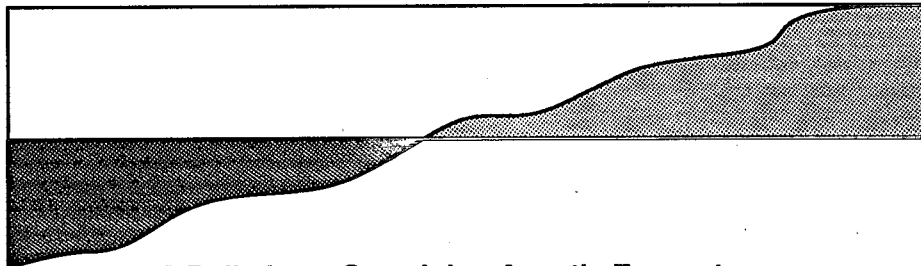




Watershed Events



A Bulletin on Sustaining Aquatic Ecosystems

Watershed Events Expands

With this issue, *Watershed Events* gains a board of contributing editors who represent eight federal agencies. This editorial expansion demonstrates the continuing commitment by the federal sector to work together to restore, manage, and protect aquatic resources.

By broadening the editorial base for *Watershed Events*, we hope to be able to better inform our readers of the watershed activities underway at the federal level. We intend to tap our collective knowledge in order to provide you with a broad picture of federal efforts. At the same time we plan to continue to bring you news of activities at the regional, state, and local level.

The U.S. Environmental Protection Agency (EPA) will continue to coordinate *Watershed Events*, and the agencies represented by contributing editors will provide input on a regular basis. The agencies joining EPA are:

- * Federal Highway Administration
- * National Oceanic and Atmospheric Administration
- * USDA Soil Conservation Service
- * Tennessee Valley Authority
- * U.S. Army Corps of Engineers
- * U.S. Bureau of Reclamation
- * U.S. Fish and Wildlife Service
- * U.S. Geological Survey



US Army Corps
of Engineers

Corps Initiates New Research Program to Evaluate Environmental Investments

by Leigh Skaggs, U.S. Army Corps of Engineers

Throughout the Nation, awareness and concern for the protection and restoration of environmental resources is increasing. Within the U.S. Army Corps of Engineers (Corps), new Congressional authorities (e.g., Sections 306 and 307 of the Water Resources Development Act (WRDA) of 1990, Sections 1103 and 1135 of WRDA 1986) and policy changes are providing more and more opportunities to pursue environmental initiatives. This increased emphasis on the environment, however, brings with it a need for improved techniques for evaluating and comparing environmental projects and programs.

More than one way to address a particular problem almost always exists, and typically more projects and programs are waiting to be undertaken than funds are available. Currently, however, there is a lack of accepted methods for assessing the effectiveness (does the project achieve its objective?) and efficiency (is it the least costly?) of investments in the protection or restoration of environmental resources.

To address these issues, the Corps has initiated the Evaluation of Environmental Investments Research Program (EEIRP). The EEIRP is intended to provide Corps planners with methodologies and techniques to aid in developing supportable environmental restoration and mitigation projects and plans. Additionally, the EEIRP will develop a framework to provide deci-

sion makers with information to facilitate the allocation of limited funds among a range of proposed projects and programs.

Historic Focus

Historically, the Corps' Water Resources Development Program has been charged with improving and maintaining navigable waterways and reducing flood damages. Along with these primary missions have arisen complementary programs for generating hydroelectric power, providing

EEIRP continued on page 11

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Watershed Events

Anne Robertson, Editor
U.S. Environmental Protection
Agency

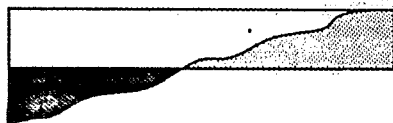
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Watershed Events is intended to update interested parties on the development and use of watershed protection approaches. These approaches consider the primary threats to human and ecosystem health within the watershed, involve those people most concerned or able to take actions to solve those problems, and then take corrective actions in an integrated and holistic manner.

Direct questions and comments
about *Watershed Events* to:

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Reclamation's Plunge into Watershed Activities

by Carrie Carnes, U.S. Bureau of Reclamation

From 1902 through the early 1990s, the U.S. Bureau of Reclamation (Reclamation) was a dam building agency renowned for its superior civil works structures. Today, those solid structures still stand in their stately significance. The dams will remain standing, but few more will be constructed. The dam building era has come to an end.

During the last 90 years, Reclamation, originally founded to reclaim water for agriculture, became multi-purpose in scope, providing water for fish and wildlife, recreation, energy, and flood control benefits.

Today our mission has evolved even further to meet demanding needs for the management, development, and protection of water and related resources. Where we once reclaimed the arid West, now we are reclaiming the watersheds that have been depleted over the years due to dams, grazing, fishing, pollution, the demands of a growing Western population, and natural causes.

To accommodate this change, we have shifted our focus to new priorities, which center on improving water management, operating and maintaining existing multipurpose facilities, and restoring and enhancing the environ-

ment. Being one of the world's leading water resource management agencies means tackling water resource challenges on a watershed/river basin level.

Reclamation recognizes the need to better coordinate watershed management by enacting interagency commitments. Since the Nation's natural resources don't end where administrative boundaries begin, interagency cooperation and partnerships are key to providing better protection and management for the Nation's natural resources.

Reclamation is heavily involved in many interagency watershed initiatives. They include the Glen Canyon Dam (Arizona) Environmental Impact Statement project, the Lower Colorado River (Arizona, California, New Mexico, and Nevada) Management Group, and the Lake Mohave (Nevada) Endangered Fish partnership on the Colorado River.

As we work toward our goal of becoming the world's foremost water resource management agency, we will continue to form close ties with others interested in watershed restoration.

For more information, contact Carrie Carnes, U.S. Bureau of Reclamation, W1540, 1849 C St., NW, Washington, DC 20240, (202) 208-4662.

