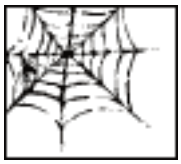

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Feds Helping Feds in the Chesapeake Bay Region

An interesting, and apparently effective, interagency effort has taken hold in the Chesapeake Bay region and has enabled the federal government to utilize its many resources to become a better steward of its lands. This effort has been undertaken through the Chesapeake Bay Program, established in 1983 as a voluntary partnership between Pennsylvania, Maryland, Virginia, the District of Columbia, the tri-state legislative Chesapeake Bay Commission, and the US EPA. The program is designed to protect and restore the 200-mile long Chesapeake Bay, and its 64,000-square mile watershed.

The Bay Program's Federal Agencies Committee has been meeting regularly since 1984 and was responsible for the creation of the *1994 Agreement of Federal Agencies on Ecosystem Management in the Chesapeake Bay*. The Agreement was signed by 30 high-level federal officials representing twenty-four agencies and departments and set out a number of specific commitments on the approximately 1.6 million acres of federally-owned lands within the bay watershed. Two of the most noteworthy commitments were the development of an annual list of priority projects for habitat restoration on federal lands in the bay watershed, and the creation of interagency teams of experts to conduct site assessments for nutrient management at federal facilities.

The *Agreement* formalized the work of two existing groups and issued them specific mandates. The Habitat Restoration Workgroup was charged with developing an annual priority list of habitat restoration projects for federal properties. The Nutrient Reduction Workgroup was asked to conduct nutrient management site assessments at federal facilities around the watershed.

Most federal facilities do not have a broad range of environmental experts available to advise managers. The site assessment teams are able to gather hand-picked experts from a range of agencies and organizations and provide assessments on a diverse number of activities. As experience with the process is gained, the assessments become more focused and efficient every year. They are no longer restricted simply to "nutrient reduction" actions, but look at all aspects of pollution prevention and even habitat restoration opportunities. An assessment protocol was developed (and has been regularly updated) which provides guidance for each site review. As has been the case from the start, these are voluntary visits and each site must be nominated by someone from within its own agency. The assessments are designed to: (1) analyze opportunities for enhanced environmental management; (2) promote successes in nutrient reduction and other Chesapeake Bay Program goals and objectives; (3) provide specific and reasonable recommendations for improvement; and (4) raise awareness among all levels of facility management about their role in meeting federal commitments to reductions in nutrient and toxics use impacts in the watershed.

Sixteen such assessments have been conducted at federal facilities since 1994 [see the Case Study for an example]. Visits and assessments are followed by a written report providing detailed recommendations to the facility staff on how to improve stewardship at the site.

The Nutrient Reduction Workgroup maintains a list of experts (with their areas of expertise) from each

member federal agency. When a team is pulled together for a site visit and assessment, state and local officials are routinely notified and invited to participate. The Habitat Restoration Workgroup is in the process of developing a similar list of experts and system of site visits and assessments to look specifically for habitat restoration opportunities. Both the nutrient and habitat site assessments are an evolving process and much has been learned and refined along the way.

For further information contact: Peter J. Marx, Associate Director for Communication, EPA Chesapeake Bay Program, or Don Maglienti, Chesapeake Research Consortium. Both may be reached at 410 Severn Ave, Suite 109, Annapolis, MD 21403; phone 1-800-YOUR-BAY ext. 713 (Marx) or 720 (Maglienti).

Chesapeake Bay Program

Case Study: A Site Visit and Assessment to the Quantico Marine Base

The U.S. Marine Corps has been an active participant in the Chesapeake Bay Program and volunteered to host a Federal Facility Site Assessment at their Quantico, VA, base in July of 1997.

In May, Quantico's Natural Resources Environmental Affairs Branch contacted members of the Federal Agencies Committee to arrange a brief preliminary assessment--a visit which suggested a number of opportunities for improvement in environmental efforts at the base. Following this initial screening, officials at the base decided that a formal Federal Facility Site Assessment would provide a valuable opportunity to expand the Corps' role as a partner actively working to improve the Chesapeake.

Federal agencies represented on the assessment team included the National Park Service, the Natural Resources Conservation Service, the Federal Highway Administration, the US EPA, the U.S. Marine Corps, the U.S. Army, and the U.S. Navy. Also participating were members from the Virginia Department of Conservation and Recreation, the Maryland Department of Transportation, and the Alliance for the Chesapeake Bay. Some of the technical talents included expertise with soil and water conservation, sediment and erosion control, wastewater treatment, riparian vegetative buffers, stormwater management, habitat restoration, and wildlife management.

The base at Quantico is located on the west bank of the Potomac River, approximately 35 miles south of Washington, DC. It occupies about 60,000 acres of land, 4,000 of which are operated under a Special Use Permit from the Department of Interior. Land uses are defined according to military or special operations uses, and general land use categories. General land uses include training, maintenance and production, research and development, supply and storage, medical, administration, housing and community facilities, and utilities.

Among the areas identified for assessment were: tracked vehicle training sites, public access areas, the

sewage treatment facility, a golf course, roadside mowing areas, and timber resource areas.

Historically, the base had an extensive training program for tracked vehicles. While this program has been considerably reduced, serious erosion problems exist on some trails. These areas are presently being seeded for erosion prevention, and heavily used trails are hardened with stone. The team recommended establishing vegetation such as trees, shrubs, and grasses on exposed areas. It was also suggested that stream crossings be lined with stones, with stone approaches on each shore. The use of earthen berms and sediment control traps will also reduce erosion. Finally, the team suggested an organized system of rotating training lands.

Much of Quantico Marine Base is open to the public, providing opportunities for hunters, fishers, bird watchers, and other outdoor recreational enthusiasts. A major problem stemming from this arrangement is the unauthorized use of all-terrain vehicles. These vehicles contribute to erosion and sedimentation problems, and are difficult to control. The team recommended strengthening of enforcement activities including signage, law enforcement patrols, and citations.

The treatment plant, located along the Potomac River, handles sewage from the east side of the complex and serves about 10,000 people. Wastewater is primarily sewage, with small amounts of industrial waste and some stormwater runoff diversions also coming into the facility. The plant is currently undergoing a three-year upgrade to include biological nutrient removal. The team recommended development studies for future expansions of the base.

The Quantico golf course is used primarily by the base community. A stream runs through the area and empties into the Potomac River, with a three hundred foot riparian segment receiving regular mowing. The base uses regular applications of fertilizer and pesticides to maintain the course. The team recommended establishing a riparian buffer of trees, shrubs, and grasses along the stream. Also recommended were reductions in nutrient and pesticide applications to the golf course, and a water quality study for monitoring restoration efforts.

Many miles of paved roads traverse the base, owned and maintained by the Marine Corps. Roadsides are mowed frequently, which can allow more infiltration of toxic and nutrient pollution into bay tributaries. The team recommended a reduction in mowing width allowing a return to natural vegetation. Also suggested was the use of low-growing, low-maintenance grasses in the mowed areas. An education and training program, stressing the ecological and economic benefits of reduced mowing, was suggested.

Much of the base consists of wooded land, and a number of timber resource areas are spread throughout the site. Quantico manages its forests for maximum species diversity, and maintains forested stream buffers which typically exceed one hundred feet. The team found that the base is managing its forests in accordance with the goals of the Chesapeake Bay Program's restoration and protection efforts, and recommended a continuation of these efforts.

The Federal Facility Site Assessment conducted at Quantico Marine Base demonstrated that the facility is

actively addressing many issues relating to the health of the bay. The team commended the base for its participation in the assessment. Sound land stewardship practices and upgrades to the sewage treatment plant were highlighted as ways the base had demonstrated its leadership in bay protection and restoration efforts. Opportunities for improving efforts to prevent erosion, and nutrient and toxic pollution of bay tributaries were identified as some of the primary needs of this facility.

Consortium Brings Nonpoint Pollution Messages Home

You fertilize the lawn. Then it rains. The rain washes the fertilizer along the curb, into the storm drain, and into lakes or streams. Not a huge pollution problem in the big scheme of things, right? In fact, estimates show more than 60% of our water pollution comes from such small, diffuse--nonpoint--sources. The pollution comes from activities many of us do every day--from driving cars that leak oil to not picking up our pet's waste. Yet opinion surveys show most residents believe water pollution is largely caused by industrial waste.

In 1994, the State of Washington's Department of Ecology joined with county and city governments to form the Water Quality Consortium as a means to carry out a mass nonpoint water quality education program. A grant from the state and money from the consortium's local governments funded the project. The goal was to raise awareness among citizens about the effect our behaviors have on water quality and to encourage people to change their behaviors. The consortium by now has reached millions of people through television and newspaper advertising.

Public opinion polling after the year-long campaign showed positive results among citizens. When asked to identify the environmental issues of greatest importance in Puget Sound, 15% more people cited water pollution after the television and newspaper advertisements ran (24% in 1995 survey, 39% in 1996). One-third of the people who recalled the advertisements on an unaided basis said the ads prompted them to change their behavior to protect water quality. Unfortunately, even after the education project, many residents still consider industrial waste to be the leading factor contributing to water pollution (42% in 1995, 39% in 1996).

The poll was based on public opinion telephone surveys of 600 Puget Sound residents prior to the campaign in 1995, and after the campaign in 1996. (The surveys provide an overall statistical reliability of plus or minus 4% at the 95% confidence level.)

Copies of posters are available. For information, contact Washington Department of Ecology's Publications Office at ecypub@ecy.wa.gov and ask for a "Water Quality Consortium Order Form."

Excerpted from "Confluence" the quarterly newsletter of the Washington State Department of Ecology's Water Division.

The Boston Harbor Navigation Improvement Project

A flexible team approach helps move the project along

The US Army Corps of Engineers (Corps) and the Massachusetts Port Authority (Massport) received, in 1997, the local, state, and federal permits necessary to undertake the long-awaited dredging of Boston Harbor. Of the total 3.7 million cubic yards to be removed, approximately 1.3 million are unsuitable for unconfined ocean disposal; this material will be placed and capped in confined aquatic disposal (CAD) cells excavated under the existing navigation channels.

To streamline the review process, state regulatory agencies developed a working group to coordinate their comments. The group initially expressed a number of concerns regarding, first, evaluation of specific elements of the proposed CAD method; and second, the identification, through ongoing monitoring, of potential short- and long-term impacts of capped material. Environmental interest groups expressed similar opinions, and were particularly concerned about the details of the proposed monitoring.

The resultant by-play between the proponents, regulators, and interest groups over the central technical issues of CAD cell construction and capping, and the sufficiency of the information provided, comprised the most intensive negotiations of the permitting process.

After in-depth review, the state largely accepted the conclusions of the Corps' DAMOS program's experience with management of unsuitable material as sufficiently demonstrating the general principles of CAD cell construction, material placement, and capping. To translate the state's concurrence with the conceptual aspects of CAD into specific project management conditions, the agencies, the proponents, and environmental interest groups developed two key oversight mechanisms.

Water Quality Certificate

The regulatory agencies negotiated for strong project construction monitoring under the auspices of the Water Quality Certificate issued by the state under the Clean Water Act. The certificate was designed to address three elements of the project; potential impacts from construction, short-term monitoring of disposal into the cells, and long-term monitoring of cell integrity. The certificate was also designed to strike a reasonable balance between a conservative environmental monitoring program (as advocated by the agencies and the interest groups) and the need for the project to proceed unencumbered by a prohibitively inflexible and costly series of permit conditions (as advocated by the proponents). Thus, the certificate, as issued, incorporates a "graduated level of effort approach" designed to intensively monitor initial conditions and rapidly confirm or refute the assumptions on which the project is based. This will be done through a provision requiring modification (or, in an extreme case, cessation) of construction in the event unacceptable impacts are noted. Conversely, there can be a significant diminution of monitoring effort if initial evaluations indicate that impacts are within acceptable bounds.

The basic provisions of the Water Quality Certificate address the following issues:

- Construction techniques - The proponents will rely extensively on precision and multi-beam bathymetry, augmented by sub-bottom acoustic profiles, side-scan sonar, and core samples to assess the accuracy of cell construction and dimensions, placement of material in the cells, and cap placement.

- Water quality impacts - Spatially and temporally intensive water column sampling and biological testing, with rapid analysis and reporting requirements, are designed to allow agency staff to determine, within a short time frame, whether state water quality standards are being violated. To provide a meaningful context within which to assess the test results, the proponents and state agencies negotiated a series of project-specific definitions of "violations" and designed provisions for re-testing areas that appear to be in violation. This was a particular concern of the proponents, given the manifold opportunities in Boston Harbor for contaminants unrelated to the project's construction activities to affect the monitoring results.

