July/August 1994
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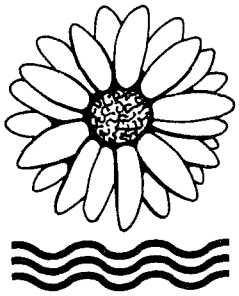

Nonpoint Source News-Notes

The Condition of the Water-Related Environment
The Control of Nonpoint Sources of Water Pollution
The Ecological Management & Restoration of Watersheds

Commentary

Ecological Restoration and the Clean Water Act

by Theresa Tuaño, U.S. EPA Office of Wetlands, Oceans, and Watersheds, Assessment and Watershed Protection Division, Watershed Branch

Water quality management has typically concentrated on limiting negative environmental impacts rather than creating positive ones. However, the Environmental Protection Agency, along with other federal agencies, is now moving toward the creation of positive impacts by encouraging the use of ecological restoration.

Despite the water quality improvements achieved through controlling point sources, it is now clear that physical changes to an ecosystem significantly degrade the value of a waterbody and render an aquatic ecosystem even more sensitive to chemical and biological stressors. A large proportion of the surface waters of the United States, especially lakes, streams, and wetlands, have suffered from chemical, biological, and physical habitat degradation. In its recently issued report, the National Research Council concluded that habitat degradation is a primary factor limiting attainment of beneficial uses of the nation's surface waters.

Restoration means many things to many people. Some envision successful restoration as the return of an ecosystem to its pristine condition, while others strive to imitate an earlier natural, self-sustaining ecosystem that can exist in equilibrium with the surrounding landscape. When discussed in the context of water resource management, restoration can also be thought of as a

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All issues of *News-Notes* are stored in downloadable files on the *NPS Electronic Bulletin Board System*. Additionally, the *NPS BBS* contains a searchable database that allows the user to search for and retrieve *News-Notes* articles on specific topics. To access the database from the main menu, type OPEN. See page 23 for log-on information.

Ecological Restoration and the Clean Water Act (continued)

natural, non-mechanical tool that can be used to build upon existing pollution control efforts in order to meet the goals of the Clean Water Act (CWA). The objective of the Act, as stated in Section 101, is to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters."

Restoration techniques can in fact serve as natural tools for meeting CWA goals when they are appropriately used to restore the natural dynamics of an ecosystem. There are a number of advantages to this approach. First, restoration efforts (such as restoring riparian vegetation or enhancing a wetland area) may increase public understanding and acceptance. Second, while no restoration or maintenance is cost free, natural techniques may cost less than more traditional water pollution controls. Third, a restored stream ecosystem can be self-sustaining and not require continuous operation and maintenance or periodic technology upgrades or improvements. Natural techniques may also provide longer-term solutions.

Water program managers have the opportunity to use restoration techniques within the context of existing water programs and watershed approaches. Restoration may be thought of as a mosaic of BMPs and other techniques that together address the stressors (both chemical and non-chemical) that impact an aquatic ecosystem and that reverse the loss of the ecosystem's functions. For example, restoration may involve rebuilding the infrastructure of an aquatic ecosystem (e.g., re-configuration of channel morphology, re-establishment of riparian vegetation, and stabilization of stream banks, accompanied by control of excess sediment loading within the watershed) so that waterbody integrity can be attained and maintained.

This issue of *News-Notes* explores several activities that relate to this emerging vision of using restoration as a tool for managing water quality. In addition to describing the legal groundwork for the largest ecological restoration project ever attempted in this country, restoration of the Florida Everglades, this issue contains stories of smaller scale restoration activities. For instance, one article recounts a public-private partnership to improve trout habitat by reducing sedimentation in two rural eastern creeks. In the Great Lakes region, another public-private partnership is working to restore the last refuge of an endangered mollusk. Midwestern research activities reported in this issue focus on improving both water quality and habitat through the re-establishment of buffer strips along waterways. Assessment is another critical piece of the restoration framework, and this issue of *News-Notes* relates how lay monitoring programs are incorporating habitat assessment.

In addition, a number of activities in EPA's Office of Water actively support the restoration approach. Among them is a draft document that addresses restoration as a tool for managing stream water quality, scheduled for publication at the end of the year. Current guidance on the award of nonpoint source grants under Section 319(h) of the CWA also puts greater emphasis on funding restoration efforts; it recommends that 10 percent of each state's overall work program be devoted to watershed resource restoration. EPA is also encouraging the restoration and creation of wetlands in an ecosystem/watershed context. (The Wetlands Hotline (1-800-832-7828) offers information on wetlands restoration initiatives.) A symposium on the use of ecological restoration to meet CWA goals is scheduled for spring 1995. Planned jointly with EPA Region 5, the event will draw on ecological, legal, planning, engineering, and economics expertise from government, academia, and private enterprise. The meeting will be a hybrid of brainstorming workshops and technical presentations. EPA envisions the conference to be national, but hopes that it will lead to region-specific follow-on activities. *News-Notes* will keep readers updated on the progress of these activities.

Notes on the National Scene

Everglades Restoration Law Passed

Florida Governor Lawton Chiles signed legislation May 3 that ended years of legal wrangling over the Everglades between the federal government, Florida, and sugar growers. The Everglades Forever Act, built partly from earlier negotiated agreements and plans, clears the way for federal and state restoration efforts by improving the giant complex's hydrology and cutting phosphorus inputs to it.

The Everglades, which once stretched from Lake Kissimmee to Key West, has been whittled down to about half its previous area by urban development and agriculture. Water management

Everglades Restoration Law Passed (continued)

projects built for flood control and water supply have disrupted the natural pulses essential to Everglades life.

According to the Army Corps of Engineers, all water entering the Everglades is now controlled by levees, canals, water control structures, and pumps; much of it is polluted by pesticide and fertilizer runoff from agricultural areas. The altered quality and quantity of water have caused dramatic declines of native species, while nonindigenous plants choke the marshes.

U.S. Deputy Assistant Attorney General Myles Flint traced the legal history of the new law recently when he testified before the U.S. House of Representatives Subcommittee on National Parks, Forests, and Public Lands on June 23.

> *. . . One major step in the process of restoring the Everglades was a 1988 lawsuit brought* [in U.S. District Court] *by the United States against the South Florida Water Management District and the state of Florida (United States v. South Florida Water Management District, et al., No.88-1886-CIV [S.D. Fla.]). The purpose of that lawsuit was to clean up the agricultural pollution, specifically phosphorus, that has degraded Everglades National Park and the Loxahatchee National Wildlife Refuge. With the assistance of Governor Lawton Chiles and Carol Browner, then director of the Florida Department of Environmental Regulation, that litigation was settled and the state of Florida began to work with the federal government to protect this unique ecosystem.* [The litigation was settled in 1991 and adopted as a consent decree in 1992.]
>
> *When the United States and the Florida agencies settled the federal Everglades water quality suit, the government parties agreed on the best technology available for reducing by 80 percent the phosphorus loads in the Everglades from the Everglades Agricultural Area south of Lake Okeechobee. There appeared no prospect at that time for reaching such a settlement with the agricultural interests, and the settlement did not include them. Instead, the settlement provided for implementation of the agreement through the state's administrative process, where the agricultural interests' opportunities to challenge and influence implementation under state law were preserved.*

Agricultural Challenges

> *The agricultural interests, primarily the Florida sugar cane industry, exploited these opportunities zealously. Agricultural challengers filed over thirty lawsuits in state and federal fora to block implementation of the settlement.*
>
> *. . . Despite the efforts of state agencies as well as those of the United States and other intervenors supporting the settlement, the administrative challenges became protracted and complicated . . . This litigation delayed implementation of the settlement and proved expensive and time-consuming for the government parties.*

Mediation

> *By early 1993, the state implementation process had bogged down . . . The government parties agreed to a proposal by agricultural challengers to stay the litigation to pursue mediated settlement negotiations. Over the next nine months, officials from the Department of the Interior and the Department of Justice, as well as EPA and the Army Corps of Engineers, personally spent substantial time in direct negotiations with principals for the agricultural industry, the District, the state, and environmental and tribal groups.*
>
> *Mediation bore substantial fruit. In July, 1993, the United States and other major parties reached an agreement in principle on the major elements of a global settlement, including the critical element of agricultural financial responsibility for cleanup costs. In a Statement of Principles, the major parties endorsed the Technical Plan* [based on the 1992 consent decree], *a network of treatment marshes designed to cleanse greater volumes of water and to provide additional hydroperiod benefits—water quantity, distribution, and timing—for the Everglades.*
>
> *In January 1994, federal officials* [from the Department of Interior] *reached settlement with the largest of the sugar cane industry parties, Flo-Sun, Inc.*

Everglades Restoration Law Passed (continued)

Resumption of Litigation

Mediation, while constructive, did not fully resolve all litigation, and when they reached an impasse in December 1993, the parties resumed intensive preparations for trial. The federal team of eight attorneys participated in several hundred hours of deposition over the three months preceding the scheduled trial date of April 25, 1994.

Then on April 15—ten days before the scheduled trial—the Florida legislature passed the Everglades Forever Act. The Act statutorily precludes the pending administrative challenges.

The State Law

The new Florida state law will address water quality, particularly phosphorus, and hydroperiod problems caused by the diversion of both surface and ground waters. The Act incorporates many elements of the early federal-state settlement agreement.

Under the new state law, Florida will implement a cleanup and restoration plan that includes more than 30,000 acres of publicly constructed and managed wetlands designed to remove phosphorus and improve the hydroperiod. Private interests will be expected to establish innovative on-farm best management practices (BMPs) to reduce nutrients and other pollutants before they leave agricultural lands. Agricultural BMPs and constructed wetlands will be designed to discharge an effluent with a total phosphorus concentration of not more than 50 parts per billion to the public Everglades. Other than the BMPs, agricultural interests will not be required to implement any additional water quality measures (and will be deemed in compliance with all state water quality standards) until 2006. Extensive monitoring and research on BMP effectiveness are also required by the law.

The Everglades Forever Act requires the Florida Department of Environmental Protection to determine, by 2003, a numeric water quality standard for phosphorus that will protect the Everglades. If a rule setting a numeric phosphorus criterion is not adopted by 2003, a default standard of 10 ppb will be set.

The Act directs the South Florida Water Management District to implement an emergency interim plan to begin Florida Bay restoration. The law also directs specific actions on other special lands: restoration of water flow to Taylor Slough, Holey Land, and Rotenberger; acquisition of parts of the Frog Pond; and special protection extended to Everglades National Park, the Florida Keys National Marine Sanctuary, and the Corps of Engineers' Water Conservation Areas.

Funding and Deadlines

Under the Act, agricultural interests will pay a per-acre agricultural privilege tax that will generate between $233 million and $322 million over the next 20 years. The total phosphorus control program is estimated to cost $685 million, with taxpayers making up the difference. In addition, the Army Corps of Engineers will construct an $87 million stormwater treatment area adjacent to Loxahatchee National Wildlife Refuge.

The Act also sets the time frame for implementation. Deadlines include

July 1994	Seeking joint federal sponsorship and approvals to implement the Florida Bay plan. Implementation to commence within 60 days of approval.
Nov. 1994	Annual agricultural tax assessments begin.
1997-2003	Completion of six Stormwater Treatment Areas.
Jan. 1999	Interim research and monitoring report due.
Dec. 2003	Issuance of a numeric standard for phosphorus and plans for addressing remaining water quality problems.
Dec. 2006	All areas of Everglades must meet state water quality standards.

Federal Interests and Activities

State efforts under the Act and federal restoration activities in the Everglades will reinforce one another. Everglades National Park, Big Cypress National Preserve, the Arthur R. Marshall

Everglades Restoration Law Passed (continued)

Loxahatchee National Wildlife Refuge, and the Florida Keys National Marine Sanctuary are all affected by the region's problems. The national interest in south Florida also includes trust responsibility for two Indian reservations.

The Army Corps of Engineers has been directed by Congress to alter the Central and South Florida Water Management Project to restore the natural water supply to the Everglades. The Corps has several restoration projects already underway. (See *News-Notes* issues # 18 and 25 for more information on the Corps' work in the region.)

The Environmental Protection Agency is conducting ecological and technical studies in south Florida. Working with Florida, EPA is establishing NPDES permits for the state-mandated nutrient removal system as well as carrying out Section 319 and wetlands protection programs.

In September 1993, the members of the South Florida Ecosystem Restoration Task Force signed an interagency agreement to:

- Agree on the federal objectives for ecosystem restoration to be incorporated into the reconnaissance study for redesign of the (Corps') Central and South Florida Project.
- Promote the establishment of an ecosystem-based science program that utilizes the strengths of public and private entities and includes research, inventory, monitoring, and modeling.
- Support the development of appropriate multispecies recovery plans for threatened and endangered species and candidate species.
- Encourage expedited implementation of projects, programs, and activities included in coordinated plans for restoration and maintenance of the south Florida ecosystem.

