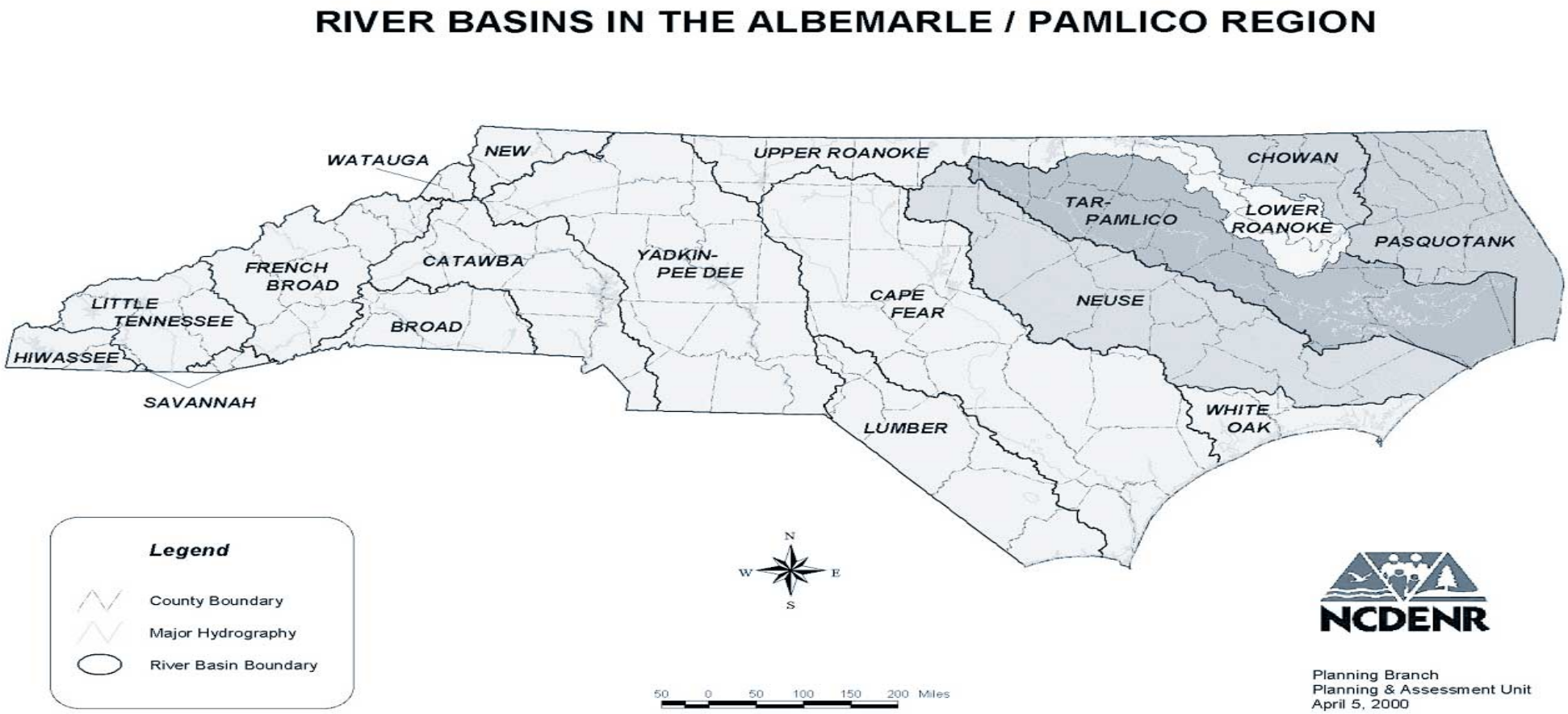
For further information, contact Tim Jones, US EPA (4504 F) Office of Wetlands, Oceans, and Watersheds, Washington, DC 20460, Phone: (202) 260-6059; Fax: (202) 260-8742/9960; E-mail: jones.tim@epa.gov.



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.

Disclaimer: The information in this website is entirely drawn from issues of newsletters published between 1994 and 2002 and these issues will not been updated since the original publication date. Users are cautioned that information reported at the time of original publication may have become outdated.

Albemarle-Pamlico Estuary Program
Taking Control of Nonpoint Source Pollution



Background

The Albemarle and Pamlico Estuary forms a complex and dynamic ecosystem that provides a bounty of natural resources, essential for North Carolina's economy. The rivers, creeks, wetlands, and watershed supply food, recreation, jobs, transportation, and a vital habitat for fish and shellfish. Economically, the Albemarle and Pamlico sounds represent the region's key resource base through commercial fishing, tourism, recreation and resort development, while the watershed supports mining, forestry and agriculture. Additionally, the diverse ecological communities provide a rich natural heritage for people living in the region.