- CAD integrity - Short- and long-term geochemical monitoring is designed to assess the integrity of the cap material on the cells and to determine the impacts of the caps to harbor biota, and will incorporate bathymetric surveys, core sampling, and REMOTS benthic surveys. The Water Quality Certificate contains provisions requiring the proponents to maintain the cells within defined performance standards.

Independent Project Observation

As the permit conditions were being developed, environmental interest groups lobbied successfully for the creation of an Independent Observer in the interest of unbiased, third-party project oversight. Massport agreed to fund the position, and a management structure was developed to allow the observer to function independently in monitoring project operations to ensure that all activities adhere to permit conditions. This includes data assessment and quality assurance, including field observation of project operations and data collection, equipment performance verification, fisheries observation, side scan sonar and fish startle system operations, as well as providing technical recommendations to the advisory committee.

The Independent Observer is directed by a Technical Advisory Committee (TAC) made up of representatives of state and federal agencies, the project proponents, environmental interest groups, academic institutions, and the dredging contractor. The role of the TAC is to recommend actions to the state regulatory agency and the Corps' contract officer (who oversees the activities of the dredging contractor) in the event that permit conditions are not met or significant technical problems arise.

To date, the Independent Observer and the TAC have provided two significant benefits to the project. The observer provides project accountability. The regular meetings of the TAC provide the opportunity for all interested parties to observe the project from "inside" the construction and monitoring process and

offers a non-confrontational forum for analysis and discussion of project impacts. The many interests represented around the meeting table are constructively engaged and can participate meaningfully in project oversight.

This integrated public/regulatory oversight approach has created a genuinely team-oriented process, and has given all of those involved the confidence to proceed with a major, and as yet, untested project.

Postscript

The first disposal cell was constructed and capped in August of 1997. Monitoring under the Water Quality Certificate determined that none of the water quality standards were exceeded. In response to concerns that cap placement did not meet permit specifications, the Corps contracted for a full geotechnical analysis of the cell. These data are now under review and the Water Quality Certificate will be revised to incorporate any modifications developed from this process into the full project, now scheduled for construction in the Spring of 1998.

For further information contact: Deerin Babb-Brott, Massachusetts Coastal Zone Management Office, 100 Cambridge Street, Boston, MA 02202;
phone: (617) 727-9530; fax: (617) 727-2754;
E-mail: dbabb-brott@state.ma.us

Navesink River (NJ) Watershed Management Program; Success Through Partnership

On January 1, 1997 the Navesink River in New Jersey was approved for unrestricted shellfish harvesting for the first time in 25 years. The improvement in water quality is due to a major inter-agency initiative involving federal, state, county, and private institutions (representing the environment, health, and agriculture) and the citizens of New Jersey, which has been underway for several years in the Navesink River watershed (Monmouth County, NJ). One of the primary goals of this program was to reduce nonpoint sources of pollution to the level that would allow unrestricted shellfish harvesting--something which has not been permitted since 1971. At an October White House ceremony celebrating the 25th Anniversary of the Clean Water Act, Vice President Al Gore used the Navesink River success story as one of twenty-five national "symbols of progress" which has resulted from this landmark legislation.

In 1986, a Memorandum Of Understanding was signed by the New Jersey's Department of Environmental Protection (NJDEP) and Department of Agriculture, the US EPA, and the US Department of Agriculture (through the Natural Resources Conservation Service) formalizing a collective commitment to the Navesink River Watershed Management Program. As stated by the signatories, "We realize the benefits which will accrue to agriculture, fish and wildlife, water supply and other related uses in pursuing a watershed approach to the problem." The water quality improvements are a direct result of the successful reduction of nonpoint source loadings implemented through partnerships developed over

many years.

The NJDEP initiated a Navesink nonpoint source study in the 1980s, including intensive watershed/land use analyses, an inventory and compliance assessment of point source permits, evaluation of potential nonpoint sources, and monitoring of the estuary and its tributaries. Sources of contamination were subsequently attributed to a combination of stormwater runoff associated with residential development, agricultural waste, and marina and boat-associated pollutants. The findings were transmitted to prospective management agencies at the federal, state, county, and municipal levels, as well as the private sector. Partnerships formed as roles and responsibilities took shape for the development of a management plan for the watershed. Letters endorsing project goals were obtained from 15 agencies, thus solidifying their commitment to the program. Multi-agency "task force" meetings were held yearly to refine management strategies and to iron out inter-agency conflicts. The salient points for discussion concerned the sources, magnitude, and transport of nonpoint pollutant loadings in the watershed; structural and non-structural management practices to be implemented; roles and responsibilities of the partnership members; and augmentation of funding.

Over the last ten years the NJDEP successfully carried out a joint project review strategy to "red-flag" coastal development permit applications for individual docks, marinas, and multi-unit development projects in the Navesink watershed. Proposed projects considered for approval were scrutinized to assure that nonpoint source Best Management Practices (BMPs) were incorporated in design plans. The NJDEP also designated the Navesink a "Special Water Area", which provides an additional measure of protection. A comprehensive shellfish water ambient monitoring program provided the basis for measuring the response of the river to the implementation of nonpoint source pollution management practices.

A $1.2 million cost-share program was authorized and implemented by the United States Department of Agriculture, Natural Resource Conservation Service to install structural and non-structural BMPs for the control of agricultural nonpoint source pollution in the Navesink drainage basin. A composting facility was constructed with USDA funds which accepts manure from horse farms in the Navesink watershed.

A Navesink Municipalities Association (representing all seven communities in the watershed) was formed in 1989 to provide coordinated recommendations to the local governing bodies on projects and activities in the watershed. The need for pumpout facilities at marinas in the Navesink River resulted in a special grant by the US EPA for the purchase and installation of equipment at Marine Park in Red Bank and public education on the availability and use of this facility.

In 1992, the US EPA obligated $100,000 through the New York/New Jersey Harbor Program for implementation and evaluation of nonpoint source stormwater management controls in the watershed. The NJDEP's Office of Natural Resources Damages funded the Monmouth County Health Department in 1995 to investigate, map (via GIS), and control point and nonpoint sources of pollution in the seven sub-watersheds to the estuary.

In addition to the establishment of partnerships and securing funding, another of the keys to the success of the Navesink program was the ability to get the public involved both in planning and the implementation of solutions. Steps in this process included hiring a public outreach coordinator dedicated to this project, extensive press coverage, public meetings and workshops, articles in industry newsletters, distribution of an informational brochure about the Navesink watershed and its management program, personal visits to farms and marinas, and distribution of a 30-minute film documentary entitled "Navesink--The Restoration of a River", produced by New Jersey Network (PBS), for the New Jersey Outdoors television series.

An effective nonpoint source management program must be able to progress from technically-based findings and recommendations to implementable (institutionally and financially feasible) pollution control strategies. Working with the array of nonpoint source problems encountered in the Navesink has shown that watershed management strategies need to be flexible, innovative, and developed on a site-specific basis. At the outset, a commitment must be made to approach the solution to nonpoint source problems holistically. This can only be accomplished by forming partnerships within the affected community. Ultimately, if institutional and financial support is to be obtained for watershed projects, the opportunities for this to occur must be created by the very partnerships that will play an integral role in management.

For further information, contact: Dr. Robert Scro, New Jersey Department of Environmental Protection; Office of Environmental Planning; phone: (609) 633-2003;

fax: (609) 633-0687; E-mail: rscro@dep.state.nj.us

United Nations Designates Year of the Ocean

The United Nations has designated 1998 as the International Year of the Ocean in recognition of "the importance of the ocean, the marine environment and its resources for life on Earth and for sustainable development." The United States is planning to take a very active role; federal agencies are already developing issue papers that will explore the following topics:

- marine transportation;
- national security;
- ocean resources (living resources, energy and minerals);
- marine environmental quality;
- recreation and tourism;
- weather, climate and natural hazards;
- science, technology and research;
- education and exploration; legal frameworks; and
- managing marine areas, uses and resources.

This effort will be accompanied by a public awareness campaign, involving representatives from government, industry, environmental organizations, academia and the media, to help educate people about the importance of oceans, threats to their health, and what we can do to help protect our ocean resources.

Over the coming year, Coastlines will periodically report on these activities as they relate to our readership.

For more information about the Year of the Ocean, check the NOAA's website at http://www.yoto98.noaa.gov/.

Lessons from a Decade of Monitoring Water Quality in Puget Sound

Ten years of monitoring in Puget Sound are paying off in Washington where, since 1987, state agencies have coordinated their work to measure the health of the estuary's waters and habitats. The agencies use the data to determine trends and develop strategies for restoring and protecting Puget Sound. Elected officials rely on the data to direct state and local funding.

"The piecemeal monitoring that had occurred up until 1987 told us that problems existed, but we were working on a puzzle with too many unconnected pieces," said Duane Fagergren, deputy director of the Puget Sound Water Quality Action Team, which oversees implementation of the National Estuary Program's management plan. "It was difficult to develop an overall strategy that addressed the severity of the problem."

The estuary's 1987 management plan established the Puget Sound Ambient Monitoring Program, which, over the past 10 years, has put more pieces of the puzzle into place. The program is a state-led effort to coordinate and manage the monitoring conducted by federal and state agencies. The Action Team coordinates efforts of two federal agencies, four state agencies, and one local government in monitoring marine and fresh waters, sediments, fish, shellfish, nearshore habitat, and marine birds and mammals.

Aside from its coordinated approach, what makes Puget Sound's program so useful is its emphasis on assessing overall water quality rather than monitoring near known sources of pollution such as outfall pipes or Superfund sites. By sampling ambient levels of pollution, the monitoring program provides a scientifically accurate picture of the overall health of the sound that cannot be rendered from existing project- or program-focused evaluations.

"Before the ambient monitoring program, there was little coordination of monitoring efforts. Sampling methods varied, quality control was inconsistent, and the data were not being used as effectively as they could have been," said Scott Redman, science coordinator for the Action Team. "Thanks to this program, a coherent assessment of Puget Sound's long-term health is beginning to take shape. We know that no

area is entirely free from the effects of human activities, but the degree to which these activities affect different parts of the ecosystem varies widely."

The program's strategy for assessing the estuary's health addresses long-term temporal and spatial trends and the condition of resources in Puget Sound. Data about such trends help resource managers better evaluate how seriously various environmental stresses affect its ecosystem.

The Puget Sound Ambient Monitoring Program assesses:
Patterns and effects of sediment contamination;
Characteristics of Puget Sound water and its changes over time;
The health of fish and threats to human health from consuming fish;
Contamination of shellfish and human-health risks from their consumption;
The size of bird populations;
The size of marine mammal populations, their health and reproductive success;
The condition of fresh water flowing into Puget Sound; and
Types and condition of nearshore habitat.

Organization of the monitoring program

Under the authority of the Puget Sound Water Quality Action Team and the Puget Sound Water Quality Management Plan, a pair of committees direct and oversee the design and implementation of the monitoring program. These committees are comprised of scientists and managers from the program's implementing agencies and are chaired by staff of the Action Team.

In 1995, a national panel of scientific monitoring experts reviewed the program to assess how well it was working. Their review led to a number of improvements in the program, including:

- A new, two-tier organization for program coordination in which the implementing agencies are represented by managers on a management committee and by scientists (the program's principal investigators) on a steering committee;

- Development of a conceptual model of Puget Sound that relates human activities and natural changes (e.g., algae blooms) to ecosystem stressors (e.g., alterations in light and turbidity) and management actions (e.g., wastewater management);

- Closer coordination between the monitoring program and the resource-management goals of agencies;

- A two-year schedule for reviewing the program to allow the monitoring program to adapt to its findings and establish new directions and priorities in Puget Sound's management plan and work plans;

- Greater involvement of other scientists and citizens outside the monitoring program's core group; and

- Improved data management and access to monitoring data.

Highlights from the past 10 years

Some highlights from recent findings of the monitoring program include:

- Metals and polycyclic aromatic hydrocarbons (PAHs) are the most prevalent contaminants in Puget Sound sediments located some distance from sources of pollutants. The prevalence of liver lesions in English sole indicates biological effects of PAH contamination on the health of fish in some urban areas of Puget Sound.

- Water quality, as indicated by nutrient and dissolved oxygen concentrations, in the main stem of Puget Sound appears to be reasonably good due to strong mixing in the deep basins. However, there are local areas--particularly in the shallow, slower flushing bays--where water quality appears degraded.

- Mercury and polychlorinated biphenyls (PCBs) are the contaminants of greatest concern in fish because of their high levels in the tissues of several species, their wide geographic distribution, and their potential detrimental effects on wildlife and humans.

- Preliminary analysis of fecal coliform bacteria in shellfish growing areas suggests some slight, but significant, changes in conditions at five of nine areas sampled since 1988. Levels in two areas appear to have increased, in three areas conditions seem to have improved. Two relatively pristine estuaries and two other areas show no significant change.

