



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

A Commentary and Editor's Note

by Hal Wise, Editor

We draw our readers' attention to the first two stories under *News From the States and Localities, Where the Action Is*. In our view, these stories provide valuable comment on two key environmental management themes of the new administration. Comment not from a command-and-control-bureaucratic-Washington-based point of view, but, rather, from people who are doing things out there, at the state and local, on-the-ground level, where the real action is. These themes deal with

- Improved, and more responsive, enforcement of environmental laws and regulations as an integral component of the nation's overall environmental management approach. EPA Administrator Carol Browner has repeatedly emphasized the need for heightened enforcement programs. Kathleen Deal, Assistant Iowa Attorney General, writes on that state's recently developed environmental prosecution emphasis "to hold polluters criminally responsible for their actions."
- Watershed management and restoration are new key concepts that Congress is about to insert into the reauthorization of the Clean Water Act. Michael Furniss, in his article, reflects on key fishery and habitat issues and their relationship to forest roads. Mike, a hydrologist at the Six Rivers National Forest in California, is the editor of the Watershed Management Council's newsletter and the technical monitor of the Watershed Restoration Network on the *NPS BBS*.

These two viewpoints are illustrative of some the local "spins" likely to be applied as Washington-generated administrative policies begin to get state and local implementation. Thanks for broadening our understanding of these things, Kathleen and Mike.

(Note: For a broad view of the Administration's direction in the reauthorization of the Clean Water Act, see the remarks of Administrator Browner to the Water Environment Federation on page 4.)

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Water Quality Concerns on the National Scene

After the Flood — EPA Takes Action

The record floods that inundated much of the upper Mississippi River basin during the spring and summer caused property damage in excess of \$10 billion, estimates the U.S. Geological Survey (USGS). No dollar amount can fully describe the loss experienced by those whose lives were disrupted by the rising waters. The flood's extent and duration caused numerous levees to fail, and the deluge submerged many areas that had never been flooded before. Flooding caused great damage to homes and crops as well as displacing many people. Millions of acres of farmland remained under water for weeks during the growing season.

Overland and river transportation routes were closed throughout the region. Drinking water became an endangered resource in many places; floodwater contaminated or damaged scores of wells, and many water treatment facilities were inoperable.

Floodwaters washed pesticides from fields and storage facilities. In Iowa, Raj Rajagopal, professor and chair of the geography department at the University of Iowa, reported that during the flood, two herbicides were found in Iowa rivers and streams in higher than normal amounts. Comparing his recent data with previous USGS data, Dr. Rajagopal estimated that the Mississippi River carried 175 metric tons of atrazine and 20 metric tons of alachlor into the Gulf of Mexico between July 7 and August 12. "This is more than the 160 metric tons of atrazine and 18 metric tons of alachlor that flowed into the Gulf during all of 1991," wrote Dr. Rajagopal. "The long-term implications of such short-term shock inputs of chemicals into the aquatic ecosystems of rivers and oceans remain to be answered."

Damage to Water and Waste Treatment Facilities

Of more immediate concern to residents of the flooded areas was the condition of water treatment facilities. According to an EPA flood report from early August, 187 wastewater treatment facilities were affected in Missouri, Kansas, Iowa, Illinois, and Wisconsin. In Missouri, Kansas, Iowa, Nebraska, Illinois, and Wisconsin, 138 drinking water treatment facilities were affected.

"The effects of the floods on the water wells is devastating," a staffer with EPA's Ground Water Protection Division said. In particular, flooding of well areas and polluted runoff could lead to contamination by viruses, bacteria, and protozoans, according to Edwin Geldreich, senior microbiologist at EPA's Drinking Water Research Laboratory in Cincinnati.

EPA Establishes Coordinating Task Force

To assist with the enormous task of assessing the serious environmental consequences of the flood, EPA established a task force for coordinating all water quality monitoring activities. This group reports directly to the Interagency Flood Environment Committee, chaired by EPA's Associate Deputy Administrator, Sylvia Lowrance.

The task force's Water Workgroup is coordinating a special monitoring program to help identify contamination and sediments in surface waters that pose a threat to human health and the environment. EPA is implementing the program, which covers all nine states eligible for flood disaster assistance.

"These supplemental monitoring programs will assist the affected states by filling gaps in contamination identification not covered by ongoing monitoring programs or other special flood activities," said Mary Belefski of EPA Office of Water and chairperson of the Water Workgroup. "In addition to identifying immediate health and environmental threats, results of this monitoring will help the states identify their longer-term water quality concerns brought on by the flood."

Some EPA-assisted monitoring has already been initiated. For instance, at the request of the Missouri Department of Natural Resources, EPA Region 7 has collected and analyzed 46 river samples and seven samples each of raw and finished drinking water at cities using surface water for their primary supply.

In addition to monitoring, the Interagency Flood Environment Committee oversees all other environmental issues associated with the flooding. Its membership includes representatives from EPA, the Department of Interior, the Department of Health and Human Services, the Federal Emergency Management Agency, the Army Corps of Engineers, and several other agencies. The Environment Committee is one of several that report directly to the overall Flood Committee, which coordinates all federal activities directed toward flood recovery. The Flood Committee is chaired by Secretary of Agriculture Mike Espy.

EPA Publishes New Guidance Bulletin on Flooded Private Wells

A timely new bulletin, "Private Wells: Guidance for What to Do after the Flood," was widely distributed in the flooded region by the EPA's Ground Water Protection Division and FEMA. This guidance is intended to supplement flood precautions issued by state and local health and environmental departments.

The guidance covers

- Danger of damage to pump and electrical shock
- Well and pump inspection
- Pump operation
- Cleaning the well and emergency disinfection of wells that have been flooded
- Sampling and testing well water
- Listing of selected state flood hotline numbers

Free copies of "Private Wells: Guidance for What to Do after the Flood," (EPA 813/F-93-001, August 1993) are available from EPA Region V, Chicago, IL, phone: (312) 886-1490 or 353-2650; Region VII, Kansas City, KS, phone: (913) 551-7033 or 7032; and Region VIII, Denver, CO, phone: (303) 294-1135 or 293-1652. Or contact John Simons (202) 260-7091 or Jane Marshall, (202) 260-8897, EPA Office of Ground Water and Drinking Water (4603), 401 M St. SW, Washington, DC 20460. FAX: (202) 260-0732.

Environmental Pollution Prevention Project Targets Developing Countries

The U.S. Agency for International Development (USAID), in conjunction with several EPA offices—Water, International Activities, and Research and Development—are undertaking the Environmental Pollution Prevention Project (EP3) in developing countries. The Water Environment Federation (WEF) is an important cooperator in the project.

EP3 provides technical field support in industrial pollution prevention and control. The project will improve environmental conditions and mitigate serious environmental problems caused by urban and industrial pollution in developing countries. The project will focus on implementing industrial pollution prevention and waste minimization programs with local industrial associations, chambers of industry, and the private sector. Pollution prevention will improve plant efficiency, conserve natural resources and reduce environmental pollution.

EP3 includes these primary activities: pollution prevention assessments; national cleaner production and pollution prevention programs; technology cooperation and investment promotion; advisory services in all aspects of environmental quality programs; and pollution prevention training and awareness.

Assistance to USAID missions, regional bureaus, and local institutions in developing countries is available through the EP3 implementation contracts:

- An interagency agreement with EPA which covers expenses for EPA experts who assist with EP3 implementation in developing countries.
- A cooperative agreement with WEF which helps promote sustainable environmental programs and provides pro bono experts to EP3. Volunteer experts identified by WEF will be sent to developing countries to identify high-priority facilities, industrial categories, or urban regions to be the focus of EP3 activities, and to develop sustainable national pollution prevention programs. Although experts will be asked to volunteer their services, travel expenses will be covered by EP3.
- An implementation contract with a private contractor, which provides for project coordination and support.

James Gallup, an EPA staffer who is EP3 project manager at USAID, said, "The Federation has an outstanding cadre of environmental experts and excellent pollution prevention and control training and information programs. The Water Environment Federation is a key element of EP3's program to mobilize and transfer pollution prevention expertise and technologies to the developing world."

EP3 is a seven-year project funded by USAID. It is staffed by three EPA personnel: Jim Gallup, Deborah Hanlon and Mario Salazar.

To date, EP3 offices have been established in Tunis, Tunisia, and in Santiago, Chile. Additional countries are being considered for EP3 activities.

On September 4 and 5, Deborah Hanlon and Jim Gallup conducted the first EP3 Pollution Prevention Workshop in Alexandria, Egypt. The workshop was attended by thirty representatives from Egyptian industry, government and academia. In addition, EP3 project participants from Tunisia and Chile attended.

During the seven-year life of the EP3 project, up to 10 pollution prevention offices will be established in developing countries around the world.

[For more information on EP3, contact Deborah A. Hanlon, ORD (8301), U.S. EPA, 401 M Street, SW, Washington, DC 20460. Phone: (202) 260-2726. FAX: (202) 260-3861. For more information on the Federation's EP3 activities, or to volunteer help, call WEF International Programs Director Eileen O'Neill, at (703) 684-2406.]

Reauthorizing the Clean Water Act

EPA Administrator Browner Addresses

Water Environment Federation Conference by Video

EDITOR'S NOTE: Here is a complete transcript of the remarks made (via video) by EPA Administrator Browner to the Water Environment Federation Conference in Anaheim, California, on October 4, 1993. It contains a summary of the Administration's current thinking on some substantive items to be included in the reauthorization of the Clean Water Act.

Hello, I'm Carol Browner, the administrator of the U.S. Environmental Protection Agency. Although I can't be with you in person, I'm delighted to have this opportunity to address the Water Environment Federation. I'm inspired and even a little awed to know that 15,000 water quality professionals are meeting to enrich their skills, share experiences, and get on with making America's waters the cleanest and safest in the world.

Far better than most Americans, water quality professionals know that everybody lives downstream of somebody else. Today, I want to ask for your support in renewing and reinvigorating our nation's commitment to clean water—first, by strengthening the Clean Water Act; second, by reforming the Safe Drinking Water Act; and finally, by using NAFTA, the North American Free Trade Agreement, to help improve conditions along the U.S.-Mexico border.

The Clean Water Act is one of the best environmental laws on the books. Since its passage, pollution in America's waters has been sharply reduced. But nearly half of American rivers, lakes, and creeks are still polluted or threatened. With your help, we can do better. I've asked Congress to strengthen the Clean Water Act by incorporating a watershed management approach.

Watershed management means dealing with water quality, not pollutant by pollutant . . . but instead, by bringing communities together to identify the sources of pollution in an entire watershed—an entire natural system, including surface water and groundwater alike. In fact, we're seeking amendments to the Clean Water Act that will provide incentives to state and local governments to adopt watershed plans that include specific commitments to reduce pollution and protect aquatic habitats.

I've also asked Congress to help us take on the difficult problem of polluted runoff—the pollutants that stream off our land, our city streets, our farms, and our industrial parks—into our waters. We need to improve our nonpoint programs. We must continue our voluntary, targeted approaches, but we also need back-up: enforceable requirements.

The scientific data are clear: without better control of polluted runoff, we will fail to meet the goals of the Clean Water Act. Changing the law is essential to controlling polluted runoff. And controlling polluted runoff is essential to protecting America's waters.

Finally, we must ensure that states and municipalities have the money they need to maintain a water quality infrastructure that is absolutely reliable. As you know, the 1987 amendments to the Clean Water Act mandated that federal funding for state revolving funds would be terminated in fiscal year 1994. But President Clinton and I understand that there are still substantial needs for more federal funding. We have requested additional funds for the states.

We need to improve the Clean Water Act, and, number two, we need to overhaul the Safe Drinking Water Act. Simply put, U.S. drinking water is among the safest in the world, but we want to ensure even more protection.

Here's how the Clinton Administration plans to help:

We've proposed to Congress a multibillion-dollar revolving loan fund to help communities build drinking water treatment plants and replace dangerous lead pipes.

We've proposed authorizing states to collect a user fee to raise additional money.

We've proposed pollution prevention programs in every community, to keep contaminants from entering the drinking water supply in the first place.

We've proposed [efforts] to strengthen enforcement of the law and make sure the public is notified whenever significant violations occur.

And we've proposed more flexibility for financially strapped communities. Communities that have no other options should be able to use less expensive treatment technologies. We hope that this will encourage water quality professionals like you to develop and improve small-scale, easy-to-operate technologies, and add to America's leadership in environmental technology.

By improving the Safe Drinking Water Act, we can provide a higher level of protection for American citizens. I look forward to working with you to urge Congress to make these reforms a reality.

Finally, I want to tell you very briefly about how NAFTA, the North American Free Trade Agreement, gives us an opportunity to help the communities along the U.S.-Mexico border.

In March, I visited El Paso and its sister city, Juarez. I saw raw sewage floating in the river, children splashing in polluted puddles, and women washing clothes in contaminated water.

The Administration budget request for this year includes \$230 million to build wastewater treatment plants and safe drinking water facilities in the border region. And as part of the NAFTA negotiations, we've proposed a Border Environmental Administration that would leverage public and private funds for drinking water, wastewater, and solid waste.

NAFTA gives us the opportunity to promote public health on both sides of the Rio Grande. I hope you'll let Congress know of your support for NAFTA, as well as for strengthening the Clean Water Act and the Safe Drinking Water Act.

In conclusion, I wish you a successful conference that promotes professionalism, integrity, and ethics throughout the field of water quality. I look forward to working with you to promote public health and protect the environment. Thank you.

Notes on Riparian & Watershed Management

U.S. District Court Upholds EPA's TMDL on Dioxin Discharges to the Columbia River

EDITOR'S NOTE: In our last issue of *News-Notes* (#32, October 1993) we briefly reported on this case as follows:

At the request of the states of Oregon, Washington and Idaho, EPA Region 10 recently prepared a Total Maximum Daily Load Allocation (TMDL) on dioxin discharge to the Columbia River. The Clean Water Act calls for TMDLs to be prepared when technology-based effluent limitations are found to be insufficient to meet water quality standards and more stringent water quality-based regulations are required. TMDLs are developed for specific pollutants, in this case dioxin.

In EPA's TMDL, [discharge load] allocations were made for specific U.S. pulp and paper mills, and other pollution sources, including point sources, natural background, and nonpoint sources, with an allowance provided for a paper mill in Canada. EPA was sued both by a coalition of paper mills and by environmentalists. The mills contended that EPA had not followed correct procedures required by law in the development of the TMDL. Environmentalists contended that EPA had not gone far enough.

On August 10, 1993, the United States District Court for the Western District of Washington upheld EPA's actions in all respects. News-Notes will have a more complete story on this important decision in our next issue.

This is the next issue, and here is the more complete story.

EPA developed a TMDL for the release of 2,3,7,8-tetrachlorodibenzo-p-dioxin into the Columbia River after Washington, Oregon, and Idaho identified the river as water quality-limited under section 303(d) of the Clean Water Act.

The Columbia River TMDL was designed to attain an ambient dioxin concentration of 0.013 parts per quadrillion (0.013 ppq) in the river and its U.S. tributaries. This value is equal to Oregon's numeric human health criterion for dioxin, calculated assuming 6.5 grams per day of fish consumption and a cancer risk level of one in a million. EPA interpreted the narrative "no toxics in toxic amounts" criteria in Washington and Idaho to be consistent with the Oregon numeric criterion.

The lawsuit was brought by two environmental groups—the Dioxin/Organochlorine Center and Columbia River United (CRU)—and by several pulp and paper mills.

The suit challenged the scientific validity of the TMDL and EPA's authority to issue the TMDL. On August 10, 1993, the U.S. District Court decided the case in EPA's favor.

The environmentalists claimed that the 0.013 ppq standard would be inadequate to protect certain populations that eat higher than average amounts of fish. The Court rejected this argument, noting that EPA has "conservatively" based the 0.013 ppq standard on the assumption that individuals would eat an average of 6.5 grams per day of fish contaminated with the maximum level of dioxin that could be present in fish living in waters meeting the 0.013 criterion. The Court noted that not all of the fish in the Columbia River, which carries large runs of anadromous fish, carry the maximum level of dioxin.

The Court also rejected the environmentalists' claims that the TMDL goal of 0.013 ppq is inadequate to protect aquatic life and wildlife. It cited strong support in the administrative record for EPA's view that the 0.013 ppq would be protective.

Finally, environmentalists' also claimed that the TMDL was inadequate because it failed to consider the presence of other chemicals in the water in establishing the allowable dioxin load. It is instructive to note the words used by the Court as it rejected this argument:

With regard to [the Dioxin/Organochlorine Center and] CRU's claim that the EPA failed to consider the synergistic and additive impacts of other pollutants, the EPA cannot be said to have acted arbitrarily or capriciously, or in violation of the law. The EPA was not required to consider the impact of all pollutants in the Columbia River, because the Clean Water Act anticipated that there could be multiple TMDLs for different pollutants. The preamble to the regulation implementing [the Clean Water Act] allow that "a single TMDL covers only one specific pollutant or one property of pollution . . ."

Such an approach is in line with the statutory requirement that each state prioritize waters requiring TMDLs based on the "severity of the pollution." A prioritized approach to the worst pollution problems would be hampered if the EPA were required to issue a TMDL only after all pollutants that existed in amounts in excess of water quality standards had been addressed. The EPA, at the behest of the states, rationally chose to pursue the regulation of dioxin as the most toxic of those chemicals threatening the Columbia that were identified by CRU and others in the administrative record.

The Court rejected the mills' claim that EPA was not authorized to establish a TMDL for dioxin prior to establishment of technology-based effluent guidelines for dioxin. The Court reasoned that the Clean Water Act contained no specific prohibition on TMDL development in the absence of technology-based guidelines, and that a TMDL is a rational method for EPA to determine how to provide for the attainment of water quality standards in impaired waters — one of the "central objectives" of the Act.

The Court also rejected the mills' claims that (1) EPA impermissibly failed to include specific allocations in the TMDL for all dioxin sources other than chlorine-bleaching pulp and paper mills, (2) EPA had no rational basis for allocating the mills just 35 percent of the loading capacity, and (3) EPA made arbitrary assumptions regarding the fate, transport, and attenuation of dioxin in the Columbia River.

The court stated that while a TMDL should consider all discharges of a pollutant, nothing in the relevant statutes or regulations explicitly requires that a TMDL set wasteload allocations for all point sources or load allocations for all nonpoint sources. The court also supported EPA's allocation scheme, calling it reasonable and based on the best available measurements of dioxin sources. Finally, the court cited EPA's assumptions regarding the fate, transport, and attenuation of dioxin as rational and supported by available data.

United States District Judge Carolyn R. Dimmick used these words in concluding her order:

In sum, the EPA interpretation of the state water quality standards is supported by the record, and adequately protects those uses designated by state regulation. Based on the 0.013 ppq water quality standard, the EPA performed scientifically valid analyses to arrive at the proper Total Maximum Daily Load for the river, and to allocate that load. Moreover, the considerable number of conservative assumptions incorporated into EPA calculations, and the EPA's recognition of and adjustments for some scientific uncertainty, ensures the margin of safety required by the Clean Water Act. The TMDL issued by the agency is not arbitrary or capricious, an abuse of discretion, nor contrary to law. The Court will not upset the conclusions of the EPA, which were reached through a rational application of its considerable expertise.

New York City Watershed Program Integrates Local Economy, Voluntary Participation, and Clean Water

The story is familiar (sediments, pathogens, nutrient enrichment, toxics), but the scale is gargantuan (1,900 square miles of land), and the stakes enormous (clean, safe drinking water for 9 million people).

Ninety percent of New York City's drinking water is piped in via an immense underground aqueduct system from 19 reservoirs north of the city. Some of them more than 150 miles from the crowded urban center that receives their waters, the upstate watersheds contain dairy farms and small towns that value an independent, rural lifestyle. Despite the differences (and the lingering resentment of communities displaced when the reservoirs were built some 50 years ago), New York City and the watershed towns are now venturing together into a great experiment in watershed protection and pollution prevention.

EPA's Expert Panel Report on New York City Water Supply Released

In November 1991, New York City applied for a filtration avoidance waiver for its water supply system. An interim waiver was granted pending results of the City's efforts to implement a comprehensive watershed protection program (see accompanying article). Earlier that year, EPA headquarters and Region 2 had appointed an expert panel to evaluate the situation.

The panel's report, issued in April 1993, recommended that New York City not be granted avoidance from filtration because of concern over the threat to public health from *Giardia* and *Cryptosporidium*. The report acknowledged that the City is meeting all objective criteria of the federal Surface Water Treatment Rule (SWTR) for avoiding filtration, although it is "on the margin" in many cases.

The panel expressed doubt that the water supply could meet anticipated enhancements to the SWTR in the future and stated that "prudence would indicate a conservative approach pending promulgation of new regulations."

The report also stated that the City does not meet the requirements of the regulation for "ownership or control" of the watershed and is not likely to do so in the future. While skeptical that New York City's watershed protection approach can meet the SWTR's requirement to "control all human activities which may have an impact on the microbiological quality of the water," the panel endorsed a watershed protection program as part of a "multibarrier system" for NYC drinking water sources, saying, "the Panel holds that both watershed protection and filtration are necessary."

Before making a final decision, EPA will evaluate information supplied by New York City on its watershed protection program.

[For more information, contact: Clive Davies, Office of Ground Water and Drinking Water (4604), U.S. EPA, 401 M St., SW, Washington, DC 20460. FAX: (202) 260-3464. Or call the Safe Drinking Water Hotline at (800) 426-4791.]

For generations, the water has been of high quality and, although it is chemically disinfected with chlorine, it has never been filtered. However, the federal Surface Water Treatment Rule of 1989 now requires the City to show adequate protection of its water supply if it is to remain unfiltered. Of particular concern are microbial pathogens, especially the protozoans *Giardia* and *Cryptosporidium*, which are more resistant to chlorination than bacteria and viruses.

Since 1905, New York State law has given the City certain controls over land in the watersheds. In 1990, seeking to maintain the quality of its water and attempting to meet state and federal standards for drinking water, New York City drafted new watershed regulations, including restrictions on agricultural activities within the watershed areas—restrictions that many believed threatened the viability of farming in the watersheds. Concerned, the farm community posed the question: If agriculture is a preferred land use in the watersheds compared with other types of development, why not include the economic health of agriculture in the water quality equation?

The New York State Department of Agriculture and Markets convened an ad hoc task force to explore that issue. Local interests conceived and presented to the task force a holistic watershed management program. They envisioned a partnership between New York City and farmers which would bolster the farm economy and land use values while achieving the City's water quality objectives.

The task force concluded that such a comprehensive voluntary pollution prevention program would protect water quality better than a regulatory approach and be less expensive than other alternatives, including filtration to remove pollutants after they enter the water supply. The New York City Department of Environmental Protection (DEP) estimates that building a filtration system would cost over \$5 billion, with annual operating costs of \$300 million.

Whole Farm Planning

In place of the proposed agricultural regulations, the City agreed to work with the watersheds' agricultural community to encourage and assist farmers to develop individual farm management plans that address soil erosion control, animal waste management, nutrient management, domestic animal pathogen control, and pesticide management. Farmers agreed to seek 85 percent participation among the watersheds' farms.

In addition, new institutions and institutional arrangements have been established to carry out the Whole Farm Planning Program. County Project Teams have formed in each of the watersheds' counties to bring together the expertise and perspective of traditional agricultural assistance agencies.

The Watershed Agricultural Council, consisting of local farmers and the Commissioner of the New York City Department of Environmental Protection, was established in February 1992 as a forum for policy development, marketing, and outreach for the program. It is the principle mechanism for partnership in the agricultural program and will run the program as it moves beyond the pilot phase.

Recently, the Council incorporated itself and applied for nonprofit status in order to assume greater operational responsibility for the Whole Farm Planning Program. "The City supports this effort and is pleased that watershed farmers are taking responsibility and ownership of this important effort," commented Bob Alpern, senior advisor to the commissioner of New York City's DEP.

Farmers who sign on to the Whole Farm Planning Program will not have to pay for planning, implementing, maintaining, or operating the BMPs installed to meet water quality objectives, but they will have to take an active part in the planning and implementation process. According to Delaware County Cooperative Extension Farm Management Specialist Dean Frazier, "A basic premise behind the New York City watershed project is that farmers be actively involved in developing plans for their farms. The County Project Teams and the farmers must reach a consensus on the solutions to problems identified on their farms. . . . Farmers will be actively involved in making decisions that affect their business while meeting water quality standards."

New York City has committed \$3.4 million to development and implementation of the program's first phase, a two-year effort to demonstrate and validate this novel approach. Ten farms have volunteered as pilots for the Whole Farm Planning process, and several of these demonstration farms are now implementing their customized plans.

Tackling the Toughest Challenges First

Steep slopes and proximity to streams, along with size and corn acreage on one farm presented one of the most challenging situations in Delaware County. Working with the farm's owner, the county technical staff identified five different management options. The option selected addresses pathogens, erosion, animal waste, and nutrient management while meeting the farmer's practical and economic needs.

This particular plan houses young calves, which are known to be a source of pathogens, separately from the rest of the herd in order to specially manage them for improved health and treat their manure to kill pathogens. Manure from the calves is then spread on low run-off fields.

Reducing excess corn acreage, short-term rotation grazing, strip cropping, diversions, waterways, tile drainage, and barnyard water management reduce erosion and sedimentation.

Animal waste and nutrient management are accomplished through soil testing, manure spreader calibration, and tailoring of manure spreading schedules to avoid peak precipitation periods.

Another demonstration project is underway on a farm in neighboring Greene County. There, similar methods to reduce pathogens are being implemented, and the Greene County Project Team is evaluating several proposals for handling excess nutrients from manure on a farm that has little suitable land for spreading manure. The solution will include manure storage during the winter and leasing additional nearby acreage, and it may involve the purchase of equipment

for hauling manure long distance or the development of regional support services that can transport, compost, and custom-spread it.

"[These first two] farms have taken an extraordinarily long time to complete [their plans] because of the refinement of the process that took place at the same time. It is anticipated that future plans will proceed much more quickly, as they must if we are to have a workable and easily delivered program," noted *Watershed Perspective*, the newsletter that connects the project's managers and participants.

Ten-Step Planning Process

The farm plans are built on a ten-step process:

1. Inventory of farm's current land, livestock, equipment, and management base;
2. Setting of long-term management goals and objectives;
3. Inventory of pollution problems;
4. Prioritization of problems;
5. Development and evaluation of conservation and management alternatives;
6. Setting of goals for BMP implementation;
7. Development of implementation plan;
8. Implementation;
9. Annual progress review; and
10. Evaluation and update of plan.

Pyramid of Support

In preparing farm plans, the farmers can rely on a wide base of support. "Visualize yourself sitting on top of a pyramid," Dean Frazier of Delaware County Cooperative Extension tells participants. In direct contact with farm operators is the County Project Team, composed of conservationists, managers, and technicians from county Soil and Water Conservation Districts, Soil Conservation Service offices, and Extension offices. These are the hands-on staff that work with farmers to fashion individual plans to meet both business and water quality objectives.

Behind the County Project Team are all the resources available to the Scientific Support Team from Cornell University, New York State Water Resources Institute, Cornell Cooperative Extension, USDA SCS, the state Department of Environmental Conservation, and New York City's Department of Environmental Protection. This scientific support group conducts research to improve farm plans, does monitoring, provides engineering support, and develops tools and materials for implementing the plans. "A particularly important responsibility is conducting research to determine the sources and fate of pathogens and their significance for water quality," said Keith Porter, director of the Water Resources Institute at Cornell University. "The toughest challenge is to determine through research the risks posed by parasitic protozoas to the water supplies. USDA research and education traditionally ignores pathogens that are a threat to public health," he added.

Composing the base of the pyramid are federal, state and City agencies. Administrative oversight comes from the New York State Soil and Water Conservation Committee, while New York City's Department of Environmental Protection finances the program. The City also plays a role in monitoring water quality and evaluating the program's effectiveness, along with U.S. EPA and the state Department of Health.

The Watershed Agricultural Council is the cement that holds together all levels of the organizational pyramid. The locally-based, farmer-directed Council scrutinizes policy issues, mediates conflicts, develops evaluative criteria, and reviews plans for demonstration projects.

Built in to the program's goals is the economic viability of agriculture in the watersheds. Richard T. McGuire, New York State Commissioner of Agriculture and Markets, told a U.S. Senate subcommittee that in the watershed, "... Farming is a preferred land use with significant long-term environmental benefits, as compared with more intensive uses like second homes, which pose even greater threats to the City's drinking water, and the City wants to take all appropriate steps to keep farming economically viable and in control of the land." Purchase of development rights on farms is one example of this.

While farmer participation is voluntary, the program incorporates a regulatory fail-safe: if, when evaluated after five years, the program does not provide adequate protection of water quality, New York City's watershed regulations may then be activated.

Whole Community Planning

As Whole Farm Planning matures, a second component that focuses on strengthening local governments' water quality protection efforts is evolving. According to the City's Commissioner of the Department of Environmental Protection, Albert Appleton, "... Whole Farm Planning sparked broader discussions between the City and a quasi-governmental organization of watershed community leaders known as the Coalition of Watershed Towns."

The year-long dialogue has spawned an approach that encourages local autonomy and watershed stewardship in exchange for the waiver of many of the City's watershed regulations. The Charter for Watershed Partnership establishing the Whole Community Planning framework was negotiated by the City, the Coalition of Watershed Towns, and Putnam County in September 1993.

The joint program will involve New York City, the state, and more than 60 local governments in the process of Whole Community Planning. Six towns now serve as pilots for the process, which combines local land use and growth management, and local regulatory and nonregulatory programs with review and cost-sharing from New York City.

The eight-step process of drawing up each Whole Community Plan includes

1. Organizing a Citizens' Advisory Committee to identify goals, educate the public, inventory resources, and identify necessary expertise.
2. Identify priority water quality concerns.
3. Collect and evaluate relevant information about the community.
4. Review the range of options a town might adopt to protect the water supply.
5. Select programs and practices, and develop a draft Whole Community Plan.
6. Public review.
7. Submit plan to local town board for adoption.
8. Implement the new program once the plan is approved and cost-sharing funds are received.

At the same time, New York City's Alpern notes: "Participating communities will be expected to implement a pollution prevention strategy tackling immediate priority problems; to involve DEP in environmental reviews of activities that are given waivers from New York City watershed regulations; and to the extent possible, to develop reservoir basin plans with other communities who share reservoirs basins with them."

Incentives for "Water-Quality Friendly" Businesses

As in Whole Farm Planning, a central premise for the success of Whole Community Planning is the economic health of the water source communities. Whole Community Planning includes an economic program that will mitigate adverse economic impacts of watershed protection and may provide incentives for voluntary participation. For example, communities with eligible water quality protection or pollution prevention plans will receive incentives for businesses that are "water-quality friendly" and fill economic voids in the area.

Additionally, communities that participate in Whole Community Planning will receive waivers for the City regulations, allowing them opportunities to develop and implement equally protective plans of their own. Other incentives could include enterprise zone designation and state tax reduction and credits. New York City will play a large role in comprehensive federal, state, city, and local cost-sharing packages for participating localities.

Wastewater treatment plants are priority items, to be addressed within the first 12 months of a community's participation, while other components of a plan may be developed within 24 months. Whole Community Planning also includes City and local cooperation in septic system maintenance and upgrades, riparian restoration, and educational, and monitoring programs.

"Both Whole Farm and Whole Community Planning are unique partnerships between urban and rural communities to prevent pollution of a high quality water supply serving nine million people," commented the Water Resources Institute's Porter.

Completing New York City's watershed protection agenda are a land acquisition and wetlands program, a monitoring and assessment program, and a regulatory program targeted mostly at "bad actors" and point sources.

Alpern emphasized that intensive research along with trial and error will continue to fine-tune both Whole Farm Planning and Whole Community Planning. "All parts of the watershed program are in evolution," he said, "so, some of the details are subject to change. We'll be learning by doing."

New York City's watershed protection program is one of the largest, boldest, and most comprehensive ever attempted. It entails the cooperation of diverse stakeholders, and recognizes the interplay of regional economy, land use, and water quality. Its execution will not be flawless, nor will its goals be easy to attain, but its essential lessons will set important precedents for carrying out voluntary watershed protection efforts of the future.

Rick Wiedenbach, district manager of the Delaware County Soil and Water Conservation District, had this to say: "In a time when everyone is talking about total quality management, reinventing government, and local empowerment, the rural residents of these watersheds and one of the nation's largest cities are blazing a trail for others to follow."

[For more information, contact: Cindy Malvicini, New York State Water Resources Institute, 116 Wing Hall, Cornell University, Ithaca, NY 14853-8101. FAX: (607) 255-5945. Or contact: Geoff Ryan, NYC Department of Environmental Protection, 59-17 Junction Blvd., Corona, NY 11368. Phone: (718) 595-5342.]

A Cowboy's Viewpoint: Stewardship from the Saddle

by Reeves Brown

EDITOR'S NOTE: Reeves Brown is a cattleman who is a member of the Colorado Cattlemen's Association and a participant in the activities of the Colorado Riparian Association. His observations here were originally prepared for the fall issue of the *green line*, the quarterly newsletter of the Colorado Riparian Association.

The Colorado Cattlemen's Association has been involved in the Colorado Riparian Association (CRA) since its inception five years ago. I think our association's initial interest in becoming involved stemmed as much from concern about what might be done to us if we weren't at the table as it did from what we might be able to do if we were at the table. Most landowners within our organization understood at that time that USFW was a four-letter word—and there was good reason to believe that EPA, SCS, TNC, and BLM were as well!¹ I personally felt that we had to be at the table to cover our own interests, if for no other reason.

However, over the course of the last few years, the CRA has provided a welcome stage for our association, the livestock industry, and private landowners in general to communicate with land management agencies, conservation organizations, and resource academia concerning riparian and watershed resource management.

In my opinion, the key to the CRA's effectiveness has been adherence to the original mission of serving as an information clearinghouse for such matters rather than being a bureaucratic think tank or eco-policeman. Two rules of conduct at each CRA board meeting have helped maintain this integrity: (1) no one points any finger at or places blame for resource damage on anyone else, and (2) all order-in pizza is dutch treat. (The latter rule probably has less significant long-term impact on Colorado's riparian resources than the former, but nonetheless helps preserve the CRA leadership's cohesiveness.)

Ranching and Riparian Management

Livestock operators have an inherent interest in good riparian management for a number of reasons:

- Their livelihood depends on the availability of clean and abundant water.
- Unlike many other users of riparian areas, livestock operators must live with the consequences of today's management practices for many years to come. Most likely,

¹ USFW – United States Fish & Wildlife Service; EPA – Environmental Protection Agency; SCS – Soil Conservation Service; TNC – The Nature Conservancy; BLM – Bureau of Land Management.

their children must as well. (This holds true on both private and public lands for any multigenerational ranching operation. The average Colorado range has been in the same family for 67 years.)

Notice that I didn't say livestock operators were perfect, just that they have an inherent vested interest in good riparian management. It is to their advantage to take the best care of riparian areas possible. Good management not only yields increased short-term profitability, but also pays long-term dividends in the form of improved resource productivity.

I think it's important for the livestock community to recognize that riparian management, like any other form of resource management, is not something to be suspicious of. I think it's equally important for riparian resource managers, both public and private, to recognize that riparian management is not synonymous with fencing off riparian corridors. In my opinion, good riparian management means evaluating the specific needs and characteristics of each riparian and upland watershed, understanding the goals of all parties involved, and incorporating a flexible management policy that works with existing riparian uses to enhance recognized resource values. Dewitt Bydabook, the overzealous, college-graduate resource manager who prescribes a textbook remedy to an individual problem, antagonizes the situation just as much as the 105-year-old rancher, Joe Likehellouwill, who thinks the way great-granddad did it is just fine.

Wildlife Habitat vs. Golf Courses

In the big picture of resource management (riparian, watershed, wildlife, and otherwise), Colorado's livestock producers play a more important role than simply serving as on-site resource stewards. In addition to producing the obvious fruits of basic commodity production, ranching families serve two other functions, more valuable but often overlooked, that help society achieve its landscape goals.

First, livestock producers (and private landowners in general) provide habitat and on-site habitat management. Certainly, some landowners provide better management than others, but they all provide habitat. Because these ranching units require open space, hay meadows, and pasture land, livestock producers and their desire to maintain their families' way of life are often the only things standing between migratory big game routes and 18-hole golf courses in Colorado's valuable, aesthetic mountain valleys.

There are as many different opinions on how private landowners should best manage habitat as there are environmentalists; however, regardless of the quality of the management, the landowner in all cases ultimately provides the habitat. Therefore, the answer to achieving optimum habitat management is not to remove livestock producers from the picture, but rather to help them carry out this management function more effectively and in a way that helps them achieve their goals (both economic and social) as landowners.

For those who would argue that the best livestock operators are no livestock operators, I suggest that someone is going to own these private parcels of critical mountain valley habitat, and if this someone is not a rancher who requires open space for his existence, then it will be the highest bidder for the property. Given the inherent value of Colorado's aesthetic mountain valleys, this highest bidder is not likely to be another fourth-generation rancher. The new owner is more likely to be a real estate developer, land speculator, or urban professional seeking a summer vacation home. In any of these cases, the habitat once managed by the rancher as a by-product of commodity production will now be replaced by smaller 20-acre ranchettes and golf courses, both of which spell habitat fragmentation and disappearance of migratory corridors.

Community Stability

A second, rarely recognized function livestock operators play in our overall landscape goals is maintaining community stability. Most of Colorado's rural communities depend heavily on land-based industries such as agriculture for their base economic activity. Most of these communities do not have a Reebok shoe factory or a business college to help sustain their economy. While the recreation and tourism traffic contributes a solid short-term injection into these economies, such sources are primarily seasonal and do not sustain the longer-term multigenerational aspects of rural communities.

Much of what we value about our western Colorado landscape has more to do with culture than anything else. Without the base economy and spirit of community that ranching families support, rural western Colorado would either be devastated economically or converted to bedroom communities like Vail . . . where the closest thing to culture is found in imported yogurt.

In summary, I believe there's room for improvement in all areas of land management, including within the livestock industry. I also believe that for this improvement to be realized and new ideas to be accepted, we need to recognize and appreciate the traditional values that the current stewards and societies place on these lands. Maintaining sustainable ecosystems means much more than simply increasing ground cover on a riparian streambank; it also means preserving our cultural heritage and maintaining a balance between us and our environment.

[For more information on the Colorado Riparian Association, contact: Karen Hamilton, President, Colorado Riparian Association, 2060 Broadway, Suite 230, Boulder, CO 80302.]

Managing Change — Grazing on Western Riparian Areas

EPA's Denver-based office (Region 8) has produced this new, attractive, informative, instructive report: *Managing Change—Livestock Grazing on Western Riparian Areas*. The report is meant for the use of ranchers and others concerned with the conservation and wise use of western range lands. Its publication is particularly apt at this time when a new administration seeks to introduce new approaches to the preservation, restoration, and environmentally sound use of these lands.

As the report says:

This document is written for the most important people in the growing national effort to enhance water quality on western rangeland watersheds: the men and women who move the livestock.

In 1990, EPA published the original *Livestock Grazing on Western Riparian Areas*, providing a broad view of the functions and values of western riparian areas and causes and effects of degraded riparian areas and water quality.

The current report is a sequel and companion piece to its predecessor. The report indicates:

Together [the reports] are designed to foster broader understanding of how improved grazing management on western riparian areas can enhance water quality and overall productivity of rangeland watersheds.

Roger Dean and Dan Merkel were the EPA Region 8 project officers on the publication. The authors are Ed Chaney, Wayne Elmore and Bill Platts of the Northwest Resource Information Center in Eagle, Idaho.

The document, *Managing Change — Livestock Grazing on Western Riparian Areas*, can be obtained by sending a postcard to one of the following sources:

Western U.S. EPA Regional Offices:

Region 6 (AR, LA, NM, OK, TX)	Brad Lamb, EPA Region 6, 1445 Ross Avenue, Suite 1200, Dallas, TX 75202-2733
Region 7 (IA, KS, MO, NE)	Julie Elfing, EPA Region 7, 726 Minnesota Avenue, Kansas City, KS 66101
Region 8 (CO, MT, ND, SD, UT, WY)	Roger Dean, EPA Region 8, 999 18th Street, Suite 500, Denver, CO 80202-2466
Region 9 (AZ, CA, HI, NV)	Jovita Pajarillo, EPA Region 9, 75 Hawthorne Street, San Francisco, CA 94105
Region 10 (AK, ID, OR, WA)	Don Martin, EPA Idaho Operations Office, 422 West Washington Street, Boise, ID 83702

Other Sources:

EPA Headquarters	Robert Goo, EPA (4503), 401 M Street, SW, Washington, DC 20460
Bureau of Land Management	Don Pritchard, BLM Service Center, P.O. Box 25047, Lakewood, CO 80225
Forest Service	Craig Whittekiend, Forest Service Region 2, P.O. Box 25127, Denver, CO 80225-5127
Soil Conservation Service	Keith Wadman, Soil Conservation Service, P.O. Box 2890, Washington, DC 20013

National Park Service and EPA Region 8 Investigate Effect of Pollutants on Jewel Cave National Monument

This news article appeared in EPA's *Water Monitor*. Thank you, Editor Alice Mayo.

EPA Region 8 has entered into an interagency agreement with the National Park Service to provide technical assistance in evaluating the potential adverse effects of surface contaminants, including heavy metals, nutrients, pesticides, and petroleum hydrocarbons discharging into the Wind Cave National Park and the Jewel Cave National Monument in South Dakota.

The National Park Service has long suspected that surface water flows entering the park and monument may be reaching the interior of the caves and having adverse effects on cave biota and delicate cave formations. EPA Region 8 was asked to design a surface and subsurface water quality monitoring program to evaluate the quality of water within the caves, assess the potential adverse effects that contaminants might be having on cave biota and formations, and identify the contaminant sources.

EPA Region 8 personnel have collected water samples for analysis by the regional laboratory since December 1992 and will continue the investigation for another year. EPA Region 8 has also trained park personnel to collect, handle, and preserve samples using "clean" techniques. Extensive surface water monitoring, including water column chemistry, sediment chemistry, in-stream biological sampling, and toxicity tests, were conducted over the summer. Researchers have tentatively identified forest management practices as affecting water quality within the caves and the surrounding park and monument surface water.

EPA Region 8 and the Park Service are working closely with other land management agencies in the area to develop control strategies to eliminate or reduce the sources of contamination.

[For more information, contact Tom Willingham, EPA Region 8, 999 18th St., Ste. 500, Denver, CO 80202-2405. Phone: (303) 236-5102.]

Report on Twelve Most Urgent National Park Water Issues

Park Waters in Peril, published recently by the National Parks and Conservation Association, examines what it calls "the 12 most pressing problems confronting efforts to protect park waters." The report outlines the organization's recommendations for remedying those problems. The problems are illustrated in case studies of 12 parks:

- Florida's Everglades National Park,
- Virginia's Colonial National Historic Park,
- Maine's Acadia National Park,
- Wisconsin/Minnesota's St. Croix and Lower St. Croix National Scenic Riverway,
- Oklahoma's Chicksaw National Recreation Area,
- Wyoming's Yellowstone National Park,
- Colorado/Utah's Dinosaur National Monument,
- Utah's Zion National Park,
- Arizona's Organ Pipe Cactus National Monument,
- California's Death Valley National Monument,
- Washington's Olympic National Park,
- Alaska's Wrangell-St. Elias National Park and Preserve.

Each case study covers the importance of park waters, threats to park waters, and the obstacles to overcoming the threats.

A limited number of copies of the report are available for \$5 (prepaid) from: NCPA, Attn: Conservation Program, 1776 Massachusetts Ave., NW, Ste. 200, Washington, DC 20036.

USDA Authorizes Cost-Sharing on Riparian Buffer Strips

The USDA Agricultural Stabilization and Conservation Service (ASCS) has authorized a new cost-sharing practice for eligible agricultural lands. The practice, Riparian Buffer Strips, or WP7, removes nutrients, sediment, organic matter, and pesticides from surface and subsurface flow with vegetation planted adjacent to permanent and intermittent streams or waterbodies. The vegetation removes pollutants by deposition, absorption, plant uptake, denitrification, and other processes. It reduces pollution and protects water quality while enhancing the ecosystem.

According to ASCS, land eligible for WP7 must be adjacent to or surrounding permanent or intermittent streams, lakes or ponds, any intermittent or permanently flooded wetland, or sinkholes, Karst areas, and other groundwater recharge areas.

In addition, the adjacent contributing land must be cropland, pasture, hayland, or rangeland.

The practice must meet all requirements of federal, state, and local environmental laws.

According to ASCS, cost-sharing is authorized for WP7 for establishment of vegetation suited for the site conditions; and for fencing and development needed to keep cattle and livestock from grazing the area.

Local SCS offices will provide technical assistance in evaluating sites proposed for such cost-sharing.

[For additional information, contact your local ASCS office.]

News From the States and Localities, Where the Action Is

More Rigid Enforcement in Iowa—The E-Team

by Kathleen M. Deal, Assistant Attorney General, Iowa
[Reprinted from *Iowa Groundwater Quarterly*, Vol. 4 No. 3, September 1993]

Less than a year ago, in the Iowa's first environmental criminal jury trial, twelve men and women returned guilty verdicts on charges of water pollution and unlawful storage and disposal of hazardous waste which were brought against the owner of a metal stripping business in Muscatine.

The verdict marked a milestone in the development of environmental prosecution in Iowa. It sent a clear signal that in certain circumstances, people in the community are willing to hold polluters criminally responsible for their actions.

The sentence imposed by the trial judge also was a hallmark for environmental prosecution. In a packed courtroom on the day of sentencing, the court demonstrated that the judiciary will take seriously the legislative intent in providing criminal sanctions and commensurate fines for environmental violations. Even though the defendant had no prior criminal history, a jail sentence was imposed.

Factors cited by the court for imposing jail time included the defendant's disregard for the safety of others in the community and the seriousness of acts of pollution. The court stated that, unlike a theft in which money is taken from one individual or company, the defendant had taken something from all of us which cannot be given a simple dollar value.

Commitment to Enforce Environmental Law

Both the jury's verdict and the jail sentence were important achievements of the fledgling E-Team, which had filed its first case less than a year earlier. This special prosecution unit was created by Attorney General Bonnie Campbell in a joint effort with the Department of Natural Resources to investigate and prosecute environmental crime.

The E-Team resulted from a commitment to enforce the state's environmental laws vigorously and, in situations where the acts of pollution meet certain criteria, to use criminal prosecution to punish polluters.

One of the crucial challenges in environmental prosecution is to find out about pollution acts in time to gather the amount of evidence necessary for prosecution. Criminal evidentiary standards are higher than those required in administrative or civil actions. In order to meet that challenge, greater awareness was needed on the part of the public, law enforcement, regulatory personnel, and other professionals that environmental crimes exist in Iowa, that they will be investigated and prosecuted, and how to report them.

Several months were devoted to presentations and meetings around the state. More than 60 presentations have been made to local law enforcement and prosecutors, industry groups and associations, lawyers, firefighters, sanitarians, and regulators in an effort to "get the word out." The meetings had two goals: to create awareness of the program and to solicit ideas and tips.

Public Sees Environment as Priority

Another challenge to the prosecution of environmental crime is the attitude that such cases "aren't really criminal." Educational efforts, along with the public's rising concern about the environment, are helpful in addressing this challenge.

A corollary may be seen in the development of domestic abuse law. Not so many years ago, people were unwilling to hold individuals in our society criminally responsible for acts of violence committed upon spouses or partners. But the public outcry following several cases in which women were literally battered to death led to tougher laws and a greater willingness, even a demand, that these perpetrators be regarded as criminals.

Similarly, on the heels of some major environmental disasters, the public began to demand that serious polluters be held criminally responsible for their actions. Earlier, the moral condemnation normally associated with criminal acts was simply not yet apparent with regard to acts of pollution.

Public opinion polls are now showing that the environment is of top concern to the public. Young people are increasingly seeking out careers in environmental areas. This interest is part of the evolving public attitude towards the environment and polluters. Citizens are beginning to consider environmental abusers as criminals, just as they do armed robbers and drug pushers. Although this perception is still in its early stages, it serves to support an impetus for more stringent enforcement of environmental laws and regulations, including criminal prosecution.

The E-Team was formed as these attitudes were changing. The name symbolizes that a team effort is required to successfully investigate and prosecute environmental crime.

Coordinating Scientific and Criminal Investigation

The cases to date have resulted from acts reported by employees, firefighters, law enforcement, and Department of Natural Resources personnel. Teamwork is required in discovering and reporting acts of pollution, and it is essential to the investigation which must "make a case" that meets the higher burden placed on the state in criminal cases. Both the scientific and law enforcement aspects of an investigation are crucial and they must be coordinated.

The scientific or regulatory part of an investigation is normally performed by environmental specialists and others in the Department of Natural Resources. The law enforcement aspect of the investigation is carried out by special agents from the Division of Criminal Investigation, the U.S. Coast Guard, and local law enforcement agencies.

On December 30, 1991, the E-Team filed its first and largest case against a riverboat, the Mississippi Belle II, for the dumping of untreated sewage into the Mississippi River. The company and its boat manager paid fines and penalties totalling \$201,000.

Since then, the E-Team has prosecuted cases resulting in approximately half a million dollars in fines and penalties. Most of the cases involved water pollution charges. They span industries as diverse as river transportation, construction, recreation, printing, stripping, livestock production, manufacturing, and meat processing.

In most of the cases, companies have been charged. In some cases, individual officers or managers have also been charged. The factors considered, on a case-by-case basis, in the decision to personally charge an individual include, but are not limited to, the individual's degree of involvement in the day-to-day activities of the business, the capacity to prevent the acts of pollution, the individual's level of knowledge of negligence, and, generally speaking, the egregiousness of the individual's acts.

Violations which exhibit the appropriate factors are the subject of criminal investigation. As with any other crime, when the investigation is completed, it is reviewed and screened, and a charging decision is made. If it is determined in screening that criminal prosecution is not appropriate, the violations are handled through administrative or civil avenues.

Care was given in the decision to place the unit within the Criminal Justice Bureau of the Attorney General's office, in order to clearly separate civil and criminal functions of environmental enforcement. Generally speaking, violations are first screened for criminal potential before seeking administrative or civil penalties.

Case-by-Case Decisions to Prosecute

In screening whether acts are appropriate for prosecution, there are many factors which are considered on a case-by-case basis. As with traditional crime, deception is one factor. If an individual or business has been dishonest with a regulatory inspector, it may indicate that an attempt is being made to hide a serious act of pollution.

Another important consideration is environmental impact or impact to health and safety. Obviously, it is not always possible to demonstrate environmental impact directly. For example, it may be difficult to prove the immediate and direct impact of a discharge into the Mississippi River, because of the river's great volume of water. Under certain circumstances, expert testimony may be used to demonstrate the effect on water quality and the result of pollution acts. Although it is not necessary to be able to demonstrate such impact, it is one factor which is weighed in the screening process.

Disposal or dumping of materials may be another indicator that an environmental violation is criminal. An accumulation of drums or damaged drums may alert the inspector that further investigation is needed. The egregiousness of the act itself is an important consideration.

The offender's violation history is another factor to be considered. However, the seriousness of a first-time offender's action or failure to act may outweigh the absence of a prior violation history. Of course, other factors, such as evidentiary considerations, which are used in screening and charging traditional crime, also apply to environmental crimes.

Restitution for Fish Kills

In several E-Team cases, restitution has been collected. In traditional criminal cases, the defendants are routinely ordered to pay the victim for financial costs the victim has suffered as a result of the crime. Similarly, in environmental crime, every attempt is made to obtain restitution for the victim. For example, in cases which have resulted in fish kills, the defendant may be ordered to pay the state fisheries fund for the loss and restocking of fish. In a case involving damage to a municipal waste treatment plant, the defendant was ordered to pay the city for the cost of the repairs.

Law-Abiding Businesses Benefit

The response to the E-Team has been, for the most part, extremely positive. A very few have asserted that it may hurt economic development in our state. Clearly, however, it is not in Iowa's best interest to ignore or cater to irresponsible corporate citizens. Undeniably, it is sometimes costly to comply with environmental regulations and to dispose of wastes properly. However, effective prosecution helps eliminate the unfair competitive advantage enjoyed by polluters who ignore their obligation to protect the environment. Viewed in that light, environmental prosecution favors business—specifically, all those businesses who do comply with environmental laws and regulations.

[For further information, contact Kathleen M. Deal, Assistant Attorney General, Department of Justice, Iowa, Des Moines, IA 50319.]

Roads in National Forests are Key Issue in Watershed Restoration

by Michael Furniss

[Reprinted from the Watershed Management Council Newsletter, Fall 1993, Volume 5 No. 3.]

According to the Chinese calendar, we are now in the Year of the Rooster, but for Pacific Northwest forest watershed managers it is the Year of the Fish. The news is all the way out that our anadromous fish stocks are in deep trouble. Recent efforts to resolve the deadlocking environmental conflicts in Pacific Northwest forests have sharpened the concern and provided some preliminary road maps toward solutions. The problems facing anadromous fish stocks are summarized by the four H's: Hydropower, Hatcheries, Harvest, and Habitat. Habitat is where watershed management gets into the picture.

The relationships between watershed processes and habitat for anadromous fishes is dauntingly complex. Yet discerning the most common cause of habitat damage is not; it's the roads. We've known this for a long time—scientific opinion is unanimous here. Yet most of our fish habitat restoration efforts have been focused on the manipulation of habitat elements in-channel, the results of which have often been disappointing.

Why are we avoiding the real problem? Simple I think; in-stream structures for fish are popular and showy, even heroic, while road restoration is unglamorous and unpopular in a country built around the automobile. Proposals to close or remove an open road will almost always meet with objections from people who need or want the option for motorized access. Mostly we've always deferred to the transportation need, only doing restoration on roads already washed out. The prevailing model has been: "We build 'em, God takes 'em out, and restoration gets rolling after the worst has already happened." That won't do.

We've build many thousands of miles of roads. We certainly do not need, nor can we afford to maintain them all. Those we do need and can afford should be configured to be watershed- and fish-friendly. Those we don't should be decommissioned or obliterated. We'll need to build teams of earth scientists, fish biologists and engineers to get on with the job, and be persuasive about the needs and stewardship responsibilities that come with having built roads. Tough job, maybe, but far from impossible. We can secure the habitats needed to recover our anadromous fish stocks. Shall we get on with it?

[For more information, contact Mike Furniss, Six Rivers National Forest, Eureka, CA 95501. Or, leave him a message on the NPS BBS.]

In Maine, Bond Brook Restoration Project Stretches 319 Grant with Volunteers

EDITOR'S NOTE: This story has been adapted from one that originally appeared in the Maine Department of Environmental Protection newsletter: *NONPOINT SOURCE TIMES – Rain, Infiltration and Runoff*.

The Kennebec Soil and Water Conservation District, with water quality specialist Mitchell Michaud leading the charge, is using a 319 Nonpoint Source Pollution Program grant to educate Bond Brook watershed residents and construct several demonstration projects. Michaud extended the effectiveness of the project's funding by seeking substantial landowner contributions, supplemental funding sources, and volunteer labor.

The 20-square mile watershed extends into the towns of Augusta, Manchester and Sidney. Bond Brook has traditionally provided excellent habitat for trout and Atlantic salmon, and the watershed contains the Governor Hill State Fish Hatchery.

While the watershed is predominantly forested, recent development has led to the point where more than a quarter of the watershed is now considered to be in urban-related use. The outlet is in a highly urbanized, low-income area. The middle of the brook runs through an industrial and commercial district, and the upper reaches of the watershed include residential, agricultural, and resource extraction activities. Development has caused large sediment inputs to the stream during storms and thermal effects from urban runoff.

Several demonstration projects using Best Management Practices have been completed or are underway. Several eroding streambank areas were heavily planted using the volunteer labor of members of Trout Unlimited and neighborhood residents. A streambank ripped by a homeowner was interplanted with drought-resistant vegetation that enabled the property owner to avoid problems with a state permit. A severely eroded streambank that was placing septic systems in jeopardy was restored with heavy riprap, and an innovative system of cardboard tubes will allow plant roots to have direct soil contact when interplanting is completed next spring.

A highly visible and badly eroded silty clay embankment located in the urbanized area of the brook's outlet will be rehabilitated as the city of Augusta removes some of the embankment material for use as landfill cover. The project includes excavating the slopes to a stable condition, installing diversion ditches, and hydroseeding a nongrass mixture directly on the new clay slopes for final stabilization.

Public education efforts include a slide show showing the problem areas and the implemented solutions. The local press has reported on the project, and a public display will be in place at the Augusta City Hall. Residents are encouraged to identify additional sources of erosion and participate in the cost-sharing through the duration of the project. Individual contacts have proven to be the most effective way of securing actual demonstration projects or providing technical assistance throughout the watershed.

Although this project has raised the public's awareness of Bond Brook as an important resource and asset to the community, the ultimate success will be the continued implementation of Best

Management Practices throughout the watershed by other landowners with the assistance of Department of Environmental Protection and the Soil and Water Conservation District staff. This is an opportunity to clearly demonstrate water quality improvement through use of nonpoint source BMPs.

[For more information on this project, contact Scott Cowger, DEP Water Bureau, State House Station 17, Augusta, ME 04333. Phone: (207) 287-3901.]

Illinois Extension Publishes

50 Ways Farmers Can Protect Their Groundwater

The University of Illinois Cooperative Extension Service has produced a 189-page book for farmers outlining 50 voluntary practices designed to reduce the risk of groundwater contamination without cutting into crop yields or profitability. Farmers, perhaps more than others, appreciate high quality groundwater. According to *50 Ways Farmers Can Protect Their Groundwater*, nine out of ten rural citizens depend on groundwater for their drinking water supply. Wisconsin farmer Robert Studnicka, profiled in the book along with nine other producers, put it succinctly: "You really care about your groundwater when it's you and your family drinking it, and you have nitrate levels of 15 to 20 parts per million."

The book emphasizes that, in addition to the benefits of protecting groundwater, economic savings can accompany these practices. Many of the practices described in *50 Ways* can boost profits by helping farmers cut back on chemical inputs. Illinois farmer Norm Larson found that he doesn't sacrifice crop yields by cutting his insecticide applications to three-quarter rates. "The University of Illinois research also showed that many fields do not need insecticide treatment at all, even when corn follows corn," Larson said.

Busy producers will appreciate the book's organization. For example, one of the practices the book describes is conserving beneficial insects. Five steps are listed:

1. Recognize the difference between pests and beneficial insects.
2. Minimize insecticide applications.
3. Use selective insecticides and apply them selectively.
4. Maintain the habitat of beneficial insects.
5. Provide pollen, nectar sources, or artificial food.

Below each step is a short explanation, as well as a discussion of the practice's pros and cons. Pictures of beneficial insects and their life cycle stages help the farmer identify them.

50 Ways includes sections on managing pests, chemical application, disposal and storage, septic systems, livestock waste management, chemigation, water testing and treatment, nitrogen fertilization, and wells. Sprinkled in among the how-to sections are profiles of farmers and their down-to-earth experiences integrating the practices into their farm management schemes.

[For a copy of *50 Ways Farmers Can Protect Their Groundwater (C 1324)*, contact the Office of Agricultural Communications and Education, 69EP Mumford Hall, 1301 W. Gregory Drive, Urbana, IL 61801. Phone: (217) 333-2007. FAX: (217) 244-7503. The cost, including postage, is \$5.]

News of the Coastal Nonpoint Pollution Control Program

Threshold Reviews Next Step in the Coastal Nonpoint Program

Now that coastal states have participated in EPA/NOAA sponsored workshops on the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA), they are in full-swing in developing their coastal nonpoint pollution control programs (coastal nonpoint programs, for short). To assist states in this task, EPA and NOAA's program guidance document, *Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance*, outlines a process for early discussions on the basic coastal nonpoint program elements. This process, termed "threshold review," is intended to provide states with early feedback on proposed approaches to their coastal nonpoint programs.

The threshold review process also encourages early public participation and allows for more direct dialogue between EPA and NOAA and the state coastal zone and water quality agencies responsible for program development. It is a voluntary process that affords states an opportunity to present their proposals before they have expended a great deal of effort and resources.

*Threshold Reviews
Next Step in the
Coastal Nonpoint
Program
(continued)*

Several states have already scheduled threshold reviews. Most of the 29 states and territories required to develop a coastal nonpoint program have indicated that they will undertake some form of a threshold review prior to the program submission deadline of July 1995.

During the threshold review process, EPA and NOAA also hope to identify examples of good programs to share with the states. As examples become available, they will be posted on the *NPS Electronic Bulletin Board* in the new Coastal Nonpoint Program Special Interest Group (SIG #8; see page 24 for log-on information).

To support state outreach efforts, EPA and NOAA have produced a brochure on the coastal nonpoint program designed for the general public. Copies of the brochure have been distributed to coastal states. For a copy of the brochure, either contact your state coastal zone or water quality agency or fax a request to NOAA at (301) 713-4367.

[For further information, contact Ann Beier, EPA, at (202) 260-7100 or Peyton Robertson, NOAA, at (301) 713-3098.]

EPA Publishes Forestry NPS Bibliography and State Forestry BMP Summary in Support of CZARA

EPA's Nonpoint Source Control Branch has issued two technical reference documents on forestry and water quality. The first document, *Water Quality Effects and Nonpoint Source Control for Forestry: An Annotated Bibliography*, provides a single source of background information on water quality impacts and literature related to the use of forestry BMPs. The document, which cites over 900 papers, is divided into 10 chapters:

Program and policy reviews	Forestry chemicals
Instream studies on physical, chemical and biological health	Streamside management areas
Road construction	Wetlands
Timber harvest	Modeling
Site preparation	Monitoring

The second document, *Summary of Current State Nonpoint Source Control Practices*, provides a synopsis of the BMPs now used by states to address NPS impacts from forestry. This document, which covers over 41 existing state BMP manuals or regulations that include BMPs, is a reference for the type and nature of state BMPs. State agencies that are evaluating and enhancing their own NPS programs to meet CZARA objectives may find information on additional practices within this document.

The documents were developed in support of the 1993 EPA *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters* (as required under section 6217 of the Coastal Zone Act Reauthorization Amendments [CZARA]). The guidance provides states and territories with management measures for agricultural runoff, urban runoff, silvicultural runoff, marinas and recreational boating, channelization and channel modification, dams, and streambank and shoreline erosion.

[A limited number of copies of the new forestry documents are available by writing to the Nonpoint Source Control Branch (4503), U.S. EPA, 401 M St., SW, Washington, DC 20460.

The two documents will also be posted in the Coastal NPS SIG (SIG #8) on the NPS Electronic Bulletin Board System. See page 24 for information on logging on to the NPS BBS.]

Notes on the Agricultural Environment

TVA Fertilizer Model Site Demonstrations Are Now a National Program For Ag-Chem Dealers

"In our containment and compliance program, we are establishing 20 model site demonstrations across the country to introduce technologies to help fertilizer and agrichemical dealers contain potential pollutants on site," John Culp, of the Tennessee Valley Authority (TVA), told the national audience at the Nutrient Management Conference in St. Louis, Missouri, last April.

*TVA Fertilizer Model
Site Demonstrations
Are Now a National
Program For
Ag-Chem Dealers
(continued)*

The demonstrations provide retail fertilizer and agrichemical dealers from surrounding areas with an actual operating facility where they can see how to install containment systems to prevent runoff pollution from spills and other operations at dealerships. The on-site containment systems also serve to eliminate on-site runoff from entering sanitary or stormwater pipes and thus the system reduces potential point source pollution.

The demonstration sites serve as real-life laboratories for researchers, technologists, educators, and participants. Each model demonstration is open for scheduled visits so that interested dealers and others can see suggested ways to provide containment and prevent pollution from retail facilities.

As concerns about protecting the environment increased in the late 1980s, fertilizer industry officials urged TVA to be more aggressive in showing dealers and others the types of practices needed to comply with more stringent regulations. TVA's National Fertilizer and Environmental Research Center (NFERC) responded by giving a top priority to environment-related research and demonstration programs.

According to TVA, selection of individual demonstration sites is typically made by a group that includes dealers, representatives of state fertilizer and agrichemical trade associations, land-grant university staff, regulatory officials, and TVA staff. TVA provides technical assistance in planning and designing the containment system, based on existing and anticipated rules and regulations applicable in that particular state, at no cost. TVA assists the dealer with educational tours through the facility.

Dealer responsibilities include covering all construction costs associated with bringing the facility into compliance; and opening the facility for visits.

Culp told the nutrient management conference audience that after the construction is complete, an "open house" is held to help the dealer show his customers, business associates, legislators, and regulators that he is a good steward of the environment.

The Willard Agri-Service retail plant in Frederick, Maryland, was described and illustrated at the St. Louis conference. This business was vulnerable to potential pollution that could result from accidents or rinsing operations. It primarily mixes and distributes fluid fertilizers. Concrete dikes were installed around the tank farms, leak detection systems were installed, and material transfer points were contained using a combination of concrete and asphalt. The transport areas in and around the Willard plant were covered with asphalt and sloped into a containment area.

Culp said members of Congress and state regulatory officials visited the Willard plant during the open house to learn how the industry is responding to environmental issues and protection.

Locations of model site demonstration dealerships at this writing are

John Pryor Company, Salinas, California
Western Farmers Service, Santa Maria, California
Agriform Farm Supply, Woodland, California
Ranch Fertilizer, Okeechobee, Florida
Farmers Fertilizer Co., Bowling Green, Kentucky
Shields Soil Service, Dewey, Illinois
Ouachita Fertilizer Company, Monroe, Louisiana
Willard Agri-Service, Inc., Frederick, Maryland
B&W Co-op, Inc., Breckenridge, Michigan
Glasgow Cooperative Association, Fayette, Missouri
TriCo Farm Service, Oxford, Nebraska
Caro Vail, Inc., Niverville, New York
Convoy Equitable Exchange, Convoy, Ohio
Wilbur-Ellis Company, Umatilla, Oregon
Cone Ag Service, Pierre, South Dakota
Alliance Agronomics, Inc., Mechanicsville, Virginia

[For more information, contact: Linda Cournoyer, Mgr. Technology Transfer, (205) 385-3411 or Willie Buchanan, Agricultural Research and Practices, (205) 386-3936, National Fertilizer and Environmental Research Center, Tennessee Valley Authority, P.O. Box 1010, Muscle Shoals, AL 35660.]

Notes on Environmental Education

(and having fun at the same time)

Georgia Teachers Turn Schoolyards into Ecological Laboratories

Georgia educators are teaching a great deal about ecology in general and water ecology in particular. One program is helping teachers learn what to teach about wetlands, and another makes teachers aware of the natural ecology of their own school grounds. A third is teaching Georgia Tech students and teachers about one of the most important river systems in the state, the Chattahoochee.

The Ecology of the Schoolyard

A two-week program at Oxford College, part of Emory University, demonstrates to teachers that ecology can be taught in or near their own schoolyards. "Anybody who has a schoolyard has an ecological system," declares Dr. Eloise Carter, an Oxford College plant ecologist and one of the instructors for the free summer program conducted by the Oxford Institute for Environmental Education at Oxford's field station near the campus.

The teachers' first assignment is to map their schoolyards and nearby natural settings, anything from parks to vacant lots. Later, each teacher will use the map in developing a plan for teaching backyard ecology. The plans are critiqued by Theodosia Wade, a science education specialist at Oxford.

The teachers, who receive recertification credits for the course, conduct field studies and collect samples from such diverse settings as lakes, pristine streams, polluted urban streams, marshes, and swamps. They wade into the water and scoop up netfulls of muck that they sift for aquatic organisms.

Steven Baker, director of Oxford Institute for Environmental Education and one of four instructors for the workshop, said, "The field trips also show how close at hand some excellent ecology labs are. It's not easy to take a whole class to Skidaway Island for nature study, but you can work with the creek that runs behind the schoolyard."

Gregory Taylor, an earth sciences teacher at Marietta High School, says he takes his students to the fringes of a shopping mall to observe the impact of the development. "The young people know about malls; they have fun at malls. So when we study the mall and its environment, they can really relate to something they see in everyday life. They really get into it."

"The lessons gleaned from studying the ecological health of a creek running behind a shopping center can be applied to environmental issues of a much larger scale," said Homer Sharp, an Oxford College biology professor. He observed that the way people treat a small stream is indicative of the way they treat resources in general.

Wetlands Fines Pay for Wetlands Workshops

Thanks to penalty money for wetlands violations, Georgia teachers have an opportunity to learn about both the science of wetlands and how to teach students about wetlands. The two-day workshops cover concepts, methods, and materials for teaching about wetlands, and they include a short field trip. The wetlands information that teachers learn in the workshops can be incorporated into state-mandated grade or course objectives, but teachers select the method of instruction and activities for their own classrooms. Teachers who complete the workshop receive certification renewal credit and a \$50 stipend.

So far, \$18,000 collected in wetlands violations cases has paid for four workshops this past summer, and four more are planned for 1994.

College-Level Course on Chattahoochee River

What may be the only college-level course in the country devoted to an entire river system is being taught at Georgia Institute of Technology by husband-and-wife team, EPA lake management specialist Howard Marshall and Douglas County schools science instructor Gail Marshall. Also involved closely with the course is Georgia Tech biology professor Lloyd Drum.

The Chattahoochee is not Georgia's mightiest river, but it is important to a large number of people in Georgia. It quenches the thirst of more than 2 million people in metropolitan Atlanta and other cities; it hauls away their wastes; it floats their ski boats; it provides power for their homes and factories; and it is home for hundreds of plant and animal species.

Gail Marshall remarked, "We realized long ago that the average Georgian knows almost nothing about the Chattahoochee, despite its importance in their daily lives. We also realized that teachers knew little about the river, and therefore upcoming generations would not know about it, either."

"Perhaps no other major urbanized region in the nation is so dependent on such a moderate-size river, yet we all take it for granted," her husband added.

After toying with the idea of teaching a college-level course about the river system for several years, the Marshalls mentioned it to a dean at West Georgia College in Carrollton. "She was very enthusiastic," said Gail Marshall, "and we began teaching it in 1986 at West Georgia."

Supported by a federal Eisenhower Act education grant, the course was moved to Georgia Tech to accommodate more Atlantans. The Marshalls use no textbook to aid them, but instead employ a variety of books, pamphlets, speakers, videos, and other materials. Students study nautical, topographic and Landsat maps in addition to river data accumulated by EPA, the Corps of Engineers, the U.S. Geological Survey, and the Georgia Department of Natural Resources.

Many students in the six-week course are teachers, who in turn will teach hundreds of students about the river. The river provides a rich medium for teaching students about both scientific and societal issues.

Studying the entire 385 miles of the river from the mountains of northern Georgia to Florida, where it empties into the Gulf of Mexico as the Apalachicola, students begin to understand the ripple effects of environmental impacts. For instance, oyster gatherers in the Apalachicola contend that the hoarding of the Chattahoochee's water upstream for Atlanta means fewer nutrients for the oysters in the bay.

Gail Marshall remarked, "We strive to keep the instruction at the personal level. We want people to understand that when they fertilize their lawns or flush their commodes, they have an impact on the river or its tributaries."

[For more information on the course at Georgia Tech or the Wetlands Workshops, contact Dr. Gail Marshall, 2126 Skyview Drive, Lithia Springs, GA 30057. Phone: (404) 941-5182.]

[For information about the Oxford Institute for Environmental Education, contact Dr. Steven C. Baker, Department of Natural Sciences and Mathematics, Oxford College of Emory University, Oxford, GA 30267. Phone: (404) 727-4390.]

National Geographic Freshwater Initiative

The month of November brought the start of a multiyear program called "The Geography of Fresh Water." The National Geographic Society initiative's goal is to raise public awareness of fresh water as an indispensable resource in need of protection and proper management.

Here are some of the events and projects that the Society is undertaking in partnership with the Conservation Fund:

- A special November *National Geographic* issue focusing on water use, quality, and conservation.
- A November television special on PBS featuring the Colorado River, Great Lakes, Columbia River, and Everglades.
- An EXPLORER TV program on TBS, that aired November 10, addressed water issues.
- A new classroom film for water conservation lessons.
- Water-theme issues of both *World* and *Traveler* magazines.
- A new exhibit on freshwater at the National Geographic Society's Explorers Hall runs October 27, 1993 – May 1, 1994.
- A National Press Club speech by the Society's president, Gilbert Grosvenor, in Washington, DC, on November 9. Grosvenor revealed the results of a national public opinion survey on water.

- A National Geographic Society/National Public Radio special program on water.
- A series of lectures on water themes at Grosvenor Auditorium in Washington, DC, in November.
- "Water Matters" Awareness Week, November 14-20. Packets were mailed to 160,000 teachers, and water-related activities took place in schools and communities across the country.

In addition, with support from the Seaver Institute, the Society has awarded grants totaling \$360,000 for freshwater studies.

The Conservation Fund sponsors the Freshwater Institute, which each year hosts 100 teachers at its Workshops on Water in California and Nevada.

Additionally, the Conservation Fund and the National Geographic Society have joined hands with the U.S. EPA, USDA SCS, and other public, private and nonprofit partners to propose a national forum on nonpoint source pollution. The forum would seek to identify and demonstrate market incentives, voluntary initiatives, and educational opportunities for controlling NPS pollution at the local, state, regional, and national levels. Through the forum, the National Geographic Society will work toward broader public understanding of nonpoint source pollution.

[For more information, contact Barbara Moffet, National Geographic Society, 1600 M Street, NW, Washington, DC 20036. FAX: (202) 828-6679. Or contact Lawrence A. Selzer, Director, The Conservation Fund's Freshwater Institute, P.O. Box 1746, Shepherdstown, WV 25443. Phone: (304) 876-2815; FAX: (304) 876-0739.]

NPS Electronic Bulletin Board News

This portion of *News-Notes* is prepared by Elaine Bloom (Tetra Tech), for the benefit of the ever-increasing numbers of *News-Notes* readers who are regular users of U.S. EPA's *NPS BBS*. Tetra Tech is the contractor for the operation and content of the *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.

Special Interest Group Forums (SIGs or mini-bulletin boards) are dedicated to specific topics and have all of the features of the main *BBS*. Currently, there are eight SIGs on the *NPS BBS*: Watershed Restoration, Agriculture, Fish Consumption Risk Management, TMDLs, Waterbody System Support, NPS Research, Volunteer Monitoring, and Coastal NPS Control.

The articles from all issues of *News-Notes* are stored in an on-line searchable database on the *NPS BBS* and may be retrieved on your personal computer.

The *U.S. EPA Nonpoint Source Information Exchange Computer Bulletin Board System (BBS) User's Manual* (Publication number EPA 503/8-92/002,) may be ordered by mail or FAX from NCEPI, 11029 Kenwood Road, Bldg 5, Cincinnati, OH 45242. FAX # (513) 891-6685. There is no cost. (Be sure to include both the title and the publication number in orders sent to NCEPI.)

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.

Welcome, INTERNET Users!

Since its inception, the *NPS BBS* has had many inquiries from Internet users about gaining access to the *NPS BBS*. Until now, the reply was always a regretful "not yet." Now, thanks to FedWorld, a project set up by the National Technical Information Service, Internet users are connected to more than 100 federal computer bulletin boards, including the *NPS BBS*.

To reach the Fedworld gateway from Internet, enter TELNET FEDWORLD.GOV from your Internet prompt. The IP address for FedWorld is 192.239.92.201. To increase response and decrease screen garbage, Internet users should turn ANSI graphics off by entering U3A from FedWorld's Main Menu and selecting ANSI option "off."

Welcome, INTERNET
Users!
(continued)

To reach the NPS BBS from Fedworld, select the Gateway option from the Main Menu. After entering the Gateway, type "D 79" to reach the NPS BBS (Fedworld lists it as 79:NPS-BBS).

Currently, BBS message functions, bulletins, database Doors, and SIGs are available through this link. File transfer capabilities and Internet E-mail are still under development. Although that means that you can't download files, you *can* use your telecommunication software log or capture function to capture messages, bulletins, and database searches to disk or printer. And of course, you can use the message system to leave messages to other NPS BBS users.

Your feedback on the connection is appreciated. Leave messages on-line to the NPS BBS or FedWorld Sysops. To talk to a real person, call FedWorld's voice help line at (703) 487-4608 or NPS BBS's Elaine Bloom at (202) 260-3665.

We look forward to your participation.

Searchable Watershed Registry For On-line Networking

An on-line searchable database of watershed project professionals is open on the NPS BBS in SIG #5, the Watershed Restoration Network. The Watershed Registry Database furnishes such information as name and contact information, expertise, and details about watershed project activities for the over 150 people who have so far entered data in the Registry.

Hosted by EPA's Watershed Branch and the Watershed Management Council, the Registry provides an electronic meetingplace for watershed project coordinators, managers, engineers, hydrologists, chemists, and biologists as well as educators, planners and administrators. Making contact with other watershed project teams allows you to review the methodology and implementation experience of others and to solve problems without "reinventing the wheel."

The Registry's purpose is to provide all of you with information about other watershed teams and what they are working on. We hope you'll use it to share technological, educational, legislative, and financial problems and solutions.

Registration in the Watershed Registry is ongoing. BBS users enter pertinent information directly into an on-line registration form. In addition, many *News-Notes* readers took the opportunity last spring to register the old-fashioned way—by filling out and mailing in a form that was included as an insert in the newsletter. Currently, all new registrations are being accepted on-line only.

The Watershed Registry On-line Form and the Watershed Registry Searchable Database can be accessed by typing J 5 from the NPS BBS's Main Menu. Users will then see the Watershed Restoration Network Menu. The form and database are located in "Doors" that can be entered by typing OPEN to either input data to the Registry Form (Door 1) or search the Registry Database (Door 2).

In the searchable database, each record in the database is keyworded with terms selected by the participant. A list of the available keywords and some simple instructions can be viewed by selecting [A]bout the Watershed Database.

Reviews and Announcements

Video Short Takes

- Managing Lakes Through Community Participation is a discussion by representatives of several New York lake associations who tell of the experiences they had in forming and managing a community lake association. It contains suggestions that might benefit others who would like to form their own lake association. Twenty-five minutes.

[Available for \$15.00 (including postage and handling). For more information, contact the Federation of Lake Associations, 2175 Ten Eyck Avenue, Cazenovia, New York 13035. Phone: (315) 655-4760.]

- A World in our Backyard: A Wetlands Education and Stewardship Program is two videos in one. The first is background and teaching information for teachers, and the second is a zany but educational short video suitable for middle school students. Twenty-four minutes total.

[Available on loan from Stafford Madison, EPA Region I, Wetland Protection Section, JFK Federal Building, Boston, MA 02203.]

Video Short Takes
(continued)

- Treating the Land, Protecting the Water: The Heber Valley Story tells how government agencies and land owners worked together to solve the phosphorous problem in Deer Creek Reservoir, the major source of water for Salt Lake City. Nine and one-half minutes.
[For more information, contact Harry Judd, Department of Environmental Quality, Division of Water Quality, PO Box 14870, Salt Lake City, Utah 84114. Phone: (801) 538-6146.]
- Get in Tune To Your Lake is a charming thirty-second public service announcement suitable for a TV spot. It is an MTV-style video of visual images of birds and a beautiful lake with accompanying loon calls and saxophone music.
[For more information, contact Celeste Moen, Wisconsin Department of Natural Resources, P.O. Box 7921, Madison, Wisconsin 53707. Phone: (608) 266-8117.]

Essential Handbook for Land Use Decisions

"No matter where you live, someone will decide how the land around you will be used. If you don't participate in deciding, someone else will decide for you," warns the flyer announcing publication of *Common Groundwork: A Practical Guide To Protecting Rural and Urban Land*.

In many parts of northeast Ohio, former farmland is now producing bumper crops of shopping centers, parking lots, condos and subdivisions. Many agricultural land owners are forced to sell their properties because of higher property taxes or other development-related stresses. These changes in land use and their associated urban runoff can cause degradation of streams, wetlands, and lakes. The Western Reserve Resource Conservation & Development area has teamed up with the Lake and Geauga counties' Soil and Water Conservation Districts and the Institute for Environmental Education to develop a tool kit for individuals, developers, and local governments to use in protecting water resources by preserving farmland and open spaces.

Produced with a \$17,000 S. 319 grant, *Common Groundwork* explains 33 land use tools, including examples of each tool and sources for more specific information. Topics include land trusts, conservation easements, agricultural districts, tax incentives, purchase and transfer of development rights, land banking, alternative zoning practices, land protection regulations, and other preservation tools.

Readers from all over the country will find value in the section on tools, which comprises two-thirds of the handbook. The sections on resources and organization of local governments are specific to Ohio, although they will certainly give readers ideas on where to look for help in their own states.

This compact guide joins an indispensable library of practical manuals for landowners, planners, and local governments. Citizens who are active in the government of small, rural communities will find it especially useful.

[To purchase a copy of *Common Groundwork: A Practical Guide to Protecting Rural and Urban Land*, send \$14 plus \$3 shipping and handling to Institute for Environmental Education, 18554 Haskins Rd., Chagrin Falls, OH 44023-1823. To order by phone, or for information on large quantity pricing, call toll-free (800) 484-7949 (then enter 4-digit code 1993).]

New TMDL Case Study Highlights Nutrient Trading

EPA's Watershed Branch has produced the tenth in a series of case studies focused on the Total Maximum Daily Load (TMDL) process and other related activities. This new seven-page document describes a program in North Carolina's Tar-Pamlico Basin in which municipal dischargers paid for the development and implementation of agricultural BMPs to achieve all or part of nutrient reduction goals. The nutrient trading program is proving to be a popular solution in the state because it achieves nutrient reduction goals and addresses nonpoint source pollution while cutting the economic burden to municipal dischargers.

The other case studies in the TMDL series are

1. Denver Metro—South Platte River Segment 15, Colorado. Revision of TMDLs to meet water quality standards. Keywords: urban, point source, nonpoint source, STREAMDO.
2. South Fork of the Salmon River, Idaho. Phased TMDL for clean sediment developed using quantified goals based on a narrative standard. Keywords: silviculture, spawning habitat.

3. West Fork of Clear Creek, Colorado. A seasonal TMDL using narrative standards for certain parameters. Keywords: point source, nonpoint source, toxics, metals.
4. Nomini Creek Watershed, Virginia. Use of GIS and watershed models to identify areas of critical nonpoint pollution. Keywords: Nutrients, sediment, nonpoint source, agriculture.
5. Albermarle/Pamlico Estuary, North Carolina. A nutrient screening approach using GIS to model watersheds within a large multibasin area. Keywords: agriculture, forestry, urban.
6. The Lower Minnesota River, Minnesota. A TMDL undergoing assessment as part of a basinwide river assessment project. Keywords: agriculture, CBOD, ammonia, point source, nonpoint source, QUAL II, RMA-12, HSPF.
7. Sycamore Creek, Michigan. A watershed analysis that links dissolved oxygen problems to sediment loads and establishes NPS load allocations. Keywords: agriculture, sediment, nonpoint source.
8. Boulder Creek, Colorado. Combines habitat restoration and point source and NPS controls to meet water quality standards. Keywords: habitat restoration, BMPs, urban, agricultural, grazing, un-ionized ammonia.
9. Appoquinimink River, Delaware. A phased TMDL for phosphorus on a tidal freshwater river reach. Keywords: SOD, agriculture, urban, phosphorus.

[The case studies can be downloaded from the TMDL Special Interest Group Forum (SIG #6) on the NPS Electronic Bulletin Board System. See page 24 in this issue for log-on information. For hard copies of any of the case studies, contact: Watershed Branch (4503), U.S. EPA, 401 M St., SW, Washington, DC 20460. Or phone: (202) 260-7074.]

Soil, Plant, Animal Waste & Water Analysis Report Still Available

We still have 125 copies left on our shelf of the *Soil, Plant, Animal Waste & Water Analysis Status Report for the United States 1988-1991*, by the USDA Extension Service and Council on Soil Testing and Plant Analysis. They are free for the asking on a first-come, first-serve basis. Write (use **THE COUPON** on page 31): NPS News-Notes (4503), c/o U.S. EPA/AWPD, 401 M Street, SW, Washington, DC 20460. Or FAX: (202) 260-1517. Sorry, we are not equipped to handle telephone orders.

ENTERING THE WATERSHED Is Now in Print and Available

by Hal Wise, Editor

In our review of this book (*News-Notes* #31, August-September 1993) we called it a remarkable and thoughtful document and said "the authors have made a compelling case."

We feel even more strongly today than when we wrote the review about the inherent soundness of the approach taken. Its science is on target—and it sets the stage for timely and meaningful political debate. It is essential reading for policymakers, academics, scientists, land managers and environmentalists involved with river issues, fisheries, endangered species, biodiversity, or river management policies.

Entering The Watershed:

- describes in detail the existing level of damage to rivers and species
- argues for a new, intensified national emphasis on rivers
- analyzes flaws and gaps in existing policy
- outlines the scientific underpinnings and management strategies needed in new policy
- makes specific policy proposals

ENTERING THE
WATERSHED
Is Now in Print
and Available
(continued)

Here are the details of how to get a copy:

Entering The Watershed
Island Press • 510 pages • 1993
Hardcover: \$55.00 ISBN: 1-55963-274-7
Paperback: \$27.50 ISBN: 1-55963-275-5

Send orders to: Island Press, Box 7 • Covelo, CA 95428

For faster service: Call 1-800-828-1302 or FAX 707-983-6414

Shipping and handling costs: \$4.25 for the first book, \$1.00 for each additional copy. California and D.C. residents, add local sales tax. Major credit cards accepted.

An Apology

In our last *News-Notes* issue (#32), we ran a picture of the staff. Alas, we neglected to credit the photographer. The picture was taken by ace photographer Steve Delaney. We appreciate your good work, Steve, and regret it took us so long to thank you.

Storm Drainage Conference Proceedings Available

The proceedings of the September 1993 Sixth International Conference on Urban Storm Drainage held in Niagara Falls, Ontario, Canada have been published. For purchase information, contact Seapoint Publishing, 2880 Seapoint Dr., Victoria, BC V8N 1S8, Canada. FAX: (604) 472-1057.

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

1993

November

- 19 *Wetlands Issues in Resources Development in the Western United States*, Denver, CO. Contact: Rocky Mountain Mineral Law Foundation, 7039 East 18th Ave., Denver, CO 80220. (303) 321-8100.
- 29-12/4 *13th International Symposium of the North American Lake Management Society*, Seattle, WA. Contact: Bob Schroeder, NALMS, PO Box 101294, Denver, CO 80250. (303) 781-8287.
- 30-12/1 *Third Annual Conference on Clean Water Act Reauthorization*, Arlington, VA. Contact: Water Policy Report, PO Box 7167, Ben Franklin Station, Washington, DC 20044. (703) 892-8505. FAX: 685-2606 or call toll-free at 1-800-424-9068. Sponsored by "Inside EPA" and the "Water Policy Report." Conference will cover the reauthorization bills and their meaning, the many lines of regulatory development being pursued by the EPA, the planning and concerns of industry, and the strategies being created by environmental groups. Topics include wetlands, watershed management, the Great Lakes and water-quality standards, combined sewer overflows, stormwater, polluted runoff, and contaminated sediments.

December

- 1-2 *Environment and the Bottom Line: Agriculture in the 90s*, Pierre, SD. Sponsored by the SD Department of the Environment and Natural Resources, Office of Water Resources Management. To inform producers about ways to meet environmental compliance and improve profitability. Contact: Tim Bjork, SD DENR, 523 E. Capitol, Pierre, SD 57501-3181. (605) 773-4216.
- 5-8 *American Water Works Association/Water Environment Federation Joint Residuals Management Conference*, Phoenix, AZ. Contact: Nancy Blatt, Water Environment Federation, 601 Wythe Street, Alexandria, VA 22314-1994. (703) 684-2400.
- 6-8 *EPA Region 7 Second Annual Nonpoint Source Program Workshop*, Kansas City, KS. Contact: Charlie McPherson (703) 385-6000. Opportunity to discuss problems and explore solutions to controlling and preventing NPS. Cost: \$40. Register by November 15.
- 6-8 *Marina and Boating Environment Conference and Trade Show*, Atlanta, GA. Contact: Susan Santoro, International Marina Institute, 35 Steamboat Avenue, Wickford, RI 02852. (401) 294-9558. FAX: 294-1630.

1993

December

- 9 *2nd Annual Fertilizer Research and Education Conference*, Davis, CA. Contact: Jacques Franco, CDFA, 1220 N St., PO Box 94281, Sacramento, CA 94271-0001.
- 11-15 *55th Midwest Fish & Wildlife Conference—New Agendas in Fish and Wildlife Management: Approaching the Next Millennium*, St. Louis, MO. Contact: Wayne Porath, MO Dept. of Conservation, 1110 S. College Avenue, Columbia, MO 65201. (314) 882-9880.
- 13-14 *Integrated Resource Management and Landscape Modification for Environmental Protection*, Chicago, IL. Contact: ASAE, 2950 Niles Road, St. Joseph, MI 49085-9659. (616) 429-0300.

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- 31-2/2 *Second Thematic Conference on Remote Sensing for Marine and Coastal Environments: Needs, Solutions, and Applications*, New Orleans, LA. Contact: ERIM, Marine Management Conference, P.O. Box 134001, Ann Arbor, MI 48113-4001. (313) 994-1200 ext. 3234. FAX: 994-5123.

February

- 1-4 *Human Dimensions in Ecosystem Management (short course)*, Pullman, WA. Contact: WSU Conferences and Institutes, 208 Van Doren Hall, Washington State University, Pullman, WA 99164-5222. (509) 335-3530. FAX: 335-0945. Cost: \$495. Topics may include evolution of ecosystem management as a social/political phenomenon, legal framework, social impacts, institutional barriers, role of collaboration, relationship between ecosystem management and culture (including Native American concerns), and social assessment. "CFE" credit available.
- 15-18 *The International Erosion Control Association 25th Annual Conference and Trade Exposition*, Reno, NV. Contact: IECA, PO Box 4904, Lincoln Avenue, Suite 103B, Steamboat Springs, CO 80477-4904. (303) 879-3010. FAX: 879-8563.
- 16-19 *Breakthroughs in Karst Geomicrobiology and Redox Geochemistry*, Colorado Springs, CO. Contact: Dr. David Culver (202) 885-2194. Registration: \$125. Sponsored by Karst Waters Institute in cooperation with the University of Colorado.
- 18 *Colorado Governor's Agricultural Outlook Forum*, Denver, CO. Contact: Colorado Department of Agriculture, 700 Kipling St., Lakewood, CO 80215. (303) 239-4100. FAX: 239-4125. One session led by the president of American Farmland Trust is devoted to Farm Bill economics and the environment. Cost: \$80.
- 27-3/2 *American Water Works Association/Water Environment Federation Water Reuse Symposium*, Dallas, TX. Contact: Nancy Blatt, Water Environment Federation, 601 Wythe Street, Alexandria, VA 22314-1994. (703) 684-2400.
- 28-3/4 *Stormwater Management Modeling*, Toronto, Ontario. Contact: Evelyn James, CHI, 36 Stuart St., Guelph, ON, Canada, N1E 4S5. (519) 767-0197. FAX: 767-2770. Three hands-on workshops on the SWMM model and a two-day conference. Conference is sponsored by the ASCE Water Resources Council, U.S. EPA, Ontario Ministry of Environment and Energy; the workshops are sponsored by CHI.

March

- 1 *Remediating Hazardous Waste and Groundwater Contamination Sites: New Approaches*, Miami, FL. Contact: Libby Strickland, Water Environment Federation, 601 Wythe Street, Alexandria, VA 22314-1994. (703) 684-2400. FAX: 684-2475.
- 3-5 *NALMS 3rd Annual Southeastern Lakes Management Conference—Watershed Management: From Concept to Implementation*, Columbia, SC. Contact: Kathy Stecker, Water Quality Monitoring, SCDHEC, 2600 Bull Street, Columbia, SC 29201. (803) 734-5402. FAX: 734-5216. Topics: regional issues, developing watershed management strategies, reservoir interactions, education, lake studies and assessment, conflict resolution, building coalitions. Organized by the North American Lake Management Society. Cosponsored by EPA, Tennessee Valley Authority, and Duke Power Company.
- 6-9 *Innovative Solutions for Contaminated Site Management*, Miami, FL. Contact: Nancy Blatt, Water Environment Federation, 601 Wythe Street, Alexandria, VA 22314-1994. (703) 684-2400.
- 7-10 *National Pesticides Management Conference*, St. Louis, MO. Contact: Lynn Kirschner, CTIC, 1220 Potter Dr., West Lafayette, IN 47906. (317) 494-9555. FAX: 494-5969. Sponsored by the Conservation Technology Information Center.
- 7-11 *The Role and Meaning of Economics in Resource and Ecosystem Management Decisions (short course)*, Pullman, WA. Contact: WSU Conferences and Institutes, 208 Van Doren Hall, Washington State University, Pullman, WA 99164-5222. (509) 335-3530. FAX: 335-0945. