EPA United States Environmental Protection Agency

COMMUNITY-BASED WATERSHED MANAGEMENT

LESSONS FROM THE NATIONAL ESTUARY PROGRAM

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Acknowledgments

This handbook was prepared by the U.S. Environmental Protection Agency's (EPA) Coastal Management Branch. The content of this handbook is the result of a collaborative effort among the directors and staff of the 28 National Estuary Programs and the EPA's National Estuary Program Regional Coordinators. The EPA Work Assignment Manager was Tim Jones, who provided overall project coordination.

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Message from the Office Director

Environmental protection programs in the United States have significantly improved water quality during the last quarter century. Nonetheless, many challenges remain. Of the waters assessed in the United States, about 40% of streams, 45% of lakes, and 50% of estuaries remain too polluted for fishing, swimming, and other uses. The watershed approach—targeting high priority water quality and habitat problems within hydrologically-defined areas—is essential to address these issues.

Through this handbook, we describe the highly successful approaches to watershed management implemented by the 28 National Estuary Programs (NEPs). The NEPs, unique partnerships of the U.S. Environmental Protection Agency (EPA) and numerous federal, state, and local organizations, work together to address coastal watershed management challenges. This document presents new information from nearly 20 years of the NEP experience and describes how the NEPs:

- protect and restore estuaries by developing and implementing comprehensive management plans;
- foster consensus on difficult issues by establishing effective governance structures;
- conduct vigorous education and outreach by involving the public;
- obtain significant funding by leveraging scarce resources;
- establish credibility by using science to inform decision making; and
- sustain their efforts by measuring and communicating results.

The principles and lessons learned contained in this document are relevant not only to NEPs, but to other watershed organizations who are working to implement watershed protection and restoration efforts. Whether working in coastal or non-coastal areas, watershed organizations can learn from the NEPs about innovative approaches to integrating science and management, fostering collaborative decision-making, and involving the public. While coastal estuaries may be home to certain elements that are not found in non-coastal areas, this handbook provides examples that do not require the presence of coastal elements to be successfully applied.

I hope this document will be useful for all practitioners involved in watershed management, including the staff of the NEP and EPA. Thank you to all of the 28 NEPs who contributed to the development of this report.

Diane Regas, Director
Office of Wetlands, Oceans, and Watersheds
United States Environmental Protection Agency

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LESSONS FROM THE NATIONAL ESTUARY PROGRAM

FEBRUARY, 2005

Oceans and Coastal Protection Division
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Executive Summary

Community-Based Watershed Management: Lessons from the National Estuary Program (NEP) is designed for all individuals and organizations involved in watershed management, including states, tribes, local governments, and nongovernmental organizations. This document describes innovative approaches to watershed management implemented by the 28 National Estuary Programs (NEPs). The NEPs are community-based watershed management organizations that restore and protect coastal watersheds. Drawing on nearly 20 years of experience, readers will learn how the NEPs organize and maintain effective citizen involvement efforts, collect and analyze data, assess and prioritize problems, develop and implement management plans, and communicate results of program activities. While estuaries and their coastal watersheds are the focus of the NEPs, the estuary program experience can also be adapted to non-coastal watershed initiatives.

Each chapter begins with the key management principles from the NEP experience. These broad principles are described and illustrated with examples from the 28 individual NEPs. The examples show how the NEPs address specific problems within identified priority problem areas, such as loss of habitat, polluted runoff, and invasive species. In many cases, actions address multiple problems simultaneously, such as land acquisition to reduce polluted runoff and increase habitat. The examples are found throughout the text and in sidebars, as well as at the end of each chapter. Six appendices provide additional information regarding the NEP watershed approach, including a brief summary of each NEP that includes their Web site address. The following paragraphs summarize the contents of each chapter.

Chapter 1 discusses the origin of the NEP and presents the four cornerstones or principles of the NEP: (1) focus on the watershed; (2) integrate science into the decision-making process; (3) foster collaborative problem solving; and (4) include the public. The chapter also describes the four phases of the NEP process—establishing a governance structure, identifying problems and solutions, developing the Management Plan, and implementing the Management Plan—and discusses the applicability of the NEP model to other watershed management efforts.

Chapter 2 explains how the NEPs develop a governance structure and support the work of stakeholder committees. The chapter describes how the NEPs provide a forum for open discussion, cooperation, and compromise that results in consensus. Examples of governance structures are provided that show how the NEPs set a course for their programs, direct day-to-day operations, coordinate with local governments, and ensure long-term financial support.

Chapter 3 describes how each NEP assesses an estuary to determine its health and the effectiveness of existing management efforts. The chapter outlines how the NEPs conduct a Technical Characterization that describes the quality of the estuary, defines its problems, and suggests possible solutions. The chapter also describes how the NEPs conduct the Base Program Analysis—an evaluation of the institutional structures that affect the estuary. Finally, the chapter discusses how the findings resulting from the Technical Characterization and Base Program Analysis are combined and translated into plain English, telling a story about the estuary and its watershed.

Chapter 4 explains how the NEPs use the results of the Technical Characterization and Base Program Analysis to develop management plans that address the problems of the estuary. The chapter discusses how the NEPs involve affected jurisdictions, agencies, and other organizations and individuals in the writing of the plan to ensure stakeholder support and a commitment to implement the plan. The chapter also shows how the NEPs use demonstration projects during plan development to showcase innovative management strategies, involve the public, and demonstrate the types of changes that full implementation can bring about.

Chapter 5 describes how the NEPs maintain the momentum of their watershed programs as they shift from planning to implementation. The chapter explains how the NEPs adopt bylaws and other agreements that define participant roles and provide a mechanism for resolving conflicts; articulate a clear and realistic definition of success that includes measurable indicators; seek a variety of funding sources to avoid over-reliance on a single entity; and involve citizens in environmental monitoring and building public support for implementation.

Chapter 6 summarizes the key principles that run throughout this unique and creative approach to watershed management and highlights how they are applied to achieve success.

Chapter 1: The National Estuary Program (NEP)

INTRODUCTION

Estuaries are unique areas where freshwater from rivers mixes with saltwater from the ocean. These bays, sounds, lagoons, and other waterbodies are among the most biologically productive places on earth, comparable to rainforests and coral reefs. In addition to providing habitat for a wide variety of fish and wildlife, including many endangered and threatened species, estuaries provide substantial economic benefits to the nation. Our ability to sustain commercial fisheries, recreational fisheries, tourism, and related activities depends upon healthy estuary ecosystems. For example, the economic value of commercial fisheries supported by estuaries is at least $19 billion annually. (Reference: U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Ocean Service. Estuaries of the United States: Vital Statistics of a National Resource Base. Washington: U.S. Department of Commerce, 1990.)

Estuarine and coastal watersheds (areas of land that drain into a coastal body of water, such as an estuary or bay) are among the most aesthetically appealing areas in the nation. They are also among the most densely developed. This narrow fringe of land, which comprises 17 percent of the land area of the United States, is home to more than 53 percent of the nation's population. America's coastal population will grow to more than 127 million people by 2010—an increase of more than 60 percent in only fifty years. (Reference: U.S. Department of Commerce, National Ocean Service. Fifty Years of Population Change Along the Nation's Coast: 1960-2010. Washington: U.S. Department of Commerce, 1990.)

This preference for the coasts has created pressures that threaten the very resources that attract people to these areas. These pressures include increased loadings of nutrients, toxic chemicals, and pathogens that strain the assimilative capacity of our estuaries and coastal areas and cause the degradation and loss of critical habitats and species that make these areas precious and economically valuable. This chapter discusses the origin of the NEP, describes the four cornerstones or principles of the NEP, outlines the NEP process, and discusses the applicability of the NEP approach to other watershed management efforts.

NEP PRINCIPLES IN CHAPTER 1

- The NEP is built on four cornerstones:

  1) a focus on watersheds as the basic management units,
  2) sound decision-making is based on good science,
  3) a collaborative approach to problem solving, and
  4) the inclusion of the public.

- The NEP's community-based watershed approach can be adapted for a variety of environmental management situations, including both coastal and non-coastal watershed initiatives.

- The four phases of the NEP process—establishing a governance structure, linking good science and sound management, developing the Management Plan, and implementing the Management Plan—are flexible and need not occur sequentially.

ORIGIN

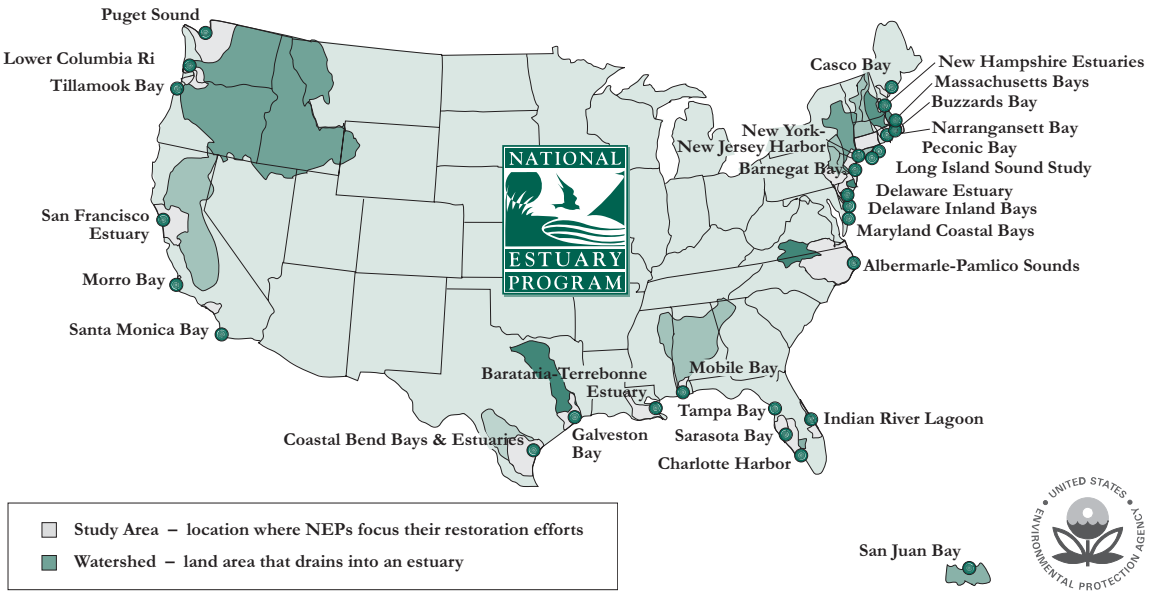
Modeled after the U.S. Environmental Protection Agency's (EPA) Great Lakes and Chesapeake Bay programs, the NEP was designed to restore and maintain the integrity of estuaries and their watersheds. As called for in Section 320 of the Clean Water Act, the NEPs conduct long-term planning and management to address the complex factors that contribute to the deterioration of estuaries, such as increasing development along our coasts. (Refer to **Appendix A** for the Clean Water Act, Section 320.)

EPA periodically calls for nominations into the NEP from state governors. If an estuary faces significant risks to its ecological integrity, contributes substantially to commercial activities, would benefit greatly from comprehensive planning and management, and meets several other criteria, EPA may include it in the program. EPA has accepted 28 estuaries into the NEP since 1987 and all of these NEPs have completed their Management Plans. **Figure 1.1** (on page 3) shows the 28 NEPs, their watersheds, and their study areas. (Refer to **Appendix B** for summary information on each of the 28 NEPs, including each program's Web site address.)

Once an estuary is accepted into the NEP, a Management Conference is formed by EPA to provide the local decision-making framework for the estuary. The Management Conference is a collection of committees that guides the program. The Management Conference typically includes local governments, affected businesses and industries, public and private institutions, nongovernmental organizations, the general public, and representatives from EPA, other federal agencies, state governments, and interstate or regional agencies. In addition to being a Management Conference participant, EPA provides financial and technical assistance, and reviews program performance. The

Management Conference defines program goals, identifies the causes of the estuary's environmental problems, and designs actions to protect and restore habitats and living resources. These action plans come together in a Management Plan which serves as a blueprint for protecting and restoring the estuary. Developing the Management Plan is a three to five year process that involves convening stakeholders and reaching consensus on solutions.

Figure 1.1: The 28 National Estuary Programs, their study areas, and surrounding watersheds



THE CORNERSTONES OF THE NEP

The fundamental principles that guide the NEP evolved from its place-based environmental management predecessors such as the Chesapeake Bay Program. The four cornerstones of the NEP are to:

- focus on watersheds,
- integrate science into the decision-making process,
- foster collaborative problem solving, and
- involve the public.

Cornerstone 1: Focus on watersheds.
Because environmental problems do not conform to political jurisdictions, the NEPs define their management areas according to watershed boundaries and the ecosystems within them. Focusing on these hydrologically-defined geographic areas helps the

NEPs achieve an effective mix of point source pollution and polluted runoff controls, as well as land preservation and other measures to protect and restore water and other natural resources. By considering all sources of pollution in the watershed, the NEPs are better able to set priorities and concentrate on those activities necessary to produce tangible improvements in water quality and habitat. Focusing on watersheds also results in more effective and efficient coordination among stakeholders working to improve water quality.

Cornerstone 2: Integrate science into the decision-making process.
Decision-making should be based on the best information and science available. Sound science provides objective information that informs debate, produces data on the status and trends of the estuary, and furnishes a basis for policies and programmatic decisions. The NEPs employ sound scientific data, tools, and techniques to assess the natural resources and the communities that depend upon them and to set goals and identify environmental objectives. Science is also used by the NEPs to develop management options and action plans, implement solutions, evaluate the effectiveness of actions, and revise plans. NEP stakeholders and partners play a key role in identifying problems to be assessed and collecting the scientific data needed to form conclusions. The NEPs apply science in an iterative fashion to encourage partners to set goals and targets and to make maximum progress based on available information, while continuing analysis and verification in areas where information is incomplete. By basing decisions on sound science, the NEPs are viewed as credible sources of information.

Cornerstone 3: Foster collaborative problem solving.
As an environmental management approach, collaboration involves creating a shared vision and joint strategies to address concerns that go beyond any particular interest or stakeholder. By ensuring that stakeholders responsible for and interested in the management and use of the estuary are involved in the process, the NEPs have achieved successful collaboration. The NEP director and staff serve as facilitators that balance conflicting estuary needs and uses without compromising the

environmental goals of restoration and protection of the estuary. The NEP ensures that decisions are made with the input of stakeholders and that all options, suggestions, and opinions are treated as worthy of consideration. Decisions are made through the NEP governance structure which provides the forum for bringing together diverse stakeholders to identify issues, develop management actions, and resolve conflicts. The governance structure provides the platform for collaborative decision-making and reflects the unique problems, citizen concerns, and other characteristics of the watershed. The NEPs have found that this collaborative approach helps overcome the obstacles to cooperation, such as different statutory and budgetary responsibilities and the costs of sharing information and coordinating program efforts.

Cornerstone 4: Involve the public.
The NEPs are guided by the principle that stakeholders in the watershed ought to have a meaningful role in shaping the program and substantive opportunities to participate in its activities. The NEPs strive to facilitate a constructive dialog in which the range of stakeholders in the watershed are given opportunities to help define estuary problems, set priorities, and implement solutions that they feel are relevant. This means that the NEPs seek to engage not only governmental entities, but the general public, nonprofits, businesses, and universities as well. This community-based approach has a high likelihood of long-term success because ownership of the solutions extends to community members who must play a role in achieving them. Strong citizen involvement programs result in support for the funding of implementation projects and changes in day-to-day behaviors in the watershed that affect the estuary. An informed and involved public is often the NEPs' most valuable asset for mustering the critical support needed to implement such actions as sewage treatment upgrades, sediment controls, and habitat restoration.

These basic principles—focusing on watersheds as the basic management unit, linking good science with sound decision-making, solving problems collaboratively, and involving the public—are themes that underpin the NEP and guide the NEP's approach to watershed management.

APPLICABILITY OF THE NEP APPROACH

The principles, examples, and lessons learned contained in this handbook are relevant not only to the NEPs but to other watershed organizations, including local governments, nonprofits, and others who are working to establish, implement, and evaluate watershed protection and restoration efforts. While the NEPs are home to certain elements not found in non-coastal areas, such as the presence of salt water ecosystems, and receive funding and organizational support from EPA, this handbook

can be successfully applied without the presence of these elements. For example, the checklists and other methods used by NEPs to assess the effectiveness of existing institutions to manage water quality problems can be used by inland watersheds. Similarly, the governance structures of the NEPs can be applied to other watershed organizations. The NEPs are located in federal and state agencies, local governments, nonprofits, and other organizations just as other watershed organizations are found in a variety of institutional settings. Whether working in coastal or non-coastal areas, watershed organizations can learn from the NEPs' innovative approaches to integrating science and management, fostering collaborative decision-making, and involving the public.

The remainder of this document is organized according to the following four phases of the NEP approach:

Phase 1: ***Establishing a Governance Structure—***Convening the Management Conference and establishing a structure of committees and procedures for conducting the group's work. (Chapter 2)

Phase 2: ***Identifying Problems and Solutions—***Assessing the condition of the estuary to determine its health, problems facing the estuary, trends for future conditions, and the priority problems to be addressed, as well as assessing the effectiveness of existing management efforts to protect the estuary. (Chapter 3)

Phase 3: ***Developing the Management Plan—A Blueprint for Action—*** Describing the state of the estuary, developing detailed strategies for actions to address the problems of the estuary, monitoring and funding Management Plan implementation, and assessing environmental results. (Chapter 4)

Phase 4: ***Implementing the Management Plan—***Carrying out actions, monitoring estuary conditions, reviewing progress, and redirecting priorities or efforts where appropriate. (Chapter 5)

Each chapter includes specific examples that demonstrate how the 28 NEPs have applied this community-based approach since the program's inception in 1987.

Chapter 2: Establishing a Governance Structure

INTRODUCTION

Each estuary program develops a governance structure that serves as the forum for bringing together diverse stakeholders to identify issues and develop the Management Plan. This governance structure, referred to as the Management Conference, is composed of the NEP Program Office and various stakeholder committees. The governance structure acts as the organizational umbrella under which each program is conducted.

The NEP office can be located in a variety of institutional settings, from state or local agencies to universities or nonprofits. Its committee structure provides the platform for collaborative decision-making and reflects citizen concerns and the unique problems and characteristics of the watershed. A comparatively small area located within a single state generally requires a simpler committee structure than a much larger, interstate watershed. Most programs target five general constituencies as key members of the governance structure: elected and appointed policymaking officials from all governmental levels; environmental managers from federal, state, regional, and local agencies; local scientific and academic communities; private citizens; and representatives from public and user interest groups—businesses, industries, and community and environmental organizations.

This chapter explains how the NEPs develop a governance structure and support the work of stakeholder committees. The chapter describes how the NEPs provide a forum for open discussion, cooperation, and compromise that results in consensus. Examples of governance structures show how the NEPs set a course for their programs, direct day-to-day operations, coordinate with local governments, and ensure long-term financial support.

NEP PRINCIPLES IN CHAPTER 2

- The Management Conference is a forum for open discussion, cooperation, and compromise that results in consensus.

- The Management Conference promotes sharing of information and allows participants to make efficient use of limited staff resources.

- The committees that comprise the Management Conference should remain open to new members as the community learns about the program and wishes to participate.

- An NEP's institutional affiliations affect perceptions about the program. An NEP based in a government agency, for example, must work to demonstrate that it is committed to the entire range of stakeholders, not just its host agency.

- An NEP office, regardless of its institutional setting, should have some degree of autonomy and visibility. Autonomy shows that the office is committed to the entire range of stakeholders and visibility builds support for future funding of the program.

THE NEP GOVERNANCE STRUCTURE

All Management Conferences establish several core committees to carry out their work. These generally include a policy and management committee and advisory committees for technical and citizen input. Some NEPs also have committees dealing with finance and local government. A director and program staff coordinate these committees and are accountable to the Management Conference. The NEP director and staff are also responsible for facilitating the development of the Management Plan, supporting its implementations, and producing documents, such as annual budgets and work plans. **Figure 2.1** (on page 9) depicts the organizational structure of a typical NEP Management Conference. **Figure 2.2** (on page 10) shows the organizational structure from the Lower Columbia River Estuary Partnership.

The following sections describe how the NEPs are involved in:

- setting the direction for the program;
- directing day-to-day program activities;
- involving stakeholder groups and the general public;
- conducting scientific investigations to support Management Plan actions;
- working with local governments; and
- ensuring long-term financial, political, and community support.

KICKOFF MEETINGS

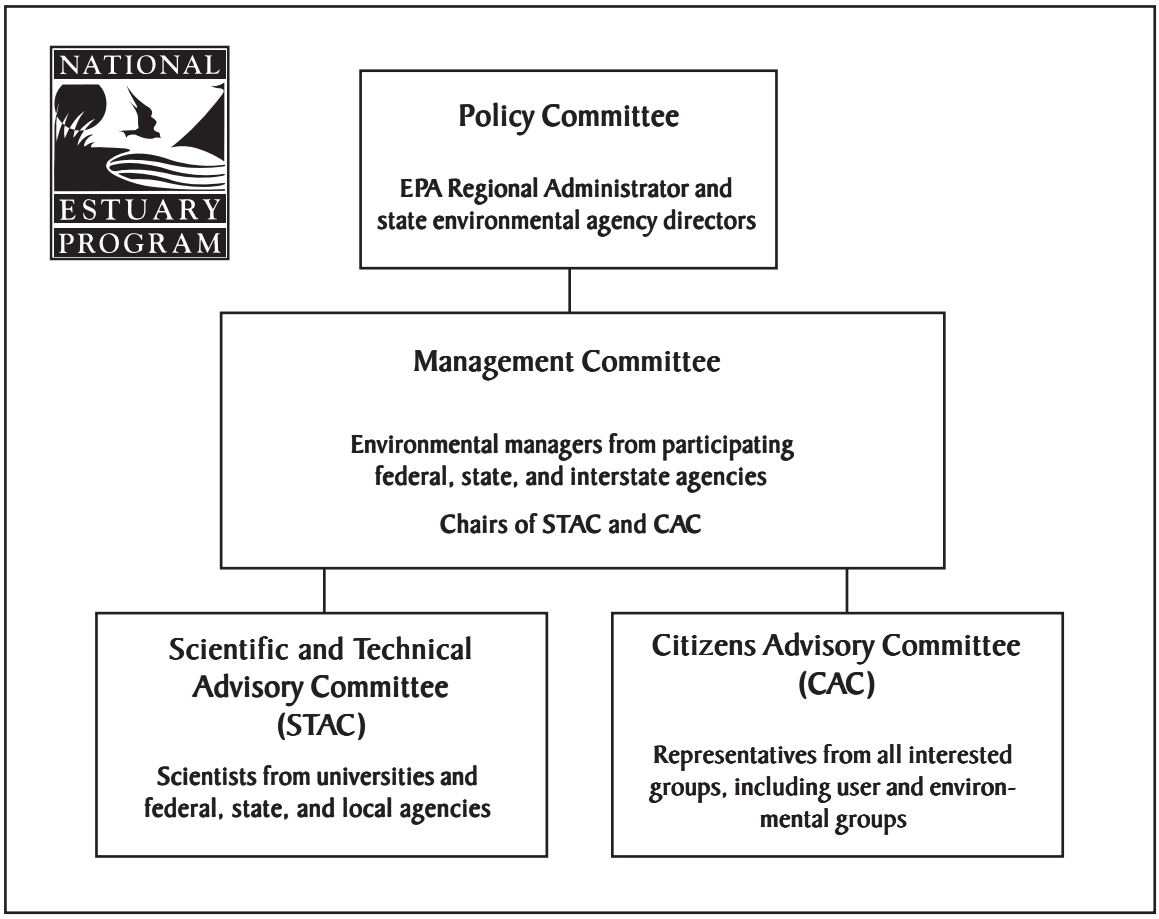
A kickoff meeting is a good first step in developing a governance structure. As a media event, such a meeting can make the public aware that all is not well in the watershed. As an educational platform, it provides a forum for identifying problems and concerns. The kickoff meeting is also an opportunity to involve all interested people and groups concerned about and affected by the watershed's problems. Furthermore, it is a chance to include influential officials in the earliest deliberations. As an outgrowth of the meeting, project participants can be organized into committees and workgroups and assigned responsibilities.