- Recent surveys indicate that numbers of scoters (a sea duck) spending the winter in Puget Sound have probably declined at least 50% over the past 15 to 30 years. Other species of diving ducks (goldeneyes and buffleheads) do not show this same pattern.

- The number of harbor seals in Puget Sound has been growing about 10% per year through the 1990s. The estimated 1996 population in Puget Sound, the San Juan Islands, and Hood Canal was nearly 17,000 individuals.

- Monitoring of rivers and streams in the Puget Sound basin between October 1995 and September 1996 showed conditions at almost 50% of the sampled stations violated state standards for fecal coliform bacteria, 33% violated standards for temperature, and almost 15% violated standards for dissolved oxygen.

- A 1995 survey of shoreline sites around Puget Sound indicated that about one-third of the

estuary's shoreline--some 800 miles--has been modified by human actions, including bulkhead construction and filling.

Lessons Learned

Monitoring in Puget Sound has come a long way in the past 10 years. The agencies involved in the monitoring program have learned that to successfully design and implement a coordinated, multi-agency monitoring program, it is important to:

- Clearly state goals and objectives for monitoring ("what are we measuring and why?") and evaluate monitoring efforts against these objectives to determine how well the monitoring is working.

- Combine scientific and management perspectives to ensure that studies use the best possible designs given available budgets. Good designs measure things that are important to people in ways that will provide useful information.

- Get the word out. Communicating monitoring findings is crucial - the work isn't complete until results have been shared with all levels; governments, affected groups, and the public.

- Collaborate with others who monitor the environment-state agencies alone cannot fully assess the health of Puget Sound.

For further information, contact Scott Redman, Puget Sound Water Quality Action Team; phone: (360) 407-7315 or visit the Action Team's web site at www.wa.gov/puget_sound.

The Public Trust Doctrine;

The Public's Trust Rights and Military Base Closings

With the end of the cold war came the beginning of the end for many military bases around the U. S. As the Berlin Wall fell and the Soviet Union dissolved, the necessity of many military bases came into question. At the same time, Congress was wrestling with a federal deficit that seemed to be increasing beyond its power to control. These two forces--the fall of communism in Europe and the out-of-control federal deficit--converged in 1990 and prompted Congress to enact the "Base Closure and Realignment Act" which established a commission to conduct a full review of the nation's network of military bases, and recommend which bases should be closed.

Many of the military installations the commission recommended for closure include vast areas of coastal land--tidelands, beaches, beautiful rocky coasts, and thousands of acres of filled tidelands. These large parcels of waterfront property are extremely valuable, and could be vital to local, state, and regional

economies. The conveyance of these coastal military lands from federal hands to either public or private hands raises an important question: What rights will the public have, through the Public Trust Doctrine, to once again use and enjoy these shorelands, once the bases are closed?

Unfortunately, this question has not been receiving the attention it merits in the base closing process. With the vast acreage of coastal land potentially involved with the closing of military installations, answering this question will not only be of great importance to the public, but also extremely difficult. A range of complex legal and factual issues are involved.

At the time a military base was established, what public trust lands (e.g., beaches, tidal wetlands, mud flats, submerged lands) existed there? How have these lands been modified by the military by filling, draining, or other actions? Did these modifications alter the boundaries of the public trust lands? Did the public use these trust lands prior to the establishment of the military base and, if so, how? The answers to these questions of fact may depend on the legal question of how the federal government acquired the property. Unfortunately, there is little guidance from the courts to help answer the legal questions, and what guidance the courts offer is in conflict.

Thus far, only two federal court cases address the question of whether the public has any trust rights in shorelands of former military bases that have been closed. In California, a federal district court ruled in 1988 that the public's trust rights were terminated when the military base was established. In that case, the military base was established by the federal government through its constitutional power of eminent domain. Having exercised this power, the court reasoned, any rights that the public had to use the shorelands under the state's Public Trust Doctrine were ended when the land was transferred to the federal government. The court could not envision a transfer of trusteeship from the state to the federal government, and terminated the public's trust rights altogether.

The opposite result, however, occurred in a 1981 federal district court case involving a military base in Massachusetts. That base was also federally acquired by eminent domain. Nonetheless, the district court upheld the public's trust rights. The court noted that the U.S. Supreme Court had held, in 1947, that federally-owned submerged land is held "in trust for all the people" and thus when the federal government takes such property by eminent domain from a state, it then becomes the trustee of the public's rights. Upon the conveyance of the closed military base back to the state, the public's trust rights under the state's Public Trust Doctrine were resurrected.

The ruling of the federal district court for Massachusetts is the more justifiable, especially in view of the legal position that the federal government has taken in other Public Trust Doctrine cases. In one case, the federal government argued that it had the sovereign authority, under the Public Trust Doctrine, to recover the monetary loss of migratory birds that were injured and killed by an oil spill, even though it was not the owner of the lands or waters involved. The court agreed, ruling that the federal government's trust powers did not arise from ownership of the land or waters, but "from a duty owing to the people".

In a second case, the federal government sued a railroad company for damage caused to wildlife habitat

from a fire started by the railroad company. In this case, the lands and waters were owned by the federal government, but it sought damages under its trust authority through the Public Trust Doctrine. Again the court agreed, holding that the Public Trust Doctrine gave the federal government this trustee authority.

Taking these cases together, one can see an inherent legal policy conflict in the positions taken by the federal government. The federal government argues in one court that its ownership of land by eminent domain terminates the public trust for citizens, while it argues in another court that even though it doesn't own any of the land or water in question it still has trustee authority to protect wildlife.

The value of shorelands to the American public is obvious. Equally obvious is the limited supply of publicly accessible shorelands. A tremendous amount of public trust land could--and should--be opened to the public when coastal military bases are closed. But the question of how, and whether, the Public Trust Doctrine applies to any shorelands must first be publicly raised in the base-closing process.

For further information, contact David C. Slade, Esq., 12211 Roundtree Lane, Bowie, MD, 20715; phone: (301) 464-6473; E-mail: scf@netrail.net.

[Mr. Slade is the editor of the recently-completed book "Putting the Public Trust Doctrine to Work". Ed.]

"Putting the Public Trust Doctrine to Work", Second Edition Available

The second edition of "Putting the Public Trust Doctrine to Work" is now available through the Coastal States Organization (CSO). First published in 1990, the 400-page book was developed with the assistance of state coastal managers and the CSO Legal Council comprised of coastal resource attorneys from throughout the nation.

Designed to be a readable but carefully researched overview of public trust law, it explains the lengthy history of the public trust doctrine, examines the doctrine's numerous interpretations and applications, and clarifies the often misunderstood "property rights enigma"; all important to understanding and protecting the public's interest in inland and coastal waterways.

The second edition contains new sections on determining Public Trust boundaries, riparian rights, trespass, federal lands, and the "public purpose" requirement. It also includes an issue-by-issue Table of Cases.

CSO advises that they have a limited number of copies available for $30.00 each.

For further information, contact the Coastal States Organization, Suite 322, 444 North Capitol Street NW, Washington, DC 20001; phone (202) 508-3860;
fax: (202) 508-3843.

New National Estuarine Research Reserve Dedicated

NOAA officials joined members of Congress in dedicating the Jacques Cousteau National Estuarine Research Reserve at Mullica River-Great Bay, New Jersey, on Monday, October 20, 1997. The new NERR is the 22nd to be accepted into the National Estuarine Research Reserve System. It has been named after Jacques Cousteau, well known for his contributions to protection of our oceans. Congressman Jim Saxton proposed naming the reserve for Cousteau because of the similarity of missions of the reserve and the famed ocean explorer and because the Cousteau name will give the area international attention. Already, reserve scientists have helped train teachers from 14 New Jersey school systems to improve the teaching of environmental and marine science. Two hundred elementary school students attended the dedication ceremony, which was followed by a field trip through the reserve. For more information contact: J. McDonnell; phone: (732) 932-6555 ext. 521.

EPA announces Availability of Watershed Indicators

The US EPA has released its Index of Watershed Indicators. The index, EPA's first national picture of watershed health, organizes and presents aquatic resource information on a watershed basis. Fifteen indicators, selected for their appropriateness, availability across the nation, and ease of duplication, were evaluated for each of 2,111 watersheds, or "Cataloguing units", in the 48 contiguous states (Alaska, Hawaii, and territories will be added in future versions). Seven of the indicators are related to the condition of the aquatic resources and eight are related to vulnerability.

The results showed that more than half of the country's watersheds have pollution problems. The EPA's assessment showed that 57% of the country's watersheds have "serious" or "moderately serious" pollution problems. Only 16% have good water quality.

The Index of Watershed Indicators is available on the Internet at http://www.epa.gov/wateratlas/geo/maplist.html.

Inbreeding may be hampering North Atlantic right whale recovery

The recovery of the North Atlantic right whale (Eubalaena glacialis), severely depleted by centuries of extensive commercial whaling and threatened today by such impacts as collisions with ships and entanglement in fishing gear, may be further inhibited because the small population is showing signs of inbreeding. DNA analysis of northern right whales and comparisons with similar samples of the closely related southern right whale (Eubalaena australis), showed significantly less genetic variation in the northern population. Given that the southern right whale was also depleted, the paper's authors note that, for there to be such a difference between the two, indicates that "northern whales have lost a substantial amount of genetic variability."

Generally, the authors continue, "one consequence of reduced genetic variability is an increase in the probability that inbreeding (mating between genetically similar individuals) will occur. Mating between genetically similar individuals may result in fewer viable offspring. Our results indicate that this may be the result with North Atlantic right whales." Despite over 60 years of protection, the North Atlantic right whale population has shown limited signs of recovery and is currently estimated to be growing at a rate of only 2.5% a year, only one-third of the increase of the South Atlantic right whale population. In addition, over the last decade, only 51 North Atlantic females (18% of the population) produced viable offspring, compared with 320 South Atlantic females (27% of that population). The paper concludes: "While reduced fertility, fecundity, and juvenile survivorship are typical characteristics of populations experiencing inbreeding depression, it is difficult to link such symptoms directly to a loss of genetic variability. However, the findings of this study, in conjunction with sightings data, suggest that the North Atlantic right whale population's failure to recover may be due, at least in part, to inbreeding depression. The protection of existing animals and maintenance of habitat quality are clearly critical for the North Atlantic right whales+ continued survival." (Excerpted with permission from SeaWeb, Ocean Update)

Source: C. M. Schaeff et al., 1997. "Comparison of genetic variability of North and South Atlantic right whales (Eubalaena), using DNA fingerprinting." Canadian Journal of Zoology 75: 1073-1080. Contact: Catherine M. Schaeff, Biology Department, The American University, Washington, DC; phone: (202) 885-2176.

Announcements

Law and Business Students Get a Taste of Oceanography

The Chesapeake Bay National Estuarine Research Reserve in Virginia, the Marshall-Wythe School of Law, and the College of William and Mary's Business school have received a $70,000 grant to develop a program to teach future lawyers and business leaders the basics of coastal science. The hope is that this program will provide the ability for future legal and business leaders to make "informed decisions about coastal issues" as they grow in their professional lives and careers. Grant funds will support background research on this topic, the development of a survey tool to determine specific needs, and the format for presentation of the program. These funds will also enable the law, business, and marine science team to develop a pilot program in "Coastal Marine Science for Graduate Students in Law and Business."

The pilot program should be completed and ready for testing in interested business and law school programs by the 1998-99 academic year.

For more information contact: David Niebuhr;
phone: (804) 684-7144; E-mail: niebuhr@vims.edu

Magnificent Fish: The Forgotten Giants

This 15-minute educational video about the giants of the open ocean--sharks, tuna, and billfish--brings viewers close to creatures they have either had misconceptions about or not known at all. Interactions between Peter Benchley, author of "Jaws" and other books, and a middle-school-aged girl working on an assignment via the Internet introduces viewers to many fascinating facts about these powerful creatures and the conservation issues surrounding them. "Magnificent Fish" is the first of an "aquatic video series" produced by the New England Aquarium. Upcoming titles include:

Bycatch: Unwanted Fish (Coming in June 1998)
Reefs: More Than Just Coral
Pinnipeds and People: Sharing the Coastal Zone
Deep Sea Discovery
Water Wars: Balancing Use and Preservation

An educator's package containing colorful and informative books, posters and brochures, as well as a curriculum and activity lists, is also available. This film is also available close-captioned and as an interactive CD.