Several signs of environmental stress have been recognized in the Albemarle-Pamlico system. Among these are declining fisheries, frequent algal blooms, closure of shellfish waters, losses of historic submerged aquatic vegetation beds, and degradation of wetland, fish and upland habitats. Much of this stress can be linked to declines in water quality, due to nonpoint source pollution.

The Problem

Nonpoint source pollution is the greatest cause of impairment to both salt and fresh water resources in the Albermarle-Pamlico region. Of the miles of impaired streams in the Roanoke River basin that do not meet criteria for supporting aquatic life, 81% are impaired due to nonpoint sources of pollution. The most significant land use in the watershed is agriculture, including crop farming and cattle farming. Although agriculture is not the only land use that contributes to nonpoint source pollution, agricultural practices are often cited as the major contributor to nonpoint source pollution. Stream bank erosion, sedimentation, and nutrient loading all contribute to water quality degradation and can be traced to detrimental agricultural practices.

A current demonstration project seeks to enhance Roanoke River water quality and to provide education and outreach with transferable benefits to others. The demonstration project is expected to restore approximately 36 acres of riparian habitat along the Roanoke River, located in Halifax County, northeast of the town of Norfleet. Expected benefits include improving water quality and wildlife and fish habitats for species such as anadromous fish and migratory birds. This will be accomplished by reducing stream bank erosion, sedimentation and nutrient loading through removal of cattle from the riverbank. Methods being used include fencing out cattle from the riverbank, establishing river and tributary buffers through the planting of hardwood trees, supplying an alternate watering source for the cattle, and providing a cattle crossing to allow for a pasture rotation system.

The Albemarle-Pamlico Sounds

The Albemarle-Pamlico estuarine system is the second largest estuarine complex in the United States, second only to the great Chesapeake Bay. The system supports an abundant and rich variety of organisms and encompasses important habitat for fish and shellfish, including key nursery areas for East Coast fisheries.

The system is composed of seven sounds: the Albemarle, Currituck, Croatan, Pamlico, Bogue, Core and Roanoke, and is drained by several major river basins: the Chowan, Tar-Pamlico, Neuse, Roanoke, Pasquotank, Perquimans, Little, North, Pungo and Alligator. The rivers drain a basin of over 30,000 square miles, including 36 counties in northeastern North Carolina and 16 counties and independent cities in southeastern Virginia. They discharge fresh water largely into the western side of the sounds.

North Carolina's sounds are characterized by wind-driven tides, which affect circulation patterns within the sounds and saltwater concentrations in their

tributaries. In contrast to lunar tides, wind tides are more variable and contribute to unpredictable changes along the coast. On the eastern side of the sounds, a chain of islands constituting North Carolina's beautiful Outer Banks, forms a barrier (with very few inlets) between the sounds and the Atlantic Ocean.

The Albemarle-Pamlico estuarine system supports an array of ecological, economic, recreational, and aesthetic functions that are of regional and national importance. For these reasons, the sounds were included in the EPA's National Estuary Program (NEP) in November of 1987.

The Albemarle-Pamlico Estuarine Study (APES, as it was known then) completed its Comprehensive Conservation and Management Plan (CCMP) in November, 1994, bringing to a close the research and development phase of the program, and commencing the implementation phase. At this time the program was renamed as the Albemarle-Pamlico National Estuary Program (APNEP).

Fortunately the Albemarle-Pamlico ecosystem is relatively healthy when compared to heavily populated and industrialized estuarine systems in other parts of the country, such as Boston Harbor or Long Island Sound. Nevertheless, nonpoint sources of pollution have impacted this largely undeveloped and agricultural region.

Project Overview

One of the five major river basins included in the APNEP region is the Roanoke River basin. It begins in the Blue Ridge Mountains of northwestern Virginia and flows in a southeasterly direction for 400 miles before emptying into the Albemarle Sound in eastern North Carolina. By the time it reaches the fall line near Roanoke Rapids, water from nearly 8,000 square miles of watershed has drained into it. From Roanoke Rapids to the coast, another 2,000 square miles are drained, giving the Roanoke the distinction of carrying more water than any other river in North Carolina. The lower portion of the basin contains the largest intact and least disturbed bottomland hardwood and cypress-tupelo ecosystems on the Atlantic coast of North America.

