

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

In Memory of Harold F. Wise, April 23, 1917 – March 22, 1994

Commentary

Tribute to a Wise Man

Although many of those closest to Hal Wise, creator and editor of *Nonpoint Source News-Notes*, say he loved *News-Notes* best, he did many other things in his life as well—graduated from Berkeley with degrees in economics and government, “invented” state planning, did the land use plans for many U.S. cities, influenced current water quality policy and environmental philosophy, was an Army colonel during World War II, grew bonsai, taught at two universities, and was a mentor to many.

So it is fitting that this issue of *News-Notes* begins with remembrances of Hal from several colleagues. Some were eloquently expressed at Hal’s memorial service in Washington. Others were contributed directly to *News-Notes*. You will find these “tributes to a wise man” on the following page.

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From Ed Liu, EPA Region 10:

I met Hal Wise in 1989, thirty years after he wrote the General Plan for the old territorial legislature for Hawaii, just before we became a state. In Hawaii, we like to "talk story," and Hal really could. He told of a Hawaii when Trader Vic's served Chinese food but wouldn't admit Asians, and when the legislature met in the old Iolani Palace.

Hal had a novel idea back then: instead of writing a planning bill every two years, why not create an office of state planning? He got it passed and wrote the plan. He identified the resort areas, more often than not on the leeward sides of islands, away from the rainforests. Those you who vacation in Hawaii know the places Hal selected: Kapalua, Royal Kaanapali, Mauna Kea Resorts, Waikalua . . .

From Hank Zygmunt, EPA Region 3 NPS Coordinator:

I met Hal several years ago when a friend from Capitol Hill suggested we meet to discuss a piece of legislation so I would better understand the positions of supporters as well as nonbelievers. Hal not only spent a great deal of time explaining how almost every living creature would be impacted by the actions proposed in the bill, but he also wove in a brief history of the shortcomings of past presidents, congressional representatives, and a few governors. His style in sharing historical stories of events that shaped today's environmental policies and programs was unique and effective . . .

Over the years, I have been blessed to have shared special times with this man who made me think and laugh . . .

From Dov Weitman, Chief, Nonpoint Source Control Branch, EPA Office of Water:

EPA was privileged to have Hal Wise devote what for most people would be "the golden years of retirement" to helping EPA usher in the nonpoint source program . . .

Quite simply, Hal was the most effective spokesperson in the nation for the cause of nonpoint source pollution control. As the creator and editor of Nonpoint Source News-Notes, Hal drew upon a lifetime of service to the causes of intelligent land use and environmental planning. . . .

Hal did not merely publish a newsletter—he helped create and foster a caring and committed community of individuals, institutions, universities, and all levels of government that are devoted to the principles of nonpoint source pollution control and watershed protection and restoration. . . .

Hal always promoted inclusion rather than exclusion, always looked for positive steps of progress rather than criticizing bad practices and political obstacles. Hal was genuinely humbled and enthused by the many talented and dedicated people working in the field, and the reader always came away infected with Hal's commitment and enthusiasm for all of the wonderful progress that he had the pleasure of reporting. . . .

. . . One anecdote conveys Hal's inimitable style, sense of fair play, and approach to solving problems. In mid-1992, Hal wrote a front-page commentary singing the praises of a new book entitled How Not to Be Cowed, which provided advice on how to assure that western rangelands are managed appropriately to protect environmental values. Hal wrote: "The various interests at play in the public lands drama—the concerned public and the Bureau of Land Management's army of public servants as well as the growing numbers of environmentally-minded ranchers—will all welcome this book as a guide to the sound management of public lands."

That issue got quite a bit of "fan mail," including a letter from ten western senators. Hal was not cowed. (Indeed, he rather enjoyed the notoriety.) In the next issue, Hal noted that he had received a letter from the National Inholders Association that produced a publication on the same subject. This group's book was entitled How to Fight Back and Win: A Ranchers Guide. Hal remarked in News-Notes, "Although we cannot completely agree [with the views expressed in the letter], we welcome the notion that grazing and environmental quality can go hand in hand."

Hal, thank you for blessing us with your knowledge, your enthusiasm, your sparkle, your engaging wit, your commitment, and your companionship.

A Tribute to a
Wise Man
(continued)

From Susan Alexander, frequent NPS News-Notes contributor and former NPS Coordinator Region 6:

Hal's career spanned almost six decades of activism and quiet vocal revolution. He wrote most of the basic urban planning ordinances under which our cities operate. He helped many state governments and legislatures create the water quality or environmental agencies we know today. Upon coming to EPA in 1987 [as part of a retired worker's program], Hal wrote some of the clearest and most farsighted guidance and policy papers about the NPS program that I have ever seen. Most were never signed by the administration but still circulated as bootleg "propaganda" among folks doing NPS work, influencing our thoughts and actions. He wrote of such things as "The Responsibilities of Lead NPS Agencies," he developed a process for real federal consistency review and resolution, he wrote about NPS regulation, and advocated EPA and state direct oversight of USDA conservation programs, among other radical ideas.

I will miss his eternal optimism, his grit and courage to keep going even in the long, gray times, and the sharp, direct, and beautifully clear writing that made NPS News-Notes insightful and educational.

[Donations in Hal Wise's memory may be made to The Nature Conservancy, 1815 North Lynn St., Arlington, VA 22209]

Notes on the National Scene

Contracts Protecting Sensitive Lands to Expire Next Year

EDITOR'S NOTE: For a detailed discussion of the Conservation Reserve Program, readers should refer to "The Conservation Reserve Program: Status, Future, and Policy Options," by Tim Osborne of the USDA Economic Research Service, in *The Journal of Soil and Water Conservation*, July-August 1993, Vol.48, no.4., pp. 271-278.

Ten-year contracts on the first 2 million acres of sensitive land taken out of agricultural production under the Conservation Reserve Program (CRP) will expire in 1995. According to the Soil and Water Conservation Society (SWCS), without a new plan for that land, much of it (and the other 34.5 million acres protected by later CRP contracts) will return to intensive cropping, reversing environmental benefits to water and wildlife.

According to program experts, most of the land now under contract will be subject to compliance with conservation practices such as conservation tillage if the land is returned to use. However, there is some question as to whether these practices would be protective enough of the most environmentally fragile land.

The program, which pays farmers an average of \$50 an acre annually to keep highly erodible land in long-term vegetative cover, was established in 1985 under the 1985 Food Security Act. According to the SWCS policy position released in January,

A major impetus for the program initially was the need to help reduce surplus agricultural commodity supplies that were lowering food and feed grain prices and increasing the federal government's farm program costs. The program was designed to provide other important environmental benefits, including soil erosion control, improved water quality, wildlife habitat enhancement, and increased recreational opportunities.

While the program has unquestionably benefited the environment and farm economy, "those benefits have not been determined with any degree of accuracy, and they need to be," said the SWCS in its policy position. The USDA's Economic Research Service estimated the 1990 value of the CRP's environmental benefits to be between \$6 billion and \$13 billion over the life of the contracts. According to the policy paper, the program's \$2 billion price tag excludes administrative costs and the value of the savings it brings to other agricultural support programs.

SWCS Recommends Refocusing on Conservation Priorities

The SWCS recommended extending the CRP program with some critical modifications. First, it said, the full focus of the program should be redirected toward natural resource conservation, rather than agricultural commodity supply management. That way, lands under new contracts can be prioritized with regard to environmental benefits and payments adjusted accordingly.

Protection of water quality is a central theme in the SWCS's proposed policy. "Riparian corridors, buffer strips along streams, habitats for threatened and endangered species . . . should be given high priority for continued enrollment," and lands important to water quality, but not currently enrolled, should be targeted in a revamped program, said the conservation society.

Long-term or permanent easements, similar to those that protect wetlands under the Wetlands Reserve Program were proposed by SWCS as a lasting solution, as well as some built-in flexibility for new contracts that would allow lower-impact uses of less-sensitive lands.

The SWCS also proposed changing program oversight to help tailor the program to needs of specific areas of the country.

State interagency committees . . . should be assembled and used to help guide decision-making on the CRP and other farm conservation initiatives. One important responsibility for these committees to assume is that of setting priorities for CRP enrollments in the different states, or in regions within a state, to ensure that the multiple goals of the program are being achieved. The committees could exercise oversight authority as well over the constraints on the management of CRP acres (weed control, mowing, etc.) . . . and choice of cover crops planted.

In addition, the policy position stated, "These technical committees must reach out beyond the governmental agencies to involve representatives from other public- and private-sector interest groups that have an interest in the CRP."

The SWCS, which held a conference in February to discuss the future of the CRP, concluded its policy position by encouraging nonfederal interests to join protection efforts,

Longer term protection and extension of CRP's environmental benefits need not be the sole responsibility of the federal government. State and local governments and private organizations may actively seek to protect and extend certain benefits—critical wildlife habitats, for example.

The lasting contribution of the CRP to the nation's natural resource base will occur on those acres where long-term, alternative, low-intensity land uses are instituted. Such activities include timber production, controlled grazing, and fee hunting. More emphasis must be placed on the CRP as a transitional opportunity for landowners and as an educational window for numerous federal, state, and local government agencies; private organizations; and academic institutions. At the same time, policymakers, program administrators, and the general public are also necessary targets for outreach and education.

[For more information or to obtain a copy of the policy position, contact Doug Kleine or Max Schnepf (515) 289-2331, or Norm Berg (202) 659-5668, SWCS, 7515 Northeast Ankeny Rd., Ankeny, IA 50021-9764.]

Update on National Forum on Nonpoint Source Pollution

The National Geographic Society and the Conservation Fund have convened the National Forum on Nonpoint Source Pollution, which brings together a diverse group of leaders from public, private, and nonprofit sectors to focus on nonpoint source pollution. (See *News-Notes* #33 [November-December 1993] article on National Geographic's water education initiative.) Its members include Secretary of the Interior Bruce Babbitt, Secretary of Agriculture Mike Espy, and Environmental Protection Agency Administrator Carol Browner.

The Forum's purpose is to identify, demonstrate, and communicate to the public innovative solutions to nonpoint source pollution in three areas: economic incentives, voluntary initiatives, and education. Each area is addressed by a work group composed of experts in that field. Their task is threefold: to define the scope of the problem, to discover which programs are working and which are not, and to find opportunities for developing new demonstration projects across the country.

The Forum, chaired by Michigan Governor John Engler, will make decisions for action based on recommendations of the work groups. Each group met in late winter and will probably meet at least three more times before making their final reports.

The Education Work Group traveled to Nebraska during March to see first hand the impact of agricultural runoff on the region's critical groundwater supplies, and to learn of several innovative policies and practices employed in Nebraska for controlling contaminated runoff. Forum members will meet with the Economic Incentives Work Group in July to discuss the potential role of market-based mechanisms in controlling nonpoint source pollution. Forum Vice Chairman Governor Howard Dean of Vermont has invited the Voluntary Initiatives Work Group to Vermont in September to see some of the initiatives underway in that state, particularly those related to dairy farming and timber production. In addition, the Forum is seeking innovative efforts being carried out across the country so that it can provide visibility and leverage to successful demonstration projects.

The Forum will publish its final report in early 1995.

[For more information, or to alert the Forum to an interesting project, contact Larry Selzer, Director of the National Forum on Nonpoint Source Pollution, Freshwater Institute, PO Box 1746, Shepherdstown, West Virginia 25443. Phone: (304) 876-2815.]

Fifty-seven States and a Tribe Report In on Water Quality

On April 20, two days before the 24th celebration of Earth Day, EPA released a report confirming that many U.S. waters remain polluted. Of the waters that were assessed, about one third failed to meet standards for their state-designated uses. The report, which compiled the results of water quality assessments across the country, verified that nutrients and sediment are leading causes of degradation, and that agricultural runoff is the most extensive source of pollution.

The National Water Quality Inventory Report to Congress, covering the years 1990 and 1991, summarizes data gathered on 18 percent of the nation's total miles of rivers, 46 percent of its lake acres, and 74 percent of the acreage of U.S. estuaries.

EPA stressed that the report provides a "snapshot" of the quality of the assessed waters and should not be used to determine trends in the nation's waters.

See the special insert in this issue of *News-Notes*. It contains a fact sheet summarizing the report.

[For copies of the 507-page *Report to Congress* (EPA 841-R-94-001) or copies of a 44-page summary, *The Quality of Our Nation's Waters: 1992* (EPA 841-S-94-002), or additional copies of the fact sheet on the National Water Quality Inventory (EPA 841-F-94-002), contact NCEPI, 11029 Kenwood Rd., Bldg. 5, Cincinnati, OH 45242. FAX: (513) 891-6685.]