A Note from the Editor

It has been brought to my attention that the story entitled "The Blind People and the Watershed—A Parable," an adaptation by Jeffrey Keidel, which was published in the Spring 1994 issue of *Watershed Events* was offensive to some readers especially those who are visually impaired. I would like to express my sincere apologies for this offense. The intention was certainly not to offend but to provide a tool that illustrates the need for all of us to consider all perspectives, not just one's own, when working in a watershed.

If any of you are considering using this parable as a tool in the future, I urge you to remove all references to blindness and visual impairment and change the title to "Seven People and a Watershed." This revised version of the parable will clearly illustrate that all points of view need to be considered and will not unintentionally offend members of your audience.

For information on speaking and writing about people with disabilities, contact the President's Committee on Employment of People with Disabilities, 1331 F Street, NW, Washington, DC 20004.



Texas Aquifer Study Offers Clues to Controlling Highway Runoff

by Ginny Finch, Federal Highway Administration

How do you study storm water runoff during a drought?

A rainfall simulator was the solution for water quality researchers from the Texas Department of Transportation (TxDOT) and the University of Texas at Austin. For the past two years these researchers have been using such a system to spray both traffic and road surfaces on the city's Loop 1 expressway.

Why go to all this trouble? Because the research team wants to protect a threatened aquifer—the Edwards Aquifer. The four-year, \$1.4 million project funded by TxDOT is designed to predict runoff's effects on water quality and quantity in the Edwards before, during, and after construction of Loop 1 and, in the process, to create a storm water runoff prediction model for the entire watershed.

The Edwards: No Ordinary Aquifer

The Edwards, the only underground source for Austin's drinking water (and therefore covered under the "sole source aquifer" program of the Safe Drinking Water Act), is a fragile aquifer. It is covered by only thin layers of topsoil, so runoff flows virtually unfiltered into the aquifer. What's more, the Edwards Aquifer is more like a pipeline than a filter, because it is made of cracked, cavernous limestone. "Since limestone is porous, surface water disappears quickly like water flushed through a plumbing system," says Carlos Swonke, Water Quality Coordinator at TxDOT. "In a more conventional, less porous aquifer system, water moves more slowly—slow enough to be filtered."

According to the U.S. Geological Survey, 85 percent of the water reaching the Edwards originates in creek beds in the recharge zone, so the Loop 1 researchers have focused mostly on these areas. To prevent runoff into the creeks, they have tested temporary barriers like geotextile silt "fences" and more permanent water pollution controls like sand filters and sediment ponds.

Their work has been thorough. To capture individual runoff pollutants at

predetermined intervals, they used the rainfall simulator—fifty 4.3 meter-high tripod stands, each mounted with a spray head, extending over a 228.6-meter length of highway. They have taken water samplings above and below new highway construction, in both dry and wet periods, and in varying traffic conditions. They have also conducted an extensive literature search on highway runoff and published their review in a 160-page technical report (*A Review and Evaluation of Literature Pertaining to the Quantity and Control of Pollution from Highway Runoff and Construction*).*

Kinds and Amounts of Highway Runoff Determine Solutions

The starting point for the Edwards research team was to discover the kinds and amounts of individual pollutants in the runoff. "The amount of damage to the environment caused by runoff depends on where it ends up," says Lyn Irish, designer of the project's rainfall simulator. "Before we build pollution controls, we've got to find out what's in the water and in what quantities."

The critical "first flush" of runoff which the TxDOT and university researchers examined contained nutrients, heavy metals, and suspended solids. When they tested various runoff controls, they found that sand-only filters didn't work well for these compounds—the filters clogged easily. When the researchers placed an alternative medium such as coal, fibric peat,

humic peat, or zeolites below the sand, they got better results.

Once the project's researchers know more about which filters work best in treating runoff, they'll be able to develop a prototype runoff control measure.

By the time the Edwards Aquifer research is completed, the Loop 1 researchers will also have clearer answers to questions like these: What is the relationship between average daily traffic and the amount of pollutants in the runoff? How do the number of dry days preceding a storm affect runoff water quality? How significant are the intensity and the duration of the storm? What structural controls work best for treating storm water runoff? How much runoff do you need to catch to control pollution?

AND...water quality experts across the country will have access to a state-of-the-art watershed computer model which can predict both the type and amount of contaminants for a site-specific location.

For more information, contact Carlos Swonke, Water Quality Coordinator, Environmental Division, TxDOT, 125 E. 11th, Austin, TX 78701, (512) 416-2625.

*This report can be ordered from: The University of Texas at Austin, Center for Research in Water Resources, Balcones Research Center, Austin, TX 78712, (512) 471-3131, FAX: (512) 471-0072.



NOAA To Open Center for Ecosystem Health

by Elleen Kane, National Oceanic and Atmospheric Administration

The National Oceanic and Atmospheric Administration's (NOAA) Center for Coastal Ecosystem Health is scheduled to open this summer in Charleston, South Carolina. The Center is expected to become a focal point for addressing specific problems, such as nonpoint source pollution, nutrient over-enrichment, and habitat loss and degradation. The overall goal of the Center is to contribute to the development and application of improved management strategies for achieving coastal

ecological, cultural, and economic sustainability. Planning teams hope to meet the Center's goal by forging partnerships between science and management communities to provide the technologies, methodologies, and information necessary to assess, predict, and improve the health of the Nation's regional coastal ecosystems.

The Center is scheduled to open in phases. The section opening this summer provides library-type facilities for NOAA Center continued on page 12



Understanding Water Quality in the Hudson River Basin: Working Together to Solve the Puzzle

by Karen R. Murray and Ward O. Freeman, U.S. Geological Survey

Understanding water quality is like working on a jigsaw puzzle in which each piece of information contributes to the final picture. Chemical, physical, and biological conditions and their interactions need to be described, and effects of farming practices, urbanization, water use, and other human activities need to be determined. The National Water Quality Assessment (NAWQA) Program of the U.S. Geological Survey provides some of this information for the Hudson River Basin by conducting field investigations that include stream and ground water chemistry, fish and insect ecology, and sediment contamination surveys. Because no single program can provide all the pieces to this puzzle, NAWQA personnel share data, coordinate sampling, and discuss findings with scientists and resource managers from universities, state and local governments, and private groups to help complete the picture. NAWQA scientists also participate in high school education programs to help foster an interest in water resource investigation so that some of these young people may contribute to future work on the "water quality puzzle." Some examples of how NAWQA scientists work with others are summarized below.

