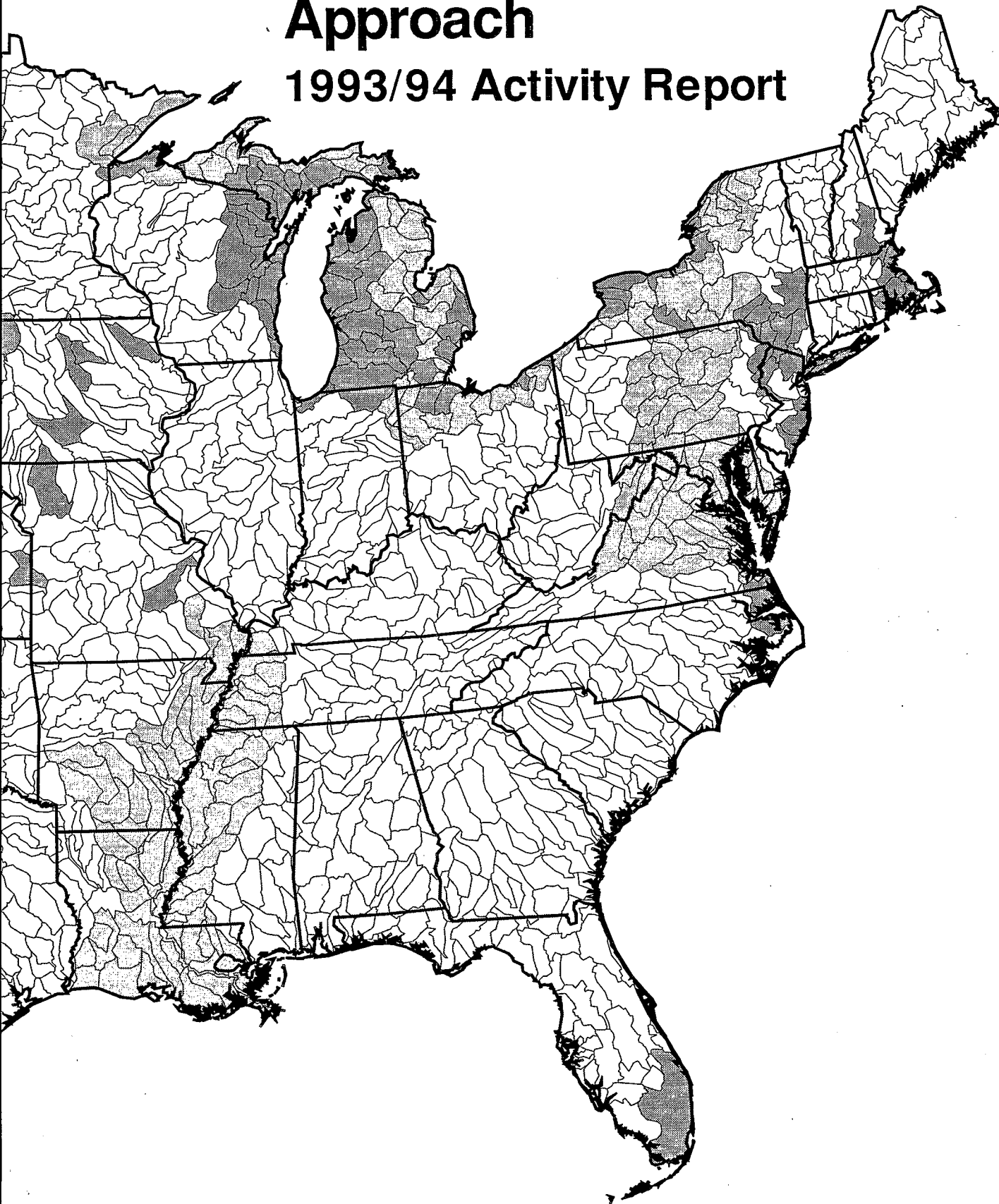




The Watershed Protection Approach

1993/94 Activity Report



The shaded areas on the map depicted on the front and back covers of this document represent the approximate locations of many of the watershed projects described in this document (descriptions begin on page 19). The intent of the map is to give the reader a general idea of the geographic scope covered by these projects; however, the map does not show all projects described in this document, and the boundaries are not exact.

Introduction

The Nation's aquatic resources are among its most valuable assets. Although significant strides have been made in reducing the impacts of discrete pollutant sources, these aquatic resources remain at risk. Today's challenges include resolving significant and complex pollution problems that come from nonpoint sources, maintaining safe drinking water supplies, and protecting and restoring the health and integrity of aquatic ecosystems. Since 1991, the U.S. Environmental Protection Agency (EPA) has been promoting the watershed protection approach as a framework for meeting these challenges. EPA's Office of Water has taken steps to reorient and coordinate point source, nonpoint source, lakes, wetlands, coastal, ground water, and drinking water programs in support of the watershed approach. In addition, EPA is promoting multi-organizational, multiobjective, watershed management projects across the nation. This shift toward comprehensive watershed management has helped lead the Agency toward a "place-based approach" to environmental problem solving (see Edgewater Consensus, p. 13).

What is the watershed protection approach?

The watershed protection approach is an integrated, holistic strategy for more effectively restoring and protecting aquatic resources. This approach focuses on hydrologically defined drainage basins—watersheds—rather than on areas arbitrarily defined by political boundaries. Thus, for a given watershed, the approach encompasses not only the water resource, such as a stream, river, lake, estuary, or aquifer, but all the land from which water drains to the resource. To protect water resources, it is increasingly important to address the condition of land areas within the watershed because as water drains off the land or leaches to the ground water it carries with it the effects of human activities throughout the watershed.

The watershed protection approach is characterized as being action oriented, driven by broad environmental objectives, and involving key stakeholders. The three major cornerstones of the watershed protection approach are:

- 1) Problem identification - Identify the primary threats to human and ecosystem health within the watershed.
- 2) Stakeholder involvement - Involve the people most likely to be concerned or most able to take action.

- 3) Integrated actions - Take corrective actions in a comprehensive, integrated manner once solutions are determined. Evaluate success and refine actions, as necessary.

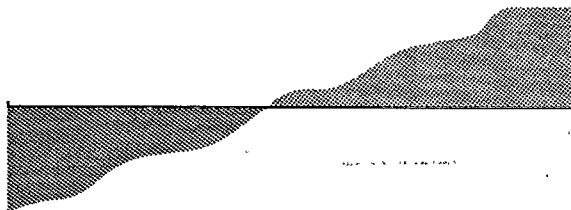
The watershed approach places emphasis on all aspects of water quality: physical (e.g., temperature, flow, mixing, habitat); chemical (e.g., conventional and toxic pollutants such as nutrients and pesticides); and biological (e.g., health and integrity of biotic communities, biodiversity). The approach encompasses all waters—surface and ground, inland and coastal.

EPA has established a five-pronged approach for implementing the watershed protection approach. The five elements of the approach are:

- 1) Try it - Initiate and carry out activities on a watershed basis.
- 2) Advertise it - Promote the watershed protection approach using a variety of opportunities including conferences, newsletters, and publications.
- 3) Integrate it - Align programs on a watershed basis.
- 4) Develop tools for it - Provide technical assistance that will facilitate implementation of the watershed protection approach.
- 5) Measure it - Monitor success of implemented solutions and make changes as necessary.

What is the purpose of this document?

This document provides a summary of activities EPA has carried out in 1993 and 1994 to support the watershed protection approach and a short discussion on anticipated future directions. In addition, summaries of watershed projects in which EPA is a stakeholder are included.



EPA is very committed to the watershed protection approach and has made great strides in 1993 and 1994 to further incorporate the watershed protection approach into its water programs and to facilitate watershed protection efforts outside of EPA. This section is organized around the five elements—try it, advertise it, integrate it, develop tools for it, and measure it—of EPA's strategy for implementing the watershed protection approach. For each element, a summary of accomplishments is provided. See pages 14 - 16 for a list of contacts for the activities and publications described in this section and the Future Activities section.

Try It

EPA is committed to trying the watershed protection approach in order to gain experience that can guide future policy. The many projects in which EPA now participates are a result of EPA's commitment to trying it (see individual project descriptions beginning on page 17). In addition, EPA's programs are creating incentives to encourage watershed protection efforts by others. For example, EPA is targeting many of its grants to assist in watershed projects. These grants include Clean Water Act Section 104(b) grants, Clean Water Act Section 319 grants, wetlands grants, and total maximum daily load/nonpoint source mini-grants.

Advertise It

To promote a broad understanding of the watershed protection concept, EPA is working to open, improve, and maintain communication with potential stakeholders, including other federal agencies, state and local governments, and nongovernmental organizations. Selected efforts to advertise watershed protection are described below.

"Know Your Watershed" Campaign: In 1993, the National Association of Conservation Districts' Conservation Technology Information Center launched a campaign to encourage rural and agricultural communities to play an active role in managing their watersheds. The "Know Your Watershed" Campaign is building a national partnership of agricultural commodity groups, farm organizations, farm managers, agricultural retailers, industry, govern-

ment, and others to address the conservation of natural resources, watershed protection, and nonpoint source pollution. EPA is a key participant in this campaign.

Initial products include a brochure, *Forming a Watershed Alliance*, that describes a watershed and how human activities may adversely affect water quality. It provides suggestions for starting a local watershed alliance and implementing practices that protect water quality. Three awareness scorecards help landowners and others evaluate their knowledge of watersheds and the environment: *Scorecard for Rural and Suburban Landowners*, *Scorecard for Farmers and Ranchers*, and *What is Your Ecological Quotient?*.

WATERSHED '93: This major conference held in March 1993 brought together more than a thousand professionals from federal, state, and local agencies and industrial, agricultural, environmental, and recreational communities to share experiences and exchange information on watershed management. The conference featured more than 150 speakers and generated considerable momentum for watershed management efforts. EPA, along with 12 other Federal agencies, several local government sponsors, and numerous nongovernmental groups supported this conference that was developed and organized by the Terrene Institute.

Watershed Events: EPA coordinates development and production of this newsletter on watershed protection which, in 1994, expanded to an interagency newsletter with contributing editors from eight federal agencies. *Watershed Events* provides its readers with information on watershed projects around the country, activities to support watershed protection, new publications, and upcoming conferences. More than 4,000 people receive the newsletter and circulation continues to grow.

Rural Clean Water Program Review: Working with the U.S. Department of Agriculture (USDA), EPA directed the review and evaluation of the 10-year Rural Clean Water Program performed by North Carolina State University. This comprehensive evaluation of 22 watershed projects resulted in a series of recommendations and findings on a wide range of watershed project topics, including project planning, evaluation, information and education, and producer participation.

Clean Lakes Program Review: A Commitment to Watershed Protection: This review of the Clean Lakes Program documents the program's success and explains how lessons learned from it can be applied to other management initiatives. Four principles form the base for this success: local involvement and commitment, state management, matching funds, and good science.

Regional Meetings: All of EPA's Regions have held watershed meetings at various levels. For example, Region VII held a workshop to introduce regional employees to watershed approach concepts and issues and move the Region toward institutionalizing the watershed approach. Region X provides another example. Region X supported a conference that was attended by over 1,000 people representing a variety of watershed stakeholders. The purpose of the conference, held from September 28-30, 1994, was to identify approaches and strategies for effective watershed stewardship. The conference allowed participants to share information about watershed tools, technology, and philosophies and to build partnerships.

National Water Quality Inventory: Report to Congress: This report is produced every two years and provides a snapshot on the quality of the Nation's waters. In 1996, this report will contain significant new information including additional biological and ecological health information. The guidelines for 1996 include a strong recommendation that states report water quality on a watershed basis.

Integrate It

EPA is striving to modify its programs to better incorporate watershed protection. EPA is building on its experience with its geographic initiatives (e.g., Chesapeake Bay, Gulf of Mexico) and pursuing opportunities to eliminate barriers and identify actions to be taken to promote and support watershed programs within EPA and at the state and local level. EPA is also playing an active role in legislative efforts to reauthorize the Clean Water Act and the Safe Drinking Water Act. Examples of some of these efforts to integrate programs are described below.

Geographic Initiatives

National Estuary Program (NEP): The NEP employs a watershed approach for protection of estuarine waters and serves as an Agency model for promoting ecosystem protection. Currently, there are 21 estuaries in the NEP. The NEP emphasizes the importance of promoting long-term involvement of all watershed stakeholders in local decision making. The experiences gained and materials produced by the NEP are extremely valuable to watershed managers. Summaries of each of the 21 NEPs are included among the individual project descriptions that begin on page 17.

Great Water Bodies: EPA has several well established programs, including the Chesapeake Bay Program, the Great Lakes Program, and the Gulf of Mexico Program, that take a comprehensive, geographically targeted approach. These programs are promoting smaller scale watershed projects as an important part of the overall effort to restore and protect the Nation's Great Water Bodies.

For the Chesapeake Bay, nutrient over-enrichment is the biggest challenge facing the overall restoration effort. To address this problem, in 1992, Pennsylvania, Maryland, Virginia, and the District of Columbia committed to set specific nutrient reduction goals for each of the Bay's major tributaries and develop individual tributary strategies to achieve those goals as well as to protect and improve aquatic habitats. The overall goal is to reduce controllable nitrogen and phosphorus levels in the Bay by 40 percent. This goal translates into an annual reduction of 74.1 million pounds for nitrogen and 8.43 million pounds for phosphorus. These targets are to be reached by the year 2000 and are based upon the 1985 base nutrient load—a combination of the 1985 point source discharges of nutrients and the average nonpoint source discharge from 1984-1987. (See individual project description on page 40 for more information.)

The Gulf of Mexico Program includes the Gulf Ecological Management Sites (GEMS) and the Mobile Bay Restoration Demonstrations. The GEMS project is currently identifying unique and important areas throughout the Gulf that need to be managed or protected to maintain their essential qualities. The Gulf of Mexico Program has recently initiated a project to identify potential mechanisms that will ensure that the areas selected as GEMS are managed in a way that protects their intrinsic value. The Mobile Bay Demonstrations are focusing on an ecosystem approach to

watershed environmental management. (See individual project description on page 67 for more information.)

For each of the five Great Lakes, the United States and Canada have agreed to develop and implement Lakewide Management Plans (LaMPs). The primary goal of a LaMP is to reduce both point and nonpoint source loadings that are causing or have the potential to cause beneficial use impairments. LaMPs also emphasize pollution prevention and address other stressors associated with beneficial use impairments such as degradation and loss of habitat and threats to protected species. A key element of each LaMP is the integration of federal, state, provincial, and local programs. Each LaMP includes the following stages:

- Stage 1: Assess beneficial use impairments and identify stressors;
- Stage 2: Identify actions to reduce, eliminate, or prevent beneficial use impairments; and
- Stage 3: Assess progress towards environmental goals.

EPA is working in partnership with the Great Lakes states and public stakeholders to develop the LaMPs. (See individual project descriptions for Lake Michigan, page 78, and Lake Ontario, page 80, for more information.)

In addition to the LaMPs, Remedial Action Plans (RAPs) are being developed and implemented for the 43 specific Areas of Concern (AOCs) in the Great Lakes region that have been designated by the United States and or Canadian governments. The RAPs address impairments to any one of 14 beneficial uses (e.g., fish and wildlife consumption, navigation, or drinking water consumption) associated with these areas. A RAP is developed in three stages which are:

- Stage I: Identify and assess use impairments and identify the sources of the stresses in the AOC;
- Stage II: Identify proposed remedial actions and their method of implementation; and
- Stage III: Document evidence that uses have been restored.

The eight Great Lakes states and the Province of Ontario have the lead in preparing and implementing the RAPs. EPA provides oversight and technical assistance. The input and expertise of other federal agencies and organizations as well as local citizen groups and individuals is also vital to the success of the RAP process. The LaMPs provide a lakewide framework for evaluating the effectiveness of RAP efforts. (See individual project descriptions that be-

gin on page 17 for more information about a number of AOCs.)

Clean Lakes Program: The Clean Lakes Program (CLP) was established in 1972 and has been an important model for the watershed protection approach and ecosystem management. The CLP has taken a holistic, place-based approach using sound science, involving stakeholders, and forming partnerships for comprehensive, integrated action to protect and restore lake resources in the Nation. Many tools have been produced under the CLP which have wider applicability. These tools include technical/guidance documents, bioassessment protocols/biocriteria, tracking systems, conferences, and outreach tool kits. The CLP has established guidelines for watershed protection, and funding was provided for a number of watershed projects under the CLP in 1993-94, as well as support of statewide lake assessment, volunteer monitoring, and lake enhancement programs for states and tribes. Better integration of the CLP with nonpoint source efforts, water quality management, permitting, and other ecosystem protection efforts is being implemented through the *Clean Lakes Strategy - New Directions for the Future*. Through better integration, the CLP will increase its emphasis on protecting ecosystem health, aquatic habitat, and drinking water supplies through pollution prevention.

Legislative Activities

President Clinton's Clean Water Initiative: This Initiative presents the position the Administration took on reauthorizing the Clean Water Act (CWA). The Initiative included specific recommendations for watershed management. Although the CWA was not reauthorized during the 1994 session of Congress, the Administration will work within its current authorities to implement to the extent possible the watershed recommendations.

The recommendations that will continue to be pursued include empowering states and local governments to practice comprehensive watershed management. Specifically, the Administration proposes to guide and reward voluntary state programs for comprehensive watershed management that would:

- Delineate watershed boundaries.
- Examine the condition of all watersheds and identify the watersheds most in need of attention—those that are impaired, threatened, or in need of special protection.

- Designate multidisciplinary, multiorganizational, locally-based watershed management teams and their lead agencies. Charge those teams to:
 - Establish environmental objectives, which would include water quality standards and other important environmental goals.
 - Identify the highest priority problems in the watershed.
 - Create and carry out action plans to solve those problems.
 - Revise their plans and actions, as needed.

In addition, establishing incentives to reward states that choose to implement a watershed program will be explored. Possible incentives include opportunities to tailor or target nonpoint source controls; to receive a multi-purpose water grant; and to obtain flexibility and streamlining under the wetlands, point source, and drinking water programs.

Safe Drinking Water Act Protection Proposal: Included in the Administration's plan for reauthorizing the Safe Drinking Water Act is a recommendation for development and implementation of source water protection programs. The goal of these programs is to protect ground and surface water drinking supplies through pollution prevention. Benefits of source water protection programs include reduced treatment needed to comply with the regulations, more focused and targeted monitoring of vulnerable water supplies, avoided costs for finding alternative sources of water, and citizen involvement in protecting water supplies. The proposed baseline source water protection program would include a delineation of drinking water protection areas, inventories of significant sources of contamination, vulnerability assessments, contingency plans, and local involvement. An enhanced program would contain stronger, enforceable prevention measures. Where enhanced programs are in place, states would be allowed to establish tailored monitoring and treatment exemptions. This program with its comprehensive approach and emphasis on local involvement compliments watershed protection efforts.

Strategies, Grant Consolidations, and State Reorientations

National Pollutant Discharge Elimination System (NPDES) Watershed Strategy: Over the past 20 years,

the NPDES program has employed technology-based and water-quality-based permit requirements to achieve significant reductions in pollutant discharges to surface waters from hundreds of thousands of NPDES regulated entities. In recent years, the NPDES program has broadened to include a number of additional initiatives aimed at addressing remaining sources of pollutant discharges including 1,100 communities with combined sewer overflows, over 15,000 treatment works treating domestic waste (sewage sludge), and storm water discharges from over 100,000 industrial facilities and 200 municipal separate storm sewer systems.

The challenge for the NPDES program is managing baseline program requirements and newer initiatives within the context of both limited resources and environmental impacts that vary from state to state and region to region. Over a six month period that began in the Fall of 1993, EPA developed a strategy to fully integrate the NPDES permits program into the watershed protection approach. By integrating its program functions into the broader Watershed Protection Approach, the NPDES program can meet this challenge and cost-effectively address remaining point source environmental impacts.

The NPDES Watershed Strategy outlines national objectives and implementation activities to 1) integrate NPDES program functions into the broader Watershed Protection Approach and 2) support development of state-wide Basin Management Approaches (BMAs). The strategy identifies six areas that are considered essential for EPA Headquarters and Regions to support these objectives. These areas are:

- State-wide coordination - Promote development of basin management frameworks that identify the roles and responsibilities of participating programs, long-term programmatic and environmental goals, geographically delineated basins, and a schedule for periodically evaluating the environmental condition of each basin.
- NPDES permits - Encourage NPDES permit issuance on a watershed basis using one of two methods: 1) development of a basin management plan and synchronization of permit issuance within basins, or 2) development of a basin management plan and assuring that permits are issued in accordance with it.
- Monitoring and assessment - Promote the development of state-wide monitoring strat-

1993/1994 EPA Activities

egies to assure the most effective targeting of limited resources and coordinate collection and analysis of NPDES, nonpoint source, and other watershed data.

- Programmatic measures and environmental indicators - Revise national accountability measures to facilitate implementation of watershed protection activities and establish new measures of success that reflect assessment of progress toward watershed protection goals.
- Public participation - Promote long-term public support for basin management activities by providing opportunities for the public to participate in goal development, priority setting, strategy development, and implementation.
- Enforcement - Coordinate compliance and enforcement programs and activities both at the federal and state level to focus resources on priority point sources within identified basins.

While the essential components listed above focus on action items for the NPDES program, they also emphasize critical areas in which the NPDES program must coordinate its activities with the efforts of other surface and ground water programs. The Strategy recognizes that, while the NPDES program will play a central environmental protection role in a number of watersheds, in many other watersheds, point sources will not represent the primary stressors. The NPDES program's main task in the latter watersheds will be to support and facilitate effective implementation activities for meeting environmental objectives (e.g., monitoring, public participation). In either case, the NPDES Watershed Strategy is not intended to supersede or impede existing watershed protection efforts; rather, it is intended to support ongoing state initiatives and supplement the efforts of other environmental programs by identifying areas where the NPDES program can contribute.

Several states and EPA Regions have taken significant steps towards integrating NPDES program activities into the broader Watershed Protection Approach, however, the program nationally is a largely untapped resource. To promote implementation of the NPDES Watershed Strategy on a national level, each EPA Regional office will complete the following action items:

- Regional state by state assessments and action plans - Assess current watershed protection activities in each state and, in the context

of that assessment, develop Regional action plans for fiscal year 1995 that identify how the Region will support and facilitate each state's movement toward the Watershed Protection Approach.

- State/EPA workplan agreements - Include specific activities within state/EPA workplans for fiscal year 1995 which will promote the central components of the NPDES Watershed Strategy.
- Internal coordination - Develop Regional strategies which describe the Regional decision making processes, oversight role, and internal coordination efforts necessary to ensure support for the Watershed Protection Approach.

Wellhead Protection Program: EPA has been operating the Wellhead Protection (WHP) Program since the 1986 Amendments to the Safe Drinking Water Act created the program. The program is a place-based ground water protection program that protects public drinking water supplies from contamination. It is designed to identify all potential sources of contamination within a delineated wellhead protection area and differentially manage those sources through a variety of regulatory and non-regulatory tools. Contingency planning is another vital element of the program, because contamination incidents can happen, even with the best source management. The active involvement of all stakeholders is needed for a viable wellhead protection program.

As of October 1993, over 18,000 local WHP Programs have been initiated. These local programs, which are essentially watershed programs, can be found in communities of all sizes across the country.

Comprehensive State Ground Water Protection Approach: In 1992, EPA released its Final Guidance for Comprehensive State Ground Water Protection Programs (CSGWPPs). EPA is encouraging states to develop these programs to coordinate federal, state, and local ground water protection efforts and to target these efforts to priority ground water areas. States are currently developing CSGWPPs and are beginning to submit them to EPA for endorsement.

Like a watershed approach, CSGWPPs are place-based rather than source-based or nationally-oriented, include all of the relevant stakeholders, and have multiple environmental objectives. CSGWPPs should be carefully coordinated with a state's water-

shed or basin protection approach for maximum effectiveness in protecting water resources.

Regional Watershed Protection Approach Framework Documents: Most EPA Regions are in the process of drafting or beginning implementation of Regional Watershed Protection Approach Framework Documents. These documents generally outline:

- The framework which EPA will use to help states move to a watershed protection approach.
- The role for states in regional identification of priority watersheds which cross state lines or are of international importance.
- Options for restructuring the Region to better promote the watershed protection approach.

106/319/604 (b) Grant Consolidation: Working within existing statutes, the Watershed Integrated Grants Workgroup is building upon the successful efforts of two earlier efforts to improve grants management for Clean Water Act Sections 106 and 319. The workgroup is systematically analyzing the grant allocation, negotiation and award, and tracking and close out processes in order to identify improvements that will facilitate state adoption of watershed protection approaches. To date, the workgroup has identified grant related barriers to adopting watershed approaches; consolidated a number of grant certifications previously required for each individual grant; and issued funding guidance for Sections 106, 604(b), and 319. The workgroup is currently investigating greater use of electronic transfer in the grant award process, increased use of automated data systems for program tracking and accountability, and potential use of other sources of funds to support state watershed protection approaches. The workgroup is composed of staff from EPA's Headquarters and Regions and from a number of states.

State Reorientation: EPA continues to support individual states and regions in implementing watershed protection approaches through facilitation of State watershed protection approach development and educational workshops. For example, EPA's Region IV office recently held two one-day workshops with the States of Georgia and Mississippi to provide them with an overview of state basin planning and a process to convert their water programs to this approach. Details provided at these workshops ranged from how to synchronize basins to how to involve the

public. Both workshops were very well received by the states. A follow-up workshop in Georgia has also been held.

Many states are taking steps toward implementing watershed management. Efforts range from showing interest to actual implementation. North Carolina is one state that is in the process of transitioning their surface water program to a basin management approach. Monitoring, assessment, planning, permit issuance and other implementation activities are rotated through the State's 17 basins every five years allowing all program resources to be focused on interrelated basin problems and solutions.

State Wetland Conservation Plans: EPA is encouraging development of State Wetland Conservation Plans (SWCPs) as a tool to achieve no net loss of wetlands in the short term and net gain in quantity and quality in the long term. These comprehensive state plans encourage integration of federal, state, and local wetlands programs with other programs which impact wetlands (e.g., nonpoint source). The State Wetland Conservation Planning process, which seeks to involve all stakeholders, encourages states to inventory existing resources and programs and to formulate goals and objectives for resource protection. These goals often include streamlining existing regulatory programs and an increased emphasis on place-based planning programs such as watershed planning. In addition, the planning process stresses the need for development of implementation and monitoring strategies in order to meet the goals and objectives outlined in the plan.

While SWCPs are useful for identification of state goals and program gaps, watershed plans are viewed as tools for implementation of goals and objectives outlined in SWCPs. EPA provides funds for development of watershed protection projects as well as for SWCPs. Each process encourages a holistic approach to resource protection and provides a significant opportunity for integration of planning and protection efforts.

Develop Tools for It

EPA recognizes the need to provide technical information and tools to support watershed protection. The Agency is working to develop tools and training for watershed stakeholders. Examples of some of these tools and training are described below.

Nonpoint Source Watershed Project Workshops: EPA initiated a series of annual workshops to provide direct assistance to nonpoint source watershed projects that are funded primarily through the Clean Water Act Section 319 Program, but also include projects administered by USDA and others. The first workshop was held in September 1993 in Charlotte, North Carolina, and was hosted by the North Carolina Cooperative Extension Service, Gaston County Quality of Natural Resources Commission, Gaston Soil and Water Conservation District, Gaston County, and Duke Power. Participants from across the Nation learned and shared ideas about project planning, land treatment, monitoring, and data analysis. A field trip highlighted the activities underway in the Long Creek Watershed, one of the first projects approved under the Section 319 National Monitoring Program. The Illinois Environmental Protection Agency with EPA support hosted the second nonpoint source watershed project workshop in September 1994. Planning for subsequent workshops has already begun for 1995-1998.

CZARA Guidance and Workshops: EPA and the National Oceanic and Atmospheric Administration (NOAA) are working together to assist states in developing their Coastal Nonpoint Pollution Control Programs (CNPCP) required by Section 6217, Protecting Coastal Waters, of the 1990 Coastal Zone Act Reauthorization Amendments (CZARA). CNPCPs are intended to strengthen the links between federal and state coastal zone management and water quality programs, thus enhancing state and local efforts to manage land use activities which degrade coastal waters and habitats. Each state with a federally approved coastal zone management program (29 of the 35 states with coastal borders) must develop and implement a CNPCP or face financial penalties. To be approvable, CNPCPs must include enforceable policies that will ensure the implementation of appropriate management measures.

EPA and NOAA have developed two guidance documents—*Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters* and *Coastal Nonpoint Pollution Control Program*. The former document addresses technology-based management measures. The latter document addresses both baseline technology management measures and additional water quality-based measures as necessary to address remaining water quality problems in particular coastal watersheds. The Guidance targets five major nonpoint sources of pollution—agricul-

ture, forestry, urban areas, hydromodification projects, and marinas. In addition, cross-cutting measures that address the protection of wetlands, riparian areas, and vegetated treatment systems are included in the Guidance. The guidance documents have been widely distributed.

EPA and NOAA are providing additional assistance through workshops and threshold reviews. The workshops were held in several locations around the country and provided training to states on developing their CNPCPs. The threshold review process established by EPA and NOAA is voluntary and is intended to provide states with early feedback on their proposed approaches to developing their coastal nonpoint programs.

Ecosystem Protection Research Program: EPA's Office of Research and Development has consolidated its ecological research under the Ecosystem Protection Research Program. The program emphasizes developing an understanding and techniques for effective place-based management of ecological resources. Research will be conducted to support assessment efforts at three broad spatial scales—the watershed, the region, and the nation. Within each spatial scale, the program is organized along the risk paradigm and will include research on effects, exposure, and assessment methods. The strategy for acquiring watershed-scale ecological risk assessment capability is to develop, test, and demonstrate integrated evaluations of the likelihood of ecological effects from one or more stressors operating at multiple scales of ecological complexity (organism, population, community/ecosystem, etc.). The Savannah River Watershed (southeastern United States) and the Pacific Northwest have been selected as initial research sites.

Guidance for Ecological Watershed Risk Assessments: EPA is developing guidance for risk assessors and risk managers on how to develop and use watershed ecological risk assessments to support the development of effective watershed management plans. Watershed management plans based on ecological risk assessments will help risk managers to prioritize risks from multiple stressors and target limited environmental dollars to achieve desired outcomes. The guidance will support ecological risk assessments in watersheds of different types and sizes and those containing a variety of stressors and ecological resources.

To establish a foundation for the guidance, five ecological risk assessment case studies are being

conducted. Watersheds selected as case studies include the Middle Platte River Wetlands, Nebraska; Big Darby Creek, Ohio; Clinch River, Virginia; Snake River, Idaho; and Waquoit Bay Estuary, Massachusetts. The experience gained during development of the case studies, coupled with the combined experience of local and state implementation of watershed management initiatives, will be used by EPA's Office of Water to write the guidance which should be available in December 1995.

The case studies and guidance documents will be used as the basis for outreach, training modules, and videotapes to help local, state, and federal risk managers. The case studies will also support future development of Agency-wide guidelines for ecological risk assessment on a landscape scale.

EMAP-Landscape Ecology: The newest formed group of the Environmental Monitoring and Assessment Program (EMAP) is the EMAP-Landscape Ecology team. Unlike EMAP's resource groups, which monitor indicators of the condition of individual resources such as lakes, forests, or estuaries, EMAP-Landscapes will monitor and assess the ecological condition of mixed groupings of ecological resources at broader geographic scales. Watersheds are being evaluated as one of the primary geographic units upon which EMAP-Landscapes' monitoring and assessment will occur. A working, integrative concept of watershed condition and indicators appropriate for estimating watershed condition is under development, and the program has expressed interest in input from watershed managers during the development process. EMAP-Landscapes' Research Plan under went peer review in early 1994, and pilot activities are currently taking place in EPA's Region III (Delaware, District of Columbia, Maryland, Pennsylvania, Virginia, and West Virginia) in cooperation with the Middle Atlantic Integrated Assessment (MAIA).

Intergovernmental Task Force on Monitoring Water Quality (ITFM): ITFM is a federal/state/tribal partnership with representatives from 20 agencies and organizations that was established in 1992 to develop a national strategy to improve water-quality monitoring, assessment, and reporting. The strategy will address surface, ground, and coastal waters; wetlands and habitat; and atmospheric deposition. EPA serves as ITFM chair, and the U.S. Geological Survey serves as vice chair and executive secretariat. The ITFM is a 3-year effort that will disband in favor of full implementation activities in January 1995.

ITFM's strategy ratifies and encourages ongoing efforts in some instances while in others it calls for fundamental changes in the ways water-quality programs are defined, designed, prioritized, and funded. Specific ITFM recommendations include:

- Establishment of a National Water-Monitoring Council as a permanent successor to the ITFM. This Council would address water-quality monitoring and assessment in the broadest sense—as keys to sustaining human health, ecosystem health, and economic stability. The Council would promote implementation of ITFM recommendations among member agencies, provide technical guidance, and sponsor the development of a coordinated national training program.
- Establishment of a Methods and Comparability Council to promote and coordinate the collection of monitoring data of known quality.
- Creation of a linked network of major agency water-quality data systems.

To facilitate implementation of the national strategy, ITFM has developed several "building block products." These include:

- A framework for a monitoring program.
- Selection criteria for environmental indicators.
- A matrix of environmental indicators to measure designated uses.
- A policy on data comparability and performance-based methods.
- A matrix of monitoring activities of federal agencies
- An index of monitoring and data programs.

The final national strategy will be released in January 1995.

Watershed Monitoring Guidance: EPA has characterized the eight stages at which watershed managers need water information and is developing a handbook to help managers locate that data. The eight stages are:

- Delineation - Determining watershed boundaries, ecological regions within watersheds, and ancillary data such as demographics and land use.
- Goal and indicator selection - Choosing indicators to assess whether or not goals are being met.
- Status information - Describing the characteristics of the watershed. Characteristics

include wetlands, sedimentation, and aquatic resources.

- Problem identification - Describing the causes and sources of problems in the watershed. Ideally, information gathered in this stage will help predict future problems.
- Priority setting and ranking - Ranking the watershed problems in priority order according to the relative risk the problems pose to human and ecological health.
- Program and project design and implementation - Designing monitoring programs to gather data to allow program and project design. Designing pollution prevention and remediation programs.
- Measuring success and compliance over time - Determining if the goal for the watershed has been achieved, if the program is achieving its desired environmental effect, and if the project is in compliance with regulatory requirements. Information gathered in this stage is the basis for evaluating the success of the watershed program and redesigning the program if necessary.
- Communicating results - Clearly presenting to managers and the public the results of watershed actions.

This handbook should be available in the latter part of 1995.

Watershed Protection Approach Guidance Documents: Two guidance documents on watershed protection are nearing completion. These documents are:

- *Volume 1: A Project Focus*
- *Volume 2: Statewide Basin/Aquifer Management*

Innovative Finance Mechanism Handbook: Financing watershed actions is an area where many resource managers have requested assistance. The NEP has begun a project to provide watershed managers with technical assistance in evaluating management options and identifying innovative or underutilized methods to finance and implement environmental infrastructure and resource management programs at local, regional, and multi-jurisdictional levels. This guidance can serve as an abbreviated implementation checklist for soliciting and evaluating alternative funding sources for watershed projects. While the contents of this document focus on the types of activities most often employed by regional NEPs, this framework is also useful to similar environmental or

natural resource programs. EPA expects to release this document in the Fall of 1994.

Using Nonprofit Organizations to Advance Estuary Program Goals: This paper examines how nonprofit organizations (NPOs) can fulfill the role of attracting and receiving funds for watershed management. It discusses the ability of NPOs to attract and disburse funds and describes the direct and indirect implementation activities they can undertake. The paper examines specific types of NPOs and reviews the case for using a public charity structure, the most commonly used type of NPO to date. The circumstances that would favor the use of some other form of NPO are also reviewed. In some cases, existing institutions, already active in watershed management, could serve as candidates to fulfill this role. The paper looks at the advantages and disadvantages of using an existing institution instead of, or in conjunction with, a new NPO. The paper was originally designed for the NEP but is applicable to all watershed management projects.

Economic Valuation Handbook for NEPs and Watershed Managers: The Economic Valuation Handbook is currently under development and uses resource economics and valuation for coastal management decision-making (as opposed to damage assessment). The Handbook will describe all relevant valuation methodologies, how needs and questions drive the choice of methodologies, and processes for carrying out an economic valuation study in a watershed. The experience of the Casco Bay NEP and the Galveston Bay NEP will be used throughout the handbook. The handbook should be completed in the Fall of 1994.

Outcome Monitoring for Estuary Managers: The purpose of this manual is to provide guidance and examples to watershed managers on developing methods for measuring the effectiveness of watershed management actions. The manual includes methods for tracking the effectiveness of agencies in managing resources as well as effectiveness of actions taken to pursue environmental improvements. Training workshops will be held to help watershed managers effectively use the manual. The final manual should be released in the Fall of 1994.

National Estuary Program Guidance: Technical Characterization in the National Estuary Program: This document provides guidance for conducting a technical characterization under the NEP and provides a ge-

1993/1994 EPA Activities

neric approach in support of other non-NEP watershed management efforts. The guidance outlines the goals and purposes of technical characterization; communicates the role of technical characterization in developing management plans; presents basic, generic tasks for accomplishing technical characterization that can be adapted to specific watersheds; and identifies various roles the management entity plays in accomplishing technical characterization.

Case Studies on CCMP Governance: The NEP is preparing national guidance on the development of government institutions for implementing the NEPs' Comprehensive Conservation and Management Plans (CCMPs). This guidance will also apply to organizations establishing watershed management entities. Case studies of several multijurisdictional environmental programs that may serve as models for overseeing CCMP implementation will be compiled. Case studies include several NEPs that have begun implementation (Puget Sound, Buzzards Bay), as well as other watershed programs (Cape Cod Commission, Chesapeake Bay Commission, Nisqually River Council, Southwest Florida Water Management District, Tampa Bay Regional Planning Council). A final report will be prepared describing key factors that should be considered when developing mechanisms for CCMP implementation. The final report is expected in the Fall of 1994.

Interactive Computer Program on the Chesapeake Bay: EPA's Chesapeake Bay Program Office worked with the National Geographic Society and the Chesapeake Bay Foundation to develop an interactive computer program on the Chesapeake Bay. This program was part of the Chesapeake Bay exhibit that was on display in the National Geographic's Explorers Hall in Washington, DC from April through October 1993. More than 200,000 visitors saw the exhibit. The interactive computer program taught visitors about how an estuary and its drainage basin interact and how nutrient inputs affect the ecosystem and the living resources that people value. An educational video that builds on the interactive computer program is being developed. Several organizations have already expressed an interest in using the video including the Smithsonian Institution and Biosphere II.

Water Data Systems Modernization: EPA is modernizing many of its water data systems—STORET, the Waterbody System, and FRDS (will become SDWIS).

By 1997, the new systems will be complete, though prototypes of parts of the system are available now. In addition, EPA's water program has significantly expanded its Geographic Information System capabilities. Together the modernized systems will deliver geo-referenced and spatial data with enhanced biological components so watershed managers can easily obtain data for the areas of interest.

Volunteer Monitoring Program: EPA conducts a strong volunteer monitoring support program including handbooks for quality assurance/quality control in volunteer monitoring programs for lakes, streams (due in 1995), and for state managers. EPA also publishes an ever expanding *National Directory of Volunteer Environmental Monitoring Programs*. These tools help volunteers ascertain the health of their watershed.

Measure It

EPA is developing methods for measuring both programmatic and environmental watershed protection successes. Some examples of these measurement methods are described below.

Clean Water Act Section 319 National Monitoring Program: The Clean Water Act Section 319 National Monitoring Program (NMP), implemented by EPA, is directed at monitoring water quality and land treatment to document water quality changes associated with land treatment. EPA has established minimum tracking and reporting requirements for land treatment and water quality in support of this program. This information will be helpful to watershed managers when determining best solutions for nonpoint source problems in watersheds.

Projects in the NMP are funded from an annual five percent set-aside of Section 319 funds. Currently, nine projects have been approved. See box on next page for a description of these projects and the primary pollution problems being addressed. These projects are all scheduled for 6-10 years and include pre-implementation and post-implementation monitoring to evaluate the extent to which project goals are achieved and to evaluate the water quality impacts of nonpoint source controls.

Environmental Indicators: EPA has adopted national water goals and made a preliminary selection of indicators to measure these goals. The goals are

applicable to any size watershed. It is intended that information on the core indicators would be gathered at all scales and aggregated into a national report. The national water goals are:

- Protect and enhance public health (safe drinking water, fish and shellfish consumption, and aquatic recreation).

National Monitoring Program Projects

Project	Primary Pollution Problem
Sycamore Creek, MI	Sediment impacting aquatic habitat.
Elm Creek, NE	Sediment, increased temperature, and peak flows impacting aquatic life.
Sny Magill, IA	Sediment, nutrients, and pesticides impacting trout fisheries and recreational fishing.
Lake Champlain, VT	Sediment, nutrients, and bacteria from livestock impacting the streams and lake.
Pequea and Mill Creeks, PA	Nitrate levels in ground water and grazing impacts on streambanks.
Long Creek, NC	Sediment, bacteria, and nutrients impacting drinking water and aquatic habitat.
Otter Creek, WI	Bacteria, nutrients, and sediment impacting fishery and recreational uses.
Oak Creek, AZ	Bacteria impacting recreational area.
Morro Bay, CA	Sedimentation impacting anadromous fish streams and bacteria contaminating oyster beds.
Snake River Plain, ID (pilot ground water project)	Nitrate and pesticide contamination of ground water.

- Conserve and enhance ecosystems (biologically healthy water resources).
- Improve ambient conditions (improved surface water ambient concentrations of toxic and conventional pollutants, attainment of water quality objectives for ground water, no net loss of wetlands, reduction of contaminated sediments).
- Reduce pollutant loadings (reduced toxic and conventional pollutant loadings).

Twenty-one indicators have been initially identified for measuring progress toward meeting the above national goals. A sampling of these indicators includes:

- Waters meet drinking water supply designated use
- Disease outbreaks from swimming
- Fish advisories
- Species diversity
- Ambient ground water quality
- Water quality standards attainment
- Extent of contaminated sediments
- Loss or gain of wetland acreage
- Marine debris

An EPA Indicators Workgroup is making recommendations for the final selection of indicators to include in a 1995 report that characterizes the baseline for reporting on the progress made toward meeting the national water goals.