SETTING THE DIRECTION FOR THE PROGRAM

Policy Committee. Most NEPs establish a Policy Committee to create a long-term vision, set priorities, and provide overall direction. The Policy Committee is typically composed of high-level federal, state, and local government decision-makers that set the general tone and direction for the program and help ensure that resources needed to support the program are available. The EPA Regional Administrator or state governor often appoints Policy Committee members. Additional state and local representatives may also be members. These members may include appointees from the water department or water quality board, the public health department, or the department of natural resources. In some programs, chairpersons from other committees also sit on the Policy Committee.

The members of the Policy Committee frequently make decisions on recommendations from all of the other committees. While this committee guides, reviews, and evaluates the program, it usually leaves the operational duties to the Management Committee.

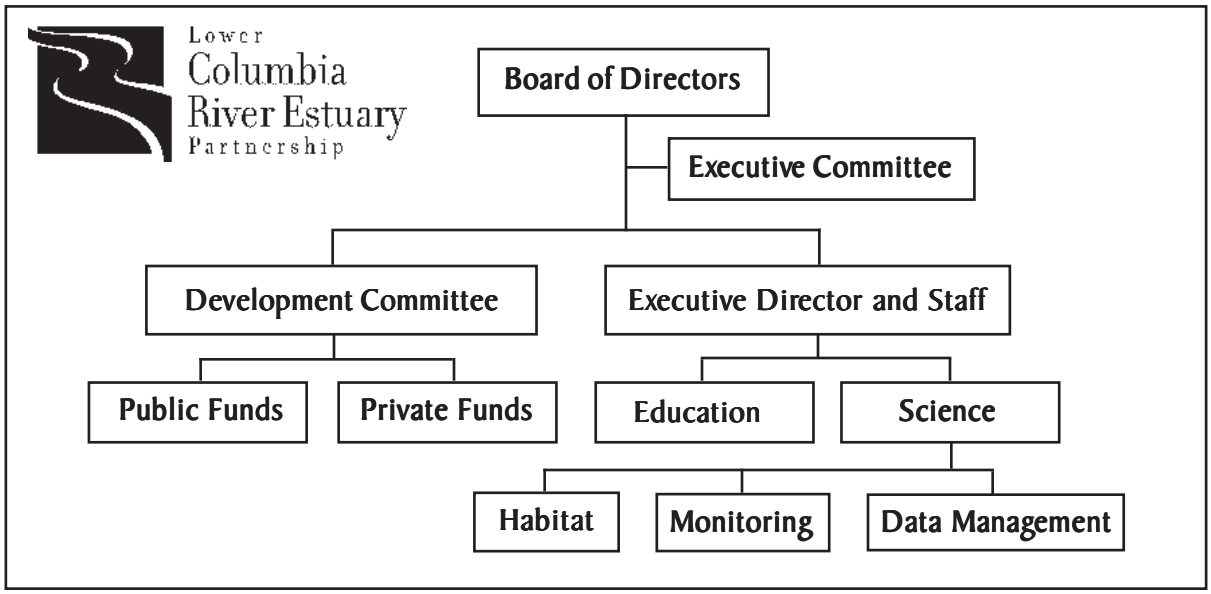
Figure 2.1: Typical NEP Management Conference organizational structure



DIRECTING DAY-TO-DAY PROGRAM ACTIVITIES

Management Committee. A core group is needed to ensure that the day-to-day work of the committees gets done. This group, often referred to as the Management Committee, is responsible for the nuts and bolts of the planning and implementation process. Management Committee representatives usually include mid-level agency managers and technical staff from the involved federal, state, regional, and local government agencies. Advised by staff, work groups, and other committees, the Management Committee defines and ranks the problems of the watershed, develops management strategies, and oversees development of the Management Plan and its components. Management Committee activities typically occur under the general guidance and direction of the Policy Committee.

Figure 2.2: Organizational structure for the Lower Columbia River Estuary Partnership



Note: *In addition to standing committees, the board may also form additional committees or work groups to assist with specific activities. Standing committees may also form subcommittees.*

The Management Committee makes recommendations on who should serve as members of the various advisory committees, and chairpersons from each of these committees typically sit on the Management Committee. This facilitates clear communication about the program's goals and objectives to the program staff and committees. Clear communication allows the committee members to gain a better understanding of their roles and responsibilities as well as the activities needed to meet program goals.

The Management Committee develops and oversees annual work plans and budgets, approves all resource and funding allocations, oversees program implementation, and monitors environmental results. In addition to defining specific tasks necessary to achieve conference goals, the annual work plan provides an opportunity to integrate planning and resources of key Management Committee members and develop synergy among various organizations. If developed properly, the work plan process can expand the influence of the NEP by providing a vehicle for requesting and obtaining matching funding at the state and local levels.

The Management Committee is also responsible for informing the public about program activities and providing public involvement during each phase of the management process. To ensure this, the Citizens Advisory Committee, typically in coordination with the Management Committee, develops a public participation program.

INVOLVING STAKEHOLDER GROUPS AND THE GENERAL PUBLIC

Citizens Advisory Committee. To generate public support for the program, citizens must have a vested interest in the outcome of its activities. For this to occur, the public must participate in each phase of the planning and implementation process—forming a management structure for the program; identifying and prioritizing the problems facing the watershed; creating a Management Plan; implementing the plan; and monitoring progress and program success. Examples of how the public can be involved in each of these steps are shown in **Table 2.1** (on page 13).

WHAT IS PUBLIC PARTICIPATION?

Public participation is a two-way process consisting of informing stakeholders about the watershed—public outreach—and eliciting participation in program activities and the decision-making process—public involvement. The success of a public participation strategy can be measured by increased awareness of the watershed, enhanced support for management actions, and greater participation in the planning and implementation processes.

Most NEPs form a Citizens Advisory Committee to ensure that the Management Committee and program staff include the public in the decision-making process and integrate the public into each program phase. The Citizens Advisory Committee recommends the most effective ways to inform the public and solicit its participation. It also identifies key people and organizations that can help bring watershed-related issues to the public's attention and build support for program activities. To successfully incorporate the public into these processes, the Citizens Advisory Committee must work closely with other committees, such as the Scientific and Technical Advisory Committee. For example, the Citizens Advisory Committee can work with the

program's outreach coordinator to present scientific findings to the public. By forming a Citizens Advisory Committee as part of the program's management structure, the program ensures representation of public concerns while options are fluid, rather than after data collection and analyses have been completed and final decisions made.

Citizens Advisory Committee Outreach Activities

The Long Island Sound Study developed membership evaluation guidelines to determine the basic eligibility of an applicant for membership on the Citizens Advisory Committee. These guidelines include a member composition requirement (e.g., a fair distribution of members from New York and Connecticut and among various membership categories including environmental, conservation, and watershed associations; user community groups; regional and local government agencies; and environmental education or academic organizations) and specific membership criteria (e.g., evaluation of potential bias, minimal knowledge or interest in water quality and resource management issues, and an ability to attend meetings regularly). The Citizens Advisory Committee application process requires potential members to submit a letter of interest and undergo a formal evaluation by the membership committee. For additional information, see www.longislandsoundstudy.net.

A typical Citizens Advisory Committee represents a broad spectrum of major resource groups, such as fishing interests, farmers, and recreational users. It also includes representatives from various environmental organizations and citizen councils. Also important are representatives from business and industry, such as lumber, shipping, and petrochemical manufacturing. Of course, representation will vary with the type of stakeholders present in the watershed. Some programs, particularly in populous areas with numerous established stakeholder groups, focus membership on individuals that can represent a given constituency and serve as liaisons to that group. In these cases, if the individuals lose their connection to their constituency, new representatives are assigned. Other programs encourage individual citizens to serve directly on the Citizens Advisory Committee. Members of the general public who will work with the program constructively and effectively, and who care about the issues and the program, often make a contribution that is as valuable as that of a seasoned community leader or environmental resource manager. Regardless of the makeup, the Citizens Advisory Committee should remain open to new members to ensure widespread representation as more members of the community learn about the program and as new interests and issues arise. In very large watersheds, such as the Long Island Sound drainage basin with a population of 8.4 million, it may be necessary to establish guidelines for membership.

Table 2.1: Examples of public participation in the NEP

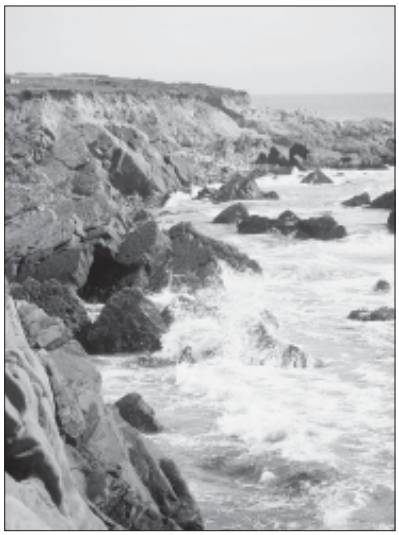
Phase:	Establishing a Governance Structure
Public Participation:	• Identify stakeholders—potentially interested and affected parties. • Develop a process for public input and participation. • Develop a vision, preliminary goals, and objectives for the program.
Results/Outcomes:	• Agreement on Management Conference. • Involvement of individuals and groups with expertise and interest in subject area as well as those who are potentially impacted. • Build constituencies.
Phase:	Linking Good Science and Sound Management
Public Participation:	• Conduct public opinion surveys to identify those issues of greatest concern and measure public understanding of watershed issues. • Hold workshops to gather information from local residents and disseminate scientific findings. • Use resource valuation/comparative risk ranking to prioritize problems.
Results/Outcomes:	• Watershed users help determine the focus of the program. • The public decision-making process is guided by science. • Controversial issues are identified. • Participants develop a shared understanding of the problems.
Phase:	Developing the Management Plan—A Blueprint for Action
Public Participation:	• Refine program visions, goals, and objectives through public meetings and workshops. • Utilize charettes, constituent focus groups, workshops, etc., to identify all possible options for addressing problems. • Utilize focus groups and public and technical input to develop criteria, narrow the range of options, and refine actions. • Obtain commitments and widespread community support for actions.
Results/Outcomes:	• A plan is created and built that all parties support. • Strong public support helps to secure governmental agency commitments for implementation. • Recommended actions are created that are measurable and achievable and take into account social impacts and impacts on quality of life.
Phase:	Implementing the Management Plan
Public Participation:	• Conduct a public review of the draft management plan. • Distribute the management plan and/or public summary documents to stakeholders. • Educate new residents and participants about the mission, goals, and progress of the program. • Utilize tools such as environmental report cards to update constituents on implementation progress and program successes. • Encourage citizens to implement "good housekeeping" best management practices. • Conduct volunteer monitoring and other ways to use volunteers. • Conduct public opinion surveys to determine behavior changes and trends in public perception of NEP progress. • Involve the public when plan redirection or reformulation is needed. • Add to or modify participating entities as needed. • Form institution oversight organizations—public watchdog.
Results/Outcomes:	• Interest in conservation and management is sustained/enhanced. • New participants and their interests are brought into the process. • Residents are actively involved in management plan implementation and monitoring. • Information on public attitudes and behaviors is used to evaluate success of public participation efforts.

Based on EPA RESOLVE Workshop, June 1997, and *Integrating Technical Analysis with Deliberation in Regional Watershed Management Planning: Applying the National Research Council Approach*. [1999] by Thomas Webler and Seth Tuler.

Citizens Advisory Committee membership should reflect the program's purposes for the Committee. Although each program establishes its own criteria for appointees, nominees generally meet one or more of the following criteria.

- Serve as spokespersons for a major user or interest group and bring information back to that group.
- Are well-respected leaders in the community.
- Have experience in the development of water quality and resource management policy.
- Have experience with volunteer nonprofit groups, the general public, outreach and education activities, and the media.
- Understand the technical and economic feasibility of the pollution control options under consideration.
- Understand the consensus-building process.
- Are energetic and motivated individuals.

Although many NEPs use a Citizens Advisory Committee as a formal mechanism for public involvement, this does not preclude the need for general public participation. The Citizens Advisory Committee often creates a strategy that outlines when and how to involve groups and individuals in the community.



CONDUCTING SCIENTIFIC INVESTIGATIONS TO SUPPORT MANAGEMENT PLAN ACTIONS

Scientific and Technical Advisory Committee. Although the program is fundamentally a management program rather than a basic research program, the importance of obtaining sound scientific information cannot be overstated. Stakeholders and those responsible for implementing recommended management strategies need actions that

are based on firm scientific findings. To ensure that recommended actions are tied to good science, most NEPs form a Scientific and Technical Advisory Committee to recommend scientific studies, investigations, sampling, and monitoring programs to the Management Committee that are necessary to determine the causes of observed or perceived environmental problems. This group is integral to the characterization phase, discussed in **Chapter 3: Identifying Problems and Solutions.** Depending on the problem, Scientific and Technical Advisory Committee members recommend the specific scientific activities necessary to meet objectives established by the program. The Scientific and Technical Advisory Committee may also conduct peer reviews of studies, report on the status and trends (description of the past and current conditions of the watershed and estuary, and predictions about the future conditions) in the watershed and estuary, and alert the Management Committee to emerging environmental problems. In addition, the Scientific and Technical Advisory Committee may develop the monitoring strategy, a "State of the Bays Report," and the Technical Characterization study. To ensure scientific rigor and quality, the Scientific and Technical Advisory Committee may also review the development of requests for proposals for technical studies as well as the actual proposals submitted.

Scientific and Technical Advisory Committee members should represent a balance of scientific disciplines that address the key issues of the watershed. They may be noted local experts, nationally recognized scientists, or resource management agency personnel. Members of the Scientific and Technical Advisory Committee can be selected with advice from the Management Committee; local, state, and federal agencies; regional scientists; and public or private institutions conducting scientific studies within the watershed.

WORKING WITH LOCAL GOVERNMENT

Local Government Committee. Many of the actions in a Management Plan affect local jurisdictions and require the support and commitment of local government agencies. To ensure that local governments are part of the decision-making process, some NEPs

form a Local Government Committee. Other programs include local government representatives on their Management and/or Policy Committees. Local government representatives can assist the program by providing practical advice on local planning needs, issues, and existing projects. The Local Government Committee can also provide the political analyses that are needed for effective decision-making and implementation.

In many programs, the Policy Committee nominates local government representatives. Members may come from municipalities, counties, or townships representing town boards, sewer districts, conservation districts, or agencies such as health or planning departments.

LOCAL GOVERNMENT INVOLVEMENT

In the Barnegat Bay Estuary Program, the Management Conference includes a Local Government Committee represented by the Ocean County Mayors' Association. The Committee meets monthly and provides the Barnegat Bay Estuary Program's Director and other program representatives with a forum to interact with 33 municipalities in Ocean County on environmental issues of concern. For additional information, see www.bbep.org.

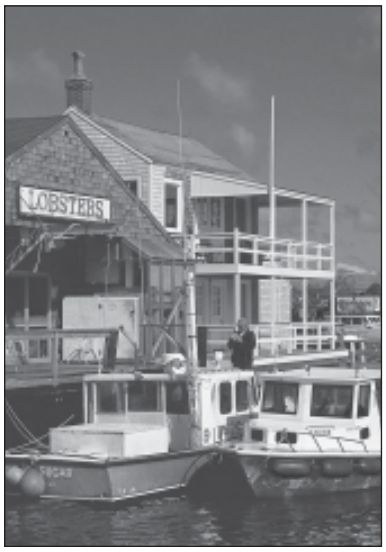
ENSURING LONG-TERM FINANCIAL, POLITICAL, AND COMMUNITY SUPPORT

Finance Planning Committee. Watershed programs require long-term funding to support both Management Plan implementation and staff operations. Implementation and operations may be supported with federal, state, local, and private sector funds. Whether financing is readily available or new funding mechanisms are needed, a Financial Planning Committee can be used to develop a funding strategy to support Management Plan implementation.

The funding strategy can include accessing revenues such as taxes, fees, and assessments; managing the flow of funds; and recommending institutions to oversee financial planning and management. The Financial Planning Committee may also identify new sources of funding, such as municipal debt or private foundations. It could also recommend a partnership or alliance with an outside agency or nonprofit group to assist with fundraising. Committee members should be knowledgeable about financing public projects and should represent key interest areas or jurisdictions. While some programs choose to establish and maintain a separate Financial Planning Committee, other programs assign those responsibilities to members of the Management Committee.

PROVIDING SUPPORT TO THE GOVERNANCE STRUCTURE

The careful consensus-building required of the committees to define program goals and other activities presents several potential challenges, including conflicting agendas, institutional constraints, and differing work styles. Effective group leaders can help address these challenges. Some NEPs hire professional facilitators to assist in conflict resolution and consensus-based decision-making. Others train committee chairs in group leadership and group dynamics. Still others rely on NEP staff with this expertise. Most NEPs have found that while the decision-making process produces some degree of conflict, there are few, if any, conflicts that cannot be resolved.



STAFFING THE PROGRAM OFFICE

Each NEP has a Program Office that facilitates the work of the committees. The Program Office consists of a director and a small staff—usually three to five professionals.

The NEP director and staff serve many functions. They provide administrative and technical support to the committees, conduct public outreach and education activities, and coordinate and integrate program activities with existing efforts in the watershed. This collaboration promotes sharing of information and allows programs to make efficient use of limited staff resources. The director and staff usually are hired by the Policy or Management Committee; however, the director and staff work in support of, and with direction from, all of the committees.

The NEP directors must have a broad range of knowledge, skills, and abilities. Maintaining local support, securing funds, and facilitating partner actions requires both interpersonal and technical skills. A director adept at collaborating with partners and

addressing complex environmental issues provides access to additional resources and authorities, helps avoid duplication, reduces turf battles, and combats the perception of the NEP creating a new layer of government. The NEP director speaks on behalf of the committees and is accountable to them. Because the director can be pivotal in bringing stakeholders to the table, the director should not be perceived as representing a particular entity or stakeholder. This allows the director to work in collaboration with the stakeholders and to better represent the program.

Photo: Steve Delaney

Most NEPs also have a communication or outreach coordinator and a science or technical coordinator. Some NEPs hire staff with fundraising and business management skills. Staff that provide technical input for restoration efforts and other projects implement key goals in the Management Plan and build the credibility of the program. Staff with communication skills produce independent newsletters, Web sites, and events that help achieve the environmental education goals of the Management Plan and heighten the NEP's visibility without jeopardizing productive partnering.

The NEP office typically serves as the focal point of planning and coordination among government agencies with jurisdiction over the watershed. Therefore, office location can impact the overall visibility of the program as well as perceptions about the program. Visibility and awareness of the program are greatly enhanced when the Program Office is located within the study area, rather than in a far away state capital or other non-estuarine location.

SELECTING AN INSTITUTIONAL SETTING

Each NEP is initially assigned a host organization or sponsor, such as a state or local government agency, university, or nonprofit. The host organization administers the federal grant funds that support the NEP and provides a physical location for the director and staff. However, individual NEPs are envisioned to be inherently autonomous.

The director and staff of an individual NEP must be, and must be perceived to be, independent of any particular interest group or agency. While the NEP sponsor

provides an invaluable service to the NEP as an administrative and financial manager, among many other things, NEP directors and staff are directed not by their administrative sponsors but by the NEP committees (which typically include the sponsors as members).

Funding awarded to the sponsor or grantee is intended to be used for purposes and activities developed and approved through consensus by all members of the committees. By requiring approval and oversight by the committees, a safeguard is built into the NEP framework to prevent individual interests from steering an NEP. To this end, many NEPs have developed and adopted operating procedures, agreements, or bylaws which outline roles and responsibilities.

Photo: Steve Delaney

After NEPs complete their Management Plans, many consider establishing separate institutions. The advantages of remaining with the original host include access to the technical resources of the host agency's employees; ability to maximize funds for programs and minimize funds for administration; access to payroll services, benefits for employees, and physical office space; and coordination between the work of the host agency and the work of the program. The advantages of a separate Program Office can include a location more accessible to the public, greater visibility, and increased fundraising opportunities. **Chapter 5** provides examples of NEP governance structures.

PREPARING TO ASSESS THE ESTUARY AND ITS INSTITUTIONS

Once the Program Office has convened and established a structure of committees and procedures for conducting the group's work, steps can be taken in moving toward the next phase of the NEP process—assessing the conditions of the estuary and evaluating the effectiveness of institutions that affect the estuary. This "characterization" process identifies priority problems, their likely causes, and how to coordinate existing programs to better protect and restore the estuary and its watershed.

ESTABLISHING A GOVERNANCE STRUCTURE: EXAMPLES

▶ ***Example 1: Initiating the program through a kickoff meeting***

The Charlotte Harbor NEP organized a Public Conference and Technical Symposium as a kickoff event for their estuary program. The two-day gathering focused attention on Charlotte Harbor's large watershed by bringing together much of the knowledge and expertise of Southwest Florida. The event was an important first step in the program's process of bringing together public and private stakeholders to discuss critical environmental issues facing the region. Hundreds of people attended the forum, which featured more than 60 presentations on technical issues, covering Southwest Florida's history, geography, and geology, as well as topics more specific to the water quality and living resources of the Charlotte Harbor region. The Public Conference featured discussions on economic activity, resource management efforts, environmental education, recreational boating concerns, and citizen groups. For additional information, see www.charlotteharbornep.com.

Photo: Steve Delaney

▶ ***Example 2: Creation of an advisory committee to assess atmospheric deposition***

The Tampa Bay Estuary Program was one of the first NEPs to assess nitrogen deposition to a coastal ecosystem. Since the Program had no experience assessing atmospheric deposition and no atmospheric scientist on staff, the senior scientist created a national advisory group to help develop the Program. The advisory group now includes nationally recognized experts in wet and dry deposition methodologies for nitrate and ammonia (and more recently mercury), national atmospheric program managers, experts with technical knowledge of modeling, and local stakeholders including several counties and the Tampa Electric Company. Since the Program does not do most of the monitoring or modeling work itself, the county and university scientists doing the work also sit on the committee. The committee meets periodically to answer specific complex questions that require group discussion and consensus. The committee responds to other questions on an as-needed basis through individual telephone calls, conference calls, or written recommendations. For additional information, see www.tbep.org.

▶ *Example 3: Puget Sound's Finance Committee and Local Government Finance Working Group*

The Puget Sound Finance Committee was responsible for identifying funding mechanisms that could be used to meet the projected shortfalls in Management Plan implementation funding. In order to ensure that a broad range of options would be considered and that these options would get the benefit of close scrutiny, a concerted effort was made to have competing interests and key stakeholders serve on the Committee. As such, the Committee included representatives from state and local governments, members of the business community, members of the state legislature, local elected officials, and tribal and citizen groups. The Puget Sound Water Authority, a partner of the NEP, assigned several of its staff to provide technical and administrative assistance to the Committee. In addition, the program hired an applied financial and economic analysis firm to undertake the technical evaluations needed to generate fiscally sound and defensible funding options.

A six-member Local Government Finance Working Group was established to work independently on local financing issues. Joint staffing of the Finance Committee and Local Government Finance Working Group provided for continuity between the two groups and ensured that the work of the Finance Committee integrated the needs, fiscal constraints, authority limitations, and general concerns of local governments. Through its work, the Financial Planning Committee identified a number of possible state funding sources to support Management Plan actions such as taxes on watercraft, litter, fish and shellfish, pesticides, gasoline, and toilet paper. The group also identified projects that could be funded with local revenue or implemented as EPA demonstration projects. For additional information, see www.psat.wa.gov.

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Chapter 3: Identifying Problems and Solutions

INTRODUCTION

Once the estuary programs have built a framework for identifying, negotiating, and solving problems, they are ready to embark on other tasks. The NEPs begin to "take the pulse" of their estuaries, determining the state of their health and the reasons for their decline, and take early corrective action if possible. This process, referred to as Technical Characterization, defines the most pressing problems in the estuary, identifies the probable causes for these problems, and suggests possible solutions based on objective evidence.

Each NEP also conducts a Base Program Analysis. The Base Program Analysis determines whether existing institutional mechanisms are effectively addressing problems occurring in the estuary. The Base Program Analysis provides an assessment of existing federal, state, and local resource programs to identify gaps in estuary management and how they might be filled. It includes a review of public and private funding opportunities.