Local Guidance Through Liaison Committee

NAWQA project personnel work with a liaison committee of government researchers and managers, university scientists, and others in many stages of the project, from design and data collection to interpretation of results. Early in the design of the Hudson River Basin study, the liaison committee identified locally critical water quality issues, including nonpoint source pollution of rivers and streams from urban and agricultural runoff; contamination of suspended sediment by metals; contamination of the Hudson River's bottom sediments, water, and the food web by PCBs; and the lack of information on ground water quality in the basin. They also suggested locations for stream and aquifer surveys. Periodic liaison committee meetings provide a forum for

informing water resource managers and scientists of NAWQA's findings and discussing water quality issues. For example, a recent liaison meeting included presentation of preliminary results from (1) a survey of contaminants in fish tissue, (2) a survey of water chemistry in 42 streams, and (3) a study of historical trends in stream and ground water quality. The meeting also included presentation of research being done in the basin by two other agencies.

Teaming Up With New York State

NAWQA personnel coordinated data collection efforts with several State programs to enhance acquisition and use of water quality information. One example

Contamination of rivers and streams by metals is a major water quality concern...

is coordination between the NAWQA program and the Rotating Intensive Basin Survey (RIBS) of the New York State Department of Environmental Conservation. The objectives of the NAWQA program and RIBS are complementary—NAWQA's focus is nonpoint source pollution such as urban and agricultural runoff, whereas RIBS' focus is point source pollution such as effluent from sewage treatment plants. Scientists from NAWQA and RIBS frequently cooperate to collect samples and share data. "Teaming up" this way allows both programs to obtain more information on a greater number of streams than either program could afford to obtain on its own, and may increase our knowledge of the relative contribution of point source and nonpoint source pollution to water quality conditions in the Hudson River Basin.

Training Future Scientists

NAWQA scientists help support environmental education in 13 local high schools that participate in the River Watch Network. River Watch Incorporated and other private and public sponsors provide training for teachers, tech-

nical advice, and equipment to give students hands-on experience in stream measurements, chemical sampling, and identification of aquatic insects. Sharon Behar, Education Coordinator for River Watch, said, "The success of this pilot project exceeded our expectations in terms of the numbers of students involved, sustainability of the program after the grant period, and school-community connections."

Modelling Watersheds

Excessive amounts of carbon, nitrogen, and phosphorus in streams can cause water quality problems such as nuisance algal blooms, oxygen depletion, and damage to fisheries. Nutrients in runoff from urban and agricultural lands into lakes and rivers commands national attention and is also of concern in the Hudson River Basin. Dr. Robert Howarth, project director of the Watershed Modelling Program at Cornell University (Ithaca, New York), states, "To fully understand the effect of land use on the export of sediments and chemical constituents to the Hudson River will require data from actual watersheds."

Dr. Howarth and his team use field data, provided by NAWQA scientists, to develop a computer model of the quantities of sediments, nutrients, and organic material discharged to the Hudson River from watersheds with various land use and geologic characteristics. The use of NAWQA data in this model could vastly expand the NAWQA program's spatial coverage within the Hudson River Basin.

Researching Hazardous Metals Transport

Contamination of rivers and streams by metals is a major water quality concern, according to the Hudson NAWQA liaison committee. For example, the world's highest known levels of contamination by elemental cadmium and nickel have been found in sediments of Foundry Cove, a U.S. Environmental Protection Agency Superfund site on the lower Hudson River (near West Point). High concentrations of these metals can be toxic to fish, other wildlife, and hu-

mans. Dr. Ronald Gibb, of the University of Delaware at Lewes, is exploring the way in which waterborne sediment particles transport these and other metals into the Hudson River. NAWQA scientists are collecting suspended sediment samples for Dr. Gibb's study. This cooperation between researchers at the University of Delaware and NAWQA personnel will help explain how metals and other contaminants such as PCBs are transported in the river.

National Geographic Society Supports NAWQA Related University Research

Two studies on water quality in the Hudson River Basin are currently (1994) funded through a memorandum of agreement between NAWQA and the

National Geographic Society. Dr. Richard Bopp, of Rensselaer Polytechnic Institute (Troy, New York), was awarded a grant to conduct a basinwide study involving age determination of contaminated bottom sediments in the Hudson River Basin. Dr. Bopp states, "One of the best means to characterize major sources of contaminants and to reveal historical trends in contaminant levels is through the use of dated sediment cores."

The second National Geographic Society grant was awarded to Dr. Rebecca Schneider of Cornell University, to investigate the effect of wetlands on Hudson River water quality. "Wetlands play a major role in trapping sediments, decreasing nutrient concentrations, storing flood waters, and mediating the ef-

fects of other factors on water quality in a stream system," says Dr. Schneider.