The National Oceanic and Atmospheric Administration has initiated a series of south Florida ecosystem research and development activities, including modeling the condition of Florida Bay and inventorying its seagrasses.

Six federal agencies have formed the South Florida Ecosystem Restoration Task Force. The departments of Interior, Agriculture, Army, Justice, and Commerce, and the Environmental Protection Agency are cooperating to ensure that ecosystem restoration is carried out consistently and effectively. Under the direction of Colonel Terrence "Rock" Salt of the Army Corps of Engineers, the task force is currently developing a comprehensive ecosystem restoration plan.

Status of Everglades Litigation

Not all court cases related to the Everglades restoration are over. While several cases have been dismissed in light of the enactment of the Florida Everglades Forever Act, cross-appeals concerning the federal settlement are pending, as is an action in federal court by the Miccosukee Tribe of Indians of Florida challenging the January 1994 Flo-Sun settlement agreement.

As for future legal issues, the Department of Justice's Miles Flint explained that the Everglades Forever Act

> *provides an exclusive remedy for challenging the agricultural tax in state circuit court. Further, the Act codifies the elements of the clean-up program, eliminating the need to wait for conclusion of administrative proceedings on* [the state's 1992] *Surface Water Improvement and Management Plan or* [Florida] *Department of Environmental Protection permit. Finally, the Act makes findings of fact confirming the need for cleanup and hydroperiod remediation, the suitability of the clean-up program as a remedy for the problems, and the propriety of the terms of the statement of principles as a basis for remediation. Although these findings don't entirely preclude the possibility of future litigation over implementation, they should greatly reduce the number and complexity of issues in such litigation, if any.*

[For a complete copy of the Everglades Forever Act, contact the South Florida Water Management District Office of Government and Public Affairs, 3301 Gun Club Road, PO Box 24680, West Palm Beach, FL 33416-4680. Phone: (407) 686-8800.

For more information on the South Florida Ecosystem Restoration Task Force, contact Dan Scheidt, U.S. EPA Region 4, 960 College Station Rd., Athens, GA 33605-2720.]

AmeriCorps Conducts Environmental Community Service Projects

EPA Receives Grant for National Service Projects

On June 20, the White House announced a grant award of $1.8 million to EPA to conduct six AmeriCorps projects under the President's new National Service Program. The AmeriCorps Program offers opportunities for Americans of all ages to perform community service in return for tuition funding and minimum salaries. AmeriCorps projects are expected to focus on some of the country's most critical problems in environment, education, human services, and public safety.

EPA's projects will target low-income communities in nine states and the District of Columbia. One high-priority project involves participants from the University of Texas at El Paso teaming with the Retired Senior Volunteer Program to help manage sources of contamination to public drinking water wells along the Mexican border. (See *News-Notes* issue # 34, January/February 1994, for an article about RSVP work on a related project.)

In Washington, DC, participants will work with several other organizations to establish a Small Habitat Improvement Program project in the Anacostia watershed. They will assist and involve residents in restoring portions of Anacostia tributaries, increasing awareness of environmental protection needs, identifying trends in environmental quality, reducing erosion, increasing recreational opportunities, and building additional community-level partnerships.

[For more information, contact Jan Shubert, EPA, Office of Groundwater and Drinking Water (4601), U.S. EPA, 401 M St., SW, Washington, DC 20460. Phone: (202) 260-7011.]

National Civilian Community Corps

Another Americorps program, the National Civilian Community Corps, offers community service opportunities for young Americans aged 18-24 in return for educational awards and a small salary. Environment is the primary focus of the NCCC, but other projects can be in education, public safety, or human needs. The NCCC provides human and logistical resources to sponsoring communities, counties, cities, states, federal agencies, and nonprofit community-based organizations. All projects must focus on important problems that cannot be addressed by existing financial and human resources.

Sponsors for projects taking one month or more to complete are being sought at the present time by the National Civilian Community Corps. Shorter-term, high-visibility projects are also encouraged.

A typical project group has 10 or 12 workers and a leader. The corps and cadre members live at military facilities but can be housed at remote locations for project purposes.

The first NCCC campus opened in June at the U.S. Army's Aberdeen Proving Ground in Aberdeen, Maryland. Other campuses will be located in Charleston, Denver, and San Diego.

[For more information, contact David Silverberg, Office of the Director, AmeriCorps-National Civilian Community Corps, 1100 Vermont Avenue, NW, Washington, DC 20520. Phone (202) 606-5000 ext 120.]

Notes On Watershed Management and Restoration

A Watershed-scale Assessment of Sediment Reduction in Two Central Pennsylvania Agricultural Basins

by Robert F. Carline, National Biological Survey, and Neil E. Wohl, Graduate Research Assistant, Pennsylvania State University

Background

The Pennsylvania Cooperative Fish and Wildlife Research Unit and the Centre County Conservation District began a long-term project in 1991 to reduce sediment loads in Spring Creek and assess responses of stream biota. An earlier study had shown that sedimentation in a six-mile reach of Spring Creek had severely reduced reproduction of wild brown trout. Spring Creek is one of Pennsylvania's premier trout streams.

A Watershed-Scale Assessment of Sediment Reduction (continued)

A survey of three sub-basins in the upper portion of the Spring Creek watershed revealed that two basins had extensive amounts of streambank erosion caused by livestock grazing in the riparian zone. The 18-square-mile Cedar Run basin had 2.8 miles of stream that flowed through pastures, and the 17-square mile Slab Cabin Run basin had 2.1 miles of pastured streambank.

Objectives

The objectives of this project are to (1) stabilize at least 90 percent of the eroded streambank in the Cedar Run and Slab Cabin Run basins by installing streamside fencing, using riprap to protect eroding banks (which will revegetate naturally), and constructing rock-lined stream crossings and access points for livestock; and (2) assess important physical, chemical, and biological variables before and after implementation of best management practices. The Pennsylvania Department of Environmental Resources and the Spring Creek Chapter of Trout Unlimited provided funding to get the project underway, and the Sport Fishing Institute helped support the preconstruction assessments. Recently, the U.S. Environmental Protection Agency's Chesapeake Bay Program has provided additional funding. By using public and private funds, work on cooperating farms is being completed at no cost to the landowner.

Preconstruction Assessments

Monitoring of streamflows and sediment loads in Cedar Run and Slab Cabin began in summer 1991. The upper 13-square-mile Spring Creek basin, which has no riparian pastures, served as a reference site. Annual sediment yields from Slab Cabin Run and Cedar Run were 11 and 16 tons per square mile, 52 to 120 percent greater than the sediment yield from the Spring Creek reference site. Densities of benthic macroinvertebrates in Cedar Run and Slab Cabin Run were less than one-half of those in Spring Creek. Densities of one-year-old and older wild brown trout in the reference site were five times greater than those in Cedar Run and 68 times greater than those in Slab Cabin Run. Differences in trout populations among streams may have been influenced by baseflow and water temperatures during summer.

Construction Progress

The first construction project on Slab Cabin Run was completed in August 1992. The eight other landowners with riparian pastures in this basin subsequently joined the program and construction on their properties will be completed by September. Construction in the Cedar Run basin is underway and should be completed by the end of 1995.

Postconstruction Assessments

The present plan calls for initiation of postconstruction assessments two years after the last project is completed in the Cedar Run basin. All variables measured during the preconstruction assessment will be monitored for at least one year. These data will provide a quantitative measure of benefits accrued from these types of BMPs.

[For more information, contact Robert Carline, Pennsylvania Cooperative Fish & Wildlife Research Unit, Merkle Laboratory, Penn State University, University Park, PA 16802. Phone:(814) 865-4511]

Midwest Buffer Strip Research Holds Promise For Restoration

Nebraska Researchers Study Effect of Buffers on Pesticides

In Nebraska, researchers at University of Nebraska-Lincoln have been studying how riparian buffer strips affect the amount of contaminants entering streams during storm runoff. In cooperation with the Lower Platte North Natural Resources District and EA Engineering, Science, and Technology of Lincoln, the researchers have been sampling four sites, each located on a small tributary in the Loseke Creek watershed north of Columbus. The riparian cover on the sites ranges from dense to none.

Kyle Hoagland, an aquatic ecologist in the Institute of Agriculture and Natural Resources, and Marian Langan, a research assistant and graduate student in biological sciences, tested stream water at sites during normal flows and analyzed the samples for pesticides, nitrogen, phosphorus, and other contaminants. They found relatively few compounds at relatively low levels, typically less than 1 part per billion in the water and the sediments, according to Hoagland.

Midwest Buffer Strip Research Holds Promise For Restoration (continued)

But when the researchers took storm runoff samples before field application in May and after application in June, they saw high levels of more than one pesticide compound at the site with no riparian cover. One sample contained more than 600 parts per billion (ppb) atrazine, more than 600 ppb alachlor, and more than 100 ppb cyanazine. That sample contained nine different pesticides. (The U.S. EPA's maximum contaminant level for atrazine is 3 parts per billion. See *News-Notes* issues # 21 and 25 for more information on atrazine and for a discussion of maximum contaminant levels.)

"There appears to be a loose correlation between riparian cover and pesticide levels; the more riparian cover, the less pesticides in the stream," Hoagland told the *Lincoln* (Nebraska) *Journal-Star* in a news article on the research. Conclusions are at best preliminary, Hoagland said. The project, which has received funding for a third year, also seeks to identify the variations in riparian zones in size, width, plant species, and composition. This will help researchers investigate how effective riparian vegetation is in preventing water pollution.

The project is financed in part by regional EPA funds administered through the state Department of Environmental Quality and Nebraska Research Initiative/Water Center, Environmental Programs, and the Agriculture Research Division at the University of Nebraska-Lincoln. Some funding is in now place for a study next spring involving the planting of experimental riparian plots.

Another Institute of Agriculture and Natural Resource project is examining the little-studied synergistic, or combined, effect of more than one pesticide on stream communities.

[For more information, contact Kyle Hoagland, Department of Forestry, Fisheries, and Wildlife, University of Nebraska, 101 Plant Industry, Lincoln, NE 68583-0814. Phone: (402) 472-2944.]

Iowa State Evaluates Buffer BMP

A study funded by the Aldo Leopold Center for Sustainable Agriculture looked at riparian buffer strips from a different angle. Part BMP, part restoration project, the study entailed starting from scratch to develop buffers using native species of trees and prairie grasses. Such a buffer, termed a constructed, multi-species, riparian buffer strip, was planted in a 66-foot-wide border between crop fields and Bear Creek, a third-order stream in Story County, Iowa.

Beginning at the crop field edge and moving toward the stream, the buffer strip includes a 24-foot-wide strip of native prairie grass, two rows of shrubs, and four rows of trees.

Headed by Richard Schultz, a multidisciplinary study team from Iowa State University is now monitoring the zone to see if it can function as a multi-purpose, economically feasible, environmentally beneficial land use. It should, Schultz explained, "function as a BMP, also yielding wood products while providing additional environmental benefits, such as increased biodiversity for wildlife habitat, sequestering of carbon for reduced global warming, and improved aesthetics in a rather sterile agricultural landscape."

The study team includes specialists in forage crops, soils, hydrogeology, hydrology, ecology, economics, biometrics, GIS, silviculture, and technology transfer. They carefully selected plant materials to perform specific functions within the structure of the buffer strip as well as to provide potentially marketable products. A primary characteristic of most of the selected species is rapid growth, which allows restoration of a riparian community in the shortest possible time.

The team chose willow, cottonwood hybrids, and silver maple for the rows closest to the creek to improve bank stability and take up agrichemicals. These fast-growing trees will be harvested on an 8- to 12-year rotation and will resprout from the stump, leaving the root system intact and the soil undisturbed. Slower growing, high quality hardwoods like red oak and black walnut may be planted for timber in the outside rows, depending on soil type and the owner's objectives.

The shrub rows develop a perennial root system, and their multiple stems slow floodwaters. The researchers chose shrub species that enhanced biodiversity and wildlife habitat, but some species, such as hazel, can be harvested for their nut crop.

Wildlife can benefit from the cover and food provided by the diverse plant community. Bird surveys this summer and mammal studies in the fall will yield data about the strip's function as a quality wildlife habitat. "We are developing corridors that are favored by edge species of

wildlife. In an agricultural landscape management scheme, these corridors would, ideally, connect larger tracts of perennial plant communities which would provide habitat for interior species. However, in the Cornbelt region of the Midwest, these corridors might provide the only respectable wildlife habitat in the county," Schultz acknowledged.