Together, the Technical Characterization and Base Program Analysis are the basis for defining and selecting the problems to be addressed in the Management Plan. This chapter outlines how the NEPs conduct the Technical Characterization and the Base Program Analysis. The chapter also discusses how the findings resulting from the Technical Characterization and Base Program Analysis are combined and translated into plain English, telling a story about the estuary and its watershed that the public and local decision-makers can understand.

NEP PRINCIPLES IN CHAPTER 3

- Technical Characterization describes the estuary's water quality and habitat problems and identifies likely causes of the problems.

- Technical Characterization relies primarily on existing scientific information.

- The Base Program Analysis is an evaluation of the institutional structures that affect the estuary. It is conducted in conjunction with the Technical Characterization.

- The results from the Technical Characterization and Base Program Analysis must be translated into plain English, telling a story about the estuary that the public can understand.

- The Technical Characterization and Base Program Analysis findings set the stage for the formulation of the Management Plan.

TECHNICAL CHARACTERIZATION

The fundamental goal of Technical Characterization is to identify the problems facing the estuary and present this information in a way that supports the selection of actions for inclusion in the Management Plan. To satisfy this goal, characterization proceeds through the following tasks:

Task 1: Identify and describe the resources and uses of the estuary.
Task 2: Determine the condition of the resources.
Task 3: Identify the priority problems that exist in the study area.
Task 4: Identify the likely causes of the priority problems.
Task 5: Provide input to the Management Plan.

The relationships among these tasks are presented graphically in **Figure 3.1** (on page 25).

Technical Characterization of problems facing the estuary relies primarily on existing scientific information already collected by federal, state, and local agencies. Such information, which can be obtained and analyzed relatively efficiently and cost-effectively, provides the most direct way to evaluate trends in estuary conditions. **Table 3.1** (on page 26) lists the types of historical information used for characterization. These data are also used to shape new sampling and monitoring programs needed to define specific problems.

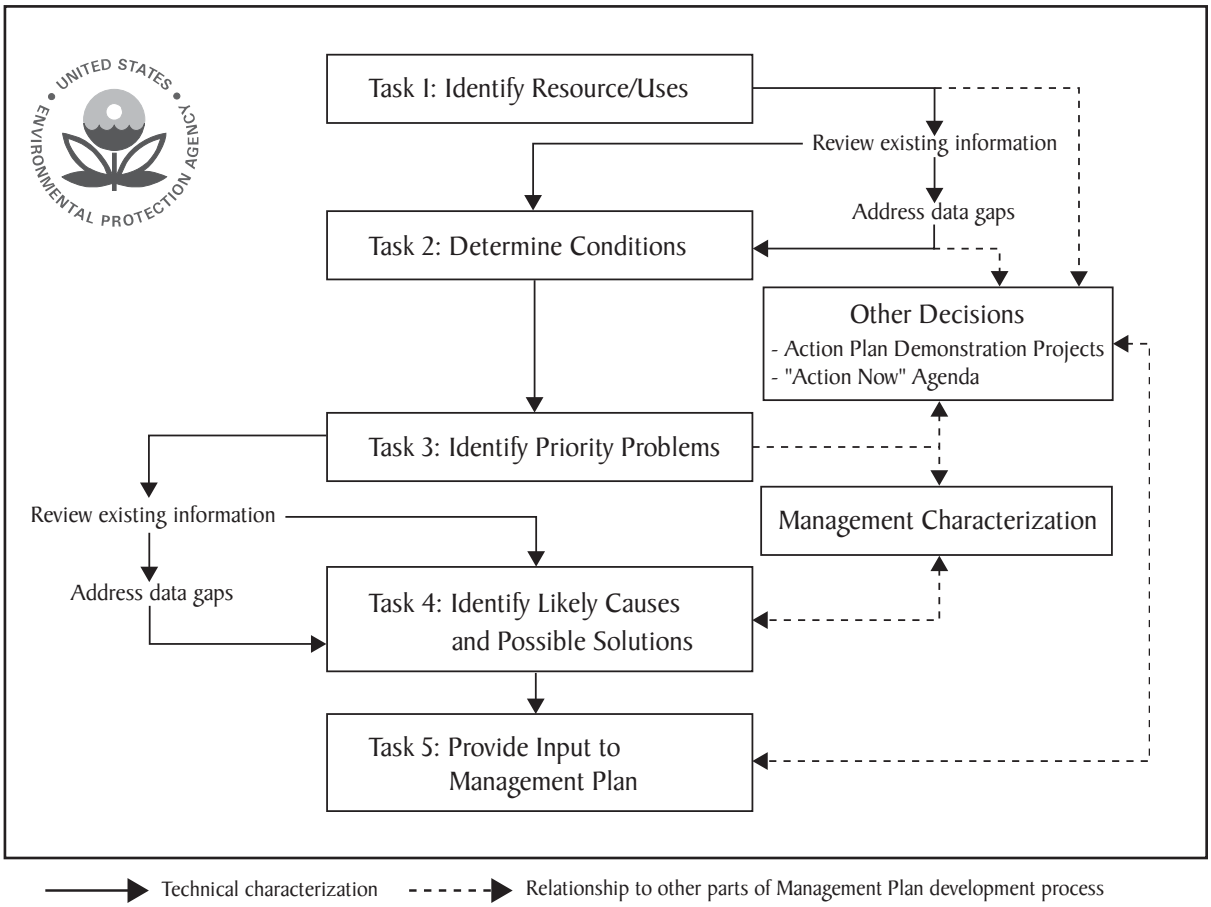
In addition to gathering scientific information to assist during the Technical Characterization process, the NEPs also rely on public input to provide additional direction and focus. Gathering public input at the early stages of the Technical Characterization process is essential for building a long-term commitment to achieving the estuary's goals. This is often accomplished through public workshops and conferences.

As a whole, the Technical Characterization process addresses historical trends, present conditions, and probable future trends if current practices are not modified. It is analogous to telling a story about the past, present, and potential future of each estuary. Results are used to substantiate environmental problems, evaluate their causes, recommend future remedial and management strategies, and develop long-term

monitoring plans. Once this process is complete, the NEPs assess the effectiveness of existing efforts to manage the identified problems. This process, referred to as the Base Program Analysis, is discussed further on pages 35 through 37.

The following sections describe the tasks of the Technical Characterization process more fully.

Figure 3.1: Relationships among Technical Characterization tasks



From EPA's *National Estuary Program Guidance: Technical Characterization in the National Estuary Program* (1994)

TASK 1: IDENTIFY AND DESCRIBE THE RESOURCES AND USES OF THE ESTUARY

The first step in the characterization process is to describe the resources and uses of the estuary and to identify the values it holds. Opinion surveys, public workshops, interviews, conferences, and other methods have been used by the NEPs to identify public perceptions concerning the resources and uses of an estuary.

Table 3.1: Examples of historical information used for estuary characterization

Pollutant Sources to the Estuary
Watershed geomorphology • Land use patterns • Freshwater input • Pollutant loadings: direct discharges, riverine discharges, nonpoint source runoff

Circulation of Material in the Estuary
Weather patterns • Tides/currents • Salinity • Temperature • Sediment grain size

Distribution of Chemicals in Estuarine Waters and Sediments
Organic carbon • Nutrients • Dissolved oxygen • Chemical contaminants

Distribution of Biological Organisms in the Estuary
Plankton • Benthic Invertebrates • Fish • Aquatic vegetation • Endangered species • Invasive species

Biological Indicators
Primary production • Secondary production • Respiration • Commercial fishery catches • Recreational fishery catches

Factors Important to Human and Environmental Health
Distribution of bacteria and pathogenic organisms • Prevalence of disease in fish and shellfish • Tissue contaminants

Geographic Areas of Special Importance
Critical spawning or nursery habitats • Recreational areas • Beach closures • Shellfish harvesting areas

TASK 2: DETERMINE THE CONDITION OF THE RESOURCES

Once the highest priority resources and uses of an estuary have been identified, the NEPs assess the condition of each of these resources. This involves a status and trends analysis of each of the resources. The status and trends analysis is a description of the past and current conditions of the estuary and forecasts the future conditions of the estuary should current trends continue. The NEPs include changes in demographics, land use, census, and other data that may influence the environmental conditions in the analysis.

The status and trends analysis can highlight gaps in information concerning the condition of the estuary, identify the need to collect new data, and suggest questions that direct future characterization work, such as "Although seagrass acreage has remained constant, has the health and productivity of the seagrass beds been altered?" and "What is the optimal level of seagrass habitat necessary to support the sea trout fisheries?" The NEPs collect data from virtually all possible sources—scientists, academic and research institutions, and public health and living resource agencies. Because collecting new scientific information is generally quite costly, historical data are used to set priorities for the kinds of new information needed for the

characterization effort. To ensure the quality and validity of all data collected, the EPA has developed a set of procedures to follow when collecting and analyzing data (see EPA Guidance for Data Quality Assessment, www.epa.gov/quality1/qs-docs/g9-final.pdf).

Detection of subtle changes over time requires more detailed analyses and statistical tests. For these analyses, several attributes of the data (e.g., distributional characteristics, seasonality, and correlation among factors) should be explored to determine the applicability of available tests for detecting changes in environmental conditions. Data collected during this task can help in designing sampling protocols (detailed plans of a scientific experiment, treatment, or procedure for dealing with a sample) for monitoring plans. This data can be entered into STORET (short for STOrage and RETrieval), a repository for water quality, biological, and physical data that is used by state environmental agencies, EPA and other federal agencies, universities, private citizens, and many others (see www.epa.gov/storet/).

In evaluating the conditions of an estuary, it is often useful to adopt a segmentation scheme. Segmentation refers to the division of an estuary into sub-areas based on homogeneous conditions such as bottom type or water temperature. Physical, chemical, and/or biological data for the estuary are then aggregated based on these segments. Segmentation represents a compromise between the difficulty of resolving the physical detail of an entire estuary and the expediency of dealing with a small number of geographical units. Analysis of the status and trends of the resources for estuary segments may also provide direction for individual actions in these segments.

From a statistical perspective, determining the status and trends of estuarine resources has inherent uncertainty associated with it due to a number of factors including

measurement errors, precision limits, and statistical variability of the analytical methods. This uncertainty in the data often leads to a set of hypotheses concerning cause-effect relationships, rather than a definitive conclusion. The uncertainty in cause-effect relationships and trends in estuary health should be made clear to the public.

Photo: Steve Delaney

TASK 3: IDENTIFY THE PRIORITY PROBLEMS

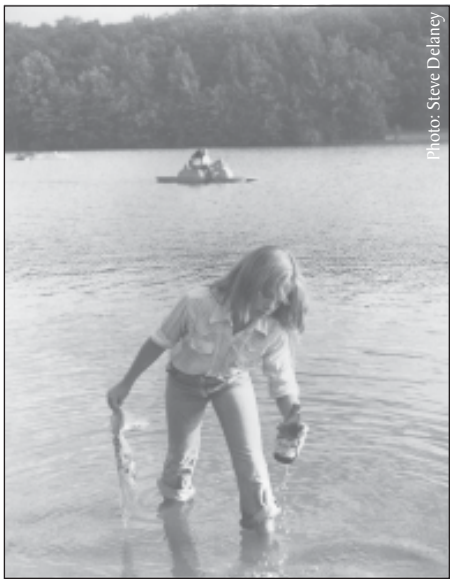
Once the assessment is complete, the Management Conference must reach consensus on the priority problems. These priorities form the foundation for the development of the Management Plan, where it is often necessary to make choices from the universe of management options.

Because all the problems cannot be addressed at once, it is critical to rank them so that effort and funding levels can be allocated effectively. The Management Conference must establish criteria by which it will define and rank environmental problems for characterization.

The NEPs establish criteria for identifying priority problems to avoid overestimating the severity of certain problems which can divert attention from those that actually deserve greater concern. The presence of seasonal Harmful Algal Blooms (HABs), for example, may capture widespread public interest because of its potential effects on fish populations. However, the incidence of HABs may be limited to specific sites and may be the result of natural causes.

Problems with a system-wide impact generally rank higher than those with localized effects. Furthermore, problems that significantly curtail the designated uses of an estuary may be ranked high. Some problems may receive a high ranking because corrective measures, such as regulatory programs and authorities, are available but have not been implemented.

The Galveston Bay Estuary Program, for example, developed an assessment matrix to assist in establishing priorities among the estuary's problems. The Scientific and Technical Advisory Committee drafted an initial priority problem list. This list was subsequently reviewed and revised by the Management Committee through a series of public meetings. Based on this review, a draft assessment matrix was developed and reviewed by the Management Conference and technical experts, resulting in the final matrix presented in **Table 3.2** (on page 31). This matrix presents the essential information about estuarine resources and sources of perturbation. The Galveston Bay Ecosystem Impact Matrix also identified relationships that were previously poorly understood, and was used by the Management Conference throughout the characterization process.



TASK 4: IDENTIFY LIKELY CAUSES OF THE PRIORITY PROBLEMS

To identify the likely causes of the priority problems, NEPs strive to collect data that are:

- relevant to defining the nature and extent of the priority problems;
- broad in temporal and spatial coverage;
- good quality; and
- available in a usable format.

Although existing information concerning a particular problem is first examined, the NEPs also conduct new research to illuminate possible causes. The NEPs work with many organizations that sponsor research including federal agencies such as EPA and NOAA, state and local government, and universities. For example, the Long Island Sound Study NEP collaborated with academic and not-for-profit institutions, as well as state and local governments to study hypoxia, examine the role of sea level rise in

wetland losses, develop ecological indicators, and assess sources of nutrients and innovative technologies for their control.

Once the data are collected, the NEPs begin to answer specific questions about the relationships among pollutants, pollutant loadings, and their effects on water, sediment, and living resources. The general objectives of these analyses are to:

- determine the temporal trends and spatial patterns related to the most pressing problems of the estuary;
- determine possible causes of these problems;
- provide an integrated description of the estuary's conditions; and
- identify significant, missing data that warrant additional monitoring or sampling.

For example, the Barataria-Terrebonne NEP described the interconnections among seven priority problems (**Figure 3.2)**: hydrological modification, habitat loss, sediment loss, changes in living resources, eutrophication, pathogens, and toxic substances. Barataria-Terrebonne NEP identified hydrological modification as the "lynch pin" problem that influences all six of the other priority problems.

Figure 3.2: Interconnections among priority problems in the Barataria-Terrebonne Estuary

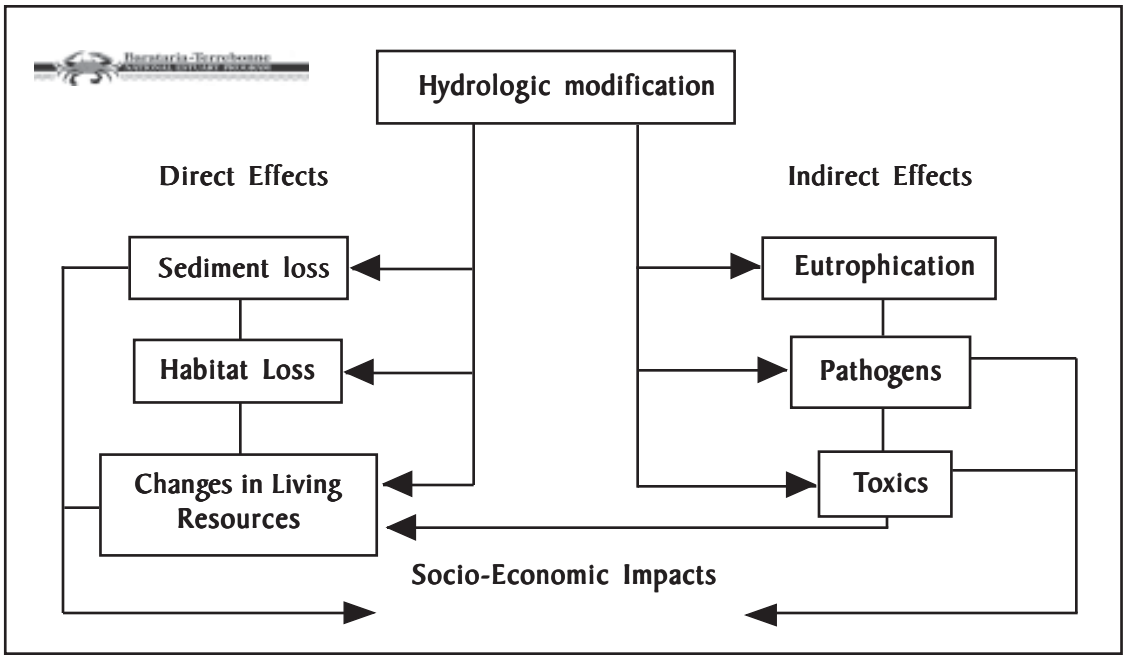


Table 3.2: Galveston Bay Ecosystem Impact Matrix

Valued Ecosystem Components

Sources of Perturbation	Water Quality	Circulation	Sedi-ment	Phyto-plankton	Zoo-plankton	Oysters	Shellfish	Other Benthos	Finfish	Birds	Marine Mammals	Sea Turtles	Human Health	Wetlands	Submerged Plants (SAV)	Shoreline	Aesthetic Appeal
Northers		**		?	?	*			**	*							
Hurricanes		**	*	?	?	*	*	**		*			?	?	***	***	
Inflow Modification	***	***	*	?	?	****	***	***	**			?		***	**		
Subsidence/ Sea Level		**				*	**		*	*				****	***	****	
Shoreline Development	**	*	*	*			**		**	**				****	**	****	***
Dredging	***	****	****	?		**	*	**	**	***	?	?	?	***	**	***	**
Shipping	**		*								?			**		**	
Point Sources	****		****	***	**	***	**	**	**	**	?	?	****	*	**		**
Nonpoint Sources	****		****	***	?	***	**	**	**	**	?	?	***	**	**		**
Commercial Fishing	?		?			**	****	?	***		?	?			**		
Recreational Fishing						*	*		***					?	*		
Boating/ Marinas	***		***	?	?			**	*					*	*	*	?
Petroleum Activity	***		***	?	?	*	**	**	*	*	?	?	*	**	*		?
Oil/Chemical Spills	***		***	?	?	**	?	?	?	**	?	?	**	***	?		***
Marine Debris									?	*	*	**					***

* - Slight influence ** - Moderate influence *** - Significant influence **** - Major influence ? - Unknown relationship ▒ - Possible management priority

From EPA's *National Estuary Program Guidance: Technical Characterization in the National Estuary Program* (1994)

Once likely cause-effect relationships of the priority problems have been established, the NEPs determine the strength of those relationships. Statistical techniques, such as regression and correlation analyses, have been used by the NEPs to explore the nature of these relationships.

If time and resources permit, the NEP can take these findings one step further by developing mathematical functions to summarize the observed relationships. These functions can form the basis for the use of predictive tools, such as water quality and hydrologic models.

It is important to emphasize the distinction between identifying likely causes of priority problems and establishing absolute cause-effect relationships. The former involves the development of hypotheses using the best available evidence concerning cause-effect relationships. The latter typically requires the collection of field or laboratory data under controlled conditions; an effort that is often beyond the resources available to an NEP.

In characterizing an estuary, it is important to consider the links among the priority problems in addition to considering them in isolation. These links can dramatically influence conclusions concerning cause-effect relationships and subsequent recommendations for action.

Photo: Steve Delaney

TASK 5: PROVIDE INPUT TO THE MANAGEMENT PLAN

After data analyses are complete for each estuary problem, the NEPs synthesize results into reports that provide input to the Management Plan. These reports may be a series of findings on several identified problem areas and may be issued separately as they become available. To increase the pool of information and to encourage further research on the estuary, many NEPs publish their findings. These findings also help the NEPs design monitoring programs to assess the effectiveness of their actions.

The NEPs have used various methods to communicate the results of the characterization effort, ranging from narrative descriptions to conceptual models that

describe estuarine processes and functions and determine likely causes of the priority problems. The NEPs develop characterization reports that:

- summarize major environmental problems within each estuary;
- identify suspected causes of the problems;
- recommend early actions and future remedial and managerial strategies; and
- suggest long-term monitoring efforts to evaluate the effectiveness of these strategies.

GETTING THE WORD OUT THROUGH A STAKEHOLDERS REPORT

The Mobile Bay NEP produced an award-winning stakeholders report, "Our Water Our Future," in preparation for the release of the Management Plan. This document highlighted the Mobile Bay area's history, environmental issues, and resources, and was developed in a sequence of text, graphics, and photos with Web site links for more information. Designed at an eighth grade level, the document appeals to audiences of all ages and remains in high demand. The document won a 1999/2000 American Advertising Federation Award. See www.mobilebaynep.com for additional information.

Most reports feature a narrative description that takes the form of a qualitative, non-technical summary of existing information explaining the relationships between human activities and impacts on resources. A narrative description may also include considerable quantitative and technical information to provide a more comprehensive assessment of these relationships.

Many reports include a conceptual model to present the current understanding of estuarine structure and function. Good conceptual models clearly and succinctly represent the best understanding of ecosystem resources (e.g., wetlands, fish, sediments), processes (e.g., predation, turbulent mixing), and factors controlling their interactions. A well-constructed conceptual model can plainly represent and communicate the estuary's complex interactions and processes in a form that is more concise than most narrative descriptions.

In general, the NEP Technical Characterization process culminates in three types of products that vary in their level of detail depending on the audience:

- Individual project reports provide technical information on the outcomes of discrete studies.

- Characterization reports furnish a comprehensive description of the estuary, including a summary of the results of individual project reports.

- Public outreach summaries provide a condensed version of the characterization reports.

The Technical Characterization results provide a baseline for monitoring and a basic understanding of important physical, chemical, and biological processes in the estuary. This information helps to specify a set of variables and ecological processes that can be used to detect changes in the estuary in response to management actions. The steps taken to ensure that high quality data results from the monitoring program should follow the same procedures used in the data collection and analysis activities during Technical Characterization.

With a baseline provided by Technical Characterization, ongoing monitoring serves as a tool to track the progress of the Management Plan and evaluate the relevance of management goals. Ongoing monitoring ensures that the Management Plan stays on target and can provide feedback for future revisions. The subject of environmental monitoring is addressed in greater detail in **Chapter 5**.

BASE PROGRAM ANALYSIS: UNDERSTANDING THE INSTITUTIONAL CHALLENGES

While the Technical Characterization describes the natural environment, the Base Program Analysis describes the institutional environment. The Base Program Analysis proceeds through the following tasks:

Task 1: Identify relevant local, state, and federal organizations.
Task 2: Assess effectiveness of existing programs.
Task 3: Identify changes needed to improve program effectiveness.

As with the Technical Characterization, it is wise to gather and review the results of previous programmatic analyses that have been conducted for the estuary. The use of valid existing information can speed up the Base Program Analysis process considerably. The following sections describe the tasks of the Base Program Analysis process.

TASK 1: IDENTIFY RELEVANT LOCAL, STATE, AND FEDERAL ORGANIZATIONS

The first step in conducting a Base Program Analysis involves the development of an inventory of existing organizations that have the potential for affecting the problems being assessed under the Technical Characterization. Base Program Analyses conducted in the NEP quite often go beyond basic statutes, codes, and legal authorities to identify the array of mechanisms available to protect the estuary. These mechanisms include influences on behavior, such as economic incentives, and technical assistance and education programs, factors not typically considered part of a resource management infrastructure.

The NEPs inventory existing organizations and mechanisms that may influence the estuary, including:

- regulatory programs;
- public and private resource management programs;
- incentive programs and voluntary initiatives;
- planning efforts; and
- public education and technical assistance programs.

Once the existing organizations have been identified, the basic information shown in **Table 3.3** (on page 36) can be collected for each of the programs.

Table 3.3: Information collected from organizations during the Base Program Analysis

Name of Program
Priority Problem Addressed
Implementing Organization
Program Authorities (laws and ordinances)
Program Description:
- I. Purpose
- II. Functions
  - A. Regulatory
  - B. Resource Management
  - C. Finance Mechanisms
  - D. Voluntary Initiatives/Economic Incentives
  - E. Public Education/Technical Assistance
  - F. Planning
- III. Geographic Jurisdiction
- IV. Resource or Activity Managed
- V. Funding
  - A. Source of Funding
  - B. Funding Rationale
  - C. Allocation of Funding
  - D. Proposed Budget and Actual Funding
  - E. Other Resources Available
- VI. Administration
  - A. Organizational Structure
  - B. Decision-Making Process
  - C. Linkages to Cooperating Agencies
  - D. Total Staff

Source: NEP Guidance, Base Program Analysis. EPA, 1993.