PCB Findings Lead to State Follow-Up

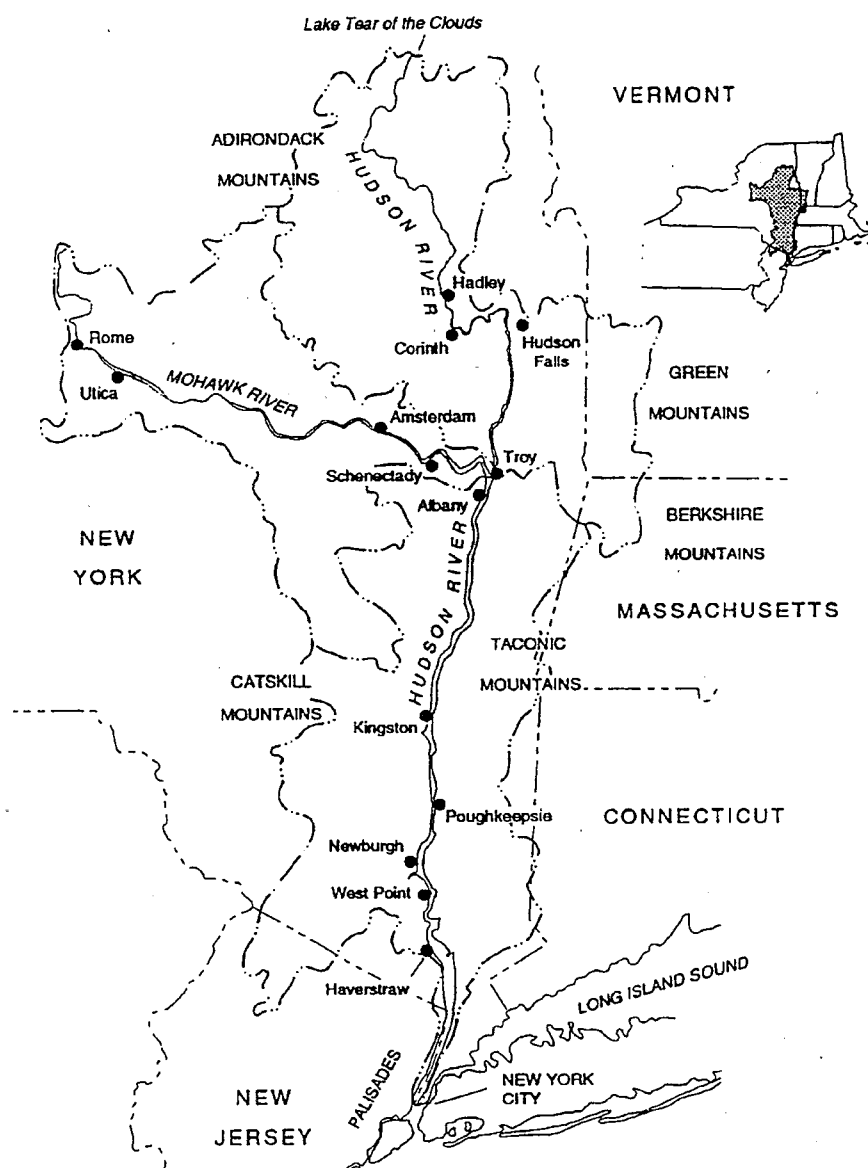
PCBs can bioaccumulate to high levels in fish, birds, and mammals. They are known to produce toxic effects in these organisms and may cause cancer in humans. PCBs were once widely used in electrical transformers and hydraulic fluids and for many other industrial applications. Although use and production of PCBs have been banned for many years, these contaminants are highly persistent in the environment.

PCBs were one of the more common synthetic organochlorine compounds detected in fish specimens in a 1992 NAWQA survey of 13 sites on streams and rivers in the Hudson River Basin. PCB concentrations in fish tissue corresponded broadly with the degree of urbanization and industrialization in the watershed.

Highest concentrations of PCBs were found in fish from the Hudson River and its largest tributary, the Mohawk River. NAWQA results for the Hudson River correspond with levels previously documented by the New York State Department of Environmental Conservation and do not indicate any new conditions. PCB concentrations in whole body composites of carp (*Cyprinus carpio*) from the Mohawk River were as high as 33 micrograms per gram (parts per million). These concentrations indicate a need for additional information on conditions and causes of PCB contamination. After a briefing on NAWQA findings, State scientists have taken steps toward establishing a health advisory for the affected reach of the Mohawk River. They are also planning a follow-up survey to (1) assess PCB concentrations in game fish and other species, (2) delineate the affected section of river, and (3) investigate possible sources.

Linking of the NAWQA PCB findings with subsequent State follow-up is a good example of working together to assemble pieces of the puzzle and thereby improve our understanding of water quality in the Hudson River basin.

For more information, contact Chief, Hudson River Basin NAWQA, U.S. Geological Survey, P.O. Box 1669, Albany, NY 12201, (518) 472-3107.





Integrating the NPDES Program with Watershed Protection

by Dan Weese, U.S. Environmental Protection Agency

On March 21, 1994, Bob Perciasepe, Assistant Administrator for Water at the U.S. Environmental Protection Agency (EPA), signed the National Pollutant Discharge Elimination System (NPDES) Watershed Strategy. The Strategy was developed over a six month period with detailed input from states and all of EPA's water programs. Because of its broad range of functions and activities, the NPDES program occupies a unique position within the overall water program; it is both a key customer and an essential partner in supporting and achieving many of EPA's broader water quality goals.

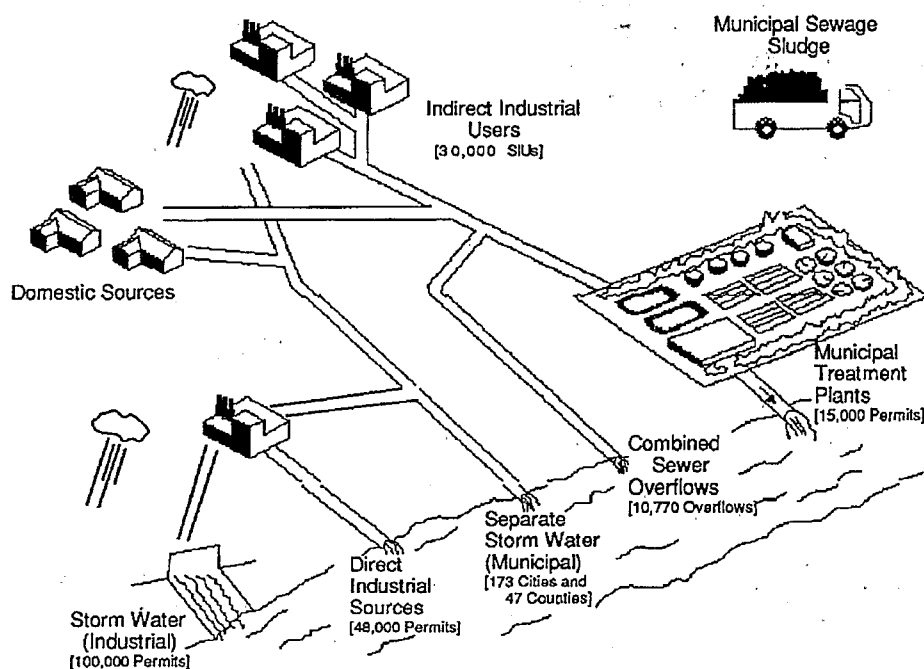
Over the past 20 years, the NPDES program has employed technology-based and water-quality-based permit requirements to achieve significant reductions in pollutant discharges to surface waters from hundreds of thousands of NPDES regulated entities. The schematic to the right illustrates the scope of the NPDES Program. There are approximately 48,000 industrial sources—commercial and manufacturing facilities that discharge process wastewater directly into waters of the United States. Municipal sources, or the discharge points of Publicly Owned Treatment Works (POTWs), number about 15,000. The National Pretreatment Program regulates 30,000 significant industrial users (SIUs) and several hundred thousand other non-domestic sources which discharge wastes to POTWs.