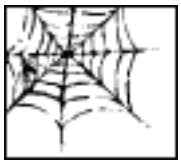
For copies of Magnificent Fish, contact:
The Conservation Department, New England Aquarium, 177 Milk Street, Boston, MA, 02109; phone: (617) 973-0274; fax: (617) 973-0242

Tidal Marshes of Long Island Sound

The publication, Tidal Marshes of Long Island Sound, produced jointly by Connecticut Department of Environmental Protection, Office of Long Island Sound Program, and Connecticut College, and funded by the Long Island Sound License Plate Program, is now on the Internet at: www.conncoll.edu/ccrec/greenet/arbo/wetlcome.html.

URL: http://www.epa.gov/owow/estuaries/coastlines/winter98/coastlin.html
Revised April 16, 1998

COASTLINES
Information About Estuaries and Near Coastal Waters



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Buzzards Bay "SepTrack" Initiative

Demonstrating Practical Tools for Watershed Management Through the National Estuary Program

Characteristics:

The Buzzards Bay watershed includes 432 square miles comprised of significant portions of 17 municipalities, with nearly 236,000 people living therein. Approximately half of the homes utilize on-site, subsurface sewage disposal systems (cesspools or septic systems) to dispose of sanitary wastes.

Government in Massachusetts is generally done by "home rule" through cities and towns. Virtually all decisions related to on-site septic system installation and maintenance is done at the local community level by an elected Board of Health.

Failing on-site systems may lead to contamination of waters of tributaries to the bay and smaller embayments around its margins, resulting in the closure of shellfish beds and possibly other water-contact recreation activities because of threats to public health.

The Problem:

Local Boards of Health typically lack the ability to efficiently and effectively monitor septic system permits and inspection and maintenance information due to insufficient staffing and information-processing equipment and systems.

The Project:

The SepTrack Demonstration Project was designed to provide computers and specialized software to communities to allow them to better manage information related to on-site septic systems, thereby freeing staff time for better design review and enforcement and helping identify patterns of failure.

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 to 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.

Introduction to Buzzards Bay

Buzzards Bay extends for 28 miles between the western shore of Cape Cod and the mainland of southeastern Massachusetts. Its 210 miles of shoreline provide a widely diverse habitat of salt marshes, sandy beaches, eelgrass beds, small embayments and tidal streams, and urban ports. The waters of the bay are used for shellfishing, swimming, and boating as well as marine transportation.

Buzzards Bay, as a whole, is still considered a relatively healthy waterbody. However, the waters of the

smaller, fringing embayments are threatened by increasing amounts of contamination. Pollution associated with residential development and other land uses, indicated by fecal coliform bacteria and elevated nitrogen concentrations, contributes to a decline of water quality in some locations.

Cesspools, failed septic systems, and high densities of septic systems contribute to the closure of swimming beaches and shellfish beds, contaminate drinking water supplies, and cause eutrophication of ponds and coastal embayments. For these reasons, improved implementation of septic system regulations and promotion of better functioning alternatives are important objectives in the Buzzards Bay Comprehensive Conservation and Management Plan.

Overview of the Buzzards Bay SepTrack Initiative

Can computers and software protect the environment and public health? The Buzzards Bay Project of the National Estuary Program thought so. In Massachusetts, municipal Boards of Health are responsible for implementing and overseeing state regulations for on-site wastewater disposal systems (septic systems). These boards, composed of elected volunteers, and sometimes lacking professional staff, are typically overburdened just keeping up with new permits. Keeping track of past permits, past orders of non-compliance, and reviewing pump-out reports submitted by sewage treatment facilities are tasks that sometimes fall to the bottom of the pile. Add to this workload new state requirements such as septic system inspections within six months of property transfer and soil evaluations before system installation, and clearly Massachusetts Boards of Health face a sizable information management problem. In some towns, the problem is especially difficult since records are filed away in storage boxes and computers are unavailable--even for word processing. These are the issues the SepTrack project was designed to address.

Initiative Objectives

The purpose of this initiative was to better enable each Board of Health to track septic system permits and inspection and maintenance information. The Project's goal was to reduce information management and retrieval burdens on Boards of Health, thereby allowing time to enhance protection of public health and the environment.

Implementing the Initiative

To achieve this end, in 1996, the Buzzards Bay Project provided computers and specialized software to 11 municipal Boards of Health in the Buzzards Bay watershed.

The Buzzards Bay Project developed the concept for a Windows-based database management software application and hired a software development firm to produce the package. Project staff had a clear sense of what kind of information Boards of Health wanted to track, but to ensure that the software met the needs of area municipalities, the Project set up a panel of health officials to test and evaluate early versions of the software. The outcome of this effort is known as SepTrack, an easy to use Windows

program that enables health officials to track information on every property in their community. More than 180 categories of information are tracked in the database ranging from septic system design, leachfield type, number of bathrooms, presence of wetlands, and pumpout frequency--essentially all the information routinely supplied to towns in building and health permits. At a click of a mouse button, data on any lot will be available to municipal staff, allowing them to be more responsive to information requests and help towns process permit applications more quickly. The program has the ability to display graphics files of site plans and engineering designs.

To help towns adopt and use the new software package, the Buzzards Bay Project provided funding for assessors' data in each community to be transferred into the SepTrack database. The Project also hired a student intern to work in each town on a rotating basis to enter old permit information and septic pumping records. Once this historical information is entered, health office administrators merely have to spend a few minutes a day entering new permit data.

SepTrack (Vers. 1.0) was written to run as an application under the database manager, Microsoft FoxPro for Windows (Vers. 2.6). However, because this software package is being phased out by Microsoft, the Buzzards Bay Project is now making available a special, compiled, stand-alone version of SepTrack (Vers. 1E.0) that can run in Windows even if FoxPro is not installed. Both versions operate identically, but Version 1E.0 is not able to run certain advanced features that are available through FoxPro. (FoxPro, Windows, and MS-DOS are trademarks of the Microsoft Corporation.)

Funding for this work was provided by the U.S. Environmental Protection Agency as part of a grant to the Buzzards Bay Project through the Massachusetts Coastal Zone Management Office.

Success Stories of the SepTrack Initiative

Is SepTrack protecting the environment? It may be too early to tell, but one thing is clear, SepTrack is becoming very popular. Buzzards Bay towns seem very pleased and enthusiastic about the software. Even before SepTrack was installed in most towns around the bay, the Project was getting calls from municipal Boards of Health in other parts of the state wondering if they, too, could receive a copy. Inquiries about the software increased this fall when the Buzzards Bay Project's sister Estuary Program, the Mass Bays Program began helping its South Shore communities implement the data management system as part of a pilot program. Generating even more interest in the software was a series of workshops around the state by the Massachusetts Department of Environmental Protection highlighting SepTrack as one of two applications for boards to manage septic system data (the other was a spreadsheet application).

Recent revisions to Massachusetts' septic system regulations bode well for the future, but only if the regulations are successfully implemented at the local level. The true utility of SepTrack will be in helping Boards of Health to be more productive and responsive, and freeing staff for much-needed field inspections, enforcement, and pressing health and environmental issues. In a very practical sense, SepTrack is allowing Massachusetts Boards of Health to systematically track, for the first time, the

permitting, inspection and maintenance of septic systems. But SepTrack is doing more than just telling municipal officials if grease traps and tight tanks are being pumped regularly. A glimpse of some of the other benefits of SepTrack is provided by these examples.

Most Boards of Health receive a monthly report from sewage treatment plants detailing dozens of pumpouts reported by septage haulers. (In Massachusetts, septage haulers must report the source of their septage.) In the past, most boards have simply filed this information because it is too time-consuming to search out properties frequently pumped (often a sign of a failing septic system). With SepTrack, at a click of a mouse button, towns are now seeing a list of these frequent pumpers, and the results have, in some cases, been eye-opening. Surprisingly, in one town, the most frequently pumped system turned out to be a town-owned property. Towns are also discovering that septage hauler information does not always appear to be complete or accurate.

For house renovations, Boards of Health tend to rely on information provided by engineers on permit applications, such as number of bedrooms in a residence, presence of private wells nearby, and other important data. In one town, the staff person for the Board of Health seldom checked the assessors' records to see if the number of bedrooms listed was, in fact, correct because the data were not easily accessible. With SepTrack in place, the staff person quickly realized that the numbers of bedrooms reported on permit applications were often inaccurate (fewer bedrooms means a smaller--and cheaper--septic system). After these "errors" were consistently caught, construction firms and engineers became much more consistent with assessors' records.

The Buzzards Bay Project had been working with one town to reduce high fecal coliform concentrations in stormwater discharges contributing to shellfish bed closures. This town hired a college student to enter public works water and sewer data into the SepTrack system to complement Board of Health data. Much to the surprise of the health officials, 200 homes along one embayment had never been connected to a sewer line. Most homes in the area were sewered years earlier because they had cesspools and the water table was high. Ironically even the residences had been charged a sewer betterment fee for years, but the homeowners at the time did not want to pay a $300 sewer connection fee. The Board of Health is now requiring these homes to connect to the existing sewer.

Lessons Learned

Early in its existence, the Buzzards Bay Project learned that you cannot simply offer computers and software to a town to solve a problem. Technical assistance and support are also vital. To ensure the success of this effort, the Buzzards Bay Project hired an intern to spend time at each town hall training municipal staff and entering data. Entering old permit data was an especially important task because Board of Health staff were reluctant to use the software if the old data were not present. Perhaps not surprisingly, with the old data in place, the towns became almost enthusiastic about keeping up with the entering of new permit data.

Another lesson learned is that a good software program and computer are not substitutes for good office

management. In one town, poor management and personnel relations have resulted in the SepTrack computer being relegated to a dark corner.

Overall, the Buzzards Bay Project has found this initiative so successful that it has begun a similar initiative with municipal Planning Boards. In the latter case, the Project is providing computers, training, software, and data layers to the municipalities to create parcel-level GIS information to assist with planning growth, developing open space plans, and protecting water quality and habitat in the many sub-watersheds of Buzzards Bay.

Previous Publications in the Demonstration Projects Series

Report Title	National Estuary Program	Date	Publication #
Biological Nutrient Removal Project	Long Island Sound, CT/NY	1995	EPA842-F-95-001A
Buttermilk Bay Coliform Control Project	Buzzards Bay, MA	1995	EPA842-F-95-001B
Georgetown Stormwater Management Project	Delaware Inland Bays, DE	1995	EPA842-F-95-001C
Texas Coastal Preserves Project Ga			

URL: http://www.epa.gov/owow/estuaries/coastlines/winter98/buzzard.html
Revised April 16, 1998

COASTLINES
Information About Estuaries and Near Coastal Waters

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United States Environmental Protection Agency

Office of Water (4504F)

January 1998

The National Estuary Program: A Ten-Year Perspective

Deminstrating Practical Tools for Watershed Management Through the National Estuary Program

Introduction

This past year, 1997, marked the 10th anniversary of the US EPA's flagship watershed effort, the National Estuary Program (NEP). What began as a demonstration of an alternative to traditional command-and-control regulatory approaches to water quality problems has evolved into a model for integrated, watershed-based, stakeholder-oriented, water resource management. A decade of trial and effort has taught some useful lessons about applying this approach; it has also led to significant environmental improvements and insights upon which the EPA expects to build over the next 10 years of the program.

History

The National Estuary Program was created by the Water Quality Act of 1987, influenced by public alarm over beach closures, fish kills, contaminated shellfish beds, and a general sense of deteriorating coastal environments. There was growing awareness of the impacts of nonpoint source pollution, and that such impacts were related to the surge in coastal growth and development. More fundamentally, there was new appreciation of estuaries as an incredibly rich and varied resource at increasing risk from cumulative activities in coastal watersheds.

These systems, and the risks, were too complex to be addressed by one entity alone and went well beyond the existing mandates of regulatory and enforcement programs. At that time, water quality was chiefly defined by concentrations of chemicals in a waterbody and was primarily driven by point source concerns and programs. There were few, if any, tools to recognize and address more comprehensive issues. Additionally, there was little authority or capability to integrate efforts within geographic or hydrologic units.

Congress recognized that in order to achieve long-term protection of water quality and living resources--the fundamental "fishable, swimmable" goals of the Clean Water Act--the participation of those most affected by environmental decisions was critical. Experiences from the Great Lakes and Chesapeake Bay Programs, with their collaborative approach to managing watersheds and estuaries, were clearly drawn upon in shaping the NEP under the Act. Stakeholders, Congress determined, must have a major role in deciding how to protect and restore their estuaries. Congress also recognized that state and local entities were at the forefront in carrying out activities affecting estuaries, and that they needed to be integral partners in the decision-making process. EPA's role was to provide technical and financial assistance, management guidance, and the organizational vehicle to foster the growing partnerships.

What is the National Estuary Program?

The NEP is a voluntary program that brings a community together to improve its estuary using a forum to establish working relationships and the trust necessary to develop solutions. This fosters a higher likelihood of long-term success because solutions are "owned" by participants who have a stake in reaching them.