Combined Sewer Overflows To Dwindle Under New Policy

EDITOR'S NOTE: Combined sewer overflows are considered point sources under the Clean Water Act. We mention this news here because of its impact on the "condition of the water-related environment" and because part of the problem does, in the real world, originate with runoff.

On April 11, 1994, EPA announced a new national policy to control combined sewer overflows (CSOs), which annually discharge 1,200 billion gallons of combined sewage and stormwater to U.S. streams, lakes, and estuaries. The policy, negotiated with municipalities, environmental groups, and states, was developed to give communities flexibility in finding affordable solutions to the problem.

EPA expects the policy to prompt communities to commit to long-term strategies that will reduce raw sewage discharges from CSOs by 85 percent or more.

* The long list of diverse interest groups gathered around the table and contributing to the policy's development includes the Association of Metropolitan Sewerage Agencies, the Environmental Defense Fund, the National League of Cities, the Association of State and Interstate Water Pollution Control Administrators, the CSO Partnership, the Natural Resources Defense Council, the Water Environment Federation, the American Public Works Association, the Center for Marine Conservation, the National Association of Flood and Storm Water Management Agencies, the lower James River Association, Safely Treating Our Pollution, and numerous individual communities.

CSOs are implicated in human health problems, high drinking water treatment costs, beach and shellfish bed closures, fish kills, and other site-specific impacts. A remnant of the county's early infrastructure, CSOs occur when older-design sewer systems, which during dry weather channel domestic and industrial wastewater to treatment plants, are flooded with flow from storm sewers during heavy rains. When that happens, the *combined* flow spills into the nearest tributary or waterbody.

About 1,100 communities, mostly in the Northeast and Great Lakes area, will be affected by the new policy.

According to EPA Administrator Carol Browner, "This policy is one of the Administration's Clean Water Act reauthorization initiatives. A new Clean Water Act containing a policy like this will strengthen environmental protection, [and] improve state and local flexibility." EPA officials explained that the policy recognizes the site-specific nature of CSOs and establishes clear expectations for the coordination of CSO controls with the review and possible revision of water quality standards.

Browner also said that the policy will "sharply reduce the costs of achieving Clean Water Act goals." Implementation of the policy's directives is predicted to cost \$41 billion. According to EPA, past CSO proposals have had estimated costs of over \$160 billion. Unlike more expensive proposals that demand a "one-size-fits-all" approach, the new policy provides the flexibility to choose cost-effective controls, the agency said.

According to EPA, the policy will be incorporated into National Pollutant Discharge Elimination System (NPDES) permits or "other appropriate enforcement mechanisms."

Key Components of the Policy

Under the policy, municipalities would immediately implement nine minimum controls:

1. Proper operation and regular maintenance programs for the sewer system and CSOs.
2. Maximum use of the collection system for storage.
3. Review and modification of pretreatment requirements to assure CSO impacts are minimized.
4. Maximization of flow to the municipal sewage treatment plant for treatment.
5. Prohibition of CSOs during dry weather.
6. Control of solid and floatable materials in CSOs.
7. Pollution prevention.
8. Public notice to ensure that the public receives adequate notification of CSO occurrences and impacts.
9. Monitoring to effectively characterize CSO impacts and the efficacy of CSO controls.

Under the policy, municipalities would use a targeted approach, giving highest priority to environmentally sensitive receiving waters. The policy instructs municipalities to work with EPA, states, and water quality groups to develop long-term CSO control plans, evaluate control options, and select a workable approach.

The policy encourages states to coordinate the CSO planning process with the review and revision of state water quality standards.

The policy states that EPA recognizes that financial considerations are often a major factor for municipalities implementing CSO controls. For that reason, the policy notes that the financial capability of a municipality may be considered in the development of a CSO control implementation schedule.

Public participation is essential throughout all planning and implementation activities, said EPA.

["The Combined Sewer Overflow Control Policy," Federal Register Notice 59 FR 18688 is available on the NPS BBS in a downloadable file (see page 20 for log-on information).

To obtain a hard copy of "The Combined Sewer Overflow Control Policy," Federal Register Notice 59 FR 18688 (EPA 830-Z-94-001), contact NCEPI, 11029 Kenwood Rd., Bldg. 5, Cincinnati, OH 45242. FAX: (513) 891-6685. For more information on CSOs, contact Jeff Lape, Office of Wastewater Enforcement and Compliance (4204), U.S. EPA, 401 M St., SW, Washington, DC 20460. Phone: (202) 260-7361.]

NACD Draws Up Model "Bad Actor" Law

EDITOR'S NOTE: NACD, which produced the model law under a cooperative agreement with EPA, anticipated that the model law will be especially useful to coastal states, required under Coastal Zone Act Reauthorization Amendments of 1990 to develop "enforceable mechanisms" to ensure implementation of NPS management measures to control NPS in several key categories, including agriculture. Non-coastal states will also find the model useful, as they work to upgrade their nonpoint source programs.

Late in February, the National Association of Conservation Districts released a document that could serve as a template for state laws to address agricultural nonpoint source pollution. The model law is intended to be used as a back-up to existing education and incentive-based approaches.

In releasing the document, NACD's executive vice president, Ernest Shea, said,

When properly designed and funded, . . . incentive-based approaches have proven to be successful. However, some gaps may be left if producers fail to respond to such incentives or fail to correct documented problems or comply with established water quality management practices. Such producers, sometimes referred to as "bad actors," have been the focus of increased attention as federal and state agencies contend with agricultural water quality issues.

Under the model law, agricultural activities must be carried out in conformity with state-established management measures to prevent nonpoint source pollution. ("Management measures" are NPS control "methods, technologies, processes, siting criteria, operating methods, or other alternatives" that produce the greatest pollution reduction and are economically achievable.)

If a farmer is not using appropriate management measures, the state may initiate a series of actions, ranging from helping the farmer develop a conservation plan, to the issuance of a corrective order. At each step, the farmer is given an opportunity to implement management measures or an approved site-specific management plan. If none of the state actions is effective in bringing the farmer into compliance, the state itself may implement corrective measures on the agricultural operation, recovering costs from the land owner or operator, who may also be fined.

In certain circumstances, other scenarios may occur. Under the model law, if a lack of management measures creates an emergency situation, including endangering fish, other aquatic life, or wildlife, the state may immediately close down all or part of an agricultural operation.

Land owners or operators who are actively applying management measures that fail due to unusual circumstances or who are applying an approved site-specific conservation plan are protected from receiving corrective orders from the state.

The model law also establishes a state Nonpoint Source Pollution Water Quality Fund. The fund would receive money from fines and reimbursements and be used to pay for corrective measures taken by the state as well as education and water quality monitoring.

[The model "bad actor" law may be downloaded from the NPS BBS's Coastal SIG (see page 20 for log-on information). For more information about the model law, or to obtain a copy of it, contact Eugene Lamb, NACD, 509 Capitol Court, NE, Washington, DC 20002. Phone: (202) 547-6223. FAX: 547-6450.]

Notes on Agricultural Environment

Great Potential Demand for Composted Materials

Composting and the use of compost can reduce nonpoint source pollution as well as enhancing plant growth. Yet, despite the benefits, the use of compost could be greatly expanded, according to a 1992 study.

Adding compost to soil helps reduce soil erosion by improving soil tilth, increasing water penetration, and increasing soil moisture retention. Not only does the use of compost reduce runoff from fields, but the addition of compost improves the physical, chemical, and biological properties of soils, increasing the aeration and drainage of dense soils, and the water-holding

capacity and aggregation of sandy soils, according to soil experts. Compost also promotes plant growth, and research has shown that turfgrass applications and some field crop applications of compost suppress plant disease, reducing the need for fumigation. The composting process reduces the bulk of organic waste materials and helps overcome the high cost of transportation and application. The heat produced during composting destroys pathogens and weed seeds, that are present in raw organic materials.

Farm Composting Handbook Available

The *On-Farm Composting Handbook: How to Produce, Use, and Market Compost*, produced by the Northeast Regional Agricultural Engineering Service of the Cooperative Extension, presents a thorough description of composting as it is practiced on the farm. It explains how farmers can produce, use, and market compost. The information is intended to help farmers decide whether composting or the use of compost is appropriate for their farm. For waste producers, environmental regulators, and public health officials, the handbook provides insight about agricultural composting and what it can reasonably accomplish.

The 199-page handbook discusses the composting process, raw materials, composting methods and operations as well as management, equipment, compost use, and application.

To order, write NRAES, 152 Riley-Robb Hall, Cooperative Extension, Ithaca, NY 14853-5701. The cost is \$15, including shipping within the United States. Phone (607) 255-7654 to inquire about a discount for 10 or more copies.

Despite these positive factors, only two percent of the current market demand for soil products is being met by compost. According to the study, done for the Composting Council by Battelle Institute, the potential demand for composted materials is over a billion cubic yards per year.

The potential demand is actually far greater than the potential supply of compost. According to the study, composting all organic waste, including 50 to 60 percent of municipal discards, agricultural residues, biosolids, food residues, yard trimmings and tree barks would produce about 100 million cubic yards of compost, or about 10 percent of the potential U.S. market.

"Clearly, the challenge is to develop markets, not to create them," concluded Gary Hyatt's paper on the study, presented at the American Society of Agronomy 1993 annual meeting.

According to the study, the four sources of compost and their corresponding potential and current supplies are as follows:

COMPOST SOURCE	POTENTIAL SUPPLY (cubic yards)	CURRENT SUPPLY (cubic yards)
Municipal Organics	60,000,000	2,000,000
Biosolids	6,000,000	4,000,000
Horticultural Residues	30,000,000	10,000,000
Agricultural Residues	6,000,000	< 600,000
TOTALS	102,000,000	< 17,000,000

The Battelle study identified nine types of application. The applications were ranked according to the expected ease of penetration of the potential market:

APPLICATION	POTENTIAL COMPOST DEMAND (million cubic yards)	CURRENT DEMAND PENETRATION (percent)
Landscaping	2.0	< 20
Delivered Topsoil	3.7	< 5
Bagged/Retail	8.0	80
Landfill Final Cover	0.6	< 5
Surface Mine Reclamation	0.2	< 5
Container Nurseries	0.9	50
Field Nurseries	4.0	< 1
Sod Production	20.0	< 1
Silviculture	104.0	< 1
Agriculture	895.0	< 1
TOTALS	1,040.0	< 2

(The 1992 report, *Potential U.S. Applications for Compost*, may be purchased for \$50, including shipping, from the Composting Council, 114 S. Pitt St., Alexandria, VA 22314. Phone: (703) 739-2401. FAX: (703) 739-2407. For additional information on the Battelle Institute study, contact Randy Monk at the above address or phone number.

Federal Cost-sharing Approved for Sealing Abandoned Wells

Abandoned wells left open or incorrectly sealed provide pesticides, fertilizers, and other contaminants an easy route into groundwater. According to federal, state, and local health and environmental laws, wells no longer in use must be properly sealed. The USDA Agricultural Stabilization and Conservation Service (ASCS) has approved federal cost-sharing for properly sealing abandoned wells. The practice, designated "WP8-Plugging Abandoned Water Wells," is part of the Agricultural Conservation Program (ACP) and provides cost share assistance up to 75 percent of the cost, not to exceed \$1,000 per well.

To be eligible for individual state ACP programs, a state must develop an approved interim well abandonment standard or have well abandonment plans approved by state-level Soil Conservation Service officials. WP8 is limited to drilled or hand-dug wells. To determine individual eligibility for this new ACP cost-sharing practice for properly sealing an abandoned well, contact local or state ASCS offices.

Manure Management: Iowa Hog Producer Makes Valuable Resource from Waste Product

"Manure is a resource worth paying attention to!" declares Ann Jorgensen of Timberline Hogs, Vinton, Iowa. "While we used to assume that hog manure was just a waste product, now we know that it is a resource," says Jorgensen, who with husband Marlyn and son Pete, have a farrow-to-finish operation marketing 9,000 head of hogs annually. Other enterprises on Jorg-Anna Farms include the production of corn, soybeans, contract-specific grains, and walnut lumber. While their interest in manure management was sparked by fear of impending environmental regulations, the Jorgensens also had a personal stake in protecting the environment. After all, they live on the farm, they drink the water, and they hope to pass on a safe environment to their children and grandchildren.

"In addition," said Jorgensen, "we learned that manure management makes economic sense." They found that the value of the liquid manure from their hogs applied to their cropping operation saved at least \$15,000 yearly in commercial fertilizer costs.

Helping Others with Manure and Nutrient Programs

The Jorgensens began their manure management program in 1971, when Iowa was just beginning to discuss regulating livestock waste disposal. Jorgensen said, "Over time, our experience led us into the business of helping other farmers with manure/nutrient programs. Our company, Farm Home Offices, develops and markets products that include farm nutrient management notebooks and on-the-farm manure testing equipment. We also provide legal resources and public presentations on manure management."

Liquid manure that exceeds the Jorgensens' crop nutrient requirements is marketed to a neighbor for 50 percent of its commercial fertilizer value. The liquid manure is delivered and spread on the neighbor's fields.

Soil and Manure Testing Match Needs to Resources

The Jorgensens have 420 crop acres and 100 Conservation Reserve Program acres surrounding the hog operation. They test both the manure and the soils to calculate appropriate application rates of hog manure to avoid overapplication. Manure samples are drawn from each site and sent to a commercial laboratory for nutrient content analysis. According to Jorgensen, the nutrient content from different manure pits varies.

In 1991, the Jorgensens cooperated with an Iowa State University study that validated their conviction that liquid hog manure improved the soil fertility of their fields.

Manure Application Rate Based on Phosphorus and Potassium

From experience, the Jorgensens found that the hog manure nutrient ratio is not necessarily the ratio that meets crop requirements on all fields. Recognizing that environmental problems can result from too much of a particular nutrient, they apply the rate that meets the phosphorus and potassium requirements, while additional nitrogen needs are met with commercial anhydrous ammonia applications. "In our case, applying enough liquid hog manure to meet nitrogen

nutrient requirements would have provided excess levels of phosphorus and potassium," said Jorgensen. She cautioned that it is easy to underestimate the amount of liquid hog manure. As a rule, she said, "If you can see where the manure has been spread, you are probably applying too much." She noted that it is also easy to neglect fields farther away from the manure pit. The Jorgensens have learned to map their priorities so the fields with the greatest need for fertilizer are treated first.

Application timing is another question. According to Jorgensen, in the fall, drier soil means less compaction; more labor is available; and microorganisms have longer to work. Spring application is often rushed, and the soil is more prone to compaction. No-till fields, however, offer a larger time window for manure applications. "We purchased a surface spreader that holds 3,150 gallons," said Jorgensen. "It has large flotation tires and spreads forty-foot widths, which means fewer trips across the field and less compaction."

According to Jorgensen, farmers are facing a "catch-22" situation: how to meet requirements to apply manure below the surface while satisfying conflicting demands not to disturb topsoil and plant residue. New equipment designs being developed, particularly for no-till shallow incorporation, promise to reduce the odor resulting from surface application.

Early this year, Jorgensen presented her experiences in a slide presentation titled "Livestock Manure Management" at a farm conference on crop residue management in Springfield, Illinois. Jorgensen concluded, "Clearly, the use of animal waste to enhance crop growth can both protect the environment and improve profits."

[For additional information, contact Ann Jorgensen, President, Farm Home Offices, Box 840, Vinton, IA 52349. Phone: (319) 477-3276. FAX: (319) 477-5744]

Training Custom Manure Haulers in Wisconsin

EDITOR'S NOTE: This article was written by Nutrient Management Specialist Kevin Erb, and originally appeared in *Keeping Current*, a newsletter published 10 times a year by the University of Wisconsin Extension Water Resources Coordinating Council.

In 1994, nearly 25 percent of northeast Wisconsin dairy farmers will manage their manure by following a nutrient management plan. As more farmers rely on custom manure haulers to pump and spread their livestock waste, these haulers need to be more aware of manure management rules and practices. Like farmers, the haulers are legally responsible for the implementation of manure management plans. Legal penalties have been assessed against custom haulers in several Wisconsin counties for manure overapplication.

With these concerns in mind, the Water Quality Demonstration Project—East River recently teamed up with the Brown County Land Conservation Department to organize a workshop to update custom haulers on nutrient management planning and practice. The workshop was held on January 18 in Green Bay. The workshop provided a good opportunity to inform haulers on such topics as working with farmers to implement plans, the calibration of manure hauling equipment and Department of Natural Resources regulations affecting manure haulers.

Surprisingly, not one of the 30 haulers at the workshop had ever seen a nutrient management plan, even though some of their customers are entering their fourth year with a plan on their farms. The haulers expressed several concerns, including the need to educate farmers about maximum application rates and the importance of farmers letting haulers examine nutrient management plan documents. One hauler noted that he had lost a customer because he would only spread 20,000 gallons per acre, not the 40,000 gallons the farmer wanted. Haulers also indicated a desire for more information on crop nutrient needs and on calculating manure storage volume.

The most lively session of the workshop was the open discussion session at the end of the workshop between haulers and agency staff. According to Kevin Erb, nutrient management specialist with East River Project, "The discussion session gave us a good opportunity to hear from the haulers regarding aspects of nutrient management plans and regulations that could be improved and made more practical."

This workshop could serve as a useful model for organizing workshops in other areas. The workshop's program included the following sessions:

- The custom hauler's role in nutrient management

- Manure and the environment
- The link between the custom hauler and the landowner
- Department of Natural Resources regulations affecting custom manure haulers
- How to read a nutrient management plan
- Calibrating hoses and pipes in manure hauling systems
- Future directions and regulations: coastal zone management, licensing of haulers, etc.

[Additional folders, handouts and information about the event are available from Kevin Erb at the Water Quality Demonstration Project—East River, 1221 Bellevue, Rm. 113, Green Bay, WI 54302. Phone: (414) 391-3923.]

Composting the Solution to Disposal of Turkeys Drowned in Flash Flood

EDITOR'S NOTE: The following story was written and submitted by Cary D. Sayre, an environmental engineer with the Missouri Department of Natural Resources. Thank you, Cary, for a dramatic and interesting story on helping a turkey producer adapt a NPS BMP in this emergency situation.

On July 6, 1993, some parts of central Missouri reported as much as 10 inches of rain in an eight-hour period. Many of the streams in the area had flash floods, and water levels rose higher than ever recorded. Wayne Jaeger's turkey farm in Bonnots Mill was flooded by Loose Creek, a small Missouri River tributary. The waters filled the turkey buildings to a depth of four feet. All 20,000 of Jaeger's turkeys drowned.

The following day, the floodwaters receded very quickly, and Jaegers contacted the Missouri Department of Natural Resources for assistance in dealing with the dead turkeys in an environmentally safe manner. After discussion within the department, it was decided that composting would be the easiest and safest way to dispose of the dead animals. Jerry Croy of the department's Jefferson City regional office and I met Jaegers at the site and helped him identify a safe place upon a grassy hill that would allow a composter to be constructed out of big round hay bales.

Over 150 neighbors helped pick up the dead turkeys, provided equipment to haul sawdust from some of the local sawmills, and helped build the composter. Big round hay bales were placed end-to-end in a u-shape to provide the walls for the 60-foot long by 5-foot tall composter. About one foot of sawdust was spread on the ground before the first layer of turkeys was placed in the composter. Six inches of sawdust were packed between each layer of turkeys. The sawdust provided the carbon needed for the composting process.

After all of the turkeys were in place, a thin plastic cover was placed on top of the composter to protect it from rain. Old tires weighted the plastic cover down.

During the next few months, the department kept track of the compost pile. Throughout the composting period, no noticeable problems with varmints, pests, or odors occurred. A long stem probe was used to measure the compost pile's temperature, which was over 130°F for more than a week.

After three months, Jaegers dug into the pile and found properly composted material. The finished compost will be land applied as fertilizer in a manner to protect the surface water and groundwater.

[For additional information, contact Cary D. Sayre, Environmental Engineer, DNR, Division of Environmental Quality, Water Pollution Control Program, P. O. Box 176, Jefferson City, MO 65102-0176. Phone: (314) 751-5532.]

Notes on Watershed Management

Urban Watershed Bill Introduced

Congresswoman Eleanor Holmes Norton, representing the District of Columbia, has introduced legislation that would set aside at least 25 percent of the funds annually appropriated under Section 319 for a national urban watershed restoration grants program. Grants would go only to projects that have both a local, regional, or state government sponsor and a local citizen group sponsor.

Norton, a member of the House of Representatives Water Resources and Environment Subcommittee of the Public Works Committee, said that urban waters comprise 18 percent of impaired river miles but receive only 13 percent of the funds appropriated under Section 319 of the Clean Water Act.

She added that her bill would help realize President Clinton's recent executive order instructing federal agencies to make environmental justice part of their missions (see *News-Notes* #35).

Norton said that the requirement for dual sponsorship of a project by citizen and governmental entities was the unique and indispensable feature of her bill because "community consciousness and community involvement" are essential ingredients for a successful cleanup.

[For more information, contact the Honorable Eleanor Holmes Norton, 1415 Longworth House Bldg., Washington, DC 20515. Or contact Donna Brazile or Lou Bayard (202) 225-8050.]

Nonpoint Source Regulations for Special Protection of Delaware River Watershed

EDITOR'S NOTE: This story has three notable aspects: first, the Delaware River Basin Commission provides an example of watershed management involving multiple states. Second, the policy contains numeric definitions of existing water quality and adopts them as criteria along with biocriteria. Also noteworthy, of course, are the NPS regulations themselves. Thank you, Richard Albert, for sending us this news.

The Delaware River Basin Commission recently adopted regulations to control nonpoint source pollution of some of the multi-jurisdictional river's most valuable waters. The Commission, established in 1961 and comprised of the governors of Delaware, New Jersey, New York, and Pennsylvania; and a federal representative has regulatory, planning, and management authority over the river. Commission actions are binding on member states.

The nonpoint source regulations complete the Special Protection Waters regulations package, the bulk of which were adopted by the Commission on December 9, 1992. The Special Protection regulations expand the Commission's nondegradation policy, which applies to the entire river, by providing additional protection to waters with "exceptionally high scenic, recreational, ecological and/or water supply values." The overriding policy of the Special Protection Waters regulations is that no measurable change to the existing water quality of the Special Protection Waters will be allowed.

A unique feature of the regulations is that existing water quality is numerically defined in the regulations. The definition of existing water quality was statistically derived from water quality monitoring data and adopted as water quality criteria. The criteria include biocriteria.

Regulations' Three-pronged Approach

The nonpoint source regulations were adopted by the Commission on February 23, 1994. The process included public hearings on nonpoint source issues and the subsequent development of several alternative sets of regulations by Commission staff and the Commission's Water Quality Advisory Committee, which consists of members from the state environmental agencies, U.S. EPA Regions 2 and 3, and representatives from the University of Rhode Island and the Philadelphia Academy of Natural Sciences. Assisting the Committee were nonpoint source experts from the four states and EPA.

The nonpoint source control provisions of the Special Protection Waters regulations entail a three-pronged approach.

NPS Control Plans for New Projects

The first prong requires that an applicant for Commission project approval submit and implement nonpoint source pollution control plans for new or increased nonpoint source loads generated in a project's new or expanded service area. For example, if a wastewater treatment plant project of 10,000 gallons per day or greater is proposed to serve a new housing development, a nonpoint source control plan for the housing development serviced by that plant must be implemented. Water supply projects greater than 100,000 gallons per day and selected other types of projects in the drainage area to Special Protection Waters are similarly affected.

The plans themselves are to be developed using the Best Management Practices handbooks prepared by the applicable environmental agency under Section 319 of the Clean Water Act or other relevant programs.

In approving the project plan, the Commission may consider trade-offs between reduction of potential new nonpoint source loads and equivalent reductions in point or other nonpoint source loads.

The regulations encourage the development of local nonpoint source control ordinances and watershed nonpoint source plans by exempting projects governed by local ordinances or watershed plans from the project plan requirement. The Commission must approve such ordinances and watershed plans, however.

Priority Watershed Plans

The regulations require that the Commission prioritize the watersheds draining to the Special Protection Waters within two years. After adoption of the priority watershed listing, the Commission, together with the applicable state environmental agency, units of local government, and other participants, must develop nonpoint source management plans for each priority watershed within five years. Adoption of the priority watershed plans into the Commission's Comprehensive Plan is the final step in the watershed planning component of the Special Protection Waters regulations. Adoption of a plan exempts projects in that watershed from the Commission's required nonpoint source plan for individual projects.

Voluntary Local Planning

The third prong of the nonpoint source control regulations encourages the voluntary development of watershed nonpoint source control plans by local governments. Plans that are submitted to the Commission can be incorporated into the Commission's Comprehensive Plan, thus exempting projects in that watershed from the nonpoint source pollution control plan requirement and putting the Commission's regulatory authority behind the watershed plan.

The Upper Delaware Scenic and Recreational River corridor and the Delaware Water Gap National Recreation Area including the Middle Delaware Scenic and Recreational River (and including the eight-mile reach between the two recreational river segments), and the 125-mile stretch of the Delaware River from Hancock, New York, to the Delaware Water Gap near Stroudsburg, Pennsylvania, are Special Protection Waters. The drainage area to these waters is 4,200 square miles.

The two components of the National Wild and Scenic Rivers System and the National Recreation Area are administered by the National Park Service. Staff from the Delaware Water Gap National Recreation Area and the National Park Service Water Resources Division participated in the planning process that led to the development of the Special Protection Waters regulations, including the nonpoint source component.

[Copies of the Water Quality Regulations are available from Chris Roberts at (609) 883-9500, ext.205; or FAX (609) 883-9522, or by writing to the Delaware River Basin Commission, Public Information Office, P.O. Box 7360, West Trenton, N.J. 08628-0360. For more information about the regulations or the process, contact Richard C. Albert, Supervising Engineer, Water Quality Planning and Analysis Section, at the above address or at (609) 883-9500, ext.256.]

News from the States and Localities, Where the Action Is

Maryland Regulations Get Tough on Agricultural Sediment Pollution

Maryland has adopted new regulations to enhance the control of agricultural sediment pollution. The regulations, announced April 11, establish a clear regulatory framework to investigate agricultural sediment pollution cases, identify appropriate corrective actions, and take enforcement action when necessary.

Developed by the state Department of the Environment with cooperation from the Maryland Department of Agriculture and the State Soil Conservation Committee, the regulations give county soil conservation districts a key role.

Conservation districts will approve or disapprove the two types of plans described in the regulation:

- Soil Conservation and Water Quality Plans detail control measures necessary to prevent sediment pollution.
- Corrective Action Water Quality Plans detail measures to correct sediment pollution problems after they have been discovered.

The regulation is triggered when a complaint of a sediment control problem is received by the Department of the Environment. The farmer involved will then be directed to seek technical assistance from the local conservation district and to carry out recommended actions to reduce sediment pollution. The Department of Agriculture and the soil conservation district may jointly inspect areas targeted by complaints of serious pollution problems.

If a farmer fails to implement corrective actions, the state can order the farmer to obtain and implement an approved Corrective Action Water Quality Plan, and specific penalties may be levied against farmers failing to take appropriate corrective measures.

However, farmers who have obtained and implemented an approved Soil Conservation and Water Quality Plan are exempt from the penalty provisions of the new regulations.

"This new enforcement authority will help the Maryland Department of the Environment and the agricultural community assure that voluntary efforts are not undermined by farmers who fail to promptly correct sediment control violations," said Maryland Secretary of the Environment David Carroll in announcing the new regulations.

The state Secretary of Agriculture, Robert Walker, agreed, stating, "The agricultural community stands ready to work with the Department of the Environment and local soil conservation districts to curtail sediment pollution."

The new enforcement authority is part of Maryland's effort to reduce pollution to the Chesapeake Bay.

[For more information, contact Michael Sullivan, Maryland Department of the Environment, 2500 Broening Highway, Baltimore, MD 21224. Phone: (410) 631-3003.]

Helping Municipal Managers Understand Polluted Runoff

The University of Connecticut Cooperative Extension System is collaborating with the Connecticut Sea Grant College Program and the university's Department of Natural Resources Management and Engineering to help municipal managers understand and deal with polluted runoff. According to program staff, the Nonpoint Education for Municipal Officials (NEMO) project is the first of a number of Extension Service projects around the nation undertaken to help protect the water quality of estuaries of national importance. NEMO's goal is to develop a process for educating professional and volunteer municipal officials about the impacts of land use on water quality and the options available for managing those impacts.

NEMO is currently working with the Soil Conservation Service, federal and state water quality regulators, and regional planning agencies on pilot projects with three towns along the Connecticut shore to devise workable solutions to nonpoint source pollution.

NEMO makes use of geographic information system (GIS) technology to help illustrate the connection between land use and water quality. The computer-mapped images are used to show the relationship of a town's land use to its water quality in a dramatic and understandable way. A series of GIS images based on satellite-derived land cover/land use data is the heart of the NEMO program, which also includes an informational videotape and a series of fact sheets.

The video, *Luck Isn't Enough: The Fight for Clean Water*, is a 12-minute, professionally produced videotape on the nature and management of nonpoint source pollution of estuaries. The video uses GIS images to display impervious areas of urban locations and how they contribute to polluted runoff. A cartoon segment explains the impact of excess nutrients. The video also illustrates many options open to municipal authorities for reducing pollution.

[For more information or to order the \$10 video, contact Chester L. Arnold, Jr., Cooperative Extension System, Sea Grant Marine Advisory Program, 43 Marne Street, Hamden, CT 06514. Phone: (203) 789-7865.]

Notes on Environmental Education and having fun at the same time

Art, Frog Watching, Monitoring are Components of St. Louis River Citizen Program

How many frogs can you identify by song? Not birds, *frogs*. Volunteer frog monitors can identify calls of all fourteen species of frogs found in Minnesota. They are part of a broad education and lay monitoring program on the St. Louis River.

St. Louis River Watch is a citizen-based program administered by the Minnesota Pollution Control Agency. Part of the Lake Superior watershed, the river curls around from the north and west to empty into Lake Superior between the cities of Duluth, Minnesota, and Superior, Wisconsin.

Many citizens and students and teachers from 16 schools participate in River Watch projects that educate and build community stewardship. The program will also provide Minnesota with its first long-term study of nearly the entire length of the St. Louis River.

Because the St. Louis River was identified as an Area of Concern, one of 43 in the Great Lakes region, a Remedial Action Plan was formulated by a citizen's advisory committee in 1992. The committee's diverse membership reflects that of the community and includes at least one student representative.

St. Louis River Watch grew out of the action plan and includes many activities, all coordinated by Director Jill Jacoby. The program receives its funding through a two-year grant from the Legislative Committee on Minnesota Resources, and is also funded by EPA's Great Lakes School Program Office.

Ojibwe Chemistry Students Test Sediments

Ojibwe students on the Fond Du Lac reservation in Minnesota are doing sediment testing as part of the St. Louis River Watch Program. Sediment contamination by dioxins, PAHs, PCBs and heavy metals is a concern in the St. Louis River. A sediment testing center has been set up for Ojibwe School chemistry students to conduct assays with benthic organisms. The students then teach their peers what they have learned about benthic surveys and sediment sampling techniques. The Commission on National and Community Service contributed a \$9,000 Serve America grant for this project.

Ojibwe School chemistry teacher Andrea Pokrzywinski said,

The students are learning how chemistry fits into the real world. They also have a new environmental awareness and enthusiasm for environmental protection. Some who didn't even know what recycling meant are now considering environmental monitoring for a career.

By visiting other schools to share results, they also serve as teachers. The program is providing good leadership roles for Native American students, who often aren't given such opportunities.

Ojibwe senior Chandler Mullens considers the class dual-purpose:

It's teaching me what water chemistry is all about and how pollution hurts water life, but it's also a service to the community. We're letting people know what's going on in their river, and we're concerned about improving its condition.

Liver Watch

Another study allows students to participate in meaningful research and to learn more about sediment contamination. Students conducted the first survey of tumors found on bottom-feeding bullheads. A retired Environmental Protection Agency pathologist, who will do the final analysis, taught students how to prepare slides of the fish livers. Students removed and preserved the organs and prepared slide sections for microscopic pathology investigation.

Program Director Jacoby commented, "This is the first time that a study of St. Louis bullhead livers has occurred, and the results of our study may dictate the need for more work."

Science and Art

The Keepers of the Waters program, the brainchild of Twin Cities-based artist Betsy Damon, brings scientists and artists together to stimulate community interest in water quality issues and to discover ways to disseminate technical information. Area artists transform scientific and technical information about the St. Louis River into art, providing education and outreach to the community.

Keepers of the Waters, developed in cooperation with University of Minnesota's Humphrey Institute, is currently creating a water quality board game using people as the game pieces. The game will require decision making and demonstrate the environmental results of those decisions. Other projects include an exhibition of community artwork, youth art programs at the Duluth Art Institute, a tee shirt picturing life in the estuary, and theater works.

Frog Study

The St. Louis Frog Watch is the first survey of frogs in the St. Louis watershed, and it will provide base-line information on frogs and their critical wetland habitats. Frog monitors learn to identify frogs by songs from a tape recording. Then, armed only with clipboards and a tape recording of frog songs (plus bug repellent), they assume positions along the tea-colored river at sunset and wait. Most likely they will only hear, not see, the frogs. They note the time, date, weather conditions, what species of frog they heard, and how many.

The data will be compiled by St. Louis River Watch and used to identify trends in the river's frog populations. It will be shared with the Wisconsin Department of Natural Resources, which has a similar program, and with Hennepin Parks in Minneapolis, which is coordinating a statewide survey.

Radio Mini-series

Marshall Middle School students produced a radio mini-series about the St. Louis River being aired on KUMD Duluth Public Radio. To educate themselves about the River Watch program, they interviewed fellow students taking water samples on the river, participating teachers, the Remedial Action Plan coordinator for the Minnesota Pollution Control Agency, and people from all cross sections of the river community. Laurie Abler, a member of the mini-series team, wrote in *Upstream*, the St. Louis River Watch newsletter,

We wanted to get an idea of the effects of a business on the river. We chose to interview representatives from Potlatch [a paper industry], since they are industrial river neighbors. We also conducted an interview with Steve Johnson from the Western Lake Superior Sanitary District so that we could understand the water treatment and sewage disposal processes. We gained knowledge of WLSSD's effect on the river, while recording machinery noises for background sounds to be used as part of the radio show. To complete the span of viewpoints on the river, we interviewed two private citizens. Ernie and Leatta Pearson live on the river and provided the citizens' view by describing the river's value as a vital source of water recreation.

These are only a few examples of the people we have interviewed. Their information has greatly aided our radio show so that we can reach the public, help them become aware of the river's environmental problems, and inform them of student involvement with the river.

Other St. Louis River Watch Activities

- Teachers at Coquet High School are working the St. Louis River theme into chemistry, biology, history, computer science, and even English courses.
- In a cooperative effort with Wisconsin, Michigan, and EPA, Minnesota is developing high school curricula addressing lake and river ecology, pollution prevention, the Remedial Action Plan and Lakewide Management plan processes, and impacts of toxics. These curricula, based on the River Watch example, will be used in Wisconsin, Michigan, and Minnesota schools in FY 1995.
- Students in area schools are conducting a benthic macroinvertebrate study. At least three times during the year, students collect samples of aquatic organisms using dip and kick nets and artificial substrates from 18 locations along 75 miles of the river.

■ Other students are conducting water chemistry tests for such attributes as dissolved oxygen and pH, and they measure physical parameters such as water temperature and total dissolved solids. They also note water velocity, streambank and habitat quality, and river bottom substrate. The information is fed into a database for analysis.

The St. Louis River Watch has become a model for similar programs in Wisconsin and Michigan. Jacoby noted, "There's no better way to teach young people about pollution problems than to take them down to the water to sample life in the river." She believes the activities are "cultivating a sense of stewardship toward the river and its communities."

High school senior Todd Rustad, student representative for the St. Louis River Remedial Action Plan, told the International Joint Commission, "The St. Louis River has been around for a long time, and we are the ones who have to take care of it. We need to learn how to do so." Rustad said that he is eager to begin actions to clean up the river.

The first St. Louis River conference was held in March of 1993. It drew nearly 200 students to Fond Du Lac Community College in Coquet to participate in a day-long program about the river. Students exchanged information about the ecology of the river, and students and teachers involved in River Watch were recognized for their efforts. Several industries, schools, and individuals received special awards for outstanding contributions.

[For more information, contact Jill Jacoby, St. Louis River Watch, Minnesota Pollution Control Agency, 320 West 2nd Street, Room 704, Duluth, MN 55802. Phone: (218) 723-4927.]

Changing Environmental Behavior and Making It Stick

EDITOR'S NOTE: This article was written by Elaine Andrews of the University of Wisconsin Environmental Resources Center, and originally appeared in *Keeping Current*, an excellent newsletter published 10 times a year by the University of Wisconsin Extension Water Resources Coordinating Council.

In the 1960s and early 1970s, concern about the environment began to gain momentum as a topic of public discussion. As a result, educators focused on the environmental awareness, attitudes, and values of individuals. The theory was that by increasing public awareness of environmental concerns, individuals would adjust their attitudes and values about the environment. They would then choose actions which reflected those newly sensitive attitudes and values. Being the curious people that they are, researchers then set about figuring out exactly how this change would occur. What education strategies could be employed to make the theory work?