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. 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.

- **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



Scope of the NPDES Program

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:

- **State-wide Coordination** - Promote development of basin management frameworks that identify the roles and responsibilities of participating programs, establish long-term programmatic and environmental goals, geographically delineate basins, and establish a schedule for periodically evaluating the environmental condition of each basin.
- **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 strategies 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 provide 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 sur-

face 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, Assistant Administrator Bob Perciasepe has asked each EPA Regional office to complete the following action items by September 1, 1994:

- **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.

During the months of June and July 1994, staff from EPA Headquarters visited each EPA Regional water program office to gain an understanding of its process for completing these action items. The information gathered during the visits will be compiled into a national report summarizing and highlighting Regional efforts to implement the NPDES Watershed Strategy. A major objective of the national report is to provide information to Regions about other Regional successes and needs as they implement the Strategy.

For more information, contact Jeff Lape, NPDES Watershed Matrix Manager, U.S. EPA (4203), 401 M St., SW, Washington DC 20460, (202) 260-5230.

Recent Releases

Biennial Report to Congress on the Administration of the Coastal Zone Management Act, 1992-1993 - A 2-volume report featuring over 200 pages of photographs, feature articles, and fast facts, all describing the progress of coastal programs under the Coastal Zone Management Act. Contact Elaine Vaudreuil, NOAA, 1305 East-West Hwy., N/ORM4, Silver Spring, MD 20910, (301) 713-3087.

Drinking Water Glossary: A Dictionary of Technical and Legal Terms Related to Drinking Water (EPA810-B-94-006) - An A to Z glossary of drinking water terms. Contact NCEPI, 11029 Kenwood Rd., Bldg. 5, Cincinnati, OH 45242, FAX: (513) 891-6685.

National Estuary Program: Bringing Our Estuaries New Life (EPA842-F-93-002) - Describes the National Estuary Program and the 21 estuaries currently in the program. The reverse side folds out into a poster with a list of contacts. Contact NCEPI, 11029 Kenwood Rd., Bldg. 5, Cincinnati, OH 45242, FAX: (513) 891-6685.

Office of Ground Water and Drinking Water Publications (EPA810-B-94-001) - Lists publications currently available from the U.S. Environmental Protection Agency's Office of Ground Water and Drinking Water. Contact NCEPI, 11029 Kenwood Rd., Bldg. 5, Cincinnati, OH 45242, FAX: (513) 891-6685.

Slope Stabilization and Erosion Control Using Vegetation: A Manual of Practice for Coastal Property Owners (#93-30) - Designed for property owners currently experiencing slope erosion problems. Contact Douglas Canning, Washington State Department of Ecology, Shorelands Program, P.O. Box 47690, Olympia, WA 98504-7690.

Vegetation Management: A Guide for Puget Sound Bluff Property Owners (#93-31) - Describes how property owners can manage existing slope vegetation. Contact Douglas Canning, Washington State Department of Ecology, Shorelands Program, P.O. Box 47690, Olympia, WA 98504-7690.



TVA's Clean Water Initiative Starts to Pay Off

by John Camarata, Tennessee Valley Authority

In 1992, the Tennessee Valley Authority (TVA) announced its goal of making the Tennessee River the cleanest and most productive commercial river system in the Nation. To get the job done, TVA created the Clean Water Initiative (CWI) (See Spring 1993 *Watershed Events*, "TVA Launches Clean Water Initiative"), an organization comprised of small, self-directed teams of technical specialists. Eventually, each of the TVA region's twelve watersheds will have a River Action Team (RAT) assigned to it.

The mission of each RAT is to work with other agencies, private groups, and concerned citizens to clean up the Tennessee River. Four RATs are now operating, with several more slated for startup in the next fiscal year. They are collecting data about water resource conditions in their assigned watersheds and developing cooperative projects aimed at solving priority pollution problems as well as protecting unique resources. Since its inception in 1992, the CWI has achieved several successes, a sample of which are described below.

Monitoring the River's "Vital Signs"

The first step toward protecting and improving our lakes and streams is an evaluation of their condition. Therefore water quality monitoring and assessment are vital parts of CWI operations.

TVA now operates one of the most comprehensive water quality monitoring programs in the Nation. Physical, chemical, and biological variables are measured at key locations on most of TVA's 35 lakes and on major tributary rivers and streams. TVA also monitors about 260 swimming areas, checking them for fecal coliform bacteria, as well as cooperating with state agencies to check fish for toxic contamination.

The results of all this testing are used to evaluate the overall condition of the river system, identify areas that need corrective action, and measure the effectiveness of programs already in place.