In the outer rows of the buffer, native, non-bunch prairie grasses and woody plants penetrate the soil with deep, extensive, well-established root systems that stabilize the riparian zone, increase infiltration of runoff, and help restore soil structure. Above the ground, their dense, stiff stems slow runoff, reduce flooding, and trap eroding sediment.

Less clear is the impact of the buffer strip on nitrates and atrazine. Initial soil water quality data indicate that the buffer strip is producing a zone of lower agrichemical concentrations along the creek. The study team has not yet clearly established the processes responsible for these reductions, but they suspect plant uptake, microbial activity, and soil immobilization play roles. The effect on the stream is complicated by field drainage tiles, which carry water rapidly under and through the buffer strip. To address this problem, the researchers constructed a small cattail wetland at the end of a field tile in the spring of 1994. They are now collecting inflow and outflow water samples to determine how well the wetland can reduce agrichemical concentrations.

The researchers also successfully used a system of willow posts and cuttings inserted directly into the streambed and streambank to immediately strengthen some eroding banks. The willow post system proved its worth by dramatically reducing erosion during the 1993 floods. Along vertical streambanks, bundles of dead trees are staked into the bank to protect it while willow cuttings planted among them become established.

Economic Benefits Possible

In addition to water quality benefits, bank stabilization, and habitat for aquatic and terrestrial animals, the researchers also think the buffer zone will provide economic benefits to landowners. Some of the hardwoods could be slated for timber harvest. Hazelnuts are another potentially marketable product of the strip. One of the most promising future markets is, according to Schultz, fuel biomass. "Presently, biomass can be used on-farm, but ethanol can be produced from woody plants and switchgrass, and biomass can be mixed with coals to co-fuel power plants. Our buffer strip model can produce large quantities of biomass, and we think the markets for this are getting closer and closer," said Schultz.

According to the final report, the tree and shrub zones can be combined, and the buffer design can easily be adapted to the USDA riparian buffer strip recently approved for cost-sharing on agricultural lands (see *News-Notes* # 33, November-December 1993, for more on this practice) or that suggested by the Forest Service for the northeastern states. A number of other cost-share programs can also fund a buffer strip based on this model. The economist on the team estimated that the installation cost will run between $350 and $400 per acre. A mile-long, 66-foot wide strip on both sides of a stream occupies only 16 acres of land, and along meandering streams, much of this land cannot be efficiently row-cropped, according to the researchers.

The Aldo Leopold Center and the Iowa Department of Natural Resources funded the project's initial three-year phase with $146,000. The project received additional funding from USDA Cooperative Research Service and the Agriculture in Concert with the Environment program. Now in its fifth growing season on the property of cooperating farmer Ronald Risdal, the strip will need to be monitored for at least 10 to 15 years to fully understand how it works. More research is needed to identify and quantify the processes responsible for agrichemical and sediment reductions, and a longer stretch of buffer strip should be installed to identify the impact on the instream ecosystem.

"The ability of this riparian plant community to modify soil, trap sediment, sequester carbon and agrichemicals, and provide wildlife habitat is far superior to riparian zone communities consisting of annual crops, such as corn or soybeans, or pastures composed of cool-season grasses," Schultz said.

[For more information, contact Richard C. Schultz, Department of Forestry, 251 Bessey Hall, Iowa State University, Ames, IA 50011. Phone: (515) 294-7602. FAX: (515) 294-2995.]

Volunteer Monitors Assess Stream Habitat

Maryland's Save Our Streams is among the growing number of volunteer monitoring programs that believe habitat assessment is critical to grasping a complete picture of stream health. Forty percent of the 517 organizations listed in the recently published *National Directory of Volunteer Environmental Monitoring Programs* reported that they perform habitat assessments.

According to EPA, "habitat, as the principal determinant of biological potential, sets the context for interpreting biosurvey results and can be used as a general predictor of biological condition. Habitat assessment is used to identify obvious constraints on the attainable potential of the site, help in the selection of appropriate sampling stations, and provide basic information for interpreting biosurvey results."

Save Our Streams' June training session for its Project Heartbeat volunteer monitors included the program's most recent refinement of its volunteer habitat assessment protocol, which is based on EPA's Rapid Bioassessment Protocols for streams and rivers. Project Heartbeat uses the same assessment parameters, but has adapted the terminology for the layperson.

Save Our Streams, a nonprofit citizen group, for 24 years has organized volunteers for education, advocacy, cleanups, and stream monitoring. Project Director Abby Markowitz said,

> *Habitat assessment is an integral component of Project Heartbeat. The effects of land use and nonpoint source pollution in the watershed have a direct impact on the availability of living space and other habitat for aquatic creatures. Our experience with Heartbeat over the last five years indicates that habitat assessment, although challenging to train, is a superior tool in citizen education and leadership development. I believe that habitat assessment is invaluable in building the educated constituency that is so crucial to watershed management. Volunteers who become well-versed in, and really understand, the language and concepts of habitat assessment gain confidence and skill in observing, reporting, and articulating potential problems to neighbors and agency folks alike.*

The clouds on the day of the training session threatened rain; not only were the trainees to get a lesson in monitoring techniques, they also got an introduction to typical weather conditions for volunteer monitoring in Maryland. (On a post-training evaluation form, "weather" was rated number one under "what I liked least.") The would-be monitors crowded an auditorium for a morning of lectures on ecology, water quality, habitat, and monitoring techniques.

Although most of the participants were local residents between the ages of 20 and 50, the group also included students, retired people, and state and local government employees. Reasons given for attending ranged from "It's required" to "It's fun," but all expressed an interest in learning about and protecting local stream habitat. About half of the participants had been involved in monitoring or other water resources projects before, and several had years of experience.

Despite threatening clouds, the group was eager to get into the stream after lunch. Guided by biologists volunteering *their* time to help with the training, trainees trooped off to practice what had been preached.

The monitoring portion began with training in macroinvertebrate sampling and then progressed to instruction in evaluating stream habitat.

Trainees did two habitat assessments, one in the segment where the macroinvertebrates were collected, a second just upstream of that. As in EPA's Rapid Bioassessment Protocols, 10 parameters were evaluated: attachment site for macroinvertebrates, embeddedness of substrate, shelter for fish, channel alteration,

The fourth edition of the National Directory of Volunteer Environmental Monitoring Programs (EPA 841-B-94-001) contains information on volunteer monitoring programs involving over 347,000 volunteers nationwide. Key findings summarized in the directory include:

- the number one use of volunteer data is education,
- local and state decisionmakers increasingly use the information gathered by volunteers,
- volunteer programs appear to be moving toward a whole-watershed approach to monitoring,
- volunteer monitoring is by and large a low-cost proposition, with the median annual budget about $4,000.

The directory is available from NECPI, 11029 Kenwood Rd., Bldg. 5, Cincinnati, OH 45242. FAX: (513) 891-6685. Please use EPA publication number when ordering.

Volunteer Monitors Assess Stream Habitat (continued)

sediment deposition, stream velocity and depth, flow status, bank vegetation, bank condition, and width of riparian vegetative zone.

Possible scores for each parameter range from zero to 20. Not surprisingly, the Baltimore area streams checked that day yielded no perfect 20s, but none earned zeros, either. The program scored well, however; it initiated 115 volunteers into the intricacies of habitat assessment and gained valuable experience and feedback for its habitat assessment monitoring component.

[For more information, contact Abby Markowitz, Save Our Streams, 258 Scotts Manor Drive, Glen Burnie, MD 21061. Phone: (410) 969-0084 or (800) 448-5826.]

Endangered Species Sparks Habitat Recovery Project

EDITOR'S NOTE: Thanks to Romy Myszka, USDA/EPA Liaison, U.S. EPA Great Lakes National Program Office, for alerting *News-Notes* to this story.

Three federal agencies, two states, a private conservation group, and farmers have mobilized to protect the last refuge of a rare species, the White Cat's Paw Pearly Mussel.

The only known population of the mussel, a federally listed endangered species, makes its home in the Williams County, Ohio, reach of Fish Creek. One of the most biologically diverse sites in the Great Lakes basin, the creek also shelters a number of other threatened or endangered species.

The 110-square-mile watershed straddles Ohio's Williams County and Indiana's Dekalb and Steuben counties. While the largely agricultural watershed is typical of the area, the creek and the riparian corridor are not. Thickly swathed in trees and undergrowth, Fish Creek's cool waters, forested banks, and gravelly bed provide nearly pristine habitat for over 60 species of mussels and fish. The Fish Creek Project seeks to maintain that habitat by preventing sedimentation and deforestation and providing protection from other potential impacts.

The impetus for the project was a 1988 survey of mussels in the St. Joseph River that documented declining species diversity. "Fish Creek is seen as an ark for much of the diversity that once existed throughout the St. Joseph and Maumee river systems," commented The Indiana Nature Conservancy Project Manager Larry Clemens, whose position is funded through a Section 319 grant. "We hope it will be the seed source for restoring populations in other parts of the basin."

To protect that source, Ohio, Indiana, and the Indiana chapter of The Nature Conservancy began discussing how to sustain the quality of the habitat that nurtures it. What evolved was a loosely-knit coalition, with U.S. EPA, Fish and Wildlife Service, USDA, the states of Indiana and Ohio, The Nature Conservancy, and local conservation districts each playing a part. There is no single coordinating agency, no boss. "That's one reason it is working; we all understand the mission, and everyone is doing their job," said Clemens. "It's a good harmony of everyone doing what they do best."

A cornerstone of the effort is the recovery plan for the White Cat's Paw Pearly Mussel accepted by the U.S. Fish and Wildlife Service in 1990. According to the plan,

> *The most immediate threats to the population in Fish Creek are reduction of the wooded riparian corridor and clearing of the stream for flood control. Recent evidence of both these activities is present. . . Landowners . . . must be made aware of the potential threat these activities pose to this mollusk. The possibility of land acquisition, management agreements, registry with The Nature Conservancy, and other means of setting aside land near the streams should be considered.*

The recovery plan calls for monitoring sedimentation and pesticide runoff because of their potential impact on the mussel. As a riffle-dwelling filter feeder adapted to a sand and gravel substrate, it is susceptible to suffocation from fine silt particles. The mussel's tolerance to pesticides is unknown right now, but the precarious position of the animal makes knowledge of

Endangered Species Sparks Habitat Recovery Project (continued)

that factor crucial. Another critical component of the recovery plan involves strict enforcement of state and EPA water quality standards.

In addition to developing the White Cat's Paw Pearly Mussel Recovery Plan, the Fish and Wildlife Service has funded baseline studies of habitat and fish and mussel populations and is helping fund a landowner contact program.

The Indiana and Ohio departments of natural resources provide technical expertise in soil conservation, biology, and land use analysis, while local SCS offices are the resource for local soils data and federal farm programs. Soil and water conservation districts throughout the project area are showing leadership on the local level, administering components of the project, facilitating information exchange, and encouraging participation in the project.

The Nature Conservancy, beside providing an informal central coordinating function, has pulled together a local citizens advisory council.

The Conservancy has also acquired 365 acres of old growth forest and farmland, on which it is continuing agricultural activities, using prescription farming and conservation tillage. The farm serves both as a demonstration project and an opportunity for The Nature Conservancy to learn about local agriculture and economics, according to Clemens. In addition, the group has carried out a fencing and reforestation project with a local farmer and has individually contacted most of the 85 landowners affected by the project's first phase.

These landowners play an important role. Not only have they furnished information about land use practices in the watershed, but farmers have put additional acres into conservation tillage and protected the riparian corridor with filter strips. Some farmers have taken advantage of a grant from the Great Lakes Commission to cost-share the purchase of conservation tillage equipment. (One glitch in the system is uncertainty about what will happen to the acres enrolled in the Conservation Reserve Program when those contracts expire. See *News-Notes* # 36 for more on the CRP.)

U.S. EPA Takes Part in Project

State natural resource and water quality agencies and local conservation districts also work with landowners and farmers. For example, EPA's Great Lakes National Program Office (GLNPO) is providing $295,000 to the Indiana Department of Natural Resources for outreach and cost-shared agricultural erosion control measures around Hamilton Lake, which drains to the creek. The practices will be implemented by local landowners in cooperation with the Steuben County Soil and Water Conservation District.

According to Romy Myszka, who works with the GLNPO, "When we started talking to Indiana, our focus was not on land treatment and best management practices but on how to support the protection and recovery of endangered mussels and other sensitive aquatic organisms. The watershed plan and mussel recovery plan had been completed—only the funds for implementation were needed. We agreed it was time EPA took a direct role in an endangered species habitat recovery project."