During the 1970s, questions about how to educate for energy conservation behavior were predominant in the environmental behavior literature. More recently, recycling and consumer purchase behavior have been the focus of many studies. In comparison, few studies focus on water conservation or protection behavior. Instead, water education studies have questioned attitudes toward water management or have described water education strategies in terms of knowledge gained.

Early environmental studies endeavored to improve understanding of how people form or change their attitudes and values. Gradually, research shifted to the "so what do attitudes and values have to do with behavior?" question. Results were unexpected.

Attitudes and Information Often Don't Affect Behavior

Numerous studies have shown that while education programs can affect participant attitudes and values, attitudes are not a predictor of behavior. For example, in one instance, researchers surveyed neighborhood attitudes about recycling. Some residents thought it was a good idea; others thought it was a bad idea. Later, the community decided to provide a curbside pickup recycling program. Participation was low. But when researchers looked at who was putting out recyclables, they found equal participation among those who thought it was a good idea and those who thought it was a bad idea. In other words, self-reported attitudes about recycling did not predict observable recycling behavior.

Behavior is not influenced by information provided in educational materials such as news articles or brochures when the citizens do not plan to change their behavior. However, brochures were found to be an important source of information when the citizen is already convinced to change behavior.

Situations That Can Lead to Behavior Change

People are more likely to change behavior when

- They have a personal discussion with someone about the new behavior, for example, a neighbor asks them if they plan to wash their car on the lawn instead of on the street.
- There is peer pressure, for example, others on the street are visibly engaging in the new behavior, such as washing their car on the lawn.
- They get an opportunity to verbalize a commitment to change. In one study, workshop participants were asked to commit themselves to one activity in a hierarchy of woodland management options. When queried six months after the workshop, most participants had completed the management step they had committed to, as well as the activity one step up in the stewardship hierarchy.
- They get a chance to practice the new behavior in an educational setting.

Other recommendations from consumer behavior studies are to

- Help citizens understand how their individual action will make a difference, rather than tell them how bad things will be if they don't change.
- Take advantage of existing social structures to provide an avenue for your new information. For example, some of the most successful recycling programs were found in communities where the recycling education was provided by the neighborhood block club and its block captain, an accepted method of sharing information in that community.

[A more detailed summary and annotated bibliography on the topic of environmental behavior is being prepared. It will be available by October 1994. To receive a copy, contact Elaine Andrews, University of Wisconsin Extension, ERC, 216 Agriculture Hall, 1450 Linden Dr., Madison, WI 53706. FAX: (608) 262-2031.]

High School Students Receive Grant for Demonstration Project

High school students in Santa Rosa, California are using more than \$86,000 in grant money and in-kind services to conduct a high quality public education campaign and to engineer a sophisticated solution to runoff from the school parking lot.

Piner High School's Nonpoint Source Demonstration Project is divided into four parts: elementary education, educational videos, water statement inserts, and engineering.

Three students, Angela Reiwe, Jun Lee, and Urvashi Patel, are creating colorful single-sheet, two-and three-fold educational pamphlets to be inserted into the water bills of 42,000 Santa Rosa residents. Two clever and amusing characters, NPS Boy and his trusty frog sidekick, Professor Irving, instruct water users about nonpoint source pollution. Patel described the production process:

We use Pagemaker to layout the insert. Jun does his drawings by hand and scans them in. Angela and I research and write the text and send it to the city managers, who review that pamphlet. Then it's sent to the printers to print 43,000 copies. The cost, color, paper size, paper type, etc., are decided on with the printer.

One recent insert was a quiz about nonpoint source pollution for customers to answer and return with the payment. NPS Boy explained that patrons' confidential answers to the quiz would be used in Piner High School Probability and Statistics classes and that answers to the quiz would be discussed in future inserts. The students expect to produce a total of seven or eight pamphlets this school year.

One water customer, impressed by the students' work, sent this note:

We received your "Splish Splash" folder recently and expect to find it most useful. You are to be commended for doing a fine job of putting it together and performing a valuable public service. Congratulations!

Student Engineers

Four other students at Piner in the 1992-1993 school year researched and, with the help of city crews, built structures to reduce runoff from the student parking lot. The students—Laura Van Diest, Deanna Clark, Edward Pizzini, and Paul Lescure—researched different types of structures and talked to manufacturers before they made their decision to use a Jensen 5,000-gallon precast stormwater interceptor to slow water movement and trap sediments, grease, and oil. The stormwater interceptor was donated by the manufacturer.

Before beginning construction, students surveyed the grade and prepared computerized drawings of the proposed structures. They also researched and helped construct an 80-foot long, 15-foot wide grass swale to filter the runoff. A set of pipes and valves designed and partially constructed by students switches the flow to either the interceptor or the swale or both so that they can compare the effectiveness of the treatments. Students consulted with local nursery-growers and conducted tests before deciding to sod the swale rather than plant it with grass seed.

Students continuing the project in 1993-1994—Jason Griffin, Jeff Earnshaw, David Reidal, and Charles Chang—took water samples up- and downstream from their constructions, tested the water for pollution, sent samples to profession labs, and compared the professionals' results with their own.

David L. Sandine, president of Consulting Engineers and Land Surveyors of California, wrote this letter to the students:

The North Coast Chapter of the Civil Engineers and Land Surveyors of California congratulates you on your pollution control project and thanks you for sharing it with us. To even dare to undertake a project of this complexity and magnitude in the context of high school studies is bold. That you actually accomplished it is remarkable. A project of this complexity is generally undertaken only in graduate engineering studies. You deserve to be proud that you were involved and contributed to its fulfillment.

You should know that your project is a leading engineering application. We in the engineering field are just beginning to work with stormwater runoff quality and nonpoint source pollution control. Your participation with and support from the city staff in this project will greatly benefit the city of Santa Rosa in its stormwater management efforts.

Student Videos

Piner students are also producing two 30-second nonpoint source educational commercials to be aired on local TV stations. Stephanie Leeks recruited her father as an actor and filmed him washing the family car and applying fertilizer to the lawn. The film shows that in the process he polluted a nearby stream. Two other students, Jun Lee and Chris Schmauch, are doing an animated split-screen cartoon showing the course of water in both the stormdrain and the wastewater systems, illustrating how stormdrains empty directly into waterways without going to a treatment plant.

Student Teachers

Other students are teaching elementary students about water chemistry, pollution prevention, and nonpoint source pollution. Last year Leslie Huber, Royce Barbera, Stephanie Neuman, and Jacquelyn Moura were student teachers; this year, Patricia Bradwell, Kevin Buchholz, Amelia Knowles, and Emily Hern took on the project.

James Gonzales, director of Piner High School Center of Technology, Environment, and Community; Bill Winchester, an engineer at the Regional Water Quality Control Board; Pete Lescure, a private engineer; and Colleen Ferguson, a civil engineer with the city of Santa Rosa Public Works Department, who is also the students' mentor, wrote the proposal for the project.

It was awarded \$43,000 by the State Water Quality Control Board and matching funds were donated by the city of Santa Rosa and local businesses. Construction was donated by contractors and the city of Santa Rosa.

The original grant will end in the summer of 1994, but a new proposal to continue the project is being written.

Edward Pizzini, one of the students working on the engineering project, wrote in a local newspaper,

Most people want to see our schools improved. But with the lack of funding to the schools, many people believe change is a difficult thing to accomplish. The way to make the much needed improvements happen is not only by giving money to the schools, but rather investing time in them.

Community involvement is what our public schools need. They need businesses offering services and partnerships so that the schools, the businesses, and the students all can benefit. One large-scale example of this theory is occurring right now on the Piner High school campus.

He added,

This is a direct result of community involvement. Five groups sat down with the hope of positive results: teachers, students, the city of Santa Rosa, the Regional Water Quality Control Board, and private industry trying to work together toward a common goal. We, the students working on the Nonpoint Source Pollution Demonstration Project, are now beginning to test our research. We are anxiously watching test results with the hope that our purpose has been accomplished.

Project mentor Colleen Ferguson said that many of the students get so involved in the project that they have to be told to stop working so hard. Others have been so accustomed to structured environments they have trouble adjusting to the idea that the project is theirs, and that it is up to them to figure out how to do it. Those students sometimes need help getting started. Either way, once they begin, students at Piner High are involving themselves in serious problems of their community, and, not incidentally, educating themselves as they go.

[For more information, contact Colleen Ferguson, City of Santa Rosa, Department of Public Works, 69 Stony Circle, Santa Rosa, CA 95401. Phone: (707) 543-3852.]

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 (NPS BBS). 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 minibulletin boards) are dedicated to certain 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. 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.

Reviews and Announcements

How Local Volunteers Saved Their Living Waters

Nearly twenty years ago, when Owen Owens' favorite fishing haunts in Chester County, Pennsylvania, were threatened by increasing urbanization, he pulled together three friends and

formed the Valley Forge Chapter of Trout Unlimited, which has worked ever since to restore and protect local streams.

Owens, a Baptist minister and sport fisher, has written a book that will lend heart to anyone who has silently and helplessly witnessed the degradation of a well-loved local waterway. *Living Waters: How to Save Your Local Stream* is not a how-to manual or a technical guide. Rather, it is the sharing of successes and failures and lessons learned, related from a very personal point of view.

Lesson number one is that restoring a piece of the environment can start with a single person's vision. In his book, Owens tells of his evolution from a silent witness to an activist, his decision to become involved, and his role in the birth of a local stream restoration organization.

The second lesson is that "they"—the federal government, local agencies, state laws—are *not* taking care of things. Comforting as it is to think they are, the truth is that while those entities sometimes provide the tools to halt degradation, it is we—the citizens, residents, sportsmen—who must pick up those tools and use them.

In the beginning, the fledgling Valley Forge Chapter of Trout Unlimited used rocks and logs, hammers and saws to save streams. Tapping the expertise of their parent organization, reading books, meeting with researchers and other restoration groups, improvising, they achieved some remarkable instream successes restoring habitat and trout populations. One particularly sweet triumph was the reestablishment of wild trout in West Valley Creek.

Beyond restoring riffles and pools, and stabilizing banks, their hands-on activities served another purpose. They slowly built the fierce sense of stewardship the chapter needed to sustain it through the larger challenge—the never-ending process of watershed restoration and protection.

The Valley Creek watershed suffered from PCB contamination, siltation, and runoff from increasing areas of pavement. The chapter realized from the beginning that instream work was not enough; as they invested time and labor, their vision of stream health expanded naturally from the narrow riparian corridor to the watershed.

By 1983, the group was still scheduling regular work days in the streams but was also becoming involved in watershed issues on many fronts; among them the proposed construction of a giant shopping mall adjacent to a creek, a lawsuit to halt the flow of PCBs into the creek, and the closure of a leaking landfill. A long fight with one particular developer went from battling a sewage treatment plant to hammering out a land-application compromise to suing the township for violation of "sunshine" laws.

The tools needed to address those tasks were more complicated and less concrete. Owens noted,

Working with lawyers, developers, and township officials was often tedious and seemingly remote from streams. . . . It is certainly less satisfying than rolling rocks to create instant habitat, or planting trout eggs and watching them grow. Without effort focused on the health of the watershed, however, all the other efforts would be of little value.

Over its 18-year life, Valley Forge Trout Unlimited has racked up some impressive and hard-won victories in the protection of its adopted streams and watershed, but such achievements took a toll on the chapter's membership. Owens wrote, "The wear and tear of conservation work can tire out the most effective group."

Valley Forge Trout Unlimited experienced ebbs and flows of energy and leadership. Hand in hand with stream restoration and watershed protection went the constant effort to build and motivate the group's members. That "subplot" winds inextricably throughout the tale, for the discoveries Owens made about keeping a group going contributed as much to its success as any technical achievements in the streambed. The book's description of the organization's formation, development, and revitalization has much to offer other volunteer groups. Part III of the book, "A Handbook for Organizers," draws on the chapter's experiences and summarizes the lessons.

Other groups may find helpful the portions of Part III that deal with the technical aspects of planning a stream restoration project: where to start, what not to do, and descriptions of instream structures. Owens stresses, however, that lay restoration teams should proceed slowly and with expert guidance. "A group needs to be in touch with landowners and whatever entity oversees a stream restoration project in its state."

Although the chapter has worked with state agencies, particularly in obtaining Exceptional Value status to protect West Valley Creek, Owens doesn't believe we can leave the fate of our waters to state agencies alone. "Laws need to be enforced with vigor, and unless citizens are paying attention and monitoring, there are going to be losses. If there is going to be change, it will be from citizens getting involved in critical issues and decisions."