TVA conveys the monitoring results to the public through CWI's an-

nual report on the river's condition, called *RiverPulse*. Produced in the form of a colorful magazine, *RiverPulse* is written primarily for people who live on TVA lakes or use them for recreation. Its simple maps and graphics give readers the answers to three main questions: where is it safe to swim? is it safe to eat the fish? and what is the overall health of the river? *RiverPulse* provides the public with understandable information on the health of the rivers and streams and is one of the best received publications TVA has ever released, with a distribution of over 60,000.

Middle Fork Holston

"Come on up and sit on the front porch, and you can tell me about what's going on in the creek." Dairy farmer Sonny Johnson's invitation was a surprise to Frank Sagona of TVA's Clean Water Initiative. Around Hutton Creek, a tributary to the Middle Fork Holston, when a person invited you up on the porch to talk, it meant that they wanted to listen to what you had to say. Frank had been monitoring this part of Hutton Creek for two years, and he knew that the invitation was important. Building bridges and forming partnerships with people is TVA's style of working for clean water, and this chance was too good to miss.

At the time of the invitation, taking samples from the creek was the extent of Frank's involvement in the watershed. You didn't have to be a scientist to tell that the creek was in trouble. "You just had to go stand on the bank and look in," said Frank. The water was full of mud and animal waste, and there were few fish to be seen. Frank decided that a fish survey might give a clearer picture. That picture was a bleak one. Hutton Creek rated in the "poor" category.

When Sonny and Frank first began talking on the porch, Frank worried about how to tell Sonny, without offending him, that his dairy was polluting the creek. It turned out that the Johnsons were already working on their own conservation projects. "When Frank came, we had cattle on the creek,

and we knew that it was a bad situation . . . but while there's a lot of things you'd like to do, you just can't do them all at once," remembers Sonny.

Sonny was retired, and his son David was running the farm. Sonny began to talk about his boyhood, how he fished and swam in the creeks, and how clean the water was then. He wished his grandchildren could enjoy those streams like he once did.

That talk on Sonny's porch grew into a partnership for TVA and a lasting friendship. Frank Sagona learned that the Johnson family wanted cleaner water in Hutton Creek, and the Johnsons learned that TVA wasn't there to tell them what they had to do on their own land. There was no need to search for common ground; they were standing on it.

The Holston Watershed, covering parts of northeast Tennessee and southwest Virginia, was one of the first four watersheds to have a river action team assigned to it. TVA's partnership with the Middle Fork Holston Water Quality Committee and concerned citizens like the Johnsons is paying off with increased awareness of water quality issues in the area, and cleaner water in the Middle Fork Holston. The Holston RAT has collected extensive data on the water resources of the watershed; is helping with a cleanup project for Steele Creek Lake in Bristol, Tennessee; and supporting local officials in their efforts to organize a North Fork Holston Water Quality Committee.

Meanwhile, David Johnson's sense of ecological responsibility has helped turn the family farm into a model operation featuring fenced creek banks, controlled animal crossings, and state of the art animal waste handling systems. It's paying off. The dairy operation is growing, the stream is cleaner, and the fish are coming back.

A third generation joined the partnership when David's wife Jo launched her Girl Scout Troop on a water quality monitoring project. The Scouts, including two of their three daughters, used equipment supplied by TVA to monitor the creek and then presented

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SCS Reviews PL-566 Small Watershed Projects

by Christine Williams, USDA Soil Conservation Service

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) is reviewing all Public Law 83-566 (PL-566) Small Watershed Projects under construction or approved for future construction. The purpose of the review is to ensure that each project supports local needs and meets environmental standards.

For 40 years, PL-566 projects have aided many rural communities, improved soil conservation, and reduced upstream flood damages. Some practices that may have been appropriate 40 years ago, however, may no longer be the best choice for today. The focus on structural measures, such as dams

and channels for flood prevention, tended to be high in cost and environmental impact. Over the past 15 years, SCS has been redirecting the PL-566 Small Watershed Program to take a more ecosystem-based approach.

SCS Chief Paul Johnson has called for a more comprehensive approach to managing natural resources in all programs administered by the agency and has established a team to evaluate the Small Watershed Program. This evaluation should help SCS better meet society's natural resource conservation needs and make the changes needed to improve service. This evaluation will be made in two phases—an initial

screening for removing infeasible work from current plans and an analysis of incomplete structures that can be completed.

In the long-run, SCS plans to have an improved watershed program—one that takes advantage of the unique perspective of the watershed approach, has ample support, and works for the good of the ecosystem and its local community. For more information contact Tom Wehri, Assistant Director, Watershed Projects Division, SCS, P.O. Box 2890, Washington, DC 20013-2890, (202) 720-9574, FAX: (202) 690-1462.



New Watershed Approach in Prince William County

by Rich Everett and Tamara McCandless, U.S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service (USFWS), working through its Chesapeake Bay field office in Annapolis, Maryland, joined a consortium of federal, state, and local partners to develop a new, innovative approach to watershed management in the Mid-Atlantic region. The multi-million dollar program to restore urban watersheds was initiated by the U.S. Environmental Protection Agency (EPA) and the government of Prince William County, Virginia to develop a watershed management program that integrates environmentally sensitive management of urban storm water runoff with protection and restoration of streams and wetlands. Development of the Prince William County program, which will occur over a five-year period, will set the stage for other areas to adopt a more environmentally feasible approach to watershed management. Additional program partners include the U.S. Army Corps of Engineers (Corps), U.S. Geological Survey, Virginia Polytechnic Institute and State University, George Mason University, and the Northern Virginia Planning District Commission (NVPDC). Principal funding sources for the program have been Prince William County, NVPDC, and the participating federal agencies.

Prince William County, located 30 miles south of Washington, DC, is facing rapid development under newer, stricter, water quality regulations. The county has been pressing EPA and the Corps to permit regional storm water management ponds as an alternative to many small on-site water detention facilities. Regional facilities, although perceived as better from an engineering standpoint than on-site structures, can have serious adverse effects on wetland and stream channel habitats through changes in hydrological regimes. A principal objective of the collaborating partners is to develop alternative, ecologically sensitive approaches to storm water management that can be implemented as the area is being transformed by residential and commercial development.

As part of this effort to restore urban watersheds, a model project to evaluate the effectiveness of riparian restoration as a best management practice for addressing storm water impacts will take place in the county. Three contiguous watersheds are serving as demonstration sites for this model watershed management project: Neabsco Creek, Powells Creek, and Quantico Creek. The three watersheds provide an excellent opportunity within which to develop and imple-

ment a more ecologically compatible approach to storm water management.

Neabsco Creek watershed has suffered significant habitat degradation from loss of natural land cover due to past development and storm water facilities designed without consideration of environmental conditions. Development in the watershed spans the range of low density residential to high density commercial. The focus in Neabsco Creek watershed will be to develop innovative approaches and techniques that can be retrofit into the existing developed landscape and restore natural stream functions and habitat for fish and wildlife.

Powells Creek watershed, predominantly rural, faces heavy development pressure over the next two to three decades. Stream and wetland habitat conditions in the upper watershed and estuarine habitats in the lower watershed are better than in Neabsco Creek, but are already beginning to exhibit signs of stress from increasing development. The challenge in Powells Creek watershed is to develop a system of protective methods that can be implemented prior to or during development.

Quantico Creek watershed, serving as a reference site, is somewhat

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Calendar of Events

Watersheds '94: Creating the Links...People, Politics, Science and Stewardship
September 28 - 30, 1994
Bellevue, Washington

This conference will identify approaches and strategies for effective watershed stewardship. The goal of the conference is to share information about watershed tools, technology, and philosophies and to build partnerships. For more information, contact Andrea Lindsay, U.S. EPA, (206) 553-1896 or 1-800-424-4EPA, or Bob Naiman, University of Washington, (206) 543-6920.

Riparian Forest Buffers in the Chesapeake Watershed
October 5 - 6, 1994
Ellicott City, Maryland

This meeting will examine the science of buffers, the policy issues and technical challenges related to establishing them, and the concerns of landowners and local governments related to costs, incentives, and long term management. Case studies illustrating successful buffer programs will be presented. For more information, contact Fran Flanigan, Alliance for the Chesapeake Bay, 6600 York Rd., Suite 100, Baltimore, MD 21212, (410) 377-6270.

14th International Symposium of the North American Lake Management Society
Managing Water Resources for the 21st Century: Finding Workable Solutions
October 31 - November 5, 1994
Orlando, Florida

This symposium will provide an opportunity for attendees to discuss issues related to the management of lakes and reservoirs. Topics include forest watershed management, role

of wetlands in water resource management, the role of ecoregion management, and basin-wide management case studies. For more information, contact North American Lake Management Society, 14th International Conference, One Progress Blvd., Box 27, Alachua, FL 32615-9536, (904) 462-2554.

30th Annual AWRA Conference
November 6 - 10, 1994
Chicago, Illinois

This national symposium will focus on water quality, the future of the Great Lakes, and the National Water Quality Assessment Program. For more information, contact American Water Resources Association, 950 Herndon Pkwy., Suite 300, Herndon, VA 22070, (703) 904-1225.

Watershed WISE:
A Workshop on
Watershed Ecology
November 14 - 16, 1994
Grand Junction, Colorado

This workshop is intended to encourage and support practical and effective approaches to watershed stewardship, and allow participants to share experiences and exchange ideas, tools, technology, philosophy, and values useful to watershed initiatives. The workshop focuses on western watersheds. For more information, contact Thorne Ecological Institute, 5398 Manhattan Circle, Suite 120, Boulder, CO 80303, (303) 499-3647, FAX: (303) 499-8340.

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Women Thinking Globally, Acting Locally: On the Road to Beijing and the 21st Century
November 15, 1994
Oakland, CA

This official U.S. preparatory meeting for the Fourth United Nations (U.N.) Conference on Women, which will take place in Beijing, China in September 1995, will provide workshops for participants to examine issues such as the particular susceptibility of women to certain health effects (breast cancer, reproductive damage) due to consumption of contaminated fish or shellfish and how women can increase their access to environmental decision-makers. For the first time the U.N. Platform for Action on the Status of Women will address the relationships between women and their environments (home, work, community, global). For more information, contact Betsy Tam, U.S. EPA (4504F), 401 M St., SW, Washington, DC 20460, (202) 260-6466, FAX: (202) 260-9960.

Protecting Ground Water: Promoting Understanding, Accepting Responsibility, and Taking Action
December 12 - 13, 1994
Washington, DC

This conference is designed to foster an exchange of practical information on ground water pollution and to educate stakeholders on the tools and techniques they can use to address ground water pollution in their communities. "Ground water and watershed issues: nonpoint sources, ecosystems and surface water" is one of six topics being covered at this conference. For more information, contact Ground Water Protection Conference, c/o Terrene Institute, 1717 K St., NW, Suite 801, Washington, DC 20006, (202) 833-8317, FAX: (202) 296-4071.

EEIRP continued from page 1

water supplies, protecting coastal shorelines, managing natural resources, and providing recreation opportunities. Individual projects typically began with an authorization by Congress to develop a plan to address a particular water resources problem. These studies were most often initiated by local interests. They included a partnership, with non-Federal interests, and public participation in the planning and implementation process. And they were justified by an economic analysis, comparing both project benefits (for example a reduction in flood damage) and construction and operation costs in monetary terms. The traditional engineering projects that resulted (for example dams, levees, and modifications of river channels) were built with the expectation of improving the Nation's material welfare, but often resulted in substantial alterations to existing watershed features and processes.

Changing Public Values

The Corps' water resources program has changed significantly over the past two decades. These changes reflect changing national preferences and desires. Alteration of watersheds for such purposes as flood control and navigation is no longer considered a sure path to economic development. There is more concern today for the protection and restoration of the natural services of heavily altered watersheds, many of which were related to previous Corps water resource development projects.