Forestry and cultivated cropland account for approximately 22 percent of the land use in the basin. Cotton, peanuts, tobacco and soybeans are among the most commonly grown crops, and only six percent of land use falls within the urban/developed category.

Because surface waters in North Carolina are classified according to their best-intended uses, water quality is determined by how well the intended uses are being met. This is known as "use support status" and is expressed as FS, for fully supporting; PS, for partially supporting; NS, for not supporting; and NR for not rated. Intended use categories include aquatic life protection/secondary recreation, primary recreation, fish consumption, shellfish harvesting, and water supply. Data are derived through water quality monitoring, fish tissue studies, benthic macroinvertebrate and fish community sampling, and are compared to use criteria. These comparisons determine the use support status or condition of the water. Water bodies receiving NS or PS ratings are considered to be impaired.

One of the greatest causes of degraded or impaired fresh or salt water is nonpoint source pollution. Forestry, construction, and urban/agricultural waste runoff all contribute significant nonpoint source pollution to the Roanoke River. The river has approximately 178 miles of streams that are impaired with respect to fish consumption and aquatic life/secondary recreation protection. While some loading of mercury and dioxin can be traced to point sources and contributes to the fish consumption impairments, the majority of the river miles are impacted by nonpoint source contributions.

Because nonpoint source pollution had been implicated in water quality impairment in this particular area of the Roanoke, the Roanoke River Basin

Regional Council (RRBRC), a member of the APNEP, chose to address it in a demonstration project involving agricultural practices. Detrimental agricultural practices in this area included allowing cattle to enter the riparian zone for water, grazing and shade. The consequences of this practice resulted in cattle excrement being deposited either directly into the river or immediately adjacent to upgradient riverbank slopes. At the same time, allowing cattle access to the river resulted in severe streambank erosion and sedimentation, which further contributed to water quality degradation.

Project Implementation

The "Roanoke River Riparian Zone Rehabilitation Demonstration Project," begun in the summer of 2000 at a cost of $42,000, consisted of fencing cattle to exclude them from a two-mile stretch of the Roanoke River in order to reduce stream bank erosion, sedimentation and nutrient loading. To form a 150-foot buffered area extending back from the river and a 75-foot buffered area on both sides of a tributary stream, hardwood plantings were established in winter, 2001 to restore approximately 21 acres of riparian habitat. Water quality will be monitored over the next four years, in conjunction with twice-yearly ground cover inspections.

This project is a joint effort among the Fishing Creek Soil and Water Conservation District, Natural Resources Conservation Service, North Carolina Division of Water Quality, North Carolina Cooperative Extension Service, US Fish and Wildlife Service, the Albemarle-Pamlico National Estuary Program, and a private landowner. As a cost-shared, cooperative effort, the project created cooperation between participating agencies and the landowner. The US Fish and Wildlife Service, Natural Resources Conservation Service, and the landowner installed project fencing in September, 2000. An existing stream crossing with eroded banks caused by cattle use was restored; this involved removing the old pipe, replacing it with new pipe measuring 42 inches, hauling soil, and placing filter fabric and gravel on the site. In addition, an existing but unused water well was repaired and new water lines were installed to new watering troughs to provide a new water source to the cattle.

Project Benefits

The landowner, cattle and the environment will all benefit from the project. The cattle will retain more of their weight by not having to travel as far to their water supply. Rotational pasture grazing is now available, drinking water for cattle will be cleaner, and there will be an annual per acre payment from the USDA for each acre of riparian buffer installed. Benefits accruing to the environment will also be realized through improved water quality and aquatic habitat downstream, and will help to forestall costlier future remedies.

This demonstration project has local and statewide applications. History has demonstrated that during high flows of the Roanoke River in warm months, water quality does not support aquatic life. Fish kills caused by low dissolved oxygen levels are experienced annually in the lower reaches of the river. These events have been accompanied by assertions that the problem is due in part to background, natural or backswamp biochemical oxygen demand, beyond the land managers' control. Land use practices that contribute to impaired water quality should be modified to prevent further impacts to historically marginal water quality. In the western reaches of North Carolina, not only streams but also drinking wells continue to be contaminated by fecal coliform bacteria from cattle excrement. Changing farming practices to include buffers to both riparian and wellhead areas would better protect water quality.

For further information, contact:
Joan Giordano, Albermarle-Pamlico National Estuary Program, North Carolina Department of Environment and Natural Resources, 943 Washington Square Mall, Washington, NC 27889; Phone: (252) 946-6481 or Jerry Holloman, Refuge Manager, USFWS, Roanoke Wildlife Refuge; Phone: (252) 794-3808.