TASK 2: ASSESS EFFECTIVENESS OF EXISTING PROGRAMS

The organizations and their programs identified by the institutional inventory are analyzed to assess their potential effectiveness for addressing the problems of the estuary. Programmatic strengths and weaknesses are identified, allowing an array of enhancements or alternatives to be considered during development of the Management Plan. The focus of this assessment is on how the framework and individual programs or activities within it are able to protect the estuary, particularly with regard to addressing the priority problems discussed in the Management Plan, and not on the effectiveness of the programs themselves.

Table 3.4 (on page 38) provides a range of questions that are often considered when conducting the programmatic assessment. Ideally, the programmatic assessment will result in as much objective, quantitative information as possible, including data on resources invested (staff, funding, etc.) and environmental results.

TASK 3: IDENTIFY CHANGES NEEDED TO IMPROVE PROGRAM EFFECTIVENESS

The results of the Base Program Analysis present findings on the overall management framework for the estuary, based on a synthesis of the institutional analysis and consideration of crosscutting issues. The heart of this synthesis is an analysis of management changes that are necessary to improve the coordination and application of existing programs.

Photo: Steve Delaney

FROM CHARACTERIZATION TO PLAN DEVELOPMENT

The ultimate goal of the Technical Characterization and Base Program Analysis is to establish the status and trends of estuarine resources, identify impacts being experienced, determine the likely causes of those impacts, and describe and evaluate the institutional environment. However, the Technical Characterization and Base Program Analysis are not an endpoint. The Technical Characterization combined with the results of the Base Program Analysis set the stage for the formulation of the Management Plan. To be useful, they must lead to the development of an effective Management Plan.

Table 3.4: Question guide for institutional analysis

- What is the organization's mandate, resource trends, and scope of jurisdiction or influence?
- What are the most successful aspects of this organization—things that work well and should be capitalized upon in the future?
- What innovative aspects of this organization's programs or approaches could serve as models for future activities?
- Are there any gaps in existing resources or authorities that limit the organization's ability to take action on one or more of the priority problems?
- What kinds of problems has this organization experienced? For example:
  - unclear goals, responsibilities, or procedures?
  - conflicting efforts by other programs?
  - difficulties in coordinating with other organizations?
  - drastically insufficient resources?
- Do other activities duplicate any of this organization's efforts?
- Are there complementary organizations that could enhance this organization's effectiveness?
- Are there organizations that impede this organization's effectiveness?
- How much support does the organization enjoy from the public and the legislature?
- What specific actions could improve the effectiveness of the institutional framework?
  - What current activities should be accelerated or expanded?
  - What new efforts should be instituted? Are new authorities or entities required?
  - What obstacles to effectiveness must be overcome?
  - What should be the Management Conference's action priorities?
- For each action suggested, what are the appropriate tasks, actors, and timing?
- What are the potential barriers to redirection? How can support be generated?

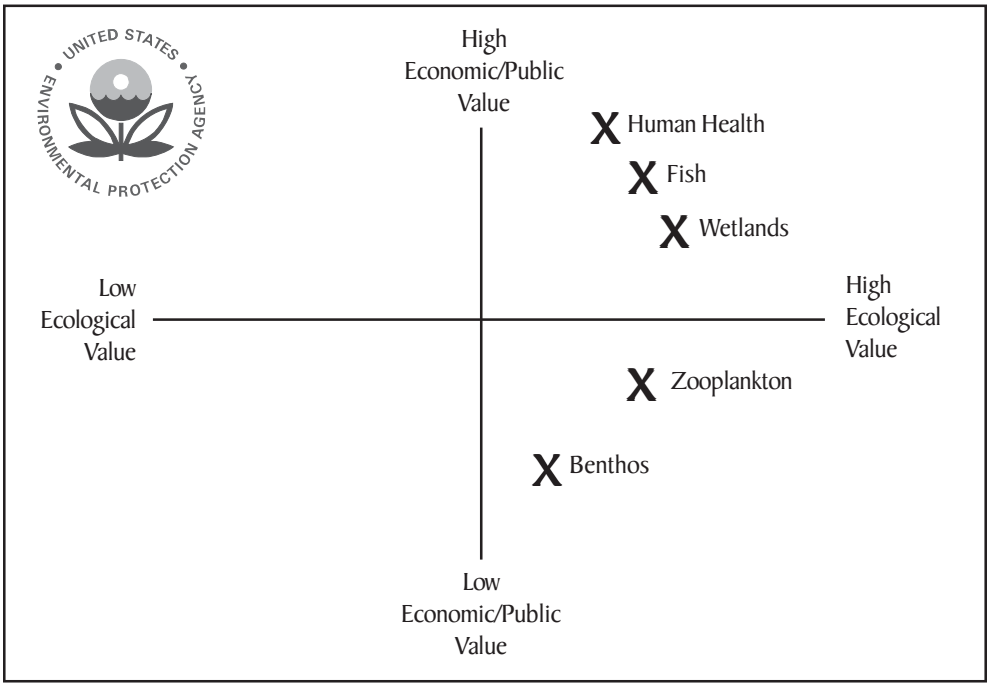
Based on EPA's *National Estuary Program Guidance: Technical Characterization in the National Estuary Program* (1994)

IDENTIFYING PROBLEMS AND SOLUTIONS: EXAMPLES

▶ ***Example 1: Use of worksheets to determine relative importance of estuary resources***

Worksheets, like the one shown below (**Figure 3.3**), can be used to develop a graphical representation of the overall relative importance of the estuary's resources. The Santa Monica Bay Restoration Commission used forms of this worksheet as workshop tools to stimulate discussion among participating managers and technical experts. Environmental managers and regulators were asked to position the valued resources along the Public Value axis while technical and scientific participants were asked to position the resources along the Ecological Value axis. The results were combined and resources were then positioned on a master worksheet. Valued resources in the upper right quadrant had the highest overall value, while those positioned in the lower left quadrant had the lowest value. For additional information, see www.santamonicabay.org.

Figure 3.3: Worksheet used to establish relative importance of an estuary's resources



From EPA's *National Estuary Program Guidance: Technical Characterization in the National Estuary Program* (1994)

▶ *Example 2: Data collection to identify priority problems and develop monitoring protocols*

The Sarasota Bay NEP used continuous monitors to evaluate diurnal fluctuations in dissolved oxygen levels. Previous sampling in Sarasota Bay was conducted during the mid-morning to early afternoon, thus eliminating data collection in early morning—the lowest dissolved oxygen period. The Sarasota Bay NEP used the continuous datasets to evaluate the extent of hypoxia (low oxygen), the potential impact of hypoxia on fisheries, and to reevaluate monitoring programs. Based on the results of this monitoring effort, it was determined that elevated hypoxia levels did not have an adverse impact on juvenile fish counts. Because temperature was not an important driver in the system, Sarasota Bay's monitoring program focuses on nutrients and light-related parameters. For additional information, see www.sarasotabay.org.

▶ *Example 3: Narrative description of estuarine processes*

The Puget Sound Action Team used a narrative approach to describe the estuary in its "State of the Sound Report." Qualitative and thorough descriptions of the estuarine processes were combined with simple diagrams illustrating circulation patterns, marine, freshwater, and terrestrial habitats, and living resource information, relating how various factors influence the estuarine processes and resources. This report also made use of easy-to-read qualitative narrative matrices to describe: 1) the possible causes, current status, and outlook for each problem indicator; 2) pollutants, possible sources, and associated impacts; 3) sources, effects, and trends; and 4) the distribution of certain contaminants in the Sound. These concise, simple matrices helped illuminate potential management solutions. For additional information, see www.psat.wa.gov.

▶ *Example 4: Relationships of priority problems*

Nitrogen is the limiting nutrient for algal productivity in Sarasota Bay. Studies conducted showed a correlation between seagrass coverage and nitrogen loads in Sarasota Bay. The Sarasota Bay NEP found that reductions in nitrogen inputs (47 percent) significantly increased seagrass coverage. Examined together, water clarity, light, and seagrass coverage appear to be good indicators of system health. Through these efforts, it was demonstrated that significant increases in seagrass habitat can be achieved with relatively small increases in water clarity of 1.5 feet in shallow water systems like Sarasota Bay. For additional information, see www.sarasotabay.org.

▶ *Example 5: Identification of data gaps through Technical Characterization*

The Technical Characterization report developed by the Lower Columbia River Estuary Partnership stated that the development of long-term solutions to the problems identified in the Lower Columbia River would require ongoing data collection and analysis. The characterization report identified four basic problems: toxics in sediment and fish tissue; decline in species; threats to wildlife and fish; and loss of habitat. The report also recommended the following studies and long-term monitoring and evaluation to address data and information gaps:

- Problem confirmation and source identification;
- Fate and transport assessment;
- Criteria and standards development;
- Ambient monitoring and assessment;
- Fish and wildlife monitoring and assessment; and
- Human health monitoring and assessment.

For additional information, see www.lcrep.org.

▶ *Example 6: Data gathering and action formulation*

In addition to developing technical issue papers and offering advice and guidance on scientific issues affecting the estuary, the Lower Columbia River Estuary Partnership's Science and Technical Work Group helped bridge the gap between data gathering and action formation. Members of the Technical Work Group played a key role assisting the Management Committee in the comparative risk ranking of potential actions. The ranking was used to select actions based on the most significant problems in the estuary, including perceived risks to public health, ecological health, and quality of life. The program's risk ranking exercises are described in Chapter 4 of its Management Plan. For additional information, see www.lcrep.org.

Example 7: Contribution of Base Program Analysis to Management Plan action plans

The purpose of the Base Program Analysis conducted by the Barataria-Terrebonne NEP was to provide members of the Management Conference with information they could use to develop actions for the Management Plan. The seven priority problems identified in the Barataria-Terrebonne Conference Agreement were used to provide information about the types of program changes needed in the future. A database was developed containing programs, monitoring stations, laws, and the research and reports relevant to the project area. The report lists 84 federal programs and 63 state programs according to their primary management tools and their relation to the seven priority problems. An analysis identified the types of strategies and regulations that lead to program effectiveness and prototypes were recommended for the action plans in the Management Plan. In addition, some strategies were identified that could be implemented prior to final Management Plan approval. For additional information, see www.btnep.org.

Photo: Steve Delaney

Chapter 4: Developing the Management Plan— A Blueprint for Action

INTRODUCTION

The Management Plan is a blueprint for restoring and protecting an estuary. Written by the estuary program office, with substantial input from stakeholder committees, it identifies the most pressing problems in an estuary and establishes goals, objectives, and actions for resolving them. The Management Plan also contains strategies for monitoring progress and financing implementation. The plans are living documents that are reexamined and revised by the estuary programs on a regular basis to ensure that the goals, objectives, and specific actions continue to address the most pressing problems. During plan development, the NEPs implement demonstration projects to test possible actions and show the results that full plan execution can bring about.

This chapter explains how the NEPs use the results of the Technical Characterization and Base Program Analysis discussed in **Chapter 3** to develop Management Plans that address the problems of each estuary. The chapter outlines how the NEPs involve affected jurisdictions, agencies, and other organizations and individuals in the writing of the plan to ensure stakeholder support and a commitment to implement the plan. The chapter also shows how the NEPs use demonstration projects during plan development to showcase innovative management strategies, involve the public, and demonstrate the types of changes that full implementation can bring about.

NEP PRINCIPLES IN CHAPTER 4

- The Management Plan identifies the most pressing problems in an estuary and establishes goals, objectives, and actions for resolving them.

- Implementation of demonstration projects during Management Plan development can showcase innovative management strategies, involve the public, and demonstrate the types of changes that full implementation of the Management Plan can bring about.

- The Management Plan must be developed in conjunction with affected jurisdictions, agencies, and programs to ensure continued stakeholder support and future implementation commitments.

- The Management Plan is a living document and should be revised on a regular basis (e.g., every five years) to ensure that the goals, objectives, and specific actions continue to address the most pressing problems and serve as effective tools for restoring and maintaining the integrity of the estuary.

COMPONENTS OF A MANAGEMENT PLAN

The Management Plan contains five basic components:

- Statement of priority problems to be addressed in the Management Plan
- Mission statement, goals, and objectives for the estuary
- Action plans for achieving goals and objectives
- Monitoring strategy
- Finance strategy

The following sections describe these five basic components.

San Francisco Estuary Project mission statement

"WE, THE PEOPLE of California and the San Francisco Bay-Delta region, believe the San Francisco Estuary is an international treasure and that our ongoing stewardship is critical to its preservation, restoration, and enhancement. Acknowledging the importance of the estuary to our environmental and economic well-being, we pledge to achieve and maintain an ecologically diverse and productive natural estuarine system."

For additional information, see www.abag.ca.gov/bayarea/sfep/sfep.html.

STATEMENT OF PRIORITY PROBLEMS

Prioritizing the problems that will be addressed in the Management Plan is an important early step in Management Plan development. No Management Plan can tackle all of the issues affecting an estuary at one time. Therefore, problems must be prioritized to ensure that limited resources can be applied wisely during implementation of action plans. As discussed in **Chapter 3**, there are many strategies used to prioritize identified problems in the estuary, including opinion surveys, stakeholder workshops, and various resource valuation techniques. The actions within the Management Plan should be clearly linked to the priority problems.

MISSION STATEMENTS, GOALS, AND OBJECTIVES

Most NEPs develop a mission statement, goals, and objectives to help ensure that stakeholders work toward the same end. This approach focuses participants on the desired end product rather than a problem-based approach that tackles individual problems one-by-one. A clear mission statement with specific goals and objectives leads to the development of integrated action plans that address multiple problems simultaneously in order to work toward achieving the desired end. This approach takes into consideration social as well as ecological factors and allows the NEPs to maintain direction in the dynamic environment in which they operate.

An NEP formulates the mission statement early in the program's development and may also formulate preliminary goals and objectives. After the Technical Characterization and Base Program Analysis are complete, the NEP revisits and refines the goals and objectives. Frequently, stakeholders are asked to identify the most important uses and resources of the estuary. This stakeholder input serves as an important basis for an NEP's program goals and objectives.

CLEAR GOALS AND OBJECTIVES HELP DEFINE SUCCESSFUL IMPLEMENTATION

Measuring success can be simplified by defining goals and objectives in readily measured, unambiguous terms. One of the goals of the Tampa Bay Estuary Program is to restore a minimum of 100 acres of low-salinity tidal marsh every five years and a total of 1,800 acres over the long-term. The goal is stated in measurable terms and provides both long-term and intermediate-term measures of success. The goal statement also provides a clear endpoint to gauge when the goal has been achieved. The Interlocal Agreement through which the Tampa Bay Management Plan is being implemented specifies that when the policy board determines that a goal has been achieved, the goal will be restructured to provide ongoing maintenance of the resource. For additional information, see www.tbep.org.

Overall program goals focus on desired end products or results for the estuary. All program goals should be environmentally meaningful and resonate with the public. Goals may range from maintaining current conditions to restoring the estuary to a past condition. Objectives, unlike goals, are specific and more clearly defined, and are aimed at achieving the broader, long-term goals. Objectives must be measurable and achievable through the implementation of specific action plans. They may reflect the environmental criteria, the preferred uses, or the elimination of impairments that the estuary program participants consider appropriate and desirable for various estuarine

segments. Objectives undoubtedly will vary from one segment of the estuary to another, but in each case are used to determine if the program goals are being met.

ACTION PLANS

Once the Management Conference has formulated goals and objectives, work can begin on developing specific actions to achieve them. These action plans—discrete activities to address a priority problem or issue and its impacts—are at the heart of the Management Plan. **Table 4.1** summarizes the basic steps involved in developing action plans. Each action plan typically addresses a priority issue such as environmental education or a priority problem such as habitat loss.

Table 4.1: Basic steps for action plan development

1. State the problem, identifying the probable causes and sources.
2. State the program goals related to the problem and its source.
3. Set specific, measurable objectives to attain the goals.
4. Determine the universe of possible management activities, both new and existing, for consideration.
5. Select the activity that will work, that the public will support, and that can be implemented within reasonable time and resources.
6. Establish specific action plans needed to abate and control the problem or to protect the resource.
7. Implement and monitor results, collecting data on measurable indicators of progress.
8. Report on progress, costs, and results.
9. Review, reevaluate, and redirect efforts as needed.

Each action plan should address the following:

- WHO: Identify who will take the lead in carrying out the action; define roles and resource commitments for each participating organization.
- WHAT: Describe what will be done. For example, set numeric load reduction targets and use designations for a location; describe which specific activities are necessary to reach them.

- WHERE: Describe the location where the action will take place and the area that will be affected.
- WHEN: Include schedules for action implementation and completion.
- HOW: Outline the procedures or steps that will be used to carry out the action.
- HOW MUCH: Estimate the cost of implementing the action.
- SOURCE OF FUNDS: Identify funding sources that can be used to carry out the action.

A range of techniques has been used by the NEPs to develop management actions. For example, the Lower Columbia River Estuary Partnership held multiple public meetings, convened work groups, used comparative risk ranking, conducted constituent focus groups, and then developed final criteria to narrow down a list of 180 actions to 43 (see **Appendix C**).

MONITORING STRATEGY

In order to track both programmatic and environmental results, the NEPs develop a monitoring strategy. The NEPs include several basic elements in their monitoring strategies.

First, they include a clear and realistic definition of success. This definition is typically driven by the goals and objectives developed during the planning process. Considered in total, the achievement of these goals and objectives equates to the yardstick that the stakeholders will use to determine if progress is being made during the implementation process.

Second, the NEPs select appropriate and measurable indicators that track with this definition. Indicators are tools that are used to assess progress toward a particular goal or objective. The NEPs' indicators measure progress toward enhancing and preserving their diverse estuarine ecosystems. To reconcile the long-term nature of

environmental improvements and the need to demonstrate short-term results to stakeholders, the NEPs integrate programmatic indicators with environmental indicators.

Third, the NEPs develop a communication plan. The plan identifies goals, objectives, and target audiences, as well as how the NEPs will create, package, and distribute their messages. One eye-catching way the NEPs use to reach a wide audience is Web-based interactive maps. This medium is a user-friendly way to track indicators and progress toward goals. For example, Performance Indicators Visualization and Outreach Tool (PIVOT), a tool developed by the National Oceanic and Atmospheric Administration Coastal Services Center, has been used by the Tillamook Estuaries Partnership to present local environmental issues and how the NEP is addressing them. Additional information on PIVOT can be found on the Web site: www.epa.gov/owow/estuaries/pivot/overview/intro.htm.

Next, the NEPs identify the roles environmental agencies and volunteers will play in monitoring. Environmental agencies bring substantial monitoring resources to the table, and volunteers can collect data in remote areas and help a program's outreach and education efforts. The NEPs convene the agencies that collect, analyze, and store estuary data to create a well coordinated monitoring program that eliminates redundancies and fills gaps. By combining local, regional, and national monitoring systems, the NEPs create a comprehensive network.

Finally, the NEPs outline the technical components of the strategy. The NEPs consult technical documents such as EPA's National Estuary Program Monitoring Guidance. The Guidance provides examples and details related to identifying monitoring objectives, establishing testable hypotheses, selecting statistical methods, choosing analytical methods and alternative sampling designs, evaluating expected monitoring study performance, and conducting monitoring and data analysis. The Guidance can be found on the Web site: http://yosemite.epa.gov/water/owrccatalog.nsf.

FINANCE STRATEGY

To successfully leverage federal seed money into substantial sums, the NEPs develop finance plans to obtain a variety of federal, state, local, and private funding. Finance plans allow the NEPs to tap into a broad spectrum of funding sources: public and private, direct and indirect, to achieve their goals and control the pace of their programs. Rather than pursue a new grant each month, the NEPs identify and evaluate a broad spectrum of potential funding before seeking a particular source. NEPs attract additional funding from various sources and through partnerships with other organizations. For example, the NEPs have tapped the Clean Water State Revolving Fund program, stormwater utility fees, municipal bond funding, fines and settlements, tax abatements and incentives, and sales fees. The following paragraphs describe the finance planning process and the time it takes to see financial results.

Photo: Steve

Finance planning involves four steps: (1) establish program priorities; (2) identify funding options; (3) evaluate funding options; and (4) develop a plan to pursue the most promising funding sources. To accomplish these steps, the NEPs may retain a consultant to facilitate a series of meetings, interviews, and follow-up sessions to determine a reasonable list of priority actions and identify potential funding sources. The resulting plan identifies sources of funding to support priority activities, such as operating costs, outreach, and habitat protection. For example, the NEPs may seek funding from an individual state Environmental Trust by first educating the organization on how the NEP program goals will support their mission. Other organizations, such as foundations, local governments, and businesses, may also be approached to fund additional project-related costs. A finance plan identifies who will develop the funding mechanisms, how this will be done, and when the mechanisms will be in place. **Appendix E** provides an excerpt from one NEP finance plan.

It may take time to see positive results from finance planning and resulting actions. For example, the Partnership for the Delaware Estuary's first direct mail appeal yielded only a handful of responses. Yet as this NEP became more active in the community, developed support among local residents, and found advocates within state and local

government, its reputation grew. With this stronger reputation, the NEP is now bringing in hundreds of thousands of dollars from a variety of sources and is in a better position to argue for more significant resources. The process of building this support took several years with small returns from early appeals blossoming into substantial support.

Photo: Steve Delaney

DEVELOPING THE MANAGEMENT PLAN

Management Plan development is a multi-year process that seeks to involve all of the watershed's stakeholders. The NEPs take a number of steps to develop their management plans.

First, the NEPs disseminate and discuss the characterization findings with affected parties in the watershed. These findings, which describe the estuary's problems and link problems to causes, form the basis for developing the goals and objectives for the estuary. To ensure that stakeholders have equal access to this information, it should be widely shared in a format that all participants can understand.

Second, the NEPs gather information through public input, technical studies and demonstration projects. The stakeholders debate the merits of each problem and determine which ones will be the focus of the Management Plan. Some programs begin the prioritization process by holding a series of public workshops. These meetings serve to disseminate information on the state of the estuary and to increase public awareness and support for the estuary program. The meetings also provide an opportunity to solicit citizen knowledge and opinions regarding the problems of the estuary. The Management Conference uses this information to draft, evaluate, and select actions for controlling pollution and managing resources. By ensuring that the public is involved, a plan is created that all parties support. Actions are created that are measurable, achievable, and sensitive to social and cultural factors. Strong public support of the Management Plan helps to secure commitments from implementing entities, as well as funding for implementation.

Next, the NEPs integrate and coordinate their activities with affected jurisdictions, agencies, and programs. Coordination with affected jurisdictions and agencies ensures that the estuary program is informed about the results of studies and research efforts conducted by other agencies, as well as initiatives that may be planned or underway that could impact the estuarine system. Continued involvement by resource agencies and affected jurisdictions also helps to ensure that commitments to implement the actions can be secured. Most NEPs include federal and state resource agency personnel on their Policy and/or Management Committees to ensure their participation throughout the process.

Finally, the NEPs begin implementing actions prior to completing the Management Plan. These early actions, referred to as Action Plan Demonstration Projects, are used by the NEPs to showcase innovative management strategies, to involve the public in hands-on estuarine resource management, and to demonstrate the types of changes that full implementation of the Management Plan can bring about. Early implementation activities can help to legitimize program activities and maintain a high level of stakeholder interest.

Straw voting to identify possible Management Plan actions

The Partnership for the Delaware Estuary utilized straw voting exercises at stakeholder group meetings to determine levels of support for proposed actions. Following the voting exercise, a facilitator led a discussion about those actions with the highest level of support as well as those actions with the least support. These discussions not only helped to identify stakeholder priority actions, but also brought to light controversial issues, opinions on the feasibility of implementing actions, suggestions for action reformulation, and suggestions for additional actions. For additional information, see www.delawareestuary.org.

The following are examples of Action Plan Demonstration Projects.