"Volunteers," Owens asserts, "can do something that professionals can't do—stick with it for 10 or 15 years." The Valley Forge Chapter of Trout Unlimited not only "stuck with it" and made a positive change in Chester County; with *Living Waters*, it encourages and guides the rest of us.

[Living Waters: How to Save Your Local Stream may be purchased from ABNM Literature Services, Valley Forge, PA 19842-0851. The paperback costs \$14.95, cloth \$35. Include postage of \$2.25 for the first copy, plus .75 for each additional copy.]

For more information on Trout Unlimited stream restoration efforts contact Karl Heine, President, Valley Forge Trout Unlimited, 152 Weedon Court, West Chester, PA 19380.]

Proceedings from Nutrient Management Conference Published

The *Journal of Soil and Water Conservation* has produced a special issue containing the papers presented at the April 1993 National Nutrient Management Conference sponsored by the Conservation Technology Information Center.

Papers in the special issue deal with such critically relevant topics as industry's attitudes and role in nutrient management, EPA's perspective on the subject, and the coastal zone nonpoint source pollution program.

Other papers focus on technology such as nitrogen testing, and methane production from animal wastes. Combined with a section on state/regional experiences and another called "Understanding the Basics," this special issue could serve as a text for an advanced course in nutrient management practices and policy. Or, as CTIC Executive Director Jerry Hytry states in the preface, "These conference proceedings are intended as a detailed reference tool. . . . We encourage you, the reader, to contact authors of the papers and other conference attendees and to continue to build the partnerships we need to develop strong nutrient management programs to protect water quality while maintaining profitability."

[To obtain a copy of the Nutrient Management Supplement to the March/April 1994 issue of the Journal of Soil and Water Conservation (EPA841-J-94-900), contact NCEPI, 11029 Kenwood Rd., Bldg.5, Cincinnati, OH 45242. FAX: (513) 891-6685]

Forestry Sediment Proceedings Now Available

Sediment production and transport processes, land and riparian zone interactions with sediment, sediment production by activities related to forest uses, and sediment impacts on fish and other aquatic populations are the topics of papers gathered from the February 1992 Technical Workshop on Sediments and now available.

The conference, which took place in Corvallis, Oregon, was sponsored by the Forest Service, the Terrene Institute, and EPA, and according to the documents' introduction, "was prompted by the increased and widespread perception of 'clean' sediment as a nonpoint source pollutant of significant ecological concern."

[To obtain a free copy of the proceedings (EPA 841-R-93-007), contact NCEPI, 10029 Kenwood Rd., Bldg. 5, Cincinnati, OH 45240. FAX: (513) 891-6685. Or contact Terrene Institute, 1717 K Street, NW, Suite 801, Washington, DC 20006. Phone: (202) 833-8317. FAX: (202) 296-4071. Cost: \$9.95, plus \$3 shipping/handling.]

Georgia Has All You Ever Wanted to Know About NPS

Georgia's Environmental Protection Division has published a list of resources in their nonpoint source library. The list contains more than 250 resource materials from catalogs to 'how-to' manuals to newsletters and videotapes. The document lists three categories of educational

materials: resource materials, teacher guides, and general public. Issues addressed include stormwater management, urban stream management, erosion control, coasts, lakes, wetlands, watersheds, rural/agricultural issues, and water conservation. Also included is a list of local, state, regional, and national program contacts. The list will be updated on a regular basis.

In addition to a short description of the resource, each entry includes a contact address and phone number so that individuals may order the materials directly. The library is unable to fill requests for the listed resources.

[To receive a copy of the Nonpoint Source Library Document List, call (404) 656-4934, or contact the Georgia Environmental Protection Division, Water Quality Management Program, 7 Martin Luther King Drive, Suite 647, Atlanta, GA 30334.]

Corrections

In the March-April 1994 *News-Notes* (#35), we incorrectly listed two telephone numbers.

- *A State and Local Guide to Environmental Program Funding Alternatives* (EPA 841-K-94-001) may be obtained from CERl by FAXing a request to (513) 569-7980.
- Mark Aveni, of Prince William County Cooperative Extension in Virginia, may be contacted by phone at (703) 792-6286 or by FAX at (703) 792-4630.

Datebook

This DATEBOOK has been assembled with the cooperation of our readers. If there is a meeting or event that you would like 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

June

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| 1-3 | <i>Chesapeake Research Conference: Toward a Sustainable Coastal Watershed</i> , Norfolk, VA. Contact: Chesapeake Research Consortium, P.O. Box 1280, Solomons, MD 20688. (410) 326-6700. Sponsored by U.S. EPA Chesapeake Bay Program Office, Chesapeake Research Consortium and others. Includes 5 plenary talks, 18 technical sessions, and a concluding panel discussion on limitations to growth in the Chesapeake Bay watershed. |
| 4 | <i>Greener Greens: The Impact of Golf Course Developments</i> , Keene, NH. Contact: Alexandra Dawson or Rachel Goen, Antioch New England Graduate School, Roxbury Street, Keene, NH 03431. (603) 357-3122 ext. 205. Focus: grassroots initiatives led by local citizen activists working with golf course managers to mitigate the possible effects on wetlands, streams, aquifers, and wildlife habitat. |
| 7-9 | <i>Restoring or Rehabilitating Damaged Ecosystems</i> , Pullman, WA. Contact: Ed DePuit, Conferences and Institutes, 208 Van Doren Hall, Washington State University, Pullman, WA 99164-5222. (509) 335-3530. FAX: 335-0945. |
| 9-10 | <i>2nd Annual Clean Water Act Conference</i> , Seattle, WA. Contact: Pat Slaten, Heller Ehrman White & McAuliffe, 6100 Columbia Center, 701 5th Ave., Seattle, WA 98104-7098. (206) 447-0900. FAX: 447-0849. Sponsored by the Puget Sound Water Quality Authority. Topics include aquatic and human health criteria, water quality standards, stormwater issues, onsite sewage treatment issues, global ocean issues, and other topics. |
| 10-11 | <i>Lake Protection: Coordinating Our County Strategies</i> , Aurora, NY. Contact: Federation of Lake Associations (New York State Chapter of NALMS), 2175 Ten Eyck Avenue, Cazenovia, NY 13035. (315) 655-4760 or (315) 655-9777. Topics: wetland protection, New York State management strategies and initiatives, public forum, watershed mapping, and other topics. |
| 13-15 | <i>Regulatory Takings and Resources: What Are the Constitutional Limits?</i> , Boulder, CO. Contact: Katherine Taylor, Conference Coordinator, School of Law, University of Colorado, Campus Box 401, Boulder, CO 80309-0401. (303) 492-1288. FAX: 492-1297. Conference will address the law of takings and its application in the areas of mining, public lands, water, wetlands, and endangered species. |

1994

June

- 16-18 *The Unfinished Agenda: Nonpoint Source Pollution*, Springfield, MO. Contact: Loring Bullard, Director, Watershed Committee of the Ozarks, Inc., 300 West Brower, Springfield, MO 65802-3817. (417) 866-1127. FAX: 866-1918.
- 19-22 *The Management of Water and Wastewater Solids for the 21st Century: A Global Perspective*, Washington, DC. Contact: Nancy Blatt, Water Environment Federation, 601 Wythe Street, Alexandria, VA 22314-1994. (703) 684-2400.
- 20-23 *Restoration of Aquatic Ecosystems: Developing a National Agenda*, St. Paul, MN. Contact: Association of State Wetland Managers, P.O. Box 2463, Berne, NY 12023-9746. (518) 872-1804. FAX: 872-2171. Sponsored by U.S. EPA and hosted by the Association of State Wetland Managers, the Coalition to Restore Aquatic Ecosystems, and the Coalition to Restore Urban Waterways. Topics include restoration of wetlands, lakes, and streams; evaluation of aquatic ecosystems; proposals for a national agenda; watershed restoration assessment and planning; legislative opportunities; and case studies.
- 26-29 *Effects of Human-Induced Changes on Hydrologic Systems*, Jackson Hole, WY. Contact: David L. Naftz, General Chairperson, U.S. Geological Survey, 1745 West 1700 South, Rm. 1016, Admin. Bldg., Salt Lake City, UT 84104. (801) 975-3389.

July

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- 8-12 *Greening the Christian Community*, Cincinnati, OH. Contact: Division of Continuing Education, College of Mount St. Joseph, 5701 Delhi Rd., Cincinnati, OH 45233. (513) 451-3932. Sponsors: EarthConnection, the College of Mount St. Joseph, and the North American Coalition on Religion and Ecology.
- 10-13 *A Global Perspective for Reducing CSOs: Balancing Technologies, Costs, and Water Quality*, Louisville, KY. Contact: Nancy Blatt, Water Environment Federation, 601 Wythe Street, Alexandria, VA 22314-1994. (703) 684-2400. Sponsored by the Water Environment Federation. Topics include national and international perspectives on state-of-the-art CSO abatement approaches, technologies, and management methods; information on upgrading, maintaining, and managing CSOs; and practical guidelines.

August

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- 2-3 *Nonpoint Source Forum*, Mendenhall, PA. Contact: Paula Peak (703) 385-6000. Sponsored by the Delaware Estuary Program. Purpose of the forum is to establish common ground among programs and organizations in order to solve NPS problems. Will feature an overview of the Coastal Nonpoint Pollution Program under the CZARA Section 6213 and statewide NPS programs.
- 7-10 *Agroforestry and Sustainable Systems Symposium*, Fort Collins, CO. Contact: Kim Isaacson, USDA Forest Service, Rocky Mountain Research Station, Center for Semiarid Agroforestry, East Campus-UNL, Lincoln, NE 68583-0822. (402) 437-5178 ext. 13. FAX: 437-5712. Focus: how trees, integrated into sustainable agricultural land-use systems in the semiarid west, will enhance agricultural productivity, natural resource conservation, and natural and human environments.
- 7-12 *Stormwater NPDES Related Monitoring Needs*, Crested Butte, CO. Contact: Barbara Hickernell, Environmental Foundation, 345 East 47th Street, New York, NY 10017. (212) 705-7837. FAX: 705-7441. Cosponsored by ASCE Urban Water Resources Research Council, American Public Works Association, U.S. EPA, and USGS. Focus: to explore the needs and technology of stormwater monitoring under municipal and industrial NPDES stormwater discharge permits.
- 23-26 *Evaluating the Effectiveness of Forestry Best Management Practices in Meeting Water Quality Goals or Standards*, Blacksburg, VA. Contact: George Dissmayer, USDA Forest Service, 1720 Peachtree Rd., NW, Atlanta, GA 30367. (404) 347-7221. FAX: 347-4448. Sponsored by USDA Forest Service, the National Association of State Foresters, U.S. EPA, the National Council of the Paper Industry for Air and Stream Improvement, USDA Extension Service, and Virginia Polytechnic Institute.

September

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- 7-9 *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. The conference's purpose is to exchange knowledge on how to improve coastal resource protection when faced with rapid coastal growth and economic development potential. The meeting will provide an opportunity to review recommendations for management of North Carolina's coastal

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September

areas with those of other states. Specific themes include quality growth management, coastal water quality protection, compatible economic development, environmental education, protection of natural heritage, public trust rights, and improving implementation and enforcement of existing programs.

- 21-23 *Environmental Problem Solving with Geographic Information Systems*, Cincinnati, OH. Contact: Sue Schock or Dan Murray, U.S. EPA, CERL, 26 W. Martin Luther King Drive, (G-75), Cincinnati, OH 45268. (513) 569-7551 or (513) 569-7522. Sponsored by the U.S. EPA Center for Environmental Research Information.
- 22-23 *Water Quality in the Sustainable West*, Park City, UT. Contact: Jack Wilbur, Utah Department of Agriculture, 350 N. Redwood Rd., Salt Lake City, UT 84116. (801) 538-7098. Sponsored by Utah NPS Water Quality Task Force. Topics may include reauthorization of the CWA; open space planning; federal, state, and local perspectives; farmland protection; water management and artificial snow production, riparian enhancement; sustainability issues; and community land use planning.
- 22-24 *Seniors for the Environment*, Chevy Chase, MD. Contact: EASI, 51 Main Street, P.O. Box 368, The Plains, VA 22171. (703) 253-5821. FAX: 253-5811. Sponsored by the Environmental Alliance for Senior Involvement. Objective: link the experience, education, and resources of senior volunteers with community needs.
- 27-30 *Evaluating the Effectiveness of Forestry Best Management Practices in Meeting Water Quality Goals or Standards*, Portland OR. See information for August 23-26.
- 28-30 *Watersheds '94*, Bellevue, WA. Contact: Andrea Lindsay, U.S. EPA, WD-125, 1200 Sixth Ave., Seattle, WA 98101. (206) 553-1896 or (800) 424-4EPA. Sponsored by U.S. EPA, the University of Washington Center for Streamside Studies, and state, tribal, local, and nonprofit organizations.

October

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- 13 *Turf, Ornamental, and Structural Integrated Pest Management*, Marlborough, MA. Contact: Allen Christensen, EPA Region 1, JFK Federal Bldg. (MS) APP, Boston, MA 02203-2211. (617) 565-4968. FAX: 565-4939. Presentations by national experts on turf, golf course, ornamental, and structural IPM.
- 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. Sessions include "Coastal Water Quality Issues," "Environmental Monitoring & Assessment," "Sediment Quality Criteria Issues," and "Watershed Management in the Great Lakes."
- 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. Current information on application and effectiveness of source controls and BMPs.

November

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- 5-10 *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. Topics of symposia are national water quality, future quality of the Great Lakes, and national water quality assessment.
- 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. Designed to assist public officials and their utility managers in addressing today's complex environmental issues.
- 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 VIII, Western Governor's 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. Objectives are to encourage and support practical and effective approaches to watershed stewardship, and to share experiences and exchange ideas, tools, technology, philosophy, and values useful to watershed initiatives.

Calls For Papers — Deadlines

1994

June

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- 1 *Watershed WISE: A Workshop on Watershed Protection*, Grand Junction, CO, November 14-16, 1994. Contact: Susan Foster, Thorne Ecological Institute, 5398 Manhattan Circle, Suite 120, Boulder, CO 80303. (303) 499-3647. FAX: 499-8340. Abstracts for papers and displays due 6/1/94.
- 20 *Environmental Problem-Solving with Geographic Information Systems*, Cincinnati, OH, September 21-23, 1994. Contact: Sue Schock or Dan Murray, U.S. EPA, CERL, 26 W. Martin Luther King Drive, (G-75), Cincinnati, OH 45268. (513) 569-7551 or (513) 569-7522. Abstracts due 6/20/94. Sponsored by the U.S. EPA Center for Environmental Research Information. Possible topics include problem identification and definition; data requirements, availability, documentation, reliability, and acquisition; approaches considered and selected for solving the problem; unique challenges and pitfalls; and interpretation of results, including level of confidence achieved based on data quality and approach taken.

July

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- 1 *Biosolids and Residuals Management Conference*, St. Louis, MO, July 30-August 2, 1995 Contact: Nancy Blatt, Water Environment Federation, 601 Wythe Street, Alexandria, VA 22314-1994. (703) 684-2400. FAX: 684-2492. Abstracts due 7/1/94. 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.

August

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- 1 *1995 WEF Laboratory Conference: Testing the Waters*, Cincinnati, OH. August 13-16, 1995. Contact: Nancy Blatt, WEF, 601 Wythe Street, Alexandria, VA 22314-1994. (703) 684-2400. FAX: 684-2492. Abstracts due by 8/1/94. Sponsored by the Water Environment Federation. Topics relating to laboratory operations, management, and quality issues will be addressed, and an exhibit hall will feature technologies and instrumentation.
- 1 *Water Resources at Risk: 1995 Annual Meeting of the American Institute of Hydrology*, Denver, CO. May 14-18, 1995. Contact: Joe Downey, Downey and Gutentag, 6301 Eldridge, Arvada, CO 80004. (303) 425-0419. FAX: 425-1053. 76330.3650@CompuServe.COM. Abstracts due by 8/8/94. Purpose of conference is to describe issues, management strategies, and technologies in hydrology, hydrogeology, and mining hydrogeology.

Note from the Editorial Staff

It was a privilege to know Hal and to work with him on *News-Notes*, which he loved so much, for the last five years. He taught us all a lot, and we miss him deeply.

As *News-Notes* goes forward, it proceeds from the groundwork that Hal himself laid. Knowing that he was dying, he worked hard in his last few months to prepare us for the transition. With your help, we will continue *News-Notes* with the same same spirit that Hal infused into it—and us—from the beginning.

Without Hal to laugh, cry, share, and argue with (for that is as integral a part of putting out a newsletter as writing and editing), we sometimes find ourselves thinking, what would Hal have done? how would Hal handle this one? It is satisfying to realize that people all over the country—readers, contributors, friends, colleagues, and acquaintances that Hal touched over years—each contain a bit of Hal's wit and wisdom. The *News-Notes* editorial staff will draw on that fund as we continue to report on "the condition of the water-related environment, the management and ecological restoration of watersheds, [and] the control of nonpoint sources of water pollution."



FACT SHEET

NATIONAL WATER QUALITY INVENTORY 1992 REPORT TO CONGRESS

Background

The National Water Quality Inventory Report to Congress is prepared every two years under Section 305(b) of the Clean Water Act. The 1992 Report is the ninth in its series.

The Clean Water Act gives states the responsibility to monitor and assess their waters and report the results to EPA. EPA provides technical assistance and guidance on monitoring and reporting, and summarizes the results of the state assessments in this Report to Congress.

This 1992 Report is based on water quality assessments submitted by 57 states, territories, interstate jurisdictions, and an American Indian Tribe (hereafter collectively referred to as states). These State assessments describe water quality conditions during 1990-1991.

Rivers, lakes, estuaries, wetlands, coastal waters, Great Lakes, and ground water are all covered in this Report. This Report also contains information on public health and aquatic life concerns, water quality monitoring, and state and federal water pollution control programs.

States measure water quality by determining if individual waters are clean enough to support uses such as fishing, swimming, and drinking. These uses are part of the state water quality standards, are set by the States, and are approved by EPA.

A Summary of Findings

For their 1992 reports to EPA, the States assessed the quality of roughly the same amount of waters as in previous reporting cycles. Many waters remained unassessed in the 2-year report period. States assessed:

- 18% of the Nation's 3.5 million river miles
- 46% of the Nation's 39.9 million lake acres
- 74% of the Nation's 37,000 estuary square miles.

This represents a near doubling of waters assessed in the initial

About two thirds of assessed waters are of good enough quality to support uses such as fishing and swimming, and therefore meet the Clean Water Act goals established by Congress.

two year period for 1984 when EPA first started to gather this type of information.

About two thirds of assessed waters are of good enough quality to support the uses states set for them such as fishing and swimming, and therefore meet the Clean Water Act goals established by Congress. The re-

Five Leading Sources of Water Quality Impairment

Rank	Rivers	Lakes	Estuaries
1	Agriculture	Agriculture	Municipal Point Sources
2	Municipal Point Sources	Urban Runoff/ Storm Sewers	Urban Runoff/ Storm Sewers
3	Urban Runoff/ Storm Sewers	Hydrologic/Habitat Modification	Agriculture
4	Resource Extraction	Municipal Point Sources	Industrial Point Sources
5	Industrial Point Sources	Onsite Wastewater Disposal	Resource Extraction

Source: 1992 Report to Congress.

Five Leading Causes of Water Quality Impairment			
Rank	Rivers	Lakes	Estuaries
1	Siltation	Metals	Nutrients
2	Nutrients	Nutrients	Pathogens
3	Pathogens	Organic Enrichment/ Low DO	Organic Enrichment/ Low DO
4	Pesticides	Siltation	Siltation
5	Organic Enrichment/ Low DO	Priority Organic Chemicals	Suspended Solids

Source: 1992 Report to Congress.

maining waters are impaired to varying degrees.

In the one third of assessed waters that have water quality problems, the leading contributors to problems are agricultural runoff, municipal sewage treatment plant discharges, storm sewers and urban runoff. Agricultural runoff is the most extensive source of pollution in the Nation's waters.

Nutrients, siltation, pathogens, metals, and organic enrichment are the most commonly reported pollutants in impaired waters. Nutrients can overstimulate the growth of algae and weeds; siltation smothers bottom-dwelling organisms and destroys stream habitat; pathogens cause shellfish harvesting restrictions, drinking water restrictions, and recreational beach closures; and organic enrichment leads to reduced levels of dissolved oxygen in water.

Municipal sewage treatment facilities, industries, and others that discharge into waterways from "points" such as pipes con-

tinue to contribute to water quality problems. Municipal discharges, for example, are the leading pollution source in estuaries and the second leading source in rivers. Industrial discharges are often the source of severe problems due to toxicants

Agriculture is the leading source of impairment in the Nation's rivers affecting 72% of the impaired river miles.

and are the leading source of fish consumption restrictions and the second leading source of fish kills. Storm sewers and urban runoff have emerged as significant problems nationwide and are the second leading source of impairment in lakes and estuaries.

Wetland loss continues at a significant rate and is attributed primarily to residential and urban development, agriculture, resource extraction activities such as mining, and the building of impoundments and high-

ways. Loss of these resources (1) reduces the biological productivity of waters because wetlands are nurseries and breeding grounds for many fish, shellfish, and birds; (2) increases the impacts of floods and storm sewers that wetlands would otherwise attenuate; and (3) deprives open waters of a natural "filter" for the removal of pollutants.

Toxic substances, though not as widely found as other pollutants, continue to cause locally severe impacts. Among these impacts are fish consumption restrictions, fish kills, and contamination of bottom sediments.

Although, in general, the quality of the Nation's ground water is good, an increasing number of pollution incidents affecting ground water have been reported. Underground storage tanks, septic systems, municipal landfills, agriculture, and abandoned hazardous waste sites are sources of ground water pollution cited by the states.

In ground water, the leading pollutants include nitrates, metals, pesticides, petroleum products, and volatile organic compounds.

River and Stream Water Quality

For 1990-1991, fifty-five states assessed the quality of 642,881 miles of rivers and streams, or 18% of the Nation's total 3.5 million miles of rivers and streams.

Of these 642,881 miles:

- 56% fully support swimming, fishing, and other uses, and an additional 6% currently support uses but are threatened and could become impaired if pollution control actions are not taken;
- 38% are impaired. Of these, 25% are considered partially supporting uses and the re-

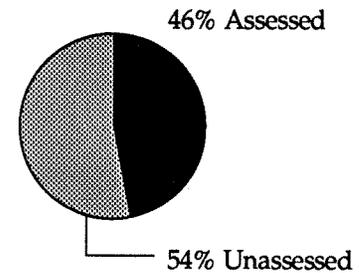
maining 13% are not supporting uses.

Leading sources - States attribute 72% of problems in assessed rivers to agriculture; 15% to municipal dischargers; 11% to resource extraction; and 11% to storm sewers and urban runoff.

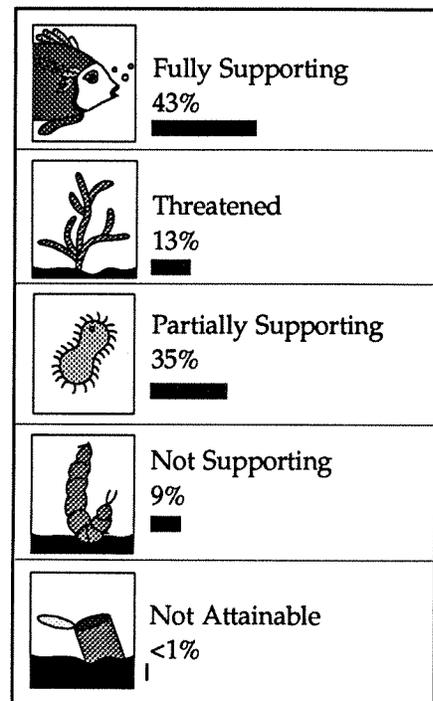
Leading pollutants - States attribute 45% of problems in assessed rivers to siltation; 37% to nutrients; 27% to pathogens; 26% to pesticides; and 24% to organic enrichment.

**Lake Acres Assessed
(For 1990-1991)**

Total lakes = 39,920,000 acres
Total assessed = 18,300,000 acres

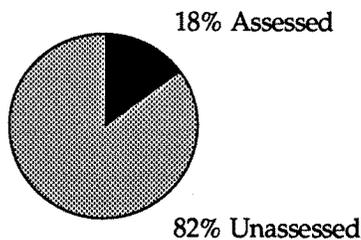


**Levels of Overall
Use Support - Lakes**

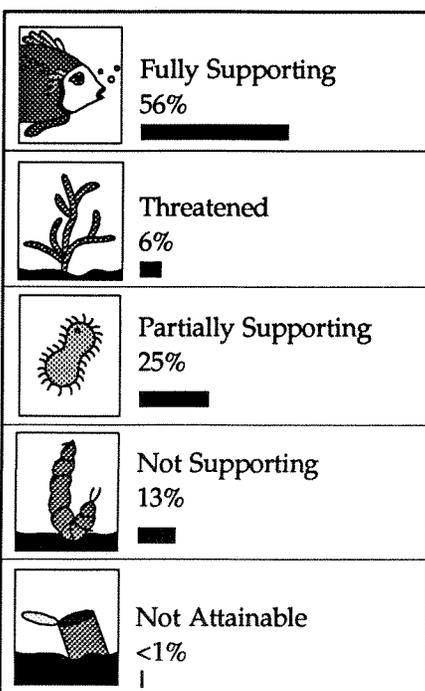


**River Miles Assessed
(For 1990-1991)**

Total rivers = 3.5 million miles
Total assessed = 642,881 miles



**Levels of Overall
Use Support - Rivers**



NOTE

Any single river mile, lake acre, or estuarine square mile is counted only once in tabulating total waters impaired. Since the waterbody can be impaired by multiple sources and causes, the sum of specific impairment categories may total more than 100%.

Lake and Reservoir Quality

For 1990-1991, forty-nine states assessed the quality of 18.3 million acres of lakes, ponds, and reservoirs, or 46% of the Nation's 39.9 million lake acres.

Of these 18.3 million acres:

- 43% fully support fishing, swimming, and other uses, and an additional 13% currently support uses but are threatened and could become impaired if pollution control actions are not taken;

- 44% are impaired. Of these, 35% are considered partially supporting uses, and the remaining 9% are not supporting uses.

Leading sources - States attribute 56% of problems in lakes to agriculture; 24% to storm sewers and urban runoff; 23% to hydrologic modifications; 21% to

municipal dischargers; and 16% to onsite wastewater disposal.

Leading pollutants - States attribute 47% of problems in assessed lakes to metals; 40% to nutrients; 24% to organic enrichment; and 22% to siltation.

Pollution can accelerate the natural aging process of lakes, known as eutrophication. Eutrophic lakes are characterized by vari-

ous conditions, such as the growth of weeds and algae due to high nutrient levels; reduced water clarity; and reduced lake depth due to buildup of silt and organic matter. Almost half of all lakes assessed (47%) were found to be eutrophic or hypereutrophic.

Estuary and Coastal Water Quality

For 1990-1991, twenty-five states assessed the quality of 27,227 square miles of estuaries, or about 74% of the Nation's total 37,000 square miles.

Of these 27,227 square miles:

- 56% fully support fishing, swimming, and other uses, and an additional 12% currently support uses but are threatened and could become impaired if pollution control actions are not taken;
- 32% are impaired. Of these, 23% are considered partially supporting uses and the remaining 9% are not supporting uses.

Leading sources - States attribute 53% of problems in assessed estuaries to municipal discharges; 43% to storm sewers and urban runoff; 43% to agriculture; and 23% to industrial point sources.

Leading pollutants - States attribute 55% of problems in assessed estuaries to nutrients; 42% to pathogens; 34% to organic enrichment; and 12% to siltation.

Water quality reporting for ocean coastal waters is limited.

Pathogens are the second leading pollution problem in the Nation's estuaries.

States assessed water quality in about 6% of the U.S. coastline miles. Only 14% of the assessed coastline miles were found to be impaired.

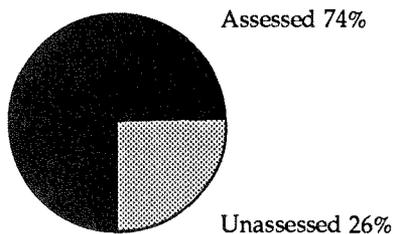
Water Quality in the Chesapeake Bay

The Chesapeake Bay Program has implemented programs to reduce impacts from nutrients, oxygen-demanding substances, and pathogens. Nutrients (primarily phosphorus and nitrogen) feed the excessive algal growth in the Bay that results in low dissolved oxygen concentrations and losses of underwater grasses that provide critical food and habitat for waterfowl and shellfish. Pathogen contamination in shellfish beds results in shellfish harvesting restrictions.

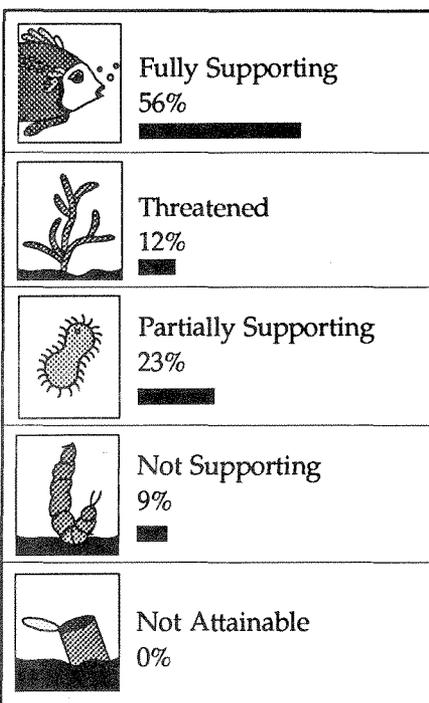
Wastewater plant upgrades, enhanced compliance with permits, bans on phosphorus detergents in the Bay watersheds, and nonpoint source controls reduced annual discharges of phosphorus into the Chesapeake Bay by 40% (4.7 million pounds) between 1985 and 1991. Overall, water quality monitoring data confirm that the reduction in phosphorus loading is reducing phosphorus concentration

Estuary Square Miles Assessed (For 1990-1991)

Total estuaries = 36,890 square miles
Total assessed = 27,227 square miles



Levels of Overall Use Support - Estuaries



in Bay waters. Total phosphorus concentrations in the Bay decreased by 16% between 1984 and 1992. However, total nitrogen concentrations have remained stable in the mainstem of the Bay and increased in some tributaries.

The Chesapeake Bay Program's nonpoint source program emphasizes controls for runoff generated by agricultural activities, paved surfaces, and construction in urban areas. The program includes nutrient management for applying animal wastes and fertilizers to cropland in amounts calculated to meet crop requirements without contaminating ground and surface waters.

Water Quality in the Great Lakes

For 1990-1991, seven Great Lakes states assessed 5,319 miles of Great Lakes shoreline, or about 99% of the Nation's total Great Lakes' shoreline.

Of these 5,319 miles:

- 2% fully support fishing, swimming, and other uses, and an additional 1% currently support uses but are threatened and could become impaired if pollution control actions are not taken;
- 97% are impaired. Of these, 30% are considered partially supporting uses and 67% are not supporting uses.

These statistics only address nearshore waters, not conditions in the deeper, less stressed central waters of the Great Lakes.

States attribute a high percentage of problem waters in the Great Lakes to fish consumption restrictions in place for nearshore areas.

Information on sources and pollutants in the Great Lakes is limited. Atmospheric deposition, contaminated sediments, and landfills are the leading sources of pollution, and leading pollutants include toxic organic chemi-

Since the 1990 Report to Congress, EPA and many States have moved toward a more geographically oriented approach to water quality management.

icals, such as PCBs; metals; nutrients; and organic enrichment.

Persistent Great Lakes problems include toxic contamination of fish tissue and sediments. However, the trophic status of the Great Lakes has improved due to declining phosphorus concentrations.

Status of Wetlands

Wetlands are being lost at a significant rate, totaling a net loss of 2.6 million acres over the 9 years of a recent U.S. Fish and Wildlife Survey Report to Con-

gress (*Wetlands Status and Trends in the Conterminous U.S., mid-1970s to mid-1980s*, September 1991).

States report that agriculture and commercial and residential development are the leading sources of wetland losses.

Sedimentation and nutrients are cited as the leading pollution problems in wetlands.

Ground Water Quality

About 53% of the U.S. population relies to some extent on ground water as drinking water.

The most frequently cited sources of ground water contamination are underground storage tanks, agricultural activities, septic systems, municipal landfills, industrial landfills, and abandoned hazardous waste sites.

The most frequently cited pollutants in ground water include nitrates, identified as a ground water problem by 49 States, volatile organic chemicals (48 States), petroleum products (46 States), metals (45 States), and pesticides (43 States).

Public Health and Aquatic Life Impacts

States report elevated concentrations of toxic substances in 8% of monitored river miles, 43% of monitored lake acres, and 13% of monitored estuarine square miles.

Forty-seven States cite 1,279 waterways with fish consumption advisories. Mercury, PCBs, pesticides, dioxin, and other organic chemicals and heavy metals are most commonly cited pollutants causing fish consumption restrictions.

Twenty-seven states discuss problems with toxic contamination of bottom sediments. These states reported 669 incidents of contamination caused primarily by heavy metals, PCBs, dioxin, and pesticides.

Forty-three states reported 930 pollution-caused fish kills affecting more than 5 million fish. Low levels of dissolved oxygen, pesticides, manure and silage, oil and gas, and chlorine are the leading pollutants causing the fish kills, and the leading sources include agriculture, industrial discharges, municipal sewers, spills, and pesticide applications.

Thirty states reported 371 swimming area closures, most of short-term duration and attributed to bacteria from sewage treatment plants, combined sewer overflows, and urban runoff.

Status of Pollution Control Programs

Since the 1990 Report to Congress, EPA and many States have moved toward a more geographically oriented approach to water quality management. In 1991, EPA highlighted the Watershed Protection Approach (WPA), a framework for focus-

ing efforts on carefully chosen watersheds. The WPA is not a new government program, but rather a means of pulling together the resources and expertise of existing local, State/Tribal, and Federal programs.

Point source dischargers are regulated through permits issued by the states or EPA. As of June, 1992, most dischargers were meeting their permit limits, but 10% of major municipal dischargers and 7% of directly-discharging industrial plants were not meeting their permit conditions (i.e., were in "significant noncompliance").

The National Pretreatment Program protects municipal wastewater treatment plants and the environment from the impacts of toxic discharges into sewers from industrial sources. Fifty-four percent of significant industrial users of sewage treatment facilities are reported to be in significant noncompliance with discharge standards and/or self-monitoring and reporting requirements. Thirty-five percent of municipalities required to do so have not fully implemented their pretreatment programs.

All states have assessed their nonpoint source pollution problems, and all have developed nonpoint source management programs to address them. EPA has approved 51 state nonpoint source management programs and portions of all remaining programs. Nonpoint sources are primarily addressed through

management activities implemented at the state and local levels.

The EPA is responsible for 20 programs related to ground water protection. EPA issued the National Guidance to assist States in developing Comprehensive Ground Water Protection Programs (CSGWPPs), which are a key component of the Agency's Ground Water Protection Strategy. The States have adopted a variety of programs to address ground water contamination. These include implementing ground water protection strategies, enacting comprehensive ground water protection legislation, and establishing programs to protect well-head areas.

Over the next few years, EPA and the States are committed to implementing a wide variety of water pollution control programs. These programs include the National Combined Sewer Overflow Strategy, storm sewer permitting requirements; and water quality standards for wetlands.

Improving Nationwide Monitoring: The Intergovernmental Task Force on Monitoring Water Quality

In 1992, the Intergovernmental Task Force on Monitoring Water Quality (ITFM) convened to prepare a strategy for improving water quality monitoring nationwide. The ITFM is a Federal/State partnership of ten Federal agencies, nine State and

Interstate agencies, and one American Indian Tribe. The EPA chairs the ITFM with the U.S. Geological Survey (USGS) as vice chair and Executive Secretariat as part of their Water Information Coordination Program pursuant to OMB memo 92-01.

The mission of the ITFM is to develop and implement a na-

tional strategic plan to achieve effective collection, interpretation, and presentation, of water quality data and to improve the availability of existing information for decisionmaking at all levels of government and the private sector. The ITFM is also producing products that can be used by monitoring programs

nationwide. For a copy of the first and second year ITFM reports contact:

USGS Office of Water Data
Coordination
417 National Center
Reston, VA 22092
(703) 648-5023

For more information about the National Water Quality Inventory Report contact:

Barry Burgan
National 305(b) Coordinator
U.S. Environmental Protection Agency (4503F)
401 M Street, SW
Washington, DC 20460
(202) 260-7060
(202) 260-7024 (fax)

For copies of this report or the companion summary document, use order form on page 8.

For copies of the *National Water Quality Inventory: 1992 Report to Congress* or the companion summary document *Quality of Our Nation's Waters: 1992* check the appropriate box(es) below and mail for Fax this form the the address/Fax number indicatated below. Allow 2-3 weeks for delivery.

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Quality of Our Nation's Waters: 1992 (EPA841-S-94-002)

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