EPA periodically calls for nominations to the program from state governors. If an estuary meets the agency's criteria, EPA may then designate it to be included in the program. Once the designation has been made, a Management Conference is formed to provide the decision-making framework for participants, which typically include government agencies at the federal, state, and local level; community residents; user groups; scientific and technical institutions; business and industry; and environmental groups. The EPA functions as the overall facilitator of the process and as a Management Conference representative. The Management Conference, or stakeholders, together define program goals and objectives, identify estuary problems, and design action plans to prevent or control pollution and restore habitats and living resources such as seagrasses and shellfish. These action plans come together in

a Comprehensive Conservation and Management Plan (CCMP) which serves as a blueprint for protecting and restoring the estuary.

Administration of each of the 28 designated local NEPs includes a Management Committee which serves as the focal point of the program. It is supported by a Director and technical and outreach staff, scientific and technical advisory committees, and citizen advisory committees.

How Does it Work?

The NEPs build on existing programs and traditional water quality control measures and tailor them to specific places and communities--coastal watersheds and related estuaries.

Each local NEP must examine changes in water quality and natural resources, evaluate point and nonpoint source pollutant loadings, and determine the relationship between loadings and priority problems for its particular system. Local NEPs generally target a broad range of issues, including contaminated runoff and sediments, releases from septic systems, shoreline erosion, declines in fish and shellfish, and loss of wetlands. There is a strong emphasis on the ability to transfer these solutions to other watershed systems in other areas.

The method used is an interactive, collaborative decision-making process where stakeholders work together to develop the CCMP for their estuary. All stakeholders participate as equal partners in setting priorities, planning, and implementing the action plan. No one single entity drives the local NEP; decisions are made collectively by the Management Conference with input from the stakeholders.

The goal is to develop--and, most importantly, implement--their CCMP, tailored to meet their particular needs and problems, while meeting national program requirements. CCMPs integrate available regulatory tools as well as innovative restoration and protection methods and techniques addressing point and nonpoint source pollution, and set time tables for implementation. Critical to this is building and sustaining long-term public support to carry out the actions agreed upon in the plan.

The NEP Today

What began in 1987 with six local NEPs scattered around the country, has grown to 28 in 18 states and Puerto Rico. The project sites offer a broad range of environmental conditions and stakeholder representation. Of the 28, 17 have completed their CCMPs and are in the implementation phase. The other 11 are still in the process of developing CCMPs (with seven scheduled to have approved plans by the end of 1998). Local programs are not, however, waiting until their CCMPs are approved to protect and restore their estuaries. Most have taken early action to address known problems or those identified during the plan development process.

Lessons Learned

A number of key lessons have been learned over the past ten years. The NEP has demonstrated that community-based resource management achieves results. Although it takes time to see environmental changes such as improvements in water quality, progress is being made. In order to demonstrate improvements in the estuary, we have seen the importance of NEPs setting measurable environmental goals and indicators. Both programmatic and environmental monitoring are critical to assess progress in implementing CCMP actions as well as changes in environmental conditions.

The program has seen that building an effective management and decision-making framework requires commitment, close collaboration on the part of participants, and time. It is especially important that there is close coordination between federal, state, and local governments. It takes time for groups to build strong partnerships and develop the trust to collectively reach decisions on actions and implementation. The NEP has seen the importance of incorporating groups that have not always been part of coastal discussions, such as oil and gas interests and the housing and development sector. Through the NEP, these and other stakeholders can work together, in some cases for the first time, to protect and restore their estuary.

It has been found to be critical that the appropriate stakeholders are involved in the NEP during the early stages of development of the CCMP. Involvement from the beginning has facilitated commitments to and adoption of the CCMP--and its implementation. The EPA has clearly learned that the consensus-building process must reflect the character of the local community and balance the divergent needs and interests of the coastal stakeholders.

The NEP has provided a laboratory where environmental impacts are examined. Research conducted or sponsored by the NEPs has led to some significant discoveries.

While it was known that estuaries serve as sinks for upstream pollutants, the NEPs have built on the work of the Chesapeake Bay Program to demonstrate that nitrogen from the air is also a major contributor to problems in coastal waters--particularly in eastern and gulf coast estuaries.

Research funded, in part, by the NEP, led to the discovery of the marine toxic microorganism *Pfiesteria* which produces neurotoxins that kill fish and may cause human health problems. This discovery has assisted a number of other estuaries coping with the impacts of *Pfiesteria*.

Nutrient over-enrichment has long been linked to stimulating growth in aquatic plants and contributing to low levels of dissolved oxygen in estuaries, but local NEPs have recently seen possible links to red and brown tides.

It was not anticipated that accidental or intentional introduction of species would become a significant environmental and economic concern for some estuaries in the NEP. However, a number of instances of this problem have been noted. Brazilian pepper is encroaching on native plant communities in the Florida NEPs. The introduction of the Asian clam in ballast water has disrupted the food web in Pacific coast NEPs by consuming food sources such as phytoplankton vital to native and endangered species. The

Japanese oyster drills found in northwest NEPs are decimating oyster populations. The work conducted by these and other NEPs was key in helping to support legislation to address the introduction of invasive species in ballast water (National Invasive Species Act).

A real surprise has been the commonality in environmental issues faced in estuaries around the country. While each estuary and its setting are unique, the NEP has found that all face similar environmental problems and challenges: over-enrichment of nutrients, contamination from pathogens and toxic chemicals, alteration of freshwater inflow, loss of habitat, declines in fish and wildlife, and introduction of invasive species. Consequently, the need to exchange scientific and management information among NEPs is critical to ensure their success and the ability to transfer the knowledge gained to other estuaries improves conditions nationwide.

Collectively, the NEPs have created a significant knowledge base and wealth of experience in dealing with the problems that threaten the health of virtually all estuaries. They serve as a vital national network for technical assistance. Each local program has produced a vast amount of outreach materials--documents, workshops and the like--to educate and inform the community and to share management insights. They also directly provide critical technical assistance to the local governments surrounding the estuary and indirect assistance to the entire collection of estuaries which ring the country.

Many local NEPs have created innovative management approaches to solve these common problems. They have employed alternative on-site wastewater treatment technologies to control nitrogen; established marina pump-out facilities; provided education and training for owners, installers, and pumpers of septic systems to reduce pathogens; promoted beneficial uses of dredged material to restore and create wetland habitat; installed fish passages to increase spawning; and helped citizen volunteers remove invasive plant species from public areas.

Accomplishments

Local NEPs, and the partnerships forged therein, have produced many significant programmatic and environmental improvements. They have been the catalyst to bring together various levels and branches of government that previously never worked cooperatively--thereby providing more comprehensive management and expediting the regulatory review processes. They have been instrumental in getting local ordinances passed addressing problems associated with stormwater runoff, have facilitated conservation easements for critical areas, and have helped local stakeholders to place limits on nitrogen loading to estuaries. One local NEP has fostered a coordinated effort to improve wastewater treatment facilities in two adjoining states as a means of reducing nutrients. Partnerships between NEPs and industry have led to new ways of doing business. NEP pollution prevention activities targeting toxic chemicals have been adopted by small businesses and reduced their wastes. Action Plan Demonstration Projects (APDP) function as program-funded, small-scale projects to test the effectiveness of technologies and approaches that may be included in the CCMP. These have included creation of artificial wetlands for stormwater mitigation, construction of an artificial oyster reef from recycled coal ash, and design of shrimp by-catch reduction devices. Through these APDP projects and early action on

the part of NEPs, many acres of shellfish beds have been reopened, seagrass acreage has increased, shorelines have been stabilized, and native habitat has been restored.

Into the Future

The most significant challenge facing the NEP is to successfully implement the CCMPs. Transition from plan development to action can be very difficult. Local NEPs need to gain commitments from implementors to support CCMP actions and create an effective administrative or institutional structure to ensure they are carried out. This usually requires that they develop the financing necessary to make this happen.

Public participation in the development of the CCMP is one of the most important facets. All too often, the completion of the plan is seen as an end-point rather than a beginning and, consequently, finding a way to maintain public involvement is a great challenge. The public must be involved early in the decision-making process in order to ensure that CCMP actions are carried out.

Because CCMP actions typically transcend a single agency, each local NEP must establish an appropriate institutional arrangement to ensure implementation. NEPs have employed a wide range of organizational structures for this effort, the most common being a coordinating institutional arrangement between the Management Conference and a designated state agency which serves as the administrative "host". A few NEPs have established non-profit organizations that serve either as the coordinating body or as a complement to that group.

Financing CCMP implementation can be costly. Implementation occurs over many years and so a stable, long-term source of funding is critical. While the EPA is committed to support the NEPs at some level during implementation, each program must identify other funding vehicles early in the planning process to ensure continued program success. NEPs must be able to leverage other sources of funds from key players, such as state and local governments, to implement CCMP commitments.

Now that the NEP has reached its tenth year, the EPA is at a critical point in setting its direction for both the near and long term.

There are approximately 130 estuaries in the United States. Do they all need to be part of the NEP? The EPA recognizes that it may not be appropriate, or even necessary, to designate all of these estuaries as NEPs. What may be more important and effective is to transfer the lessons learned within the NEP to other areas. Clearly, a wealth of knowledge, experience, and tools exist after ten years of the NEP that can be used to further coastal watershed protection. The EPA is working with other federal, state, and local agencies to get information to local decision-makers and interested stakeholders.

The EPA has committed a significant amount of time and resources in support of Management Conference activities for the local NEPs--matched by state partners. Local NEP participants have invested vast numbers of hours in developing their CCMPs and gaining consensus among stakeholders,

as well as educating and getting the community involved in activities to restore their estuaries. This common investment is yielding dividends. NEPs are successfully addressing the broad range of problems and issues facing local coastal communities. Not only does the NEP benefit the individual estuaries in the program, but the approach and findings have assisted other coastal areas in addressing water quality issues on a watershed basis.

The US EPA looks forward to continuing its partnership with the 28 NEPs over the years to come and witnessing improvement in the health of our nation's estuaries.

Please visit the US EPA web site at www.epa.gov/owow/estuaries/nep.html to find out more about the NEPs.

URL: http://www.epa.gov/owow/estuaries/coastlines/winter98/january.html
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United States Environmental Protection Agency	Office of Water (4504F)	EPA842-F-97-002I June 1997

Coquina BayWalk at Leffis Key

Demonstrating Practical Tools for Watershed Management Through the National Estuary Program

Characteristics:

- The Sarasota Bay watershed comprises about 150 square miles of land and 52 square miles of water surface.
- Nearly 500,000 people live in the Sarasota Bay area.
- Land use in the watershed is 42 percent residential, 10 percent commercial, 8 percent agricultural, and 40 percent open space.

The Problem:

- Wetland loss, including encroachment of non-native plant species, is one of the major problems threatening Sarasota Bay.

- Since 1950, the Sarasota Bay watershed has lost 39% of its intertidal habitat. Freshwater and non-forested wetlands have also declined dramatically, more than 45% in the past 20 years.

- Only 20 percent of the shoreline remains in its natural state.

- Non-native plants have invaded 66% of mangrove wetlands in the bay.

The Project:

The Coquina BayWalk at Leffis Key Restoration Project was designed to create native habitat on 30 acres of public land. Project objectives also included improving water quality, increasing public access to the bay, and providing opportunities for public education and participation.

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 to 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.

Introduction to Sarasota Bay

Sarasota Bay is located on Florida's fast-growing southwest coast. Although bay resources have been

significantly affected by habitat modifications over the past 50 years, Sarasota Bay still supports an abundance of aquatic life.

Rapid residential development has caused major changes in the bay's ecosystem. Natural shorelines have been replaced by seawalls, bulkheads, and riprap. Large-scale dredge and fill projects, completed during the 1950s, dramatically altered the bay's shoreline and bottom habitat.

The Sarasota Bay National Estuary Program has focused habitat restoration efforts on bettering both intertidal and bottom habitats through improvements in water quality, restoration of wetlands, and creation of artificial reefs for juvenile fish. The Leffis Key project is one of many restoration projects completed in the bay to restore lost wetland habitat. And many more are planned or under construction.

Overview of the Coquina BayWalk at Leffis Key

Leffis Key is a 30-acre site, owned by Manatee County, located along the Sarasota Bay shoreline on the southeast tip of Anna Maria Island, just north of Longboat Pass. The site is directly adjacent to Coquina Beach. It is estimated that more than two million people visit Coquina Beach annually, making it one of the most heavily utilized recreational areas in the Manatee-Sarasota county region.

The disposal of material from the dredging of the Intracoastal Waterway during the 1950s covered a small mangrove island and created the peninsula known as Leffis Key. The site had become vegetated by non-native plant species such as Australian pine and Brazilian pepper. Seagrass beds were also covered during dredged material disposal in the 1950s.