The list of accomplishments in the Fish Creek watershed is long. It includes watershed analysis, surveys of habitat and fish, mussel, reptile, and amphibian populations, reforestation in the watershed and on the streambanks, wetland development, acquisition of one of the most important forest tracts in the watershed, agricultural soil and water conservation implementation, water quality monitoring, and public participation.

Nearly all of the efforts were accomplished through creative mixes of funding and work by the large and small entities concerned with not only the survival of a species but that of an ecosystem. Intrinsically valuable, Fish Creek's further function as a haven and incubator for the region's unique biologic community necessitates its protection. While its role as an oasis for rare creatures demonstrates the creek's present high quality, the question, according to Clemens, is, "Which direction is it going?" The tremendous effort and cooperation being demonstrated through the Fish Creek Project help assure the direction will be positive.

[For more information, contact Romy Myszka, USDA/EPA Liaison, Great Lakes National Program Office, U.S. EPA., 77 West Jackson Blvd., Chicago, IL 60604-3590. Phone: (312) 353-8034. FAX: (312) 886-2403. Or contact Larry Clemens, Project Manager, The Nature Conservancy, Fish Creek Watershed Project Office, Peachtree Plaza, Suite B-2, 1220 North 200 West, Angola, IN 46703. Phone: (219) 665-9141.]

Notes on Agriculture

Wisconsin Approves Rotational Grazing Cost-share

Intensive grazing management or rotational grazing systems are now eligible for cost-share funding for Wisconsin farmers involved in Priority Watershed Program watershed projects, reports the Wisconsin Department of Natural Resources (DNR). This practice can benefit water quality through reductions in soil loss, phosphorus, and organic loads from animal lots, according to DNR. In addition, it usually replaces row crop fields with permanent sod.

The DNR considers rotational grazing an "alternative BMP," and makes decisions about eligibility on a case-by-case basis. Because rotational grazing systems usually involve extensive on-farm management changes, the DNR pays particular attention to the landowner's ability to manage such a system.

The cost-share can be applied to Wisconsin croplands that are currently contributing sediments, nutrients, or pesticides to a water resource. The practice involves a number of restrictions: streambank erosion and habitat degradation must be addressed; a grazing management plan must be developed for paddocks within riparian areas to control livestock access during critical periods; and grazing of previously ungrazed woodlots is not allowed.

At the same time, exclusion of livestock from woodland, wildlife habitat, and recreational areas is encouraged.

Components eligible for cost-sharing include access lanes (including cattle crossings), fencing, pasture and hayland planting, watering systems, critical area planting, and gates.

Cost-sharing will be at the 50 percent level and is subject to a maximum state cost-share limit of $2,000 per watering system.

[For additional information about the state cost-share practice, contact Don Baloun, Department of Natural Resources, Water Resources Management, 101 S. Webster, Madison, WI 53707. Phone: (608) 264-9222. FAX: (608) 267-2800.

University of Wisconsin Extension (UWEX) offers a rotational grazing publication, Wisconsin Pastures for Profit: A hands-on guide to rotational grazing (pub. A3529). Order from UWEX Publications, Rm. 245, 30 North Murray St., Madison, WI 53715. Cost $2.25 plus $1.05 postage.]

Pennsylvania Counties Develop Manure Marketing Programs

Pennsylvania agriculture is noted for intense livestock operations on small farms. High land values have forced farmers to increase animal units per acre and to import feed. Animal products such as milk, eggs, beef, and pork are exported from the farm, but a surplus of nutrients remain behind in the form of animal manure, an NPS concern.

Fortunately, in Pennsylvania's Lancaster County, a solution was right next door: crop producers in the same region needed a source of nutrients for their crops. To bring supply and demand together, Penn State Extension developed a manure marketing program as part of the Rural Clean Water Program and the Chesapeake Bay Program.

Lancaster County farmers who supply or would like to receive manure are now participating in supplier/receiver lists that facilitate manure marketing transactions, according to Extension Agent Leon Ressler. Developed to promote redistribution of manure nutrients, the lists now include almost three times as many receivers as suppliers.

Farmers on the lists reported transferring 16,270 tons of manure in 1991; that amount increased to 19,040 in 1993. Twenty-five percent of the suppliers are able to custom-apply the manure; 33 percent are willing to supply the manure free if the receiver picks it up; 49 percent of the receivers are willing to pay for the manure; and 39 percent are interested only if the manure is free.

Pennsylvania Manure Marketing Programs (continued)

Multi-county Manure Marketing Directory

In central and east central Pennsylvania, 168 farmers interested in exporting or importing manure are listed in another manure marketing directory published by the Extension Service, according to Montour County Extension Agent Phil Durst. The ratio of 142 farmers interested in importing manure to 26 interested in exporting proves that an enthusiastic market for manure exists in Union, Snyder, Montour, Northumberland, Columbia, and Lycoming counties.

The manure marketing directory also lists custom manure haulers and nutrient plan preparers, as well as components of a nutrient management plan and sources for soil and manure test kits. Durst reported that the response to the directory was so great that it is now difficult to find more than a few copies in any office in the six-county area.

According to Durst, a telephone survey of custom haulers, exporters, and importers one year after distribution of the directory highlighted the need for educating potential participants about the economics of hauling manure. The extension agent calculated that the value of the available primary nutrients, even in liquid manure, significantly exceeds the cost of custom hauling within at least a five-mile radius from the point of storage. The survey also revealed that, although poultry manure is more marketable because of its lower moisture content and higher nutrient concentration, 60 percent of the farmers interested in importing manure were interested in any type of manure.

Farmers Teach Nutrient Management Workshops

As a follow-up to the multi-county manure marketing directory, the Extension Service, conservation districts, key leaders in the farm communities, and the Agricultural Stabilization and Conservation Service cooperated in planning and conducting nutrient management workshops. Lenders and contractors helped by advertising the workshops among their customers. Farmers and crop management advisors were trained as the primary instructors. Held in four different locations in three counties, the workshops drew 134 people—twice the number anticipated, according to Extension Agent Durst.

Each participant in the workshops received a prepaid manure analysis kit and a packet of five soil test kits to encourage them to start a three-year plan to soil test all of their farm fields.

[For more information on the Lancaster County Program, contact Leon Ressler, Extension Agent Agriculture/Environment, Lancaster County Cooperative Extension, 1383 Arcadia Road, Room 1, Lancaster, PA 17601-3149. Phone (717) 394-6851. FAX: (717) 394-3962. For information on the multi-county program, contact Phil Durst, Extension Agent Dairy and Manure Management, 114 Woodbine Lane, Suite 102, Danville, PA 17821. Phone: (717) 275-3731. FAX: (717) 271-3031.]

Holding on To Nitrogen With Rye

Researchers at the University of Maryland have shown that fall planting of a cereal grain cover crop can immobilize a large percentage of the root-zone nitrate-nitrogen, which then can be released to successive crops but not to groundwater.

R.B. Brinsfield and K.W. Staver's studies indicated that if managed properly, cereal grain cover (rye is the most effective) incorporated into continuous corn production systems in the flat coastal plain of the mid-Atlantic region can rapidly reduce soil and root zone nitrate levels following corn grain harvest.

The research showed that planting cover crops early in the fall is important. For example, rye seeded October 1, 1988, following a severe drought, assimilated 161 pounds of soluble nitrate-nitrogen by spring of 1989. However, changes in soil-nitrate levels for the October 30 cover crop planting differed little from the no-cover areas.

According to the Wye Research Center researchers, tying up the root-zone nitrate eventually lowers the nitrate levels in the groundwater. Nitrate-nitrogen in the groundwater under one field fell from 15 parts per million (ppm) to 5 ppm after five years of a rye cover crop.

"The use of cereal cover crops constitutes a major agricultural best management practice being considered to help farmers meet the Chesapeake Bay agreement's nitrogen reduction goal in the coastal plain watershed," said Brinsfield, who heads University of Maryland's Wye Research Center.

Holding on To Nitrogen With Rye (continued)

Maryland Agricultural Water Quality Cost-share Program

The practice of planting a cover crop is eligible for the Maryland Agricultural Cost-share (MACS) payment. Specific annual cover crops are planted in the early fall, immediately following the harvest of a corn crop to immobilize unused nitrogen from the crop root zone. In 1994, the cover crop may also follow soybeans, according to the Maryland Department of Agriculture.

According to the MACS practice description, cover crops can also provide significant erosion control benefits, but the purpose of offering cost-sharing through the MACS program is to reduce the leaching of excess crop nutrients into groundwater during the fall and winter. Another secondary benefit may be reduction of fertilizer requirements the following spring.

More than 24,000 acres of cover crops were planted by the 456 farmers participating in the fall 1993 MACS program, reported Program Assistant Mark Berry.

In the MACS program, cost-share is available for winter cover crops of rye, barley, and wheat, and for these crops in mixture with the legumes vetch or crimson clover.

[For additional information on rye cover crop research, contact Russell B. Brinsfield, University of Maryland Wye Research Center, P.O. Box 169, Queenstown, MD 21658. Phone: (410) 827-6202. FAX: (410) 827-9039. For more information on the Maryland agricultural water quality cost-share program, contact Mark Berry, Program Assistant, Maryland Department of Agriculture, Water Quality Cost-Share Program, 50 Harry S. Truman Parkway, Annapolis, MD 21401. Phone: (410) 841-5864. FAX: (410) 841-5987.]

News From the States and Localities: Where the Action Is

Massachusetts NPS "Megamanual" Provides Guidance to Municipalities

Weighing in at over two pounds, a new guidance document for Massachusetts municipal officials is a comprehensive reference to understanding and controlling nonpoint source pollution at the local level.

"Municipal officials in Massachusetts have the authority to enact local controls and provide the leadership needed to combat nonpoint sources of pollution in their communities," said Arleen O'Donnell, assistant commissioner of the state Bureau of Resource Protection. "I hope that this manual will serve not only as guidance, but as an incentive to communities to begin and continue to reach toward the goal of clean surface and groundwater resources."

The binder-style document begins by detailing the NPS impacts of 40 activities ranging from agriculture to wood-preserving. Succeeding chapters cover community NPS management plans, regulating NPS, and best management practices. Chapter 5 contains checklists designed to help local officials evaluate water impacts during reviews of proposed land-use activities. For example, the checklist for proposed construction projects suggests 10 items for officials to require, including descriptions of the soils, proposed activity, how the site will be permanently stabilized, and areas that are susceptible to severe erosion.

Co-authored by Christine Duerring, environmental analyst for the state Department of Environmental Protection, and Laurence Boutiette, Jr. of USDA Soil Conservation Service, the guidance has been distributed to every city and town in the state. The response to the manual from municipal officials, environmental groups, and other states has been positive, according to Duerring. She reported that an outreach program, part of the state's watershed approach, is currently being conducted to introduce the manual to users and, perhaps, alleviate the 300-plus-page document's "intimidation factor."

[For more information, contact Christine Duerring, Department of Environmental Protection, P.O. Box 116, North Grafton, MA 01536-0116. FAX: (508) 839-3469.]

Olympia, Washington, Studies Reduction of Impervious Surfaces

"Save it—don't pave it!" That's the theme for Olympia, Washington's innovative Impervious Surface Reduction Study. Olympia's Water Resources Program is conducting the two-year study with the help of a citizen advisory committee and other local governments. The study team has taken up the challenge of identifying and implementing strategies that reduce impervious surfaces such as pavement, roads, rooftops, and parking lots, without appreciably increasing development costs.

As the Northwest's population grows, impervious surfaces also tend to increase. Impervious surfaces prevent precipitation from infiltrating the soil, reducing the recharge of groundwater and causing flooding and erosion. Impervious surfaces dramatically increase runoff, which, with its greater flow and temperature and the contaminants it carries, degrades stream habitat.

Thurston County and the cities of Olympia, Lacey, and Tumwater make up the 84-square-mile region known as the North Thurston Urban Growth Management Area. Study results will be integrated into land-use policies for the Growth Management Area. "Already," said study coordinator Cedar Wells, "recommendations are getting implemented as we go along. Many policies, such as street and parking standards, are being revised and provide opportunities for early implementation of the study's initial findings."

The project will produce alternatives for retrofitting existing situations and for new development to accommodate the 66 percent increase in the area's population expected by 2014. The study's technical and policy analysis report recommends strategies in four categories:

- Higher density development: for example, providing "density credits" to developers for reduced impervious surfaces;
- Reduced vehicle-oriented pavement: for example, narrower residential streets with reduced, but adequate parking;
- Alternative pavement: for example, replacing impervious surfaces with permeable surfaces like paving blocks or "Grasscrete" for low-use areas like bikeways or overflow parking areas;
- More effective use of open space: for example, encouraging landscape designs that reduce soil compaction.

The report is just the first major step in the study. Over the next year, the study team will analyze the costs and benefits of the draft recommendations and construct demonstration projects.

Demonstration projects may be planned public works such as downtown streets, sidewalks, or bikeways, or they may be private residential or commercial undertakings. Modifications or alternative practices gleaned from monitoring the demonstration projects will be incorporated into the study.

Private partners cooperating in the demonstration projects will receive technical assistance in design and construction. The project will also provide assistance to municipal engineers and planners and to developers who want to incorporate recommended techniques.

Public participation and the dissemination of information complete the project. Community involvement is ongoing, with

Olympia's Sustainable City Philosophy

In March 1993, the city of Olympia adopted a Sustainable City Philosophy as a "new way of thinking" about the complex issues facing communities. Olympia defines a sustainable community as one that "persists over generations and is far-seeing enough, flexible enough, and wise enough to maintain its natural, economic, social, and political support systems."

. . . The Olympia City Council has pledged to evaluate all city policy decisions based on these two sustainable city criteria:

- Future generations — meet present needs without jeopardizing future generations, and
- Interrelationships — consider the environmental, economic, social, and political requirements for their success, and their impact on the natural environment and human activities.

The Olympia Public Works Department is using the Impervious Surface Reduction Study as a model to see how useful the philosophy's two criteria are in analyzing a complex issue such as impervious surface reduction. Applying the criteria results in taking a long-term perspective and using a broad, integrated, regional approach that considers the interrelationships among water resources, transportation, economics, and other urban growth issues. Past attempts to deal with each of these issues separately have resulted in a plethora of regulations that often work at cross-purposes. The sustainable criteria are a reminder to step back and look at the big picture, identify contradictions, and create a framework for making tradeoffs consistent with long-term benefits.

from the Impervious Surface Reduction Study, Technical and Policy Analysis Final Report, May 1994

Olympia, Washington Studies Impervious Surfaces (continued)

the city of Olympia providing opportunities for both the private sector and the general public. The study team is also sharing information with professional groups and other local governments throughout Washington and nationwide.

The study, begun in March 1993, will produce its final report in 1995. The report will contain an implementation strategy and summarize the process of developing the strategies. "We want to make the study useful on the ground, in the field, by builders and developers," said citizen advisory committee member Priscilla Terry, a realtor. "We're insisting on using real-life situations and finding solutions that are cost-effective."

[For more information, contact Cedar Wells, City of Olympia Water Resources Program, P.O. Box 1967, Olympia, WA 98507. Phone: (206) 753-8494 or 753-8598 (24-hour).]

River Parkways: San Joaquin's New Conservancy Points the Way

Excerpted from an article by Serena Herr in *On Saving Land*, a newsletter for California land trusts, January–February 1994.

By all accounts, 1993 was a good year for California river advocates. The high point for many came in June, when an historic agreement by three local governments capped a seven-year effort to create a greenbelt, or parkway, along a 22-mile corridor of the San Joaquin River near Fresno.

The new greenbelt will be managed by a brand-new state conservancy—similar to the Tahoe Conservancy or the Santa Monica Mountains Conservancy—with a mandate to acquire lands, protect habitat, and provide for public access and recreation within the parkway.

It is only the fifth time in the state's history that such a governmental body has been created, and the first time one has been created to manage a parkway. The effort to create the new San Joaquin River Parkway Conservancy was spearheaded by the local land trust, the San Joaquin River Parkway and Conservation Trust.

The San Joaquin success is the latest in what appears to be a groundswell (or should we say rising tide) of riparian greenbelt protection throughout California, much of which involves land trusts. Currently, 47 communities across the state are working to establish river parkways.

And the efforts are not limited to the big, well-known rivers—the Sacramento, the Kern, the Klamath—which have long had advocates in the fishing and recreation industries. Increasingly, it is the local tributaries and smaller rivers—the Santa Clara, the Napa, the Santa Margarita—that are getting attention from local conservationists.

A Comprehensive Approach

The basic idea behind the river parkway approach is to look at the whole river as a system, and the lands on either side of it as an enormous watershed, and then to plan a multiple-use greenway with input from everyone who has a stake in it.

Advocates say that by keeping the big picture in mind, river parkways can avoid the pitfalls of more traditional, piecemeal protection efforts by numerous—sometimes competing—entities. By getting all the players together at the planning stage, agencies can combine their overlapping jurisdictions, and local communities can resolve land-use or appropriate-use conflicts from the start.

"The great benefit of the greenway approach is that you have local people, using local knowledge, sitting down with state agencies and developing common goals together," says Elizabeth Patterson, a senior planner for the State Lands Commission (SLC) who recently produced a report on the status and future of California's rivers.

Patterson says riparian parkways have another advantage: plain, old-fashioned income. "These greenways offer great economic returns, because you can charge user fees, fees for the use of amphitheaters, fees for educational programs. There's also all the economic benefits from people renting kayaks and bicycles, and stopping by in nearby shops."

For proof, Patterson points to the state's oldest riparian greenway—Sacramento's American River Parkway. Created in the late 1950s, the parkway is used by 5 million visitors each year

and brings in about $750,000 annually in user fees. In addition, it generates an estimated $3 million for the local recreation industry, including raft and canoe rental companies, bait and tackle shops, bicycle stores, and hotels where river-trip clients stay.

Patterson says the parkway's tremendous popularity is an inspiration for many of today's grassroots river parkway efforts. "The American River Parkway showed that by protecting a small portion of a river near a city, you could produce a high level of concern for the whole river."

The one notable defeat for river parkways last year, according to Patterson, came when Governor Pete Wilson vetoed AB 350. The bill would have set up an SLC program to provide financial and technical assistance to river greenway projects around the state.

The new funding hope for parkway enthusiasts is the California Parks and Wildlife Initiative (CalPAW 1994), which includes $12 million for as-yet-unidentified river parkways and earmarks additional amounts for specific parkways around the state, including the new San Joaquin River Parkway. [The Initiative did not pass. At this time, it is not known how this will affect the San Joaquin projects — eds.]

New San Joaquin Conservancy

San Joaquin's method was unique in that it created the San Joaquin River Parkway Conservancy to manage the 22-mile stretch of river, which flows through three jurisdictions: Fresno County, Madera County, and the city of Fresno.

The parkway plan calls for a multi-use trail, protected wildlife habitat, recreational opportunities, and public access. It designates approximately 6,000 acres for the parkway, almost 4,500 of which are now privately owned. The new conservancy will acquire an estimated $50 million worth of land and easements over the next two decades.

"This is a major milestone," says Dave Koehler, executive director of the San Joaquin River Parkway and Conservation Trust. "Having a single entity that can coordinate the various interests and acquire, manage, and operate the parkway will be critical."

Consensus Planning Drove Parkway

The river parkway was the first major project the trust tackled after its formation in 1988. "Our board did two things right away," says Koehler. "They held public meetings to get input, and hired an open space planner to put together a conceptual plan for the parkway." That initial planning effort was completed about a year later.

"In our situation, the majority of property along the river is in private ownership," says Koehler, "so it was important to put together a comprehensive plan that the public supported, that upheld private property rights, and that gained the cooperation of the three jurisdictions involved."

The positive community response to the completed plan inspired the formation of a 25-member, multiple-agency task force to lead a two-year consensus planning effort. The task force looked at a number of different options—open space park districts, state park ownership, a memorandum of understanding between the three local agencies involved—but in the end recommended the new conservancy.

A concerted effort by the community, the land trust, the city, and two counties resulted in the passage of conservancy legislation and the 1993 approval of the parkway by all involved.

Modeled to some extent after the Tahoe Conservancy, San Joaquin's conservancy board is made up of seven voting representatives from Fresno County, Madera County, and the city of Fresno, and five nonvoting members from state and local agencies. One unique feature is that one of the voting board members must be appointed from a list of property owners groups, and one from a list of local conservation organizations.

How does the land trust fit into the new picture? "I think there's always going to be a need for a nonprofit that can react to immediate opportunities to help advance the parkway. Whether that's an opportunity for land acquisition or river restoration or community outreach and involvement, we'll be there," Koehler said.

[For more information, contact The Trust for Public Land, 116 New Montgomery St., 3rd Floor, San Francisco, CA 94105. Phone: (415) 495-5660.]

An Opinion

Land Acquisition Using 319 Funds: An Idea Whose Time Has Come?

by Susan Alexander, teacher, writer, and former NPS coordinator in EPA Region 6

Private property rights. Three little words that are at the heart of almost every civic improvement project in America, from building a county road to controlling water pollution or protecting wildlife. Many historians argue that the opportunity for ownership and control of property by individuals was a primary reason the United States emerged as a uniquely stable and productive nation. Many individuals, however, view environmental laws and programs as an erosion of these rights.

For us to really do our jobs—effectively control NPS, properly manage entire watersheds, or adequately protect unique or critical ecosystems—we must deal directly with how private (and public) land is used and managed. As we all know, one of our most difficult tasks is to protect private property rights (the rights of the individual) while protecting the environment (the rights of society). Our challenge, therefore, is to be creative and find many opportunities and options for resolving this seeming contradiction.

Some of our more established government programs such as the NPDES permit program have, to a certain extent, made private property rights a non-issue by saying, in essence, if industry wishes to operate, industry must conform to an established set of guidelines. Are there ways in the nonpoint source program to make private property rights a non-issue also?

Possibly. One option is to buy those parcels of land that we wish either to protect or manage in a certain way. These lands are then "ours" to manage for the benefit of society, assuming from our point of view that the "benefit of society" is defined as clean water and stable, sustainable watershed function. This is certainly not a new idea, nor is it a trouble-free panacea. State and federal governments and private land conservation trusts or organizations have been buying and preserving land for years. And while federal and state governments have not always had an untarnished resource protection record during their management of public lands, they have had some shining successes. We might ask where the wonders of Yellowstone would be today if Teddy Roosevelt and his compatriots had not set it aside.

Initially, it seemed that Section 319 of the Clean Water Act presented us with such a difficult task, and such lofty goals, yet provided us with so few resources (both federal and state) to meet these goals, that some people felt it was a recipe for failure. When we received the first real 319 money in 1990, we focused our efforts on demonstrations, hoping that through technology transfer we could encourage or assist (and even require) others to adopt the best management practices shown. This is still a valid strategy since there will never be enough state or federal time and money to solve all our NPS woes. Yet programs have matured, 319 funds have continued, and we are running out of unique demonstration ideas. Perhaps it is time to explore some alternative and longer-term uses of 319 funds. Perhaps land acquisition has a place among the many BMPs in our programs.

Some of our agricultural programs to control pollution or stabilize watersheds use cost-share and land easement incentive-type approaches with varying success. These are valid although sometimes short-lived strategies, since often, when the incentive runs out, the BMPS are removed. Or when oversight of land easements is lax, encroachments or modifications take place.

So how could land acquisition help us? Land acquisition is not an incentive-type program. It takes land away from the private sector, and it may be cheaper (i.e. buy more conservation) in the long term than incentive programs for private lands. Demonstration projects and cost-share programs generally rely upon voluntary adoption or, at best, quasi-regulatory dis-incentives. Some people will simply choose not to comply. Sometimes these people are the ones who own the very pieces of property that are most crucial to the successful restoration of water or wetland resources. Without a regulatory program for NPS, how do we reach these people?

Land acquisition using 319 monies is an idea that many states and regions are examining. They have put careful thought into the many questions and impediments that need to be addressed

Land Acquisition Using 319 Funds: An Idea Whose Time Has Come? (continued)

before land acquisition could become a reality. Some of the most straightforward questions include:

- Is it legal? At a minimum, the use of 319 funds for land acquisition would seem to require an update or revision of a state NPS Management Program.
- What are the priority areas that need to be protected? Some states have and use a well-defined priority list of waters/watersheds. Others have priority categories for NPS control. So do we purchase, if possible, entire stream corridors in critical watersheds, or do we target critical areas within corridors, or both? Is the stream corridor even the most critical land to acquire?
- Do states focus on watersheds where upland work is already underway and use land acquisition to purchase critical areas, or do we turn our attention to pristine areas and purchase these for future protection?
- How will we know when we've acquired enough land to make a difference without spending the bulk of our funds monitoring and modeling just to determine if we've purchased enough land?
- Who will actually own these lands, and who will manage them on a daily basis—state agencies, private groups, federal fisheries folks? Where do the funds for continuing land oversight or management come from? And what if the land purchased needs lots of BMPs (and it seems most likely it will); do we use 319 funds for rehabilitation of these lands or can other funds be used now that the land is no longer private?
- Land is expensive. Do we pay fair market value? Do we pay whatever is asked because our professional judgement has indicated that acquisition of that particular piece of land is critical to the watershed restoration effort? Do we try to set some sort of upper limits on costs?
- Should we do some type of long- and short- term cost-benefit analysis on each purchase in each watershed or do we just decide that land acquisition is a course to pursue and move forward?
- How would states carry out acquisition—would it be voluntary? How could states design land acquisition programs without the negative connotations of land condemnation?

Many more important environmental and program issues will arise before we declare that direct land acquisition is a viable solution to a portion of our NPS control and wetland protection problems. But the fact that many people are thinking about the idea in so much detail is a step in the right direction.

[Susan Alexander may be contacted at (409) 787-4821.]

Notes on Environmental Education and having fun at the same time

Oregon Wetlands Study Takes Teachers from Behind the Desk

EDITOR'S NOTE: Dr. Bruce Alberts, president of the National Academy of Sciences, has said, "Schoolchildren should learn science the way scientists do, not by memorizing definitions in boring textbooks, but by doing science." This program addresses the trend in science education to teach by providing opportunities for children to experience for themselves how the world actually works.

A study of wetlands paired teachers with the Wetlands Research Program at EPA's Corvallis, Oregon, Environmental Research Lab — and both benefitted. The lab collected data to compare natural wetlands to restored and created wetlands, and teachers gained knowledge and skills to pass on to their students.

Oregon Wetlands Study Takes Teachers from Behind the Desk (continued)

Mary E. Kentula of the Wetlands Research Program explained,

> *Compensatory mitigation is the process by which wetlands must be created or restored to replace others lost to development. Environmental Protection Agency scientists in Oregon found that they lacked the personpower to monitor those new sites to see if they were functioning as designed, and they lacked sufficient data to make good comparisons between mitigation projects and natural wetlands.*

Portland State University's Center for Science Education addressed that need by working with EPA to train teachers to collect quality data from wetlands. Twenty-three science educators started the two-year project in the spring of 1993 with a graduate-level study program in plant identification, soils, hydrology, mapping, and other tools of wetland science. During two months that summer they gained experience in the field by monitoring 97 sites in the Portland area. They worked in three teams, each with a scientific team leader.

In the autumn, the program focused on helping them translate their summer efforts into new classroom strategies. Follow-up classes helped the teachers, who received a stipend from EPA and university credit, develop material appropriate to their students.

One teacher remarked, "The most valuable result of this experience for me was the conviction that as a science teacher I must find ways for my students to actively engage in the process of science." Another commented, "Doing science in a team setting became almost second nature to me this summer." And a third noted,"The value of teamwork was impressed upon me. The emphasis on quality assurance was a new idea for me that I will try to transfer to my classroom teaching."

The teachers are incorporating much of what they learned into their schools' curricula, primarily as a new approach to science education in general rather than through new units on wetlands.

According to Neal Maine of Portland State University Center for Science Education, teachers in the program prepare proposals to submit to their administrations that detail and identify the new direction of their teaching. They receive special assistance to help them design budgets and find sources of funding to get their projects off the ground. Over half of the proposals developed by the educators were turned into grant applications that received funding from outside organizations.

Programs Developed By Participants

Two teachers from different schools are cooperating on a project to study a highly impacted wetland on Swan Island in the Columbia River near Portland. Funding for the project is coming from a large National Science Foundation grant.

A third teacher and her students have developed a proposal to "unearth" a small stream that has been tiled underground near their school. The project, as yet unfunded, would restore the stream to surface flow, establish a stream channel, create vegetated buffers, and develop a small pond at the mouth of the stream where it enters the Willamette.

Another participant established a partnership with the local soil and water conservation district to develop a program, Environmental Academy, for middle school students. Together, they have made a successful grant application for equipment and funding for transportation to their study site.

One Oregon Wetlands Study participant is using a nearby wetland as a field lab site for her general science studies to help develop wetland concepts and methods of studying them. Her students are also monitoring surface water on the trails into the wetlands for the local parks board to determine the need for elevated walkways. In addition, the students will be doing a wetlands characterization project using 30-meter transects with 6-member teams. This project has recently received a $2,000 grant.

Participants Stay in the Loop

Since their training, participants in the Oregon Wetlands Study keep in touch with the program through the *OWS Newsletter*, and the Portland State staff continues to assist teachers with development of their proposals for wetland study projects. Last April, participants gathered for a retreat to report on their projects.

Oregon Wetlands Study Takes Teachers from Behind the Desk (continued)

The benefits of the program have been many. EPA gained a series of thorough and reliable data on wetlands in the area, and was able to cover many more sites than otherwise possible. The science teachers were able to work as science technicians under the supervision of scientists. Their students will be learning about science, and about wetlands, by participating in science studies rather than just reading about it, and by making real contributions to environmental projects in their own communities.

A video, "Citizen Science," which documents the study, is available on request from Technifilm Vaugn, 1434 NW 17th, Portland,OR 97209. The price is $25 per copy.

[For more information, contact Neal Maine, PSU/Center for Science Education, 5107 Hwy. 101 N., Seaside, Oregon 97138 (503) 738-4021, or Dr. Mary E. Kentula, Wetlands Research Program, Environmental Protection Agency, 200 SW 35th Street, Corvallis, OR 97333.]

Project Uses Water Quality Model to Predict Effectiveness of Public Education

Maryland's Prince George's County has developed a modeling strategy for demonstrating and quantitatively estimating the effectiveness of public outreach in reducing nonpoint source pollution.

The county's Watershed Protection Branch used data from a community survey in the HSPF model to calculate the reduction in nonpoint source pollutant applications from residents' activities and estimate pollutant load reductions to the receiving stream.

The survey measured the pre-outreach program level of water quality awareness and activities in the Kettering community where the first pilot was launched. Survey questions focused on car and lawn care practices to broadly estimate the amounts of fertilizers, pesticides, detergents, oil, grease, and antifreeze entering the watershed. Other questions gauged public reaction to the project.

Thirty-six percent of the 1,125 households that received the survey responded. According to the Prince George's County Watershed Protection Branch, the survey showed that Kettering residents lacked a general knowledge of basic water quality source issues. For example, 58 percent of the residents did not know that stormwater runoff from residential neighborhoods causes water pollution. About 2,800 people live in the watershed community, which was constructed 20 years ago without water quality controls.

Automobile Care A Source of Pollution

The responses also provided insight into residential practices such as automobile care. About 31 percent of the residents change their own oil, and 10 percent of them dispose of it improperly. Based on residents' answers, the project staff concluded that nearly all of the used antifreeze from the 25 percent of residents who change it themselves contaminated stormdrain systems and nearby waterways.

Car washing is another source of water pollution. Ninety percent of residents wash their own cars at home, many of them weekly (21 percent) or monthly (34.9 percent). The project abstract notes, "Residential car washing occurs primarily on impervious areas where detergent-laden water discharges directly to nearby stormdrain systems. Detergents contain high levels of phosphorus and other pollutants potentially toxic to the aquatic system."

Green Lawn Enthusiasts

According to Prince George's County, Kettering single-family home residents, like many Americans, are "green lawn enthusiasts." Approximately 85 percent of them applied lawn fertilizers, and 80 percent used pesticides. Only about 10 percent of those who fertilized their lawns used the environmentally sensitive lawn care program developed by the Maryland Cooperative Extension Service.

The county team combined the lawn care and fertilizer use information with other information and with monitoring data gathered in the field to generate estimates of chemical application in the watershed. They used the HSPF water quality model to simulate reductions in pollution based on levels of success in the public education program. This information allowed the team

Modelling to Predict Effectiveness of Public Education (continued)

to target education efforts to where they would be most effective and to show residents the impacts of their activities.

For example, the model was used to assess nutrient concentrations downstream of residential areas before and after a public education program assuming 70 percent participation. The model showed that phosphorus declined significantly, and nitrogen decreased in the spring and summer because of the shift to fall applications encouraged by the educational program.

In addition, the project staff said, the information generated by the surveys regarding residential car care revealed how a public education program can directly reduce the amount of automotive fluids reaching local waterways.

They concluded, "The data generated was very useful in targeting public education programs. The methods used were simple and relatively inexpensive, and provide an ideal alternative to extensive, costly, and difficult water quality monitoring." The county now plans to apply this approach to other community projects on a small watershed scale.

[For more information, contact Jennifer Smith or Stephen Paul, Prince George's County, 9400 Peppercorn Place, Landover, MD 20785. FAX: (301) 883-5962.]

NPS Electronic Bulletin Board News

This portion of *News-Notes* is prepared for the benefit of the ever-increasing numbers of *News-Notes* readers who are regular users of U.S. EPA's *NPS BBS.*

Nonpoint Source Electronic Bulletin Board System. EPA's *NPS BBS*, through the user's personal computer, provides timely, relevant NPS information; a nationwide forum for open discussion; and the ability to exchange computer text and program files. Specific Issue Groups (SIGs or mini-bulletin boards) are dedicated to specific topics. Currently, there are eight SIGs on the *NPS BBS*: Watershed Restoration, Agriculture, Fish Consumption Risk Management, TMDLs, Waterbody System Support, NPS Research, Volunteer Monitoring, and Coastal NPS Control. All articles from all issues of *News-Notes* are stored on the *NPS BBS* and may be retrieved on your personal computer. A searchable *News-Notes* database helps you find the information you need.

To access the *NPS BBS*, you will need • A PC or terminal • Telecommunications software (such as Crosstalk or ProComm) • A modem (1200, 2400 or 9600 baud) • A phone line. The *NPS BBS* phone number is (301) 589-0205. Parameters are N-8-1.

The *NPS BBS* may also be accessed from the Internet by typing TELNET FEDWORLD.GOV. Once on FedWorld, turn ANSII graphics off and go through the Gateway to NPS-BBS, or command D 79.

NPS BBS Users Top 2,600

NPS BBS use continues to grow! The latest user statistics available for EPA's popular computer bulletin board show that a record 1,260 people logged on in May 1994, among them 198 new users. The total number of active users of the free service now stands at 2,615.

An estimated 30 percent of the users belong to the private sector, while 17 percent are from state government, 12 percent from EPA, 12 percent from other federal agencies, 7 percent from regional and local government, 5 percent from schools and universities. Three percent identified themselves as concerned individuals, and 3 percent identified themselves as members of environmental groups.

The *NPS BBS* has been fully operational since March of 1991 and in that time has been stocked with over 1,000 on-line bulletins and downloadable files including *Guidance Specifying Management Measures for Control of NPS in Coastal Waters*, TMDL case studies, the Executive Summary and Aquatic/Watershed Chapter from the *President's Forest Plan Report*, President Clinton's Clean Water Initiative, and all the issues of the *Volunteer Monitor* and *NPS News-Notes*.

Of the eight Specific Issue Groups open to all users, the Volunteer Monitoring SIG was the most popular in May, fielding 160 calls. The VolMon SIG hosts two searchable databases, one of state volunteer monitoring programs, the other of resources for volunteers. Next in usage was the Fish Consumption Risk SIG, with its database of U.S fish advisories.

NPS BBS Users Top 2,600 (continued)

Look Ma, No Manual?

The *Nonpoint Source Electronic Bulletin Board System Users Manual* is currently out of print because the *BBS* is undergoing a user-friendly "makeover." Menus, help screens, and prompts are being revised so that users will have a clearer understanding of the *BBS's* resources, functions, and commands. The *NPS BBS's* new look should enable users to get around the *BBS* without a 64-page manual. When the makeover is complete, a much slimmer "cheat sheet" will be available to help people get started.

In addition, on-line help is available for all functions by typing **H** and any command listed on the Main Menu. For example, typing **H R** will supply help reading messages. Typing **?** is a second way to access on-line help.

Please call Chelie Stubblebine or Elaine Bloom at (703) 385-6000 if you need more help.

Reviews and Announcements

EPA Explains Requirements for Applying Sludge on Farmland

Many communities battling rising costs and shrinking landfills are finding the idea of beneficial uses for sewage sludge, or "biosolids," attractive. Farmers, on the other hand, are interested in affordable sources of crop fertilizers.

Biosolids, which may include domestic septage, have value as a crop fertilizer, and such use can reduce local disposal problems. However, just as with animal manures and chemical fertilizers, proper handling is required to maximize benefit and minimize possible health or environmental risks.

Three publications designed to help communities and biosolids handlers understand and meet the new national standards for the use or disposal of sewage sludge, also known as 40 CFR Part 503 (*Federal Register*, February 19, 1993), are now available from EPA.

Most pertinent to nonpoint source managers is *Domestic Septage Regulatory Guidance: A Guide to the EPA 503 Rule.* Domestic septage is defined as liquid or solid and coming from a system that receives only household, noncommercial, nonindustrial sewage. The document outlines the requirements for the application of domestic septage on farmland and other nonpublic sites.

The application rates required in the guidance are nitrogen-based and must not be more than needed to supply the nitrogen required by the crops being grown. The guidance provides a formula for determining the annual allowed rate based on an estimated three-year average availability of nitrogen in domestic septage.

Two other EPA publications are designed to help communities meet the national sewage sludge standards. *Preparing Sewage Sludge for Land Application or Surface Disposal* introduces the new standards controlling the quality of sewage sludge applied to land, landfilled, or incinerated.

Environmental Regulations and Technology: Control of Pathogens and Vector Attraction in Sewage Sludge discusses the public health aspects of pathogens, requirements for pathogen reduction, and controlling pathogen vectors.

Domestic Septage Regulatory Guidance: A Guide to the EPA 503 Rule (publication number EPA/832/B-92/005) and *Preparing Sewage Sludge for Land Application or Surface Disposal* (publication number EPA/831/B-93/002a) are available from the Office of Water Resources Center (RC-4100), U.S. EPA, 401 M St., SW, Washington, DC 20460. *Environmental Regulations and Technology: Control of Pathogens and Vector Attraction in Sewage Sludge* (publication number EPA/625/R-92/013) is available from CERI, 26 West Martin Luther King Drive, Cincinnati, OH 45268. Please use publication numbers when ordering. A new booklet, *Biosolids Recycling: Beneficial Technology for a Better Environment* (EPA/832-R-93-009) should be available from ORC in August 1994.

U.S. EPA recently reorganized its wastewater program responsibilities. The former Office of Wastewater Enforcement and Compliance became the new Office of Wastewater Management as enforcement functions shifted to the Office of Enforcement and Compliance Assurance. The Office of Wastewater Management will involve itself with permitting, municipal support, and technical assistance. For more information, contact: Office of Wastewater Management (mail code 4201), U.S. EPA Headquarters, 401 M St., SW, Washington, DC 20460. Phone:(202) 260-3715.

Rangeland Video Library

The Society for Range Management has 86 videotapes available for loan. A sampling of titles includes *Mountain Erosion Control and Brush Management, Fence Posts and Lariats, Grazing Management: The Key to Total Range Management, Legendary Ranches of Texas, Wealth in the Wetlands,* and *Where Water Meets Land: Understanding and Managing the Riparian Resource.* Several of the tapes document riparian or watershed restoration projects, including work on Boulder Creek (see *News-Notes* # 18 for more on this project.)

The SRM lends the videos for up to one month for a loan fee of $6 per tape to cover shipping and handling costs. Allow two weeks for delivery. For a complete list and order form, contact the Society for Range Management, 1839 York St., Denver, CO 80206.

Videos Help Kids Study Lake Eutrophication

Most kids these days can reel off long, complicated dinosaur names, so why not teach them an important word like eutrophication?

Upper elementary school students in New Hampshire are studying the compelling problem of lake eutrophication in a new educational program developed by the New Hampshire Department of Environmental Services called the Interactive Lake Ecology Program. It features seven 5-to-7 minute videos, in which the narrator explains one concept about water and asks a thought-provoking question to whet students' appetites before they do activities from their workbooks that illustrate the concept.

The unique and contemporary videos, professionally produced with the collaboration of New Hampshire limnologists, use photography combined with animation. Special effects add visual interest; for example, the image of the narrator introducing a piece of monitoring equipment is superimposed on a view of someone using it.

The student workbook presents the basics of lake ecology, including coverage of the important nutrient phosphorus and the interdependency of nature. Students read case studies of three different sample lakes. From data given in their workbooks, students record field observations, laboratory and field data, and land use within the watershed described in the case study. Using this log, the students determine the trophic classification of the lake and make recommendations for watershed protection.

State agency staff or local business people visit the classroom to provide depth and perspective.

Experiments demonstrating various concepts reinforce the explanations provided in the video. For example, temperature-dependent changes in water density important in lake stratification are demonstrated by heating one container of water and cooling the other. Different colors are added to each sample and they are carefully combined. The warmer one will float above the cold one.

In addition to the properties of water, the program covers the water cycle, the food chain, watersheds, pollution, and testing. In New Hampshire, citizen monitors from the New Hampshire Volunteer Lake Assessment Program meet with students either in the classroom or at a lake. These volunteers are in a unique position to offer the student historical information, lake quality data, and a knowledge of limnological sampling techniques.

Lake Organization Video

NHDES has produced another video, *People Making a Difference,* to assist lakeside residents who are interested in forming a lake protection association. The video provides a close-up look at the organizational needs of an association, as well as the rationale for forming one. Filmed on beautiful Lake Sunapee in New Hampshire, the video presents a clear picture of how individuals can band together to have a positive effect on the quality of their lake.

The material in both programs would be useful in most geographic areas. The teaching package contains a teaching guide and 20 student workbooks and may be purchased for $94. Additional workbooks are $4 each. The Program and Lake Association videos are $9.95 each; a preview video is free.

[For more information, contact Jody Connor or Natalie Landry, NHDES, 6 Hazen Drive, Concord, NH 03301. Phone: (603) 271-3503.]

Land Trust Handbook Published

One way of protecting a water resource is to protect the land around it. Land trust organizations have been doing that since the mid-1800s, according to the Chesapeake Bay Foundation's new publication, the *Pennsylvania Land Trust Handbook*. The comprehensive manual contains over 200 pages of practical information on the purposes of land trusts, how to organize and incorporate one, and land acquisition methods. The handbook is available for $10 from the Chesapeake Bay Foundation, 214 State St., Harrisburg, PA 17101. Phone: (717) 234-5550.

A New Dimension to Traditional Runoff Management

URBANIZATION AND WATER QUALITY: A Guide to Protecting the Urban Environment

Anyone who has ever seen a program flounder on unrecognized political or fiscal realities in the community will appreciate *Urbanization and Water Quality.* Written for decisionmakers in small- to medium-sized communities, its entire approach to nonpoint source pollution management centers on educating and involving the public.

From diagnosing the symptoms and sources of pollution (chapter 1) to a step-by-step approach to planning a nonpoint source management program (chapter 2); from developing the land use plan and finding technical solutions (chapters 3 and 4) to the continuing education and involvement of the public (chapter 5), this book speaks simply and directly to the most important stakeholders in every project.

Urbanization and Water Quality answers our first questions—how to organize and finance a nonpoint source program, publicize it, and get it started; and our later ones—how to continue to manage the program and maintain its momentum. Both kinds of advice are practical and timely.

Produced by the Terrene Institute in cooperation with U.S. Environmental Protection Agency, Washington, D.C. paperback, 67 pages.

[Urbanization and Water Quality is $12.95 plus $3 for shipping and handling. Contact: Terrene Institute, 1717 K St. NW, Suite 801, Washington, DC. Phone: (202) 833-8317. FAX: (202) 296-4071.]

Video Documents Watershed Coalition Building

by Sari Sommarstrom, reprinted from the Watershed Management Council newsletter (Spring 1994)

Miracle at Bridge Creek: How to Build a Natural Resource Coalition Among Groups at Odds, produced by the Oregon State University Extension Service, shows the valiant efforts of the Oregon Watershed Improvement Coalition. Scenes of the lions peacefully sitting down with the lambs are encouraging, but reflect years of persistent work. Informal picnics and campouts helped the group break the ice, as did the voluntary resignation of certain uncompromising members. The state-wide group worked with local landowners to successfully tackle specific grazing-related problems in a small watershed for the benefit of native trout. As a result of their work, the positive feelings seem to be spreading to other watersheds in the state. We can all learn lessons from their experience.

The 30-minute case study stands on its own for general audiences, while the 90-minute version is oriented to extension agents and others who need details on setting up similar cooperative groups.

[The 30-minute video (VTP-013) costs $30, including postage, and 90-minute video (VTP-012) is $40. Order from Publication Orders, Agricultural Communications, Oregon State University, Admin. Services A422, Corvallis, OR 97331-2119.]

Two-Year Urban Runoff Study Produces Manual

The Northern Virginia Soil and Water Conservation District, under a grant from the U.S. Environmental Protection Agency, has completed a two-year study of issues associated with storm water runoff control programs in urbanized areas across the U.S. The result is a comprehensive manual describing the strategies which local communities can use to develop the institutional frameworks needed to implement runoff control programs.

The 94-page manual contains case studies of six communities across the country. While each community has different urban runoff management needs, environmental concerns, and available resources, building an effective program requires certain common key steps. This manual lays out the essential elements, which will also be useful in preparing the management plans required by various federal regulations and programs.

[The manual is available for $10.00 pre-paid with a check made out to NVSWCD. To order, contact NVSWCD, 12055 Government Center Parkway, Suite 905, Fairfax, VA 22035-5512. Phone: (703) 324-1460.]

Ecological Restoration Proceedings Issued

Symposium on Ecological Restoration, the proceedings of a conference held March 2-4, 1993, has been published. Containing 33 papers by many leading experts in the field, the publication provides an overview of the issues surrounding ecological restoration. The document is available by contacting the Watershed Branch (4503 F), U.S. EPA, 401 M St. SW, Washington, DC 20460. Phone: (202) 260-7074. FAX: (202) 260-7024.

National NPS Forum Newsletter

Interested in what's happening with the National Forum on Nonpoint Source Pollution? Convened last February by the National Geographic Society and The Conservation Fund to focus on nonpoint source pollution, the Forum is an unprecedented collaboration of industries, conservationists, educators, and the government. And it's just published its first newsletter. For a copy, contact Larry Selzer at The Conservation Fund, P.O. Box 1746, Shepherdstown, WV 25443. Phone: (304) 876-2815. FAX: (304) 876-0739.

Coastal Nonpoint Source Workshop

Building Partnerships is the theme of this fall's coastal nonpoint source workshop, the product of a truly diverse group of public and private organizations.

Led by the Soil Conservation Service, contributors include the National Pork Producers Council, the Southeastern Poultry & Egg Association, and the Potash Institute as well as EPA's National Estuary Programs, NOAA, Coastal America, and the Terrene Institute.

The Oct. 17-19 workshop in Tampa, Fla., will focus on opportunities for long lasting working relationships between the public and private sectors that will develop successful programs to address coastal nonpoint source programs.

In addition to case studies of innovative approaches to the coastal nonpoint source issue and discussions of resources and agencies available for assistance, the program will include an update from the President's Council on Sustainable Development and concurrent sessions on funding, partnerships, and scientific issues.

[For more information, contact the Terrene Institute, 1717 K St. NW, Suite 801, Washington, DC. Phone: (202) 833-8317. FAX: (202) 296-4071.]

Datebook

DATEBOOK has been assembled with the cooperation of our readers. If you would like a meeting or event placed in the DATEBOOK, contact the *NPS NEWS-NOTES* editors. Due to an irregular printing schedule, notices should be in our hands at least two months in advance to ensure timely publication. A more complete listing can be found on the *NPS BBS*.

Meetings and Events

1994

September

7-12 — *Celebrating the Year of the Coast, Innovations in Coastal Management,* Wilmington, NC. Contact: Allison Ballard, Jordan McColl Inc, PO Box 3415, Wilmington, NC 28406. (800) 258-6711 or (910) 762-6711.

13-15 — *Water Quality Criteria and Standards for the 21st Century,* Arlington, VA. Contact: Betty Peterson at (703) 734-2551 or 734-2586. There is no registration fee but space is limited. Sponsored by U.S. EPA Office of Water. Focus is on how water quality criteria and water quality standards are used in a holistic approach to watershed protection. Will highlight new physical and biological water quality assessment tools and how they can be used in conjunction with traditional chemical-specific tools to extend protection to human health, aquatic life, and water-dependent wildlife.

14-15 — *International Groundwater Protection Seminar,* El Paso, TX. Contact: Brad Cross, Community Support Programs Section, TNRCC, PO Box 13087, Austin, TX 78711-3087. (512) 475-4615. Emphasis on NPS, groundwater protection and problems along the U.S.-Mexico border. Sponsored by the Texas Natural Resources Conservation Commission with a grant from EPA.

20-23 — *Coastal Zone Canada '94,* Halifax, Nova Scotia. Contact: Coastal Zone Canada '94 Secretariate, Bedford Institute of Oceanography, PO Box 1006, Dartmouth, Nova Scotia, CANADA B2Y 4A2. Goals are to generate a dialogue between government, scientists, academics, industry, and aboriginal and community representative; to gain insights which will contribute to cooperative coastal zone management; and to produce recommendations for action.

21-23 — *Environmental Problem Solving with Geographic Information Systems,* Cincinnati, OH. Contact: Sue Schock or Dan Murray, EPA, CERI, 26 W. Martin Luther King Drive, (G-75), Cincinnati, OH 45268. (513) 569-7551 or (513) 569-7522. Sponsored by the EPA Center for Environmental Research Information.

22-23 — *Water Quality in the Sustainable West,* Park City, UT. Contact; Jack Wilbur, Utah Dept. of Agriculture, 350 N. Redwood Rd., Salt Lake City, UT 84116. (801) 538-7098.

22-23 — *Fifth Annual Utah Nonpoint Source Water Quality Conference: Water Quality in the Sustainable West,* Park City, UT. Contact: Jack Wilbur, Utah Department of Agriculture, 350 North Redwood Road, Salt Lake City, UT 84116. (801) 538-7098. Sponsored by the Utah office of USDA Soil Conservation Service, Utah State University Cooperative Extension Service, and other state and federal agencies.

22-24 — *Seniors for the Environment,* Chevy Chase, MD. Contact: EASI, 9309 Center St., Ste. 101, Manassas, VA 22110. (703) 330-5667. FAX: 330-3268. Sponsored by the Environmental Alliance for Senior Involvement.

27-30 — *Evaluating the Effectiveness of Forestry Best Management Practices in Meeting Water Quality Goals or Standards,* Portland, OR. Contact: George Dissmeyer, USDA Forest Service, 1720 Peachtree Road, NW, Atlanta, GA 30367. (404) 347-7221. FAX: 347-4448. Sponsored by USDA Forest Service, National Association of State Foresters, U.S. EPA, National Council of the Paper Industry for Air and Stream Improvement, USDA Cooperative Extension Service, and Virginia Polytechnic Institute and State University.

28-30 — *Watersheds '94 Expo,* Bellevue, WA. Contact: Andrea Lindsay, EPA, WD-125, 1200 Sixth Avenue, Seattle, WA 98101. (206) 553-1896 or (800) 424-4EPA. Cooperative effort of the U.S. EPA, the University of Washington Center for Streamside Studies, and state, tribal, local, and nonprofit organizations.

28-30 — *Who Governs Public Lands? Washington? The West? The Community? 2nd Annual Western Public Lands Conference,* Boulder, CO. Contact: Kathy Taylor, (303) 492-1288. Sponsored by the University of Colorado School of Law. Topics include Colorado Grazing Roundtable and Rangeland 94, Option 9 and Pacific Northwest forests, bypass flows and Colorado national forests.

1994

September

29-10/1 — *Friends of Trashed Rivers II: A Conference of the Coalition to Restore Urban Waters,* New York, NY. Contact: Friends of Trashed Rivers II, Local Conference Manager, c/o KLS Communications, Inc., 292 Main St., Ste.16, Hackensack, NJ 07601. Will include a broad range of restoration and citizen action issues. Funded in part by Philip Morris Companies, USDI Bureau of Reclamation, SCS, EPA, and New York Department of Environmental Conservation.

October

5-7 — *Change in the West: Evolution of the Watershed Approach,* Alamosa, CO. Contact: Karen Hamilton, EPA (8WM-WQ), 999 18th Street, Suite 500, Denver, CO 80202-2466. (303) 293-1576. FAX: 391-6957. Topics include: changing values and expectations of the watershed; San Luis Valley wetlands; changing policies and management practices in riparian areas; watershed management case studies; and field trips to Alamosa Wildlife Refuge.

9-12 — *National Ground Water Association's 46th Annual National Convention and Exposition,* Las Vegas, NV. Contact: Natalie Marko, National Ground Water Assoc., 6375 Riverside Drive, Dublin, OH 43017. (614) 761-1711. FAX: 761-3446. or (800) 551-7379.

11 — *Watershed Management and Clean Water Act Reauthorization,* Ontario CA. Contact: Carmen Rios, Los Angeles County Department of Public Works, Waste Management Division, PO Box 1460, Pasadena, CA 91802-1460. (818) 458-3525. Sponsored by the American Public Works Association, Southern California Chapter Water Resource Committee. Topics include watershed management concepts, federal and state regulations, GIS applications, land use planning, CWA reauthorization, and environmental advocate perspectives.

16 — *The Relative Role of Urban and Rural Nonpoint Source Controls in Managing Wet Weather Water Quality,* Chicago, IL. Contact: Christine McKallip, Water Environment Federation, 601 Wythe Street, Alexandria, VA 22314-1994. (703) 684-2400. FAX: 684-2492. Sponsored by the Water Environment Federation.

16-20 — *Water Environment Federation's 67th Annual Conference and Exposition,* Chicago, IL. Contact: Maureen Novotne, Water Environment Federation, 601 Wythe Street, Alexandria, VA 22314-1994. (703) 684-2400. Topic: surface water quality and ecology.

17-19 — *Coastal Nonpoint Source Workshop: Building Partnerships,* Tampa, FL. Contact: Julia Johnson 1717 K St., NW, Ste. 801, Washington, DC 20006-1504. (202) 833-8317. Sponsored by SCS, EPA, NOAA, Coastal America, and Terrene Institute. Topics: coastal management and protection.

21 — *Water Management for Sustainable Development: Annual Conference of New Jersey Section of American Water Resources Association,* Freehold, NJ. Contact: Greg Westfall, NJ AWRA, PO Box 7814, West Trenton, NJ 08628. (908)246-1977, ext.133.

23-26 — *The National Symposium on Protecting Rural America's Water Resources: Partnerships for Pollution Solutions,* Washington, DC. Contact Ground Water Protection Council, 827 NW 63rd St., Ste. 103, Oklahoma City, OK 73116. FAX (405) 848-0722.

31-11/5 — *Managing Water Resources in the 21st Century: Finding Workable Solutions,* Orlando, FL. Contact: NALMS, 1 Progress Blvd., Box 27, Alachua, FL 32615. (904) 462-2554.

November

6-10 — *American Water Resources Association's 30th Annual Conference and Symposia,* Chicago, IL. Contact: Michael C. Fink, Director of Meetings, AWRA, 5410 Grosvenor Lane, Suite 220, Bethesda, MD 20814-2192. (301) 493-8600. FAX: 493-5844.

9-10 — *2nd Annual Virgin Islands Nonpoint Source Conference,* St. Croix, VI. Contact: Virgin Island Resource Conservation and Development Council, PO Box 4399, Kingshill, VI 00851-4399. (809) 778-9838.

14-16 — *Management of Environmental Problems for Elected Officials,* Richmond, VA. Contact: Nancy Blatt, Water Environment Federation, 601 Wythe Street, Alexandria, VA 22314-1994. (703) 684-2400. FAX: 684-2492.

14-16 — *Watershed WISE: A Workshop on Watershed Protection,* Grand Junction, CO. Contact: Susan Foster, Thorne Ecological Institute, 5398 Manhattan Circle, Suite 120, Boulder, CO 80303. (303) 499-3647. FAX: 499-8340. Steering committee and sponsors include U.S. EPA Region 8, Western Governors' Association, MT Dept. of Health and Environmental Sciences, SD Dept. of Environment and Natural Resources, CO Dept. of Health, SCS, The Nature Conservancy Western Regional Office, BLM, and Thorne Ecological Institute.

15-16 — *Canada/United States Technical Workshop on the Upper Columbia River Basin: An International Dialogue,* Spokane, WA. Contact: Diane Weber, State of Washington, Water Research Center, Washington State University, Pullman, WA 99164-3002. (509) 335-5532. FAX: 335-1590. Presented by Lake Roosevelt Water Quality Council, Environment Canada, State of Washington Water Research Center, and U.S. EPA.

1994

November

16-18 *Watersheds '94: Respect, Rethink, and Restore: Watershed Management Council Symposium,* Ashland, OR. Contact: Hannah Kerner, University of California, ESPM Extension, Forestry, 163 Mulford Hall, Berkeley, CA 94720. (510) 642-2360. kerner@nature.berkeley.edu. Will address issues of integration and communication in watershed management and will demonstrate understanding and respect for the functions and values of watersheds.

17-18 *Promoting Community Groundwater Protection,* Washington, DC. Contact the Groundwater Foundation, (800) 858-4844. Honors Groundwater Guardian communities.

December

4-7 *56th Midwest Fish and Wildlife Conference - The Future of Fish and Wildlife is Now,* Indianapolis, IN. Contact: Debbie Fairhurst, Division of Fish and Wildlife, Atterbury Fish & Wildlife Area, Edinburgh, IN 46124. (317) 232-7535.

12-13 *Protecting Ground Water: Promoting Understanding, Accepting Responsibility, and Taking Action,* Washington, DC. Contact Laura Ludwig, Terrene Institute, 1717 K St. NW, Washington, DC 20006. (202) 833-8317. FAX: (202) 296-4071.

14 *Third Annual Conference of the Fertilizer Research and Education Program of the California Department of Food and Agriculture,* Parlier, CA. Contact: Jacques Franco, Program Coordinator, California Dept. of Food and Agriculture, 1220 N Street, P.O. Box 942871, Sacramento, CA 94271-0001. (916) 653-5340. Conference will include a grower/industry panel on current water quality and agricultural issues.

1995

February

23-24 *Water, Nitrogen, and People: An International Conference,* Everett, WA. Contact: Craig MacConnell, Washington State University Extension, Whatcom County, 1000 North Forest St., Suite 201, Bellingham, WA 98225-5594. (206) 676-6736. Sponsored by WSU Cooperative Extension, Washington State Department of Health, BC Environment, and U.S. EPA. Focuses on sustainability of the water resource and understanding the effect of nitrogen on water. Targets health officers, land use planners, public policy makers, agricultural commodity groups, environmental groups, tribes, local governments, conservation districts, and agricultural and water quality professionals.

28-3/3 *International Erosion Control Association's 26th Annual Conference and Trade Exposition,* Atlanta, GA. Contact: John T. Price, IECA Program Chair, Price & Company, Inc., 425 36th Street, SW, Wyoming, MI 49548. (616) 530-8230. FAX: 530-2317. Topics include policy and management practices; methods and techniques; case histories; research and development; product introduction; and special topics.

May

14-18 *Water Resources at Risk — 1995 Annual Meeting of the American Institute of Hydrology,* Denver, CO. Contact: James R. Kunkel, Advanced Sciences, Inc., 405 Urban Street, Suite 401, Lakewood, CO 80228. (303) 980-0036. FAX: 980-1206. Purpose: describe issues, management strategies, and technologies in hydrology, hydrogeology, and mining hydrology. Conference will feature sessions on subjects of current concern in hydrology, poster sessions, short courses, and field trips.

July

5-9 *Partners for the Planet Youth Summit,* Snowbird, UT. Contact: Gail Church, Tree Musketeers, 136 Main Street, Suite A, El Segundo, CA 90245. (310) 322-0263. FAX: 322-4482.

16-19 *Interdisciplinary Conference on Animal Waste and the Land-Water Interface,* Fayetteville, AR. Contact: Patti Snodgrass, Arkansas Water Resource Center, 113 Ozark Hall, University of Arkansas, Fayetteville, AR 72701. (501) 575-4403. FAX: 575-3846. The purpose of the conference is to provide a forum for interdisciplinary, holistic discussion of animal waste, soil and water interactions. Proposed topics: waste characteristics and edge-of-field losses, impact on stream and lake ecology, watershed management, BMPs, alternative uses, regulatory vs. voluntary programs, and socio-economic considerations.

17-22 *Coastal Zone 95 - Spotlight on Solutions,* Tampa, FL. Contact: Billy Edge, CZ 95 Program Committee, Ocean Engineering Program, Civil Engineering Department, Texas A&M University, College Station, TX 77843-3136.

30-8/2 *Biosolids and Residuals Management Conference,* St. Louis, MO. Contact: Nancy Blatt, Water Environment Federation, 601 Wythe Street, Alexandria, VA 22314-1994. (703) 684-2400. FAX: 684-2492. Sponsored by the Water Environment Federation. Meeting will relate cost data to the topics presented, including technical case studies, alternative and innovative programs, research findings, and compliance issues.

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Nonpoint Source NEWS-NOTES is produced by the Terrene Institute under an EPA Cooperative Agreement (# 820957-01) from the Assessment and Watershed Protection Division, Office of Wetlands, Oceans and Water, U.S. Environmental Protection Agency. It is distributed free of cost. Views expressed do not necessarily reflect those of EPA or the Terrene Institute. Mention of commercial products or publications does not constitute endorsement or recommendation for use by EPA or the Terrene Institute.

NONPOINT SOURCE
News-Notes
c/o Terrene Institute
1717 K Street, NW
Suite 801
Washington, DC 20006

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