- The Indian River Lagoon NEP worked with state agencies and utilized volunteers to help protect natural habitat by planting mangroves in areas where there was habitat loss due to development or where the mangroves have been crowded out by the invasive species Brazilian pepper. Volunteers and contractors of the Indian River Lagoon Program planted more than 100,000 mangrove trees along causeways and shorelines of the lagoon. Young mangrove sprouts are planted in vertically split PVC pipes filled with native soils. This allows the roots to stabilize along the wave-turbulent shoreline. As the plants grow, the protective pipes fall away allowing the plant to survive without further support. This Action Plan Demonstration Project

provided a useful technology and approach that was used by the NEP in the Management Plan.

- The Barataria-Terrebonne NEP implemented several Action Plan Demonstration Projects during Management Plan development to test the feasibility of new technologies prior to large-scale implementation. They included: 1) oil canal conversion; 2) seagrass best management practices; 3) seafood processing plant wastewater improvement; 4) small-flow wastewater treatment; and 5) alternative dredging and soil deposition. Following implementation, the program prepared reports on the results of each demonstration project.

- The Mobile Bay NEP funded an Action Plan Demonstration Project that was collectively implemented by the Alabama Coastal Foundation, U.S. Fish and Wildlife Service, McDavid Christmas Tree Farm, Cam Beckwith, and Alabama Power. The partners addressed the priority issue of habitat loss by placing discarded Christmas trees in fencing along an eroding shoreline. The trees absorbed wave action and reduced siltation. The Youth Conservation Corps planted black-needle rush (*Juncus roemerianus*) between the brush fence and shoreline. The marsh planting increases the rate of sediment entrapment, protects the shoreline from erosion, and augments wildlife habitat along the shoreline.

FROM MANAGEMENT PLAN DEVELOPMENT TO IMPLEMENTATION

The Management Plan articulates a vision and goals for the estuary, identifies priority problems, specifies actions to address the problems, and outlines monitoring and finance strategies. While completion of the Management Plan requires many years of concentrated work, it is only the first step toward cleaning up and protecting the estuary. Implementation of the Management Plan becomes the focus of NEP efforts once it is approved by the Management Conference, state government, and EPA.

To successfully implement the plan, the NEPs need the skills, knowledge, and abilities to:

- raise funds,
- secure partner commitments,
- monitor progress,
- document and communicate results,
- provide public education and involvement opportunities, and
- revise the program to maintain momentum.

The next chapter discusses how the NEPs address these challenges.

Photo: Steve Delaney

DEVELOPING THE MANAGEMENT PLAN: EXAMPLES

Example 1: Stakeholder involvement in development of the program vision

The Partnership for the Delaware Estuary conducted a series of facilitated workshops to form a "vision of the Delaware Estuary for the year 2020 which was shared by the users of the estuary." During facilitated discussions, workshop participants, representing a variety of stakeholder interests, were asked to identify the most important uses and resources of the estuary, based on their perspective as a user (e.g., fishing, recreational boating, land development, manufacturing, etc.). These workshops resulted in a collective list focusing on fisheries, wildlife, recreation, water supply, and commerce as the most important uses of the estuary. These uses and values became the basis for goals and objectives endorsed by the program. For additional information, see www.delawareestuary.org.

Example 2: Public involvement and community outreach demonstration projects

The San Juan Bay Estuary Program conducted several community efforts to enhance education, health, and the environment. The Program delivered numerous

presentations focusing on themes such as water quality. Demonstration Projects in Loiza, San Juan, and Catano communities included:

- A solid waste management project in Loiza that has reduced floatable debris through recycling and improved the overall environmental quality of the coastal community of Pinones.
- A series of 10 presentations and home visits, supplemented by the installation of warning signs, to alert Peninsula de Canteras Community to fish advisories.
- A 10-week series of workshops on Las Cucharills Marshland ecology, including sessions on community organizing and environmental restoration, that gave participants a coherent vision and ideas about how they could achieve it.

For additional information, see www.estuariosanjuan.org.

Photo: Steve Delaney

Example 3: Development of environmental education goals and objectives to help focus outreach efforts

The Public Education Strategy of the Charlotte Harbor NEP is to educate and to motivate the people within the greater Charlotte Harbor watershed to understand, to participate in, and to implement their Management Plan. To achieve this strategy, the Charlotte Harbor NEP developed four public education goals and four quantifiable objectives to support the goals.

Public Education Goals:

1. Increase public awareness, understanding, and support of the action items in the Management Plan through involvement in educational programs, resource-based activities, and special events.
2. Establish and maintain environmental education efforts with organizations, educational centers, and government agencies.
3. Increase awareness and understanding of the natural and cultural resources of the Greater Charlotte Harbor Watershed.
4. Develop stewardship and a sense of shared responsibility for estuaries, rivers, tributaries, and their watersheds.

Public Education Objectives:

1. Maintain a core staff, including a Public Affairs Specialist, at the Charlotte Harbor NEP office to ensure implementation of the Management Plan.
2. Support and further the educational action items of the Management Plan.
3. Assess annually the progress of the Public Education Strategy.
4. Develop future directions based on the annual assessment.

Following the development of these objectives, priority actions were developed by the Program to define the management activities needed to attain the quantifiable objectives. For additional information, see www.charlotteharbornep.com/.

▶ *Example 4: Use of resource valuation to gain public and political support*

The Peconic Estuary Program conducted a resource valuation study assessing the public's assessment of the estuary's values. The Program felt that a credible picture of the monetary worth of the natural resources and environmental amenities of the area would better substantiate the value of the actions in the Management Plan and broker more support from public officials and the general public. By documenting market and non-market resource benefits, decisions on resource allocation for implementation could be made at least in part on cost-benefit considerations. The multifaceted study responded to the needs of the Peconic Estuary Program by identifying estuarine-dependent economic sectors and their impacts on the local economy and assessing the largely non-market values of natural amenities, and the recreational services provided by those amenities. The second part of the study was comprised of (1) a recreation study, (2) a resource valuation analysis, (3) a property value study, and (4) a wetlands productivity analysis.

The results of the resource valuation study indicated that the public has a strong attachment to the environmental and amenity resources of the Peconic Estuary system, even if they do not use the resources directly. The resource valuation survey identified the public's priorities for enhancing or preserving local natural resources. The relative priorities of respondents, in order, were farmland, eelgrass, wetlands, shellfishing grounds, and undeveloped land. The estimated per acre dollar values were about $74,500 for farmland, $70,000 for eelgrass, $56,700 for saltmarsh, $30,000 for unpolluted shellfishing grounds, and $14,000 for undeveloped land, using a 25-year time horizon and a seven percent discount rate.

The economics information generated was extremely useful to the Program, presenting a credible picture of the market and non-market worth of the services provided by Peconic Bay and its environs. The results of the various studies conducted (the impact assessment, travel cost, and contingent choice) influenced several initiatives within the region and helped generate over $100 million at the state, county, and local levels to support environmental preservation. For additional information, see www.peconicestuary.org.

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Chapter 5: Implementing the Management Plan

INTRODUCTION

The focus of this chapter is on how to move from studying problems plaguing our estuaries to implementing management measures to solve those problems. To ensure success, the NEPs work with their partners to see that they follow through with their commitments to support Management Plan implementation. The NEPs invigorate local involvement by addressing local problems and developing finance mechanisms to raise money to pay for implementation activities. Indicators of success are developed, tracked, and communicated by the NEPs to build additional support for implementation. The NEPs improve their implementation performance by sharing successes and lessons learned at events, such as national conferences and workshops, and by updating their Management Plans periodically. This chapter discusses how the NEPs organize effective institutional arrangements that ensure long-term oversight and accountability, obtain stable and diverse sources of funding, monitor results and communicate them to the public, and update the Management Plan periodically.

The NEPs have learned that the following actions can help lead to successful implementation:

- Organize effective institutional arrangements that ensure long-term oversight and accountability.
- Obtain stable and diverse sources of funding.
- Monitor results and communicate them to the public.
- Update the Management Plan periodically.

The following sections describe how the NEPs successfully implement their Management Plans.

NEP PRINCIPLES IN CHAPTER 5

- To prevent conflicting agendas and individual interests from derailing the program, the NEPs adopt bylaws and other agreements that define participant roles and provide a mechanism for resolving conflicts.

- Several different institutional structures or arrangements have been effective for various NEPs as they move into implementation.

- A variety of funding sources are needed to avoid over-reliance on a single entity since implementation occurs over many years and is costly.

- A clear and realistic definition of success, including measurable indicators, should be developed and communicated to all stakeholders.

- Environmental results should be communicated in terms that are meaningful to all stakeholders.

- Citizens can play an important role in environmental monitoring and building public support for implementation.

MAINTAINING MOMENTUM FROM PLANNING THROUGH IMPLEMENTATION

With the Management Plan complete, the NEPs increase their focus on implementation: obtaining funds, building partner support, and measuring and communicating results. To sustain the momentum gathered during plan development, the NEPs revisit their governance structure to ensure that it is appropriate to effectively implement the Management Plan. The NEP asks itself whether it should remain within its current institutional host, become a nonprofit, or establish a nonprofit arm. Each of these options has advantages and disadvantages in regards to fundraising, building partner support, and measuring and communicating results. The NEPs also intensify their efforts to involve stakeholders and build partner support. The NEPs engage stakeholders in applied activities, such as volunteer monitoring and implementing mini-grants, and create an environment that respects all voices, gives real power to participants, clearly states objectives and timetables, and makes clear progress on those objectives.

REVISITING THE GOVERNANCE STRUCTURE

In deciding whether to remain in its original institutional location, an NEP investigates a variety of different alternatives and identifies the place that best suits its specific needs. The NEPs examine the community of the estuary: how decisions are reached, what perceptions are prevalent, and who or what institutions are influential. Several different institutional locations have been effective for different NEPs. Coastal Bend Bays and Estuaries (Texas) and Tillamook Bay (Oregon) moved from state and local government institutions to become independent nonprofit organizations. San Francisco and Delaware Bay NEPs remained in their state government institutions but created nonprofit arms to conduct outreach and fundraising activities. The San Juan Bay NEP established a trust fund to conduct fundraising and a board of directors with representatives from the public and private sectors to provide overall direction for the

program. And, the New York-New Jersey Harbor NEP remained in the EPA Region II office. While locating the NEP within a government agency can allow the NEP to more easily coordinate with other government programs and have greater access to data and certain regulatory functions, locating the NEP outside a government agency, in a satellite office or nonprofit, has advantages including greater autonomy, visibility, and certain funding opportunities. **Appendix D** presents a one-page list of the advantages and disadvantages of becoming a nonprofit.

LOCATING THE NEP WITHIN AN ACADEMIC INSTITUTION

In 1997, the Casco Bay Estuary Project moved from the Maine Department of Environmental Protection to the University of Southern Maine. The Muskie School for Public Service, a graduate school at the University, and the Marine Law Institute act as hosts to the Project. The Casco Bay board of directors went through a request for proposals process to find a host site. The University's successful bid brought the Project to an academic institution that exemplifies environmental stewardship. With the University, the Project receives an office on campus and the use of the institutional infrastructure. Benefits the Project has received from being located at the University include:

- Convenient location for meetings and outreach efforts.
- Credibility as an academic institution that is viewed as neutral without associations with enforcement agencies or advocacy groups.
- Many opportunities for graduate and undergraduate assistantships/internships.
- Opportunities to guest lecture in courses at the University and to get students involved in projects that benefit the Estuary Project.

For additional information, see www.cascobay.usm.maine.edu.

SUSTAINING STAKEHOLDER INVOLVEMENT AND PARTNER SUPPORT

The NEPs reinforce the partners' commitment by continuing to hold stakeholder meetings, managing the NEP committee process, and working to sustain the consensus and common vision reached among the partners during plan development. While the NEPs implement some actions independently, they oversee, coordinate, and in other ways influence many more partner actions. For example, the NEP may provide seed money or the initial organization for implementing partners that do have the legal authority or resources to implement actions.

The NEPs, however, are sometimes frustrated by a decline in stakeholder participation after the Management Plan is completed. Without the focus of plan development,

stakeholders may lose interest in the program. "Lack of time" is everyone's first response to the question of why they don't remain involved. But research from the NEP experience suggests that it is more a matter of setting priorities than the availability of time itself. (Reference: Webler, Thomas. "Why Do (or Don't) Local Government Officials Participate in Watershed Planning Efforts." Coastlines 10.2 (2002). Washington: U.S. Environmental Protection Agency.) People free up time for things that are most important to them. The challenge for NEPs and other community-based watershed efforts is to invigorate local support by addressing local problems, but doing so in a coordinated manner that enhances mutual benefits and makes progress on regional problems. The mechanisms for involving the public vary from NEP to NEP. Some programs hire staff to focus on this activity, while others delegate this task to a separate entity, such as a local nonprofit. For example, the Morro Bay NEP has partnered with nonprofit organizations working in and near the estuary to create the Estero Conservation Alliance. Through this Alliance, member organizations cooperatively work to meet common goals and complete joint projects to enhance Morro Bay and surrounding areas.

A GUIDEBOOK TO HELP ENGAGE THE COMMUNITY

Understanding community social systems is key to successful Management Plan implementation. EPA's *Community Culture and the Environment: A Guide to Understanding a Sense of Place* is a toolbox for understanding the social dynamics involved in community-based efforts. Readers learn about a flexible, step-by-step process for building a picture of community cultural preferences and priorities by identifying local values, beliefs, and behaviors as they relate to community life and the surrounding natural environment. Easy-to-use worksheets and community assessment stories from around the country provide methods that can be used to:

- identify a community's vision and goals,
- engage volunteers and other stakeholders,
- enhance education and outreach efforts, and
- build and strengthen partnerships.

To order the *Guide* (EPA 842-B-01-003), contact the National Service Center for Environmental Publications, U.S. EPA Publication Clearinghouse, P.O. Box 42419, Cincinnati, OH 45242, 1-800-490-9198, ncepiwo@one.net.

How can coastal managers and watershed organizations like the NEP entice local government officials and other stakeholders to participate in the implementation process?

- First, focus attention on producing a working environment that respects all voices, builds a sense of camaraderie, gives real power to the participants, clearly states the objectives and timetable, and makes clear progress on these objectives. Stakeholders are more likely to participate if the watershed project stays abreast of local problems and incorporates these into the program's objectives. Going out into the communities, listening to concerns, and inviting local participation are much more productive ways to secure involvement than merely sending a form letter to the town clerk, mayor's office, or county commissioners. For example, Massachusetts Bays NEP created five Local Governance Committees that function like mini-NEPs. Each covers a specific region of the coast and staff visit each community in order to secure its commitment to implement Management Plan actions.

- Second, recruit people who have a strong environmental ethic, enjoy working collaboratively with peers, are able to take a regional perspective, and who pursue goals linked to the project's objectives. Invitations to new participants should include announcements listing existing participants and provide opportunities for networking and learning.

USE OF THE INTERNET TO STIMULATE PUBLIC INVOLVEMENT

The Tampa Bay Estuary Program's Community Advisory Committee created the Bay Opinion Poll to stimulate continued public involvement and communication. This informal poll assesses perceptions of the bay and identifies major community concerns related to bay protection. The poll is available on the Tampa Bay Estuary Program Web site: www.tbep.org.

- Third, use mini-grants, segmentation schemes, and other mechanisms that enable stakeholder groups to make progress on their local agenda while remaining connected to the watershed project. The Maryland Coastal Bays Program awards an average of $100,000 per year for local stakeholders to conduct projects in the watershed. Recipients provided many times the amount of their grants in matching funds which attracted more money to the watershed. The Tampa Bay Estuary Program subdivides the bay into seven segments. The program established nitrogen load reduction goals and management actions to achieve them for each segment. Achieving the chlorophyll targets will provide sufficient water clarity to allow recolonization of 12,350 acres of seagrasses and tangible results for local stakeholders.

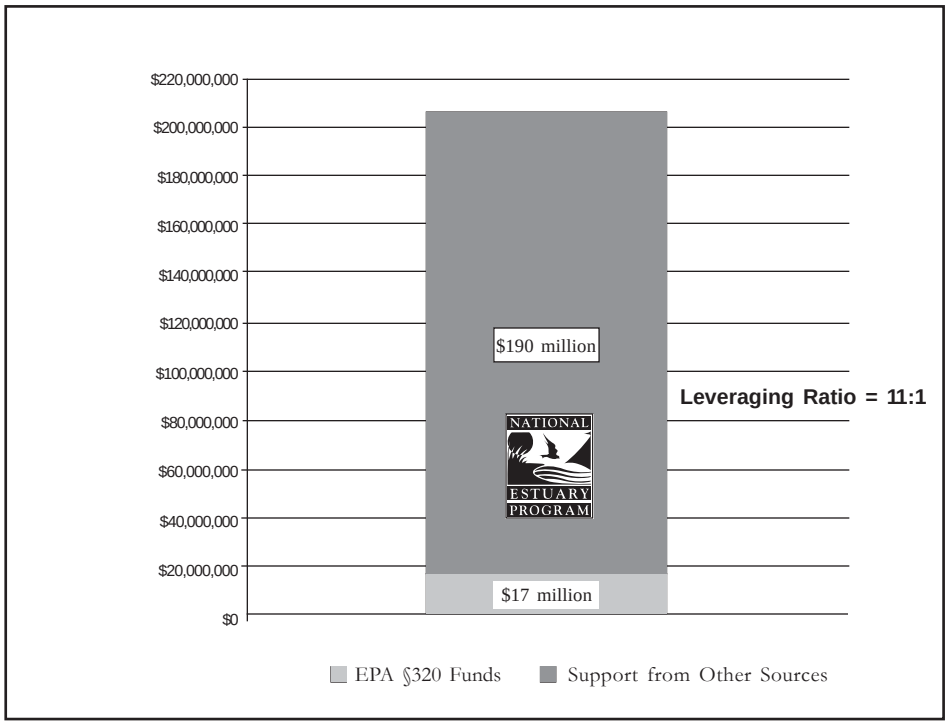
- Fourth, use volunteer programs to broaden public involvement throughout the implementation process. Some NEPs have developed volunteer water quality monitoring programs while others enlist volunteers to deliver education and outreach activities. These opportunities for active involvement allow the public to become engaged in tangible efforts, build stewardship for the resource, and create public and private interest in providing financial support for implementation.

- Finally, avoid approaching any stakeholder group as an homogenous body. Watershed managers need to approach local government organizations and other stakeholder groups as individuals with different experiences, needs, values, and beliefs. To maximize stakeholder participation, it may be wise to design a process that contains a variety of ways and levels for stakeholders to become involved.

OBTAINING FUNDS

NEPs attract funding and support to administer these funds from various sources and through strategic partnerships with other organizations. For example, the NEPs raised $11 for every $1 provided by EPA in 2003. This additional funding comes from a variety of federal, state, local, and private sources (see **Figures 5.1** and **5.2,** page 63).

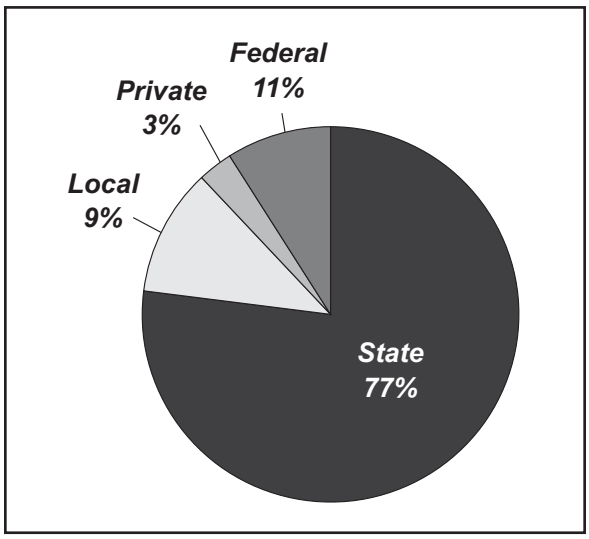
Figure 5.1: Resources leveraged by the NEPs



Source: NEP Annual Workplans, June, 2003.

To help manage this additional funding, the NEPs obtained substantial support through partnerships with the public, private, and nonprofit sectors. For example, the Coastal Bend Bays and Estuaries Program (CBBEP) directly administered only about one-third of their leveraged funding, with the remaining two-thirds administered by local governments, universities, state agencies, and nonprofits. The CBBEP also created a land trust that has proved successful in acquiring and managing funds to protect habitat in the watershed.

Figure 5.2: Sources of NEP leveraged dollars (percent total)



Source: NEP Annual Workplans, June, 2003.

How do the NEPs leverage these resources? First, the NEPs develop finance plans that identify and evaluate funding sources to implement their priority actions. The funding plans enable the NEPs to sift through potential sources and decide where to invest limited time and personnel. Rather than focus on a new grant each month, the NEPs pursue funding that supports their priorities. (See **Appendix E** for an excerpt from an NEP finance plan.)

Second, the NEPs develop strategic alliances with implementing partners to obtain their financial support. The NEPs reinforce the partners' commitment by continuing to hold stakeholder meetings, managing the NEP committee process, and working to sustain the consensus and common vision reached among their partners during plan development. While the NEPs implement some actions independently, they oversee, coordinate, and in other ways influence many more partner actions.

Third, the NEPs demonstrate results that convince stakeholders that the NEPs are effective, can be trusted with their resources, and will give them credit for their contributions. The NEPs work closely with the media and produce independent newsletters, Web sites, and events that promote the achievements of the program and heighten the visibility of the NEP and its implementing partners.

Finally, the NEPs provide seed money or staff to initate and develop new funding sources. For example, the NEP may lead meetings with local governments to develop stormwater utilities or obtain resources from the State Revolving Loan Fund.

The following sections provide examples of the types of funding NEPs have secured from federal, state, local, and private sources to finance their operations and projects. Most NEP activities are funded by more than one source and involve extensive partnering.

FUNDING OPERATING COSTS

Covering operating costs remains a perennial challenge for most NEPs. Nonetheless, the NEPs have developed several creative approaches to address this challenge.

> ***FUNDING NEEDED TO SUPPORT OPERATING EXPENSES***
>
> The experience of several of the NEPs suggests that annual funding of $600,000 to $2.0 million is needed for initial program implementation. Basic staffing and program operations—to support outreach, monitoring, and other activities—account for approximately $400,000 to $600,000 of this total. Grant programs, contracts, and seed money—to implement other Management Plan actions—account for $200,000 to $1.4 million that are directly controlled by the Program itself.

County general budget. The Peconic Estuary Program Office is part of the Office of Ecology in the Suffolk County Department of Health Services and the county general budget covers most of the operating costs of the estuary program. Suffolk County has a long-standing commitment to environmental management. It pushed for Peconic Estuary to be recognized as a National Estuary Program, and with the success of that effort, it has offered continued support. The Peconic Estuary Program presents its budgets as an investment with a greater return, not just as money to be expended.

State line-item funding. The Galveston Bay Program and the Coastal Bend Bays and Estuaries Program each receive state line-item funding of about $1 million per year from the Texas legislature; the estuary programs use some of these funds for program operation. The Galveston Bay Program and the Coastal Bend Bays and Estuaries

Program worked together to gain support for this state line-item funding. The estuary programs worked with local representatives to develop language for a bill in the state legislature, and the estuary programs enlisted local governments, nonprofit organizations, and individual citizens to support this measure. These NEPs also educated legislators statewide about the National Estuary Program and the estuary programs' role in Texas coastal protection. The bill received strong support and passed in 1999.

The Delaware Center for the Inland Bays used a series of breakfast presentations and individual meetings with state legislators to articulate current environmental problems such as *Pfiesteria*. Made aware of these problems, the Legislature provided specific monies for the NEP project to restore and preserve the Rehoboth, Indian River, and Little Assawoman Bays. The funding supports NEP outreach and research efforts and establishes local "tributary teams" to develop consensus-based plans to implement best management practices near the rivers and streams feeding into these bays. The Center for Inland Bays has successfully used the line-item funding to leverage additional funding sources.

Annual giving program. The Partnership for the Delaware Estuary (a nonprofit organization that was created to implement actions in the Delaware Estuary Plan) generates some of its operations funding with an annual giving program. Initially, the Partnership used a mail house to send out an appeal to the 25,000 people on the program's mailing list. Later, the Partnership sent out personalized appeals and an annual report to previous donors and a select group from the mailing list (less than 1,000 people) which resulted in a significant increase in the amount of donations.

Technical assistance fees. Buzzards Bay includes technical assistance fees on partner grant applications. The estuary program requests a 10 to 30 percent overhead charge for its grants to cover staff, printing, and outreach expenses. This charge, which generates $20,000 to $150,000 per year, requires a moderate amount of extra development and management. The Buzzards Bay Project communicates with grant makers to determine where staff expenditures and support costs are allowed under their grant programs. The estuary program thoroughly itemizes its expenses so that the grantor can see the specific needs and costs associated with completing tasks under the grant.

FUNDING IMPLEMENTATION PROJECTS

The NEPs use a variety of sources to fund implementation activities. The following examples show how the NEPs have used specialty license plate fees, foundation grants, capital giving campaigns, stormwater utility fees, state bond acts, tax credits, and low-interest loans to fund land acquisition, habitat protection, pathogen controls, and other activities.

COST OF MONITORING PLAN IMPLEMENTATION

The costs of the Puget Sound Ambient Monitoring Program were calculated by a technical costing subcommittee of the monitoring management committee. The estimates provided by this subcommittee demonstrate that the costs of comprehensive monitoring programs can be substantial. In addition to the $200,000 in staff and consultant time required to develop the monitoring program design, the calculated costs of full implementation of the monitoring program were estimated at $3.2 million per year. The initial sampling program was reduced in scope due to resource constraints, and costs for the program were $250,000 to $350,000 over the first two years. For additional information, see www.psat.wa.gov.

Affinity credit card. The Long Island Sound Study NEP worked with the Connecticut Department of Environmental Protection (CTDEP), to develop a Long Island Sound affinity credit card. The CTDEP developed the proposal for the Long Island Sound affinity credit card and fronted the operating costs until the program started to generate revenues. People's Bank won the award and continues to donate $5 to the Long Island Sound account of Connecticut's "Environmental Quality Fund" for every Long Island Sound credit card application it receives. The bank also donates half of one percent of the interest on all purchases made with the card. Revenues from the Long Island Sound affinity credit card program support grants for education, research, public access, and habitat restoration projects.

Specialty license plate fees. These fees generate $400,000 per year for the Indian River Lagoon Estuary Program and at least 80 percent of these funds support habitat protection projects. The NEP proposed the idea to the state legislature with 12,000 signature petitions stating that registered vehicle owners intended to purchase the specialty plate. The NEP paid a $15,000 administration fee to the state and developed a marketing strategy. The NEP is responsible for promotion of the license plate and management of the grant program supported by these revenues. The Anheuser-Busch Corporation donated $15,000 to help pay for more than 70 billboard advertisements and the Florida Outdoor Advertising Association donated $60,000 worth of billboard advertising space. For three months, a local car dealership provided all new car buyers with Indian River Lagoon license plates.

Foundation grants. The Narragansett Bay National Estuary Program partnered with a local nonprofit organization, Save The Bay, and received $200,000 in foundation grants to support habitat restoration. Recognizing the overlap in their interests, the two organizations successfully applied to the Pew Charitable Trusts for grant funding that was available to partners in the Restore America's Estuaries coalition. The

Narragansett Bay National Estuary Program leveraged these resources by using them as matching funds for a variety of other grant funding.

Photo: Steve Delaney

Capital giving campaign. In Casco Bay, a capital giving campaign raised more than $56,000 from local businesses to relocate juvenile lobsters prior to a Portland Harbor dredging project. As the Portland Harbor dredging project was moving forward, local lobstermen raised concerns that dredging would disrupt lobster habitat. The Chair of the Board for the Casco Bay NEP, a city manager, wrote letters to harborfront property owners and businesses and the cities of Portland and South Portland asking for financial support to research the issue and to design and implement a plan to protect the lobsters. Before dredging began, a coalition of lobstermen, state regulators, and staff and volunteers from the Casco Bay Estuary Project and Friends of Casco Bay moved 34,012 small lobsters from the dredge area. This group also tagged 4,000 lobsters to help evaluate the project's success and keep the dredging project on schedule.

Stormwater utility fee. This fee funds a stormwater management program in Sarasota County, Florida that addresses priority actions in the Sarasota Bay NEP's Management Plan, such as encouraging property management that minimizes stormwater runoff. The Sarasota Stormwater Environmental Utility has generated more than $100 million in revenue to fund planning, maintenance, and capital improvements, such as canal cleaning, mowing, and low-cost construction projects. The staff of the Sarasota Bay NEP served as an information source and members of the NEP's Citizen Advisory Committee provided public testimony during the utility development process.

State bond act. The Long Island Sound NEP Citizen Advisory Committee facilitated a memorandum of understanding signed by the governor and legislative leaders that committed over $100 million of New York State Clean Air/Clean Water Bond Act funds to wastewater treatment, stormwater control, nonpoint source pollution control, and wetlands restoration projects in the watershed. New York State guidelines favor projects that address the highest priorities identified in NEP Management Plans. New York State also forwards funding recommendations to the NEP Management

Conferences for consultation regarding consistency with the NEP Management Plan priorities. Over $200 million of this total has supported water quality improvement projects in the New York-New Jersey Harbor, Long Island Sound, and Peconic Bay NEPs.

Taxes. Ocean County, New Jersey voters approved a Natural Lands Trust financed by a new property tax of 1.2 cents per $100 of valuation. The measure is expected to raise nearly $4 million annually for the protection of the Barnegat Bay's watershed and agricultural lands. The new tax received broad support and was based on the results of public opinion surveys. Only natural lands or easements on natural lands will be purchased by the Trust, and public access will be guaranteed. No development will be allowed on the purchased properties.

Tax credits and low-interest loans. The Buzzards Bay Project and the Massachusetts Bays Program encourage citizens in their watersheds to take advantage of programs in Massachusetts that offer tax credits and low-interest loans to individuals that remediate failing septic systems. Under this program, the state's Clean Water State Revolving Fund makes interest-free loans to communities. The communities in turn lend money to homeowners that repair failing septic systems. Homeowners repay the loans with real estate taxes.

Real estate transfer tax. The Peconic Bay NEP worked with a nonprofit partner to implement a two percent real estate transfer tax, an assessment made by the county on land and deed transfers based on the sales price of property. Five towns surrounding the estuary have raised nearly $70 million in less than three years with the tax.

MONITORING AND COMMUNICATING RESULTS

The NEPs' Management Plans present goals, objectives, and actions designed to improve and protect estuaries and the quality of their waters. To evaluate how effective their actions have been in achieving Management Plan goals, the NEPs conduct environmental and programmatic monitoring. The NEPs develop and track environmental indicators to help communicate results to stakeholders and the general public that show how well management efforts are progressing and what changes in the estuary are taking place.

ENVIRONMENTAL MONITORING

Environmental monitoring measures changes in the biophysical conditions of the estuary and answers questions such as:

- Is the ecological integrity of the estuary changing?
- Is water quality improving or getting worse?
- Is the area of wildlife habitat increasing or decreasing?

Table 5.1 presents an excerpt from one of the Charlotte Harbor NEP's quarterly environmental reports. These reports are posted on their Internet Web site and present information on trends in water quality and the health of the surrounding habitat.

Table 5.1: Excerpt from one of the Charlotte Harbor NEP's quarterly environmental reports

Charlotte Harbor Proper/Lemon Bay			
Parameter	**Assessment**	**Parameter**	**Assessment**
Temperature	Slightly higher than normal	Phosphorous	Slightly higher than normal
Salinity	Slightly higher than normal	Dissolved Oxygen	Normal to very good
Color	Normal	Turbidity	Better than normal
Chlorophyll a	Normal	Secchi Depth	Normal to very good
Total Nitrogen	High in January	Near Bottom Dissolved Oxygen	Normal to very good

Through the last quarter, water flows, water quality, and habitat were in generally good shape. Issues of particular concern this quarter included higher than normal water flows from the Myakka, higher than normal excess nutrients in Charlotte Harbor and Lemon Bay, a sewage spill in the Estero Bay basin, closed shell fishing in East Pine Island Sound, and chronic water quality impairments of water bodies identified within the study area.

For additional information, see www.charlotteharbornep.com/ProgramReports/reports.htm.

To supplement their own environmental monitoring programs, the NEPs often establish volunteer programs that can provide high-quality, reliable data. Volunteer monitoring programs provide the NEP with both a large, committed, and voluntary workforce, and a venue for public education and outreach. The direct involvement of individual citizens provides a strong base for continued support—from planning through implementation. Extensive information on how to develop volunteer monitoring programs and use volunteer data effectively can be found in EPA's *Volunteer Estuary Monitoring: A Methods Manual* (www.epa.gov/owow/estuaries/ monitor/).

For example, the Morro Bay NEP, in conjunction with Friends of the Estuary and the Regional Water Quality Control Board, administers a volunteer monitoring program. Volunteers collect samples and record flow, nitrates, coliforms, dissolved oxygen, water temperature, turbidity, phosphates, and macroinvertebrates. In addition,

geomorphology, vegetation cover, and stormwater runoff are assessed yearly within the watershed. Over two hundred citizen monitors, ranging in age from school children to retirees, have participated in this very successful program. The Volunteer Monitoring Program increases public awareness and also assists the NEP in recording trends in environmental resources and water quality. The data are used to strengthen the mathematical models used by the NEP for management decisions.

PROGRAMMATIC MONITORING

Programmatic monitoring measures how well management efforts are progressing and answers questions such as:

- Are milestones being met?
- How much funding is being spent?
- Are partners following through on their commitments?

For example, the Charlotte Harbor NEP communicates their programmatic progress through monthly progress reports posted on their Internet Web site. These reports summarize the research, restoration, funding, and outreach activities completed during the month.

ENVIRONMENTAL REPORT CARD

The San Francisco Estuary Project produced the "Bay-Delta Environmental Report Card" to communicate the progress of the NEP to the public. The report card documented progress addressing the top 10 critical issues, such as invasive species, facing the Bay-Delta users, managers, watchdogs, and communities. The report card communicated the status of these issues, changes in public awareness of the issues over the three years, including ecosystem politics, funding, and effectiveness of efforts to address the issues. The report card also served to educate the public about emerging issues and new priorities for the future. For additional information, see www.abag.ca.gov/bayarea/sfep/sfep.html.

COMMUNICATING RESULTS

The NEPs use environmental indicators to track and communicate how well management efforts are progressing and what changes in the estuary are taking place. These indicators measure the estuary's conditions over time and show the pressures on the estuary and the resulting effects on ecological and human health. These indicators help gauge how effective NEP management efforts have been in achieving measurable results. For example, several NEPs use the area in which shellfish can be safely harvested as an indicator. This indicator shows the extent to which contamination restricts shellfish harvesting and can reflect problems related to how land is used and

cared for in the nearby watersheds. NEPs use these indicators to help answer two key questions:

- Is the condition of the estuary changing?
- Are the goals and objectives of the Management Plan being met?

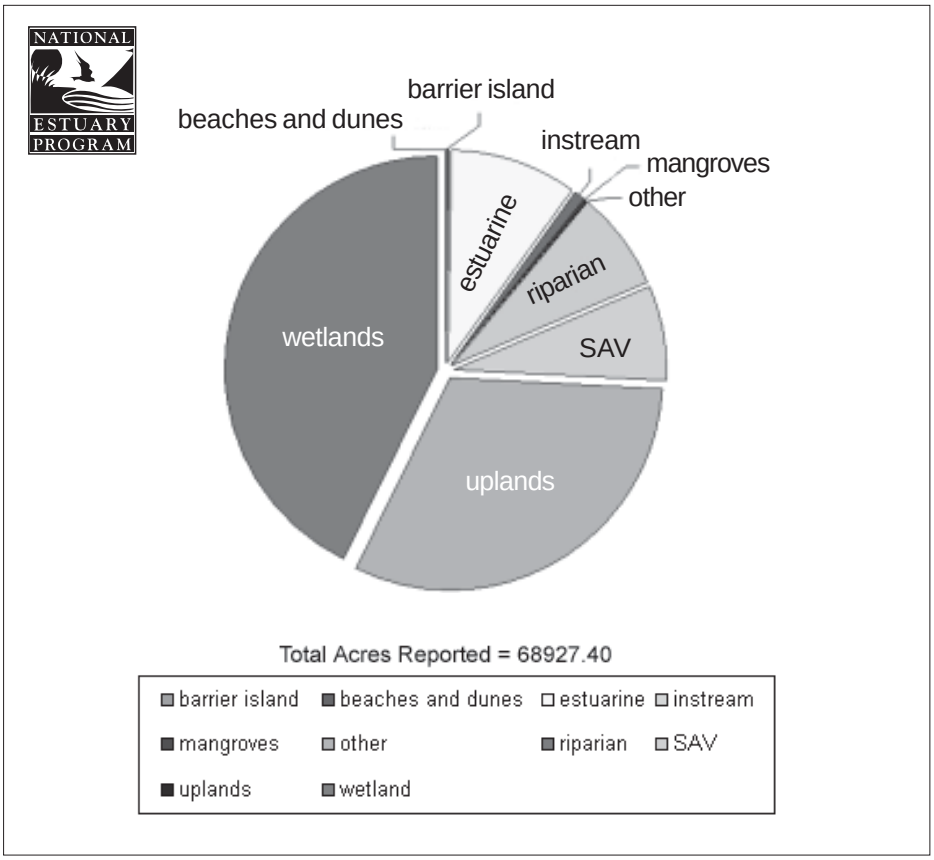
To communicate their monitoring results, the NEPs report their indicators on both an individual and aggregate level.

Photo: Steve Delaney

On an individual level, the NEPs report on a suite of indictors tailored to their estuary. For example, the Puget Sound NEP tracks and reports on 19 indicators to assess the successes and shortcomings of its efforts to protect and restore Puget Sound. The NEPs communicate these results through such means as State of the Bay reports, Web sites, and newspaper inserts. For example, the Long Island Sound Study developed their *Sound Health 2003—A Report on Status and Trends in the Health of Long Island Sound* report to communicate their results to a broad audience. This easy-to-read document (in newspaper format) required $10,000 and four months of staff time to produce, and $65,000 to print and distribute. It was inserted in the Sunday editions of more than 400,000 area newspapers and distributed to area libraries, nature centers, the state marine trades associations, and schools.

On a national scale, EPA uses a more limited number of indicators to assess the progress of the NEP as a whole. For example, the EPA tracks the number of acres and types of habitat restored and protected by the 28 NEPs. The EPA communicates these results through its Web site and other mechanisms. (See **Figure 5.3** on page 72.)

Figure 5.3: Habitat restored or protected by the NEPs



Source: NEP Government Performance Results Act reports, October, 2001.

UPDATING THE MANAGEMENT PLAN

Because the Management Plan is a flexible tool, it permits an estuary program to adapt to changing circumstances and to apply the lessons learned by experience. Some actions may be unsuccessful. New data may reveal unforeseen problems. Earlier assumptions may have been incorrect and technological advances may enhance cleanup capabilities. The resolution of some problems will free resources to tackle others. Furthermore, even though the Management Plan is a document reflecting consensus, conflicts among jurisdictions, agencies at various government levels, and the public are inevitable. These conflicts will need to be resolved, possibly by modifying the plan.

To help ensure the relevance of their Management Plans to ongoing project activity, many NEPs have provisions in their bylaws or operating plans that require periodic reviews of their plans. The updating of Management Plans has been used by estuary programs to celebrate progress and reaffirm commitments to their estuaries. The Coastal Bend Bays and Estuaries Program updates their Management Plan every five years. The update includes measurable environmental goals and targets as well as

timeframes for implementation over the next five to ten years. The Indian River Lagoon, Long Island Sound and New York-New Jersey Harbor estuary programs also periodically update their goals and implementation schedules. For example, to renew the commitment of stakeholders to the implementation of their Management Plan, the Long Island Sound Study developed a Long Island Sound 2003 Agreement. The 2003 Agreement was an update to the 1996 Agreement on implementing the Management Plan, and was approved by the Policy Committee. The 2003 Agreement was developed using a consensus-based process coordinated through the Management Conference and was subject to public review and comment.

Photo: Steve Delaney

IMPLEMENTING THE MANAGEMENT PLAN: EXAMPLES

Example 1: Development and implementation of a bi-state total maximum daily load (TMDL)

The Long Island Sound Study's (LISS) close partnership with the states of New York and Connecticut fostered an innovative TMDL approach that can serve as a model for how flexibility and market forces achieve efficient waste load allocations. The LISS Management Plan called for reductions in point and nonpoint source nitrogen loading to the Sound to improve water quality and reduce hypoxia. The LISS worked with the states and local governments to adopt aggressive nitrogen reduction targets in 1998 and then to adopt a nitrogen TMDL for the Sound in 2001. This TMDL, arguably the most comprehensive and complex one developed in the nation to date, establishes an enforceable schedule for point and nonpoint nitrogen reduction to the Sound over a 15-year period ending in 2014. The LISS helped Connecticut develop a general permit to incorporate nitrogen load limits for participating publicly-owned treatment works in the watershed. The LISS also fostered New York's bubble permit proposal for dischargers to the Sound. The Connecticut general permit scheme incorporates a nitrogen credit trading program that, in concert with the TMDL limits, sets a historic precedent in finding new ways of meeting water quality standards and protection, while keeping costs down for taxpayers. The TMDL is posted on the LISS Web site. For more information, see www.longislandsoundstudy.net.

▶ ***Example 2: Wetland construction to filter pathogens from stormwater runoff***

The Buzzards Bay Project assisted the Town of Marion, Massachusetts in developing a constructed wetlands system to abate pathogen contamination at Spragues Cove, a shellfish harvesting site regularly closed due to high concentrations of fecal coliforms. The discharge also adjoined a bathing area. A three-acre constructed wetland was designed to collect and treat stormwater runoff and associated nonpoint source pollutants from a 64-acre drainage area. Within the first year following construction, sampling indicated a reduction of fecal coliform bacteria in the cove. As additional plants become established in the wetlands, it is expected that fecal coliform counts will continue to decrease. For more information, see www.buzzardsbay.org.

▶ ***Example 3: Development of a technical assistance program to address toxic contamination***

The Narragansett Bay Estuary Program set up the Hazardous Waste Reduction Program as a partnership with the Rhode Island Department of Environmental Management and the University of Rhode Island. The Program focuses on both education and prevention. The Program provides technical assistance to businesses for pollution prevention through a waste information hotline and distributes information on source reduction, recycling, and chemical substitution-disposal alternatives. The Program also has developed a system for conducting onsite hazardous waste assessments for local businesses and industries. The Hazardous Waste Reduction Program has been so successful that it is now a state-funded, broad-based industrial pollution prevention program. The Program has been expanded to include information on, and a collection and treatment facility (the Eco-Depot) for, household toxic and hazardous wastes. For more information, see www.nbep.org.

▶ ***Example 4: Dam removal to allow fish to return to historic spawning areas***

The Management Plan for the Albemarle-Pamlico Sounds National Estuary Program calls for the restoration of vital fisheries habitats by means such as replanting vegetation, repairing hydrological systems, and improving water quality. The removal of the Quaker Neck Dam successfully restored 1,054 miles of anadromous fish

spawning habitat along the Neuse River and its tributaries. This project was significant because it was the first dam ever removed specifically to benefit the environment. Biologists reported that striped bass had returned to spawn in the lower half of the newly opened portion of the river. Other species expected to benefit include several major commercial and recreational fish species, such as American shad, hickory shad, and shortnose sturgeon. The success of the Quaker Neck Dam removal project resulted in the removal of two additional North Carolina dams for environmental purposes. For more information, see www.apnep.org.

Photo: Steve Delaney

Example 5: Outreach to homeowners to combat an invasive plant

The Tampa Bay Estuary Program provided seed money to a local homeowners association to develop a brochure on the Brazilian pepper plant. This plant threatens native species and poses health threats including skin irritation and respiratory problems. This educational leaflet provides homeowners with information on how to identify and eradicate the Brazilian pepper and where to obtain help. The brochure was distributed to citizens with shoreline homes and has been one of the Program's most popular public outreach tools. For more information, see www.tbep.org.

Example 6: Development of best management practices to improve freshwater flows to the estuary

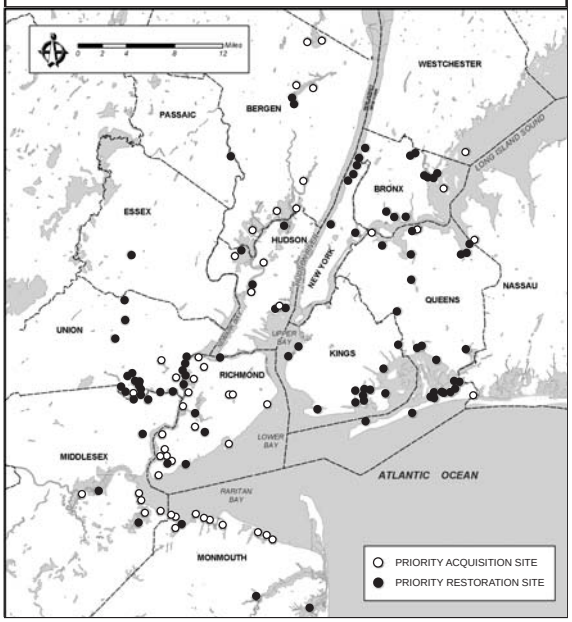
The Charlotte Harbor National Estuary Program's Management Plan (www.charlotteharbornep.com/) calls for a watershed approach to surface water management. Under this approach, a plan is created for each drainage basin that establishes minimum flows and water levels for each water body and determines the maximum cumulative withdrawals. One such plan is the Peace River Comprehensive Watershed Management Plan, developed by the Southwest Florida Water Management District and a team of stakeholders, which helps serve as a framework for future water use decisions. This plan seeks to provide a holistic method of protecting water quality in the basin and also ensuring adequate water supply for urban areas, agriculture, and the environment. Activities in the Comprehensive Watershed Management Plan and related efforts by the Charlotte Harbor National Estuary Program and the state include:

additional research of surface and groundwater flow conditions within the study area; regulation of surface and groundwater withdrawals for water supply, agriculture, and industrial purposes; regulation and monitoring of flow rates of point source discharges from sewage treatment plants and industrial facilities; use of best management practices to decrease and retain stormwater runoff; issuance of water use permits; and public education programs. Two community education programs related to water use for landscaping are xeriscaping and the Florida Yards and Neighborhoods Program (http://hort.ufl.edu/fyn/).

▶ ***Example 7: Development of a priority list and a GIS map of habitat sites for restoration and acquisition***

Through an ongoing process, the New York-New Jersey Harbor Estuary Program Habitat Work Group (www.harborestuary.org/) developed a list and Geographic Information Systems (GIS) map (refer to figure below) of priority habitat sites for restoration and acquisition. This information is being used by the states, federal partners, and others to identify appropriate restoration and acquisition projects. The map and the tireless activity of the workgroup have resulted in the funding of millions of dollars worth of restoration projects. One of the major sources of funding has been the multimillion dollar New York State Clean Water/Clean Air Bond Act. The map has also been used by the Corps of Engineers to refine its list of sites to be included in the Hudson-Raritan Reconnaissance Study, an effort that may ultimately result in the restoration of hundreds of acres of habitat.

New York - New Jersey Harbor



Source: New York-New Jersey Harbor Estuary Program Habitat Workgroup, July 31, 2002

▶ *Example 8: Replacement of failing septic tanks*

The Casco Bay Estuary Project and the Maine State Department of Environmental Protection entered into an innovative cooperative agreement to target the specific problem of overboard discharges (i.e., sand filter septic systems from homes on islands or other areas where conventional septic systems are difficult to install). The Department was understaffed, making statewide coordination of their Overboard Discharge Program and remediation of overboard discharges throughout the state difficult. The Estuary Project, working on a project to open closed clamflats to harvesting by removing known sources of pollution, arranged with the Department to manage the overboard discharge program in Casco Bay. With a clear understanding of the shared desire to accomplish this environmental goal, the Department agreed to provide the Estuary Project $1,000 for every overboard discharge system that is replaced with an acceptable alternative system. This cooperative agreement is mutually beneficial to the stakeholders, effectively addresses a serious environmental threat, provides measurable results, and furnishes revenue to the Estuary Project. For more information, see www.cascobay.usm.maine.edu.

Photo: Steve Delaney

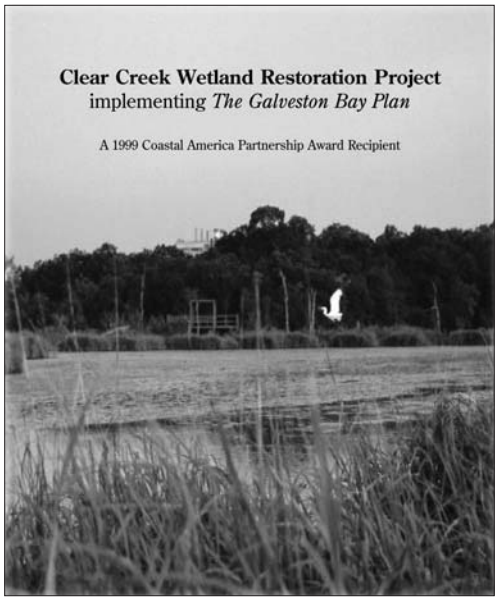
▶ *Example 9: Clam beds reopened through water quality improvements due to increased municipal sewerage coverage*

In November 2000, the Seabrook Middle Ground was reopened to clamming for the first time in nearly 10 years. This reopening points to marked water quality improvements largely due to increased municipal sewerage coverage in the Town of Seabrook and other smaller scale pollution control measures. The pollution source identification and reduction work that made this possible was a cooperative effort by the New Hampshire Estuaries Project; New Hampshire Department of Health and Human Services; New Hampshire Fish and Game Department; New Hampshire Office of State Planning; New Hampshire Department of Environmental Services; the Towns of Seabrook, Hampton, and Hampton Falls; and a number of dedicated volunteers from Great Bay Watch and area towns. The reopening of the Seabrook Middle Ground represents a significant increase in the area and number of shellfish available for recreational harvest by New Hampshire residents. For additional information, see www.state.nh.us/nhep.

▶ *Example 10: Innovative partnerships to implement the Management Plan*

Innovative partnerships are being created for implementation of *The Galveston Bay Plan*, developed through the Galveston Bay Estuary Program. The goal of the Program's Natural Resource Uses Subcommittee was to implement a project that would address the highest priority actions in the *Plan*—restoring wetlands and using dredged material in wetlands restoration. The objectives of the Clear Creek Wetland Restoration Project are:

- Demonstrate a cost-effective way to use dredged material in a beneficial manner.
- Test innovative seeding techniques that allow planting in very loose sediment.
- Form a partnership of agencies, businesses, and interest groups to serve as a model for restoration efforts throughout the Bay and in other coastal areas.



The project proved successful and demonstrated the benefits of agency-industry partnerships in leveraging resources and expertise including:

- Galveston Bay Estuary Program administered the grant and facilitated the project coordination.
- Reliant Energy, Inc. provided the site for the project, dredged the intake canal, and transported the material to the wetland site. Their expert staff provided project coordination.

- EPA Region VI provided a major source of funding, technical review, and facilitated the quality assurance process.

- Natural Resources Conservation Service tested the innovative treatment and distribution of seeds.

- U.S. Fish and Wildlife Service contributed the air boat for seed distribution.

- Padgett Shoreline Construction, Inc. built the levee and donated about half of its billable equipment time.

- Novus Systems, Inc., tested a variety of wave action barriers to protect the levee.

For more information, see www.gbep.state.tx.us.

Example 11: Environmental stewardship awards illustrate community involvement

To sustain stakeholder involvement and partner support, the Mobile Bay NEP created annual Stewardship Awards to recognize individuals, businesses, and local governments that "maintain and promote the wise stewardship of the water quality and living resources of the Mobile Bay and Delta." Presented at the Bay Area Earth Day celebration, a recent round of recipients included the City of Mobile Urban Planning Department for its smart growth work, a local ecotourism business for its commitment to protecting the Bay, and a man who led the effort to sponsor a specialty license plate issue that will raise money for land conservation in Alabama. Additional awards went to those who helped educate the public about the Mobile Bay ecosystem. The awards generate publicity for the program and strengthen ties with the recipients. For more information, see www.mobilebaynep.com.

Example 12: Regional volunteer monitoring programs

The Buzzards Bay Water Quality Monitoring Program and Massachusetts Bay Program have successfully built networks of citizen volunteers who contribute to key monitoring efforts. To document and evaluate nitrogen-related water quality and long-term ecological trends in Buzzards Bay's important embayments (more than one-quarter of the Massachusetts coast), the Coalition for Buzzards Bay recruited over 300 Baywatchers to monitor 180 stations. Baywatchers measure early morning oxygen levels, temperature, salinity, and water clarity on a set schedule once a week from May to September. The volunteers also collect samples on four dates in July and August for analysis of nutrients by a university laboratory. These basic parameters provide an immediate snapshot of the health of the Bay and are an excellent first warning system. The data are also being used to develop recommended limits and TMDLs for Buzzards Bay embayments and sewage treatment facilities. For more information, see www.buzzardsbay.org.

Massachusetts Bays' volunteer program is similar, but focuses on wetlands. The Wetland Health Assessment Program was developed out of the need to better assess the overall quality of wetlands in order to enhance protection, preservation, and restoration efforts. Both programs have the dual benefit of collecting comprehensive water quality data while educating and empowering people to get involved and make a difference in the sound management and restoration of their estuarial watersheds. For more information, see www.mass.gov/envir/massbays.

▶ *Example 13: Developing environmental indicators: lessons learned*

The Long Island Sound Study (LISS) developed approximately 50 environmental indicators of the health of Long Island Sound and the progress being made in protecting and restoring it.

The LISS reported the following lessons learned from development of their environmental indicators:

- Many environmental databases are not designed to provide watershed or ecosystem-specific information. The authors required additional time and effort to organize the data for Long Island Sound.

- Even when relying on existing monitoring programs and data, developing environmental indicators is a significant undertaking. Achieving initial agreement from Management Conference partners requires persistence and patience, however the investment needed to maintain and revise the indicators is less than the investment needed to develop them. The indicators can then provide an ongoing tool for assessing and reporting on progress.

- Information sharing among NEPs undertaking development of environmental indicators and state-of-the-estuary reports would benefit these efforts.

- Environmental indicators used in state-of-the-estuary reports can provide a powerful communication tool. Specific products tailored to different audiences can make the overall effort more effective.

For more information, see www.longislandsoundstudy.net.

Chapter 6: Conclusion

Much has been learned from the NEPs' experience. The NEPs have succeeded because they focus on the watershed, use science to inform decision-making, emphasize collaborative problem solving, and involve the public. The combination of these four elements has produced many positive results. The age-old adage: "A chain is only as strong as its weakest link;" tells us that successful watershed management depends on fulfilling all of the core elements. Some of the key ways in which the NEPs realize the core elements include:

Establishing governance structures according to watershed boundaries. Because environmental problems do not conform to political jurisdictions, the NEPs define their management areas and management committees according to watershed boundaries and the ecosystems within them. Where watersheds cross political jurisdictions, the NEPs establish partnerships that enable them to draw upon the full range of available management resources and tools. This watershed and ecosystem-based approach allows the NEPs to better understand and address the complex environmental problems found in estuaries.

Using science to develop and implement the Management Plan. The NEPs use science to assess estuary conditions, develop solutions to estuary problems, and adapt management efforts. They conduct a Technical Characterization that describes the quality of the estuary, defines its problems, and links problems to causes. The NEPs use these findings to develop the Management Plan. Science is also employed during implementation to monitor water quality and habitat and guide restoration and protection decisions. By basing decisions on sound science, stakeholders see the NEPs as credible sources of information.

Fostering collaborative problem solving. The NEPs invest a considerable amount of time to facilitate consensus on complex environmental issues. They develop mechanisms such as charters, bylaws, or memoranda of agreement to provide a framework for resolving conflicts. The NEP directors strive to be neutral parties to avoid being viewed as representing a particular entity or stakeholder. The NEPs use these mechanisms and skills to work in collaboration with the stakeholders and prevent conflicting agendas from derailing the program.

Informing and involving stakeholders to sustain commitment. The NEPs involve affected jurisdictions, agencies, nongovernmental organizations, and individuals in the writing

and implementation of the Management Plan. The NEPs inform stakeholders about the estuary and their mission, goals, objectives, and progress to ensure their sustained commitment. The NEPs involve stakeholders through such mechanisms as opinion surveys and small group meetings as well as formal participation on citizen advisory and other committees.

Leveraging limited funding resources to ensure implementation. A diversity of long-term funding sources are critical. The NEPs develop finance plans and strategic alliances with implementing partners to attract funds from various sources. The plans enable the NEPs to sift through potential funding sources and identify a variety of sources to pursue. The strategic alliances enable the NEP to cultivate partners who bring resources to the table for collaboration over long periods of time.

Measuring and communicating results to build support. The NEPs develop clear and realistic measures of success and use a variety of media to communicate them to all stakeholders. The NEPs translate environmental and programmatic results into plain English, telling a story about the estuary and its watershed that the public and local officials can understand.

We hope that the wealth of knowledge, experience, and tools presented here can help you to further watershed protection and restoration in your area. The NEP can serve as a model for future watershed protection and restoration efforts. The lessons learned by the 28 NEPs can be adapted for use in a variety of watershed management situations, both coastal and non-coastal. We also would like to hear how you used this guide, what you liked or disliked, and the lessons you learned while conducting your watershed projects. Please send us your comments through EPA's feedback link at www.epa.gov/owow/estuaries/contact.htm.

Appendix A: Clean Water Act, Section 320, as Amended

NATIONAL ESTUARY PROGRAM

a. MANAGEMENT CONFERENCE.

1. NOMINATION OF ESTUARIES. The Governor of any State may nominate to the Administrator an estuary lying in whole or in part within the State as an estuary of national significance and request a management conference to develop a comprehensive management plan for the estuary. The nomination shall document the need for the conference, the likelihood of success, and information relating to the factors in paragraph (2).

2. CONVENING OF CONFERENCE.

   A. IN GENERAL. In any case where the Administrator determines, on his own initiative or upon nomination of a State under paragraph (1), that the attainment or maintenance of that water quality in an estuary which assures protection of public water supplies and the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife, and allows recreational activities, in and on water, requires that control of point and nonpoint sources of pollution to supplement existing controls of pollution in more than one State, the Administrator shall select such estuary and convene a management conference.

   B. PRIORITY CONSIDERATION. The Administrator shall give priority consideration under this section to Long Island Sound, New York and Connecticut; Narragansett Bay, Rhode Island; Buzzards Bay, Massachusetts; Massachusetts Bay, Massachusetts (including Cape Cod Bay and Boston Harbor); Puget Sound, Washington; New York New Jersey Harbor, New York and New Jersey; Delaware Bay, Delaware and New Jersey; Delaware Inland Bays, Delaware; Albemarle Sound, North Carolina; Sarasota Bay, Florida; San Francisco Bay, California; Santa Monica Bay, California; Galveston Bay, Texas; Barataria Terrebonne Bay estuary complex, Louisiana; Indian River Lagoon, Florida; Lake Pontchartrain Basin, Louisiana and Mississippi; and Peconic Bay, New York.

3. BOUNDARY DISPUTE EXCEPTION. In any case in which a boundary between two States passes through an estuary and such boundary is disputed and is the subject of an action in any court, the Administrator shall not convene a management conference with respect to such estuary before a final adjudication has been made of such dispute.

b. PURPOSES OF CONFERENCE. The purposes of any management conference convened with respect to an estuary under this subsection shall be to –

1. assess trends in water quality, natural resources, and uses of the estuary;

2. collect, characterize, and assess data on toxics, nutrients, and natural resources within the estuarine zone to identify the causes of environmental problems;

3. develop the relationship between the inplace loads and point and nonpoint loadings of pollutants to the estuarine zone and the potential uses of the zone, water quality, and natural resources;

4. develop a comprehensive conservation and management plan that recommends priority corrective actions and compliance schedules addressing point and nonpoint sources of pollution to restore and maintain the chemical, physical, and biological integrity of the estuary, including restoration and maintenance of water quality, a balanced indigenous population of shellfish, fish, and wildlife, and recreational activities in the estuary, and assure that the designated uses of the estuary are protected;

5. develop plans for the coordinated implementation of the plan by the States as well as federal and local agencies participating in the conference;

6. monitor the effectiveness of actions taken pursuant to the plan; and

7. review all Federal financial assistance programs and Federal development projects in accordance with the requirements of Executive Order 12372, as in effect on September 17, 1983, to determine whether such assistance program or project would be consistent with and further the purposes and objectives of the plan prepared under this section.

For purposes of paragraph (7), such programs and projects shall not be limited to the assistance programs and development projects subject to Executive Order 12372, but may include any programs listed in the most recent Catalog of Federal Domestic Assistance which may have an effect on the purposes and objectives of the plan developed under this section.

c. MEMBERS OF CONFERENCE. The members of a management conference convened under this section shall include, at a minimum, the Administrator and representatives of –

1. each State and foreign nation located in whole or in part in the estuarine zone of the estuary for which the conference is convened;

2. international, interstate, or regional agencies or entities having jurisdiction over all or a significant part of the estuary;

3. each interested Federal agency, as determined appropriate by the Administrator;

4. local governments having jurisdiction over any land or water within the estuarine zone, as determined appropriate by the Administrator; and

5. affected industries, public and private educational institutions, and the general public, as determined appropriate by the Administrator.

d. UTILIZATION OF EXISTING DATA. In developing a conservation and management plan under this section, the management conference shall survey and utilize existing reports, data, and studies relating to the estuary that have been developed by or made available to Federal, interstate, State, and local agencies.

e. PERIOD OF CONFERENCE. A management conference convened under this section shall be convened for a period not to exceed 5 years. Such conference may be extended by the Administrator, and if terminated after the initial period, may be reconvened by the Administrator at any time thereafter, as may be necessary to meet the requirements of this section.

f. APPROVAL AND IMPLEMENTATION PLANS.

1. APPROVAL. Not later than 120 days after the completion of a conservation and management plan and after providing for public review and comment, the Administrator shall approve such plan if the plan meets the requirements of this section and the affected Governor or Governors concur.

2. IMPLEMENTATION. Upon approval of a conservation and management plan under this section, such plan shall be implemented. Funds authorized to be appropriated under titles II and VI of this chapter and CWA § 319 of this title may be used in accordance with the applicable requirements of this chapter to assist States with the implementation of such plan.

g. GRANTS.

1. RECIPIENTS. The Administrator is authorized to make grants to State, interstate, and regional water pollution control agencies and entities, State coastal zone management agencies, interstate agencies, other public or nonprofit private agencies, institutions, organizations, and individuals.

2. PURPOSES. Grants under this subsection shall be made to pay for activities necessary for the development and implementation of a comprehensive conservation and management plan under this section.

3. FEDERAL SHARE. The Federal share of a grant to any person (including a State, interstate, or regional agency or entity) under this subsection for a fiscal year –

A. shall not exceed –

(i) 75 percent of the annual aggregate costs of the development of a comprehensive conservation and management plan; and

(ii) 50 percent of the annual aggregate costs of the implementation of the plan; and

B. shall be made on condition that the non-Federal share of the costs are provided from non-Federal sources.

h. GRANT REPORTING. Any person (including a State, interstate, or regional agency or entity) that receives a grant under subsection (g) of this section shall report to the Administrator not later than 18 months after receipt of such grant and biennially thereafter on the progress being made under this section.

i. AUTHORIZATION OF APPROPRIATIONS. There are authorized to be appropriated to the Administrator not to exceed $35,000,000 for each of fiscal years 2001 through 2005 for –

1. expenses related to the administration of management conferences under this section, not to exceed 10 percent of the amount appropriated under this subsection;

2. making grants under subsection (g) of this section; and

3. monitoring the implementation of a conservation and management plan by the management conference or by the Administrator, in any case in which the conference has been terminated.

The Administrator shall provide up to $5,000,000 per fiscal year of the sums authorized to be appropriated under this subsection to the Administrator or the National Oceanic and Atmospheric Administration to carry out subsection (j) of this section.

j. RESEARCH.

1. PROGRAMS. In order to determine the need to convene a management conference under this section or at the request of such a management conference, the Administrator shall coordinate and implement, through the National Marine Pollution Program Office and the National Marine Fisheries Service of the National Oceanic and Atmospheric Administration, as appropriate, for one or more estuarine zones-

A. a long-term program of trend assessment monitoring measuring variations in pollutant concentrations, marine ecology, and other physical or biological environmental parameters which may affect estuarine zones, to provide the Administrator the capacity to determine the potential and actual effects of alternative management strategies and measures;

B. a program of ecosystem assessment assisting in the development of (i) baseline studies which determine the state of estuarine zones and the effects of natural and anthropogenic changes, and (ii) predictive models capable of translating information on specific discharges or general pollutant loadings within estuarine zones into a set of probable effects on such zones into a set of probable effects on such zones;

C. a comprehensive water quality sampling program for the continuous monitoring of nutrients, chlorine, acid precipitation dissolved oxygen, and potentially toxic pollutants (including organic chemicals and metals) in estuarine zones, after consultation with interested State, local, interstate, or international agencies and review and analysis of all environmental sampling data presently collected from estuarine zones; and

D. a program of research to identify the movements of nutrients, sediments and pollutants through estuarine zones and the impact of nutrients, sediments, and pollutants on water quality, the ecosystem, and designated or potential uses of the estuarine zones.

2. REPORTS. The Administrator, in cooperation with the Administrator of the National Oceanic and Atmospheric Administration, shall submit to the Congress no less often than biennially a comprehensive report on the activities authorized under this subsection including –

   A. a listing of priority monitoring and research needs;

   B. an assessment of the state and health of the Nation's estuarine zones, to the extent evaluated under this subsection;

   C. a discussion of pollution problems and trends in pollutant concentrations with a direct or indirect effect on water quality, the ecosystem, and designated or potential uses of each estuarine zone, to the extent evaluated under this subsection; and

   D. an evaluation of pollution abatement activities and management measures so far implemented to determine the degree of improvement toward the objectives expressed in subsection (b)(4) of this section.

k. DEFINITIONS. For purposes of this section, the terms "estuary" and "estuarine zone" have the meanings such terms have in CWA § 104 (n)(3) of this title, except that the term "estuarine zone" shall also include associated aquatic ecosystems and those portions of tributaries draining into the estuary up to the historic height of migration of anadromous fish or the historic head of tidal influence, whichever is higher.

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Appendix B: NEP at a Glance

Appendix B contains summary information for each of the 28 NEPs, including each program's Web site address. Source: *The National Estuary Program: Protecting Our Nation's Estuaries* (EPA842-F-99-001).

Albemarle-Pamlico Sounds, North Carolina

Key management issues: water quality, habitat protection, and fisheries

The Albemarle-Pamlico Sounds system is the nation's second largest estuarine system. Working closely with local councils, the Albemarle-Pamlico NEP is implementing cost-effective solutions for the top environmental priorities in the river basin. The NEP has spearheaded a number of significant restoration and protection projects, including identifying and acquiring over 27,000 acres of habitat; opening over 1,000 miles of blocked fish spawning areas; and developing more than 50 geospacial datasets as a component of the North Carolina Corporate Geographical Database. Several commercial and recreational fisheries have also been improved.
Web site: www.apnep.org

Barataria-Terrebonne Estuarine Complex, Louisiana

Key management issues: water flow alterations, sediment reductions, habitat loss/alteration, nutrients, pathogens, toxic chemicals, and changes in living resources

The confinement of the Mississippi River by man-made levees along with extensive channel construction through adjacent wetlands has changed the natural flow of water and sediments, increasing the impacts of subsidence and allowing the intrusion of salt water. Restoration projects implemented over a two-year span, however, have improved over 5,700 acres of wetlands at a cost of over $58 million. Nearly 2,500 sewage treatment systems have also been installed, eliminating the discharge of almost one million gallons of raw or partially treated sewage each day. Conservation projects on more than 4,000 acres of agricultural lands have reduced runoff containing nutrients, bacteria, and toxic chemicals.
Web site: www.btnep.org/

Barnegat Bay, New Jersey

Key management issues: nonpoint source pollution (pathogens, nutrients, sediments), and habitat loss/alteration

Over 450,000 people live within New Jersey's Barnegat Bay watershed, and that number doubles in the summer when people flock to the shore. The estuary is not only vital to the state's tourism industry, but also supports commercial and recreational fish populations and rare species. To balance suburban growth with ecosystem protection, all 33 municipalities in Ocean County approved a referendum in 1997 to purchase critical land areas. This land acquisition will help protect stream corridors, water supply areas, natural lands, agricultural land, buffer areas, and aquifer recharge areas. A growing network of private and public partners are working together to ensure the success of this project.
Web site: www.bbep.org/

Buzzards Bay, Massachusetts

Key management issues: nutrients, pathogens, contaminated seafood, and habitat loss/alteration

The diverse habitat of Buzzards Bay includes sandy beaches, salt marshes, eelgrass beds, and urban ports. The waters of the Bay are relatively healthy, but some of the smaller embayments are threatened by increasing amounts of pollution from residential development, industrial wastes, and sewage contamination. To address these issues, the Buzzards Bay Project has assisted in the construction of a test center to promote advanced septic treatment solutions and established limits on the amount of nitrogen that can enter the embayments. In addition, the program has acquired lands for preservation and reopened more than 4,000 acres of shellfish beds.
Web site: www.buzzardsbay.org/

Casco Bay, Maine

Key management issues: habitat protection, toxic chemicals, stormwater and combined sewer overflows, water quality in shellfish and swimming areas, and community stewardship

Casco Bay is a picturesque New England Bay covering 578 miles of shoreline. The Bay supports recreational activities, tourism, and industries, such as shipping, commercial fishing, and shellfishing. Accomplishments of the Casco Bay Estuary Project include promoting the adoption of Portland's combined sewer overflow management plan; organizing efforts to eliminate pollution sources to 360 acres of clam flats and reopen closed clamming areas; assisting in the relocation of 37,000 juvenile lobsters during the dredging of Portland Harbor; assisting with state shellfish advisories by conducting annual toxicity testing in the Bay; and helping to produce an award-winning public service announcement on the protection of the Bay.
Web site: www.cascobay.usm.maine.edu/

Charlotte Harbor, Florida

Key management issues: nutrients, pathogens, habitat loss/degradation, introduced species, and water flow alterations

The Charlotte Harbor Estuary on Florida's west coast is home to more than 2,300 animal species, including manatees, sea turtles, and dolphins. Over 2,100 species of plants—from grasses to mangroves to oaks—are also found in the region. Rapid growth, however, is changing the character and ecology of the watershed. To preserve the estuarine environment, this program is sponsoring 32 varied projects, ranging from removing exotic plants that threaten native species to erecting educational signs on visitor trails. The program also has created an information center, synthesized existing scientific knowledge of the watershed, completed a regional monitoring plan, and assessed the economic value of the area's natural resources.
Web site: www.charlotteharbornep.com/

Coastal Bend Bays and Estuaries, Texas

Key management issues: habitat loss/alteration, nutrients, stormwater runoff, debris, pathogens, and drinking water quality/supply

Located in a semiarid region, this estuary faces pressures from agriculture, tourism, maritime commerce, and the large and growing City of Corpus Christi. The Coastal Bend Bays and Estuaries Program is working to meet the area's water needs while protecting the estuaries' rich plant and animal life. The program is focusing on three key actions: shoreline management, nonpoint source management, and freshwater resources. The program's Management Plan was completed in a streamlined, community-based process with an unprecedented diversity of stakeholder involvement. The Texas Legislature also has designated $900,000 over two years for the program.
Web site: www.cbbep.org/

Delaware Estuary, Delaware, New Jersey, Pennsylvania

Key management issues: population growth, urban sprawl, habitat fragmentation, and toxic chemicals

The Delaware Estuary watershed spans three states. Bringing stakeholders together in such a large and complex watershed poses daily challenges. The Partnership for the Delaware Estuary coordinates resources, draws on the expertise of its many stakeholders, and inspires large numbers of residents in its watershed to become involved. Through these actions, the Partnership works to support environmentally sound land use practices, enhance important habitats, reduce polluted runoff, and reduce toxic and bacterial contamination. These efforts help ensure that contact recreation and fishing are permitted throughout the estuary.
Web site: www.delawareestuary.org