Since the site was in public ownership and was heavily modified, it became a prime candidate for restoration.

Project Objectives

The objectives of the Coquina BayWalk project were to:

- restore one of many dredged material disposal sites in Sarasota Bay as a model for other projects;
- increase the area of functional mangrove, wetland, and shallow water habitats;
- improve bay circulation;
- increase levels of managed access to the northern sections of Sarasota Bay and its resources;
- increase available spawning and juvenile fish habitat; and
- increase bay educational and interpretive facilities available to both local residents and tourists.

Implementing the Project

The Sarasota Bay National Estuary Program drafted the initial proposal for funding in concert with the Florida Department of Environmental Protection and Manatee County. The project design was initially

developed by the staff members of the Florida Department of Environmental Protection and reviewed and influenced by the Sarasota Bay National Estuary Program Technical Advisory Committee. Manatee County Public Works staff members also participated in surveying, topographic mapping, and final design of the site, as well as constructing the project.

During construction, the first step was to remove exotic species. This was followed by excavation of intertidal pools and tidal inlets and construction of boardwalks and walkways for public access.

The overall plan was to recreate the island through excavation of a channel through the peninsula, thus re-establishing tidal circulation around the area. A footbridge was installed to provide visitor access to the BayWalk. Fill material from the key and adjacent north and south shorelines was used to create dunes to serve as visual and sound barriers to road traffic. Volunteers planted more than 50,000 native saltmarsh, intertidal, and upland plants and trees. Interpretive signage was installed, and an educational brochure was produced to inform visitors to the site about the ecological importance and interdependence of the mangrove forest and other surrounding habitats.

The site is monitored regularly for plant survival. Maintenance is provided by the Manatee County Department of Recreation and Parks.

Success Stories

The project re-established over 30 acres of wetland habitat previously disrupted by human activities. As such, it becomes a significant part of the larger program to restore intertidal and freshwater wetlands in Sarasota Bay.

The project has received positive media reviews. It won an Environmental Excellence Award from the Florida Marine Research Institute, was featured in Good Housekeeping magazine, and is now included in the Florida Wildlife Viewing Guide.

The project made it possible to draw together a wide range of active participants and funding sources directed toward a common goal. These included Manatee County, Florida Department of Environmental Protection, the City of Bradenton Beach, Florida Sea Grant, and the US Environmental Protection Agency. The Sarasota Bay National Estuary Program provided technical assistance and citizen input to the project. The US Environmental Protection Agency provided $75,000 as Early Action Demonstration Project Funds. Manatee County provided significant in-kind services including design, site preparation, and excavation, as well as $9,000 from the county pollution-recovery account. The Florida Department of Environmental Protection provided approximately $250,000 and the Florida Department of Natural Resources provided native plants. Overall cost of the Coquina BayWalk project totaled approximately $350,000.

Lessons Learned

The Sarasota Bay National Estuary Program has identified areas throughout the region which are suitable for wetland restoration and is working hard to meet goals established as part of their planning process.

Specific lessons include:

- Dredged material disposal areas can be successfully restored into productive habitats with recreational and educational value.
- Tourists and local residents have been attracted to the site in significant numbers.
- Volunteers are more than willing to participate in planting. They indicate that it is fun and rewarding.
- Restoration efforts are excellent media events.
- Funds are generally available for habitat restoration.

Previous Publications in the Demonstration Projects Series

Report TItle	National Estuary Program	Date	Publication #
Biological Nutrient Removal Project	Long Island Sound, CT/NY	1995	EPA842-F-95-001A
Buttermilk Bay Coliform Control Project	Buzzards Bay, MA	1995	EPA842-F-95-001B
Georgetown Stormwater Management Project	Delaware Inland Bays, DE	1995	EPA842-F-95-001C
Texas Coastal Preserves Project	Galveston Bays, TX	1995	EPA842-F-95-001D
Shell Creek Stormwater Diversion Project	Puget Sound, WA	1995	EPA842-F-95-001E
City Island Habitat Restoration Project	Sarasota Bay, FL	1995	EPA842-F-95-001F
Buzzards Bay "SepTrack" Initiative	Buzzards Bay, MA	1997	EPA842-F-97-002G
New Options for Dredging in Barataria-Terrebonne	Barataria-Terrebonne Basin, LA	1997	EPA842-F-97-002H

URL: http://www.epa.gov/owow/estuaries/coastlines/winter98/june.html
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New Options for Dredging in Barataria-Terrebonne

Demonstrating Practical Tools for Watershed Management Through the National Estuary Program

Barataria-Terrebonne Basins, Louisiana

Characteristics:

- The Barataria-Terrebonne Estuary includes over 4.1 million acres of wetlands, waterbodies, farmlands, and forests in 15 Louisiana parishes. Approximately 602,000 people live and work within its boundaries. The area contains a multitude of natural and man-made waterways, providing water access for industries such as oil and gas production and shipping.

- The wetlands surrounding the estuary are being lost at the remarkable rate of 21 square miles per year (one half-acre every 15 minutes). Extensive characterization and modeling of the Estuary and its wetlands as part of the Barataria-Terrebonne National Estuary Program has shown that one of the major causes of wetlands loss has been human modification of the hydrology of the system through such actions as construction of navigation canals and levees.

- Thousands of cubic yards of material are dredged throughout coastal Louisiana every year for the maintenance of oil and gas canals and navigation channels. The majority of this material is either prop-washed or placed on existing levees of dredged material in a manner not conducive to the propagation and enhancement of adjacent marsh vegetation.

- One of the most common methodologies employed by public and private entities for displacing dredged material is the use of bucket dredges, with which sediments are dug out and placed on the shore adjacent to the water body. The levees created with this dredged material, sometimes called "spoil banks", form impoundments or otherwise impede natural sheet flow hydrology.

The Problem:

The extensive wetland losses appear to be exacerbated by disruptions to the natural hydrology of the system. Impoundments, produced by dredged material levees, block water flow over land between marsh and water. They also disrupt the critical process of sedimentation on the surface of the marsh from tidal flooding.

The Project:

The purpose of the Alternative Dredging and Spoil Deposition Project was to determine the costs and benefits, both economic and environmental, of using a small hydraulic dredge for maintenance of oil field canals, as opposed to the traditional bucket dredge. The project was designed to place a thin-layer deposition of dredged material over the marsh in order to create new marsh and/or restore habitat and to avoid creating impoundments.

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 to 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.

Introduction to Barataria-Terrebonne

The Barataria-Terrebonne Estuary lies between the Missis-sippi and Atchafalaya Rivers in south central Louisiana. It is rich beyond imagination in natural resources and cultural heritage, and provides billions of dollars of revenue to the region, the State of Louisiana, and the nation through industries such as commercial fishing, trapping, agriculture, tourism, shipping, and oil and gas.

Unfortunately, the Barataria-Terrebonne Estuarine System is facing a serious crisis. This nationally significant area is experiencing land loss at a faster rate than any other region in the nation, about 21 square miles per year. This translates to about one half-acre every 15 minutes. Studies have shown that over 445,000 acres of marsh converted to open water between 1932 and 1990, and conservative estimates are that an additional 163,000 acres of land will be lost by the year 2010.

The lowland swamps, marshes, and low ridges of Barataria-Terrebonne were built by accumulating Mississippi River sediment. As the river flowed through the area, it deposited sediment in deltas and during flood stages, deposited sediments on the surface of the wetlands themselves. Marsh plants quickly invaded these newly formed lowlands.

Periodically, the river would change course and find a shorter pathway to the Gulf. Without the continuing riverine deposits, soft marsh sediment compacted and the land sank below sea level. Meanwhile, new land built up along the repositioned channel. Before human intervention, sinking land in one spot was replaced with new land somewhere else.

Today, the rivers carry less sediment than a century ago. Additionally, levees constructed to prevent flooding funnel the flow straight to the Gulf where most of the sediment is lost in deep water. Consequently, new land is not forming. Additionally, impoundments resulting from dredging activities prevent sheet flow across the wetlands, precluding sediments from maintaining existing wetlands.

Over the previous century the Barataria-Terrebonne marshes have been criss-crossed with channels to accommodate navigation and the oil and gas industries. In order for these revenue-generating industries to continue to thrive, waterways must be maintained at sufficient widths and depths. This is typically accomplished through maintenance dredging, most often done with bucket dredges. The dredged material is placed on the marsh along the edge of the canal, forming levees which block the natural sheet flow of water, and sediments, over the marsh surface. Additionally, the material covers, and ultimately kills, the existing marsh vegetation.

When they become extensive enough, the levees form impoundments on the surface of the marsh which prevents sediments from reaching the marsh surface and maintaining its elevation. The impoundments can also flood from storm overwash or rising ground water which leads to standing water which also will kill marsh vegetation. This combination of loss of sediment and standing water leads to marsh compaction and loss of wetlands. Studies have shown that there is a direct correlation between the existence of canals, dredged material levee density, and land loss. Local erosion is often isolated around the levees or within areas partially or wholly impounded by them. For this reason, the Barataria-Terrebonne National Estuary Program believes that it is important to promote alternative techniques that will beneficially use dredged material to enhance adjacent marsh areas.

The amount of dredging done within the estuary (over 22 million cubic yards of material have been dredged in Lafourche Parish alone in the past fifteen years) and the resulting levees and impoundments make this a significant aspect of wetland loss.

Overview of the Demonstration Project

Is hydraulic dredging a viable alternative to bucket dredg-ing? Do the benefits outweigh the costs? Can new marsh be created by thin-layer deposition of dredged material over marshes? The Barataria-Terrebonne National Estuary Program thought so, but wanted to investigate.

Scientists recognize hydraulic dredging as a viable alternative to bucket dredging. This alternative has fewer detrimental impacts and is recognized as producing a more beneficial use of dredged material. Pumping fluidized dredged material over the marsh, rather than concentrating it in a levee, reduces the effects and degree of impoundment and in many ways mimics the natural deposition of sediment from river flooding. The hydraulic operation involves pumping dredged material from canal or channel water bottoms to a nearby containment area. Containment areas in shallow water require the construction of a minimal retention levee to hold slurry material until the water drains or evaporates out of the contained area.

Project Objectives

The purpose of the Action Plan Demonstration Project was to compare the costs and benefits of using a small hydraulic dredge for maintenance of an oil field canal and placement of material in a thin-layer deposition in order to create new marsh and/or restore habitat.

Implementing the Project

To achieve the project's objectives, Texaco, Inc. and the Barataria-Terrebonne National Estuary Program entered into an agreement with the Lafourche Parish Coastal Zone Management Program for project design and implementation. Eight potential sites for deposition of dredged material were identified in the Leeville field in Lafourche Parish, Louisiana. The field is highly active with a number of canals and sections of deteriorating marsh sites. The sites vary in size, depth, percent of vegetation coverage, and

degree of impoundment.

Soil investigations found them to be a "Timbalier-Belle Pass associate" characterized by very fluid organic soils overlying a very fluid clay. A pre-construction over-flight provided current aerial photos of the area. The Parish subsequently entered into a professional service contract with Picciola and Associates, Inc. for surveying, technical specifications, advertisements, and administrative aspects of the project and contracted with Grillot Company, Inc. to dredge 26,600 cubic yards of material and deposit it onto four sites.

Before dredging commenced, retention levees were built, as needed, using a marsh buggy elevator, and monitoring stations were constructed by the National Biological Service of Lafayette, LA. The data to be obtained included: thickness of dredged material after deposition, diversity, compaction of the material over time, subsidence of pre-dredge pond bottom over time, subsidence over vegetation vs. subsidence over pond bottom, and changes of plant diversity/abundance/biomass over time as related to change in sediment cover.

The dredging itself took eight days to complete. The dredge, "Crown Point", was 85 feet in length and 24 feet wide and required a 4.5 foot draft. It had a 42-inch cutter head and could potentially dredge to a depth of 38 feet and discharge to a distance of 3,500 feet without a booster station. The dredge discharged at a 200 yd3/hr. rate through a 12-inch effluent line.

Success Stories

Although the project was designed to do a cost comparison of hydraulic vs. bucket dredging, it also provided the opportunity to study and determine if the environmental benefits of utilizing the bucket dredge method outweigh the additional costs. Monitoring of sites was conducted in June and October of 1996, and the sites were visited in January and March of 1997. A preliminary analysis of a small portion of the data collected at three ponds in Leeville, LA provided an indication of the amount of material accumulated and the levels of subsidence occurring. This admittedly preliminary analysis suggested that the deposited material did compact as expected. The material enhanced the sites and created new marsh in areas that were formerly covered by water. Existing vegetation appears to be thriving, and sprouting vegetation is visible throughout.

The project has shown that hydraulic dredging is a viable alternative to bucket dredging and can be effective not only in enhancing existing marsh but also in creating new marsh.

The Barataria-Terrebonne National Estuary Program believes that it is important to promote the use of hydraulic and other alternative dredging techniques that will beneficially use dredged material to enhance marsh areas. Thin layer deposition is one method that has fewer detrimental impacts than bucket dredging techniques and reduces the effects and degree of impoundment. Alternative techniques need to be explored as well. The costs associated with the dredging work may be slightly higher, at least initially, but the environmental benefits outweigh the costs in the eyes of many.

Lessons Learned

Although the project's cost comparisons showed that, in this instance, the hydraulic dredge technique was more expensive than the bucket dredge method ($1.96 per cubic yard versus $.91 per cubic yard), several important factors were revealed:

- To date, the use of hydraulic dredge operations in South Louisiana has been infrequent. This factor has two important effects on the cost of the beneficial use technique--economists agree that the lack of competition increases the price and a lack of equipment and experience with small hydraulic dredges in the oil and gas field contributes to the higher cost. It is predicted that if this technique becomes more widely used, the per unit cost would decrease.

- Hydraulic dredging technology may provide opportunities for the public and private sectors to work together to achieve beneficial use of dredged material in a coordinated effort that would assist public goals of wetland creation and coastal restoration. Cooperative agreements can be sought to share costs associated with hydraulic dredge work.

- Coastal Use Permit applicants could reduce the amount of off-site mitigation required for habitat damage caused by their dredging activities by beneficially using the material to restore or create marsh habitat. In cases where applicants create more wetland values with dredged material than they alter by dredging, they would be eligible to receive advanced mitigation requirements for future projects. Such opportunities would promote cost savings in mobilization and demobilization by having fewer, larger projects utilizing equipment already on-hand.

URL: http://www.epa.gov/owow/estuaries/coastlines/winter98/options.html
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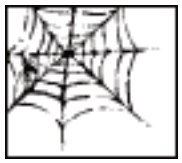

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"Pilot Project Goes Airborne"

Mapping Critical Resources in Narragensett Bay

Demonstrating Practical Tools for Watershed Management Through the National Estuary Program

Characteristics:

- Narragansett Bay covers 147 square miles of water surface. Its watershed covers an area of 1,657 square miles, 39% in Rhode Island and 61% in Massachusetts. Nearly two million people live in the watershed, making it one of the most densely populated estuarine watersheds on the East Coast.

- Eelgrass provides valuable habitat to fish, shellfish, and waterfowl, as well as controlling bottom sediment erosion. Likewise, salt marshes produce and export large quantities of biomass to nearby

waters to form the basis of the estuarine and marine food web, and help maintain water quality by filtering pollutants and recycling nutrients.

- Scientists have shown that eelgrass habitat in Narragansett Bay has severely declined over the past hundred years. These areas were once considered the most productive scallop grounds in the bay. The Narragansett Bay Estuary Program's Comprehensive Conservation and Management Plan (NBEP CCMP) identifies eelgrass beds (Zostera marina) and salt marshes as critical resource areas of outstanding ecological significance. The protection and restoration of these resources are high priority initiatives of the NBEP, now a program within the Rhode Island Department of Environmental Management (RIDEM).

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 to 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.

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The Problem

State and local environmental managers lack the tools to effectively protect critical resources in Narragansett Bay--especially eelgrass habitat--due to outdated information and insufficient resources. The development of accurate maps showing the distribution and abundance of eelgrass beds and salt marshes is a crucial, yet costly, step in the process. The NBEP has begun to fill this need through an innovative and collaborative approach.

The Project

The goal of the project was to develop a critical resource inventory that would serve as the basis for a bay-wide approach to resource protection and restoration. The project evolved from a pilot mapping effort using donated equipment and staff time to a much larger effort using federal and state grant funding to purchase new 1996 color aerial photographs of the bay and to delineate and map eelgrass beds, salt marshes, and other coastal features.

Introduction to Narragansett Bay

Naragansett Bay is not only an estuary of national significance, but has also been referred to as "Rhode Island's most important resource". The waters of the bay are used for transportation, shellfishing, research, recreational and commercial fishing, boating, swimming, as well as US Navy-related activities.

The multiple demands placed upon the bay by its many users have caused documented environmental degradation. Point and nonpoint source pollutants as well as coastal development have had major impacts on the bay. As one example, nutrient-enriched ground water emanating from densely developed neighborhoods near the bay and surface failures of septic systems in unsewered areas have caused overgrowth of nuisance seaweeds (e.g., Ulva lactuca L.) in coves and embayments where eelgrass, and the marine life that depended on it, had once flourished. A number of coves and embayments suffer from seasonal dissolved oxygen depletion, algal blooms, and occasional fish kills related to organic loadings. Without the identification of and effective protection from human activities, ecologically critical areas (areas that function as important fish breeding, feeding and nursery areas, or support rare species or diverse natural communities) could be permanently impaired or lost.

Overview of the Project

The NBEP organized the Aquatic Habitat Mapping Workgroup (AHMW) made up of environmental scientists, planners, and engineers from various federal and state agencies, universities, and nonprofit organizations who share a common interest in protecting and restoring critical resources in Narragansett Bay. Members brought to the table different technical backgrounds and skills which provided for comprehensive and creative discussions on approaches to solve both immediate and long-term problems related to the resources of concern. With limited available funding, the workgroup conducted a pilot project to map eelgrass beds using volunteer divers, donated GPS equipment and staff time. The results showed that the labor intensive and time consuming methodology utilized was not feasible for mapping the resources of the entire bay. However, research into other mapping efforts in New England which utilized remote sensing led the NBEP to purchase new aerial photographs as a basis to map critical resources. Partnerships between members of the workgroup and others--and generous donations/loans of equipment and staff time along the way--made this mapping project possible.

Initiative Objectives

The objectives were to develop updated Geographic Information System (GIS) maps and information on a priority subset of the critical resources of Narragansett Bay in order to: a) evaluate proposed development

projects and their impacts; b) develop state and local policy to protect specific habitats in the bay; c) develop baseline data on which to design habitat restoration projects; d) monitor changes in the distribution of these habitats; and e) increase public awareness through educational efforts.

Implementing the Initiative

Since 1995, the NBEP has assembled the AHMW monthly to evaluate existing habitat mapping and data, identify future mapping needs, and build coordinated projects. Because of limited resources, cooperative projects were the most effective way to accomplish the common goals. The workgroup recognized eelgrass and coastal wetlands, especially fringing salt marshes, as ecologically critical resources. It was determined that the state did not have current, accurate maps of these resources. Due to limited time, it was decided to make eelgrass a priority for a demonstration mapping project.

In 1995, members of the workgroup traveled to Rose and Goat Islands off Newport, RI, to perform a pilot eelgrass mapping project. Mapping data were collected in known eelgrass bed locations using small boats, a Trimble Pathfinder ProXL Global Positioning System (GPS) unit, and scuba divers. The information was processed using ARC/INFO GIS software to create a base map and to show locations of the existing eelgrass beds. Contributions and loans of equipment, resources, and accommodations by RIDEM, Trimble Navigation, and the Rose Island Lighthouse Foundation made the project possible.

Limitations of the methodology used in the pilot project led the workgroup to pursue alternative approaches. The NBEP investigated efforts by other New England states mapping eelgrass habitat using remote sensing (including Massachusetts Wetlands Conservancy Program and Maine Department of Marine Resources). The National Oceanic and Atmospheric Administration's Coastwatch-Change Analysis Program (NOAA C-CAP) had recently developed national protocols for the delineation of submerged aquatic vegetation (SAV) and coastal wetlands, recommending the use of aerial photography to develop accurate baselines against which to monitor long-term changes.

With a better understanding of the benefits of remote sensing for resource mapping, the NBEP developed two successful grant proposals to fund a bay-wide critical resources mapping project. An aerial overflight was conducted in the summer of 1996 utilizing the NOAA C-CAP guidelines to produce true color aerial photographs at scales 1:12,000 and 1:40,000. Links were made with Save The Bay, Inc. (a major environmental advocacy group) as it launched a major public outreach campaign for habitat protection and restoration with funding from the Pew Charitable Trust.

Because of its expertise in project design and photo-interpretation, the University of Massachusetts Natural Resource Assessment Group (NRAG) (formerly with the U.S. Fish & Wildlife Service (USFWS) National Wetlands Inventory) was contracted to interpret the aerial photographs to identify, delineate, and classify SAV (primarily eelgrass), salt marshes, and coastal features (barrier beaches, cobble beaches, spits, bars, mud flats, oyster reefs, and coastal banks). NRAG has been successful in differentiating eelgrass beds from other SAV using 1:12,000 scale photographs. This information was then transferred to mylar U.S. Geologic Survey 7.5 minute series quadrangle base maps to be digitized and incorporated into the state GIS in order to produce resource maps.

Data from the project will be available to environmental permitting agencies and local planning groups, and will be a central component of the NBEP's efforts to develop a bay-wide approach to habitat protection and restoration. Overall, the project has created a network of agencies, technical groups, municipalities, and nongovernmental organizations ready to continue collective action to protect and restore critical resource habitat.

Success Stories of the Initiative and Follow-up Projects Underway

- This has been the first successful attempt in the northeast to use remote sensing techniques to differentiate eelgrass from other SAV. Other programs found that remote sensing was useful for locating and mapping SAV beds but additional field effort was required to differentiate the signatures of eelgrass from other species.

- In the summer of 1997, the NBEP and RIDEM GIS Program started to work cooperatively with the Town of Bristol, RI by providing technical assistance in developing GIS resource mapping for the town's Harbor Management Plan. Maps showing locations of critical resources, along with policies providing protection of these resources, will be incorporated into the plan. A public outreach and educational program will be implemented and the town will maintain and update these coverages.

- The NBEP and NRAG, in cooperation with the University of R.I., Save The Bay, and the USFWS, have received grant funding for a project that would provide a scientific basis for identifying and prioritizing coastal wetland restoration actions with the baseline data developed in the project described above. GIS maps and databases will be created using additional photo-analysis and field surveys.

- Legislation was recently introduced by Save The Bay to fund habitat restoration and protection, targeting eelgrass beds and coastal wetlands in R.I. In cooperation with the USFWS, the NBEP convened an existing group of restoration experts, the R.I. Habitat Restoration Technical Advisory Committee to review the growing number of proposed coastal restoration projects. The NBEP is working to ensure that this critical technical review function is incorporated in the legislation so that restoration decisions are based on sound science and will achieve restoration goals.

- The NBEP is in the midst of a pilot project funded by US EPA through the Clean Water Act to establish six salt marsh reference sites. Vegetation and fish species are being inventoried at these sites in order to provide a quantitative target for future restoration efforts. The NBEP workplan for 1998 includes provisions to conduct benthic invertebrate inventories and to construct hydrologic models for each of the reference marshes.

Lessons Learned

- The project has been built on existing and new partnerships between government agencies and nongovernmental organizations that together represent a diversity of skills and resources. This collaborative tackled an incredible amount of work in a short amount of time, balancing technical expertise with public outreach and educational campaigns. The effort could not have been accomplished by any of these partner organizations working alone.

- It was found that the methodology using a GPS unit, small boats, and scuba divers is appropriate to map the perimeter of eelgrass beds on a case-by-case basis in specific conditions: a clear day with little to no wind, a small eelgrass bed, and an urgent need for mapping based on a serious threat to a known, but unmapped bed. For larger eelgrass beds and or a bay-wide mapping effort, this approach would not be feasible.

- The use of remote sensing to map eelgrass provided a synoptic view of large beds and eliminated the initial time-consuming field investigations to determine the presence/absence and areal extent of the resource. As a result, field time could be spent primarily on surveying the edges of the eelgrass beds already delineated on the aerial photographs and in determining species distribution.

Previous Publications in the Demonstration Projects Series

Report Title	National Estuary Program	Date	Publication #
Biological Nutrient Removal Project	Long Island Sound, CT/NY	1995	EPA842-F-95-001A
Buttermilk Bay Coliform Control Project	Buzzards Bay, MA	1995	EPA842-F-95-001B
Georgetown Stormwater Management Project	Delaware Inland Bays, DE	1995	EPA842-F-95-001C
Texas Coastal Preserves Project	Galveston Bays, TX	1995	EPA842-F-95-001D
Shell Creek Stormwater Diversion Project	Puget Sound, WA	1995	EPA842-F-95-001E
City Island Habitat Restoration Project	Sarasota Bay, FL	1995	EPA842-F-95-001F
Buzzards Bay "SepTrack" Initiative	Buzzards Bay, MA	1997	EPA842-F-97-002G
New Options for Dredging in Barataria-Terrebonne	Barataria-Terrebonne Basin, LA	1997	EPA842-F-97-002H
Coquina BayWalk at Leffis Key	Sarasota Bay, FL	1997	EPA842-F-97-002I

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URL: http://www.epa.gov/owow/estuaries/coastlines/winter98/october.html
Revised April 16, 1998

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.

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The National Estuary Program: A Ten-Year Perspective

Demonstrating Practical Tools for Watershed Management Through the National Estuary Program

Introduction

This past year, 1997, marked the 10th anniversary of the US EPA's flagship watershed effort, the National Estuary Program (NEP). What began as a demonstration of an alternative to traditional command-and-control regulatory approaches to water quality problems has evolved into a model for integrated, watershed-based, stakeholder-oriented, water resource management. A decade of trial and effort has taught some useful lessons about applying this approach; it has also led to significant environmental improvements and insights upon which the EPA expects to build over the next 10 years of the program.

History

The National Estuary Program was created by the Water Quality Act of 1987, influenced by public alarm over beach closures, fish kills, contaminated shellfish beds, and a general sense of deteriorating coastal environments. There was growing awareness of the impacts of nonpoint source pollution, and that such

impacts were related to the surge in coastal growth and development. More fundamentally, there was new appreciation of estuaries as an incredibly rich and varied resource at increasing risk from cumulative activities in coastal watersheds.

These systems, and the risks, were too complex to be addressed by one entity alone and went well beyond the existing mandates of regulatory and enforcement programs. At that time, water quality was chiefly defined by concentrations of chemicals in a waterbody and was primarily driven by point source concerns and programs. There were few, if any, tools to recognize and address more comprehensive issues. Additionally, there was little authority or capability to integrate efforts within geographic or hydrologic units.

Congress recognized that in order to achieve long-term protection of water quality and living resources-the fundamental "fishable, swimmable" goals of the Clean Water Act-the participation of those most affected by environmental decisions was critical. Experiences from the Great Lakes and Chesapeake Bay Programs, with their collaborative approach to managing watersheds and estuaries, were clearly drawn upon in shaping the NEP under the Act. Stakeholders, Congress determined, must have a major role in deciding how to protect and restore their estuaries. Congress also recognized that state and local entities were at the forefront in carrying out activities affecting estuaries, and that they needed to be integral partners in the decision-making process. EPA's role was to provide technical and financial assistance, management guidance, and the organizational vehicle to foster the growing partnerships.

What is the National Estuary Program?

The NEP is a voluntary program that brings a community together to improve its estuary using a forum to establish working relationships and the trust necessary to develop solutions. This fosters a higher likelihood of long-term success because solutions are "owned" by participants who have a stake in reaching them.

EPA periodically calls for nominations to the program from state governors. If an estuary meets the agency's criteria, EPA may then designate it to be included in the program. Once the designation has been made, a Management Conference is formed to provide the decision-making framework for participants, which typically include government agencies at the federal, state, and local level; community residents; user groups; scientific and technical institutions; business and industry; and environmental groups. The EPA functions as the overall facilitator of the process and as a Management Conference representative. The Management Conference, or stakeholders, together define program goals and objectives, identify estuary problems, and design action plans to prevent or control pollution and restore habitats and living resources such as seagrasses and shellfish. These action plans come together in a Comprehensive Conservation and Management Plan (CCMP) which serves as a blueprint for protecting and restoring the estuary.

Administration of each of the 28 designated local NEPs includes a Management Committee which serves as the focal point of the program. It is supported by a Director and technical and outreach staff, scientific and technical advisory committees, and citizen advisory committees.

How Does it Work?

The NEPs build on existing programs and traditional water quality control measures and tailor them to specific places and communities-coastal watersheds and related estuaries.

Each local NEP must examine changes in water quality and natural resources, evaluate point and nonpoint source pollutant loadings, and determine the relationship between loadings and priority problems for its particular system. Local NEPs generally target a broad range of issues, including contaminated runoff and sediments, releases from septic systems, shoreline erosion, declines in fish and shellfish, and loss of wetlands. There is a strong emphasis on the ability to transfer these solutions to other watershed systems in other areas.

The method used is an interactive, collaborative decision-making process where stakeholders work together to develop the CCMP for their estuary. All stakeholders participate as equal partners in setting priorities, planning, and implementing the action plan. No one single entity drives the local NEP; decisions are made collectively by the Management Conference with input from the stakeholders.

The goal is to develop-and, most importantly, implement-their CCMP, tailored to meet their particular needs and problems, while meeting national program requirements. CCMPs integrate available regulatory tools as well as innovative restoration and protection methods and techniques addressing point and nonpoint source pollution, and set time tables for implementation. Critical to this is building and sustaining long-term public support to carry out the actions agreed upon in the plan.

The NEP Today

What began in 1987 with six local NEPs scattered around the country, has grown to 28 in 18 states and Puerto Rico. The project sites offer a broad range of environmental conditions and stakeholder representation. Of the 28, 17 have completed their CCMPs and are in the implementation phase. The other 11 are still in the process of developing CCMPs (with seven scheduled to have approved plans by the end of 1998). Local programs are not, however, waiting until their CCMPs are approved to protect and restore their estuaries. Most have taken early action to address known problems or those identified during the plan development process.

Lessons Learned

A number of key lessons have been learned over the past ten years. The NEP has demonstrated that community-based resource management achieves results. Although it takes time to see environmental changes such as improvements in water quality, progress is being made. In order to demonstrate improvements in the estuary, we have seen the importance of NEPs setting measurable environmental goals and indicators. Both programmatic and environmental monitoring are critical to assess progress in implementing CCMP actions as well as changes in environmental conditions.

The program has seen that building an effective management and decision-making framework requires commitment, close collaboration on the part of participants, and time. It is especially important that there is close coordination between federal, state, and local governments. It takes time for groups to build strong partnerships and develop the trust to collectively reach decisions on actions and implementation. The NEP has seen the importance of incorporating groups that have not always been part of coastal discussions, such as oil and gas interests and the housing and development sector. Through the NEP, these and other stakeholders can work together, in some cases for the first time, to protect and restore their estuary.

It has been found to be critical that the appropriate stakeholders are involved in the NEP during the early stages of development of the CCMP. Involvement from the beginning has facilitated commitments to and adoption of the CCMP-and its implementation. The EPA has clearly learned that the consensus-building process must reflect the character of the local community and balance the divergent needs and interests of the coastal stakeholders.

The NEP has provided a laboratory where environmental impacts are examined. Research conducted or sponsored by the NEPs has led to some significant discoveries.
While it was known that estuaries serve as sinks for upstream pollutants, the NEPs have built on the work of the Chesapeake Bay Program to demonstrate that nitrogen from the air is also a major contributor to problems in coastal waters-particularly in eastern and gulf coast estuaries.
Research funded, in part, by the NEP, led to the discovery of the marine toxic microorganism *Pfiesteria* which produces neurotoxins that kill fish and may cause human health problems. This discovery has assisted a number of other estuaries coping with the impacts of *Pfiesteria*.
Nutrient over-enrichment has long been linked to stimulating growth in aquatic plants and contributing to low levels of dissolved oxygen in estuaries, but local NEPs have recently seen possible links to red and brown tides.
It was not anticipated that accidental or intentional introduction of species would become a significant environmental and economic concern for some estuaries in the NEP. However, a number of instances of this problem have been noted. Brazilian pepper is encroaching on native plant communities in the Florida NEPs. The introduction of the Asian clam in ballast water has disrupted the food web in Pacific coast NEPs by consuming food sources such as phytoplankton vital to native and endangered species. The Japanese oyster drills found in northwest NEPs are decimating oyster populations. The work conducted by these and other NEPs was key in helping to support legislation to address the introduction of invasive species in ballast water (National Invasive Species Act).

A real surprise has been the commonality in environmental issues faced in estuaries around the country. While each estuary and its setting are unique, the NEP has found that all face similar environmental problems and challenges: over-enrichment of nutrients, contamination from pathogens and toxic chemicals, alteration of freshwater inflow, loss of habitat, declines in fish and wildlife, and introduction of invasive species. Consequently, the need to exchange scientific and management information among NEPs is critical to ensure their success and the ability to transfer the knowledge gained to other estuaries improves conditions nationwide.

Collectively, the NEPs have created a significant knowledge base and wealth of experience in dealing with the problems that threaten the health of virtually all estuaries. They serve as a vital national network for technical assistance. Each local program has produced a vast amount of outreach materials-documents, workshops and the like-to educate and inform the community and to share management insights. They also directly provide critical technical assistance to the local governments surrounding the estuary and indirect assistance to the entire collection of estuaries which ring the country.

Many local NEPs have created innovative management approaches to solve these common problems. They have employed alternative on-site wastewater treatment technologies to control nitrogen; established marina pump-out facilities; provided education and training for owners, installers, and pumpers of septic systems to reduce pathogens; promoted beneficial uses of dredged material to restore and create wetland habitat; installed fish passages to increase spawning; and helped citizen volunteers remove invasive plant species from public areas.

Accomplishments

Local NEPs, and the partnerships forged therein, have produced many significant programmatic and environmental improvements. They have been the catalyst to bring together various levels and branches of government that previously never worked cooperatively-thereby providing more comprehensive management and expediting the regulatory review processes. They have been instrumental in getting local ordinances passed addressing problems associated with stormwater runoff, have facilitated conservation easements for critical areas, and have helped local stakeholders to place limits on nitrogen loading to estuaries. One local NEP has fostered a coordinated effort to improve wastewater treatment facilities in two adjoining states as a means of reducing nutrients. Partnerships between NEPs and industry have led to new ways of doing business. NEP pollution prevention activities targeting toxic chemicals have been adopted by small businesses and reduced their wastes. Action Plan Demonstration Projects (APDP) function as program-funded, small-scale projects to test the effectiveness of technologies and approaches that may be included in the CCMP. These have included creation of artificial wetlands for stormwater mitigation, construction of an artificial oyster reef from recycled coal ash, and design of shrimp by-catch reduction devices. Through these APDP projects and early action on the part of NEPs, many acres of shellfish beds have been reopened, seagrass acreage has increased, shorelines have been stabilized, and native habitat has been restored.

Into the Future

The most significant challenge facing the NEP is to successfully implement the CCMPs. Transition from plan development to action can be very difficult. Local NEPs need to gain commitments from implementors to support CCMP actions and create an effective administrative or institutional structure to ensure they are carried out. This usually requires that they develop the financing necessary to make this happen.

Public participation in the development of the CCMP is one of the most important facets. All too often, the completion of the plan is seen as an end-point rather than a beginning and, consequently, finding a way to maintain public involvement is a great challenge. The public must be involved early in the decision-making process in order to ensure that CCMP actions are carried out.

Because CCMP actions typically transcend a single agency, each local NEP must establish an appropriate institutional arrangement to ensure implementation. NEPs have employed a wide range of organizational structures for this effort, the most common being a coordinating institutional arrangement between the Management Conference and a designated state agency which serves as the administrative "host". A few NEPs have established non-profit organizations that serve either as the coordinating body or as a complement to that group.

Financing CCMP implementation can be costly. Implementation occurs over many years and so a stable, long-term source of funding is critical. While the EPA is committed to support the NEPs at some level during implementation, each program must identify other funding vehicles early in the planning process to ensure continued program success. NEPs must be able to leverage other sources of funds from key players, such as state and local governments, to implement CCMP commitments.

Now that the NEP has reached its tenth year, the EPA is at a critical point in setting its direction for both the near and long term.

There are approximately 130 estuaries in the United States. Do they all need to be part of the NEP? The EPA recognizes that it may not be appropriate, or even necessary, to designate all of these estuaries as NEPs. What may be more important and effective is to transfer the lessons learned within the NEP to other areas. Clearly, a wealth of knowledge, experience, and tools exist after ten years of the NEP that can be used to further coastal watershed protection. The EPA is working with other federal, state, and local agencies to get information to local decision-makers and interested stakeholders.

The EPA has committed a significant amount of time and resources in support of Management Conference activities for the local NEPs-matched by state partners. Local NEP participants have invested vast numbers of hours in developing their CCMPs and gaining consensus among stakeholders, as well as educating and getting the community involved in activities to restore their estuaries. This common investment is yielding dividends. NEPs are successfully addressing the broad range of problems and issues facing local coastal communities. Not only does the NEP benefit the individual estuaries in the program, but the approach and findings have assisted other coastal areas in addressing water quality issues on a watershed basis.

The US EPA looks forward to continuing its partnership with the 28 NEPs over the years to come and witnessing improvement in the health of our nation's estuaries.

Please visit the US EPA web site at www.epa.gov/owow/estuaries/nep.html to find out more about the NEPs.