Regional-EMAP: EPA's Region IV office (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, and Tennessee) has initiated an EMAP-type monitoring study in the Savannah River basin. This study will provide statistically significant information on the status and trends of the condition of basin resources. This information will complement existing state monitoring programs by merging EMAP concepts and methods with the state programs and will, ultimately, serve as a baseline upon which to measure progress of the Savannah River Basin Watershed Project. These methods can be applied to other priority basins to assess the condition of the basin and to measure progress toward project goals.

Future Activities

More and more, the natural resource protection community is moving toward a holistic approach to protecting natural resources and managing on an ecosystem basis. At EPA, shifting toward ecosystem management is a top priority. The Agency's strategy for ecosystem management was developed in the Spring of 1994 and is referred to as the Edgewater Consensus. To address ecosystem management for water, EPA's Assistant Administrator for Water has established the Watershed Management Policy Committee.

Edgewater Consensus

The Edgewater Consensus (drafted in Edgewater, Maryland in March 1994) is a proposed strategy for ensuring that EPA programs work to protect ecosystems. The Edgewater Consensus states that ecosystem protection is place-based environmental management that is driven by the key environmental problems that occur in particular geographic areas. It relies on stakeholders in those places to define the problems, to set priorities, and to help with the solutions. As envisioned, such place-based environmental management would integrate the goals for long-term ecosystem health with those for economic stability. Protecting human health and welfare and protecting natural systems are integral goals of the Edgewater Consensus.

EPA's role in place-based environmental management will often be that of catalyst or facilitator. For any given place, EPA will participate in establishing a process for determining environmental needs

and will orient its work to meet those needs. EPA will help to define the vision, assist in convening collaborative efforts, bring to bear its expertise and authorities, and provide financial and technical assistance. EPA will not always be the lead but will frequently be a participant in ecosystem management projects led by others such as another federal agency or a state or regional agency.

The Edgewater Consensus reinforces and provides a further impetus for the continuation of EPA's watershed efforts and these efforts provide a foundation for achieving the vision articulated in the Edgewater Consensus. For ecosystems that are best defined by watershed boundaries, the goals of the Edgewater Consensus can be readily met by applying the watershed protection approach.

Watershed Management Policy Committee

EPA has instituted a regular leadership forum for coordinating its programs to support watershed management. Upper-level water program managers from EPA's headquarters and regional offices serve on this Watershed Management Policy Committee which is chaired by EPA's Assistant Administrator for Water. The Committee meets on a regular basis to assess how successfully EPA has implemented the watershed approach, identify and commit to critical action items, and assure fundamental consistency on key issues across water programs. In addition, the Committee is coordinating the water program's support of the Agency's Ecosystem Management Task Force.

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Selected Watershed Projects

EPA plays a variety of roles, including participant, catalyst, and facilitator, in a large number of watershed efforts. The following projects are a sampling of these projects which are representative of an integrated, holistic watershed approach. They illustrate the array of watershed protection approach efforts across the country.

Albemarle-Pamlico Sound, NC
 Alcyon Lake, NJ
 Anacostia River, DC, MD
 Ashtabula River Area of Concern, OH
 Barataria-Terrebonne Estuary, LA
 Barnegat Bay, NJ
 Bear River, ID, UT, WY
 Beeds Lake, IA
 Big Darby Creek, OH
 Big Spring Basin, IA
 Blackfoot River, MT
 Blackstone River, MA
 Bowman-Haley Reservoir, ND
 Buffalo River Area of Concern, NY
 Buzzards Bay, MA
 Cache River, IL
 Camden County Aquifer, NJ
 Cameron Atrazine Pollution Trading, MO
 Canaan Valley, WV
 Casco Bay Estuary, ME
 Chalk Creek, UT
 Chehalis River, WA
 Chesapeake Bay, NY, PA, DE, MD, VA, WV, DC
 Christina, DE, PA
 Clark Fork-Pend Oreille Watershed, MT, ID, WA
 Clear Creek, CO
 Clear Lake, IA
 Clinton River Area of Concern, MI
 Coeur D'Alene Basin, ID
 Colorado River, CO, UT, AZ, WY, NV, CA, NM
 Coos Bay/Coquille River Basins, OR
 Corning Aquifer/Elmira Aquifer, NY
 Corpus Christi Bay, TX
 Cranberry Lake, NJ
 Deal Lake, NJ
 Delaware Estuary, NJ, DE
 Delaware Inland Bays, DE
 Eighteenmile Creek Area of Concern, NY
 Elkhorn Slough, CA
 Elm Creek, NE
 Endicott-Johnson City Aquifer, NY
 Flint Creek, AL
 Florida Keys National Marine Sanctuary, FL
 Galveston Bay Estuary, TX
 Goodman Creek, ND
 Grand Calumet River, Indiana Harbor Canal Area of Concern, IN

Great Lakes, NY, PA, OH, IN, MI, IL, WI, MN, Ontario
 Greenwood Lake, NY, NJ
 Gulf of Mexico Program
 Gulf Ecological Management Sites
 Mobile Bay Restoration Demonstrations
 Hackensack Meadowlands District, NJ
 Hillsdale Reservoir, MO
 Illinois River - Battle Branch, OK
 Indian River Lagoon, FL
 Iowa Great Lakes, IA
 Klamath Basin, CA, OR
 Kootenay River, MT, ID, British Columbia
 Lake Champlain, NY, VT
 Lake La Plata, PR
 Lake Loiza, PR
 Lake Michigan, IL, IN, MI, WI
 Lake Musconetcong, NJ
 Lake Ontario, NY, Ontario
 Lake Pontchartrain Basin, LA
 Lake Roosevelt, WA
 Lake Worth, TX
 Little Bear River, UT
 Long Island Sound, NY, CT
 Los Angeles River, CA
 Lower Mississippi Delta Initiative, AR, IL, KY, LA, MO, MS, TN
 Malibu Creek, CA
 Maryland's Atlantic Coastal Bays, MD
 Massachusetts Bays, MA, NH
 Massachusetts Bays Program/Mini-Bays Project, MA
 Maumee River Area of Concern, OH
 Meramec River, MO
 Merrimack River, NH, MA
 Middle Fork River, WV
 Middle Snake River, ID
 Milwaukee Estuary Area of Concern, WI
 Morro Bay, CA
 Narragansett Bay, MA, RI
 New York City Water Supply Watersheds, NY
 New York-New Jersey Harbor, NY, NJ
 Niagara River Area of Concern, NY
 Niagara River Toxics Management Plan, NY
 Northwest Indiana Environmental Initiative, IN
 Oak Creek, AZ
 Onondaga Lake, NY

Watershed Projects

Oswego River Harbor Area of Concern, NY
Otter Creek, UT
Peconic Bay, NY
Pequea and Mill Creeks, PA
Pine Creek, IA
Platte River, NE
Pocono Watershed, PA
President's Forest Plan (Pacific Northwest), WA,
OR, CA
Puget Sound Estuary, WA
Red River, ND
Rochester Embayment Area of Concern, NY
Saginaw Bay, MI
St. Lawrence River Area of Concern, NY
St. Mary's River Area of Concern, MI
San Francisco Bay/Delta Estuary, CA
San Juan Bay, PR
San Luis Rey River, CA
Santa Margarita River, CA
Santa Monica Bay, CA
Sarasota Bay, FL

Savannah River, GA, SC, FL
Silver Lake, DE
Southeast Michigan Initiative, MI
South Florida Ecosystem, FL
Squaw Creek/Baldwin Creek, WY
Swartzwood Lake, NJ
Tampa Bay, FL
Tangiapahoa River, LA
Tensas River, LA
Tillamook Bay, OR
Truckee River, CA, NV
Upper Arkansas River, CO
Upper Clark Fork Basin, MT
Upper Tennessee River Basin, VA
Verde River, AZ
Virginia Eastern Shore Coastal Waters, VA
Waquoit Bay, MA
West Lake, IA
West Maui Watershed, HI
Willamette River Basin, OR
Yakima River, WA

Albemarle-Pamlico Estuary

Size and location: The Albemarle-Pamlico Estuary is composed of seven sounds with several rivers which in turn drain over 30,000 square miles of land. A total of 36 counties in northeastern North Carolina and all or part of 19 counties and independent cities in southeastern Virginia comprise the watershed.

Organization that initiated project:
State of North Carolina

Major environmental problems:
Declines in fishery productivity
Impaired health of aquatic resources
Impairment of nursery area function
Eutrophication and sedimentation
Fish kills
Habitat loss
Shellfish closures
Toxic contamination

Actions taken or proposed: The Albemarle-Pamlico Estuary was selected for inclusion in the National Estuary Program by EPA in 1987. A Comprehensive Conservation and Management Plan (CCMP) that recommends priority corrective actions to restore and maintain the estuarine resources was completed and accepted by the Albemarle-Pamlico Sound Policy Committee in November 1993. The Albemarle-Pamlico Estuary Management Conference proposes to coordinate implementation of the CCMP through five regional councils organized along watersheds. The CCMP calls upon local governments and citizens to protect the estuary through stronger state and local land use policies, land stewardship, best management practices, and public education. The CCMP stresses:

- Voluntary programs with strong incentives for implementing the various recommendations in the CCMP;
- Land and water use plans; and
- Improved wetland and habitat protection.

During development of the CCMP, several demonstration projects were undertaken to show the viability of final recommendations for restoration of the estuary. These demonstration projects included habitat restoration, storm water management, animal waste management, and fishery by-catch reduction.

Stakeholders:

Businesses
Commercial fishing
General public
Recreational users including anglers and boaters

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Alcyon Lake

Size and location: Alcyon Lake is located in the Borough of Pitman, Gloucester County, New Jersey. The lake is 13.5 acres in size, with a watershed of 4 square miles. The lake is 800 feet downstream of the LiPari landfill, a Superfund site.

Organization that initiated project:

Gloucester County Planning Department

Major environmental problems:

- Toxic contamination from the LiPari landfill
- Silt and organic matter from a sewage treatment plant (closed in 1972)
- Sediments, organics, and heavy metals from urban storm water runoff
- Siltation: nutrient and pesticides from agricultural sources

Actions taken or proposed: New Jersey received a Clean Lakes Program grant in 1991 to conduct a Phase I diagnostic/feasibility study for Alcyon Lake and its watershed. This study will analyze the lake's condition and determine the causes of that condition, examine the watershed to determine the sources of pollution, and then evaluate solutions and recommendations for the most feasible procedures to restore and protect lake water quality.

Through the National Demonstration Program for lake water quality established under the Clean Water Act and earmarked and competitive Clean Lakes funding, a watershed master plan will be developed and implemented. Actions to be taken may include:

- Development of a Geographic Information System (an interactive land management data base that uses water quality modeling to determine methods of mitigating sediment loadings).
- Installation of erosion control devices.
- Establishment of a Watershed Action Committee to technically review proposed activities.
- Design of a storm water conveyance system.
- Development of environmental ordinances and land management guidelines.

In addition, the LiPari landfill itself has been remediated through the Superfund program. The downstream wetlands and the lake itself have been included as part of the offsite remediation, and actions will include dredging and restoration of the wetlands and dredging of the lake sediments, which will deal with the in situ toxics.

Stakeholders:

Borough of Pitman
City of Gloucester
Gloucester County Planning Department
Local citizens
U.S. Environmental Protection Agency

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Anacostia River

Size and location: The Anacostia River flows from Montgomery and Prince George's Counties in Maryland to the District of Columbia where it empties into the Potomac River and eventually the Chesapeake Bay.

Organizations that initiated project:

State of Maryland
Montgomery and Prince George's Counties in Maryland
District of Columbia

Major environmental problems:

Nonpoint source runoff
Storm water problems
Toxic contamination of sediments
Loss of natural habitat for fish

Actions taken or proposed: The Anacostia River is a priority for several different organizations. The White House Task Force on Ecosystem Management has included this river among its seven priority areas for study. The Chesapeake Executive Council has designated the Anacostia as one of three Regions of Concern for toxic pollution. EPA has targeted the Anacostia in its fiscal year 1995 budget as one of four priority ecosystems for Ecosystem Management. American Rivers, Inc. has made the Anacostia River one of its top 10 priorities.

The Anacostia Watershed Restoration Committee has outlined six goals which serve as the strategic framework for the restoration of the Anacostia River.

On July 14, 1994 an agreement on ecosystem management in the Chesapeake Bay was signed between EPA and 25 other federal agencies. Under this agreement the U.S. Army Corps of Engineers is developing a Biennial Federal Workplan for the Anacostia. It will provide a framework for all federal stakeholders to contribute to the restoration of the Anacostia River through specific commitments including environmental compliance. One aspect of the agreement is support to the Anacostia River Demonstration Project in conjunction with the Anacostia Watershed Restoration Committee. The intent of the Anacostia River Demonstration Project is to provide an opportunity to apply innovative ecosystem management concepts in an urban environment. Planning for this project will begin in fiscal year 1995.

A Chesapeake Bay Regional Action Plan for the Anacostia is under development with EPA financial

and technical support. The plan defines goals and strategies for remediation and prevention of toxic pollutants. The plan may include remediation measures for sediments, preventive measures for point/nonpoint sources, and public education. It will be completed in the fall of 1995.

In fiscal year 1994, EPA awarded, through a cooperative agreement, \$250,000 to the District of Columbia to conduct toxicological human health and ecological risk assessments for purposes of implementing risk reduction, pollution prevention, and public education and outreach. The objectives of this project are to identify, rank, reduce, and/or prevent pollutants in the impacted communities. EPA expects to provide additional support for this effort in fiscal year 1995.

In fiscal year 1995, EPA will place additional emphasis on enforcement activities in the Anacostia watershed. EPA will identify facilities with significant adverse environmental impacts in the watershed. EPA will schedule inspections at selected facilities and determine environmental compliance. EPA will administer appropriate enforcement response to facilities in violation of environmental regulations. In addition, EPA is revising the National Pollutant Discharge Elimination System permit for the District of Columbia's Blue Plains facility to conform with the National Combined Sewer Overflow Policy.

Other activities include a U.S. Arboretum led effort to develop a federal tributary strategy for landholders within the District of Columbia by the end of 1995. This tributary strategy will deal with meeting the nutrient reduction goals of the Chesapeake Bay Program in support of the District of Columbia.

Stakeholders:

American Rivers, Inc.
Anacostia Watershed Restoration Committee
Anacostia Watershed Society
Congresswoman Eleanor Holmes Norton
District of Columbia
Federal agencies including U.S. Army Corps of Engineers, U.S. Department of Agriculture (U.S. Arboretum), U.S. Environmental Protection Agency, and the National Park Service
Local public interest groups including Friends of the Anacostia, Georgetown University Law Center, and Sierra Club Legal Defense Fund
Maryland

Anacostia River continued on page 24

Ashtabula River Area of Concern

Size and location: The Ashtabula River Area of Concern (AOC) is located in the northeast corner of Ohio. It includes the watershed for the lower Ashtabula River, its tributaries, and the harbor and nearshore of Lake Erie. One of the tributaries, Fields Brook (Brook), is a Superfund site.

Organizations that initiated project:

U.S. Congress
U.S. Environmental Protection Agency

Major environmental problems:

- Contaminated sediments (contaminants of concern are: PCBs, PAHs, hexachlorobenzene, hexachlorobutadiene, and to a lesser degree some metals)
- Degraded fish and wildlife populations
- Unhealthy fish and wildlife consumption
- Degradation of fish habitat
- Degradation of benthos

Actions taken or proposed: The Ashtabula River AOC is one of 43 AOCs that have been designated by the United States and/or Canadian governments in the Great Lakes region. A Remedial Action Plan (RAP) is being developed for this AOC to provide a long-term course of action for environmental cleanup. A RAP Advisory Council, comprised of local stakeholders has been established. Stage I of the RAP, which describes the nature and extent of the problems, was completed in 1992, and approved by EPA and the International Joint Commission in late 1992.

Stage II of the RAP, which devises a plan for implementing remediation, is in its conceptual stages. Recently, the Advisory Council has decided to initiate a new tool in developing Stage II. Focusing on the contaminated sediments in the entire watershed, the Advisory Council is seeking to develop a public-private partnership in the Ashtabula. The partnership would combine sediment projects in the AOC; the authorities of different agencies; different potential funding sources; and the goals of the RAP, citizens, and agencies to save time, money, and effort in obtaining a solution.

Already a partnership charter has been signed by stakeholders, agencies, and industrial firms; and over half a million dollars have been directed by EPA, the Ohio Environmental Protection Agency, and the Corps to investigate multi-party remediation plans. The funds shall be used to study locations for and to design a disposal facility to hold contaminated sediments. It is hoped that a consensus-based plan,

focusing on the entire watershed can remediate the area instead of Superfund. While Superfund is continuing studies of the river contamination, EPA is holding off on formally designating the downstream river a Superfund site to see how the partnership develops.

Superfund activities on the upstream highly contaminated Brook are continuing and include:

- A Record of Decision in 1986 which directs design of the Fields Brook cleanup.
- A Remedial Investigation and Feasibility Study done in 1986 describing contamination and possible remedial alternatives.
- Studies of properties on the Brook to ensure that the Brook is not recontaminated which are near completion.

In addition, an ecological assessment of the area surrounding the Brook is planned.

Superfund activities in the river are assessing how contaminated sediments might move or be transported and result in wildlife and humans being exposed to these sediments.

Stakeholders:

Boaters
City Manager
Congressional staff
Industry
Local citizens
Local government agencies
Ohio Environmental Protection Agency
Ohio Sea Grant
Port authority
Soil and Water Conservation District
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency

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Barataria-Terrebonne Estuary

Size and location: The Barataria-Terrebonne Estuary consists of adjacent basins which cover over four million acres of south central Louisiana, between the Mississippi River and the Atchafalaya River. Parts or all of 15 parishes are included in the study area.

Organizations that initiated the project:

State of Louisiana/Department of Environmental Quality
U.S. Environmental Protection Agency

Major environmental problems:

- Loss of more than 656 square miles of productive wetlands and barrier islands
- Hydrological modification
- Loss of sediments
- Habitat loss/modification
- Changes in living resources

Actions taken or proposed: Barataria-Terrebonne Estuary was selected for inclusion in the National Estuary Program in 1990. A Comprehensive Conservation and Management Plan (CCMP) is being developed by a coalition of affected agencies, industries, and other organizations to identify detailed remedial action plans.

In order to assess future environmental conditions in the Barataria-Terrebonne estuarine system, and to evaluate potential management measures, the program will use two state-of-the-art predictive models. Although the two models address different environmental parameters, hydrological alteration, and landscape change, they are being developed in close coordination with one another. This coordination is essential because the hydrology of the estuarine system greatly affects the rate and timing of habitat change. Other activities/studies include:

- Working with the Federal Emergency Management Agency to determine the extent of environmental damage caused by Hurricane Andrew on the Barataria-Terrebonne estuary system and to develop plans to minimize future impacts.
- Mapping the oyster producing areas within the Barataria-Terrebonne estuaries. This mapping will assist in evaluating how the oyster and fishery is influenced by environmental changes within the estuaries.
- Survey of vegetative damage caused by nutria herbivory in the Barataria-Terrebonne basins. This will provide information regarding the distribution of damaged areas,

species of vegetation being impacted, and status of recovery of damaged areas.

- Locating, characterizing, and mapping storm water drainage stations with the Barataria-Terrebonne systems. Focusing on storm water runoff discharge and its potential contribution to elevated levels of fecal coliform bacteria in areas that support recreation and shellfish will assist in developing a storm water management strategy.
- Measuring the input and distribution of suspended sediments and other aquatic parameters in the western Terrebonne marshes and determining the system's response to those inputs. This involves determining the distribution of selected water column parameters and how their distribution relates to forcing functions such as tide and river discharge.
- Developing a Wetlands Workshop to increase public awareness regarding environmental problems and issues facing Louisiana's coast.
- Production of a high quality video focusing on residential sewage treatment systems and development of support materials. This video will educate the public regarding the importance of maintaining or installing a treatment system.

Stakeholders:

Educational institutions
Federal government agencies
Industries and businesses
Local citizens
Local government agencies
Regional planning agencies
Scientific community
State government agencies
Various user groups

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Barnegat Bay

Size and location: Barnegat Bay is a 75-square mile estuarine system, with Ocean County, New Jersey as the northern boundary and New Jersey Route 72 as the southern boundary.

Organizations that initiated project:

New Jersey Department of Environmental Protection (NJDEP)
Ocean County Board of Chosen Freeholders
Bay Area Municipalities

Major environmental problems:

- Degraded water quality caused by
 - Nonpoint source loadings caused by development on land and the activities associated with development (e.g., vehicle use, lawn and garden maintenance, septic systems)
 - Boat populations
 - Wildlife populations

Actions taken or proposed: In 1987 the New Jersey Legislature passed a law requiring the study of the nature and extent of development impacts upon the Bay. As a result of that study, a draft Watershed Management Plan for Barnegat Bay was completed by the NJDEP in April 1992. The watershed management plan is being reviewed with all of the municipalities within the watershed to solicit their support and to make changes in a municipality's zoning and subdivision regulations, where needed, to effectively implement the draft management plan watershed-wide.

In support of this effort, Clean Water Act funds are being utilized for best management practice (BMP) demonstration, determining the effectiveness of BMPs, and intensive monitoring.

Stakeholders:

Borough of Barnegat Light
Borough of Bay Head
Borough of Beachwood
Borough of Harvey Cedars
Borough of Island Heights
Borough of Lavallette
Borough of Mantoloking
Borough of Ocean Gate
Borough of Pine Beach
Borough of Point Pleasant
Borough of Point Pleasant Beach
Borough of Seaside Heights
Borough of Seaside Park

Borough of Ship Bottom
Borough of South Toms River
Borough of Surf City
New Jersey Department of Environmental Protection
Ocean County Board of Chosen Freeholders
Township of Barnegat
Township of Berkeley
Township of Brick
Township of Dover
Township of Lacey
Township of Long Beach
Township of Ocean
Township of Strafford

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Washington Council of Governments

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Bear River

Size and location: The Bear River has a 7,600-square mile watershed located in Wyoming, Utah, and Idaho.

Organization that initiated project:

Utah Division of Water Resources

Major environmental problems:

- Soil erosion, increased sediment loadings, coliforms, and high nutrient loadings due to animal feeding operations, dairies, urban development, roads, oil and gas exploration, and silviculture
- Riparian vegetation removal
- Stream channelization
- Degraded stream channels and stream banks

Actions taken or proposed: Interest in increasing the use of the river as a drinking water source for the growing urban population in the lower basin and along the Wasatch Front prompted the Utah Legislature to enact the Bear River Development Act and fund a Bear River water development and management plan. The effort is to address both water development and water quality issues, with a water quality plan that includes a broad reaching analysis of pollutant loading to the river as well as chemical, biological, and physical habitat assessments. Because the Bear River encompasses Utah, Wyoming, and Idaho, a regional planning effort has been initiated. The purpose of the regional effort is to share information, coordinate planning efforts, and involve "grassroots" direction and participation. An array of water projects in the Bear River Basin initiated by different organizations and groups are being coordinated through the Bear River Watershed Water Quality Coordination Committee.

For example, the State of Utah, EPA, and the U.S. Department of Agriculture (USDA), initiated a watershed restoration project on the Little Bear River (one of the major tributaries in the basin), using funds from USDA and EPA. The project includes stream channel and riparian habitat restoration, land management, and animal waste treatment actions. Several additional nonpoint source projects are now underway in Wyoming that are aimed at restoring tributary streams that have been impacted by channelization, stream bank modification, and riparian habitat loss.

These "on-the-ground" demonstration projects are helping to generate enthusiasm for more cooperative efforts.

Stakeholders:

Bear Lake Regional Commission
Bear River Resource Conservation and Development Council
Idaho Division of Environmental Quality
Idaho Fish and Game Department
Local citizen groups
Soil Conservation Service
U.S. Bureau of Land Management
U.S. Bureau of Reclamation
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Forest Service
Utah Department of Agriculture
Utah Department of Environmental Quality
Utah Division of Water Resources
Utah Division of Wildlife Resources
Utah Power and Light
Wyoming Department of Environmental Quality
Wyoming Game and Fish Department

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Beeds Lake

Size and location: Beeds Lake has an 18,966-acre watershed and is located in Franklin County in north central Iowa.

Organizations that initiated project:

Friends of Beeds Lake
Franklin County Soil and Water Conservation District

Major environmental problems:

- Sediment, nutrients, and pesticides from cropland
- Animal wastes

Actions taken or proposed: The Beeds Lake project was initiated with Fiscal Year 1993 Clean Water Act Section 319 funds. The State Resource Enhancement and Protection Program and the Agricultural Stabilization and Conservation Service Water Quality Incentive Program are also providing funding. The project workplan lays out a three-year project, but with the involvement of an active citizen's group, watershed protection activities should extend beyond the life of the funds.

Project objectives include reducing sedimentation by 70 percent, and encouraging the farmers to apply best management practices such as no-till, contour farming, and nutrient and pesticide management on the 5,500 most critical acres upstream from the lake. Seventy percent of the watershed landowners are targeted for involvement over the next two years. Grass/tree filter strips, pasture and hayland management, critical area planting, animal waste management, streambank stabilization, and well testing are among the other activities planned.

Stakeholders:

Agricultural Stabilization and Conservation Service
American Boy Scouts
Ducks Unlimited
Franklin County Board of Supervisors
Franklin County Conservation Board
Franklin County Sanitarian
Franklin County Soil and Water Conservation District
Friends of Beeds Lake
Future Farmers of America
Hampton Fish and Wildlife Club
Iowa Department of Agriculture and Land Stewardship
Iowa Department of Natural Resources

Iowa State University Extension
Pheasants Forever
Soil Conservation Service
The Jaycees
U.S. Environmental Protection Agency

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Big Darby Creek

Size and location: The Big Darby Creek watershed is located in west central Ohio. The watershed drains 557 square miles.

Organization that initiated project:
The Nature Conservancy

Major environmental problems:

- Changes from agricultural land use to urban and suburban development
- Uncertainties of market and governmental influences on agricultural practices and land use

Actions taken or proposed: The Nature Conservancy has identified the Big Darby Creek as a high priority area for protection of biological diversity and is trying to develop a long-term management and protection plan for the river and riparian areas. In support, EPA and the Ohio Environmental Protection Agency are jointly conducting an ecological risk assessment case study. The intent of the case study is to clearly identify risks to Big Darby Creek so that managers may guide development and land use in a manner that allows native species to continue to exist.

To achieve short-term improvements, EPA is providing grants for agricultural projects through Section 319 of the Clean Water Act. The work involves the installation and monitoring of best management practices for various sites within the watershed. Another grant, under Section 104 (b) (3) of the Clean Water Act, funds the development of a plan to control long-term growth.

The U.S. Department of Agriculture (USDA) is involved in Big Darby Creek in a variety of ways. The Soil Conservation Service is providing technical assistance, the Agricultural Stabilization and Conservation Service is providing financial assistance, and the Extension Service is implementing an educational program. USDA participates in a conservation tillage and increased critical area seedings project that has been established for the watershed. The project has a goal of reducing sediment by 50,000 tons. To date sediment reduction to the stream is estimated at 17,000 tons. Gross erosion has been reduced by 243,000 tons.

The U.S. Geological Survey is monitoring pesticides, nutrients, and suspended solids on a daily basis. Three in-stream monitoring devices are in place to develop long-term trends. During the past three years biologic integrity of the streams appears

to have remained constant with some new species migrating further upstream.

Stakeholders:

Agricultural Stabilization and Conservation Service
Big Darby Partners
Extension Service
General Public
Ohio Department of Natural Resources
Ohio Environmental Protection Agency
Ohio State University
Private Corporations
Soil Conservation Service
The Nature Conservancy
U.S. Department of Agriculture
U.S. Environmental Protection Agency
U.S. Geological Survey

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Big Spring Basin

Size and location: Big Spring Basin is a 103-square mile ground water basin in Clayton County in northeast Iowa.

Organization that initiated project:

Iowa Consortium on Agriculture and Water Quality

Major environmental problems:

- Elevated nitrate and coliform levels in farmstead wells
- Herbicides including atrazine in ground and surface water

Actions taken or proposed: The Big Spring project comprises a comprehensive multidisciplinary approach including research, demonstrations, and education programs. The research phase was started in 1981, and the demonstration program started in earnest in 1986. Project activities are ongoing, with funding from numerous sources, including EPA, Soil Conservation Service, various state programs, and others. Because it takes a long time for water quality monitoring to provide conclusive evidence of the effectiveness of best management practices, monitoring will continue over the next several years, even though the major portion of funding for the demonstration projects has run out.

The project focuses on the impacts of agricultural activities on ground and surface water. Specific actions include:

- Demonstration sites for animal waste management and various crop related activities such as alfalfa management and weed management.
- Collection of detailed information at the Spring through monitoring.
- Studies of the aquatic ecology of the Basin.
- Examination of the impacts of agriculture on aquatic ecosystems, and in turn assessment of the nutrient losses that are taken up in this ecosystem.
- Surveys of farm management practices and chemical use.
- Extensive publicity and public education activities.
- Numerous field days for national and international visitors, as well as for local and regional interests.

The Big Spring project has been the basis for other innovative initiatives in Iowa such as the Integrated Farm Management Program and the Model

Farms Demonstration Program. Iowa has been able to demonstrate significant reductions in nitrogen fertilizer use across the state, with no loss in crop yields. These programs were the foundation for Iowa's receiving the EPA Administrator's Pollution Prevention Award in 1992.

Stakeholders:

Agricultural Stabilization and Conservation Service
Clayton County Soil and Water Conservation District
Farmers
Iowa Chemical and Fertilizer Dealers Association
Iowa Consortium on Agriculture and Water Quality
Iowa Department of Agriculture and Land Stewardship
Iowa Department of Natural Resources
Iowa State University Extension
Soil Conservation Service
U.S. Environmental Protection Agency
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Blackfoot River

Size and location: The Blackfoot River has a 2,290-square mile watershed located in western Montana and eastern Idaho. The watershed is 125 miles long.

Organizations that initiated project:

Blackfoot Trout Unlimited
Clark Fork-Pend Oreille Coalition

Major environmental problems:

- Sedimentation from grazing and silvicultural activities
- Heavy metals from active and inactive mines
- Loss of riparian areas and instream habitat
- Recreational impacts

Actions taken or proposed: In 1991, the Blackfoot River Symposium was held and created the Blackfoot River Challenge. It was established to promote cooperative resource management of the Blackfoot River, its tributaries, and adjacent lands. The Symposium developed the following goals:

- Provide a forum for the timely distribution of technical and topical information from public and private sources.
- Foster communication between public and private interests to avoid duplication of efforts and capitalize on opportunities.
- Recognize and work with the diverse interests in the Blackfoot Valley to resolve issues and avoid confrontation.
- Examine the cumulative affects of land management decisions and promote actions that will lessen their adverse impacts in the Blackfoot Valley.

American Rivers listed the Blackfoot River as one of the top 10 most endangered rivers. Native char and native cutthroat trout are species of concern.

EPA funded a Geographic Information System project that will assemble the available information on the Blackfoot River into a usable format that will facilitate watershed assessment and land use decisions. Meanwhile, private funds have been provided for a fisheries investigation report and a part-time facilitator. In addition, some ranchers are reducing cattle access to tributaries to reduce erosion and nonpoint source pollution. EPA has supported the restoration and monitoring of a tributary impacted by placer mining and channel straightening.

To date, activities have been limited to non-controversial arenas. However, the coalition will continue to work together searching for solutions to more difficult issues over time.

Stakeholders:

ARCO
ASARCO
Blackfoot Trout Unlimited
Champion International
Clark Fork-Pend Oreille Coalition
County Commissioners
Idaho Department of Fish and Game
Idaho Division of Environmental Quality
Landowners
Montana Department of Fish, Wildlife, and Parks
Montana Department of Health and Environmental Sciences
Montana Department of State Lands
Phelps-Dodge
Plum Creek Paper
Recreationalists
Soil Conservation Service
The Nature Conservancy
Trout Unlimited
U.S. Bureau of Land Management
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Blackstone River

Size and location: The Blackstone River is located in south central Massachusetts and flows from Worcester, Massachusetts to the Seekonk River in Pawtauket, Rhode Island. The Blackstone has a total length of 48 miles with a drainage area of 540 square miles. The river is the second largest freshwater tributary to the Narragansett Bay. The Blackstone River is an important natural, recreational, and cultural resource to both the States of Rhode Island and Massachusetts. In 1986 the United States Congress established the Blackstone River Valley National Heritage Corridor along portions of the river in both Massachusetts and Rhode Island.

Organization that initiated project:

U.S. Environmental Protection Agency based on recommendations from Massachusetts and Rhode Island

Major environmental problems:

Industrial and municipal discharges
Water withdrawal
Heavily contaminated sediments

Actions taken or proposed: Both Massachusetts and Rhode Island have adopted numeric and whole effluent water quality criteria and anti-degradation provisions in their state water quality standards. Strict water quality based permits have been issued to major wastewater dischargers, and combined sewer overflow strategies are being implemented. The following actions have been taken or are currently underway:

- Historic analysis of existing water quality data.
- Collection of dry weather data.
- Calibration of a dissolved oxygen model to include impacts from phosphorus and nitrogen.
- Calibration of trace metals model for the development of a Total Maximum Daily Load (TMDL) and waste load allocation (WLA).
- Collection of wet weather data to determine annual wet weather loads to Narragansett Bay as well as intermediate locations along the river and the identification of water quality hot spots to target land use based best management practices.

In addition to the above, the Massachusetts Executive Office of Environmental Affairs has initiated a technical assistance program which is providing pollution prevention assistance to industries to assist

them in reducing the use of toxic materials. The assistance is provided by a non-regulatory state office and consists of various activities including multimedia evaluations, economic evaluations, educational materials, seminars and workshops, and identification of alternative chemicals and process technologies.

The U.S. Army Corps of Engineers, as part of their Section 22 Planning Assistance to States Program, has funded a study to investigate the feasibility of restoring anadromous fish and enhancing water fowl habitat along the Blackstone River.

The State of Rhode Island has completed a Comprehensive Conservation and Management Plan for the Narragansett Bay which includes recommendations for the Blackstone. The Commonwealth of Massachusetts is including the Blackstone in its Watershed Permitting Plan.

Stakeholders:

Commonwealth of Massachusetts
Environmental, recreation, cultural, and watershed organizations
Local governments
Local industries and utilities
New England Interstate Water Pollution Control Commission
State of Rhode Island
U.S. Army Corps of Engineers
U.S. Department of the Interior
U.S. Environmental Protection Agency
U.S. Geological Survey
University of Rhode Island

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Bowman-Haley Reservoir

Size and Location: Bowman-Haley Reservoir consists of a 304,000-acre watershed located in southwestern North Dakota along the border between North and South Dakota.

Organization that initiated project:

Bowman-Slope Soil Conservation District

Major environmental problems:

- Nutrients from grazing practices and feed-lots
- Eutrophication
- Sedimentation from grazing practices and eroding streambanks
- Contamination from livestock waste

Actions taken or proposed: To improve water quality conditions in the reservoir, the Bowman Slope Soil Conservation District and Water Resource District Boards initiated a water quality improvement plan. At least 90 percent of the watershed issued for agriculture or wildlife recreation. The primary goal of the plan is to reduce wind and water erosion in the watershed by improving the management practices on over 50 percent of the agricultural lands in the watershed. The project objectives are:

- Develop resource management for over 50 percent of the agricultural lands in the watershed to reduce wind/water erosion and the transport of nonpoint source pollutants to the reservoir.
- Develop livestock waste management plans for the priority livestock concentration areas to reduce/eliminate runoff from these areas.
- Monitor water quality trends and track best management practices implementation.
- Educate landowners/operators on the most effective land use technologies and management strategies which will protect/improve water quality.

The Conservation District is meeting the objectives by implementing an aggressive nonpoint source information/education campaign and providing financial and technical assistance to landowners to encourage voluntary implementation and conservation practices on their farm units. Participation by individual farmers to voluntarily implement practices to improve water quality throughout the watershed has been high.

Stakeholders:

Agricultural Stabilization and Conservation Service
Bowman-Slope Soil Conservation District
Ducks Unlimited
Farmers
Harding County Conservation District
North Dakota Department of Health
North Dakota Extension Service
North Dakota Game and Fish
Pheasants Forever
Soil Conservation Service
South Dakota Department of the Environment and Natural Resources
State Association of Conservation Districts
U.S. Environmental Protection Agency

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Buffalo River Area of Concern

Size and location: The Buffalo River Area of Concern (AOC) is located in the City of Buffalo in western New York State and extends approximately six miles from the mouth of the river to the east. The river discharges into Lake Erie near the head of the Niagara River.

Organizations that initiated the project:

U.S. Environmental Protection Agency
New York State Department of Environmental Conservation (NYSDEC)

Major environmental problems:

- PCBs, chlordane, and PAHs are impairing fishing and aquatic life
- Navigational dredging of the river and bulkheading and other alterations of the shoreline have degraded fish and wildlife habitat
- Metals and cyanides in the sediment

Actions taken or proposed: The Buffalo River AOC is one of 43 AOCs that have been designated by the United States and/or Canadian governments in the Great Lakes region. A Remedial Action Plan (RAP) has been developed for this AOC to provide a long-term course of action for environmental cleanup. RAP development began in 1987 and was completed in 1989 as a working document. A Remedial Advisory Committee was formed in 1990 to assist NYSDEC in RAP implementation. Actions that have been taken to date include:

- A flow activated sampling station was established by NYSDEC to collect samples during high flow events. Measurements were also made at another station at the upper end of the AOC.
- A sediment dynamics model of the Buffalo River has been developed by EPA under the Assessment and Remediation of Contaminated Sediments Program. This model will allow predictions of sediment scour and deposition under a variety of flow conditions in the AOC.
- A remedial waste removal action is underway at the Bern Metal site and remedial construction action is underway at the Madison Wire site.
- A plan has been developed by NYSDEC to assess existing habitat conditions in the Buffalo River and to identify potential habitat improvements. Field work has been initi-

ated to compile data on existing habitat conditions in the AOC and the immediate upstream watershed. Faculty and students at New York State University have conducted physical mapping, siltation rate evaluations, and additional biological surveys.

Stakeholders:

ARO Corporation
Bern Metal
Buffalo River Citizens' Committee
Buffalo River Study Group
Dresser Industries
Erie County Department of Environment and Planning
Friends of the Buffalo River
Madison Wire
New York State Department of Environmental Conservation
Other industries
U.S. Environmental Protection Agency

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Buzzards Bay

Size and location: Buzzards Bay is located in southeastern Massachusetts. It has a surface area of 228 square miles and a watershed area of 432 square miles.

Organizations that initiated project:

U.S. Environmental Protection Agency
Massachusetts Executive Office of Environmental Affairs

Major environmental problems:

Nitrogen enrichment
Toxic pollutants
Pathogenic contamination of shellfish

Actions taken or proposed: Buzzards Bay was selected for inclusion in the National Estuary Program in 1987. A Comprehensive Conservation and Management Plan that recommends priority corrective actions to restore and maintain the estuarine resources has been developed. Actions accomplished include:

- Development of nitrogen loading limits for localized embayments.
- Establishment of a tri-town nitrogen management district.
- Creation of a toxic use reduction program for the highly industrialized New Bedford area.
- Establishment of a boat no discharge area for the waters in the town of Wareham.
- Completion of two storm water remediation projects and partial completion of four others.
- Establishment of a Mutual Aid Compact for Oil Spill Containment among the 12 municipalities surrounding Buzzards Bay.

Stakeholders:

Anglers
Boaters
Citizens
Coastal property owners
Environmental organizations
Industry
Local governments
Massachusetts Executive Office of Environmental Affairs
Naturalists
Tourists
U.S. Environmental Protection Agency

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Cache River

Size and location: The Cache River is located in southern Illinois and is a tributary of the Ohio River. The area is adjacent to the Shawnee National Forest.

Organization that initiated project:
The Nature Conservancy

Major environmental problems:
Habitat loss
Timber loss
Impacts of agriculture

Actions taken or proposed: The Nature Conservancy is working on a long-term plan for the Cache River Basin.

The State of Illinois received a grant from EPA under Section 319 of the Clean Water Act in October 1992 that was used to obtain and control land easements in critical areas. Also, work was conducted on seed bank protection and preparation.

Stakeholders:

The Nature Conservancy
Illinois Environmental Protection Agency

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Camden County Aquifer

Size and location: Activities will focus on the southeastern half of Camden County, New Jersey. Well-head protection program activities will be expanded to the northwestern half of the county by the Camden County Department of Health.

Organization that initiated project:
U.S. Environmental Protection Agency

Major environmental problems:

- Ground water contamination potentially caused by unpermitted discharge, underground storage tank operations, abandoned hazardous waste sites, and salt storage at municipal garages

Actions taken or proposed: EPA and the New Jersey Department of Environmental Protection are working in concert to enhance the capability of the Camden County Department of Health to establish a well-head protection program countywide. These activities include: design of a ground water-related geographic information system database; geo-positioning of public drinking water needs and potential sources of contamination to the underlying aquifer system; delineation of zones of influence (wellhead

protection areas) around public wells; and public outreach and education. The regulatory agencies will also target ground water-related program activities to the project area including inspections and preremedial investigations.

Stakeholders:

Business interests
Camden County Department of Health
Municipal governments
New Jersey Department of Environmental Protection
Other county agencies
U.S. Environmental Protection Agency

Contacts:

EPA:
Susan Schulz
U.S. EPA Region II
Water Management
Division
New York, NY 10278
(212) 264-5719
FAX: (212) 264-2194

Local:
Robert Pirrotta
Camden County Dept. of
Health
Jefferson House, 3rd
P.O. Box 9
Lakeland Road
(609) 757-8600
FAX: (609) 374-0143

Cameron Atrazine Pollution Trading

Size and location: This project consists of a 2,500-acre watershed that contains three city water supply lakes. The watershed is located in Clinton and Dekalb Counties in northwest Missouri.

Organization that initiated project:
U.S. Environmental Protection Agency

Major environmental problems:
Atrazine in city drinking water supply
Runoff from agricultural activities

Actions taken or proposed: EPA provided seed money in 1992 for this project under Section 104 of the Clean Water Act. The final report for the activities funded by that grant is due in early 1995. The U. S. Department of Agriculture has also provided funds for watershed management activities through the Water Quality Incentive Program. The project is directed at evaluating the most cost effective and efficient method of atrazine control in the drinking water supply. The project costs of treatment at the water plant are being compared with costs of implementing integrated crop management practices in the watershed. Water quality monitoring of the reservoirs is also being conducted.

Stakeholders:

Agricultural Stabilization and Conservation Service
City of Cameron
Clinton County Soil and Water Conservation District
Dekalb County Soil and Water Conservation District
Grindstone, Lost, and Muddy Creek Watershed Trustees
Missouri Department of Agriculture
Missouri Department of Natural Resources
Soil Conservation Service
U.S. Environmental Protection Agency
University of Missouri Extension

Contact: Tom Lorenz
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726 Minnesota Ave.
Kansas City, KS 66101
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FAX: (913) 551-7765

Canaan Valley

Size and location: Canaan Valley covers 55 square miles and is located in Tucker County, West Virginia.

Organization that initiated project:
The Canaan Valley Task Force

Major environmental problems:

- Second home development and off-road vehicle (ORV) use threaten sensitive wetlands

Actions taken or proposed: EPA created the Canaan Valley Task Force in July 1990. The Task Force is a public, private, and government partnership formed to ensure long-term environmental protection while allowing for reasonable and sustainable economic growth. The Task Force facilitates open and regular dialogue among all the interests in the Valley. The Canaan Valley Task Force coalesces diverse, often competing interests into a working federal, state, local, and public partnership to address a comprehensive range of issues. The dialogue facilitates the resolution of controversial and sensitive issues of

habitat protection, economic growth, and property rights.

The following actions have been taken or are under way:

- A land-use trends analysis through Geographic Information System applications.
- Advance identification of wetlands.
- Suspension of Nationwide Permits for surface mining, minor road crossings, and headwater and isolated wetlands.
- Increased wetlands surveillance and enforcement.
- Vigorous public outreach including numerous open public meetings and development of fact sheets as well as an informational brochure.
- A wastewater assimilation study of the Blackwater River.
- Two-year assistance to Tucker County for non-traditional means of wastewater treatment.

Canaan Valley

- Studies of impacts from ORVs involving water quality and vegetative communities.
- A study of the economic impact of the proposed Canaan Valley National Wildlife Refuge.
- An assessment of the headwater wetlands of the Valley.
- A U.S. Geological Survey (USGS) ground water study and development of a conceptual ground water flow model.
- A USGS surface water study and development of a surface water model.

Due in large part to the activities of the Task Force, the Monongahela Power Company, the largest landowner in the northern half of the Valley where most of the sensitive wetlands are located, has prohibited the use of ORVs on its property, thereby reducing impacts to the wetlands ecosystem from this activity. The Task Force has also helped pave the way for the creation of the Canaan Valley National Wildlife Refuge. The first refuge acquisition was formally dedicated on October 22, 1994 as the Nation's 500th National Wildlife Refuge. As more sensitive habitat is acquired for the refuge, the integrity of the wetlands ecosystem will be better protected.

Stakeholders:

Brooks Bird Club
Canaan Valley Landowners Association
League of Women Voters
Local Citizens Groups
Local citizens
Motorcycle Industry Council
National Audubon Society
National Park Service
National Wildlife Federation
The Nature Conservancy
Timberline Council
Trout Unlimited
Tucker County Chamber of Commerce
Tucker County Citizens for Progress
Tucker County Commission
Tucker County Convention and Visitor's Bureau
Tucker County Development Authority
Tucker County Planning Commission
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Geological Survey
West Virginia Audubon Council
West Virginia Chapter of the Sierra Club

West Virginia Division of Environmental Protection

West Virginia Division of Izaak Walton League

West Virginia Division of Natural Resources

West Virginia Division of Tourism and Parks

West Virginia Highlands Conservancy

West Virginia Mountain Bike Association

West Virginia Off-Highway Vehicle Association

West Virginia Recreational Vehicle Association

West Virginia Wildlife Federation

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841 Chestnut Building
Philadelphia, PA 19107
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FAX: (215) 597-7906

Casco Bay Estuary

Size and location: Casco Bay covers 229 square miles and its watershed covers 985 square miles. The bay extends from Cape Elizabeth, Maine to Phippsburg, Maine. Portland, Maine's largest city, borders Casco Bay.

Organization that initiated project:
Maine Department of Environmental Protection

Major environmental problems:

- Water quality impacts from storm water and combined sewer overflows
- Habitat impacts from development
- Water quality and human health impacts from individual wastewater systems (septic systems)
- Living resource impacts from existing sediment contamination
- Lack of public stewardship

Actions taken or proposed: Casco Bay was selected for inclusion in the National Estuary Program in 1990. A preliminary management plan for the Bay has been developed, and a final Comprehensive Conservation and Management Plan that recommends priority corrective actions to restore and maintain the estuarine resources is due in September 1995. To date a series of implementation and demonstration projects have been undertaken, including:

- The Agricultural Stabilization and Conservation Service distributed over \$200,000 in cost-share funds in Casco Bay watershed to address agricultural nonpoint source pollution.
- A public education campaign provided information on the need to restore eroding streambanks along the Pleasant River. Volunteers undertook the restoration work.
- A training program for municipal officials was developed to provide information on nonpoint source pollution and best management practices.
- Administrative structures to ensure the inspection and maintenance of septic systems are being evaluated.
- A storm water management plan for a town center is under development to demonstrate storm water control planning in areas that are designated as growth areas under local zoning ordinances.

Stakeholders:

Business and industry
Environmentalists
Farmers and foresters
Fishing industry
Homeowners
Local, state, and federal officials
Marina operators
Realtors and land developers

Contacts:

EPA:	State:
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U.S. EPA Region I (WQE)	Casco Bay Estuary
JFK Federal Bldg.	Project
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FAX: (617) 565-4940	(207) 828-1043
	FAX: (207) 828-4001

Chalk Creek

Size and location: Chalk Creek has a 173,000-acre watershed that is located 45 miles east of Salt Lake City, Utah.

Organizations that initiated project:

Utah Department of Environmental Quality
Utah Department of Agriculture

Major environmental problems:

- Sedimentation due to oil and gas construction sites, grazing practices, road construction, and loss of riparian vegetation
- Nutrients due to erosion and livestock concentrations
- Degrading stream channels and stream banks
- Loss of riparian vegetation
- Eutrophication of Echo Reservoir

Actions taken or proposed: Inventories have been completed for rangeland, forest, irrigated cropland, fisheries, stream and riparian areas, and wildlife. Alternative treatment plans have been developed for rangeland, irrigated cropland, and forest land.

The resource inventories and alternative treatment plans were used to complete a coordinated resource management plan (CRMP) for the watershed in 1994. The CRMP is a watershed management plan that represents consensus of all the stakeholders in the watershed. Watershed activities are coordinated by a Project Steering Committee which was organized by the U. S. Department of Agriculture (USDA) and the local soil conservation district in 1991.

A Project to demonstrate stream stabilization measures has been completed with Clean Water Act (CWA) Section 319 funds. USDA provided the technical assistance. Now that the CRMP has been completed, USDA is accelerating work on development of conservation plans for individual landowners. Watershed treatment practices to stabilize stream channels and control pollutants from rangeland and irrigated pasture and hayland are in the initial phases of implementation. Funding is being provided through CWA Section 319, USDA Water Quality Incentive Program, and landowners. Information and education activities are also being carried out.

Stakeholders:

Citizens Dependent on Weber River for Drinking Water
Local governments
Local landowners
Summit Land Trust
U.S. Department of Agriculture
U.S. Environmental Protection Agency
Utah Association of Conservation Districts
Utah Department of Agriculture
Utah Department of Environmental Quality
Utah Division of Oil, Gas and Mining
Utah Division of Water Resources
Utah Division of Water Rights
Utah Division of Wildlife Resources
Weber Basin Water Conservancy District

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Department of Environmental Quality
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FAX: (801) 538-6016

Chehalis River

Size and location: The Chehalis River has a 2,660-square mile drainage basin, located midway along the western Washington State coast (includes the entire Chehalis River Watershed, minus the Grays Harbor estuary).

Organization that initiated project:
Chehalis River Council (CRC)

Major environmental problems:

Bacteria
Temperature
Dissolved oxygen
Siltation
Suspended sediments
Phosphorus

Actions taken or proposed: A plan has been developed and is in place for protecting and restoring the Chehalis River Basin. Funding to implement the plan is currently being sought. Actions to be taken once funding has been obtained include:

- An economic feasibility study for a biowaste processing facility to remove wastestreams—Tri-County BioProducts, a group of dairy farmers and other interested citizens and agricultural interests will manage the study.
- Ground water monitoring studies of fecal coliform and nitrates impacted areas (the county is already doing some work).
- Education and outreach to teach people about environmental problems and their relationship to the ecosystem.

Actions that have already been taken or are underway in the Chehalis River Basin include:

- Completed a nonpoint source pollution plan by consensus of river basin users in December 1992.
- Formed the Chehalis Basin Resources Alliance—a nonprofit not eligible for tax deductible gifts—for fund raising and grant applicant for CRC.
- Formed Chehalis Basin Resource Trust—a nonprofit eligible for tax deductible gifts, easements, and bequests.
- Washington Department of Ecology (Ecology) is doing a Total Maximum Daily Load study of the middle Chehalis River and Black River, a tributary, and began a wasteload allocation process in fiscal year 1994.
- Ecology (with EPA funding) has developed a proposal to use the Chehalis River system

to test a trading scheme between point and nonpoint sources to improve water quality.

- Dillenbaugh Creek Model Watershed project begun by Lewis County Conservation District.
- Basin-wide private well water testing program is underway through Centralia College.
- The Chehalis Basin Fisheries Task Force, a nonprofit group, is developing and implementing a \$20 million fisheries (salmon and steelhead) restoration plan for the Chehalis River Basin—the U.S. Fish and Wildlife Service funded 21 projects (primarily habitat restoration) in fiscal year 1992 some of which were completed in fiscal year 1993.

Stakeholders:

Agricultural interests
Chehalis Basin Fisheries Task Force
Chehalis River Council
Cities and counties in the basin
Columbia/Pacific Resource Conservation and Development
Confederated Tribes of the Chehalis Reservation
Conservation districts
Environmental groups
Fish Growers Association
Fisheries interests
Grays Harbor Conservation District
Indian Tribes in the basin including the Quinault Indian Tribe and the Chehalis Indian Tribe
Lewis County Cattlemans Association
Lewis County Conservation District
Timber interests
U.S. Fish and Wildlife Service
U.S. Forest Service
Universities
Washington Department of Ecology
Washington Environmental Council
Washington State Department of Fisheries
Washington State University Cooperative Extension

Contact: Dave Palmer
Chairman
Chehalis River Council
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Oakville, WA 98568
(206) 273-8117

Chesapeake Bay

Size and location: The Chesapeake Bay's watershed covers 64,000 square miles and encompasses parts of New York, Pennsylvania, Delaware, Maryland, Virginia, West Virginia, and the District of Columbia.

Organizations that initiated project:

U. S. Congress
U. S. Environmental Protection Agency (representing all federal agencies)
States of Maryland, Virginia, and Pennsylvania
District of Columbia
Chesapeake Bay Commission

Major environmental problems:

- Nutrient enrichment from all sources, including air deposition
- Habitat loss and degradation (including submerged aquatic vegetation)
- Toxic substances
- Interstate fishery management
- Population growth and development

Actions taken or proposed: The major initiative of the Chesapeake Bay Program concerns nutrient reduction. In 1987 the signatory jurisdictions agreed to reduce nutrients entering the Bay by 40 percent by the year 2000 and retain those levels into the next century. In 1992 that agreement was further clarified to apply to the 10 major tributaries in the watershed. The four jurisdictions have completed their draft strategies specifying how the 40 percent reduction target will be reached in each tributary. A ban on phosphate detergent in the Bay states has helped to reduce phosphorus entering the Bay by 16 percent since 1985. Biological Nutrient Removal, a leading-edge cost-effective technology developed by the Bay Program, is currently being used to remove nitrogen at eight sewage treatment plants throughout the Bay watershed. Nutrient management plans, and erosion and runoff control measures initiated by the Bay Program are now being used on over 700,000 acres of agricultural land throughout the Bay watershed.

Habitat restoration projects address numerous problems. The removal of blockages and construction of denil fishways and fish elevators to create fish passages has reopened 175 miles of river to anadromous fish in the watershed, with many new projects underway. The Bay Program has committed to reopening 731 miles of stream habitat by 1998 and 1,357 miles by 2003. Oyster reefs have been created in various areas throughout the Bay. The return of submerged aquatic vegetation (SAV) is inseparably

linked to water quality improvement and nutrient reduction, and areas of the Bay where SAV is now growing have nearly doubled since 1984.

The Bay Program has developed a Toxics of Concern List and is developing strategies to remove or reduce the impact of these chemicals. The Program identification of tributyltin (TBT) boat paint as a harmful toxin and its subsequent ban in the Bay led to a nationwide ban. Voluntary Integrated Pest Management practices to decrease the use of pesticides and pesticide runoff are successfully promoted throughout the watershed. The new *Chesapeake Bay Basinwide Toxics Reduction and Prevention Strategy* commits the Bay Program to 75 percent coverage of the entire watershed with Integrated Pest Management practices. The Strategy also commits federal facilities in the watershed to reduce all toxic emissions by 75 percent by the year 2000 and targets a 75 percent reduction of Toxics of Concern by private industry.

The striped bass or rockfish, which spawns in Chesapeake Bay, was the focus of federal legislation in 1984 to regulate this interstate fish. A subsequent moratorium on fishing, first by Maryland and then Virginia, led to a dramatic recovery of the species. The 1993 survey of juvenile rockfish in the Bay was the highest in the 40 years that the survey has been conducted. The Bay Program has developed baywide interstate fishery management plans for a dozen species of finfish and shellfish.

Both Maryland and Virginia passed statewide legislation aimed at helping to protect sensitive Bay shoreline areas from development.

In July 1994, representatives from 25 federal agencies and departments signed the *Agreement of Federal Agencies on Ecosystem Management in the Chesapeake Bay*. The agreement included many very specific commitments by federal agencies, especially on federal lands within the watershed, including pollution prevention assessments by interagency teams aimed at reducing nutrients; beneficial use of clean dredge material for habitat restoration projects; and integration with National Civilian Community Corps projects throughout the watershed.

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Christina River

Size and location: The Christina River Watershed encompasses over 1,000 square miles and drains portions of southeastern Pennsylvania, Delaware, and a small portion of Maryland. The watershed lies within the Delaware River Basin.

Organizations that initiated project:

Delaware Department of Natural Resources and Environmental Control
Pennsylvania Department of Environmental Resources

Major environmental problems:

- Nutrient problems caused by point and nonpoint sources
- Toxic pollutants
- Threats to water supplies, major recreational areas, and aquatic life from urban and agricultural runoff as well as major point sources, including several hazardous waste sites

Actions taken or proposed: Through a coordinated effort by Pennsylvania and Delaware, this area is in the first stages of developing a Total Maximum Daily Load (TMDL). Problems have been identified, and a proposed short and long term monitoring strategy has been developed. The monitoring plan and proposed future studies for the development of control requirements have been approved by environmental officials in Pennsylvania, Delaware, the Delaware River Basin Commission (DRBC), and EPA. The monitoring program was initiated on October 1, 1994.

The approved plan calls for three years of monitoring in order to develop sufficient data to calibrate and verify the Water Quality Analysis Simulation Program water quality model. The last two years of the plan will be devoted to the development of low flow TMDLs and control needs.

The states, DRBC, and EPA have begun to factor in the nonpoint source problems in the basin. An interstate nonpoint source workgroup has been established that will develop a workplan to address these problems. This workplan will factor in, as much as possible, the ongoing monitoring activities described above. The receiving stream model noted above will be used to develop TMDLs and control needs for the problem areas within the basin.

In addition, the states have initiated a ground water study for a portion of this watershed—the Red Clay Creek watershed (between Pennsylvania and Delaware). Studies of ground water quality and quantity were conducted by the U.S. Geological Sur-

vey (ground water supplies 70 to 80 percent of base flow year round). The effects of ground water pumping, septic systems, and recharge by wastewater spray irrigation systems were examined. The potential for deep injection of wastewater was also examined and ruled out due to the geology of the basin. The ground water of the Red Clay Creek was found to be generally good, but there are warning signs about potential threats to ground water quality.

Stakeholders:

Brandywine Conservancy
Brandywine Valley Association
Chester County Water Authority
City of Newark
City of Wilmington
Conservation districts
Delaware Nature Society
Delaware Department of Natural Resources and Environmental Control
Delaware River Basin Commission
New Castle County
Pennsylvania Department of Environmental Resources
Red Clay Valley Association
Soil Conservation Service
U.S. Environmental Protection Agency
U.S. Fish and Wildlife
U.S. Geological Survey
White Clay Creek Watershed Association

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Philadelphia, PA 19107
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Clark Fork River-Pend Oreille Watershed

Size and location: The Clark Fork-Pend Oreille Watershed covers 26,000 square miles in Montana, Idaho, and Washington.

Organization that initiated project:
U.S. Congress

Major environmental problems:

- Nutrients from sources including irrigated agriculture, septic tanks, and municipal and industrial waste water discharges
- Heavy metals from active and inactive mining activities

Actions taken or proposed: Section 525 of the Clean Water Act calls for a comprehensive study of the sources of pollution in Lake Pend Oreille and the Clark Fork River and its tributaries. Such an undertaking has required help from three states, two EPA regions, and the EPA Las Vegas Environmental Monitoring Systems Laboratory. Using a range of technological tools, the study of the rivers feeding Lake Pend Oreille was linked with an analysis of the lake by a project team made up of the U.S. Geological Survey, the University of Idaho, the Panhandle Health District, the Eastern Washington University, the Bonner County Planning and Development Department, the Idaho Department of Environmental Quality, the Idaho Department of Fish and Game, and the EPA Las Vegas Environmental Monitoring Systems Laboratory.

Objectives of the project include:

- Control nuisance algae in the Clark Fork River by reducing nutrient concentrations.
- Protect Pend Oreille Lake water quality by maintaining or reducing current rate of nutrient loading from the Clark Fork River.
- Reduce near shore eutrophication in Pend Oreille Lake by reducing nutrient loading from local sources.
- Improve Pend Oreille Lake water quality through macrophyte management and tributary nonpoint source controls.

Actions include:

- Convene a Tri-State Implementation Council to implement the management plan recommendations.
- Establish a basin-wide phosphate detergent ban.
- Establish numeric nutrient loading targets for the Clark Fork River and Pend Oreille Lake.

- Develop and maintain programs to educate the public on its role in protecting and maintaining water quality.
- Control Eurasian milfoil (a nuisance plant) by education, rotovation (a harvesting technique), and research into alternative methods of control.
- Install centralized sewer systems for developed areas on Pend Oreille Lake.
- Institute seasonal land application and other improvements at the Missoula wastewater treatment facility.
- Enforce existing regulations and laws consistently and aggressively, particularly state anti-degradation statutes.
- Establish and maintain a basin-wide water quality monitoring network to assess effectiveness and trends and to better identify sources of pollutants.
- Develop and enforce storm water and erosion control plans and county ordinances.

In addition, Idaho received a Clean Lakes Program grant in 1987 to conduct a Phase I diagnostic/feasibility study for Lake Pend Oreille and its watershed. This study will analyze the lake's condition and determine the causes of that condition, examine the watershed to determine the sources of pollution, and then evaluate solutions and recommendations for the most feasible procedures to restore and protect lake water quality.

In 1993, a Phase II Clean Water Lakes grant was awarded. The Phase II project will translate the Phase I recommendations into action. Phase II projects implement in-lake restoration work as well as critical watershed management activities to control nonpoint source pollution to the lake.

Stakeholders:

City of Butte
City of Deerlodge
City of Missoula
City of Newport
Clark Fork Pend Oreille Coalition
Clean Lakes Coordinations Council
Idaho County Commissions
Idaho Department of Environmental Quality
Idaho Department of Fish and Game
Implementation Council
Intermountain Forest Industry Association
Intermountain Resources
Kalispell Indian Tribe

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Clear Creek

Size and location: The Clear Creek watershed covers roughly 600 square miles and includes 5 counties and more than 13 communities. From the headwaters on the continental divide to the plains near Denver, Clear Creek connects small mountain communities with Colorado's largest metropolitan area.

Organization that initiated project:

No one organization initiated the project, per se. It resulted from a critical mass of representative groups from industry, agencies, local organizations, and private citizens that joined together to protect the Clear Creek.

Major environmental problems:

- Metal loadings from active and inactive mining sites
- Highway construction and maintenance runoff and direct spills to the creek from highway accidents
- Urban development and runoff
- Hydrologic modification
- Nutrient pollution from septic tanks and municipal point sources
- Channel and riparian area destruction and erosion caused by construction for gambling growth
- Industrial discharges
- Leaking underground storage tanks

Actions taken or proposed: In 1983 the Clear Creek/Central City site was included on the Superfund National Priorities List. It is one of the largest Superfund study areas in the Nation encompassing all of two counties in the upper watershed. Planned Superfund remedial actions and voluntary cleanups have played and will continue to play an important role in the restoration of the river. Specifically, they include: Argo Tunnel water treatment plant, Burleigh Tunnel and man-made wetlands treatments, and private party mine waste cleanups in Central City and Blackhawk.

The most unique partnership was formed to address the McClelland Mine. Recently, through cooperative efforts of Superfund, Coors Brewing Company, the Colorado Department of Health, the Colorado Department of Transportation, Clear Creek County, and the Mining Headwaters Initiative, each taking one part of the six-part project, a comprehensive restoration was accomplished. The capping of mine tailings and mine waste piles, treatment of a wetlands area, and boat ramp and trail installation

transformed what was once a hazardous site into a county park.

Other actions taken in the watershed are:

- Emergency dial-down system to inform water users when spills have occurred in the Creek.
- Coors, the County, the Department of Transportation and the U.S. Forest Service have completed the Bakersville to Loveland Trail.
- AMAX Henderson Mine water quality project.
- Reworking of old Urad mill tailings to reduce metal loadings.
- Guanella Pass road reconstruction.
- Bear Mine Project by the U.S. Bureau of Mines and the U.S. Forest Service.
- Idaho Springs habitat remediation project.
- Formation of the North Clear Creek miniforum—a venue for small mountain communities to jointly cooperate on environmental solutions.
- Water supply environmental impact statement.
- Wetlands planning.
- City ordinances.
- Clear Creek Land Conservancy - Forest Stewardship Program.
- Jefferson County Open Space—acquisitions to protect water quality and stream corridors "Trails 2000 Plan."
- The Nature Conservancy mapping of endangered species specifically the orchid, Ute Ladies' Tresses (*Spiranthes Diluvialis*).
- Clear Creek Canyon Action Plan—environmentally sustainable development plan for the central canyon area.
- Golden Gate Canyon—"Great Outdoors Colorado" State Park improvements.
- Colorado School of Mines freshman class EPICS-nonpoint source evaluations.
- Colorado School of Mines Research Institute—emergency cleanup of radioactive waste.
- City of Golden—water quality ordinances and enforcement.
- Riparian restoration of Clear Creek through Golden and Wheat Ridge by Coors.
- Clear Creek WIIN Newsletter and video.
- Clear Creek-I-76 joint land use plan by Arvada and Jefferson County with specific environmental performance standards.

Clear Creek

- Standley Lake Agreement—comprehensive watershed management agreement for implementation of new water quality standards within the basin.
- Urban Drainage and Flood Control District—urban runoff water quality control and flood prevention projects.
- Division of Wildlife - Stream Watch Program.
- Adams County River Parks.

Many of these projects and programs were instigated or facilitated by the two Clear Creek Watershed Forums which were organized and attended by a diverse group of stakeholder interests. The Clear Creek watershed effort is a model for ecosystem protection in Colorado. The water and the watershed through which it flows easily establishes a sense of place for the citizens and a focus for efforts to protect the environment. Over 85 percent of the water is used as a drinking water supply for the metro area; therefore, the people of the lowlands have a special interest in remediation of the impacts of the past mining activities. Also the enhancement and protection of natural areas for recreation have spawned several joint projects throughout the watershed.

Stakeholders:

Cities - Central City, Black Hawk, Empire, Silver Plume, Georgetown, Idaho Springs, Golden, Arvada, Westminster, Northglenn
Colorado Department of Health
Colorado Department of Transportation
Colorado Division of Wildlife
Counties - Jefferson, Clear Creek, Gilpin
Denver Regional Council of Governments
Environmental groups - Clear Creek Land Conservancy, PAVE
Large and Small industries - Amax/Cypros, Coors Brewery Company, Western Mobile Permit
Local citizens
Professional organizations
U.S. Bureau of Mines
U.S. Environmental Protection Agency
U.S. Forest Service
U.S. Geological Survey
Upper Clear Creek Watershed Association

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Chesapeake Bay continued from page 40

Stakeholders:

Agricultural interests
Alliance for the Chesapeake Bay
Chesapeake Bay Foundation
Chesapeake Research Consortium
District of Columbia
Industry
Local environmental and citizens groups
Sport and commercial fisheries
States of Maryland, Virginia, and Pennsylvania
Utilities
Various federal agencies including EPA

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Clear Lake

Size and location: Clear Lake consists of an 8,700-acre watershed located in Cerro Gordo County in north central Iowa.

Organization that initiated project:

Cerro Gordo County Soil and Water Conservation District

Major environmental problems:

Nutrients, specifically nitrogen and phosphorus
High turbidity
Low water clarity
Algal blooms
Impaired fishery
Inhibited recreational use
Runoff from urban areas and cropland

Actions taken or proposed: This three-year project was initiated with Fiscal Year 1994 Clean Water Act Section 319 Nonpoint Source Management funds. The project will address both urban and agricultural nonpoint source water pollution through household and agricultural campaigns that consist of demonstrations and education efforts, technical assistance, and financial incentives for best management practice implementation. The urban campaign includes reducing nutrient impacts at the business and residential level as well as a volunteer water quality monitoring program. The agricultural campaign includes wetlands development, nutrient and pest management, and both structural and non-structural practices in the watershed. Specific goals are to reduce urban phosphorus and nitrogen inputs by 70 percent and 50 percent respectively; to reduce or eliminate algal blooms; and to improve water clarity by reducing phytoplankton levels.

Stakeholders:

Cerro Gordo County Health Department
Cerro Gordo County Soil and Water Conservation District
Cerro Gordo County Solid Waste Agency
Clear Lake Economic Development Corporation
Clear Lake Sanitary District
Ducks Unlimited
Hancock County Soil and Water Conservation District
Iowa Department of Agriculture and Land Stewardship
Iowa Department of Natural Resources
Northern Iowa Area Community College
Pheasants Forever

U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service

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Kootenai Tribe of Idaho
Local citizens
Missoula City, County Health Department
Montana County Commissions
Montana Department of Fish, Wildlife and Parks
Montana Department of Health and Environmental Science
Montana Power Company
Pend Oreille Conservation District
Soil Conservation Service
Steering Committee for the Tri-State Implementation Council
Stone Container
U.S. Environmental Protection Agency
U.S. Forest Service
University of Idaho
Washington Department of Ecology
Washington Department of Environmental Quality
Washington Water and Power

Contacts:

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Local: Ruth Watkins
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Clinton River Area of Concern

Size and location: The Clinton River is located in southeastern Michigan, just north of Detroit. The river flows 80 miles from its headwaters to Lake St. Clair near Mt. Clemens, and is a tributary in the Lake Erie watershed. Before entering Lake St. Clair, the river flows through a natural channel and a man-made spillway. The Area of Concern (AOC) is comprised of the main branch of the Clinton River downstream of Red Run (a major tributary of the Clinton River) to the mouth (17 miles) and the spillway (2 miles).

Organization that initiated project:

Michigan Department of Natural Resources

Major environmental problems:

- Degradation of benthos
- Degradation of fish populations and habitat
- Contaminated sediments (contaminants include PCBs, heavy metals, cyanide, ammonia, oil and grease, and phenol)
- High fecal coliform bacteria levels
- Low dissolved oxygen levels
- Increased sedimentation (due to the naturally occurring problems of low flow and the decreased slope of the river)
- Municipal and industrial discharges
- Nonpoint sources of contaminants from urban storm water, agricultural runoff, combined sewer overflows (CSOs), ground water contamination, and atmospheric deposition

Actions taken or proposed: The Clinton River AOC is one of 43 AOCs that have been designated by the United States and/or Canadian governments in the Great Lakes region. A Remedial Action Plan (RAP) is being developed for this AOC to provide a long-term course of action for environmental cleanup. Stage II of the RAP, which identifies proposed remedial actions and their method of implementation, is targeted for completion by April 1996. The RAP includes 23 recommendations; of these, 6 are for specified actions and 14 call for investigations to provide information for further decision-making. Three programs called for in the RAP are underway: nonpoint source and erosion control, air quality and monitoring, and a watershed-funded clearinghouse.

In addition, a variety of other activities have been taken or are underway including:

- Navigational channel dredged, increasing flow rate substantially during high flow periods only.
- Sediment deposits dredged from behind the spillway weir.
- A reconnaissance/feasibility study is being done by the U.S. Army Corps of Engineers to redesign the weir to allow fish to go over. The design study will follow in the near future.
- A spill response plan is being developed for Red Run Drain (portion of the Red Run that has been placed underground).
- Cleanup activities proceeding at four Superfund sites.
- The Michigan Department of Natural Resources (MDNR) reissued National Pollutant Discharge Elimination System permits for three wastewater treatment plants that included provisions for treatment or elimination of CSOs.
- Nine towns in the AOC have upgraded their wastewater treatment plants, reducing discharge of both conventional and toxic pollutants and bacterial contamination.
- Biological surveys and reports completed under nonpoint source surveillance for seven tributaries.
- Bottom draw structure at the Lake Orion dam installed, resulting in cooler water discharges to Paint Creek, a tributary to the Clinton River, increasing suitable trout water through the summer.
- Implementation begun of best management practices to control and prevent nonpoint sources of pollution to Gallagher Creek, a tributary to the Clinton River, with focus on storm water control and ordinance standards.
- Development, by the Clinton River Watershed Council using a Public Participation Grant from the State, of a training video and manual for the Clinton River Early Warning System (CREWS). CREWS is a voluntary network of residents who help detect spills by observing water conditions such as odor and color and reporting changes to the fire department.
- Citizen cleanups and a River Watch program (for reporting of spills) are on-going.

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Coeur D'Alene Basin

Size and location: The Coeur D'Alene Basin encompasses 3,700 square miles in Idaho.

Organizations that initiated project:

Idaho Department of Environmental Quality
U. S. Environmental Protection Agency
Coeur D'Alene Tribe

Major environmental problems:

Heavy metals contamination
Eutrophication
Threatened water supply

Actions taken or proposed: Because of the many agencies involved in the restoration efforts for Coeur D'Alene Basin, a Steering Committee was created to oversee the basin restoration and policies regarding basin restoration activity.

One major source of basin contamination is the South Fork of the Coeur D'Alene River, which was identified as a water quality limited segment. Therefore, the State of Idaho must develop a Total Maximum Daily Load (TMDL) for both the point sources and nonpoint sources in the basin. Another major source of basin contamination is the Bunker Hill Superfund Site. Contamination at this site is being

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- MDNR has obligated \$120,000 to conduct remedial investigations to identify the sources of PCBs to the Clinton River.

Stakeholders:

Clinton River Remedial Action Plan Public Advisory Council
Clinton River Watershed Council
Michigan Department of Natural Resources
Mt. Clemens River Improvement Program (a collection of local entities, including the City of Mt. Clemens, citizen groups, service organizations, and local corporations)
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency

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addressed through the Superfund remedial action process. The remedial actions implemented and resulting monitoring data will provide information that can help evaluate cleanup strategies.

Stakeholders:

Agricultural interests
Benewah County
Coeur D'Alene Basin Interagency Group
Coeur D'Alene Tribe
Idaho Department of Environmental Quality
Idaho Department of Land Management
Idaho Department of Water Resources
Idaho Fish and Game
Kootenay County
Kootenay Environmental Alliance
Local citizens
Mining interests
Panhandle Health District
Shoshone County
Soil Conservation Service
Three soil conservation districts
Timber interests
U.S. Bureau of Indian Affairs
U.S. Bureau of Land Management
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Forest Service
U.S. Geological Survey
University of Idaho

Contact: Geoff Harvey
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2110 Ironwood Parkway
Coeur D'Alene, ID 83814
(208) 769-1422

Colorado River

Size and location: The Colorado River basin covers about 244,000 square miles in seven states including west-central Colorado, eastern Utah, western Arizona, southwestern Wyoming, southeastern Nevada and California, and western New Mexico.

Organization that initiated project:
U.S. Congress

Major environmental problems:

- Increasing salinity levels in the river and the effects on agricultural soils in Arizona, California, and Mexico and on municipal/industrial water supplies in Nevada, Arizona, and California
- Loss of wetlands

Actions taken or proposed: Colorado River salinity standards, including a plan of implementation and numeric criteria, were developed by the states and approved by EPA. The plan of implementation is designed to maintain the salinity concentrations at or below the numeric criteria established at three lower basin monitoring locations and to meet commitments to Mexico. The plan of implementation includes policies used in all basin states for implementing the salinity standards through the National Pollutant Discharge Elimination System permit program and salinity control projects implemented through federal and state funding primarily in the upper basin states. Improved irrigation systems for salinity control on agricultural lands can dry up existing irrigation-induced wetlands. Mitigation of wetland losses is required for Bureau of Reclamation salinity control projects. The U.S. Department of Agriculture manages a voluntary wetland replacement program for its on-farm salinity control program.

Salinity control activities are coordinated through an Interagency Salinity Control Coordinating Committee, the Colorado River Basin Salinity Control Forum comprised of representatives of the seven basin states, and two other committees.

Stakeholders:

Citizens of AZ, CA, CO, NV, NM, UT, WY
Mexico
State wildlife agencies
U.S. Department of Agriculture
U.S. Department of Interior
U.S. Environmental Protection Agency

Contact: Jack Barnett
CO River Basin Salinity Control Forum
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Bountiful, UT 84010
(801) 292-4663
FAX: (801) 524-6320

Coos Bay/Coquille River Basins

Size and location: Coos Bay and Coquille River Basins are located along the southern part of the Oregon coast.

Organization that initiated project:

U.S. Environmental Protection Agency

Major environmental problems:

Degraded Salmonid spawning gravel areas
Overgrazing of riparian corridors
Bank erosion
Elevated water temperatures
Degraded commercial shellfish beds
High bacteria loadings
High rates of juvenile salmon mortality
Toxics contamination

Actions taken or proposed: State and local interests have recognized the major environmental threats listed above for some time. In many instances, individual actions had already been planned or initiated, but the level of effort and necessary teamwork was not nearly adequate to address the magnitude of the problem. EPA approached the lead state agencies to attempt a more integrated watershed approach.

Stakeholders:

County Department of Economic Development
Local drainage district
Oregon Department of Agriculture
Oregon Department of Environmental Quality
Oregon Department of Fish and Wildlife
Oregon Department of Forestry
Soil Conservation District
U.S. Environmental Protection Agency

Contact:

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Seattle, WA 98101
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FAX: (206) 553-1775

Corning Aquifer/Elmira Aquifer

Size and location: The Corning Aquifer and Elmira Aquifer are located in Steuben and Chemung counties, in south central New York State. These aquifers are designated as primary sources of drinking water by the New York State Department of Environmental Conservation.

Organization that initiated project:
U.S. Environmental Protection Agency

Major environmental problems:

- Ground water contamination potentially caused by unpermitted discharges, underground storage tank operations, abandoned hazardous waste sites, and salt storage at municipal garages

Actions taken or proposed: EPA geographically targeted its ground water-related program activities to the project area and provided technical and Geographic Information System (GIS) assistance to the local agencies in the development of their wellhead protection programs. EPA completed activities such as inspections and pre-remedial investigations within the project area. GIS equipment was purchased for the regional planning board with EPA grant funding and custom-designed with contractor assistance.

Intermunicipal workgroups were formed to coordinate ground water protection strategies. The local participants are implementing wellhead protection practices, and new local ordinances are being developed to provide for zoning changes in vulnerable wellhead protection areas. In addition, the local participants are conducting outreach activities including increased outreach on Underground Injection Control Program requirements.

Stakeholders:

Big Flats, NY
Cooperative Extension Service
Cornell Water Resources Institute
Corning, NY
Erwin, NY
Horseheads, NY
New York State Department of Environmental Conservation
New York State Department of Health
Painted Post, NY
Soil and Water Conservation Districts
South Corning, NY
Southern Tier Central Regional Planning and Development Board
Steuben County Farm Bureau
Three Rivers Development
U.S. Environmental Protection Agency
U.S. Geological Survey

Contacts:

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(212) 264-5719
FAX: (212) 264-2194

Local:
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Southern Tier Central
Regional Planning and
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Painted Post, NY 14870
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Corpus Christi Bay

Size and location: The Corpus Christi Bay National Estuary Program (CCBNEP) encompasses the estuarine environment of 75 miles of the south-central Texas coastline and the 12 member counties of the Coastal Bend Council of Governments. This 550-square mile area includes all bays and saltwater bayous in the Aransas, Corpus Christi, Baffin, and upper Laguna Madre Bay systems.

Organizations that initiated the project:

Office of the Governor of Texas
Texas Natural Resource Conservation Commission
U.S. Environmental Protection Agency

Major environmental problems:

- Limited freshwater inflows to the Corpus Christi Bay system
- Loss of wetlands, seagrasses, and other critical habitats
- Oil field brine discharge into estuaries
- Negative impacts from dredging and the disposal of dredged materials
- Impacts of persistent brown tide
- Degradation of water quality in the estuaries and their tributaries from point and nonpoint sources of pollution
- Endangered Species issues: Whooping Crane, Piping Plover, and Kemp's Ridley sea turtle

Actions taken or proposed: Corpus Christi Bay was selected for inclusion in the National Estuary Program in 1992. A Comprehensive Conservation and Management Plan (CCMP) is being developed for Corpus Christi Bay that recommends actions to protect and enhance the water quality and living resources of the Bay.

The CCMP will outline specific actions, schedules, and budgets to remediate those problems identified by the CCBNEP. These actions will be developed using a consensus-based approach involving all possible affected parties. The CCMP will be a truly comprehensive plan including commitments and plans for financing, implementing, and monitoring priority management actions.

Stakeholders:

Business and industry representatives
Citizen's groups
Federal agencies
Local agencies and governments
Local citizens
State agencies
Universities

Contacts:

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FAX: (512) 985-6301

Cranberry Lake

Size and location: Cranberry Lake is located in Byram Township, New Jersey. The lake is 190 acres in size, with a mean depth of 6.9 feet and maximum depth of 15.1 feet. The watershed is 1,814 acres, including the lake.

Organization that initiated the project:
Byram Township

Major environmental problems:

- Excessive weed growth
- Reduced dissolved oxygen
- Sediment loading
- High in-lake phosphorus concentrations
- Excessive algal concentrations
- Reduced fish habitat
- Septic related and nonpoint source discharges
- Sediment infilling

Actions taken or proposed: New Jersey received a Clean Lakes Program Phase II Restoration/Implementation grant in 1992 for Cranberry Lake. This project will implement in-lake restoration work as well as critical watershed management activities to control nonpoint source pollution to the lake. Activities that are being supported by this funding include:

- Control of future land development through a sensitive lands management plan.
- Weed harvesting.
- Storm sewer management.
- Correction of existing soil erosion problems.

Stakeholders:

- Byram Township
- Cranberry Lake Community Club
- New Jersey Department of Environmental Protection
- Sussex County Planning Department
- Tourism
- U.S. Environmental Protection Agency

Contacts:

EPA:	State:
Theresa Faber	Budd Cann
U.S. EPA Region II	Bureau of Monitoring
26 Federal Plaza	Management
New York, NY 10278	NJ Department of Environ-
(212) 264-8708	mental Protection (CN 427)
FAX: (212) 264-2194	Trenton, NJ 08625
	(609) 292-0427
	FAX: (609) 633-1095

Deal Lake

Size and location: Deal Lake is located in eastern Monmouth County, New Jersey. The lake is 143 acres with a watershed of 1,228 acres.

Organization that initiated project:

Deal Lake Commission (a substate agency under the Land Use Planning Law of New Jersey), in conjunction with the neighboring towns.

Major environmental problems:

- Upstream and urban development causing increased nutrients and sediment loads
- Filling in of some shallower areas of the lake
- Accelerated weed growth
- Algal blooms which produce odor problems when rotting
- Bacteria levels exceeded bathing criteria

Actions taken or proposed: A State funded diagnostic/feasibility study was completed in 1983. It developed a three step approach. The steps are:

- 1) to upgrade or develop ordinances and zoning requirements dealing with soil erosion control, storm water quality management, and proper watershed/land use management;
- 2) the identification of all existing sources of erosion and implementation of the ordinances or avoidance of development; and
- 3) the construction of detention basins.

The Harvey Brook arm of the lake was restored in 1988. The demonstration project included several sediment-nutrient control projects, identification of sensitive environmental areas, and the development of environmental ordinances and rezoning. The Deal Lake Commission has developed agreements with the five watershed municipalities and meets on a regular basis to discuss watershed activities.

In 1989, New Jersey was awarded a Clean Lakes Program Phase II Restoration/Implementation grant for Deal Lake. This project will implement in-lake restoration work as well as critical watershed management activities to control nonpoint source pollution to the lake. Permits are presently being obtained for construction of sedimentation basins funded through the Clean Lakes Program, and a preliminary draft of the sensitive land management plan is under review.

Stakeholders:

Asbury Park
County Mosquito Commission
Deal Lake Commission
Interlaken
Local citizens
Neptune Township
Ocean Township
Tourists
Town of Deal
U.S. Environmental Protection Agency

Contacts:

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Trenton, NJ 08625-0427
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Delaware Estuary

Size and location: This project focuses on the tidal portion of the Delaware River between the falls at Trenton, New Jersey and the mouth of the Bay (between Cape May, New Jersey and Cape Henlopen, Delaware). The project area, however, encompasses the entire river basin.

Organizations that initiated project:

The States of Pennsylvania, New Jersey, and Delaware petitioned EPA for inclusion of the Delaware Estuary in the National Estuary Program.

Major environmental problems:

- Toxics in sediments, fish, and birds
- Loss of diversity and loss and fragmentation of certain habitat types
- Nonpoint source pollution
- Water use: supply, quality, and allocation

Actions taken or proposed: The Delaware Estuary was selected for inclusion in the National Estuary Program in 1988. A Comprehensive Conservation and Management Plan (CCMP) is currently being developed for the Delaware Estuary that advocates a watershed protection approach in implementing the action plans contained in the CCMP. It will provide a basin-wide perspective in managing land use, toxics, habitat protection, and water use issues.

One project already underway is mapping of habitat for priority species throughout the estuary. The maps will be designed for use by local governments to help them protect habitat through improved planning procedures. Land uses and practices appropriate for such areas, coordination of interstate management plans, and inclusion of the important species in Environmental Impact Statements will be proposed.

The program is also developing a nonpoint source plan that will assist states in prioritizing watersheds, an action plan to address the impacts of toxics on fisheries and raptors, and an action plan for restoration of urban stream corridors. Interstate fish advisories will be coordinated and loading limits for selected toxicants (Total Maximum Daily Loads) will be established. The program will provide technical support for watershed-based land planning for storm water management and nonpoint source control.

The program is proposing development of a long-term environmental policy plan that would integrate environmental concerns into decision-making

by all sectors of society to achieve sustainable development.

Other activities include:

- Examining potential water supply shortages in certain areas of the Delaware basin (such as the Potomac-Raritan-Magothy aquifer system and the Triassic lowland bedrock aquifers) and encouraging protective action by water and wastewater utilities.
- Providing tools and technical assistance to local governments in support of improved land use planning.
- Encouraging and providing incentives for increased regional planning.
- Improving coordination of water supply planning to address water quantity and quality planning.
- Addressing toxics loadings from ground water and nonpoint sources.
- Developing a regional information management service that will facilitate sharing of information.
- Continuing and expanding the ongoing public participation program.
- Coordinating and expanding the monitoring programs of Delaware, New Jersey, and Pennsylvania.

Stakeholders:

Anglers
Business and industry
Commercial fishing
Environmental groups
Local and regional agencies
Local citizens
Private organizations
States of Delaware, New Jersey, and Pennsylvania
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service

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Philadelphia, PA 19107
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Delaware Inland Bays

Size and location: The Delaware Inland Bays Estuary program addresses the water quality and environmental problems of three interconnected watersheds (the Indian River, the Rehoboth, and the Little Assawoman Bays) in Sussex County, Delaware. The drainage area is approximately 300 square miles, with a water surface area of 32 square miles.

Name of organization that initiated project:

Delaware Department of Natural Resources and Environmental Control

Major environmental problems:

- Habitat loss/modification due to erosion, sedimentation, dredging, and filling
- Eutrophication (nutrient over-enrichment)

Actions taken or proposed: The Delaware Inland Bays Estuary was selected for inclusion in the National Estuary Program in 1988. The draft Comprehensive Conservation and Management Plan (CCMP) for the Estuary has been completed and recommends a five-tiered approach to resolving the problems. These efforts include:

- 1) An Agricultural Source Action Plan which proposes treatment of agricultural wastes and fertilizers.
- 2) A Habitat Protection Action Plan which proposes various methods to control the loss of significant habitat and the preservation of existing aquatic and terrestrial ranges.
- 3) A Public Education and Outreach Program which explains the benefits of the Estuary and the methods of preservation.
- 4) An Industrial, Municipal and Septic System Action Plan which proposes a pollution control strategy and a long-term capital expenditure program for wastewater treatment.
- 5) A Land Use Action Plan which evaluates current land-use practices and proposed mitigation measures.

In March 1990 the Inland Bays Recovery Initiative was launched. This two-year program has been integral to the estuary program. The purpose of the Recovery Initiative was to field test ideas that could be central to the CCMP. In addition to the Recovery Initiative, Action Plan Demonstration Projects which are designed to test new techniques were started. Lessons learned from these projects will influence a number of the tactics selected for implementation in the CCMP.

Other activities in the estuary include:

- *Preparation of the Water-Use Activity Impacts Report* in 1989 which will serve as a basis for developing a Water-Use Plan for managing use of the Bays' waters.
- Development, by the University of Delaware Sea Grant Marine Advisory Service, of the Inland Bays Citizen Monitoring Program which is monitoring 30 to 50 sites using more than 50 volunteers.
- Use of a Geographic Information System to provide topographical and other information useful in planning water and wetland programs and in issuing permits.
- Identification, by the Soil Conservation Service, of areas in which to focus water quality treatment technologies as part of a national Hydrologic Unit Area project. Results will be used to further refine existing agricultural runoff control tactics.
- Assistance to landowners for implementing conservation practices that include building structures for water control and waste management, tree planting, buffer stripping, and managing wetlands. This assistance is provided through the Indian River Watershed Protection Plan.

Stakeholders:

Delaware Department of Agriculture
Delaware Department of Natural Resources and Environmental Control
Environmentalists and landowners
Farmers
Local citizens
Resource users (anglers, swimmers, etc.)
Sussex County Council
Sussex Conservation District
Sussex County local governments
Tourist industry
U.S. Department of Agriculture
U.S. Environmental Protection Agency
Various industries

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Dover, DE 19903
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Eighteenmile Creek Area of Concern

Size and location: This Area of Concern (AOC) is defined as Eighteenmile Creek and Olcott Harbor on the southwestern shore of Lake Ontario in New York.

Organizations that initiated the project:

U.S. Environmental Protection Agency
New York State Department of Environmental Conservation (NYSDEC)

Major environmental problems:

- Contaminated sediments
- Contaminated fish
- Loss of habitat in the lower reach of the Eighteenmile Creek

Actions taken or proposed: The Eighteenmile Creek AOC is one of 43 AOCs that have been designated by the United States and/or Canadian governments in the Great Lakes region. A Remedial Action Plan (RAP) is being developed for this AOC to provide a long-term course of action for environmental cleanup. RAP development began in March 1994. The Stage I Report on problem definition is in progress and is projected to be completed in 1995. A Remedial Action Committee has been formed to assist NYSDEC in RAP development. Meanwhile, some projects that had been planned on a Lake Ontario-wide basis are resulting in actions that impact the Eighteenmile Creek AOC. For example, NYSDEC is developing pollution prevention regulations to require implementation of "Toxic Chemical Reduction Plans" for facilities that generate certain amounts/types of hazardous wastes or toxic chemicals. Some industries in the Eighteenmile Creek AOC have already taken the initiative to institute pollution prevention practices.

Stakeholders:

New York State Department of Environmental Conservation

Other stakeholders to be identified

U.S. Environmental Protection Agency

Contact:

Alice Yeh

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Elkhorn Slough

Size and location: Elkhorn Slough winds between Santa Cruz and Monterey, California covering a distance of approximately seven miles. Its watershed encompasses 2,500 acres of salt marsh, mudflat, and tidal channels and is the largest wetland in central California.

Organization that initiated project:
Elkhorn Slough Foundation

Major environmental problems:
Overgrazing
Erosion
Nonpoint source pollutants
Pesticide runoff

Actions taken or proposed: EPA is funding several projects to demonstrate the restoration of native vegetation on formerly over-grazed lands in this coastal watershed and implement nonpoint source best management practices. In addition, the project includes a survey of restoration needs and livestock impacts in the Elkhorn Slough (the Slough) watershed.

Many entities are presently carrying out projects at Elkhorn Slough. The Slough is a National Estuarine Research Reserve, designated by the National Oceanic and Atmospheric Administration, and managed by the California Department of Fish and Game. The California State Water Resources Control Board is managing a Clean Water Act Section 205(j) project studying runoff from strawberry fields. The Nature Conservancy recently purchased a large parcel near the site of this EPA project, and is planning restoration efforts.

The Elkhorn Slough Foundation, a nonprofit environmental organization focusing on restoration of the watershed, is receiving assistance for surveys and educational activities from Moss Landing Marine Laboratory graduate students. Additional funds to augment aerial photo costs have also been acquired.

Stakeholders:

California Coastal Commission
California Coastal Conservancy
California Department of Fish and Game
California Regional Water Quality Control Board
California State Water Resources Control Board
Elkhorn Slough Foundation
Local farmers
Local governments
Local industry
Moss Landing Marine Lab
National Oceanic and Atmospheric Administration
The Nature Conservancy
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
University of California-Santa Cruz

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FAX: (415) 744-1078

Elm Creek

Size and location: Elm Creek consists of a 35,800-acre watershed located in Webster County in south central Nebraska.

Organization that initiated project:

Lower Republican Natural Resource District

Major environmental problems:

- Nonpoint source pollution in the form of instream sedimentation affecting cold water fishery
- Erosion from near-stream gullies/overfalls, upland areas of cropland and pasture, irrigation return flows, and livestock access
- Streambank erosion

Actions taken or proposed: Elm Creek is a U.S. Department of Agriculture (USDA) Hydrologic Unit Area project, and is one of EPA's National Monitoring Program Projects under Section 319 of the Clean Water Act (CWA). A small amount of USDA Water Quality Incentive Program funding has also been devoted to the project area.

The objectives of the project are to:

- Identify and target critical areas of nonpoint source pollutant loadings contributing to impairment of beneficial uses.
- Implement demonstrable land treatment practices which are "cost-effective" and can

functionally reduce sediment loadings to Elm Creek by 50 percent.

- Facilitate a nonpoint source public education effort within the project area.
- Conduct water quality monitoring; and integrate CWA Section 319 funding/activities with other funding/activities in the watershed to provide a holistic watershed management project for water quality protection. Practices being employed include nutrient and pest management, grazing management, cattle exclusion from the streams, and streambank restoration.

Stakeholders:

Lower Republican Natural Resources District
Nebraska Department of Environmental Quality
Nebraska Game and Parks Commission
Soil Conservation Service
U.S. Environmental Protection Agency
University of Nebraska Extension

Contact:

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Endicott-Johnson City Aquifer

Size and location: The Endicott-Johnson City Aquifer is located in Broome County in south central New York. This area is designated as a primary source of drinking water by the New York State Department of Environmental Conservation (NYSDEC).

Organization that initiated project:

U.S. Environmental Protection Agency

Major environmental problems:

- Ground water contamination potentially caused by unpermitted discharges, underground storage tank operations, abandoned hazardous waste sites, and salt storage at municipal garages

Actions taken or proposed: EPA geographically targeted its enforcement program activities to the project area and provided technical and Geographic Information System (GIS) assistance to the local agencies

in the development of their wellhead protection programs. EPA's enforcement and remedial programs completed activities such as inspections and pre-remedial investigations within the project area. GIS equipment was purchased for the county Department of Health with EPA grant funding and custom-designed with contractor assistance.

Under joint EPA and NYSDEC grant funding, a technical assistance center has been developed to help small quantity generators of hazardous waste comply with applicable regulations and research current techniques for pollution prevention. The local participants are implementing wellhead protection practices, and new local ordinances were passed providing for zoning changes in vulnerable wellhead protection areas. In addition, the local participants are conducting outreach activities including increased outreach on Underground Injection Control Program requirements.

Endicott Aquifer continued on page 60

Flint Creek

Size and location: Flint Creek has a 290,000-acre watershed that is located in north-central Alabama and drains to Wheeler Reservoir in the Tennessee River.

Organization that initiated project:

U.S. Environmental Protection Agency
Alabama Department of Environmental Management*
Tennessee Valley Authority*
U.S. Department of Agriculture*
*key players in formation of the project

Major environmental problems:

Runoff from agricultural lands
Point source pollutants
Runoff from urban areas
Bank-side and instream debris and litter

Actions taken or proposed: The Flint Creek Watershed Project was initiated in 1992 with an organizational meeting with stakeholders. Project objectives and resource commitments were obtained at this meeting. Several subsequent meetings of the major stakeholders and sub-committee members have resulted in the following actions:

- Hired a Project Leader.
- Developed watershed maps and an inventory of land uses in the watershed.
- Compiled existing water quality data and collected additional water quality data.
- Conducted two fish health studies and several biological assessments.
- Initiated an Agriculture Stabilization and Conservation Service Water Quality Initiative Project in Crowabout Creek.
- Developed a volunteer monitoring program.
- Working on development of a Total Maximum Daily Load model.
- Developed three outdoor laboratories.
- Formed a watershed Conservancy District and elected eleven directors from the three county area.
- Developed a Geographic Information System for the watershed.
- Approved grants for best management practices to control waste on dairy and swine farms.
- Assisted area farmers with animal waste lagoon pumpout.
- Developed a Self-Enviro-assist program.
- Implemented a sociological survey to assess

community attitudes and measure attitude changes over time.

- Developed several educational activities and environmental literature for school and community distribution.

Stakeholders:

Alabama A & M Cooperative Extension Service
Alabama Department of Agriculture and Industries
Alabama Department of Environmental Management
Alabama Department of Public Health
Alabama Forestry Commission
Alabama Geological Survey
Alabama Soil and Water Conservation Committee
Auburn University Cooperative Extension Service
Cullman County Soil & Water Conservation District
Lawrence County Soil & Water Conservation District
Morgan County Litter Control Office
Morgan County Soil & Water Conservation District
Soil Conservation Service
Tennessee Valley Authority
Tennessee Valley Resource Conservation & Development
U.S. Agriculture Stabilization and Conservation Service
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Geological Survey

Contact:

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Florida Keys National Marine Sanctuary

Size and location: The Florida Keys National Marine Sanctuary encompasses approximately 2,800 square nautical miles of nearshore waters extending from just south of Miami to the Dry Tortugas, a small island west of Key West in the Gulf of Mexico.

Organizations that initiated project:

U.S. Environmental Protection Agency
National Oceanic and Atmospheric Administration (NOAA)
Florida Department of Environmental Protection

Major environmental problems:

- Degraded water quality
- Septic leachate from on-site disposal systems
- Discharges from sewage treatment/package plants and live-aboard vessels
- Storm water runoff
- Seagrass die-off, sponge die-off, algal blooms

Actions taken or proposed: EPA and the Florida Department of Environmental Protection have recently completed the development of a Water Quality Protection Program for the Sanctuary. The purpose of the Program is to recommend 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 Sanctuary. A comprehensive water quality monitoring and research program was also developed and will be implemented in fiscal year 1995.

Stakeholders:

Local citizens
National Oceanic and Atmospheric Administration
Recreational users including anglers, boaters, and divers/snorkelers
Seafood processors
State of Florida
Tourist industry
U.S. Environmental Protection Agency

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Atlanta, Georgia 30365
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FAX: (404) 347-1797

Endicott Aquifer continued from page 58

Stakeholders:

Bromme County Department of Health
Broome County Division of Solid Waste
Chenango, NY
Conklin, NY
Fenton, NY
Johnson, NY
Kirkwood, NY
New York State Department of Environmental Conservation
Southern Tier East Regional Planning Board
U.S. Environmental Protection Agency
Vestal, NY

Contacts:

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Susan Schulz
U.S. EPA Region II
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Division
New York, NY 10278
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FAX: (212) 264-2194

Local:
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Broome County Department of Health
One Wall Street
Binghamton, NY 13901
(607) 778-8885

Galveston Bay Estuary

Size and location: Galveston Bay Estuary is located near Houston, Texas and empties into the Gulf of Mexico. The estuary itself covers 600 square miles and has a watershed that encompasses 32,000 square miles.

Organization that initiated project:

Texas Natural Resource Conservation Commission (formerly Texas Water Commission)

Major environmental problems:

Wetland loss
Nonpoint source pollution
Sewer overflows/bypasses
Possible future alterations of freshwater inflow
Aquatic toxicity
Living resources declines
Poor shoreline management practices
Oil and chemical spills
Bioaccumulation of toxics in seafood
Illegal connections to storm sewers
Low dissolved oxygen
Oyster bed closures
Poor water and sediment quality in marinas
Shoreline erosion
Bay debris
Risks of contact recreation due to pathogens
Exotic species

Actions taken or proposed: Galveston Bay Estuary was selected for inclusion in the National Estuary Program in 1988. A Comprehensive Conservation and Management Plan (CCMP) is being developed for Galveston Bay that recommends priority corrective actions to restore and maintain the estuarine resources. Costs for implementation of the CCMP are projected to be about \$36.5 million.

Actions that have been taken in the Bay include:

- Designation of two State Coastal Preserves.
- Proposed designation of Christmas Bay as an Outstanding National Resources Water under the State's water quality standards.
- Restored shoreline vegetation in several areas.
- Conducted industrial pollution prevention activities.
- Built a 5-acre oyster reef using artificial substrate.
- Increased use of pump-outs by recreational boaters through an intensive education effort.

- Implemented a continually expanding citizen monitoring program.
- Implemented a Citizens' Pollution Reporting Hotline.
- Developed a seafood consumption safety program.

Some of the most important actions that have yet to be taken but that have been proposed in the development of the CCMP include:

- Acquire and protect quality wetlands.
- Restore, create, and protect wetlands.
- Implement storm water control programs for local cities.
- Establish residential load reduction programs.
- Correct malfunctioning septic tanks.
- Eliminate or reduce bypass and overflow problems.
- Issue National Pollutant Elimination Discharge System permit for control of oil and gas discharges.
- Establish sediment quality criteria.
- Perform Total Maximum Daily Load for oxygen demand and nutrients.
- Reduce nutrient and biological oxygen demand loadings to problem areas.
- Establish a planning program for shoreline development.
- Reduce water consumption.
- Implement a Bay-wide effort to strengthen species management.

One unique feature of the Galveston Bay program was the use of contingent valuation to determine an estimated value for the resource.

Stakeholders:

Business and commerce
Commercial fishing
Environmental groups
Federal agencies
Local citizens
Local governments
Local industries
Recreational fishing
State government agencies

Galveston Bay Estuary continued on page 62

Goodman Creek

Size and location: Goodman Creek has a 59,000-acre watershed and is located in west central North Dakota.

Organization that initiated project:

Mercer County Soil Conservation District and Water Resource District

Major environmental problems:

- Nutrients from soil erosion
- Sediments from soil erosion and degraded riparian areas
- Contamination from livestock waste

Actions taken or proposed: The Mercer County Soil Conservation District is sponsoring and coordinating this project in rural North Dakota. The water quality of Goodman Creek will be improved by promoting improved land management and installing various best management practices (BMPs) which effectively reduce erosion on 60 percent of the agricultural lands within the watershed. These land treatment practices will primarily focus on managing crop residue and improving current grazing systems within the project areas. In addition, information on the positive impacts the implementation of various BMPs can have on water quality within a small watershed will be documented and disseminated. Water quality and land treatment data compiled during this project will be used to determine the correlation between land treatment and water quality improvements. Upon completion of this project, the data will be analyzed to evaluate the impact the project activities had on the water quality within the subwatershed and the cumulative effect subwatershed treatment can have on water quality within the large watersheds of North Dakota. Given the size of this project area, trends toward improved water quality should be nearly immediate and more easily documented as compared to those in larger watersheds.

Stakeholders:

Individual farmers
Mercer County Soil Conservation District and Water Resource District
U.S. Environmental Protection Agency

Contacts:

State: Greg Sandness
North Dakota State Department of Health and Consolidated Laboratories
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Local: Pam Stabenow
Mercer County Soil Conservation District and Water Resource District Boards
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Beulah, ND 58523
(701) 873-2101
FAX: (701) 873-4689

Galveston Bay Estuary continued from page 61

Contacts:

EPA:	Local:
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U.S. EPA Region VI	Program Director
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FAX: (214) 665-6689	Webster, TX 77598
	(713) 332-9937
	FAX: (713) 332-8590

Grand Calumet River/Indiana Harbor Canal Area of Concern

Size and location: The Grand Calumet River/Indiana Harbor Canal (GCR/IHC) Area of Concern (AOC) lies approximately 15 miles southeast of Chicago, Illinois in Lake County, Indiana. The AOC covers the entire Grand Calumet River watershed, including the Indiana Harbor Canal and Nearshore Lake Michigan from the Indiana/Illinois State Line southeast to the Marquette Park Lagoons in Gary, Indiana.

Organization that initiated project:

U.S. Environmental Protection Agency

Major environmental problems:

- Municipal and industrial discharges
- Combined sewer overflows
- Contaminated ground water
- Storm water runoff
- Highly polluted sediments (pollutants include chromium, lead, and PCBs)

Actions taken or proposed: The GCR/IHC AOC is one of 43 AOCs that have been designated by the United States and/or Canadian governments in the Great Lakes region. A Remedial Action Plan (RAP) is being developed for this AOC. The RAP will provide EPA and the Indiana Department of Environmental Management (IDEM) with a long-term course of action for environmental cleanup for the Grand Calumet River and Indiana Harbor. The RAP is addressing controlling nonpoint sources of pollution, remediating contaminated sediments, and restoring habitat.

Because of water quality problems and other threats to human health and the environment, EPA and IDEM have focused their Northwest Indiana Environmental Initiative (see page 105) on the GCR/IHC AOC. Initiative successes include court-enforceable agreements with facilities at the head of the Grand Calumet to clean up wastewater discharges to meet permitted limits and remediate contaminated sediments in a 5-mile stretch of the River. The Agencies secured a \$55 million agreement covering cleanup, process improvements, and sediment remediation with a facility adjacent to the Indiana Harbor Canal. In August 1994, the Agencies entered into a groundbreaking voluntary agreement with five northwest Indiana companies to control the migration of oil floating on top of the ground water.

Through the Initiative, the Agencies will continue to ensure compliance with all federal and state environmental statutes. The Agencies will also be working to see that Ambient Air Quality Standards for the area are achieved and that methods of pollu-

tion prevention are promoted to local industry and municipal treatment facilities. The initiative will direct special attention to efforts necessary for the dredging of the Indiana Harbor Canal and the safe disposal/treatment of sediments. EPA has been working with the U.S. Army Corps of Engineers on a draft Environmental Impact Statement required for the dredging of the canal.

Stakeholders:

Citizens' Advisory for Remediation of the Environment (CARE) Committee
Indiana Department of Environmental Management
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency

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Size and location: By area, the Great Lakes constitute the world's largest area of surface freshwater (95,000 square miles, 6 quadrillion gallons, holding 18 percent of the world's supply). The five Great Lakes and their drainage areas encompass all or parts of eight states (New York, Pennsylvania, Ohio, Indiana, Michigan, Illinois, Wisconsin, and Minnesota) and the Province of Ontario.

Organization that initiated project:

The Great Lakes National Program Office (GLNPO) steers and coordinates a consortium of local, state, federal, and non-governmental organizations in ecosystem management and priority setting. The Great Lakes Five-Year Strategy, developed jointly by GLNPO and its multi-State, multi-agency partners and built on the foundation of the Great Lakes Water Quality Agreement with Canada, provides the agenda for Great Lakes ecosystem management.

Major environmental problems:

- Contaminated fish and wildlife
- Contaminated bottom sediments
- Threatened habitats ("endangered" or "threatened" classification for 52 species of plants and animals within the region)
- Non-native species (More than 130 non-native species have been introduced to the Great Lakes since 1800, recent invaders include zebra mussels and river huffe)
- Vulnerable native fish populations
- Excessive phosphorus

Actions taken or proposed: Federal, State, and Tribal partners developed the Great Lakes Five-Year Strategy to jointly address the problems of the Great Lakes ecosystem. The Strategy focuses on three over-arching goals: reducing releases of toxicants to the environment, protecting and restoring habitat, and protecting human/ecosystem species health.

In 1989, in recognition of the vulnerability of the Great Lakes to bioaccumulative chemicals, EPA and the States began the Great Lakes Water Quality Initiative, a precedent setting, cooperative effort to establish common regulatory practices for the Great Lakes waters. Proposed guidance for minimum water quality standards, antidegradation policies, and implementing procedures was published in the Federal Register in April 1993.

Pursuant to a Great Lakes Pollution Prevention Action Plan, launched by EPA and the Great Lakes

States in 1991, source reduction projects are underway with the auto and printing industries. Under the National 33/50 Program, Great Lakes manufacturers have already surpassed the Agency's interim 33 percent reduction goal.

In 1993, EPA and its partners initiated a Virtual Elimination Pilot Project to analyze opportunities for achieving virtual elimination through source reduction of targeted pollutants. Two pollutants, PCBs and mercury, have thus far been selected for analysis.

Sediment cleanups are being accomplished at numerous sites across the Basin under EPA's regulatory authority. Examples include: the December 1992 Gill Creek cleanup of 6,500 cubic yards of PCB-contaminated sediment which has eliminated 20 percent of total annual PCB load to Lake Ontario through the Niagara River; the 1990-93 Waukegan Harbor Superfund removal of over one million pounds of PCB-contaminated sediment; and multimillion dollar consent decrees in Northwest Indiana requiring sediment characterization and cleanup. As a follow-up to the completed Assessment and Remediation of Contaminated Sediments program, GLNPO is supporting states with contaminated sediment characterization and assessment as the necessary first step in remediating contaminated sediments.

Air toxics monitoring stations have been established on each of the Great Lakes to collect data on nutrients, toxic metals, and organic contaminants. Two years of intensive monitoring of air, water, sediments, and biota began in 1994 on Lake Michigan. From such work, EPA and its partners will design load reduction strategies.

EPA, Environment Canada, the states, and the Province of Ontario announced the Lake Superior Binational Program in 1991, one aspect of which is the designation of nine bioaccumulative pollutants for "zero discharge." The program will also identify beneficial use impairments and restore and protect the basin's ecosystem.

The watershed approach that EPA and its partners are taking in Lakes Ontario, Superior, and Michigan is embodied in the Lakewide Management Plans (LaMPs) for each of these lakes. A similar effort has commenced in Lake Erie and will be taken for Lake Huron. In addition, Remedial Action Plans are being developed and implemented on a smaller "watershed" level for the 43 Great Lakes Areas of Concern.

EPA is working with its partners, including U.S. Fish and Wildlife Service (USFWS), states, tribes, and The Nature Conservancy (TNC), to restore and protect habitat within the Great Lakes consistent with a

TNC report: *The Conservation of Biological Diversity in the Great Lakes Ecosystem: Issues and Opportunities*. The Report, funded in part by EPA, identifies important habitat for achieving biological diversity and ecological integrity in the Great Lakes ecosystem. GLNPO has funded some 70 habitat protection/restoration projects over the last three years. Projects are underway at locations such as Hamilton Lake/Fish Creek, Kakagon/Bad River Sloughs, the Maumee River, Allouez Bay, Irondequoit Bay, Black River, St. Louis River, Saginaw Bay, and Green Bay. These demonstrations reflect a variety of activities including on-the-ground restoration, public participation, and education. GLNPO can provide information regarding each of these efforts upon request; however, the following project summaries best illustrate the watershed work GLNPO is currently supporting:

- Hamilton Lake/Fish Creek (Steuben County, Indiana) combines wetland restorations by USFWS, agricultural land treatment practices through U.S. Department of Agriculture and its state and local partners, and actions of TNC. Resultant actions will improve habitat for species of mussels (some endangered) and fish.
- Kakagon/Bad River Sloughs Watershed Demonstration Project (involving the Bad River Band of the Chippewa Nation and TNC) centers around a 16,000-acre wetland complex—the largest undeveloped wetland complex on Lake Superior. The project will protect and restore fish spawning ground and a waterfowl marsh inhabited by numerous rare species; model restoration and protection for more profoundly disturbed sites; explore sustainable development possibilities for the watershed; and demonstrate possibilities for ecologically viable activities.

The Glacial Lake Chicago Crescent, a multi-faceted initiative in northeast Illinois and northwest Indiana emphasizing sustainable economic development is another major project that is currently underway. This initiative includes:

- A Housing and Urban Development/EPA Demonstration Project to rehabilitate vacant buildings for housing and reuse empty lots for native garden projects.
- TNC's Mighty Acorn Project which incorporates in-the-field education about ecological processes including hands-on restoration for children.

- Organization by the Indiana Nature Conservancy, working with the Illinois Nature Conservancy field office, of a volunteer stewardship network to encourage public participation in stewardship of northwest Indiana natural area sites requiring ecological protection and restoration.
- CitySpace—developing open space policies for empty Chicago lots, through which lots will be redeveloped into parks and garden space for residents.

Partners in initiative projects will include TNC, local school districts, park districts and forest preserves, U.S. Forest Service, USFWS, and many others.

Actions to control introductions of non-native species include Coast Guard requirements for mandatory ballast water exchange, EPA regulation of chemical control, USFWS and state testing of control techniques, and National Oceanic and Atmospheric Administration educational efforts.

Stakeholders:

23 Indian Tribes
 Forest preserves
 Great Lakes Fisheries Commission
 Illinois
 Indiana
 Industry
 Labor
 Local citizens
 Local school districts
 Michigan
 Minnesota
 National Oceanic and Atmospheric Administration
 New York
 Non-governmental organizations
 Ohio
 Park districts
 Pennsylvania
 The Nature Conservancy
 U.S. Army Corps of Engineers
 U.S. Coast Guard
 U.S. Department of Agriculture
 U.S. Department of Interior (National Park Service and National Biological Survey)
 U.S. Environmental Protection Agency
 U.S. Fish and Wildlife Service
 U.S. Geological Survey
 Wisconsin

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Greenwood Lake

Size and location: Greenwood Lake is located in Orange County, New York and Passaic County, New Jersey. The lake is 1,920 acres in size, 9.6 miles long and 1.2 miles wide, with a mean depth of 17 feet, and a maximum depth of 57 feet. The watershed is 37.2 square miles, exclusive of the lake.

Organization that initiated the project:
U.S. Congress

Major environmental problems:

- Massive weed growth in parts of the lake
- Floating stumps form a hazard to navigation
- Anoxic conditions in the summer months
- Erosion from development causing sedimentation at river mouths
- Taste and odor problems
- Nonpoint storm water runoff
- Septic and point source discharges
- Internal phosphorus cycling

Actions taken or proposed: In 1980, New Jersey received a Clean Lakes Program grant to conduct a Phase I diagnostic/feasibility study for Greenwood Lake and its watershed. This study analyzed the lake's condition and determined the causes of that condition, examined the watershed to determine the sources of pollution, and then evaluated solutions and recommendations for the most feasible procedures to restore and protect lake water quality. A management plan was developed. This plan recommended:

- Weed harvesting.
- Lake drawdown.
- Construction of storm water quality management structures.
- Septic management district development.
- Sensitive lands management plan.
- Public education.

In 1989, Phase II Clean Lakes Program grants were awarded to New Jersey and New York for Greenwood Lake. Phase II projects implement in-lake restoration work as well as critical watershed management activities to control nonpoint source pollution to the lake. The Phase II projects will translate the Phase I recommendations into action.

Stakeholders:

Greenwood Lake Improvement Committee
Greenwood Lake Watershed Management District, Inc.
New Jersey Department of Environmental Protection
New York State Department of Environmental Conservation
New York/New Jersey Departments of Transportation
Orange County Planning Commissioner
Orange County Soil and Water Conservation District
Save the Lake Action Committee
Tourism
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
Warwick and Greenwood Lake, NY
West Milford, NJ

Contacts:

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Great Lakes continued from page 65

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Gulf of Mexico Program

Size and location: The Gulf of Mexico, an area of 630,000 square miles, abuts five Gulf Coast states and has a watershed area of 1,812,000 square miles in the United States. About two-thirds of the total area of Mexico is within the Gulf watershed.

Organization that initiated project:

U.S. Environmental Protection Agency

Major environmental problems:

- Loss of coastal wetlands and seagrass beds
- Endangered commercial and recreational fisheries and shellfish beds
- Nutrients
- Toxic substances
- Pathogens
- Trash on beaches
- Impaired coastal habitats that support migratory birds, fish, and other living resources

Actions taken or proposed:

Accomplishments to date include:

- Developed a program infrastructure and five-year plan that ensured a common cooperative approach with all local, state, and federal agencies having legislative or administrative responsibility for any portion of the environmental health of the Gulf. The plan has been signed by the Gulf-State governors and cooperating agency heads.
- Funded demonstrations to use wetlands for filtration of domestic, agricultural, and urban wastewater to reduce impacts on shellfish growing waters in several locations.
- Organized biannual beach cleanups that remove nearly 1,000 pounds of trash per mile.
- Funded restoration of 600 acres of coastal habitat in cooperation with the Tampa Bay Estuary Program and the State of Florida.
- Developed technical background information and promoted special area designation under MARPOL Annex V for the Gulf of Mexico (Wider Caribbean).

Within the next five years, through an integrated effort that complements existing local, state, and federal programs, the program will:

- Significantly reduce the rate of loss of coastal wetlands.
- Achieve an increase in Gulf Coast seagrass beds.
- Enhance the sustainability of Gulf commercial and recreational fisheries.

- Protect human health and food supply by reducing input of nutrients, toxic substances, and pathogens to the Gulf.
- Expand public education/outreach tailored for each Gulf Coast county or parish.
- Ensure that all Gulf beaches are safe for swimming and recreational uses.
- Reduce by at least 10 percent the amount of trash on beaches.
- Increase Gulf shellfish beds available for safe harvesting by 10 percent.

Descriptions of two specific projects that are being carried out by the Gulf of Mexico Program follow.

Stakeholders:

Agriculture
Development interests
Environmental organizations
Fisheries
Local and state governments in FL, AL, MS, LA, and TX
Manufacturing and mining
National Oceanic and Atmospheric Administration/National Marine Fisheries Service
Other cooperating agencies
Public deriving food, recreation, and income from the Gulf of Mexico
Tourism
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Food and Drug Administration
Soil Conservation Service

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FAX: (601) 688-2709

Gulf of Mexico Program

Gulf Ecological Management Sites

Size and location: The Gulf of Mexico abuts five Gulf Coast states and has a surface area of 630,000 square miles and a U.S. coastline length of almost 1,700 linear miles.

Organization that initiated project:
Gulf of Mexico Program

Major environmental problems:
Habitat degradation
Impairment of wetland functions
Impaired habitat for rare or endangered species

Actions taken or proposed: The Gulf Ecological Management Sites (GEMS) initiative was created by the Gulf of Mexico Program (GMP) to demonstrate successful models of action to protect, restore, and maintain the environmental and living resources of the Gulf of Mexico. All five Gulf states are participating in the project with each having designated a GEMS coordinator from an appropriate state agency. The Nature Conservancy, through the Natural Heritage Program, is also a key participant in this project. From the federal agencies, participants who will assist in coordination include the National Oceanic and Atmospheric Administration, the U.S. Fish and Wildlife Service, and EPA. The potential for involvement by private industry is good, as privately owned coastal lands have already been identified that companies may wish to donate for the purpose of conservation or sustainable development.

Under the GEMS concept, local, state, and federal agencies are nominating areas that have a specific value such as unique or scarce habitat type, containing rare or endangered species, supports wide diversity of species, or high productivity. Once all states have had a chance to identify these areas, a select subset will be endorsed by all participating agencies for endorsement as GEMS. For these selected sites, mechanisms to manage these areas to sustain or enhance their unique and/or valuable characteristics will be identified and implemented. At a time when Gulf coastal wetlands are being lost or functionally compromised at a rapid rate, this project incorporates a sustainable development approach by which state and federal agencies can work together to identify areas that are of value and provide support for them.

The initial compilation of sites is currently underway in all five Gulf states. In 1995, sites will be

evaluated to decide which ones receive the multi-agency designation and support as one of the GEMS. In 1996, mechanisms will be identified and implementation initiated for the GEMS. Funding for this phase is now in place. After the initial selection of GEMS, the process will be re-evaluated and revised as necessary.

Stakeholders:

Environmental organizations
National Oceanic and Atmospheric Administration
Other cooperating agencies
State governments in FL, AL, MS, LA, and TX
U.S. Air Force
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service

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Mobile Bay Restoration Demonstrations

Size and location: The Mobile Bay estuarine drainage area covers 39,725 square miles in nine South Alabama counties. The surface area of the Bay is about 500 square miles.

Organizations that initiated project:

Gulf of Mexico Program in conjunction with U.S. Fish and Wildlife Service, Alabama Department of Environmental Management, U.S. Army Corps of Engineers, Alabama Department of Economic and Community Affairs, Soil Conservation Service, National Marine Fisheries Society, National Aeronautics and Space Administration, U.S. Environmental Protection Agency Region IV

Major environmental problems:

Rapid population growth
Heavy shipping
Damaged wetlands
Loss of submerged seagrass beds
Reduced water quality
Closing of numerous oyster reefs

Gulf of Mexico Program

Actions taken or proposed: The Gulf of Mexico Program coordinated state and federal restoration demonstrations in Mobile Bay to provide an ecosystems approach to watershed environmental management. The Program was instrumental in initiating the following projects within the Mobile watershed ecosystems:

- Implemented activities in conjunction with USFWS and ALDEM that demonstrate how water quality may be improved by restoring salt marsh and seagrass habitats which act as water filters for nearby oyster reefs.
- Implemented a program with the Alabama Department of Public Health and the Mobile County Health Department to monitor and control nonpoint sources of pollution affecting water quality for coastal shellfish growing waters. One project involved constructing a wetland to filter fertilizer and pesticide-laden runoff from a golf course.

- Developed and implemented a citizen monitoring support program—Bay Watch—to use citizen volunteers to gather information to target and follow-up on pollution control activities in the Mobile Bay watershed, in cooperation with ALDEM.
- Coordinated development of a menu driven Geographic Information System to improve decisions made during section 404 wetland permit review for the Mobile Bay area.

Stakeholders:

Agriculture
Alabama Department of Economic and Community Affairs
Development interests
Fisheries
Local and state governments in Alabama
Manufacturing and mining

Mobile Bay continued on page 72

Hackensack Meadowlands District

Size and Location: The Hackensack Meadowlands District (HMD) is a 32 square mile area covering portions of 14 municipalities in northeastern New Jersey. This district comprises much of the lower tidal area of the Hackensack River watershed. The undeveloped areas within the HMD are primarily wetlands (approximately 8,260 acres) and are under substantial developmental pressure.

Organization that initiated project:

Hackensack Meadowlands Development Commission

Major environmental problems:

Development

Actions taken or proposed: EPA, U.S. Army Corps of Engineers, Hackensack Meadowlands Development Commission, the National Oceanic and Atmospheric Administration, and the New Jersey Department of Environmental Protection and Energy agreed, by entering into a Memorandum of Understanding (MOU) on March 14, 1988, to prepare and implement a Special Area Management Plan (SAMP) for the HMD. The MOU requires the preparation of an Environmental Impact Statement on the SAMP and the development of appropriate regulatory products (e.g., Clean Water Act (CWA) Section 404 wetlands gen-

eral permits and/or an abbreviated permit process and advance CWA Section 404(c) actions). The SAMP will facilitate compliance of future development activities with all applicable environmental statutes and regulations.

Stakeholders:

Hackensack Meadowlands Development Commission
National Oceanic and Atmospheric Administration
New Jersey Department of Environmental Protection and Energy
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency

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Hillsdale Reservoir

Size and location: Hillsdale Reservoir is a 4,580-acre Corps of Engineers impoundment located in Kansas 30 miles southwest of Kansas City, Missouri. Its watershed covers 92,180 acres.

Organizations that initiated the project:

Citizens Management Committee
Lakes District Resource Conservation and Development District

Major environmental threats:

- Nutrient overload and associated eutrophication effects from both point and nonpoint sources
- Minor threat from atrazine

Actions taken or proposed: A nutrient loading Total Maximum Daily Load has been developed. A local association of concerned citizens and agencies, together with the Kansas Department of Health and Environment and EPA staff support, are initiating a

watershed management program using Clean Water Act Section 319, U.S. Department of Agriculture Water Quality Incentives Program, and state funding to control animal waste and cropland nutrient sources and to protect the recreational and drinking water supply benefits of the reservoir.

Stakeholders:

Association of citizens and agencies
Citizens Management Committee
Kansas Department of Health and Environment
Lakes District RC&D
U.S. Environmental Protection Agency

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Illinois River - Battle Branch

Size and location: The Battle Branch watershed is a sub-watershed within the Illinois River Basin. It contains approximately 36,000 acres and is located in Delaware County, Oklahoma.

Organization that initiated project:

Cherokee Hills Resource Conservation District

Major environmental problems:

Nutrient pollution from a variety of sources including:

- Inadequate rural wastewater systems
- Disposal of other domestic refuse
- Sub-optimal techniques for disposal of dead poultry or other animals
- Livestock holding areas and lagoons associated with dairy operations
- Excessive application of poultry litter and other animal wastes to agricultural pasture lands (more than 24,200 tons of poultry and dairy waste per year)

Actions taken or proposed: This project was divided into four major components:

- 1) Install best management practices (BMPs) using structural or vegetative measures suited to a program of landowner cost-sharing.

- 2) Support development of animal waste plans through technical and/or financial assistance to landowners. Promote voluntary landowner adoption of such plans.
- 3) Conduct regular monitoring to document the effectiveness of installed BMP measures in improving water quality.
- 4) Use information learned from Battle Branch project to facilitate the transfer of effective BMP approaches to other small watershed units within the Illinois River Basin.

The project manages nutrient sources on-site as thoroughly as possible through installation of water quality oriented BMPs. BMPs were developed which utilized proper land application techniques and waste handling methods in order to reduce the amount of nutrients entering Battle Branch and its tributaries. To date approximately 84 percent of landowners in the Battle Branch watershed have signed-up for participation in the project.

Implementation of BMPs in the Battle Branch watershed have significantly reduced nutrient concentrations. During run-off events, nitrate levels have decreased as much as 72 percent and total phosphorus levels have decreased as much as 35 percent. Further, it is projected that if similar reductions could be achieved in all creeks of the Illinois

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Indian River Lagoon

Size and location: The Indian River Lagoon (IRL) comprises more than a third of Florida's east coast and extends 155 miles from Ponce de Leon Inlet in the north to Jupiter Inlet in the south. The IRL basin spans about 2,280 square miles and includes three major watersheds.

Organizations that initiated project:

Marine Resources Council of East Central Florida
State of Florida
St. Johns River Water Management District

Major environmental problems:

- Isolation of coastal wetlands due to mosquito impoundments
- Storm water runoff
- Undesirable freshwater discharges
- Increased suspended matter loadings and sedimentation
- Increased nutrient loadings
- Population increase resulting in undesirable watershed alterations
- Loss of seagrass beds
- Loss of emergent wetlands
- Lacking consistency for environmental protection rules and criteria

Actions taken or proposed: The IRL was selected for inclusion in the National Estuary Program (NEP) by EPA in 1990. IRL NEP activities have focused on the development of a Comprehensive Conservation and Management Plan (CCMP) to identify and promote the restoration of water quality and resources in the area. Emphasis has been placed on assessing nonpoint sources of runoff, determining environmental requirements needed for submerged aquatic vegetation, reconnecting and acquiring mosquito impoundments, and promotion of IRL stewardship. As part of the development of the CCMP, several demonstration projects are being undertaken to show the viability of final recommendations for restoration of the estuary. These demonstrations include habitat restoration, storm water management, and innovative ecosystem management practices.

Stakeholders:

Businesses
Commercial fishing
Local citizens
Recreational users including diver/snorkelers, boaters, and anglers

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River Basin, it would represent a significant reduction in nutrient loading to the Illinois River. Examples of implemented BMPs include:

Conservation plans.
Waste management plans.
Rural wastewater systems.
Poultry composters.
Riparian tree planting.
Waste storage structures.

Stakeholders:

Businesses
Government agencies
Local citizens
Special interest groups

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Iowa Great Lakes

Size and location: The Iowa Great Lakes consist of a 64,000-acre watershed in Dickinson County in northern Iowa.

Organization that initiated project:
Dickinson County Soil and Water Conservation District

Major environmental problems:

- Sediment
- Nutrient runoff from both rural and urban lands threatening 14 natural lakes

Actions taken or proposed: This five-year project was initiated with fiscal year 1990 Clean Water Act Section 319 funds and has also received funding from the Agricultural Stabilization and Conservation Service through the Agricultural Conservation Program, the Iowa Resource Enhancement and Protection Program, and the U. S. Fish and Wildlife Service. The purpose of the project is to reduce the amount of sediment, nutrients, pesticides, and animal wastes entering the numerous lakes in the watershed. Efforts are focusing on avoiding unnecessary or excessive nutrient applications, especially phosphorus; assisting with practices that reduce water running off cropland; showing lakeshore landowners how they can better manage their property to protect water quality; and using wetland restoration and critical slope protection programs.

In the two years since the project was initiated, about 80 acres of wetlands in critical drainage areas have been improved, restored, or protected. These wetlands act as filters to stop pollution before it enters the lakes. New areas of trees and grasslands have been established on 78 acres in the watershed; project workers have made site visits with a total of 83 of the 185 watershed landowners to discuss water quality; and landowners throughout the watershed, including urban residents, have gained a water quality awareness through the project's education program.

One third of the watershed is in Minnesota, and a cooperative effort occurs across state boundaries. There are also plans underway to apply for similar project funding for the Minnesota side of the watershed.

Stakeholders:

Agricultural Stabilization and Conservation Service
Dickinson County Soil and Water Conservation District
Iowa Department of Agriculture and Land Stewardship
Iowa Department of Natural Resources
Iowa Natural Heritage Foundation
Iowa State University Extension
Local lake protective associations
Soil Conservation Service
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service

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Mobile Bay continued from page 69

National Aeronautics and Space Administration
National Oceanic and Atmospheric Administration/National Marine Fisheries Service
Public deriving food and recreation from Mobile Bay
Tourism
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Food and Drug Administration
Soil Conservation Service

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Klamath Basin

Size and location: The Klamath Basin ecosystem covers an area of 8,003 square miles in south-central Oregon and northwestern California. In Oregon, the basin covers 5,676 square miles primarily in Klamath County with smaller areas in Jackson, Josephine, and Lake Counties. Three river systems in the Upper Klamath Basin discharge to Upper Klamath Lake, including the Wood, Williamson, and Sprague Rivers. The Upper Klamath Lake is a large (90,000 acre), shallow (7.9 foot average depth) lake.

Organizations that initiated project:

The Klamath Tribe
U.S. Fish and Wildlife Service

Major environmental problems:

- Habitat degradation resulting in the listing of two endangered species—Lost River Sucker (*Deltistes luxatus*) and Shortnose Sucker (*Chasmistes brevirostris*)
- Water quality degradation and degradation of wildlife habitat caused by traditional forestry practices including large areas of clear-cuts
- Declines in anadromous fish populations including the chinook salmon due to elevated temperature, sedimentation, and blockage of migration pathways
- Excessive upstream withdrawals have resulted in low river flows over the past several years
- Diversion of 500,000 acre feet of water in the Upper Klamath Basin to irrigate 225,000 acres of hay, potatoes, and sugar beets
- Loss of wetlands to agricultural uses (this conversion has been linked to water quality and riparian degradation and wildlife habitat destruction)
- Point source discharges
- Questionable application of toxic chemicals, including pesticides, that have the potential to impact salmonids, endangered species (fish and wildlife), and non-target aquatic invertebrates

Actions taken or proposed: The Department of the Interior has formed the Klamath Basin Ecosystem Restoration Office. This office is staffed by both the Bureau of Reclamation and the U.S. Fish and Wildlife Service. The office is based in Klamath Falls, Oregon. The Bureau of Land Management purchased the Wood River Ranch, a significant land acquisition

adjacent to the Wood River at the north end of Agency Lake.

EPA provided funds for the Klamath Tribe Fish and Wildlife Section to complete a water quality study of Upper Klamath Lake. The grant was funded under a Clean Lakes Water Quality Assessment Grant. In addition, EPA has provided Clean Water Act Section 319(h) grants to assist in developing a comprehensive Geographic Information System database for the Klamath Basin and implementing nonpoint source controls in high priority tributary watersheds.

A Technical Advisory Committee (TAC) has been formed to discuss and evaluate all studies currently underway in the Klamath Basin. TAC members include federal, state, and local agency personnel.

Several state and federal agencies have initiated an investigation of the application of toxic chemicals, including pesticides, that have the potential to impact salmonids, endangered species, and non-target aquatic invertebrates.

Stakeholders:

Bureau of Land Management
Bureau of Reclamation
City of Klamath Falls plus other point source dischargers
Hunting groups
Klamath Tribe
Local ranchers/farmers
Non-consumptive resource users
Several tribes in California
Sport and commercial fishing interests
Timber interests
U.S. Fish and Wildlife Service

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Tribe Chairman	Chief Biologist
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Kootenay River

Size and location: The watershed for the Kootenay River covers 19,000 square miles in northwestern Montana, northern Idaho, and British Columbia.

Organization that initiated project:
Cabinet Resource Group

Major environmental problems:

- Threats from silviculture, hydropower, mining, and pulp mills
- Species of special concern (white sturgeon and bulltrout)

Actions taken or proposed: The Kootenay River Network (KRN) has been formed and is composed of federal, state, tribal, provincial, industry, and citizen group representatives who are interested in the Kootenay River Basin. The mission of the Network is to involve stakeholders in the protection and restoration of the chemical, physical, and biological integrity of the Kootenay River basin waters. The goals are:

- Improve communication among government and tribal water resource management agencies and public and private interests for British Columbia, Idaho, and Montana.
- Pursue coordination of efforts and standardization of methods.
- Develop and implement a basin-wide water quality monitoring program.
- Fully use monitoring information to accomplish proactive, scientifically-based water resources management.
- Educate the public and solicit information about water resources issues.

EPA, the Bonneville Power Administration, Noranda Minerals, and Champion International funded *Water Quality Status Report* (January 1994) which provides a history and description of the Kootenay River Basin; discusses current water quality issues, development activities, and aquatic resources in the basin; gives an overview of past, present, and potential future environmental issues and problems in the basin; and makes recommendations for prioritizing the basin's water quality concerns and critical issues.

The Network also received funding to have Adopt-A-Stream Foundation prepare a workshop to train 20 citizen volunteers in stream monitoring methods and implement a monitoring program. These volunteers are called Streamkeepers and are to train others as well. The Network has received funding for a professional facilitator.

Stakeholders:

British Columbia Ministry of Environment
Cabinet Resource Group
Champion International
East Kootenai Environmental Society
Idaho Department of Fish and Game
Idaho Division of Environmental Quality
Kootenai National Forest
Kootenai Tribe of Idaho
Kootenai Tribes of British Columbia
Montana Department of Fish, Wildlife, and Parks
Montana Department of Health and Environmental Sciences
Noranda Minerals Corps
Panhandle National Forest

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Lake Champlain

Size and location: Lake Champlain is located in the northeastern United States. Its basin includes portions of Vermont, northeastern New York, and the Province of Quebec, Canada. The lake is 110 miles long and 12 miles wide at its widest. Total area of the basin is over 8,200 square miles.

Organization that initiated project:
U.S. Congress

Major environmental problems:

- Toxics in lake sediments, with elevated levels in Malletts and Cumberland Bays and Burlington Harbor
- Eutrophication, caused by both point and nonpoint sources, affects water quality and causes increased plant growth in the bays
- Phosphorus especially from nonpoint sources
- Consumption advisories due to contaminated fish
- Non-native nuisance aquatic vegetation and fauna, e.g., zebra mussels

Actions taken or proposed: Planning actions date to the 1940s. In 1979 the New England River Basin Commission performed a Level B Study.

In 1988, New York and Vermont signed a Memorandum of Understanding (MOU) with Quebec for cooperative environmental management of the lake including adoption of consistent phosphorus standards. The MOU was renewed in 1992. It called for the creation of Citizen Advisory Committees to focus on the lake.

In 1989, EPA awarded a Clean Lakes Program grant for a Phase I diagnostic/feasibility study, which is nearing completion, under the joint administration of the New York State Department of Environmental Conservation and the Vermont Agency of Natural Resources. This study will analyze the lake's condition and determine the causes of that condition, examine the watershed to determine the sources of pollution, and then evaluate solutions and recommendations for the most feasible procedures to restore and protect lake water quality.

The Lake Champlain Management Conference was established under Title 3 of the Great Lakes Critical Program Act of 1990, the Lake Champlain Special Designation Act of 1990. Comprised of 31 representatives from both sides of the lake, including federal, state, and local governments; local interest groups; and citizens, its goal is to develop a Pollution Prevention, Control and Restoration Plan. A Pro-

gram Office funded through the conference has been established in Grand Isle, Vermont and funding provides for education, research, monitoring, planning, and demonstration projects.

Stakeholders:

Adirondack Park Agency
Audubon Society
Clinton County Chamber of Commerce
Lake Champlain Committee
Lake Champlain Research Consortium
Lake George Commission
Local citizens
National Park Service
New York State Department of Environmental Conservation
Soil Conservation Service
States of Vermont and New York
U.S. Agricultural Stabilization and Conservation Service
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Geological Survey
Vermont Agency for Natural Resources
Vermont Roundtable

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Lake La Plata

Size and location: Lake LaPlata is a 1.9-square mile lake located in the municipality of Toa Alta, near San Juan, Puerto Rico.

Organization that initiated project:
Puerto Rico Environmental Quality Board

Major environmental problems:

- Nonpoint source pollution from agricultural practices and urban development
- Extreme sedimentation rates reducing storage capacity of the reservoir
- Increased nutrient rates accelerating eutrophication
- Oxygen depletion below 13-16 feet
- Water hyacinth infestation
- Bacterial concentrations exceeding water quality standards

Actions taken or proposed: Puerto Rico received a Clean Lakes Program grant in 1981 to conduct a Phase I diagnostic/feasibility study for Lake LaPlata and its watershed. This study analyzed the lake's condition and determined the causes of that condition, examined the watershed to determine the sources of pollution, and then evaluated solutions and recommendations for the most feasible procedures to restore and protect lake water quality. The overall restoration plan that was developed addressed water hyacinth harvesting, sewage improvements, and nonpoint source best management practice implementation, including animal waste treatment. The watershed is extensively used for chicken production.

In 1986 and again in 1991, Phase II Clean Water Lakes grants were awarded. The Phase II projects will translate the Phase I recommendations into action. Phase II projects implement in-lake restoration work as well as critical watershed management activities to control nonpoint source pollution to the lake. The Phase II projects include a farmer education and agricultural inspection program and the construction of a chicken manure processing plant. The manure processing plant construction is complete. The processed manure will be sold to Island flower growers as fertilizer. It is a cooperative effort with the Commonwealth's Rural Development Corporation.

Stakeholders:

Local citizens
Local government
Puerto Rico Department of Health
Puerto Rico Environmental Quality Board
Rural Development Corporation
U.S. Environmental Protection Agency

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Lake Loiza

Size and location: The Lake Loiza watershed covers 207 square miles (101,380 acres) and is located in the mountains of east-central Puerto Rico, originating in the Espino Ward in the town of San Lorenzo and flowing to the Atlantic Ocean at Loiza Aldea.

Organizations that initiated project:

- Puerto Rico Environmental Quality Board
- Soil Conservation Service
- U.S. Agricultural Stabilization and Conservation Service
- Cooperative Extension Service

Major environmental problems:

- High nutrient concentrations
- Bacteria
- Pesticides
- Sedimentation
- Household garbage
- Dead animals
- Polluted runoff from urban areas

Actions taken or proposed: In 1990, an Agricultural Nonpoint Source Hydrologic Unit Project Plan was submitted to and approved by the U.S. Department of Agriculture as part of its Water Quality Initiative to fund agricultural nonpoint source projects. A four-year accelerated technical and financial assistance program is being carried out on approximately 36,050 acres of agricultural land that will be adequately treated or benefited by the application of agricultural best management practices (BMPs). The Loiza Lake project will reduce onsite soil erosion on 4,050 acres of cropland and 26,000 acres of pasture land to an acceptable level and reduce offsite agricultural sedimentation by 85 percent or 983,350 tons per year and will reduce the amount of chemical and organic matter in the lake.

Clean Water Act funds are being used to inspect applied BMPs, determine BMP effectiveness, and carry out an intensive monitoring program.

In addition, information and education efforts will include BMP demonstration projects, field tours, training meetings, broadcast and print media, and publications and bulletins.

Stakeholders:

- Este Soil Conservation District
- Municipality of Aguas Buenas
- Municipality of Bayamon
- Municipality of Caguas
- Municipality of Carolina
- Municipality of Guaynabo
- Municipality of Loiza
- Municipality of San Lorenzo
- Municipality of Trujillo Alto
- Puerto Rico Association of Conservation Districts
- Puerto Rico Department of Agriculture
- Puerto Rico Environmental Quality Board
- Turabo Soil Conservation District

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Lake Michigan

Size and location: Lake Michigan is 307 miles long and 118 miles wide covering 22,300 square miles of area. Another 45,600 square miles of land drain into the Lake and the watershed extends across the states of Illinois, Indiana, Michigan, and Wisconsin.

Organization that initiated project:
U.S. Congress

Major environmental problems:
Toxic pollutants

Actions taken or proposed: Under the Great Lakes Water Quality Agreement between the United States and Canada, a Lakewide Management Plan (LaMP) for Critical Pollutants has been developed for Lake Michigan. A draft LaMP was published in 1992 and revisions were made based on the public comments received. A second draft will be published in late 1994 in the Federal Register. The final LaMP will be published in 1995. The goal of the LaMP is to reduce toxic pollutants in order to restore the beneficial uses of Lake Michigan and prevent any further degradation of the Lake system from the release of toxic pollutants.

Several activities have already been initiated directly through the Lake Michigan LaMP process. These include:

- Tributary and air deposition monitoring for LaMP pollutants.
- Sediment assessment and remediation projects for Lincoln Park Gun Club, Illinois; Manistee Lake, Michigan; and Trail Creek, Indiana.
- Agricultural "clean sweep" collections for pesticides in Indiana, Michigan, and Wisconsin.
- Urban "clean sweep" in northwest Indiana.
- Pollution prevention technical assistance and education projects in Milwaukee, Wisconsin; Chicago, Illinois; and western Michigan.
- Development of a mass balance model for Lake Michigan.
- Assessment of potential pollutant loads to Lake Michigan from contaminated sediments.
- Development of the Great Lakes Envirofacts data management system to provide access to loadings and ambient data as well as programmatic databases.

A number of other projects are planned or will be implemented based on results of the monitoring study or further review of existing information. These include:

- Continue sediment remediation at high priority sites, and use results of the Assessment and Remediation of Contaminated Sediments (ARCS) study to select appropriate remediation technologies.
- Continue to identify pollution prevention needs and opportunities for LaMP pollutants.
- Develop and monitor chemical and biological indicators of ecological health to track progress towards restoration of beneficial uses.

Stakeholders:

Chippewa/Ottawa Fishery Treaty Management Authority
Illinois Environmental Protection Agency
Indiana Department of Environmental Management
Industry
Local citizens
Local governments
Michigan Department of Natural Resources
Non-profit organizations
U.S. Army Corps of Engineers
U.S. Department of Agriculture
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Geological Survey
Wisconsin Department of Natural Resources

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Lake Musconetcong

Size and location: Lake Musconetcong is located in Sussex County, New Jersey. The lake is 329 acres in size, with a mean depth of 4.8 feet, and a maximum depth of 10 feet. The watershed covers 14,000 acres. Lake Musconetcong is upstream of Lake Hopatcong, the largest lake in New Jersey at 2,686 acres and is part of its watershed.

Organization that initiated the project:

Lake Musconetcong Regional Planning Board

Major environmental problems:

- Extensive weed growth
- Nonpoint source storm runoff
- Septic and point source discharges around upstream lakes
- Internal nutrient recycling
- Accumulation of organic sediments
- Algal mat bloom

Actions taken or proposed: The immediate area around the lake has been sewerred. The restoration and management plan developed as a result of the Phase I Clean Lakes project recommended the following:

- Decrease nutrient inputs from watershed sources.
- Reduce the influx of storm water related sediment loading.
- Control the growth of aquatic vegetation and mat algae.
- Deepen the lake.

Funding was provided for localized dredging, shoreline stabilization, and implementation of a storm water management program (detention basins). The lake is also a priority watershed in New Jersey. It has received Clean Water Act Section 319 funding for best management practices.

Stakeholders:

Borough of Netcong
Lake Musconetcong Regional Planning Board
New Jersey Department of Environmental Protection
Tourism
Town of Stanhope
U.S. Environmental Protection Agency

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Lake Ontario

Size and location: Lake Ontario lies at the downstream end of the chain of Great Lakes. It is the smallest of the Great Lakes in terms of surface area (7 square miles, 7.8 percent of the total Great Lakes surface area). It has a land drainage area of 24,720 square miles (12.2 percent of the Great Lakes drainage area). It is the second deepest lake with a 282 foot average depth and an 800 foot maximum depth, but its volume (393 cubic miles) surpasses only Lake Erie.

Organizations that initiated the project:

U.S. Environmental Protection Agency
New York State Department of Environmental Conservation (NYSDEC)
Environment Canada (EC)
Ontario Ministry of Environment and Energy (MOEE)

Major environmental problems:

- Restrictions on fish and wildlife consumption due to PCBs, dioxin, DDT, and mirex
- Degradation of fish and wildlife populations, as well as bird and animal deformities or reproductive problems due to PCBs, dioxin, DDT, and dieldrin
- Drinking water taste and odor problems due to algae or bacteria

Actions taken or proposed: Under the Great Lakes Water Quality Agreement between the United States and Canada, a Lakewide Management Plan (LaMP) for Critical Pollutants is being developed for Lake Ontario. The primary goal of the LaMP is to reduce both point and nonpoint source loadings that are causing or have the potential to cause beneficial use impairments.

In addition, a Declaration of Intent was signed in 1987 by EPA, EC, NYSDEC, and MOEE, initiating the Lake Ontario Toxics Management Plan (LOTMP) to reduce toxics loadings to the lake. Actions that have been taken to date under the LaMP and LOTMP include:

- EPA has initiated a pilot Clean Sweep project in Erie County to assist farmers to safely dispose of stores of their banned or unregistered pesticides. About 77 farmers and agribusinesses participated, resulting in the collection of approximately 7,500 pounds of toxic contaminants. The Clean Sweep project is being extended to neighboring counties and to the Great Lakes basin-wide to make

the program self-sustaining without additional federal funds.

- EPA and NYSDEC have begun multi-media (air, water, land) inspections at industrial and municipal facilities to evaluate opportunities for implementing pollution prevention techniques. In the 1994 fiscal year, of the 491,000 pounds of pollutants that had been emitted by seven facilities (estimated through their permits and waste reports), approximately 212,800 pounds (43 percent) were eliminated as a result of the facilities implementing the techniques identified in the inspections.
- EPA has completed Assessment and Remediation of Contaminated Sediments Program demonstration projects designed to evaluate and demonstrate numerous remedial treatment technologies for the control and removal of toxic pollutants in the Great Lakes, with emphasis on the removal of toxic pollutants from bottom sediments. A demonstration project was completed in the Lake Ontario Basin on the Buffalo River. The remedial treatment technology was successful in removing over 80 percent of the polynuclear aromatic hydrocarbons present in the sediment sample.

Stakeholders:

Environment Canada
Erie County, NY
Farmers and agribusinesses
New York State Department of Environmental Conservation
Ontario Ministry of Environment and Energy
U.S. Environmental Protection Agency

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Lake Pontchartrain

Size and location:: Lake Pontchartrain and its adjacent lakes form one of the largest estuaries in the United States. Nearly 1.5 million people live in the fourteen parishes of the Lake Pontchartrain Basin, one-third of the entire population of Louisiana. The Lake Pontchartrain Basin is a 4,700-square mile watershed in southeastern Louisiana, stretching from the State of Mississippi on the north and east, to the Mississippi River on the west and south, and to Breton Sound at the Gulf of Mexico.

Organizations that initiated project:

Lake Pontchartrain Basin Foundation
U.S. Congress

Major environmental problems:

- Nonpoint source pollutants from sewage and farm animal wastes
- Saltwater intrusion
- Storm water runoff
- Sewage from fishing camps and poorly sewered and non-sewered communities
- Habitat destruction from rapidly expanding urban development
- Commercial activities along the Inner Harbor Navigation Canal
- Loss of wetlands
- Dwindling grassbeds
- Diminished shellfish and fish harvests
- Closed beaches
- Occasional occurrence of oxygen-deficient areas ("dead zones") in the Lake

Actions taken proposed: A Comprehensive Management Plan that reflects a holistic watershed approach to solving the water quality problems has been developed for the Lake Pontchartrain Basin. A number of projects are underway including:

- A pilot storm water treatment effort (with created wetlands and retention ponds).
- A basin-wide educational program.
- Continued construction and clean-out of no-discharge dairy wastelagoons in Tangipahoa Parish.
- A submerged aquatic vegetation restoration project.
- Citizens monitoring projects.
- A Model Ordinance project on the North Shore.

Stakeholders:

Businesses (industry, fishing, agriculture, others)
Government agencies (local, state, and federal environmental, parks, recreation, land use, etc.)
Local citizens
Special interest groups (environmental, recreation, preservation, education, etc.)

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Lake Roosevelt

Size and location: Lake Roosevelt, located in north-central Washington, has a surface area of about 125 square miles.

Organizations that initiated project:

U.S. Environmental Protection Agency
Washington State Department of Ecology
Local citizens

Major environmental problems:

- Metals contamination in fish tissues and lake sediments
- Chlorinated dioxin and furan compounds in fish tissue
- Point source discharges

Actions taken or proposed: The findings of metals and dioxin contamination in sediment and fish, followed by fish consumption advisories, led local citizens to press Congress to appropriate \$500,000 to EPA to develop a water quality management plan for the lake.

As a first step, in August 1991, EPA and the Washington State Department of Ecology brought together interested groups and agencies in the Lake Roosevelt community to create the Lake Roosevelt Water Quality Council. The Council is guiding a study that is assessing the water quality of the lake, which should lead to recommended strategies for improved protection. The final product will be a comprehensive water quality management plan for Lake Roosevelt.

In addition, Washington received Clean Lakes Program grants in 1991, 1992, and 1993 to conduct a Phase I diagnostic/feasibility study for Lake Roosevelt and its watershed. This study analyzed the lake's condition and determined the causes of that condition, examined the watershed to determine the sources of pollution, and then evaluated solutions and recommendations for the most feasible procedures to restore and protect lake water quality.

Stakeholders:

Boise Cascade, Kettle Falls
British Columbia Ministry of the Environment
Citizens for a Clean Columbia
Colville Confederated Tribes
Douglas County Commission
Environment Canada
Ferry County Commission
Grant County Commission
Lake Roosevelt Coordinating Committee
Lake Roosevelt Forum
Lake Roosevelt Property Owners Association
Lincoln County Commission
National Park Service
Okanogan County Commission
Pend Oreille County Commission
Spokane Tribe
Stevens County Commission
Stevens County Grange
Tri-County Health Department
U.S. Bureau of Reclamation
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Geological Survey
Upper Columbia River Counties
Upper Columbia United Tribes
Washington Association of Wheat Growers
Washington Department of Community Development
Washington Department of Ecology
Washington Department of Health
Washington Department of Wildlife
Washington Rural Organizing Project
Washington Water Research Center

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Lake Worth

Size and location: Lake Worth is located in north central Texas. The Lake covers approximately 50 acres and has a watershed of 2,064 square miles.

Organizations that initiated project:

Texas Natural Resource Conservation Commission
City of Fort Worth

Major environmental problems:

- Increasing eutrophication
- Algae blooms
- Sedimentation
- Agricultural (dairy farms) and mining (sand and gravel operations) impacts on lake water quality and aquatic habitat

Actions taken or proposed: Texas received a Clean Lakes Program grant in 1987 to conduct a Phase I diagnostic/feasibility study for Lake Worth and its watershed. This study analyzed the lake's condition and determined the causes of that condition, examined the watershed to determine the sources of pollution, and then evaluated solutions and recommendations for the most feasible procedures to restore and protect lake water quality.

In 1989, a Phase II Clean Water Lakes grant was awarded. The Phase II project will translate the Phase I recommendations into action. Phase II projects implement in-lake restoration work as well as critical watershed management activities to control nonpoint source pollution to the lake. Several restoration activities are underway including:

- Construction of a pressurized sewage collection system to replace septic systems currently causing nonpoint source pollution around the Lake.
- Removal of submerged stumps in the Lake.
- Development of a comprehensive basin water quality management plan.
- Possible enhancement of an existing wetland to remove nutrient loading to the Lake.

Stakeholders:

City of Fort Worth
Dairy owners
Local citizens
Recreation industry
Sand and gravel mining operators
Soil Conservation Service
Tarrant County Water Control and Improvement District
Texas Natural Resource Conservation Commission
Trinity River Authority
U.S. Environmental Protection Agency

Contacts:

TX:

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Local:

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City of Fort Worth
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FAX: (817) 871-8195

Little Bear River

Size and location: Little Bear River has a 192,000-acre watershed located approximately 80 miles north of Salt Lake City, Utah.

Organizations that initiated project:

Soil Conservation Service
Utah Department of Environmental Quality
Local soil conservation district

Major environmental problems:

- Sediments
- Nutrients
- Erosion
- Runoff from dairies, feedlots, and irrigated cropland where animal wastes are frequently applied
- Poor riparian conditions
- Degradation of Hyrum Reservoir
- Degraded stream channels and stream banks

Actions taken or proposed: This watershed project is a coordinated effort involving funds from the U.S. Department of Agriculture (USDA) Hydrologic Unit Area Program, Clean Water Act (CWA) Section 319, USDA Water Quality Incentive Program, Bureau of Reclamation, landowners, and a state revolving fund. A wide range of practices for stream stabilization, animal waste management, riparian restoration, and grazing and cropland management are being implemented. The project is also being coordinated with a CWA Section 314 project to improve Hyrum Reservoir.

Stakeholders:

Lake users
Local citizens
Local soil conservation district
U.S. Department of Agriculture
U.S. Environmental Protection Agency
U.S. Forest Service
Utah Association of Conservation Districts
Utah Department of Agriculture
Utah Department of Environmental Quality
Utah Department of Natural Resources

Contact: Roy Gunnell, Division of Water Quality
Department of Environmental Quality
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FAX: (801) 538-6016

Long Island Sound

Size and location: Long Island Sound is 110 miles long and 21 miles wide. The Sound stretches from the Battery in Manhattan to the Race at the eastern end of Long Island.

Organizations that initiated project:

New York State Department of Environmental Conservation
Connecticut Department of Environmental Protection
U.S. Environmental Protection Agency

Major environmental problems:

- Hypoxia (low dissolved oxygen)
- Toxic substance contamination
- Pathogen contamination
- Floatable debris
- Threats to habitat and living resources
- Land use and development resulting in habitat loss and degraded water quality

Actions taken or proposed: The Long Island Sound Study (LISS) was selected for inclusion in the National Estuary Program in 1987. A Management Conference was convened and the members of the Management Conference developed a Comprehensive Conservation and Management Plan (CCMP) for the Sound that recommends priority corrective actions to restore and maintain the resources of the Sound. The CCMP was approved by the LISS Policy Committee on March 1, 1994. The governors of New York and Connecticut and the Administrator of EPA signed a special implementation agreement on September 26, 1994.

The Management Conference is implementing a phased agreement to reduce nitrogen loads to Long Island Sound. In 1990, in order to prevent continued declines in dissolved oxygen levels, the LISS Policy Committee called for a freeze on point and nonpoint source nitrogen loadings to the Sound in key geographic areas at 1990 levels. This "no net increase" policy is being implemented by the States of Connecticut and New York through consent orders and permit modifications. Phase II, detailed in the CCMP, includes significant, low-cost nitrogen reductions of 18.6 percent to begin the process of reducing the severity and extent of hypoxia. Phase III actions will be developed over the next year to identify additional nitrogen reductions needed to meet the long-term dissolved oxygen goals.

Other activities include:

- Reviewing municipal and industrial discharge permits to surface waters to reduce the allowable concentrations of toxic pollutants from the previous, permitted values.
- Implementing combined sewer overflow abatement programs in areas affecting Long Island Sound to decrease pathogen contamination and floatable debris.
- Developing enforceable policies to control storm water in areas where it causes closures of bathing beaches and shellfish beds.
- Encouraging public participation in activities relating to the cleanup and protection of the Sound and providing support for activities including storm drain stenciling, beach grass planting, and beach cleanups.

Stakeholders:

Association of Marine Industries
Citizen's Campaign for the Environment
Connecticut Department of Agriculture/
Aquaculture Division
Connecticut Department of Environmental Protection
Connecticut Sea Grant Marine Advisory Program
Empire State Marine Trade Association
Frank M. Flower & Sons, Inc.
Friends of the Bay
Interstate Sanitation Commission (NY/NJ/CT)
Long Island Sound Foundation
Long Island Sound Taskforce
Long Island Sound Watershed Alliance
Marine Sciences Research Center of the State University of New York
National Audubon Society
National Oceanic Atmospheric Administration
New York City Department of Environmental Protection
New York Sea Grant Extension Program
New York State Department of Environmental Conservation
New York State Department of State
North Fork Environmental Council
Northeast Utilities
Pfizer, Inc.
Soil Conservation Service
Sound Keeper
Sound Watch

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Los Angeles River

Size and location: The Los Angeles River has a watershed that covers approximately 890 square miles and encompasses the Los Angeles Basin and San Fernando Valley in California.

Organization that initiated project:

Los Angeles Regional Water Quality Control Board

Major environmental problems:

Degraded water quality
Habitat loss
Urban runoff
Wastewater discharge
Nutrients
Coliform/pathogens
Toxics

Actions taken or proposed: Since the late 1930s, the Los Angeles River has been modified for flood control purposes and to receive storm water and wastewater discharges. There are three major sewage treatment plants discharging into the Los Angeles River and its tributaries, as well as wastewater from the Los Angeles Zoo. Flow is also added by other industrial discharges and runoff from an extensive network of storm drains.

In recent years, environmental groups and community organizations have been interested in increasing recreational and wildlife uses of the river. All the interested parties participated in the Los Angeles River Master Plan, an initiative that will identify opportunities for river enhancement and restoration.

The California Water Quality Assessment Report (1992) listed several sections of the Los Angeles River as impaired or threatened. The Regional Water Quality Control Board has proposed Total Maximum Daily Load and Waste Load Allocation studies for the river. EPA provided a Clean Water Act Section 104(b)(3) grant for a flow regime study and surface water sampling to develop a Geographic Information System model of the Los Angeles River. A trial study will provide information needed by the Regional Board and the Los Angeles River.

Stakeholders:

California Fish and Game
California Regional Water Quality Control Board
Caltrans
Environmental groups
Friends of Los Angeles River
Local dischargers, developers, and homeowners groups
Local municipal governments
Los Angeles County
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Forest Service

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Monterey Park, CA 91754-2156
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Sound Waters
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
U.S. Geological Survey
University of Connecticut
Westchester County Department of Environmental Facilities
Westchester County Department of Planning

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Lower Mississippi Delta Initiative

Size and location: The Lower Mississippi Delta Alluvial Plain spans 700 miles from southern Illinois to the mouth of the Mississippi River, a 219-county, 7-state area (Arkansas, Illinois, Kentucky, Louisiana, Missouri, Mississippi, and Tennessee). It is one of the largest watersheds in the world.

Organizations that initiated project:

U.S. Environmental Protection Agency
National Biological Survey
U.S. Fish and Wildlife Service
The Nature Conservancy

Major environmental problems:

- Historic conversion of bottomland hardwoods to agriculture
- Loss of habitat and reduction in biodiversity
- Nonpoint source pollution
- Toxic contamination
- Loss of flood control functions

Actions taken or proposed: A Delta-wide conference is being planned through the leadership of the National Biological Survey that will focus on wetland restoration, water quality protection, and agricultural management practices. The Lower Mississippi Delta has been named as the Number 1 priority ecosystem for study and remediation by the U.S. Fish and Wildlife Service. A Delta technical forum is planned for 1994-1995 with many Delta participants.

An EPA Region VI proposal entitled *Sustainable Development Strategy - Lower Mississippi Delta* was selected under the President's Council on Sustainable Development. This project will specifically focus on empowerment within impoverished minority communities to contribute to environmental remediation and planning in the Delta.

For 1994, The Nature Conservancy has proposed a large data network (Geographic Information System-based) plan for the Delta area, working through existing State systems and the University of Arkansas.

Stakeholders

Agricultural industry
Agricultural organizations
Conservation organizations
County and parish governments
Cultural heritage organizations
Environmental organizations
Federal, state, and local agencies
Flood control interests
Forest products industry
Grassroots groups
Hunting and fishing interests
Planning agencies
Public: farm and non-farm, non-government organizations
Recreation industry
Small landowners
Tourism industry
Universities
Urban interests

Contacts:

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	FAX: (214) 665-7446

Malibu Creek

Size and location: Malibu Creek is located northwest of Los Angeles, California. The Creek and its watershed span approximately 109 square miles.

Organizations that initiated project:

Santa Monica Bay National Estuary Program
Topanga-Las Virgenes Resource Conservation District

Major environmental problems:

Water quality and quantity
Habitat loss
Urban runoff
Confined animal runoff
Wastewater discharge
Accelerated sediment loadings
Nutrients
Coliform/pathogens

Actions taken or proposed: Efforts to protect this watershed have been underway since the 1970s and were accelerated recently when the Santa Monica Bay Restoration Project, the local National Estuary Program, identified the watershed as one of the major contributors of pollution to the Bay. These efforts were augmented by the Local Resource Conservation District, which requested and received watershed planning assistance through the U.S. Department of Agriculture's Small Watershed Program (resulting in a Natural Resources Plan study) and by the State, which targeted the lagoon for early action in developing Total Maximum Daily Loads and Waste Load Allocations, because the lagoon is not meeting State Water Quality Standards.

EPA provides a Near Coastal Waters and a Clean Water Act (CWA) Section 319 grant for planning, restoration activities, and communication among several of the participants listed below. These efforts resulted in a watershed plan with 111 agreed-upon recommendations. The stakeholder group is forming an implementation committee (possibly under a joint powers agreement) to carry out these recommendations. EPA will work with the State and local stakeholders to identify funds for implementation. The Resource Conservation District recently received a CWA Section 319 grant to address confined animal runoff and to restore a section of streambank in the watershed that was damaged by development. With EPA assistance, the stakeholder group is developing a comprehensive watershed monitoring plan.

Stakeholders:

California Regional Water Quality Control Board
Coastal Conservancy
Environmental groups
Local dischargers, developers, and homeowner groups
Local municipal governments
Local Resource Conservation District
Santa Monica Bay Restoration Project
U.S. Department of Agriculture
U.S. Environmental Protection Agency
Ventura and Los Angeles Counties

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Maryland's Atlantic Coastal Bays

Size and location: Maryland's Atlantic Coastal Bays are located on the east coast of the state behind the barrier islands of Assateague and Fenwick. These bays consist of Chincoteague, Newport, Sinepuxent, Isle of Wight, and Assawoman Bays and are within Worcester County, Maryland extending between the Delaware and Virginia state lines. The Bays' watershed encompasses 187 square miles.

Organization that initiated project:

Maryland Department of the Environment--
Chesapeake Bay and Watershed Management
Administration

Major environmental problems:

- Rapid development causing loss of habitat, increased nonpoint source storm water runoff, and increased nutrient loadings to ground water via septic systems
- Water quality degradation
- Habitat and living resources losses
- Conflicting land uses
- Excessive anthropogenic pollutant sources
- Loss of wetlands and shallow water habitat from dredging and filling activities
- Closure of shellfishing grounds
- Excessive loadings of fecal coliform bacteria, sediments, and nutrients primarily from nonpoint sources

Actions taken or proposed: A synoptic report that evaluated all relevant scientific studies performed in the Coastal Bays, identified research needs, provided an annotated bibliography, assessed the principle subbasins responsible for the majority of pollutant loadings, and provided a number of management options to control the pollutant loads entering the bays was prepared.

A more in-depth evaluation of the Bays' watershed by the State found that the St. Martins River, the largest tributary to the Coastal Bays is experiencing significant water quality degradation from point and nonpoint sources of pollution from excessive loadings of nutrients. In a companion project the State of Maryland received an additional grant from EPA to apply a nutrient model to the St. Martins River and the upper coastal bays to identify priority subwatersheds which will become the focus for follow-up pollution abatement and control activities.

The Maryland Department of the Environment has completed a report that contains estimated loadings to the Bays' ground water by nonpoint sources

and will conduct a similar follow-up study that will examine the St. Martins River area.

Stakeholders:

City of Ocean City
National Park Service
State of Maryland
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
Worcester County, MD

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Massachusetts Bays

Size and location: The Massachusetts Bays study area contains both Cape Cod Bay and Massachusetts Bay, which in turn consist of a myriad of smaller embayments along the entire eastern coast of Massachusetts. The Bays encompass a surface area of approximately 2,000 square miles, with a contributing watershed area of about 6,300 square miles. The watershed consists of significant portions of both Massachusetts and New Hampshire, and in particular, includes almost half of Massachusetts' 351 cities and towns.

Organization that initiated project:

The Massachusetts Bays Program (MBP) is a joint federal/state/local partnership initiated in 1988 with an award of \$1.6 million in settlement funds from the federal lawsuit over the pollution of Boston Harbor.

Major environmental problems:

- Chemical contamination of water and sediments
- Bioaccumulation and effects of chemical contamination
- Pathogen contamination
- Impaired water quality
- Habitat loss and modification
- Sea level rise

Actions taken or proposed: The MBP was selected for inclusion in the National Estuary Program (NEP) in 1990. With NEP designation and accompanying federal funding (\$5 million over 5 years), the MBP began development of a Comprehensive Conservation and Management Plan (CCMP) to achieve the goals of restoration and protection of water quality and enhancement of the marine resources of the Bays. The CCMP, first drafted in 1991, is currently under revision. A draft final CCMP will be released in May 1995 for public review. Final publication of the CCMP is scheduled for September 1995.

The CCMP and accompanying annual work plans serve to direct numerous program activities including:

- Establishment and staffing of governing committees, such as those for Policy, Management, Steering, Technical Advisory, Local Governance, and Public Outreach purposes.
- Implementation of the CCMP on a regional, geographic basis.
- MBP funded research, demonstration, and "Mini-Bays" projects (see page 91).

- Protection of living resources from chemical contamination through source reduction.
- Numerous education and outreach efforts (e.g., teacher training, publication of a coastal access guide and watershed map).
- Protection and restoration of harvestable shellfish resources through storm water remediation and septic system upgrades.

Stakeholders:

Academic community
Business and industry
Commercial and recreational users such as anglers, whale watchers, boaters, swimmers
Environmental groups
Federal, state, and local government agencies
Shipping industry
Tourists
Waste disposal industry

Contacts:

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	FAX: (617) 727-2754

Massachusetts Bays Program / Mini-Bays Project

Size and location: The Mini-Bays Project includes the following three areas:

- Wellfleet Harbor on Cape Cod (9.5 square miles)
- Fore River Estuary just south of Boston in Braintree, Quincy, and Weymouth (5 square miles)
- Plum Island Sound and Rivers System on the north shore of Boston (7 square miles)

Organization that initiated project:
Massachusetts Bays Program (MBP)

Major environmental problems:

- Wellfleet Harbor: pathogens and excessive nutrients threaten a nationally known oyster population
- Fore River Estuary: chemical and pathogenic contaminants, which if controlled could improve shellfish beds in an historically industrialized area
- Plum Island Sound: pathogen contamination from existing and future development which endanger the nationally famous Ipswich clam

Actions taken or proposed: With a five-year funding commitment from the MBP, each MiniBay project has developed a plan of action, created management and advisory committees, and actively begun identifying pollution sources. Additional effort has included and will include the development and implementation of cost effective corrective actions; the establishment of monitoring programs (typically staffed by volunteers); and the generation of local support. Specific examples of these efforts include creation of the Plum Island Sound volunteer monitoring program and reseedling of oyster beds in Wellfleet Harbor.

Stakeholders:

Academic community
Business and industry
Commercial and recreational users such as anglers, whale watchers, boaters, swimmers
Environmental groups
Federal, state, and local governments
Shipping industry
Tourists
Waste disposal industry

Contacts:

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Maumee River Area of Concern

Size and location: The Maumee River Area of Concern (AOC) is in Lucas County in northwest Ohio. It includes the Maumee Bay at the southwestern corner of Lake Erie.

Organization that initiated project:

Ohio Environmental Protection Agency (OEPA)

Major environmental problems:

- Degradation of fish and wildlife populations
- Loss of fish and wildlife habitat
- Degradation of benthos
- Eutrophication or undesirable algae
- Impaired drinking water
- Beach closings
- Historical discharges from wastewater treatment facilities
- Industrial dischargers
- Combined sewer overflows (CSOs) and urban runoff
- Agricultural runoff
- Dredge disposal
- Contaminated sediments

Actions taken or proposed: The Maumee River AOC is one of 43 AOCs that have been designated by the United States and/or Canadian governments in the Great Lakes region. A Remedial Action Plan (RAP) is being developed for this AOC to provide a long-term course of action for environmental cleanup. In October 1990 the Stage I report of the RAP, which describes the nature and extent of the problems, was completed. Stage II activities, which focus on identifying remedial actions and implementation methods, are currently being conducted.

Data collection efforts have begun in the mainstem Maumee and tributaries to assess the extent of contaminated sediments and degraded fish and benthos communities and to evaluate water quality.

The agricultural committee has developed a management policy statement to provide a greenway and buffer strip along all Maumee River and tributary waterways to inhibit further erosion.

Other actions include:

- Completion of basin-wide intensive surveys (1992-ongoing).
- Intensive investigation of landfill sources, pathways, and impacts on the AOC.
- Development of public involvement activities (e.g., workgroups, cleanups, evening socials, and Maumee River related events).

- Evaluation of hazardous waste sites under the Superfund Accelerated Cleanup Model.
- Sediment screening of Ottawa River.
- Reduction of CSO bypassing to the Maumee River and tributaries as a result of a recently completed deep tunnel reservoir project by the Toledo Bayview Plant.
- Completion of the second field season of a massive effort to evaluate the fish, macroinvertebrates, sediment, and habitat of the Maumee River and tributaries by the OEPA.
- Development with local area high schools of education and monitoring programs.
- Completion by Perrysburg of a 5-year upgrade to its wastewater treatment plant (WWTP), doubling its treatment capacity.
- Education of local land users on pollution prevention methods for nonpoint source pollution by EPA, OEPA, Ohio Department of Natural Resources (ODNR), and Soil Conservation Service (SCS).
- Joint development of a long-term dredged materials management plan among U.S. Army Corps of Engineers, OEPA, City of Toledo, EPA, Toledo Port Authority, ODNR, U.S. Fish and Wildlife Service, and SCS.

Future actions planned for this area include:

- Upgrade various municipal WWTPs at an expense of \$ 27 million.
- Correct CSOs at an estimated investment of \$420 million.
- Abate agricultural and urban nonpoint sources.
- Address contaminated sediment problems in Swan Creek, Ottawa River, and Maumee River.
- Preserve Maumee Bay from further filling.
- Preserve and restore lost wetlands.
- Conduct river investigations to document impacts on environmental and potential problems associated with landfill runoff.
- Complete Stage II RAP.

Maumee River continued on page 93

Meramec River

Size and location: The Meramec River meanders some 220 miles through six Missouri Ozark Highland counties—Dent, Phelps, Crawford, Franklin, Jefferson, and St. Louis—before it empties into the Mississippi River. Between the mouth and its source, it falls 1,025 feet. The Meramec watershed covers portions of eight additional counties—Maries, Gasconade, Iron, Washington, Reynolds, St. Francois, Ste. Genevieve, and Texas—totalling approximately 3,980 square miles.

Organization the initiated project:

Missouri Department of Conservation

Major environmental problems:

- Sand and gravel dredging operation impacts
- Developmental pressures
- Increased agricultural and livestock production
- Nonpoint source pollution
- Point source pollution
- Threats to water quality and drinking water supply
- Flooding
- Impaired aquatic diversity (including federally and state threatened and endangered species) due to habitat loss
- Riparian corridor destruction
- Wetland loss

Actions taken or proposed: The Missouri Department of Conservation under a State Wetland Protection Development Grant from EPA will coordinate scientific information with stakeholders to develop a watershed plan for the Meramec basin through the following measures:

- Provide scientific information on physiography, geology, hydrology, geomorphology, land usage, Clean Water Act Section 404 jurisdiction (stream and wetland), structural influences, water quality, fish contamination, habitat conditions, community sampling of fish and invertebrates, and locations of threatened and endangered species.
- Provide data in Geographic Information System form.
- Identify basin problems and potential solutions.
- Prepare a basin-specific, dynamic plan to aid managers in addressing management, coordination, and information needs to integrate wetland protection and management into a watershed context.

- Identify potential socio-political partnerships needed to implement improvement programs.

Stakeholders:

Citizen groups
Landowners
Local governments
Missouri Department of Conservation
Missouri Department of Natural Resources
Missouri Stream Teams
Private organizations
Regional planning groups
Soil Conservation Service
U.S. Army Corps of Engineers, St. Louis District
U.S. Environmental Protection Agency

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Kansas City, KS 66101
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Stakeholders:

Local residents
Ohio Department of Natural Resources
Ohio Environmental Protection Agency
Soil Conservation Service
Toledo Metropolitan Area Council of Governments
Toledo Port Authority
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service

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Merrimack River

Size and location: The Merrimack River has a 5,010-square mile watershed located in New Hampshire and Massachusetts.

Organizations that initiated project:

U.S. Environmental Protection Agency
States of New Hampshire and Massachusetts
New England Interstate Water Pollution Control Commission

Major environmental problems:

Combined sewer overflows
Nonpoint source pollution
Toxics
Loss of wetlands and habitats
Increasing demand for water

Actions taken or proposed: In an effort to reach out to stakeholders or user groups in the watershed and to better define the issues, the Merrimack River Watershed Consortium was held in February 1992. As a result of the Consortium, a Management Committee and four issue oriented subcommittees were formed. The Management Committee and Subcommittees include federal, state, regional, and local interest group representatives. The subcommittee issues are: Water Quality, Instream Flow, Information Management/Geographic Information System (GIS), and Resource Use and Value.

On June 7-8, 1993 the first annual Merrimack River Watershed Management Conference, "Solutions for the Future...Actions for the Present," was held. Over 200 people attended the conference and contributed to the development of a draft Watershed Management Plan. In fiscal year 1993 the Initiative had approximately \$400,000 in funding. This funding was used for staffing the Initiative and in pursuing a variety of priority projects determined by the Subcommittees and Management Committee. These include: a resource use and value inventory of the watershed, water quality assessment, hydrologic analysis, communication strategy, two pilot sub-watershed studies, hydrographic coding of the watershed, and the development of GIS basemaps.

The Management Committee will be refining the Watershed Management Plan and working to communicate the Initiative. Projects selected for action in fiscal year 1994 include: the formation of a watershed advisory group; the development of a citizen environmental monitoring network, resource assessment, information access network, business/government forum, and biomonitoring in the watershed.

The second annual Watershed Management Conference was held in June of 1994. In addition, internal EPA workgroups are pursuing projects related to integrating internal data bases, targeting compliance efforts, addressing combined sewer overflow issues on the main stem river, focusing on minor permits in degraded stream segments, targeting RCRA inspections, and locating waste sites.

Stakeholders:

Environmental organizations
Industry and business
Local governments
Massachusetts
National Park Service
New Hampshire
Regional planning agencies
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Forest Service
U.S. Geological Survey
Universities
Utilities
Watershed organizations

Contacts:

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Middle Fork River

Size and location: The Middle Fork River Watershed encompasses 151 square miles in the hills of central West Virginia.

Organization that initiated project:
U.S. Environmental Protection Agency

Major environmental problems:

- Acid mine drainage from abandoned mines severely impacts drinking water sources, aquatic life including a trout fishery, aesthetics, and recreational activities

Actions taken or proposed: Critical areas have been defined based on acid loads. A steering committee reviews restoration plans such as anoxic limestone trenches and wetlands. An engineered wetland has been installed. The project helped generate additional state and federal funds for mine reclamation activities. It has helped the State develop a restoration fund which will be used on a priority basis for reclaiming mined areas.

Six ground water monitoring stations were installed near Cassity, West Virginia. Two were placed outside of the impacted area to collect background data. The sites, which are monitored twice a year, include naturally-occurring springs and water. Additional ground water monitoring occurs near Kittle Flats, West Virginia. Ground water seepage is monitored as part of the acid mine drainage control and abatement project in the watershed. The monitoring will help assess the effectiveness of the anoxic limestone drains that are being installed.

Stakeholders:

Recreationalists
Soil Conservation Service
U.S. Environmental Protection Agency
U.S. Office of Surface Mining
West Virginia Division of Energy
West Virginia Division of Natural Resources
West Virginia State Soil Conservation Committee

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Middle Snake River

Size and location: The Middle Snake River is located in the Snake River Plain in south-central Idaho.

Organizations that initiated project:

U.S. Environmental Protection Agency
State of Idaho
Middle Snake River Study Group

Major environmental problems:

Threatened water quality
Aquatic ecosystem degradation
Runoff
Effluent
Riparian/wetland habitat degradation
Endangered and threatened species
Loss of recreational resources

Actions taken or proposed: In 1988, EPA became concerned about cumulative impacts to the Middle Snake River from existing and proposed hydroelectric projects. As a result, EPA initiated an ecological risk analysis of this portion of the Snake River which utilizes both measurements and models to estimate the likelihood of deleterious changes in the watershed.

In 1990, the State of Idaho designated parts of the Middle Snake River as water quality-limited, which required the establishment of a Total Maximum Daily Load. The State then developed a Nutrient Management Plan (NMP). With input from industry, environmental groups, and local government, the NMP hopes to define a pollutant load limit that achieves water quality standards and specifies a clearly enforceable allocation of allowable pollutant loadings among the various dischargers.

Local officials also became aware of the water quality problems in the Middle Snake River and formed the Middle Snake River Study Group (MSRSG). The MSRSG has completed a draft Coordinated Water Resource Management Plan for the Middle Snake River.

The integration of these three efforts (NMP, ecological risk analysis, and MSRSG plan) is providing a coordinated approach to addressing water quality problems in the Middle Snake River.

Stakeholders:

B&C Energy, Inc.
City of Twin Falls
Clear Springs Trout Company
Cogeneration, Inc.
Dairy and feedlot owners and operators
Hagerman Valley Citizens Alert, Inc.
Idaho Aquaculture Company
Idaho Cattle Association
Idaho Conservation League
Idaho Dairymen's Association
Idaho Department of Fish and Game
Idaho Department of Parks and Recreation
Idaho Division of Environmental Quality
Idaho Power Company
Idaho Rivers United
Idaho Whitewater Association
L.B. Industries
Middle Snake River Study Group (elected officials and citizens from four counties)
North Side Canal Company
Rangen, Inc.
Twin Falls Canal Company
Twin Falls County Parks Department
U.S. Environmental Protection Agency

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Milwaukee Estuary Area of Concern

Size and location: The Milwaukee Estuary Area of Concern (AOC) is in the City of Milwaukee. It includes the nearshore waters of Lake Michigan, Milwaukee Harbor, and portions of the Milwaukee, Menomonee, and Kinnickinnic rivers. Twenty-two square miles of land drain directly to the AOC. This 22-square mile drainage area cover less than three percent of all the land draining to the estuary. (The AOC encompasses only a small portion of the entire watershed.)

Organization that initiated project:

Wisconsin Department of Natural Resources

Major environmental problems:

- Degraded fish and wildlife habitat
- Degraded benthos, plankton, fish, and wildlife communities
- Eutrophication
- Tumors and other deformities in fish
- Beach closings and other restrictions on full-body contact with surface waters
- Combined sewer overflows
- Contaminated sediments
- Hydromodification
- Storm water runoff
- Sewage treatment plant effluent
- Industrial process and noncontact cooling water discharges

Actions taken or proposed: The Milwaukee Estuary AOC is one of 43 AOCs that have been designated by the International Joint Commission (a U.S.-Canadian commission) in the Great Lakes region. A Remedial Action Plan (RAP) is being developed for this AOC to provide a long-term course of action for environmental cleanup. The Wisconsin Department of Natural Resources (WDNR) completed Stage I of the RAP, which describes the nature and extent of problems, in March 1991. In July 1994, the WDNR released a report describing progress on the identification and implementation of remedial actions.

The WDNR has designated all six of the watersheds that are tributaries to the AOC as priority watersheds under the State's Priority Watershed Program. Designation as such has led to development of nonpoint source pollution control plans for five of the six watersheds. A plan for the sixth should be complete in 1994.

Development of the plans has enabled the implementation of practices which control discharges of pollutants from rural and urban sources. Nearly 150

rural landowners have signed agreements to share the \$1.4 million cost to implement controls. In addition, 32 public and nonprofit organizations have initiated nonpoint source pollution control programs in urban areas. Through mid-1993, the WDNR and the 32 organizations spent \$2 million to implement the programs.

The WDNR has allocated \$4 million for implementation of the nonpoint source pollution controls in 1994. Implementation will reduce soil erosion from farm land, construction sites, and streambanks. It also will reduce the discharge of livestock waste and household hazardous waste to surface waters. Structural controls established in urban environments will reduce pollutant loads from storm water runoff and mitigate the adverse hydrologic effects of impervious surfaces.

EPA is overseeing the design of a remedial action for the Moss-American Superfund site. The site, located in the City of Milwaukee, was used for several decades to treat railroad ties with a creosote and fuel oil mixture. An investigation of the site indicated the presence of several organic compounds in ground water, soil, and Lower Menomonee River sediment. Among the compounds, polycyclic aromatic hydrocarbons were the most prevalent. They were found at concentrations known to promote the formation of tumors in fish.

In 1973, EPA funded the removal and treatment of contaminated sediments from a 5,000-foot reach of the Little Menomonee River. Activities to be conducted as part of a full remedial action will involve relocation of the Little Menomonee River, removal and treatment of contaminated soil and sediment, collection and treatment of contaminated ground water, and isolation of untreated soil and sediment. The remedial action is expected to take up to four years to implement at a cost of \$26 million. It is scheduled to begin in 1997. When complete, the remedial action is expected to reduce releases of organic compounds to the Lower Menomonee River and the AOC.

In 1996, local governments will complete a \$2.2 billion effort to reduce the frequency of overflows from combined sewers and improve the quality of effluent from the Milwaukee Metropolitan Sewerage District's (MMSD) two wastewater treatment plants. This effort involves significant improvement to existing sewers, the construction of tunnels to store wet weather flows for subsequent treatment, and expansion of the MMSD's two wastewater treatment plants. Reduction in the number of overflow events and

Milwaukee Estuary Area of Concern

improvement in treatment plant effluent will significantly reduce the discharge of oxygen-consuming matter, solids, pathogens, and toxic substances to the AOC.

Future actions that are planned for the AOC include:

- Implement programs and practices to control urban and rural nonpoint sources of pollution.
- Control pollutants discharged from the Milwaukee storm sewer system.
- Remediate the Moss-American Superfund site.
- Characterize sediments in streams that are tributaries of the AOC (e.g., Lincoln and Cedar creeks, Milwaukee River) and control releases of associated contaminants.
- Characterize sediments in the AOC and implement actions to minimize the adverse effects of associated contaminants.
- Restore streambanks and create vegetative buffer zones.
- Aerate a portion of the Menomonee River.
- Establish a household hazardous waste collection facility.
- Minimize the introduction of pollutants to sewers and surface waters through public education.

Stakeholders:

Citizens Advisory Committee
City of Milwaukee
Milwaukee County
Milwaukee Metropolitan Sewerage District
Milwaukee River Revitalization Council
Southeast Wisconsin Regional Planning Commission
Technical Advisory Committee
U.S. Environmental Protection Agency
Wisconsin Department of Natural Resources

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Milwaukee, WI 53212
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Morro Bay

Size and location: Morro Bay has an approximately 100-square mile watershed located on the California coast, approximately 150 miles north of Los Angeles.

Organizations that initiated project:

California State Coastal Commission
Soil Conservation Service
Central Coast Regional Water Quality Control Board

Major environmental problem:

Sedimentation

Actions taken or proposes: To protect this endangered area, EPA supports the Morro Bay Watershed Project with both funding and technical guidance on nonpoint source monitoring and implementation of nonpoint source controls. Clean Water Act Section 319 grant funds are being used to implement erosion control and sediment retention practices on several farms and ranches in the watershed. A National Nonpoint Source Monitoring Program project measures the effectiveness of agricultural and silvicultural best management practices in reducing sedimentation. In addition, the Regional Water Board has initiated an effort to closely coordinate implementation of other water quality programs, including underground tank remediation, storm water, and point source permitting on a watershed basis.

Stakeholders:

California Polytechnic Institute—San Luis Obispo
California Regional Water Quality Control Board
California State Coastal Commission
Local interest groups and landowners
Resource Conservation District
Soil Conservation Service
U.S. Environmental Protection Agency

Contact: Howard Kolb
Central Coast Regional Water Quality Control Board
81 Higuera St., Suite 200
San Luis Obispo, CA 93401-5414
(805) 549-3332

Narragansett Bay

Size and location: Narragansett Bay is an estuary covering 147 square miles of water surface. Its watershed comprises 1,657 square miles, 61 percent of which is in Massachusetts and 39 percent is in Rhode Island.

Person that initiated project:
Governor of Rhode Island

Major environmental problems:

- Toxic pollutants
- Nutrients and eutrophication
- Land-based impacts on water and habitat quality
- Declining health and abundance of living resources
- Need for fisheries management
- Adverse health risk to consumers of seafood
- Adverse environmental impacts on commercial and recreational uses

Actions taken or proposed: The Narragansett Bay was selected for inclusion in the National Estuary Program in 1987. A Comprehensive Conservation and Management Plan (CCMP) has been developed as the blueprint for immediate coordinated action by federal, state, and local implementing authorities. Recommended actions to address the problems listed above are prioritized and need to be staged over a number of years to achieve measurable progress. Since the CCMP received EPA approval in January 1993, some examples of implementation activities that have been completed include:

- Development of a Marina Pumpout Siting Plan that will help lead to a request to EPA to designate the Bay as a "no discharge area."
- A Quahog (hard shell clam) Management Plan for Greenwich Bay.
- A regulatory review to identify and resolve inconsistencies in state policies regarding water quality issues.
- Revision of the state's individual sewage disposal system regulations and industrial pre-treatment regulations.

Stakeholders:

Environmental advocacy groups
Federal, state, and local government agencies
Industry
Land development interests
Local citizens
Marine trade organizations
Universities

Contacts:

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FAX: (617) 565-4940

State:
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Chris Deacutis
Narragansett Bay Project
Rhode Island DEM
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FAX: (401) 521-4230

New York City Water Supply Watersheds

Size and location: The water supply for the City of New York is composed of three systems. Together, these systems provide water for 8 million residents in New York City as well as 1 million residents north of the city. The Catskill and Delaware Systems (Schoharie, Cannonsville, Pepacton, Ashokan, Neversink, and Rondout Reservoirs) lie west of the Hudson River, covering an area of approximately 2,000 square miles. The Kensico and West Branch Reservoirs of the Catskill/Delaware Systems (plus the independent Croton System) lie east of the Hudson River.

Organization that initiated project:
New York City

Major environmental problems:

- Nonpoint source contamination from residential and commercial development
- Runoff from dairy farming operations
- Discharges from wastewater treatment plants

Actions taken or proposed: On December 30, 1993, EPA issued a Determination granting filtration avoidance to New York City for the Catskill and Delaware systems. The Determination, which is effective until a further Determination is made or until December 15, 1996, requires New York City to comply with over 150 conditions. These conditions mainly consist of steps to further enhance watershed protection. Some actions being taken include:

- Water quality inventory, surveillance, and monitoring.
- Promulgation of new watershed regulations.
- Partnership programs with watershed communities and the farm community.
- Kensico Reservoir coliform remediation.
- Upgrading of New York City-owned and non-City-owned sewage treatment facilities.
- Septic tank review, inspection, and remediation.
- Enhanced enforcement of water quality regulations.
- Land acquisition.
- Stream corridor protection.

The New York City Department of Environmental Protection is undertaking these actions either directly or by providing funding to others.

Stakeholders:

Building Contractor Association of Westchester
& the Mid-Hudson River
Catskill Center
Catskill Committee of the Sierra Club
City Club of New York
City of New York
Coalition of Watershed Towns (representing all towns in the five West of Hudson counties)
Congressman Boehlert
Congressman Fish
Congresswoman Lowey
Environmental Defense Fund
Hudson Riverkeeper
Natural Resources Defense Council
New York State Bar Association, Environmental Law Committee
New York State Department of Environmental Conservation
New York State Department of Health
Pure Water Alliance
Putnam County Legislature
Sierra Club - New York City Group
U.S. Environmental Protection Agency
Westchester County
Woodstock Times/Huguenor and Highland Herald Publisher

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New York, NY 10278
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New York-New Jersey Harbor

Size and Location: The core area for this project is defined as the New York-New Jersey Harbor from the area up to and including the Hudson River near Piermont Marsh to the Sandy Hook-Rockaway Point Transect, the Harlem and East Rivers to Hellgate, and all other tributaries to the head of tide. The core area is encompassed within an approximately 50-mile diameter circle centered on the Upper Bay of New York-New Jersey Harbor. For planning purposes, the New York Bight Apex along with the New Jersey and Long Island coasts to three miles offshore, and the Hudson River to the limit of anadromous fish spawning are considered within the study area.

Organizations that initiated the project:

New York State Department of Environmental Conservation
New Jersey Department of Environmental Protection

Major environmental problems:

Floatable debris
Pathogenic contamination
Toxic contamination
Nutrient and organic enrichment
Habitat loss and degradation

Actions taken or proposed: The New York-New Jersey Harbor was selected for inclusion in the National Estuary Program in 1988. A Comprehensive Conservation and Management Plan (CCMP) is being developed for the Harbor that recommends priority corrective actions to restore and maintain the resources of the Harbor. The draft CCMP is expected to be released to the public in late 1994. The final CCMP is due to EPA and the Governors of New York and New Jersey by June 1, 1995, and EPA's Administrator is expected to approve the CCMP in September 1995.

Actions identified to date include:

- Floatables Action Plan.
- Beach/Shellfish Bed Closure Action Plan.
- Site-Specific Water Quality Standard for copper.
- Wasteload Allocations for toxic metals.

Stakeholders:

Citizens' groups
Interstate Sanitation Commission
Local governments including New York City
National Oceanic and Atmospheric Administration
New Jersey Department of Environmental Protection
New York State Department of Environmental Conservation
Port Authority of New York and New Jersey
Scientific and technical community
U.S. Army Corps of Engineers
U.S. Department of Interior
U.S. Environmental Protection Agency

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Niagara River Area of Concern

Size and location: The Niagara River Area of Concern (AOC) is located in Erie and Niagara Counties in western New York. The AOC extends from Smokes Creek near the southern end of the Buffalo Harbor, north to the mouth of the Niagara River at Lake Ontario.

Organizations that initiated the project:

U.S. Environmental Protection Agency
New York State Department of Environmental Conservation (NYSDEC)

Major environmental problems:

- Habitat and survival of aquatic life have been impaired by PCBs, mirex, chlordane, dioxin, hexachlorobenzene, polynuclear aromatic hydrocarbons, lead, mercury, tetrachloroethylene, and pesticides
- Fish tumors and other deformities
- Metals and cyanides in the sediment prevent open lake disposal of bottom sediments dredged from the river

Actions taken or proposed: The Niagara River AOC is one of 43 AOCs that have been designated by the United States and/or Canadian governments in the Great Lakes region. A Remedial Action Plan (RAP) is being developed for this AOC to provide a long-term course of action for environmental cleanup. RAP development began in 1989. The final draft was completed in March 1993. A Remedial Advisory Committee will be formed to assist NYSDEC in RAP implementation. Actions that have been taken to date include:

- Upstream (Fort Erie) and downstream (Niagara-on-the-Lake) water quality monitoring is ongoing in order to estimate pollutant loadings.
- Scheduled remedial actions at Occidental Chemical's Buffalo Avenue and Durez sites, DuPont's Necco Park and Buffalo Avenue sites, Bell Aerospace, and CECOS International have resulted in an estimated 25 percent reduction in loadings from waste sites in the Niagara River basin.
- Remedial actions on Gill Creek were completed in 1992.
- NYSDEC is developing pollution prevention regulations to require implementation of "Toxic Chemical Reduction Plans" for facilities that generate certain amounts/types of hazardous wastes or toxic chemicals. Many

industries have already taken the initiative to institute pollution prevention practices.

- Additional actions taken in this AOC are included in the summary of projects undertaken for the Niagara River Toxics Management Plan (see page 103), which covers a larger, but similar area.

Stakeholders:

Bethlehem Steel
Buffalo Sewer Authority
Columbus-McKinnon
DuPont-Necco Park
Environment Canada
INS Equipment
New York State Department of Environmental Conservation
Niagara River Action Committee
Occidental Chemical
Ontario Ministry of Environment and Energy
Other industries
U.S. Environmental Protection Agency

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U.S. EPA Region II
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FAX: (212) 264-2914

Niagara River Toxics Management Plan

Size and location: The Niagara River is a 37-mile channel that connects Lake Erie to Lake Ontario. Divided into upper and lower reaches by Niagara Falls, it provides 83 percent of the total tributary flow to Lake Ontario.

Organizations that initiated the project:

U.S. Environmental Protection Agency
New York State Department of Environmental Conservation (NYSDEC)
Environment Canada (EC)
Ontario Ministry of Environment and Energy (MOEE)

Major environmental problems:

- Habitat and survival of aquatic life have been impaired by PCBs, mirex, chlordane, dioxin, hexachlorobenzene, polynuclear aromatic hydrocarbons, lead, mercury, tetrachloroethylene, and pesticides
- Fish tumors and other deformities
- Metals/cyanides in sediments prevent open lake disposal of bottom sediments dredged from river

Actions taken or proposed: A Declaration of Intent was signed in 1987 by EPA, EC, NYSDEC, and MOEE initiating the Niagara River Toxics Management Plan (NRTMP) to reduce toxics loadings to the Niagara River. Actions that have been taken to date include:

- In 1989, EPA and NYSDEC identified the Falls Street Tunnel as responsible for over 50 percent of the aggregate point source loadings (from the United States to Niagara River) of the ten persistent toxic chemicals targeted for significant reductions by the NRTMP. In 1993, the U.S. Department of Justice lodged a settlement in Federal Court which commits the City of Niagara Falls to treat all the dry-weather flow. Construction to divert the entire dry-weather flow to the Niagara Falls wastewater treatment plant was completed on schedule, and treatment of the toxic chemicals has been confirmed.
- Over 5,800 cubic meters of highly contaminated sediment were removed from Gill Creek, eliminating, among other pollutants, an estimated 0.4 pounds per day load of PCBs to the Niagara River. This magnitude of loading is approximately 20 percent of the loading measured from the Niagara River to Lake Ontario.

- EPA and NYSDEC identified 24 waste sites responsible for 99.9 percent of the estimated toxic loads from all sites and developed ambitious cleanup schedules for them. In June 1994, the agencies reported that remediations at eight sites have resulted in an estimated 25 percent reduction in these loads. By 1996, scheduled remedial actions will reduce the estimated toxic loads by 89 percent.
- Approximately 29,000 cubic yards of contaminated sediments were removed from Bloody Run Creek, also associated with leachate from the Hyde Park landfill. Substances removed included chlorobenzene, hexachlorobenzene, and low levels of dioxin. The creek was relined with clean gravel.
- EPA has carried out inspections at Niagara River basin facilities for waste minimization activities on behalf of the Niagara Frontier Program. EPA targeted facilities that discharge either NRTMP priority toxics or toxics that are highly bioaccumulative. EPA's reports include descriptions of facility manufacturing processes, waste generation and environmental releases, waste minimization achievements to date, potential waste minimization opportunities, and facility response to the evaluation.

Stakeholders:

Bell Aerospace
City of Niagara Falls
DuPont
Environment Canada
New York State Department of Environmental Conservation
Occidental Chemical
Ontario Ministry of Environment and Energy
Other industries
U.S. Environmental Protection Agency
U.S. Geological Survey

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Northwest Indiana Environmental Initiative

Size and location: The Initiative centers on the Grand Calumet River watershed and encompasses parts of Lake and Porter counties in northwest Indiana. Municipalities include: City of Hammond, City of East Chicago, City of Gary, and City of Whiting.

Organization that initiated project:

U.S. Environmental Protection Agency

Major environmental problems:

- Five to ten million cubic yards of contaminated river and harbor sediments
- Toxics
- Five Superfund sites
- Ground water contaminated with 15-30 million gallons of free-phase hydrocarbons

Actions taken or proposed: The Grand Calumet watershed is an Area of Concern under the Great Lakes Water Quality Agreement.

EPA is working closely with the Indiana Department of Environmental Management (IDEM) on a watershed basis. EPA and IDEM have developed a strategy for the area and have workgroups implementing this strategy. EPA actions include: a Memorandum of Understanding with the U.S. Army Corps of Engineers to develop a sediment dredging project,

targeted enforcement against watershed non-compliers, pollution prevention projects and workshops, multi-media site evaluations and cleanups, natural resource damage assessments, and an area ground water workgroup developing a map of the extensive ground water contamination.

Stakeholders:

Indiana Department of Environmental Management
Indiana Department of Natural Resources Industries
Local environmental groups
Local municipalities
Property owners
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
Unions

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Oak Creek

Size and location: Oak Creek Watershed covers 427 square miles in Arizona.

Organization that initiated project:

Arizona Department of Environmental Quality

Major environmental problems

High bacteria levels
High nutrient levels
Sedimentation

Actions taken or proposed: The Arizona Department of Environmental Quality initiated the Oak Creek project to provide an analytical, planning, and implementation framework to address water quality problems associated with point and nonpoint pollutant discharges. Oak Creek was selected as a National Nonpoint Source Monitoring project site for long-term monitoring and assessment of nonpoint source best management practice effectiveness. A variety of

practices to control runoff from paved surfaces will be implemented.

Stakeholders:

Arizona Department of Environmental Quality
Arizona Department of Transportation
Local county government
Local environmental groups and landowners
Northern Arizona Council of Governments
U.S. Department of Agriculture
U.S. Environmental Protection Agency

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Onondaga Lake

Size and location: Onondaga lake is located along the northern end of the City of Syracuse in Onondaga County, New York. The lake covers an area of 4.6 square miles. The lake receives water from a drainage basin of 248 square miles located almost entirely within Onondaga County.

Organization that initiated project:
U.S. Congress

Major environmental problems:

- Excessive nutrient loading from a large municipal discharge causing eutrophic and low oxygen conditions
- Combined sewer overflows of untreated sewage and debris generating bacteria concerns
- Mercury and other hazardous materials in the sediment, water, and biota from past manufacturing operations
- Low dissolved oxygen levels, high turbidity levels, elevated levels of ammonia and salinity, reduced plant life, unsuitable substrate, and the presence of mercury have adversely affected aquatic organisms.
- Sediment loading from the Tully Valley Mudboils

Actions taken or proposed: In 1989 Congress appropriated funds for EPA to convene a management conference for Onondaga Lake. Subsequently, the Great Lakes Critical Programs Act of 1990 called for the establishment of a management conference for the restoration, conservation, and management of Onondaga Lake and called for the development of a comprehensive restoration, conservation, and management plan for Onondaga Lake that recommends priority corrective action and compliance schedules for the cleanup of the lake. The Management Conference consists of representatives from the federal, state, local, public, and private sectors who have an interest in the Lake.

Management Conference projects include:

- Develop a eutrophication model for the Seneca River.
- Develop a lake productivity model.
- Develop a hydrodynamic model for the lake outlet.
- Fund studies on the release of nutrients and toxic substances from lake sediments under changing dissolved oxygen levels.
- Establish a long-term baseline water quality program.

- Characterize the nonpoint source pollution problems.
- Draft a rural nonpoint source pollution plan.
- Draft an urban/suburban nonpoint source pollution plan.
- Draft a fish and wildlife management plan.
- Demonstration project of manipulated littoral zone habitat structures indicated that fencing and wave breaks could significantly increase plant survival, growth, and diversity and that these habitats also increased survival of young-of-the-year fish.

Future projects proposed for Onondaga Lake include:

- Evaluate, and update on a regular basis, the contamination status of lake organisms.
- Develop and implement a biological monitoring program
- Develop a public education plan.
- Conduct pilot projects to implement flow modification and sediment load reduction in the Tully Valley Mudboil area.
- Implement large scale macrophyte planting project.
- Reconnect fragmented wetlands area to Onondaga Lake to provide vital fish spawning and young-of-the-year nursery areas.
- Study the role of vegetation in mercury cycling.
- Complete the full "State of Onondaga Lake" report.

Implementation of the plan will involve the targeted use of existing regulatory programs within the geographic confines of Onondaga Lake. For example, a Remedial Investigation and Feasibility Study is being performed pursuant to a consent decree with New York State.

Stakeholders:

City of Syracuse
New York State Department of Environmental Conservation
New York State Department of Law
Onondaga County
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency

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Oswego River Harbor Area of Concern

Size and location: The Oswego River Harbor Area of Concern (AOC) is located on the southeastern shore of Lake Ontario and is centered in the City of Oswego, New York.

Organizations that initiated the project:

New York State Department of Environmental Conservation (NYSDEC)
U.S. Environmental Protection Agency

Major environmental problems:

- Restrictions on fish and wildlife consumption primarily due to PCBs and dioxin
- Loss of fish and wildlife habitats caused by periodic extreme low flow conditions below the Varick Dam contributes to the degradation of fish populations
- Eutrophication and reported algal blooms have been attributed to excess phosphorus from municipal discharges, combined sewer overflows (CSOs), and agricultural runoff
- Pollutants of concern from identified sources in the basin are PCBs, dioxin, phosphorus, mercury, mirex/photomirex, and octachloro-styrene

Actions taken or proposed: The Oswego River Harbor AOC is one of 43 AOCs that have been designated by the United States and/or Canadian governments in the Great Lakes region. A Remedial Action Plan (RAP) is being developed for this AOC to provide a long-term course of action for environmental cleanup. RAP development began in 1987. The Stage I Report, which describes the nature and extent of problems, was completed in 1990. The Stage II Report, completed in 1991, includes a remedial strategy to restore water quality in the lower river and harbor, and eliminate adverse impacts to Lake Ontario from pollutants carried by the Oswego River. A Remedial Advisory Committee (RAC) was then formed to represent all stakeholders and assist NYSDEC in RAP implementation. Actions that have been taken to implement the recommendations of the Stage II Report include:

- Under a recent settlement and enforcement action, Bristol Myers Squibb in East Syracuse agreed to a \$30 million upgrade to its pretreatment facilities and to conduct site investigations and pollution prevention activities.
- EPA and NYSDEC are jointly overseeing the implementation of eight Approved Pretreatment Programs in the Oswego Basin.

- Modeling of Onondaga Lake and Three Rivers (Oswego, Seneca, and Oneida) is well underway and is to be used to determine loadings, additional upgrade needs, and CSO needs.
- Implementation of remedial actions is underway at the Clothier and Quanta Resources hazardous waste sites. Clothier involves drum and soil contamination removal. Quanta involves additional monitoring to determine if interim remedial measures are effective and sufficient. Remedial Investigation/Feasibility Studies are in progress at seven other sites, including Onondaga Lake and Ley Creek PCB sites, as prerequisites to remedial action.
- NYSDEC is working with Niagara Mohawk and other hydroelectric utilities to allow restricted fish passage at Oswego River facilities and to resolve minimum flow problems at Varick Bypass. Estimated completion is 1995.

Stakeholders:

Auburn, Canadaigua, Fulton, Geneva, Ithaca, Newark, Oswego, and Onondaga Counties
Bristol Myers Squibb
Citizens' Advisory Committee
New York State Department of Environmental Conservation
Niagara Mohawk and other hydroelectric utilities
U.S. Environmental Protection Agency

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Otter Creek

Size and location: Otter Creek has a 240,000-acre watershed located approximately 200 miles south of Salt Lake City, Utah.

Organizations that initiated project:

- Soil Conservation Service
- Utah Department of Environmental Quality
- Local soil conservation district

Major environmental problems:

- Nutrients
- Sediment
- Degraded riparian areas and stream channel
- Streambank erosion
- Erosion on rangeland
- Animal waste
- Eutrophication of Otter Creek Reservoir

Actions taken or proposed: This project is coordinating funding through the U.S. Department of Agriculture (USDA) Hydrologic Unit area, Clean Water Act (CWA) Section 319, USDA Water Quality Incentive Program, U.S. Bureau of Land Management (BLM), U.S. Forest Service, and private sources. The Soil Conservation Service oversees this project, and a watershed project steering committee plays an active role in this project. Several water quality demonstration projects such as riparian and stream stabilization, rangeland brush control, and re-seeding are underway or have been completed with technical assistance from USDA and BLM. This watershed restoration project includes treatment of both private and federal lands. Watershed treatment is also coordinated with a CWA Section 314 project to improve Otter Creek Reservoir.

Stakeholders:

- Local landowners
- Local soil conservation district
- U.S. Bureau of Land Management
- U.S. Department of Agriculture
- U.S. Environmental Protection Agency
- U.S. Forest Service
- Utah Association of Conservation Districts
- Utah Department of Agriculture
- Utah Department of Environmental Quality
- Utah Department of Natural Resources

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FAX: (801) 538-6016

Peconic Bay

Size and location: The surface area of Peconic Bay is about 200 square miles. The estuary lies between the twin forks of Long Island, New York.

Organization that initiated the project:

Suffolk County Department of Health Services

Major environmental problems:

- Nuisance algal bloom which destroyed the once important scallop fishery and has impacted other shellfish, finfish, and their nursery areas
- Nutrients in the western areas of the bay
- Pathogens from point and nonpoint sources

Actions taken or proposed: Peconic Bay was selected for inclusion in the National Estuary Program in 1992. A Comprehensive Conservation and Management Plan is being developed for Peconic Bay that will recommend priority corrective actions to restore and maintain the estuarine resources.

Actions that have been taken in the Bay include:

- Freezing the nitrogen load from sewage treatment plants at current levels.
- Remediating nonpoint source nutrient pollution from a local duck farm.
- Replanting scallops to recovering areas.
- Planting grass buffer strips to control pathogen contamination due to road runoff.
- Remediating wetland habitats.
- Construction of boat pump-out facilities.
- Adoption of a total nitrogen surface water quality guideline for the western area of the Bay.

Stakeholders:

Accabonic Protection Committee
ACT NOW!/Promoting Community Awareness
Adelphi University
Association of Marine Industries
Brookhaven National Labs
Concerned Citizens of Montauk
Cornell Cooperative Extension Association of Suffolk County
East Hampton Historical Society
East Hampton Town Baymen's Association
Group for the South Fork
Harbor Marina
Larry's Lighthouse Marine
League of Women Voters
Long Island Farm Bureau, Inc.

Long Island Pine Barrens Association
Long Island Regional Planning Board
Long Island University
Long Island Water Commission
Modern Yachts
Montauk Boatman and Captain's Association
Montauk Chamber of Commerce
Montauk Harbor Association
National Oceanic and Atmospheric Administration
New Suffolk Civic Association
New York Sea Grant
New York State Department of Environmental Conservation
New York State Department of State
New York State Department of Transportation
North Fork Bank
North Fork Environmental Council
Office of the Suffolk County Executive
Okeanos Ocean Research Foundation
Peconic Land Trust
Red Cedar Point Association
Riverhead Conservation Advisory Council
Rutgers University
Seafood Harvesters Association of New York
Shelter Island Baymen's Association
Shinnecock Marlin & Tuna Club
Soil Conservation Service
South Town Baymen's Association
Southampton Town Baymen's Association
State University of New York - Stony Brook
Suffolk Community College
Suffolk County Department of Health Services
Suffolk County Planning Department
Suffolk County Soil and Water Conservation District
The Nature Conservancy
Town of Brookhaven Division of Environmental Protection
Towns of East Hampton, Southampton, Shelter Island, Riverhead, and Southold
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Food and Drug Administration
U.S. Geological Survey

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Pequea and Mill Creeks

Size and location: The Pequea and Mill Creeks watershed is located in southeastern Pennsylvania in Lancaster and Chester Counties. The watersheds total 135,000 acres. Land use in the watershed is predominantly agricultural; 63 percent of the land is devoted to cropland and 13 percent to pasture.

Organization that initiated project:
U.S. Geological Survey (USGS)

Major environmental problems:
Agricultural runoff
Stream bank erosion
Nutrient enrichment
Pesticide contamination

Actions taken or proposed: Surface water in the Pequea and Mill Creeks is used for drinking, irrigation, boating, fishing, water contact sports, watering livestock, wildlife habitat, and industry. Four tributaries are protected as trout stocked fisheries, seven areas as cold water fisheries, and five areas as high quality cold water fisheries. Ground water resources of the Pequea and Mill Creeks watershed are the primary source of private and public drinking water, livestock water, and barn/milkhouse water. According to Pennsylvania Department of Environmental Resources (PaDER), 58.5 stream miles within the watershed have been degraded by agricultural nonpoint sources of pollution.

This initiative will implement a comprehensive surface and ground water watershed program including the establishment of total maximum daily loads for the Pequea and Mill Creek basins in Lancaster County, Pennsylvania.

State and local coordinating committees have been formed to implement a comprehensive watershed initiative. These committees have been meeting regularly for several years. The U. S. Department of Agriculture (USDA), EPA, USGS, PaDER, the Pennsylvania Department of Agriculture (PDA), the Lancaster Conservation District (LCCD), several private consultants, and the Pennsylvania Fish and Game Commission are all members of these committees.

The Pequea and Mill Creeks watershed was chosen as a Hydrologic Unit Area by USDA in February 1991. Under this designation, USDA is given resources to provide technical and financial assistance to farmers in the watershed for the implementation of best management practices. USDA has provided assistance to farmers in the watershed over the past

three years, with the goals of significantly reducing nutrient, bacteria, and pesticide contamination to surface and ground waters and controlling sedimentation from runoff and erosion.

In addition, the Pequea-Mill is being used in a cooperative computer modeling effort among the PaDER-Bureau of Land and Water Conservation, Penn State University, and Soil Conservation Service state offices in Pennsylvania and Massachusetts. Data from the watershed will be used in the development of the National Agricultural Pesticide Risk Assessment.

USGS is conducting a number of studies. A ground water survey was initiated in 1991. USGS began a watershed-wide baseline Water Quality Characterization Project in July 1992. The purpose of this long-term study is to document changes in surface water quality for storm and base flow conditions in three watersheds within the Pequea-Mill project area, qualitatively link the water quality changes to agricultural practices and land use changes, and determine water quality changes due to increased livestock production by comparing the data to water quality data collected in the basin in prior years.

The Pennsylvania Fish and Boat Commission is conducting a biological assessment in the Muddy Run basin. The purpose of the study is to compare existing fish and benthic macro invertebrate populations to populations after implementation of stream fencing for livestock exclusion and other conservation practices. Data for the pre-project condition were collected in 1991. A follow-up assessment will be conducted in 1996.

A Wellhead Protection project for two public water supply wellfields is also being developed within the watershed. The local township officials of these Boroughs, LCCD, and PDA are inventorying the existing sources of contamination within these Wellhead Protection Areas and PSC Engineers (consultant for the Boroughs) is developing ordinances to protect the public wells from contamination.

EPA is currently pursuing a Geographic Information Systems initiative in the Pequea and Mill Creeks watershed.

This watershed is in the top 10 percent of the Pennsylvania nonpoint source priority watersheds, is on the Pennsylvania 303(d) list, and is a priority for the Chesapeake Bay Program, Ground Water Protection Program, and Public Drinking Water Supervision Program.

Pequea and Mill Creeks continued on page 113

Pine Creek

Size and location: Pine Creek is a 9,680-acre watershed in Hardin and Grundy Counties in north central Iowa. Upper and Lower Pine Lakes are the feature waterbodies of Pine Lakes State Park.

Organizations that initiated project:

Hardin County Soil and Water Conservation District
Grundy County Soil and Water Conservation District

Major environmental problems:

Sediment and nutrients from eroding croplands
Frequent algal blooms
Impaired fisheries
Degraded aquatic habitat
Reduced recreational use
Animal waste
Streambank erosion

Actions taken or proposed: Iowa received a Clean Lakes Program grant in 1989 to conduct a Phase I diagnostic/feasibility study for Upper and Lower Pine Lakes and the surrounding watershed. This study provided the basis for this three-year water quality protection project. Watershed measures are being carried out using Clean Water Act Section 319 Nonpoint Source, Agricultural Stabilization and Conservation Service Water Quality Incentive Program, and the State's Resource Enhancement and Protection Program funding. Restoration of the lakes is being carried out using Clean Lakes Program Phase II funding awarded in 1992. The objectives of the project include:

- Implementing best management practices (BMPs), on a priority basis, to reduce sediment and nutrient loads to Upper and Lower Pine Lakes by 60 percent.
- Implementing BMPs on 3,000 acres in the watershed per year.
- Increasing the area of warm season grasses in the watershed by 100 percent.
- Holding farmer-to-farmer meetings to facilitate technology transfer to landowners and operators in the watershed.
- Demonstrating and promoting the economic feasibility of BMPs to the local community and public at large.

Currently, about 30 producers are participating in the project, which is designed to encourage local producers to implement comprehensive resource management systems to control erosion, reduce pes-

ticide and fertilizer use, and better protect streambanks. Activities include wildlife habitat management, pasture management, animal waste management, livestock exclusion, streambank stabilization, filter strips, critical area plantings, integrated crop management, and others.

Stakeholders:

Agricultural Stabilization and Conservation Service
Grundy County Soil and Water Conservation District
Hardin Soil and Water Conservation District
Iowa Department of Agriculture and Land Stewardship
Iowa Department of Natural Resources
Iowa State University Extension
Soil Conservation Service
U.S. Environmental Protection Agency

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Platte River

Size and location: Originating in the mountains of Colorado and Wyoming, the Platte River watershed drains two-thirds of the State of Nebraska. Ground water is a critical component of this watershed, as there are extensive surface water/ground water interactions, and the Platte River alluvial aquifer provides drinking water for 70 percent of Nebraska's citizens.

Organizations that initiated project:

U.S. Environmental Protection Agency
Nebraska Department of Environmental Quality (NDEQ)

Major environmental problems:

Nonpoint sources of pollution
Nitrate and pesticide contamination
Habitat destruction and alteration
Floodplain development
Hydrologic modification

Actions taken or proposed: The Platte Watershed Program is a partnership to protect and enhance the ecosystem of the Platte River and its alluvial aquifer in Nebraska. This ecosystem serves as a vital link in the Central Flyway migratory bird route; sustains a rich diversity of plant and animal life, including threatened and endangered species; supports multiple uses, including drinking water, recreation, aquatic life and wildlife, irrigation, industrial water supply, and hydropower generation; and sustains an economy based on rich agricultural production.

The Platte watershed is a priority Landscape Conservation Area under the Great Plains Initiative and serves as a pilot demonstration site for watershed ecosystem management. EPA has been working with the Nebraska Department of Environmental Quality (NDEQ), the University of Nebraska, and other partners to develop a comprehensive ecosystem approach to the Platte River Basin. The goal is to prevent pollution and maintain a healthy, sustainable ecosystem, which provides for the health and welfare of humans as well as other living things.

The strategy is to build state and local capacity to protect the ecosystem by organizing partnerships and involving stakeholders in cooperative assessments and action. The Platte Watershed Program is using a two pronged approach to meet its goal: 1) coordinating and focusing activities basinwide; and 2) involving stakeholders in assessing problems and developing action plans by subbasin.

EPA serves as a facilitator in the Platte Watershed Program coordinating activities basinwide, performing scientific assessments, supporting outreach and education, and providing resources to help build state and local capacity for long-term ecological and economic sustainability.

EPA is working in coordination with NDEQ's newly adopted Basin Management Approach to compile and assess existing water quality and pollutant source data for each of the six Platte River subbasins in Nebraska. This information will support NDEQ's development of water quality monitoring project plans and basin management plans for each subbasin. Involvement of parties most affected by management decisions (federal, state, and local stakeholders as appropriate) in monitoring, identifying problems, setting environmental goals, and measuring success will be crucial to development of these basin management plans.

For the Middle Platte subbasin, the assessment will include ecological as well as water quality and pollution source data. The Middle Platte subbasin was selected by EPA in 1993 as one of five national case study sites to develop the procedures for conducting multiple-stressor, watershed-level ecological risk assessments. The purpose of the case studies is to develop a scientific process that increases understanding of how ecological resources within watersheds respond to a combination of human activities. By comparing the five case studies, EPA hopes to identify the principles of watershed risk assessment and develop guidance on how to perform such assessments. The Middle Platte case study is intended to demonstrate how a watershed approach incorporating ecological response assessment might be used by stakeholders in planning for a sustainable future. The Middle Platte Ecological Response case study is being conducted by a workgroup consisting of technical representatives from EPA, the U. S. Geological Survey, the U. S. Fish and Wildlife Service, and The Nature Conservancy and participants from 12 state and local natural resource agencies and organizations in Nebraska.

Building on the Middle Platte ecological response assessment, the Platte watershed is serving as a pilot area in the Great Plains for developing wetlands biocriteria, utilizing environmental indicators to measure progress, and understanding landscape structure in relation to ecosystem function. An economic analysis is also being planned as a companion project to the Middle Platte ecological response as-

Platte River

assessment. Together the ecologic and economic analyses will provide information for resource managers to use in evaluating management options and identifying those which maximize ecological protection while maintaining a viable economy.

Outreach and education are important components of the Platte Watershed Program as well. Through the Summer Orientation about Rivers (SOAR) Program of the Prairie Plains Resources Institute, students experience first-hand the relationship between the quality of the natural resource base and the quality of their life. Scientists and natural resource managers share information and discuss issues related to the Platte watershed during the annual Platte Basin Ecosystem Symposium. Cooperative Extension Specialists at the University of Nebraska-Lincoln coordinate and promote environmental education activities throughout the Platte watershed, facilitate stakeholder involvement and dialogue between diverse interests, form partnerships, coordinate investigations of the Platte River, and promote increased public involvement in environmental planning, volunteer monitoring, and adopt a waterbody programs.

EPA has provided over \$2.4 million for investigations and implementation activities in the Platte watershed since fiscal year 1991. Projects are initiated at the local and state levels and focus on nonpoint source management, wetlands and ground water protection, pollution prevention, applied research on atrazine, and environmental education.

Stakeholders:

- Agricultural groups
- Audubon
- Bureau of Reclamation
- Businesses
- Community groups
- Farm organizations
- Industries
- Municipalities
- Natural resource districts
- Nebraska Department of Agriculture
- Nebraska Department of Environmental Quality
- Nebraska Department of Water Resources
- Nebraska Game and Parks Commission
- Nebraska Natural Resources Commission
- Platte River Whooping Crane Maintenance Trust
- Prairie Plains Resources Institute
- The Nature Conservancy

- U.S. Army Corps of Engineers
- U.S. Department of Agriculture
- U.S. Environmental Protection Agency
- U.S. Fish and Wildlife Service
- U.S. Geological Survey
- Utilities (power and irrigation)

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Stakeholders:

- Environmental advocacy groups
- Lancaster County Conservation District
- Lancaster County Planning Commission
- Local farmers
- Pennsylvania Agronomic Products Association
- Pennsylvania Department of Agriculture
- Pennsylvania Department of Environmental Resources
- Pennsylvania Fish Commission
- Pennsylvania Game Commission
- Pennsylvania State Cooperative Extension
- Soil Conservation Service
- U.S. Agricultural Stabilization and Conservation Service
- U.S. Environmental Protection Agency
- U.S. Geological Survey

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Pocono Watershed

Size and location: The Pocono Project focuses on county level activities with additional implementation of actions within several watersheds including the Tobyhanna Watershed which covers 187 square miles and the McMichaels Creek Watershed which covers 113 square miles, both located within Monroe County, Pennsylvania.

Organization that initiated project:
U.S. Environmental Protection Agency

Major environmental problems:
Development pressures

Actions taken or proposed: Growth and development in this biologically diverse area threaten to cause degradation and/or loss of valuable upland and wetland ecosystems which would increase the likelihood for adverse impacts to water quality. This demonstration project is aimed at proactively bringing to the forefront issues related to growth and development that may pose threats before further alteration of the landscape jeopardizes the future of the area as a viable recreational and biologically rich region.

Planning actions that have taken place include:

- Establishment of an Advisory Group and Steering Committee of local stakeholders.
- Development of a project proposal and workplan.
- Through consensus, development of a vision statement.
- Identification of goals and objectives.

Several research actions have been completed including:

- Inventory of biological diversity as described by the U.S. Fish and Wildlife Service Gap Analysis process (Cornell University and New York Fish and Wildlife Cooperative Research Unit).
- Evaluation of different conservation/development options for Monroe County (Harvard University).

Additional research actions are currently taking place including:

- Collection and integration of data layers on a Geographic Information System.
- Assessment of risks to biodiversity (EPA - Corvallis Laboratory).

Ongoing activities include:

- Implementation of goal to identify landscape linkages/ecosystem mosaics with input to Monroe County Comprehensive Plan.

- Workshops for developers on open space design.
- Outreach to specific developers and township officials.
- Establishment of stream reference sites for biological monitoring.

Stakeholders:

Brodhead Watershed Association
Economic Development Council of Northeast Pennsylvania
Monroe County Conservation District
Monroe County Planning Commission
Penn State Extension
Pennsylvania Department of Natural Resources
Pennsylvania Game Commission
Pocono Mountains Chamber of Commerce
Pocono Mountains Vacation Bureau
Pocono Plan Alliance
State and private forestry
Tobyhanna Watershed Association
Township officials
U.S. Environmental Protection Agency
U.S. Forest Service

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President's Forest Plan (Pacific Northwest)

Size and location: The President's Forest Plan covers western Washington and Oregon and northern California.

Organization that initiated project:

U.S. Government (President Clinton)

Major environmental problems/issues:

- Court ordered injunctions on federal (U.S. Forest Service/U.S. Bureau of Land Management) timber sales/harvest in western Washington, Oregon, northern California
- Endangered Species Act (ESA) issues - northern spotted owl, marbled murrelet - "old growth" forest ecosystem provides critical habitat
- Pending petitions for ESA listing of other species impacted by forest harvest, (e.g., salmon, steelhead, bull trout)
- Regional economic impacts--significant reduction in forest-related jobs, particularly for rural communities whose economic base depends on the forest industry

Actions taken or proposed: An Aquatic Conservation Strategy is a key component of President Clinton's Forest Plan. This region-wide strategy is aimed at restoring and maintaining the ecological health of watersheds. The strategy is designed to provide a scientific basis for protecting aquatic ecosystems and

to enable planning for sustainable resource management. The strategy applies to riparian reserves along perennial and intermittent streams and key watersheds. The strategy provides direction for watershed analysis, restoration, and monitoring across all land allocations.

The Klamath River, Mad River, Eel River, and multiple tributaries are currently targeted for inter-agency watershed assessment.

Stakeholders:

Conservation groups
Federal, state, and local agencies
Industrial and nonindustrial landowners
Other publics
Tribes

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Puget Sound Estuary

Size and location: The Puget Sound Estuary and its watershed cover several thousand square miles in Washington State in the area bordering with British Columbia in Canada.

Name of organizations that initiated project:

U.S. Environmental Protection Agency
State of Washington
Puget Sound Water Quality Authority

Major environmental problems:

- Loss of fish and wildlife habitat
- Nonpoint source pollution
- Contaminated sediments
- Diminished biological resources
- Diseased and chemically contaminated fish
- Contaminated (by bacteria) and closed shellfish beds

Actions taken or proposed: Puget Sound was selected for inclusion in the National Estuary Program in 1987. A Comprehensive Conservation and Management Plan that recommends priority corrective actions to restore and maintain the estuarine resources of the Estuary was approved in 1991 and is currently being reviewed and updated.

Stakeholders:

Numerous large and small environmental groups

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Red River

Size and location: The Red River watershed is located in eastern North Dakota and eastern Minnesota. Part of the project area covers the Carmel, Homme, and Renwick subwatersheds in northeastern North Dakota which totals 296,332 acres. Another part of the efforts on the Red River is focused on the southern part of the watershed near the cities of Fargo and Moorhead.

Organizations that initiated project:

Red River Resource Conservation and Development Council
Pembina, Walsh, and Cavalier Soil Conservation District and Water Resource District
North Dakota Department of Health and Consolidated Laboratories

Major environmental problems:

- Eutrophication of Homme Reservoir due to agricultural practices
- Sedimentation of Red River and tributaries in northeastern North Dakota due to agricultural practices
- Ammonia and low dissolved oxygen due to wastewater treatment discharges in southeastern North Dakota
- Threats from agricultural practices to the Icelandic aquifer

Actions taken or proposed: The Red River Resource Conservation and Development Council (RC&D) initiated the watershed effort in the northeastern area of the watershed to reduce wind and water erosion on 80 percent of the agricultural lands in the subwatersheds. The RC&D annual nutrient and sediment loadings are expected to be lowered by implementing the following objectives which are underway:

- Develop resource management plans for 80 percent of the lands in the subwatersheds.
- Implement an information and education program to educate the residents on the impacts of nonpoint source pollution and possible preventive measures.
- Document land use improvements and trends in water quality.
- Provide financial and technical assistance to producers to implement the resource management plans.

- Demonstrate best management practices to restore riparian zones which are under various agricultural uses such as crop land and livestock production.

The State of North Dakota partnered with the U.S. Geological Survey (USGS) to model and verify conditions in the southern area of the Red River mainstem using QUAL2E. The data will be available by the end of 1994, but the work has so far produced a list of monitoring and modeling needs. A group of stakeholders has developed a coordinated, monthly synoptic in-stream monitoring plan to continue modeling efforts. In addition, the group is currently coordinating with several organizations to implement a project to observe the river's behavior in winter conditions when discharges take place under the ice during low flow.

The result of these studies will help determine the next pollution prevention actions. In the immediate future, actions will include the refinement of effluent limits from the cities' discharges. These limits will probably lead to upgrading waste water treatment facilities. Possible future actions for consideration during phase two of this effort include changing upstream dam operations, and addressing nonpoint source pollution from surrounding agricultural use areas.

Stakeholders:

American Crystal Sugar
City of Fargo, North Dakota
City of Moorhead, Minnesota
City of Park River
Farmers
North Dakota Department of Health
North Dakota Game and Fish Department
North Dakota Parks and Recreation
Minnesota Pollution Control Agency
Pembina, Walsh and Cavalier Soil Conservation District and Water Resource District
Red River Resource Conservation and Development Council
U. S. Army Corps of Engineers
U. S. Environmental Protection Agency
U. S. Geological Survey

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Rochester Embayment Area of Concern

Size and location: The Rochester Embayment Area of Concern (AOC) is an area of Lake Ontario formed by the indentation of the Monroe County shoreline between Bogus Point (Town of Greece) and Nine Mile Point (Town of Webster). The southern boundary includes approximately 6 miles of the Genesee River that is influenced by lake levels, from the river's mouth to the Lower Falls. The drainage area of the embayment is over 4,828 square miles in area.

Organizations that initiated the project:

Monroe County Department of Planning and Development (MCDPD)
U.S. Environmental Protection Agency
New York State Department of Environmental Conservation (NYSDEC)

Major environmental problems:

- Restrictions on fish and wildlife consumption
- Degradation of fish and wildlife populations and loss of habitat
- Bird and animal deformities or reproduction problems
- Eutrophication or undesirable algae and beach closings
- Restrictions on drinking water or taste and odor problems

(The above impairments are caused by mirex and dioxin; PCBs and chlordane from past use; PAHs from coal gas production; heavy metals and cyanide from industrial dischargers; coliform, ammonia, phosphorus, and sediment from the watershed; and phenols.)

Actions taken or proposed: The Rochester Embayment AOC is one of 43 AOCs that have been designated by the United States and/or Canadian governments in the Great Lakes region. A Remedial Action Plan (RAP) is being developed for this AOC to provide a long-term course of action for environmental cleanup. RAP development began in 1988. The Stage I Report, which describes the nature and extent of the problems, has been completed, and the Stage II Report, which identifies remedial actions and implementation methods, is underway (to be completed in 1994). Actions that have been taken to implement the recommendations of the Stage II Report include:

- A Combined Sewer Overflow (CSO) Abatement Program has been implemented to construct underground storage tunnels to intercept CSOs before they enter the Embayment

and the Genesee River. The tunnel system conveys the wastewater in the combined sewers to the Van Lare Wastewater Treatment Facility before entering Lake Ontario. The number of annual overflows at 30 previous overflow locations has been dramatically decreased from sixty to two or less.

- The Irondequoit Bay Oxygen Supplementation Project is a water quality/habitat enhancement project, whose goal is to improve the control of phosphorus by both chemical processes (increased oxygen will enhance the natural system of adsorption/precipitation with iron oxides) and biological means (reduced phosphorus deposition through algal harvesting by fish). To revitalize the cold-water fishery in the bay, introduction of oxygen into the deep waters will both accelerate natural ecosystem recovery and cause an immediate improvement in fisheries habitat.
- NYSDEC is developing pollution prevention regulations to require implementation of "Toxic Chemical Reduction Plans" for facilities that generate certain amounts/types of hazardous wastes or toxic chemicals. Many industries have already taken the initiative to institute pollution prevention practices.

Stakeholders:

City of Rochester
Genesee Basin Subcommittee - Government Policy Group
Lake Ontario Central/Irondequoit Basin/Lake Ontario West Basin Subcommittees
Monroe County Department for Planning and Development
New York State Department of Environmental Conservation
U.S. Environmental Protection Agency

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Saginaw Bay

Size and location: The Saginaw Bay watershed encompasses over 8,000 square miles and is located on the north-western side of Lake Huron in Michigan. The watershed completely surrounds the Saginaw Bay itself. Several large tributaries provide a source of freshwater to the Bay, including the Saginaw River, Cass River, Flint River, Shiawasee River, and Tittabawasee River. Within the watershed lie the jurisdictions of 22 counties and numerous townships.

Organization that initiated project:

Michigan Department of Natural Resources

Major environmental problems:

- Fish consumption advisories due to contamination with PCBs
- Eutrophication due to nutrient enrichment
- Widespread destruction of aquatic habitat from sediment
- Alteration of aquatic and terrestrial habitat from altered watershed hydrology

Actions taken or proposed: Saginaw Bay is one of 43 Areas of Concern (AOC) that have been designated by the United States and/or Canadian governments in the Great Lakes region. In 1987, the State of Michigan developed a Remedial Action Plan (RAP) that provides a long-term course of action for environmental cleanup of the Saginaw River and Bay. Through the RAP process and the Saginaw Bay National Watershed Initiative the State of Michigan, along with other partners, has identified priority activities to be undertaken to restore and protect the Saginaw Bay watershed. The overall goal for the watershed is to "develop a comprehensive water quality/resource management effort utilizing the resources of federal, state, and local units of government, as well as interested organizations and citizens, to identify water quality/resource management issues impacting the use or quality of natural resources in the watershed and to implement actions to restore and protect the Saginaw Bay watershed."

Recent activities to support the goals include:

- Monitoring in the Bay and tributaries.
- Prioritization of sediment delivery and erosion areas.
- An aggressive public education campaign.
- Wetland restoration efforts to support wildlife habitat.

- Implementation of urban and agricultural best management practices to prevent erosion.

Stakeholders:

Dow Corning Corporation
Michigan Association of Conservation Districts
Michigan Department of Agriculture
Michigan Department of Natural Resources
Michigan Department of Public Health
Michigan Farm Bureau
Michigan State University
National Oceanic and Atmospheric Administration
Saginaw Basin Alliance
Saginaw Bay Watershed Council
Saginaw Valley State University
Soil Conservation Service
U.S. Army Corps of Engineers
U.S. Cooperative Extension Service
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
University of Michigan

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St. Lawrence River Area of Concern

Size and location: The St. Lawrence River Area of Concern (AOC) begins above the dams at the Massena Village, New York water intake and follows the river downstream to the international boundary with Canada. It also includes portions of the Grasse, Raquette, and St. Regis Rivers.

Organizations that initiated the project:

New York State Department of Environmental Conservation (NYSDEC)
U.S. Environmental Protection Agency

Major environmental problems:

- Restrictions on fish and wildlife consumption caused mainly by PCBs, mercury, mirex, and dioxin
- Loss of fish and wildlife habitats caused by physical disturbances and contaminated sediments

Actions taken or proposed: The St. Lawrence River AOC is one of 43 AOCs that have been designated by the United States and/or Canadian governments in the Great Lakes region. A Remedial Action Plan (RAP) is being developed for this AOC to provide a long-term course of action for environmental cleanup. RAP development began in 1988. The Stage I Report, completed in 1990, identified use impairments, their causes, and sources. The Stage II Report, completed in 1991, includes the development of remedial strategies to: 1) restore water quality and use impairments of the tributary rivers and St. Lawrence River, and 2) eliminate adverse impacts to the AOC from sources of pollutants at major hazardous waste sites. A Remedial Advisory Committee (RAC) was then appointed to represent all stakeholders and assist NYSDEC in RAP implementation. Actions that have been taken to implement the recommendations of the Stage II Report include:

- Following EPA's issuance of an Administrative Order, ALCOA has agreed to remediate all sites on its approximately 3,460-acre plant at an estimated cost of up to \$150 million, for approximately eight years. A secure landfill is to be completed by 1995 at a cost of \$36 million.
- EPA released a proposed remedial project to remove 42,650 cubic yards of PCB-contaminated St. Lawrence River sediments next to the Reynolds Metals Plant site for treatment and disposal in a specially prepared upland site on Reynold's property. The estimated

cost of the work is \$36.7 million. Reynolds has initiated the design phase for this work.

- A significant reduction in the mass of PCBs discharged from Massena industries has been achieved by the installation of wastewater treatment systems, implementation of best management practices (BMPs), and interim remediation activities.
- Interim wastewater treatment systems at ALCOA designed to remove PCBs and other contaminants from various waste streams, including the sanitary lagoon effluent, have been placed in operation. Eventually, all contaminated storm water and process water will receive appropriate treatment.
- NYSDEC has completed nonpoint source assessment reports for each New York State county. A Priority Water Problem list has been prepared to rank impaired waterbodies. Various BMPs, including storm water management and agricultural methods, have been recommended.

Stakeholders:

ALCOA
Environment Canada
General Motors
International Joint Commission
Massena Citizen Advisory Committee
New York State Department of Environmental Conservation
Ontario Ministry of Environment and Energy
Other industries
Reynolds Metals
The Mohawks at Akwesasne
U.S. Environmental Protection Agency

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St. Mary's River Area of Concern

Size and location: The St. Mary's River forms one of the borders between the United States and Canada. It is also a connecting Channel between Lake Superior and Lake Huron. It is located in Chippewa County in Michigan's Upper Peninsula.

Organization that initiated project:
Ontario Ministry of Environment and Energy

Major environmental problems:

- Pollutant discharges from paper and steel industries
- Discharges from Publicly Owned Treatment Works
- Superfund site - Cannelton Site, former tannery
- Contaminated sediments
- Flow diversions for navigation and power generation
- Habitat loss/change

Actions taken or proposed: The St. Mary's River Area of Concern (AOC) is one of 43 AOCs that have been designated by the United States and/or Canadian governments in the Great Lakes region. A Remedial Action Plan (RAP) is being developed for this AOC to provide a long-term course of action for environmental cleanup. Stage I of the RAP, which identified use impairments, their causes, and sources, was completed in March 1992, and Stage II development is underway. Stage II focuses on identifying remedial actions and their methods of implementation.

Activities already underway include:

- Sewer separation in the City of Sault Ste. Marie, Michigan.
- Improved treatment by Algoma Steel to enhance removal of oil and grease.
- Various monitoring and assessment efforts.
- Superfund remediation work at the Cannelton site.
- Several pilot-scale in situ sediment remediation projects on the Canadian side of the River to evaluate various remediation options (completed).

Full scale sediment remediation is planned.

Stakeholders:

Environment Canada
Michigan Department of Natural Resources
Ontario Ministry of Natural Resources
Ontario Ministry of the Environment and Energy (lead)
U.S. and Canadian citizens (Binational Public Advisory Committee)
U.S. Environmental Protection Agency

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San Francisco Bay/Delta Estuary

Size and location: The San Francisco Bay/Delta Estuary has a watershed that covers over 1,600 square miles in central California.

Organizations that initiated project:

U.S. Environmental Protection Agency
State of California

Major environmental problems:

- Destruction or fragmentation of wetlands and riparian forest resulting from agricultural conversion and urban expansion
- Diversion of freshwater and loss of low-salinity habitat
- Alteration of aquatic habitats related to water supply systems including dams, reservoirs, pumping facilities, and canals
- Discharge of pollutants such as pesticides, fertilizers, oil and grease, metals, nutrients, and sediments from farms, ranches, and cities
- Interference of alien organisms in the life cycles of indigenous biota

Actions taken or proposed: The San Francisco Bay/Delta Estuary was selected for inclusion in the National Estuary Program in 1987. A Comprehensive Conservation and Management Plan that recommends priority corrective actions to restore and maintain the estuarine resources of the San Francisco Bay/Delta Estuary was completed in 1993.

To address wetland concerns, two initiatives have been put in place. The first, the North Bay Initiative, focuses on wetlands management in Napa and Sonoma Counties. The second, the Central Valley Initiative, has two major goals which are: 1) the facilitation of protection, restoration, and enhancement of wetlands and 2) planning for the minimization of impacts to wetlands from agriculture and urban development. Actions that have been initiated include:

- Local planning and resource identification.
- A floodplain management study in the American Basin.
- Development of a comprehensive wetlands protection plan for state park system lands along the San Joaquin River corridor.
- Workshops on private landowner assistance programs.

To address problems caused by agriculture in the Central Valley, the Agricultural Initiative has been established. This Initiative is developing partner-

ships to foster pollution prevention and sustainable agriculture.

Also, water quality standards for surface water have been proposed by EPA in conjunction with the Endangered Species Act decisions of the U.S. Fish and Wildlife Service and the National Marine Fisheries Service and allocation decisions of the U.S. Bureau of Reclamation.

Stakeholders:

Bay Conservation and Development Commission
Business
California Department of Parks and Recreation
Central Valley Habitat Joint Venture
Central Valley Regional Water Quality Control Board
Delta Protection Commission
Elected officials
Environmental groups
Industry
National Marine Fisheries Service
Nine counties in the Bay Area and three counties in the Delta
Resource Conservation Districts
Soil Conservation Service
State Waters Resources Control Board and Regional Boards #2 and #5
The Nature Conservancy
U.S. Army Corps of Engineers
U.S. Bureau of Reclamation
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
Yolo County Resource Conservation District

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San Juan Bay

Size and location: Seventy-five square miles of land comprise this bay-canal-lagoon system on the northern coast of Puerto Rico, which extends from Punta Vacía Talega on the east to Isla de Cabras on the west.

Organization that initiated project:

The Puerto Rico Environmental Quality Board

Major environmental problems:

- Heavy metals
- High levels of arsenic, cadmium, chromium, cyanide, mercury, nickel, thallium, and zinc
- Violations to the Puerto Rico water quality standards have been measured for copper, lead, mercury, selenium, and zinc
- Contaminated sediments
- High levels of oxygen-depleting nutrient loads
- Low dissolved oxygen levels
- Repeated fish kills
- Pathogens including coliform
- Floatables from garbage dumping
- Hindered coral growth
- Mangrove destruction
- Non-permitted dredging activities
- Urban development causing sediment loads
- Herbicides and pesticides
- Sedimentation
- Loss of seagrass beds

Actions Taken or Proposed: San Juan Estuary was declared an estuary of national significance and added to the National Estuary Program in October 1992. A Comprehensive Conservation and Management Plan is being developed for San Juan Estuary that will recommend priority corrective actions to restore and maintain the estuarine resources.

Stakeholders:

Municipality of Toa Baja
Municipality of Cataño
Municipality of Guaynabo
Municipality of San Juan
Municipality of Carolina
Municipality of Loíza
Puerto Rico Aqueduct and Sewers Authority
Puerto Rico Planning Board
Puerto Rico Department of Natural Resources
Puerto Rico Environmental Quality Board
Puerto Rico Planning Board
Puerto Rico Ports Authority
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Geological Survey
U.S. National Oceanic and Atmospheric Administration
University of Puerto Rico Sea Grant Program

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San Luis Rey River

Size and location: The San Luis Rey (SLR) River is located in San Diego County in California.

Organizations that initiated project:

U.S. Environmental Protection Agency
San Diego County Board of Supervisors

Major environmental problems:

Sand and gravel-mining operations
Agricultural activities
Urban development
Impaired streams and riparian areas
Sediment and nutrient runoff

Actions taken or proposed: The California Coastal Conservancy, the San Diego County Department of Parks and Recreation, and the San Diego County Planning Department are working together to develop a Multi-objective River Corridor Management Plan for long term management of the San Luis Rey River. The goals for this plan include better coordination of enforcement, restoration, and development activities for maximization of wetlands protection and enhancement.

San Diego County is involved in coordinating the many interest groups and public agencies in the area. A Technical Advisory Committee and a Citizens Advisory Committee have been formed to oversee development of the Management Plan. A consultant is working on a resource inventory and an opportunities and constraints analysis to be used as the basis for development of the Management Plan. The County has completed a Memorandum of Understanding for the participating agencies' signature which outlines the agencies' commitment to the project.

Stakeholders:

California Department of Fish and Game
California Department of Transportation
California Division of Mines and Geology
California State Coastal Conservancy
City of Oceanside
Pala, Pauma, La Jolla, and Rincon Indian Tribes
Rainbow, San Luis Rey, and Yuima Municipal Water Districts
San Diego Area Council of Governments
San Diego County Department of Parks and Recreation
San Diego County Planning Department
San Diego County Rock Producers Association
San Diego County Water Authority
San Diego Farm Bureau
San Diego Gas and Electric
San Diego Regional Water Quality Control Board
U.S. Environmental Protection Agency
U.S. Army Corps of Engineers
U.S. Fish and Wildlife Service
Upper San Luis Rey Resources Conservation District

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Santa Margarita River

Size and location: The Santa Margarita River has a 740-square mile coastal watershed and is located in Riverside and San Diego counties in California.

Organizations that initiated project:

Riverside and San Diego Counties
California State Coastal Conservancy
U.S. Environmental Protection Agency

Major environmental problems:

Endangered wetland and riparian habitat
Flooding
Development pressures
Impacts from channelization of tributaries
Wastewater and storm water discharges
Nonpoint source discharges

Actions taken or proposed: The California State Coastal Conservancy in cooperation with Riverside and San Diego Counties is developing an integrated watershed management plan for the Santa Margarita River Watershed. This planning effort will take a watershed protection approach to the long-term preservation of important wetland and riparian habitats, particularly in the estuary and the Santa Margarita River floodplain. Flood control and development engineering design criteria will be formulated which focus on the maintenance of hydrologic balance and riparian and creek values in both the upper basin and the lower reaches of the watershed. An economic analysis of alternative flood control and development design criteria will be conducted.

A watershed policy committee, consisting of representatives of Riverside and San Diego counties, Temecula, Murrieta, and Camp Pendleton, has been established. Three subcommittees—the Recreation, Open Space and Wildlife Habitat Subcommittee; the Water Quality and Supply Subcommittee; and the Flood Control and Land Use Subcommittee—have also been created.

EPA will coordinate Superfund activities (including an ecological assessment and remediation of Superfund sites along the Santa Margarita River), permit review, grant funds, the Effluent-Dependent Streams guidance, and other applicable water quality standard issues in the watershed.

A technical framework for evaluating wetland functions in the watershed is being developed. This framework will be consistent with the hydrogeomorphic approach currently being developed by a task force of scientists under the auspices of the Wetlands Research Program at the U.S. Army

Corps of Engineers. Also, a wetlands advance identification planning project that identifies aquatic sites within the Santa Margarita River watershed and evaluates whether or not they are suitable for possible future disposal sites for the discharge of dredge and fill material is being conducted. This project will augment a planning effort for the Santa Margarita River that has recently been initiated by Riverside and San Diego Counties with the assistance of National Park Service's Rivers, Trails, and Conservation Assistance program.

Other activities include:

- Developing a database that can serve as a focal point for enhancing all the water programs in the watershed.
- Conducting a source assessment based on existing information for nutrients and sediments and to set target reduction goals.

Stakeholders:

California State Coastal Conservancy
Camp Pendleton
Local citizens
Murrieta County
National Park Service
Riverside and San Diego counties
State of California
Temecula County
U.S. Army Corps of Engineers
U.S. Bureau of Reclamation
U.S. Environmental Protection Agency

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Santa Monica Bay

Size and location: The Santa Monica Bay Restoration Project (SMBRP) stretches from the Ventura County line to Point Fermin at the southern most tip of the Palos Verdes Peninsula covering approximately 50 miles of coastline. Santa Monica Bay's watershed covers 414 square miles.

Organizations that initiated project:

U.S. Environmental Protection Agency
California State Water Resources Control Board

Major environmental problems:

- Impairment of water quality primarily due to urban runoff and other nonpoint source pollution
- Public health issues associated with swimming and consuming seafood
- Loss and degradation of habitats/ecosystem

Actions taken or proposed: The Santa Monica Bay was selected for inclusion in the National Estuary Program in 1988. In May 1994 the SMBRP released for public comment a Comprehensive Conservation and Management Plan (CCMP) that identifies actions necessary for Bay restoration and protection. The plan is entitled the Santa Monica Bay Restoration Plan. The Plan, which focuses primarily on controlling urban runoff and other diffuse sources of pollution, contains nearly 250 actions. Of these 250, 73 have been identified as "priority actions." The Plan provides a strategy for coordinating water pollution control on a watershed basis. The following are highlights of the Plan:

- Establishment of a Santa Monica Bay Watershed Council.
- Implementation of a "mass emissions approach" to more effectively control discharge of toxic pollutants from both point and nonpoint sources.
- Reduction of hazardous waste use from households and small businesses.
- Best management practices (BMPs) to improve the quality of urban/storm water runoff that enters the Bay.
- Full secondary treatment of sewage at the City of Los Angeles and County Sanitation Districts treatment facilities.
- Assessment of swimming health risks and a plan to track down pathogen sources.
- Restoration and enhancement of priority wetlands and other sensitive marine, coastal, and upland habitats.

- Improved public education and involvement programs.
- Implementation of a comprehensive Bay-wide monitoring program.
- Adoption of a comprehensive watershed planning and management strategy.

In addition to developing the CCMP, the SMBRP has undertaken a number of significant projects and programs that support and further the goals of Bay restoration and protection. They include:

- Instituted a pilot program for treating storm drain runoff with ozone (the City of Santa Monica and the University of California-Los Angeles Laboratory of Biomedical and Environmental Science showed that ozone is an excellent disinfectant).
- Issued a Los Angeles County Storm Water National Pollutant Discharge Elimination System (NPDES) Permit that is unique in its emphasis on BMPs as opposed to water quality standards.
- Established new breeding sites for the California least tern, an endangered species.
- Instituted a storm drain stenciling project to educate the public about disposal of contaminants in the storm drains funded by the SMBRP and carried out by various cities within the watershed and Heal the Bay (a local environmental group).
- Restored the Lower Zuma Creek wetland, lagoon, and sand dunes.
- Established a "mini-grants" program to provide funding for schools, inner-city youth, environmental groups, and municipalities to educate and involve the public in Bay resource protection and pollution prevention efforts.
- Designed the first ever epidemiological study of human health risk from contaminated runoff for the West Coast.
- Performed first technical study to quantify pollutant loads associated with storm water runoff for the Bay watershed.
- Conducted research on seafood contamination and analyzed sportfish consumption patterns of local anglers.
- Conducted a study to identify and map remaining wetlands and riparian habitat in the watershed and identified several sites for possible restoration.

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Sarasota Bay

Size and location: This project encompasses Sarasota Bay, Roberts Bay, Little Sarasota Bay, Dryman Bay, and Blackburn Bay and consists of a coastal watershed of approximately 150 square miles of land area and 52 square miles of water surface extending from Anna Maria Key south to Casey Key on the southwest coast of Florida.

Organization that initiated project:

This is a cooperative project stimulated by local governments and communities and Mote Marine Laboratory. Sarasota Bay was selected for inclusion into the National Estuary Program (NEP) by EPA in 1988. The Sarasota Bay NEP is sponsored by the Southwest Florida Water Management District, Manatee County, Sarasota County, the City of Sarasota, and EPA.

Major environmental problems:

- Excessive nitrogen loads due to inadequate wastewater treatment
- Storm water runoff
- Loss of natural habitat (fresh and saltwater wetlands and submerged aquatic vegetation)

Actions taken or proposed: The NEP provides funds to develop a Comprehensive Conservation and Management Plan (CCMP) for Sarasota Bay that will recommend priority corrective actions to restore and maintain the estuarine resources. During the CCMP development, several demonstration projects are being undertaken to illustrate how the final recommendations for Bay restoration will be implemented. These demonstrations include 11 habitat-related projects and 2 storm water management projects. The intertidal habitat restoration projects will restore 80 acres of habitat lost since 1950. Implementation of the storm water projects will reduce the quantity and improve the quality of storm water discharge in specific basins as well as providing valuable information about storm water management techniques in highly urbanized coastal areas. Local governments have made significant strides toward restoring and protecting the Bay primarily by integrating the strategy of the Sarasota Bay NEP into community decisions that may affect the Bay. Public education/outreach and citizen involvement have been critical in allowing the Sarasota Bay NEP to progress to this point and will be essential in full implementation of the CCMP recommendations.

Action Plans have been drafted for inclusion into the CCMP. These action plans address: wastewater/

nitrogen loading reduction, storm water management, fresh and salt water wetlands restoration and protection, fisheries and other living resources, sustainable recreational use, and Bay management (governance). The final CCMP will be completed in June 1995 and will propose not only the action plans needed to restore Sarasota Bay, but also who should take the lead for implementation activities, how much these activities will cost, how these activities will be funded, and a timeline for determining success of implementation.

Stakeholders:

Businesses
Local citizens
Property owners
Recreational users including divers/snorkelers, boaters, anglers
Scientists
Tourists

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Savannah River

Size and location: The Savannah River basin is a 10,000 square mile watershed located in the southeastern United States and includes portions of North Carolina, South Carolina, and Georgia. The Savannah River, which is the boundary between South Carolina and Georgia, is formed at Hartwell Reservoir by the confluence of the Seneca and Tugaloo Rivers and flows southeast to the Atlantic Ocean at the port city of Savannah, Georgia. Above the junction of the Seneca and Tugaloo Rivers, the major headwater streams of the Seneca River are the Keowee River and Twelve Mile Creek. The Tugaloo River is formed by the union of the Tallulah and Chattooga Rivers. These headwater streams originate on the southern slopes of the Blue Ridge Mountains in North Carolina and Georgia.

Organization that initiated project:

U.S. Environmental Protection Agency

Major environmental problems:

- Impaired fisheries due to poor water quality
- Low dissolved oxygen (D.O.) in Savannah River and Estuary
- Savannah River Site (listed as a Superfund site in 1989) discharges and releases
- Negative water quality impacts on public drinking water supplies
- Nonpoint source impacts from forestry, agriculture, and urban land use
- Salinity in estuary—impacts to public/private drinking water supplies, fisheries, wetlands
- Sedimentation in estuary causing navigation problems and increased dredging
- Modification and physical changes in the estuary
- Point source discharge effects
- Dam release impacts—e.g., fish kills, cold water releases, low D.O. releases
- Development impacts—e.g., development near urban areas, river access projects, wetland losses, possible future harbor development
- Habitat alteration/destruction—e.g., dredging, salinity impacts, sedimentation, hydropower releases, development
- Commercial shipping impacts on Harbor water quality
- Water quality impact of drought management plans—e.g., low flow scenarios
- Urban storm water runoff

- Ground water quantity limitations due to saltwater intrusion and drawdown and the potential interaction with surface water

Actions taken or proposed: EPA initiated this project in 1992 with the water quality agencies of Georgia and South Carolina to reach consensus on the nature and scope of this project. A multi-agency/organization meeting with stakeholders in the basin to plan and organize a comprehensive and integrated watershed project followed. Actions are underway to develop a Watershed Management Plan that includes input on priority actions from all basin stakeholders. An organizational structure has been developed to manage the project and includes equal representation from major stakeholders. Additionally, resource-based sub-committees will provide the technical support for this project. There is a great deal of interest in coordinated management of the natural resources of the Savannah River basin, and the many stakeholders in the basin are committed to participation in project management, planning, and implementation.

Stakeholders:

Augusta Canal Authority
Augusta Chamber of Commerce
Central Savannah Regional Development Center
City of Beaufort, South Carolina
Duke Power
Federal Paper Board Corporation
Fort Howard Company
Georgia Conservancy
Georgia Department of Natural Resources
Georgia Environmental Protection
Lower Savannah Council of Governments
National Park Service
Savannah Area Chamber of Commerce
Savannah River Forum
Sierra Club
South Carolina Coastal Council
South Carolina Department of Health and Environmental Control
South Carolina Department of Natural Resources
South Carolina Electric and Gas
South Carolina Sea Grant Consortium
Southeastern Power Administration
Southern Environmental Law Center
Stone Savannah River Company
U.S. Army Corps of Engineers
U.S. Department of Energy - Savannah River Site

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Silver Lake

Size and location: Silver Lake is located just north of downtown Dover, Delaware. The surface area of the lake is 167 acres, and the lake drains approximately 19,000 acres.

Organization that initiated project:

Delaware Department of Natural Resources and Environmental Control

Major Environmental problems:

- Algal blooms and bacterial contamination due to agricultural and urban runoff

Actions taken or proposed: Delaware received a Clean Lakes Program grant in 1987 to conduct a Phase I diagnostic/feasibility study for Silver Lake and its watershed. This study analyzed the lake's condition and determined the causes of that condition, examined the watershed to determine the sources of pollution, and then evaluated solutions and recommendations for the most feasible procedures to restore and protect lake water quality.

In 1990, a Phase II Clean Water Lakes grant was awarded. The Phase II project will translate the Phase I recommendations into actions. Phase II projects implement in-lake restoration work as well as critical watershed management activities to control nonpoint source pollution to the lake. A seven part plan has been initiated by the participating stakeholders, and the project is coordinated by the Delaware Department of Natural Resources and Environmental Control. The plan includes:

- Development of a nature preserve.
- Modification of lake use for bank stabilization.
- Working with property owners to install vegetative cover, riprap, etc. for shoreline erosion control.
- Retrofit storm water control ponds entering Silver Lake to include water quality enhancements.
- Enforcement of construction runoff regulations.
- Installation of agricultural best management practices.
- Public education.
- Follow-up monitoring.

Storm water detention basins will be modified to reduce sediment and phosphorus loadings into the lake. Citizen volunteers have placed fish attraction structures in the lake.

Stakeholders:

Area farmers
Area merchants
City of Dover
Delaware Department of Natural Resources and Environmental Control
Kent County Conservation District
Lake users
Soil Conservation Service

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- Developed a comprehensive and coordinated monitoring program to provide insights into regional, cumulative, and long-term impacts; link public concerns with measurable indicators; and reduce costs associated with current monitoring practices.
- Developed the Santa Monica Bay Restoration Plan.

Stakeholders:

Area Universities
Bay watershed cities (NPDES co-permittees)
Heal the Bay
Los Angeles County
National Oceanic and Atmospheric Administration
State Department of Fish and Game
State Department of Health Services
State Water Resources Control Board
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Soil Conservation Service
University of California-Los Angeles Laboratory of Biomedical and Environmental Science

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Southeast Michigan Initiative

Size and location: The Southeast Michigan Initiative (SEMI) covers eight counties in and around the Detroit, Michigan metropolitan area and includes five Areas of Concern (AOCs) designated under the Great Lakes Water Quality Agreement. The five AOC watersheds are: the Clinton River (see page 46), River Rouge, Detroit River, River Raisin, and the St. Claire River. The counties in the initiative area include St. Clair, Macomb, Oakland, Livingston, Washtenaw, Wayne, Lenawee, and Monroe.

Organization that initiated project:

U.S. Environmental Protection Agency

Major environmental problems:

Combined sewer overflow
Nonpoint source pollution
Sediment contamination
Urban air pollution

Actions taken or proposed: SEMI is a partnership formed among the Michigan Department of Natural Resources (MDNR), EPA, and other state and local agencies to focus resources in eight counties in the Detroit metropolitan area. This partnership was prompted by the recognition that environmental problems may be better addressed through a more coordinated effort, and that they need not be solely addressed by regulatory solutions. Also that a geographical, cross-media, ecosystem and/or holistic solution may be required for their resolution.

The Agencies' base programs will be key tools used in this effort. Consequently, intense discussions have been initiated between EPA and MDNR. Examples of issues under discussion include remediation of industrial waste in landfill along the banks of the Rouge River and remediation of a sediments PCB hotspot on the Raisin River. The goal, in general, is to better use the permitting, enforcement, and planning processes to further environmental work.

During 1994, the Initiative will be developing innovative programs on pollution prevention, Remedial Action Plans and sediments, public participation (including risk communication), and compliance and enforcement. Several projects already initiated include: an industrial pretreatment pollution prevention program for publicly owned treatment works, the development of an industrial pollution prevention network, an environmental justice study, and a neighborhood environmental problems survey. In

addition, major resources have been allocated for contaminated sediment characterization and remediation.

One project in the SEMI area of particular note is the Rouge River Wet Weather Demonstration Project. The project, which is funded through \$128 million in federal grants, is designed to investigate sources of water pollution in a highly urbanized watershed during wet weather events and demonstrate methods for their control. Additional funds totalling \$160 million have been appropriated for this project.

Stakeholders:

Academic institutions
Citizen and technical advisory groups for each of the five Areas of Concern
City of Detroit
Civil Rights groups
County governments, health departments, and health providers
Environmental groups
Interested citizens
Michigan Department of Natural Resources
Regulated community
Southeast Michigan Council of Governments
U.S. Environmental Protection Agency

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U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Geological Survey
U.S. Soil Conservation Service
Union Camp Corporation
Westinghouse Savannah River Company

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South Florida Ecosystem

Size and location: The South Florida Ecosystem encompasses a 16,000-square mile watershed located at the southern terminus of the Florida peninsula. This region includes the Kissimmee River, Lake Okeechobee, the Everglades, Big Cypress, Florida Bay, and the Florida Keys; contains three National Parks, one National Preserve, two National Marine Sanctuaries, and twelve National Wildlife Refuges; and is home to over six million people.

Organizations that initiated project:

U.S. Environmental Protection Agency
U.S. Department of Interior
U.S. Army Corps of Engineers
U.S. Department of Agriculture
U.S. Department of Commerce
State of Florida

Major environmental problems:

- Mercury contamination of Everglades fish and other biota
- Ecological degradation of Florida Bay and the Florida Keys National Marine Sanctuary (FKNMS)
- Water supply conflicts among agricultural interests, natural resources, and an expanding urban population
- Nutrient enrichment of the Everglades by agricultural or urban drainage water
- Loss of historic hydropatterns, water gradients, and discharge
- Rapid regional population growth leading to increased pollution of both air and water
- Spread of exotic plants and animals
- Loss of native populations and species of flora and fauna
- Extensive conversion of remaining wetlands and natural lands to other land uses

Actions taken or proposed: In 1993 a five-year inter-agency agreement on South Florida Ecosystem restoration was signed by six federal departments including EPA, creating a Task Force to further ecosystem restoration, protection, and maintenance. The watershed was chosen as an appropriate unit for ecosystem management. Efforts are to be comprehensive in nature, with various agencies taking the lead on specific restoration activities. A focus of the inter-agency effort is the submission of an integrated plan for ecosystem restoration, maintenance, and protection that details current achievements, ongoing ac-

tivities, and projected accomplishments. This plan, which is to be updated annually, is to include an evaluation of the effectiveness of ongoing efforts.

A multitude of specific efforts are underway to address environmental problems in the South Florida watershed. EPA has designed and begun to carry out a comprehensive interagency multi-disciplinary study to address the mercury contamination issue and identify sources and solutions. EPA is working with NOAA and the State of Florida to develop and implement a water quality protection program for the FKNMS. The Army Corps is proceeding with a number of projects that will attempt to provide the hydrologic capability to restore the hydrology and ecology of portions of Everglades National Park, the Kissimmee River, and the ecosystem as a whole. The State of Florida and the federal government are working with private interests to rectify the phosphorus enrichment issue that the Everglades faces.

Stakeholders:

Local governments
National and local environmental groups
South Florida agricultural interests
South Florida urban interests
State of Florida
U.S. Army Corps of Engineers
U.S. Department of Agriculture
U.S. Department of Commerce
U.S. Department of Interior
U.S. Environmental Protection Agency

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Squaw Creek and Baldwin Creek

Size and location: The watershed for Squaw Creek and Baldwin Creek covers 65,000 acres in central Wyoming.

Organization that initiated project:
Popo Agie Conservation District

Major environmental problems:

- Ground water contaminated with pesticides
- Hydrological modification
- Severe sedimentation
- Surface water contaminated by coliform, nutrients, salinity, and pesticides
- Destroyed riparian areas resulting in loss of trout fishery
- Contaminated drinking water

Actions taken or proposed: The Conservation District has received Clean Water Act Section 319 funding to work with nearly all of the 96 landowners in the watershed to implement best management practices (BMPs) through cost-sharing. The BMPs include proper grazing use, irrigation water management, pasture and hayland management, nutrient and pest management, wildlife upland and wetland habitat management, and stream improvements. An information and education program includes displays at the county fair, news releases, tours of the project area, workshops for teachers, a national award-winning demonstration area at Lander High School, and other activities.

Stakeholders:

Boy Scouts
City of Lander
County Extension Service
Elementary and high schools
Landowners
Popo Agie Conservation District
Soil Conservation Service
Students
U.S. Bureau of Land Management
U.S. Forest Service
Wyoming Department of Environmental Quality
Wyoming Fish and Game Department
Wyoming Outdoor Council

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Swartzwood Lake

Size and location: Swartzwood Lake is located in a state park in Sussex County, New Jersey. The lake is 504 acres in size, with a mean depth of 22 feet and a maximum depth of 42 feet. The watershed covers 11,196 acres, including the lake.

Organization that initiated the project:
Sussex County Board of Freeholders

Major environmental problems:

- High in-lake phosphorus
- Reduced fish habitat
- Excessive weed/algal growth
- Anoxia caused by internal phosphorus recycling
- Reduction in clarity

Actions taken or proposed: In 1982 the Sussex County Board of Freeholders initiated activity in the Swartzwood Lake watershed. Sussex County and the state of New Jersey have also been active. Actions to restore and protect this watershed include:

- Inactivation of internal phosphorus by hypolimnetic aeration.
- Weed harvesting.
- Development of a septic management plan.
- Implementation of homeowner best management practices.
- Control of future land development.

Stakeholders:

New Jersey Department of Environmental Protection
Stillwater Township
Sussex County Board of Freeholders
Sussex County Department of Planning Tourism
U.S. Environmental Protection Agency

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State:
Budd Cann
Water Monitoring Management
NJDEP (CN 427)
Trenton, NJ 08625-0427
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FAX: (609) 633-1095

Tampa Bay

Size and location: The Tampa Bay National Estuary Program (NEP) study area encompasses both the 398-square mile bay and its 2,300-square mile watershed. The watershed extends north of the Bay to the upper reaches of the Hillsborough River, east to the headwaters of the Alafia River, and south to Sarasota County. Tampa Bay is the longest bay in the state of Florida and the seventh longest in the United States.

Organizations that initiated project:

The Tampa Bay Regional Planning Council, the Southwest Florida Water Management District, state and local governments, and citizens began an effort culminating with EPA selecting Tampa Bay for inclusion into the National Estuary Program in 1990.

Major environmental problems:

- Growth and development causing habitat destruction, shoreline hardening, and increased anthropogenic impacts
- Pollutant loadings from both point and nonpoint sources
- Loss and degradation of primary habitats within and around the bay such as tidal marshes, mangroves, seagrasses, non-vegetated bay bottom, and open water (pelagic) communities
- Alteration of surface and ground water flow patterns
- Atmospheric deposition (nitrogen)

Actions taken or proposed: The NEP provides funds to develop a Comprehensive Conservation and Management Plan for Tampa Bay that will recommend priority corrective actions to restore and maintain the estuarine resources. The Tampa Bay NEP intends to approach bay restoration and measures of success by linking water quality standards to the environmental needs of bay habitats and aquatic communities they support. Scientists will monitor representative plant and animal species from each of the Bay's communities to determine the overall health of that portion of the Bay. Assessing the condition of these indicator species will provide tangible evidence of progress toward goals. The Program is currently completing a comprehensive review of conditions in the Bay, as well as scientific studies which will define the environmental requirements of key species. By moving beyond water quality as the end result in bay restoration to standards which measure success based upon the health of the Bay's living resources, scientists

hope to encourage more resource-based initiatives in environmental management.

Stakeholders:

Anglers
Businesses
Local citizens
Recreational users including anglers, divers/
snorkelers, boaters
Tourists

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Atlanta, GA 30365
(404) 347-3555, ext. 2063
FAX: (404) 347-1797

Tangipahoa River

Size and location: The Tangipahoa River watershed includes about 529,600 acres, of which 355,200 are in Louisiana, mostly located in Tangipahoa Parish.

Organization that initiated project:

Louisiana Department of Environmental Quality

Major environmental problems:

- Nutrient and sediment nonpoint source pollution
- Bacterial contamination
- Improperly functioning municipal wastewater treatment facilities
- Runoff from unsewered communities, trailer parks, and homes (lack of a septic system or septic tank failure)
- Runoff and discharges from dairies and other concentrated animal operations
- Runoff from truck farming, forest harvest areas, and roads

Actions taken or proposed: Louisiana has targeted the Tangipahoa River within their Nonpoint Source Management Program to reduce bacterial contamination. More specifically, the Louisiana Department of Environmental Quality (LDEQ) has three nonpoint source pollution control cooperative agreements (Section 319(h) of the Clean Water Act) with EPA, which contain activities/projects within the Tangipahoa River watershed, to address bacterial and nonpoint source pollution.

LDEQ has implemented an educational program in the areas of Tangipahoa Parish which are listed in the Nonpoint Source Assessment Report as having septic tank problems. The purpose is to educate local people about their individual wastewater problems contributing to bacterial contamination of the river.

LDEQ has been working with state and federal agricultural agencies on a project to implement Soil Conservation Service (SCS) designed no-discharge lagoon systems into the dairies which operate in Tangipahoa Parish. There are approximately 273 dairies in the parish and approximately 225 have agreed to participate in either the SCS or the Agricultural Stabilization and Conservation Service federal cost-share program for installation of the lagoons. Of the 225 dairymen who have agreed to participate, approximately 93 lagoon systems have been installed. The purpose of these lagoons is to reduce bacterial and nutrient loading to the Tangipahoa River.

In addition to the federal cost-share program, the

Louisiana State Legislature enacted a provision to establish a state cost-share program to assist the dairymen in installation costs of the lagoon systems. First year funding for the state cost-share program had \$350,000 of state funds allocated to it; the second year of funding for the program had \$250,000 of state funds directed to it. The state cost-share program has been successful, with approximately 80 dairymen participating.

LDEQ has implemented a series of five dairy demonstration field days to educate dairymen on how the solids in the lagoon systems need to be cleaned out every two to four years, if they are to continue to function as no-discharge systems. The demonstration included information on nutrient availability in the lagoon systems and how this translates to nitrogen and phosphorus values that can be applied to the dairyman's fields. The equipment that is utilized for pumping solids from the lagoon system was available and functioning at the demonstration site, in order for the dairymen to see what was involved in pumping the lagoons and land applying wastes to their fields. These demonstrations were well attended by more than 100 dairymen in Tangipahoa Parish.

The Department of Health and Hospitals has estimated a reduction of approximately one million gallons a day of untreated sewage being discharged into the river, and the water quality data is beginning to show measurable declines in the concentration of fecal coliform bacteria within the Tangipahoa River.

Stakeholders:

Businesses
Government agencies
Private citizens
Special interest groups

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U.S. EPA Region VI
1445 Ross Avenue
Dallas, TX 75202-2733
(214) 665-7140
FAX: (214) 665-6689

Tensas River

Size and location: The Tensas River flows approximately 315 miles through the upper northeast part of Louisiana, eventually emptying into the Red River. The Tensas River National Wildlife Refuge, established in 1980, is comprised of 65,000 acres of extensive bottomland hardwood swamps. The Tensas River Basin Initiative is located in the upper Tensas watershed of Louisiana, a 750,000-acre watershed in portions of East Carroll, Franklin, Madison, and Tensas Parishes.

Organizations that initiated project:

Northeast Delta Resource Conservation and Development Board
Louisiana Department of Environmental Quality
The Nature Conservancy

Major environmental problems:

- Historic conversion of bottomland hardwoods to agriculture, resulting in loss of wetlands
- Channelization and loss of riparian areas
- Water quality degradation
- Reduction in wildlife habitat and biodiversity
- Nonpoint source pollution
- Environmental justice (most impoverished area in the U.S.)
- Loss of flood control functions

Actions taken or proposed: The Louisiana Department of Environmental Quality (LADEQ) received a grant from EPA to develop a comprehensive watershed protection plan for the Tensas River, utilizing a holistic approach. LADEQ has contracted with The Nature Conservancy to develop the watershed protection plan for the Tensas River Watershed. An additional EPA grant to the Soil Conservation Service (SCS) in Louisiana is contributing to the development of a program-neutral River Basin Study. A Technical Steering Committee comprised of representatives from various state and federal agencies, non-profit and special interest groups, and local citizens, and chaired by the local Farm Bureau Representative, has developed a plan of work.

The Northeast Resource Conservation and Development Board, through funding from EPA, SCS, and The Nature Conservancy, has hired a Watershed Manager to inform rural landowners of the project and to communicate between the participating partners (agencies) and the public. The U.S. Geological Survey has included the Tensas River Basin in the

Mississippi Embayment National Water Quality Assessment study unit. Dr. Angel Roman-Mass will develop a proposal for participation by five states to restore hydrology to pre-channelized conditions.

The Tensas effort is serving as a model for two other watershed projects within the Lower Mississippi Delta. A *Draft River Basin Study* is due in late 1994. The Study will have an individual watershed focus and will use Public Law 566 funds for watershed planning. This will give landowners money for watershed restoration. The community of Richland will target the Boeuf River/Richland Creek subwatershed for nonpoint source runoff reduction.

Two field days were held in 1994 to inform landowners of incentive programs for wetland restoration and protection such as the Wetland Reserve Program and Partners for Wildlife. An annual Environmental Education Workshop for local high school students has been implemented with support from state and federal agencies and private individuals. Brochures and a videotape promoting wetland values and landowner cost share programs and utilizing selected local farmers as role models are planned.

Stakeholders:

Agricultural industry
Agricultural organizations
Conservation organizations
County and parish governments
Cultural heritage organizations
Environmental organizations
Federal, state, and local agencies
Flood control interests
Forest products industry
Grassroots groups
Hunting and fishing interests
Local citizens
Planning agencies
Recreation industry
State and local agencies
Tourism industry
Universities
Urban interests

Contacts:

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1445 Ross Ave. (6E-FT)	c/o EPA
Dallas, TX 75202-2733	1445 Ross Ave. (6E-FT)
(214) 665-8339	Dallas, TX 75202-2733
FAX: (214) 665-7446	(214) 665-6497
	FAX: (214) 665-7446

Tillamook Bay

Size and Location: Tillamook Bay is a large shallow estuary along the north coast of Oregon State. Its watershed covers 364,800 acres. Five major rivers—Miami, Kilchis, Wilson, Trask, and Tillamook—drain the watershed.

Name of organization that initiated project:

A variety of groups in Tillamook County and the Oregon Department of Environmental Quality asked the Governor of Oregon to nominate Tillamook Bay to EPA's National Estuary Program (NEP). There is a strong local involvement in the project conception and implementation.

Major environmental problems:

- Fecal coliform contamination
- Low dissolved oxygen levels
- Animal wastes from agricultural activities
- Bacterial contamination from dairy animal waste
- Habitat loss and sedimentation are threatening anadromous fisheries (summer steelhead, spring/fall chinook, and one of the few remnant chum salmon populations in the state)
- Habitat modification is impacting threatened and endangered species (brown pelican, peregrine falcon, bald eagle, Aleutian Canada goose)
- Possible sedimentation problems if future logging activities are not carefully conducted

Actions taken or proposed: Tillamook Bay was selected for inclusion in the NEP in 1992. A Comprehensive Conservation and Management Plan that will recommend priority corrective actions to restore and maintain the estuarine resources of the Bay is being developed.

The Methane Energy and Agricultural Development Project, an effort to collect animal waste from dairies to produce electricity, soil amendments, and fertilizer products, has been initiated.

Stakeholders:

Commercial/recreational fisheries
Environmental groups
Logging industry
Methane Energy and Agricultural Development Policy Committee
National Marine Fisheries Service
Oregon Department of Agriculture
Oregon Department of Environmental Quality
Oregon Department of Fish and Wildlife

Oregon Department of Forestry
Oregon Department of Land, Conservation, and Development
Oregon Department of State Lands
Oregon Health Department
Oregon Parks Department
Oyster/clam industries
Residents
Soil Conservation Service
Soil and Water Conservation District
Tillamook Bay and Garibaldi Port Districts
Tillamook County
Tillamook County Creamery Association
Tillamook County Economic Development Committee
Tillamook Sanitation Technical Advisory Committee
Tourism industry
U.S. Agriculture Stabilization and Conservation Service
U.S. Army Corps of Engineers
U.S. Bureau of Land Management
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Forest Service
Water Resources Department

Contacts:

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(206) 553-4183	(503) 842-9922
FAX: (206) 553-0165	FAX: (206) 842-3680

Truckee River

Size and location: The 140-mile long Truckee River runs from Lake Tahoe, California into the saline Pyramid Lake in Nevada.

Organization that initiated project:

U.S. Environmental Protection Agency

Major environmental problems:

Water quality degradation
Deterioration of aquatic habitat
Threatened and endangered fish species

Actions taken or proposed: The flow of the Truckee River is highly regulated with most of the river water fully allocated via water rights. Some of the water is used by the U.S. Fish and Wildlife Service to induce spawning of the endangered fish, cui-ui, and to provide drought relief. Approximately one-third of the river flow is diverted via a dam to Lahontan Valley to irrigate alfalfa and pastures. The watershed also supports the resort communities surrounding Lake Tahoe, the greater metropolitan area of Reno and Sparks, and the Pyramid Lake Paiute Indian Reservation.

The Pyramid Lake Paiute Tribe has taken numerous legal actions over the last 100 years to obtain legal compensation for the adverse impacts resulting from the diversion to Lahontan Valley. Lake elevations have dropped 80 feet, thereby restricting fish access for spawning. The Tribe also pressed for efforts to reduce pollutant loadings, to ameliorate elevated water temperatures, and to restore the water course.

EPA initiated the Truckee River Strategy to end litigation, and Senator Reid of Nevada facilitated a negotiated settlement accord through public law. EPA coordinates different program activities and agencies to focus restoration efforts on the Truckee River Strategy, a holistic watershed restoration program. In particular, EPA:

- Provides grant assistance to a Native American tribe and the states of Nevada and California to assess problems, to develop a water quality model, and to implement both nonpoint and point source controls.
- Oversees and approves the development of state water quality standards, Total Maximum Daily Loads, and storm water and treatment works permits.
- Funds a grant to explore alternative economic incentives to conserve water and improve water quality.
- Awarded a Clean Water Act Section 319

grant to Nevada to establish a water bank that would allow residents to donate their water rights to the bank to be used for beneficial instream uses.

Stakeholders

California Lahontan Regional Water Quality Board
Fenley Town Utilities
Lyon, Storey, and Washoe Counties in Nevada
National Park Service
Nevada Department of Wildlife
Nevada Division of Environmental Protection
Nevada Division of Transportation
Public Resource Associates
Pyramid Lake Paiute Tribe
Reno and Sparks municipal governments
Sierra Club
Sierra Pacific Power Company
Soil Conservation Service
The Nature Conservancy
Truckee River Advisory Board
U.S. Army Corps of Engineers
U.S. Bureau of Indian Affairs
U.S. Bureau of Reclamation
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Geological Survey
University of California, Davis
University of Nevada, Reno
Washoe-Storey Conservation District

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San Francisco, CA 94105
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FAX: (415) 744-1078

Upper Arkansas River

Size and location: The watershed for the Upper Arkansas River covers 5,000 square miles in central Colorado extending from the Continental Divide in Pike-San Isabel National Forest to Pueblo Reservoir where the plains meet the mountains.

Organizations that originated the project:

- U.S. Environmental Protection Agency
- U.S. Bureau of Reclamation
- Colorado Department of Health
- Colorado Department of Natural Resources

Major environmental problems:

- Pollution from past mining practices
- Erosion of rangeland
- Loss of riparian and wetland areas
- Hydrologic modification
- Contaminated sediments

Actions taken or proposed: Many state and federal agencies are involved in a wide range of activities in the basin. In 1989, a technical workshop brought all people conducting research in the Upper Arkansas basin together to inform each other of their work, discuss specific questions, and develop recommendations for further research in the basin. The overarching finding from this forum was that coordination among agencies had to be improved. At the same time, researchers from EPA developed a proposed management plan for research that would lead to a comprehensive understanding and remediation of water quality impacts from human disturbances, principally hard rock mining. The ongoing work, the workshop, and the management plan helped generate enthusiasm for more cooperative efforts which culminated in a Memorandum of Understanding (MOU) among the Colorado Departments of Health and Natural Resources, the U.S. Bureau of Reclamation, and EPA, which, among other things, set a self-reproducing brown trout fishery as their biological remediation goal for the river.

In 1992, EPA formed a Regional Upper Arkansas Watershed Initiative Team to coordinate development and implementation of a watershed protection strategy for the Upper Arkansas Basin. A number of Clean Water Act Section 319 Nonpoint Source projects were initiated at abandoned mining sites along Chalk Creek and St. Kevin's Gulch and on rangeland along Badger Creek. In addition, recently constructed metal treatment facilities will control two major draining mine discharges to the river, with an expected significant reduction in metals load to the mainstem of the

river as a result of Superfund and water discharge compliance actions.

Local citizens are active in the watershed. A local Resource Conservation and Development Council, with EPA funding support, hired a local teacher to serve as the on-site watershed coordinator for the Initiative, and he has been rehired for a second year because of his successes. The on-site coordinator fosters cooperation among various stakeholders, solicits ideas for the strategy, and implements a public outreach program for the Initiative. He coordinated a second MOU which has the following goal: improve or maintain the aquatic ecosystem of the Upper Arkansas River Watershed. He coordinated the first watershed forum directed to enhancing awareness and knowledge of watershed citizens throughout the 150 miles of the river. It was planned and implemented with a steering committee of local interests. The evaluations showed it was highly successful and helpful in bringing information and a sense of watershed community to the participants. A volunteer monitoring program, with strong participation by local high schools, is active in the basin. This program was developed by the Colorado Division of Wildlife. Based on its success in the Arkansas basin, the program is being implemented statewide.

The U.S. Bureau of Land Management (BLM) is conducting a water needs assessment for fish, recreationalists, and the riparian area of the mainstem. EPA is supporting the development of a Geographic Information System data base and a research project addressing hydrologic needs of wetland/riparian areas. The U.S. Forest Service and BLM consider the Upper Arkansas a priority watershed and a potential demonstration project for ecosystem management through the Colorado Ecosystem Partnership.

Stakeholders:

- ASARCO
- Cities of Leadville, Buena Vista, Salida, and Canon City
- Colorado Association of Conservation Districts
- Colorado Division of Minerals and Geology
- Colorado Division of Parks and Outdoor Recreation
- Colorado Division of Wildlife
- Colorado Riparian Association
- Colorado State Engineer's Office
- Colorado State Soil Conservation Board
- Friends of the Arkansas

Upper Arkansas continued on page 140

Upper Clark Fork Basin

Size and location: The Upper Clark Fork Basin consists of a 6,060-square mile watershed in western Montana.

Organization that initiated project:
Montana State Legislature

Major environmental problems:

Over appropriation of water leading to dry reaches, elevated water temperatures, nuisance algae, low dissolved oxygen, and damaged fish habitat

Actions taken or proposed: The Montana State Legislature passed legislation calling for a moratorium in the issuance of most new surface water rights until June 30, 1995. The legislation created the Upper Clark Fork Steering Committee which is charged with operating a water management plan that would consider and balance all beneficial water uses in the basin above Milltown Dam. By law, the plan must contain a recommendation concerning the water rights moratorium and identify and make recommendations for resolving water issues in the basin.

A planning process was developed following six public meetings throughout the basin. Six committees are to identify specific problems and potential solutions in various reaches of the basin and develop a dispute resolution process. The steering committee will integrate the information from the six committees into a coordinated, comprehensive management scheme.

Stakeholders:

City and county government
Hydroelectric utilities
Irrigators
Landowners
Montana Department of Fish, Wildlife, and Parks
Recreational and environmental groups
State and local water management agencies
U.S. Environmental Protection Agency
Water user groups

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Helena, MT 59620
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Upper Arkansas continued from page 139

Irrigation companies
Lake County Conservation District
Sangre de Criso Resource Conservation and Development Council, Inc.
Southeast Colorado Water Conservancy District
The Nature Conservancy
U.S. Bureau of Land Management
U.S. Bureau of Mines
U.S. Bureau of Reclamation
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Forest Service
U.S. Geological Survey
U.S. Soil Conservation Service
Upper Arkansas River Recreation Task Force

Contact: Jeff Keidel
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Buena Vista, CO 81211
(719) 395-6035

Upper Tennessee River Basin

Size and location: The Upper Tennessee River Basin contains the Clinch, Powell, and Holston River Basins in southwest Virginia.

Organization that initiated project:
The Nature Conservancy

Major environmental problems:

- Treated and untreated point sources (untreated point sources are the more significant problem)
- Nonpoint sources from agriculture, urban runoff, and coal mining
- Threats to habitat of endangered species

Actions taken or proposed: The Nature Conservancy launched its Clinch Valley Bioreserve in 1969 and brought other stakeholders together to plan restoration and protection activities. The Virginia Division of Soil and Water has adopted many subwatersheds as high priorities for nonpoint source pollution controls. The Virginia Department of Environmental Quality placed a ban on halogen-based sewage treatment systems in endangered species waters. More stringent water quality standards have also been adopted for other pollutants. The Nature Conservancy has completed a five-year strategic plan for the watershed.

Caves, fissures, sinkholes, sinking streams and underground streams in this limestone karst area serve as direct recharge areas to ground water. Nonpoint source impacts to the ground water from poor agricultural and land-use practices are being addressed through the implementation of appropriate best management practices (BMPs). To prevent cattle from reaching the streams and to buffer the nonpoint source loading from fields, alternative drinking water sources for cattle, fencing, buffer strips adjacent to sinkholes and cave entrances, rotational grazing, and permanent vegetation cover on critically eroded sites will be installed. Conservation planning, septic tank installation, and the removal of trash will also occur. Hydrogeologic studies will be conducted to define, to the extent practical, ground water drainage patterns and spring discharge sites for future karst BMP implementation. Surface water monitoring will occur.

Stakeholders:

Local governments
The Nature Conservancy
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
Virginia Department of Environmental Quality
Virginia Division of Soil and Water Conservation
Virginia Polytechnical Institute and State University

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Philadelphia, PA 19107
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Verde River

Size and location: This project extends from Sullivan Lake to Horseshoe Reservoir covering 125 miles of the Verde River in Yavapai and Gila Counties in Arizona.

Organizations that initiated project:

U.S. Environmental Protection Agency
U.S. Army Corps of Engineers

Major environmental problems:

- Sand and gravel mining related sedimentation and hydrologic modification problems
- Polluted runoff from abandoned hardrock mines
- Bank stabilization
- Flooding
- Threatened and endangered species (including Razorback sucker and Southwestern willow flycatcher)

Actions taken or proposed: EPA and the U.S. Army Corps of Engineers (Corps) initiated an advance identification (ADID) wetlands project in the Verde River watershed after receiving requests for an ADID from the U.S. Fish and Wildlife Service and the Arizona Department of Environmental Quality. This ADID is identifying aquatic sites along the river and evaluating whether or not these sites are suitable for possible future disposal of dredge and fill material. Goals of the ADID are two-fold:

- To achieve a net gain in the quality and quantity of the Verde River riparian ecosystem in terms of acres, functions, and values.
 - To restore and maintain the physical, chemical, and biological integrity of the Verde River riparian ecosystem.
- The objectives are to:
- Strengthen the Clean Water Act (CWA) Section 404 wetlands permit and enforcement program through public outreach.
 - Ensure compliance with CWA Section 404 early in the planning process.
 - Seek avoidance of placing fill in sensitive aquatic sites.
 - Augment state and local efforts to develop a comprehensive riparian management plan for the Verde River.
 - Encourage restoration efforts.

EPA and the Corps have conducted several public meetings to discuss the Section 404 program and ADID, to present the results of the functional assessment of the Verde River, and to solicit public

comments on options for identifying "suitable" and "unsuitable" sites along the river. The technical summary document and the final site identifications will be completed in 1994. Public workshops will be held to answer questions and clarify points.

In addition, Camp Verde will soon be funding a flood mitigation study in the Town of Camp Verde which will include determining the feasibility of channelizing West Clear Creek, a major tributary to the Verde River. Flood protection is a priority concern for the Town of Camp Verde because approximately 20 percent of the town is located in the floodplain.

Stakeholders:

Local towns including Town of Camp Verde, Cottonwood, Clarkdale, and Jerome
State of Arizona
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
Verde Watershed Association

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Virginia Eastern Shore Coastal Waters

Size and location: A portion of the Virginia Eastern Shore Coastal Waters lie within The Nature Conservancy's Virginia Coast Reserve. The Reserve encompasses 62.5 square miles; includes 14 barrier islands, tidal marshes, and waterfront mainland sites; and extends along the Atlantic coast of Virginia's eastern shore.

Organization that initiated project:
The Nature Conservancy

Major environmental problems:

- Development pressures
- Nonpoint source pollution from farms
- Failed septic tanks
- Point source loadings from seafood processing plants

Actions taken or proposed: Under an EPA grant The Nature Conservancy has begun work with a local landowner and a multidisciplinary group of university researchers to develop and implement a model protection initiative for farmland that encompasses several subwatersheds to Hog Island Bay. The initiative has prioritized the threats to the subwatersheds via an ecological risk assessment and is working with the landowner and local officials to develop model land use plans and a model conservation easement. This model conservation easement can then be used to protect seaside farmlands that are at risk from ecologically unsound development.

As a complement to the farmland conservation easement initiative, The Nature Conservancy, with the assistance of an EPA grant, is undertaking a model waterfront village protection initiative to address key threats associated with development of Virginia Eastern Shore seaside towns and villages. The Conservancy plans to develop a sustainable development plan and implement a model protection initiative at Willis Wharf, one of five waterfront towns and villages on the Eastern Shore's seaside, working in close partnership with the local citizens, businesses, and government.

The Nature Conservancy has also sponsored studies including the Broadwater Macrosite Model Watershed Protection Initiative, of loadings of nutrients to both ground and surface water at selected sites on the Chesapeake Bay. The Water Quality Monitoring Initiative, a citizens water monitoring project, monitors both ground and surface water.

Stakeholders:

Accomack-Northampton Planning District Commission
Citizens for a Better Eastern Shore
Northampton County Board of Supervisors
The Nature Conservancy
Town of Exmore
U.S. Environmental Protection Agency
Water Quality Consortium
Working Watermens Association

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Waquoit Bay

Size and location: Waquoit Bay is located on the southern shore of Cape Cod, Massachusetts. The Bay and its watershed encompass an area of approximately 20 square miles; 2.5 square miles of this area is surface water.

Organizations that initiated project:

National Science Foundation
U.S. Environmental Protection Agency
National Oceanic and Atmospheric Administration

Major environmental problems:

- Enrichment of the Bay's water with excess amounts of nitrogen
- Decline in water quality
- Loss of eelgrass beds
- Decline of shellfish
- Increase in fish kills and mats of macroalgae

Actions taken or proposed: The Land-Margin Ecosystems Research Project was initiated to determine the relationship between land use and water quality. Land uses and nutrient loadings are being characterized; physical, chemical, and biological processes occurring in the Bay and surrounding subwatersheds are being determined; and a Geographic Information System and a variety of models are being developed to understand the links between land use and impacts observed in Waquoit Bay. Research results are being fed into an easy-to-use "management model" that calculates steady state nitrogen loading rates for various scenarios. The model is intended to be specific enough to make predictions about Waquoit Bay and general enough to be used in other embayments depending upon the parameters selected. It is important that the model be more than locally applicable since nitrogen is a pervasive problem along much of the East Coast.

Stakeholders:

Association for the Preservation of Cape Cod
Cape Cod Commission
Citizens for the Protection of Waquoit Bay
Massachusetts Department of Environmental Protection
Massachusetts Executive Office of Environmental Affairs
National Oceanic and Atmospheric Administration
National Science Foundation
Towns of Falmouth and Mashpee

U.S. Environmental Protection Agency
U.S. Geological Survey

Universities

Boston University
Hampshire College
Smith College
University of Southern California
Waquoit Bay National Estuarine Research Reserve
Woods Hole Oceanographic Institute

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Research:

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Marine Biological Laboratory
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FAX: (508) 548-7295

West Lake

Size and location: West Lake has a 6,340-acre watershed and is located in Clarke County in south central Iowa.

Organizations that initiated project:

Clarke County Soil and Water Conservation District
Iowa Department of Agriculture and Land Stewardship

Major environmental problems:

- Sediment
- Nutrients and pesticides
- Algal blooms
- Declining fishery
- High levels of organic matter in combination with chlorination have produced trihalomethanes exceeding the drinking water standard
- Agricultural pesticides, specifically atrazine, cyanazine, and alachlor; atrazine consistently exceeded drinking water maximum contaminant levels

Actions taken or proposed: This project was initiated in 1990 with Clean Water Act Section 319 funding and is expected to formally last four to five years. Funding from the State's Resource and Protection Program has also been used to address water quality concerns in the watershed. Cost share or other financial assistance is offered for a variety of practices in the watershed ranging from traditional earthen terraces to buffer strips, to crop rotations, to pasture management, to integrated crop management. Twenty of the 35 landowners in the watershed are involved in the project. Four landowners voluntarily implement practices without cost share dollars. Soil erosion has been reduced on contracted fields from 13 tons per acre per year in 1990 to 7.5 tons per acre per year in 1992. Atrazine and cyanazine levels in the lake have been reduced, and use of crop residue management is widespread. Other activities include public education and monitoring of the water quality of the lake and the treated water at the water supply plant. Changes in farming practices to protect the water supply should continue for the long term.

Stakeholders:

City of Osceola
Clarke County Soil and Water Conservation District
Farmer cooperators
Iowa Department of Agriculture and Land Stewardship
Iowa Department of Natural Resources
Iowa State University Extension
Soil Conservation Service
U.S. Environmental Protection Agency

Contact:

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Iowa Department of Natural Resources
Wallace State Office Building
Des Moines, IA 50319
(515) 281-6402
FAX: (513) 281-8895

West Maui Watershed

Size and location: This project consists of a series of small watersheds along a 16-mile stretch of coast on the island of Maui, Hawaii.

Organizations that initiated project:

U.S. Environmental Protection Agency
Hawaii Department of Health

Major environmental problems:

- Sediment runoff from agriculture and construction sites
- Nearshore turbidity
- Macroalgal blooms and nutrient runoff possibly associated with agricultural runoff, wastewater infiltration to surface waters, resorts, and urban areas

Actions taken or proposed: The algal problem was first brought to EPA's attention by four Congressional inquiries in the fall of 1991. EPA responded by forming an EPA Maui Algae Team to coordinate with the State of Hawaii Department of Health. This partnership drafted a strategy to mitigate the algal problem. The strategy is basically a comprehensive watershed management plan focusing on nutrient source controls within the watershed. EPA is also working with the Hawaii Department of Health, the County of Maui, and the National Oceanic and Atmospheric Administration on studies regarding the linkage between sewage injection wells and the ocean and source controls. EPA funded a local watershed manager to facilitate assessment and planning of watershed protection activities in West Maui. Through this effort, the Mayor of Maui publicly committed to increased water reclamation and canceled plans for new sewage injection wells.

Stakeholders:

Hawaii Department of Health
Local sugar and tourist industries
Maui County
National Oceanic and Atmospheric Administration
U.S. Environmental Protection Agency

Contact:

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Willamette River Basin

Size and location: The Willamette River basin is located in Oregon and covers 11,500 square miles. Within the Basin are more than 5,000 miles of rivers and tributaries.

Organization that initiated project:

A number of local, state, and federal groups are working together to align their programs.

Major environmental problems:

Development pressures

Actions taken or proposed: EPA is working with a variety of federal, state, local, and private groups to develop several strategic workplans for the Willamette River Basin. These workplans include:

- Riparian and Aquatic Habitat Restoration Targeting and Implementation;
- Applying Sustainability Concepts and Approaches;
- Environmental Justice through Reduction of Toxics Exposure Risks; and
- Drinking Water Protection through a Pollution Prevention Strategy.

All workplans are including field level demonstration projects. EPA is also developing new technical approaches for reconciling conflicts between land use and the management of terrestrial and aquatic biodiversity.

Federal Forest Ecosystem Management Plans are being developed for the "key watersheds" on federally owned forest lands within the Willamette Basin. More than a dozen "key watersheds" have been designated within the Basin. Watershed analysis for restoration work began in 1994.

Oregon is developing state policies and processes for fostering greater local stewardship through inter-agency communication and the formation of local basin councils.

Six communities within the Willamette Basin are developing comprehensive wetland protection plans. There are a number of sub-watersheds in which Total Maximum Daily Loads are being developed.

Many local and basin-wide networks have been or are being formed in response to changes in social and land use development patterns and the corresponding effects on resource management options.

Stakeholders:

Local citizens
Local planning networks
Local soil and water conservation districts
Multiple state agencies
Pacific River Council
Soil Conservation Service
The Nature Conservancy
U.S. Environmental Protection Agency

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Yakima Basin

Size and location: The Yakima basin is located in south-central Washington and drains an area of 6,155 square miles.

Organization that initiated project:
Yakima Valley Conference of Governments

Major environmental problems:

- Altered temperature, pH, and in-stream flows
- Habitat loss and degradation
- Fecal coliform
- Fish populations including salmon, other aquatic life, and recreational uses at risk

Actions taken or proposed: A Water Quality Management Plan that includes basin characterization and problem identification; a basin and subbasin action plan; and technical appendices has been completed for Yakima Basin. Future work will center on action plan implementation and local government and public involvement/participation.

Stakeholders:

Agricultural, development, and timber interests
Bonneville Power Administration
Concerned citizens
Environmental interests
State and local government
U.S. Environmental Protection Agency
Yakima Indian Nation

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