Delaware Inland Bays, Delaware

Key management issues: nutrients and habitat loss

Development and intensive agriculture in a burgeoning coastal resort area threaten the Inland Bay's habitat and natural resources. To help address these issues, the Delaware Center for the Inland Bays established the James Farm Ecological Preserve, a 150-acre county-owned property, which is leased as an outdoor living and recreation area. The program is also investigating harmful algal blooms and recommending pollution control strategies to address nutrient levels in the Bays. In addition, the program is restoring seagrasses; strengthening scallop, clam, and oyster populations; planting trees and shrubs to buffer stream banks from pollution; and examining the amount of nutrients entering the watershed through precipitation.
Web site: www.inlandbays.org/

Galveston Bay, Texas

Key management issues: habitat loss, nonpoint source pollution, and water flow alterations

Galveston Bay has lost 30,000 acres of wetland habitat and 90 percent of its seagrasses since the 1950s. Contaminated runoff has degraded water quality and sediments in the Bay's tributaries and some near-shore areas. In addition, altered freshwater inflows have changed the water's salinity and circulation patterns, which can severely stress wetlands and oyster reefs. In an effort to address these problems, industry and various levels of government are working together to leverage funding, save money, and develop creative restoration solutions. This diversified partnership has, for example, implemented an innovative seeding technique and used dredged material in wetland restoration efforts.
Web site: www.gbep.state.tx.us

Indian River Lagoon, Florida

Key management issues: habitat loss/alteration, increased freshwater flows, nutrients, sedimentation, and "muck" deposits

The location of the Indian River Lagoon on Florida's eastern coast—between the temperate climate of the north and the subtropical climate of the south—combined with its large size make it an estuary of high biological productivity. To ensure the health and diversity of the estuary, this program is partnering with numerous municipalities and counties to reduce stormwater runoff, which carries excess nutrients and sediments into the lagoon. The program's blueway/conservation and recreation lands project has acquired approximately 8,800 acres of land in the watershed, and mangrove replanting is helping to restore critical habitat. Sales and renewals of the program's license plate initiative across Florida have raised more than $1.6 million dollars for estuary restoration.
Web site: http://www.sjrwmd.com/programs/outreach/irlnep/index.html

Long Island Sound, Connecticut, New York

Key management issues: nutrients, habitat loss and degradation, toxic chemicals, and pathogens

More than 8 million people live within the 16,000 square-mile Long Island Sound watershed. Boating, fishing, swimming, and beach-going generate more than $5 billion annually for the regional economy. The top propriety of the Long Island Sound Study is to reduce nutrients that are impairing fish and shellfish habitat by depleting oxygen levels in many areas of the Sound. The program has set an ambitious goal to reduce nitrogen loads by almost 60 percent over 15 years and to restore 2,000 acres and 100 river miles of habitat by 2008. To meet these goals, the program is upgrading sewage treatment plants to treat nitrogen; restoring wetlands, beaches, dunes, coastal grasslands, forests, and shellfish reefs; and involving local communities in developing watershed-based approaches to control polluted runoff.
Web site: www.longislandsoundstudy.net

Lower Columbia River Estuary, Oregon, Washington

Key management issues: biological integrity, impacts of human activity and growth, habitat loss/alteration, conventional pollutants, toxic contaminants, institutional constraints, and public awareness/stewardship

The Columbia River is one of the nation's premiere natural resources. It supports a billion dollar economy with impacts far beyond the Pacific Northwest. The lower Columbia River and Estuary are in trouble, however, and its problems are manifested in the numerous threatened and endangered species of salmon and steelhead. To maintain the ecological integrity and economic health of the watershed, the Lower Columbia River Estuary Partnership developed a comprehensive, well-supported Management Plan with extensive public involvement. The plan makes use of a number of innovative tools, including a system to compare and rank the problems in each of the seven priority management areas. The plan also brings a coordinated approach to environmental monitoring on the lower Columbia River.
Web site: www.lcrep.org/

Maryland Coastal Bays, Maryland

Key management issues: nutrients, population growth, toxic chemicals, habitat/wildlife loss, sediments, and fisheries

During the summer, the population of the Coastal Bays swells to more than 250,000 people each week. Population growth is one of the major threats to the estuary, along with excess nutrients, habitat loss, sedimentation, and toxic chemicals. As a result, species diversity has declined in the northern bays. To instill a stewardship ethic among citizens and visitors, the Maryland Coastal Bays Program has sponsored more than 50 events, including free boat tours, cleanups, fundraisers, and land management workshops. It also has held "Alternative Futures" workshops to allow residents to create their vision for the watershed's future and to produce different growth scenarios. The program also helped secure a grant to preserve nearly 10 percent of the watershed's natural land.
Web site: www.mdcoastalbays.org

Massachusetts Bays, Massachusetts

Key management issues: contaminated shellfish, habitat loss, stormwater pollution, municipal wastewater management, local land use, and growth

The Massachusetts Bays region encompasses all of the coastal waters from the tip of Cape Cod to the New Hampshire border. Because of the region's diversity—in terms of its land use, ecology, and other factors—it hosts a wide range of environmental problems. In light of these challenges, the Massachusetts Bay Program has spearheaded an interagency program to reopen contaminated shellfish beds by identifying sources of pollution and implementing solutions for remediation. To address habitat loss and degradation, the Program has piloted a unique, holistic approach to assess wetland quality that may serve as a model in New England. Other initiatives include conducting a workshop series to prepare municipal officials for upcoming stormwater regulations and helping towns with growth planning and open space preservation.
Web site: www.mass.gov/envir/massbays

Mobile Bay, Alabama

Key management issues: water quality, physical and hydrologic modifications, habitat loss, living resources, human uses, and public involvement/education

The Mobile Bay watershed covers more than 71,500 square miles along the Gulf of Mexico. The program's successful projects include shoreline erosion control, habitat restoration, and wetland stormwater management. It has enhanced public awareness of key management challenges through community meetings and encouraged volunteer monitoring by citizens. Local governments and businesses have also been active participants in supporting watershed activities. The program has completed an economic valuation of Mobile Bay, along with preliminary characterization studies for each of the key management issues.
Web site: www.mobilebaynep.com/

Morro Bay, California

Key management issues: erosion and sedimentation, pathogen contamination of shellfish operations, nutrients, freshwater flow reductions, heavy metals, and habitat loss.

This estuary encompasses roughly 2,300 acres of mudflats, eelgrass beds, tidal wetland, and open water habitat—making it the most significant wetland system on California's south central coast. Threats to the estuary include erosion and sedimentation, as well as water diversion, urban and agricultural runoff, and changing land uses that threaten water quality and wildlife habitat. Faced with these challenges, the program has held workshops and established multi-stakeholder issue groups to focus on priority problems. In addition, the U.S. District Court awarded the program $3.6 million to carry out its conservation and Management Plan, drawing from gas and electric utility penalty funds.
Web site: www.mbnep.org/index.html

Narragansett Bay, Rhode Island

Key management issues: nonpoint source pollution (nutrients), pathogens, habitat loss/degradation, monitoring, and local land use/growth

For hundreds of years, Narragansett Bay has supported a remarkably diverse set of resource uses. The densely populated upper Bay watershed has served as a cradle of American industry, while the lower Bay provides a recreational resource of regional importance and international renown. The Bay is home to important fisheries and supports a wide variety of migratory fish and wildlife. The Narragansett Bay Estuary Program is working collaboratively to better assess the ecological health of the Bay, reverse ecological degradation, and improve planning for the Bay's future. Specifically, the Bay Program is mapping Rhode Island's estuarine habitats and promoting habitat restoration; monitoring water quality and advocating nutrient controls; and helping to develop watershed-based approaches toward sustainable use of the Bay's natural resources.
Web site: www.nbep.org/

New Hampshire Estuaries, New Hampshire

Key management issues: pathogens, habitat loss/alteration, nutrients, and toxic chemicals

The New Hampshire Estuaries Project is using the health of the state's shellfish population as an indicator of water quality and a measure of overall estuarine health. For the first time in more than 10 years, the Hampton/Seabrook Estuary—the most productive recreational clam flat in coastal New Hampshire—was opened, and more than 800 shellfishers participated in the opening day harvest. Many organizations within the state have worked together to identify and eliminate pollution sources and reopen shellfish beds. Their work has resulted in the opening of an additional 550 acres of shellfish waters in the Great Bay Estuary.
Web site: www.state.nh.us/nhep/

New York-New Jersey Harbor, New York, New Jersey

Key management issues: toxic chemicals, dredged material management, pathogens, nutrients, and habitat loss/alteration

For over 300 years, the Harbor has served as a critical port and economic center in the midst of a densely populated area. These factors have contributed stresses to the estuarine system. Many areas of the Harbor contain elevated levels of toxic chemicals. Pathogenic contamination results in beach and shellfish bed closures. To address these and other issues, the program is identifying sources of loadings of toxics, pathogens, and nutrients to the Harbor and is reducing them by cleaning up sources of toxics, controlling discharges from combined sewer overflows, and improving nitrogen removal at treatment plants. A protocol now allows managers to quickly assess potential impacts of accidental sewage discharges and to take action to protect the public. The program also developed a map of priority habitat sites and helped direct millions of dollars to their acquisition and restoration.
Web site: www.harborestuary.org/

Peconic Bay, New York

Key management issues: nutrients, pathogens, toxic chemicals, brown tide, and natural resource threats

One of The Nature Conservancy's "Last Great Places in the Western Hemisphere," the Peconic Estuary is a high-quality resource, vital to the economy of Long Island. However, brown tides have decimated the once nationally significant bay scallop industry, bacterial contamination has closed many shellfishing areas, and nutrient inputs have depressed dissolved oxygen locally. In response, the Peconic Estuary Program has integrated economics with habitat and water quality management, establishing specific policies to control nitrogen inputs. More than 50 early implementation projects deal with stormwater management, wastewater treatment upgrades, and scallop, wetlands, and eelgrass restoration. Public support and nonfederal resources have been critical, resulting in tens of millions of dollars for land preservation, pollution control, and resource management.

Web site: www.peconicestuary.org

Puget Sound, Washington

Key management issues: habitat loss, declining fish stocks, stormwater runoff, onsite septic systems, introduced species, and shellfish protection

Puget sound encompasses 2,300 miles of shoreline and is home to more than 200 species of fish and 14 species of marine mammals. The Puget Sound Action Team has helped protect this critical resource. The program's plan led to the development of the nation's first sediment standards. More than a third of the 140 local governments in the basin have adopted the plan's basic stormwater program. Further, laws have been passed to require certification of professionals who work with onsite septic systems. Commercial shellfish acreage has been reopened after years of closures. And an award-winning public education program has involved more than 1.5 million people. The program also works with British Columbia on common issues including marine protected areas, toxics, and the introduction and spread of aquatic nuisance species.

Web site: www.psat.wa.gov/

San Francisco Estuary, California

Key management issues: aquatic resource degradation, wetlands loss, decline of wildlife species, altered flow regimes, introduced species, increased pollution, and lack of integrated planning and management

Facing a variety of challenges—from the loss of wetlands to a lack of economic incentives to promote public/private habitat protection—the San Francisco Estuary Project has made great strides by strengthening and providing support for local planning efforts. The project worked cooperatively with local, state, and federal agencies, and private organizations to develop the Baylands Ecosystem Habitat Goals Report—a scientific guide for restoring and improving the baylands and adjacent habitats of the San Francisco Estuary. The project is now working to implement the report by developing a regional wetlands Management Plan that will include identifying restoration projects and their costs, establishing a wetland monitoring framework, and reaching agreements among funding, regulation, and implementing parties.
Web site: www.abag.ca.gov/bayarea/sfep/sfep.html

San Juan Bay Estuary, Puerto Rico

Key management issues: sewage discharges, reduced water circulation, nutrient-toxic contamination, living resource degradation, aquatic debris, and lack of public awareness/involvement

The San Juan Bay Estuary is one of many tropical areas trying to harmonize economic development with resource protection. Urban development during the past 40 years has led to considerable changes in freshwater inflows and degradation of many habitats and living resources. To address these challenges, the program focuses on improving water and sediment quality and enhancing and protecting habitat and living resources. The program is restoring the Martin Pena Channel, and promoting active participation of all associated communities. The program helped establish a solid waste management and recycling program and conducted environmental education demonstration projects directed at community-based conservation and development. In addition, it has created fences to reduce illegal dumping, cleaned up beaches, planted mangrove seedlings, and reforested tributaries.
Web site: www.estuariosanjuan.org/

Santa Monica Bay, California

Key management issues: stormwater/urban runoff, habitat restoration, toxic chemicals, pathogens, sediment contamination, contaminated seafood, and bay plan financing

As home to more than 5,000 species of flora and fauna, Santa Monica Bay provides a rich natural resource immediately adjacent to the second largest metropolitan area in the nation. With more than 45 million visitors per year, the Bay faces many challenges regarding water quality and habitat protection. To address concerns about health risks to Bay swimmers, the Santa Monica Bay Restoration Commission completed the first west coast study to assess human health risks of swimming in waters contaminated by urban runoff. Other accomplishments include developing a comprehensive Bay monitoring program; leading efforts to establish a stormwater permit for Los Angeles County and its 85 cities; conducting groundbreaking research on urban runoff sources, toxicity, and impacts; restoring coastal wetland habitats; and funding public outreach programs to encourage Bay stewardship.
Web site: www.santamonicabay.org

Protecting Our Water Heritage

Sarasota Bay, Florida

Key management issues: population growth and development, nutrients, habitat loss/degradation, and stormwater runoff/sewage discharges

Nearly 50 years of urban growth and development have taken a toll on Sarasota Bay. Excess nitrogen—which enters the Bay through wastewater, stormwater, rainfall, and the atmosphere—poses the biggest threat to the health of the estuary. Working with the community, the Sarasota Bay NEP has helped to reduce the amount of nitrogen entering the Bay by 47 percent, resulting in an 18 percent increase in seagrass coverage. The program has embarked on a series of projects to enhance habitat related to seagrasses, wetlands, and artificial reefs. As compared with 1998, the Bay now supports an additional 110 million fish, 71 million crabs, and 330 million shrimp. The program has also enhanced more than 130 acres of wetlands since 1990—about eight percent of those lost since 1950.
Web site: www.sarasotabay.org/

Tampa Bay, Florida

Key management issues: water and sediment quality, habitat loss/alteration, species loss/decline, and spill prevention/response

Tampa Bay—Florida's largest open water estuary—stretches 398 square miles at high tide. After decades of pollution, the Bay is coming back to life, thanks in part the Tampa Bay Estuary Program. In particular, the program has focused on controlling nitrogen loadings to the Bay to restore vital underwater seagrass beds. The Tampa Bay Nitrogen Management Consortium, an innovative public-private partnership, developed an action plan to achieve nitrogen reduction goals. The consortium is making impressive progress toward the program's long-term goal of recovering 12,350 acres of seagrasses baywide. The program is also providing national leadership in addressing air deposition of nitrogen and other pollutants to coastal waters.
Web site: www.tbep.org/

Tillamook Bay, Oregon

Key management issues: habitat loss/degradation, bacterial contamination, altered flow regimes, sedimentation, and erosion

Dominated by rugged mountains with a narrow coastal plain, Tillamook Bay faces a challenging combination of environmental concerns. In particular, past land use practices and flooding have impacted critical habitats for salmon spawning and rearing. To address these challenges, the Tillamook Coastal Watershed Resource Center houses a 150-layer GIS database and posts environmental data and watershed enhancement updates online. Other projects include streamside fencing and riparian re-vegetation to keep livestock out of streams and to restore riparian areas; adding large rocks and woody debris to improve in-stream habitat; and purchasing ecologically valuable land to be preserved in land trusts. A consortium of agencies, industries, and stakeholders is responsible for implementing the programs Comprehensive Conservation and Management Plan.
Web site: www.tbnep.org

Appendix C: Components in Developing Action Plans for the Lower Columbia River Estuary Partnership

1. Public meetings. Public meetings were held throughout the study area at key program junctures to present the priority issues, discuss the preliminary goals and objectives for each issue, ask what possible actions could be taken to address the issues, and discuss how implementation should occur. At each series of meetings, the Program did two things: asked for reaction to specific ideas and sought guidance for the next step. The first set of meetings encouraged a brainstorm of actions, the second conducted the comparative risk ranking, and the final set reviewed the draft Management Plan and discussed implementation ideas.

2. Charrette. A charrette—an interactive meeting between various groups of people in a community and experts designed to produce a tangible outcome—was held which involved management committee members, workgroup members, and scientific and technical experts in biology, ecology, land use planning, economics, and other disciplines. The day-long "From Issues to Action" charette explored possible actions, based on the participants' technical expertise and input from the earlier public meetings. The experts' input helped refine the overall goal, or vision, for each priority issue and helped identify objectives for each. A preliminary list of 180 actions was developed, providing a full range of options to consider.

3. Comparative Risk Ranking. The Lower Columbia River Estuary Partnership was the first NEP to utilize comparative risk ranking in the development of its Management Plan. The risk ranking allowed the estuary program to explore how citizens and technical experts perceive the relative risk posed by environmental problems in the estuary. Using the Program's priority issues as a basis, the Management Committee identified 21 problems (such as loss of wetlands and habitat, contaminated sediment, stormwater runoff, and altered streamflow). Participants were asked to rank the problems against each other according to their perceived risk to public health, ecological health, and quality of life. A set of criteria was developed to assist the focus groups and technical group in their ranking. Criteria included questions, such as "How widespread is the problem?" "What are the consequences of delay?" "Is this a fundamental or underlying issue—one that is the cause of other problems on the list?" and "Does the problem result in lost jobs, increased health care costs, or lowered incomes?" Three separate rankings were completed:

- Public ranking – more than 1,100 citizens ranked risks by completing a survey published in 14 area newspapers or by attending one of eight public meetings.
- Constituent focus group ranking – 267 participants ranked risks at 27 focus group meetings hosted by individual management committee members for their constituents.
- Technical ranking – the 31-member management committee ranked risks with the help of the program's science and technical workgroup experts.

The results of the rankings were used to identify actions to address the priority issues, define the role of the estuary program in implementing actions, and design objectives and components of the estuary program's education efforts.

4. Focus Groups. Like public meetings, constituent focus group meetings were held at three junctures in developing the Management Plan. Each Management Committee member hosted a meeting with their constituents to get reaction to Committee ideas and to seek guidance on next steps. In one series of focus groups, 17 meetings were held to ask participants to help refine the list of 180 actions. Another series of meetings with constituents was held to complete the risk ranking. At the final series of meetings, participants reviewed and commented on the draft Management Plan and asked questions about implementation: "Of the long list, what are the top five or ten actions? Which ones should stay in the Management Plan? Which ones should be dropped?" "Which actions could citizens help implement?"

5. Management Committee Action Selection. Using the results of the public and technical input, the Management Committee used a three-step process to determine which actions to include in the Management Plan and how they would be implemented.

- Determining SMART Actions. The Management Committee screened each of the 180 actions to determine which actions were SMART: **S**pecific, **M**easurable, **A**chievable, **R**esponsive, and **T**rackable.
- Refining the List of Actions. SMART actions were screened further, using a set of criteria that focused on factors such as social impact and impact on quality of life, technical basis for the action, linkage to estuary program goals, and effectiveness in protecting and restoring the river and estuary. The process involved considerable discussion of policy and consistency. This process narrowed the list of actions from 125 to 92 and resulted in well-defined, action-oriented, specific actions.
- Developing an Implementation Plan for Each Action. The last step was to develop an implementation plan to specify who would implement each action, how much it would cost, and how it would be funded. Several interdependent actions were combined, narrowing the list of actions down to 43. Criteria such as feasibility, probability of success, resulting impacts, and timeframe for implementation were applied to each action.

6. Research Groups. For the final series of public meetings reviewing the draft Management Plan, the Program conducted a series of research groups. The same questions were asked as in the public meetings; however, in the research groups, the participants were randomly selected and paid a small stipend to help ensure that they reflected a cross-section of the community.

Appendix D: Pros and Cons of Becoming a Tax-Exempt Nonprofit

Reasons to Become a 501(c)(3) Tax-Exempt Nonprofit:

NEP-Specific Benefits

- Receive donations/Ability to fundraise
- Quicker decision-making for grants and contracts
- Flexibility
- Can be proactive
- Independence
- Visibility
- Ability to support or challenge agency partners
- Support from citizens
- Less encumbered by bureaucracy

General Benefits

- Tax exempt status
- Can apply for public or private grants
- Can act as neutral forums for stakeholders
- Can access private funds more easily as a nongovernmental organization
- Can be modified as required
- Greater flexibility in the use of paid or volunteer staff than governmental organizations
- Qualifies an organization for low postal rates, favorable pension plan status, and tax-sheltered annuity plans
- In some states, can also receive property tax and sales tax exemptions

Reasons Not to Become a 501(c)(3) Nonprofit:

NEP-Specific Drawbacks

- Lack of institutional framework for operational funding and staff support
- State agencies can still exercise influence if they are on the board of directors
- Not in the loop in state budget decision-making
- Incur new costs (e.g., increase in health insurance, liability insurance, computer maintenance, Internet, accounting, legal, corporate reporting, etc.)
- Vulnerable to economic downturns
- Competition with other nonprofits
- Politics of the job

General Drawbacks

- Harder to secure government appropriations and grants
- Cannot receive more than 90 percent of their income from an endowment
- Can only undertake limited lobbying activities
- Cannot exercise regulatory authority

Source: U.S. Environmental Protection Agency, Coastal Management Branch. Nonprofit NEPs: Looking Back on the Lessons They Learned. Washington: U.S. Environmental Protection Agency, 2002.

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Appendix E: Excerpt from an NEP Finance Plan

Source	Program	Amount
	Funding Committed	
Marmot Foundation	Schoolyard Habitat	$ 10,000.00
Visteon Corporation	Sense of Place Habitat Projects	$ 3,000.00
Conectiv	2002 Teachers Institute	$ 2,500.00
DelDOT	Program Support	$ 50,000.00
City of Wilmington	Program Support	$ 28,000.00
PG&E Logan Generating Plant	Habitat Work	$ 5,000.00
Longwood Foundation	Building/Equipment	$ 50,000,00
Total:		$ 148,500.00
	Requests Pending	
ALICO	General Operating and Program Support	$ 59,000.00
Delaware River Port Authority	General Operating and Program Support	$ 229,000.00
The AIG Life Companies	Program Support	$ 70,000.00
PA DEP Growing Greener	Clean Water Theater	$ 80,000.00
Sun Company	Program Support	$ 20,000.00
PA CZM	Coast Day 2003	$ 29,000.00
Delaware 319	Schoolyard Habitat	$ 20,000.00
Delaware 319	Delaware CESP	$ 24,000.00
U.S. EPA Region III - RGI	Clean Water Partners - N.C.C.	$ 137,000.00
Total:		$ 668,000.00
	Proposals Not Funded	
PG&E	Classroom Education	$ 4,000.00
Environmental Endowment for NJ	Schoolyard Habitat	$ 11,000.00
League of Women Voters	Classroom Education	$ 4,000.00
U.S. EPA Headquarters - Enviro. Ed.	Municipal Stenciling	$ 54,000.00
U.S. EPA Region II - 104(b)3 C.W.A.	Maurice River Ecotourism	$ 10,000.00
U.S. EPA Region II - RA Priority	Schoolyard Habitat	$ 13,600.00
Total:		$ 96,600.00
	Potential Proposals	
Delaware River and Bay Authority	Delaware CESP	$ 30,000.00
Chichester Foundation	Programs	$ 100,000.00
MBNA	Educational Program	$ 30,000.00
Prospect Hill Foundation	General Operating	$ 10,000.00
MacArthur Foundation	Programs	$ 150,000.00
Good Samaritan Foundation	Programs	$ 20,000.00
William Penn Foundation	Programs	$ 300,000.00
Total:		$ 640,000.00

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COMMUNITY-BASED WATERSHED MANAGEMENT: LESSONS FROM THE NATIONAL ESTUARY PROGRAM

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Visit the EPA Office of
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