Since the early 1970s, the emphasis of the Corps' water resources program has shifted from the construction of new projects to the improved operation of existing projects with increased concern for the environment. Today, Corps funds budgeted for the operation and maintenance of existing projects exceed those budgeted for new construction. Environmental restoration is now a "high priority" mission in the Corps budgetary process, along with the more traditional missions of navigation and flood control. In addition, the Corps can participate in the

modification of existing projects for the purposes of fish and wildlife habitat restoration.

Evaluating Environmental Investments

Although there is a change in emphasis, there is every reason to believe the planning approaches of the past might be adapted for evaluating environmental projects. Authorization by Congress for individual projects or programs will still be required, as will partnerships with non-Federal interests and public involvement. Limited funds will be available to allocate among these projects and programs, and there will still be the need to answer the analytical question of how much should the fish and wildlife habitat or the watershed be altered in relation to some existing condition. However, unlike more traditional projects, many outputs of environmental restoration and mitigation cannot be measured in monetary terms. The challenge, therefore, becomes how to select the most efficient and effective projects when they cannot all be compared in like, monetary terms. Questions that the EEIRP must address include how to incorporate "uncertain" measures of output and differing public and institutional values into a rational and supportable evaluation and selection process.

New Research Program

The overall objective of the EEIRP is to provide an evaluation framework, techniques, and procedures to assist planners, managers, and regulators in addressing both the site and portfolio issues; i.e., whether the recommended action is the most effective and efficient alternative for a particular location, and how to allocate limited resources among competing recommended actions. One goal of the program is the development of a series of environmental evaluation procedures manuals ("how to" manuals) addressing various steps in the planning, evaluation, and prioritization processes. To accomplish these objectives, the research program has been divided into ten more specific study areas, called work units. These study areas include:

- Determining and Describing Environmental Significance
- Determining Objectives and Measuring Outputs
- Objective Evaluation of Cultural Resources
- Engineering Environmental Investments - Formulating Inputs and Monitoring Effectiveness
- Cost Effectiveness Analysis Techniques
- Monetary and Other Valuation Techniques
- Incorporating Risk and Uncertainty into Environmental Evaluation
- Environmental Database and Information Management
- Evaluation Framework
- Interagency Coordination and Program Management

Research on each of these topics will take place over the next two years, culminating in the publication of the environmental evaluation procedures manuals series by the end of 1996.

For more information on the EEIRP, contact Darrell Nolton, U.S. Army Corps of Engineers, Institute for Water Resources, 7701 Telegraph Rd., Alexandria, VA 22315-3868, (703) 355-3084.

**Call For Abstracts
National Estuary Program
Coastal Technology
Transfer Conference
February 13-16, 1995
New Orleans, Louisiana**

This conference will focus on four major environmental problems which are common to most estuaries: nutrients, pathogens, toxic substances, and habitat loss. The conference will be designed to share new approaches for identifying, characterizing, and correcting or preventing these problems, as well as assessing progress in estuarine and coastal management. Abstracts are due September 30, 1994. For more information, contact Betsy Tam, U.S. EPA (4504F), 401 M St., SW, Washington, DC 20460, (202) 260-6466, FAX: (202) 260-9960.

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insulated from development pressures because it lies almost entirely within the Prince William Forest National Park and Quantico Marine Base. Habitat quality of streams and wetlands are high throughout the upper watershed. Quantico Creek habitats will serve as a benchmark for habitat quality goals in Neabsco and Powells Creeks.

USFWS's two main objectives as a participant in the program are to restore habitat values and water quality to benefit fish and wildlife populations, and to evaluate restored natural floodplains and wetlands as an alternative to the use of engineered storm

water management facilities. Currently, USFWS biologists are directing two demonstration projects in Neabsco Creek watershed, one in a residential area and the other in a commercial area. The demonstration projects will restore approximately 1 mile of stream channel, 6 acres of associated riparian forest, and 20 acres of emergent wetland habitat. Degradation of these areas has had a direct impact on important habitat for anadromous fish and migratory song birds. The potential pay-offs are three-fold: (1) improvement of water quality and habitat conditions at the restoration sites, (2) demonstration of the cost-effectiveness of habitat restoration for achieving water

quality improvements, and (3) demonstration of the potential for integrating habitat restoration as a component of a comprehensive watershed management program.

Although federal, state, and local protection programs over the last several decades have produced great improvements in the quality of the Nation's aquatic resources, much work remains to rectify generations of neglectful and abusive water policy and practice. Difficult and controversial issues, such as urban storm water management, will require cooperative action by all parties concerned.

For more information, contact Rich Everett or Tamara McCandless, USFWS, Chesapeake Bay Field Office, 177 Admiral Cochrane Dr., Annapolis, MD 21401, (410) 224-2732.

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their findings at a water quality conference organized by the Water Quality Committee. They got a standing ovation. Now Jo wants to make the program a long term effort.

The continuity is encouraging, from the grandfather who remembers how clean the water used to be, to the son working to make it clean again, to the granddaughters who will inherit it and hopefully preserve it. That's what this success is all about.

For more information, contact Chris Ungate, TVA, 400 Summit Hill Dr. (WT-10D), Knoxville, TN 37902, (615) 632-8502.

NOAA Center continued from page 3

people researching coastal and ocean ecosystem management.

NOAA has established a management committee of senior NOAA and state coastal managers to advise the Center on programs and operations. Center activities currently being discussed include providing information on environmental, legal, regulatory, and management practices; offering restoration services; and providing near real-time, high-resolution data from satellite and ocean color sensors for coastal areas.

The Center is being established at the Charleston Navy Yard site. Con-

gress has mandated the closure of the Charleston Navy Yard, and the Center is an example of how closed military facilities can be put to other uses. In addition to utilizing the Navy facilities, the Center may also employ some of the Navy Yard's technical experts and support personnel. The Center will open in phases as the Navy Yard closes in phases.

For more information, contact Joe Uravitch, NOAA, Office of Ocean and Coastal Resource Management, 1305 East-West Hwy., N/ORM, Silver Spring, MD 20910, (301) 713-3087.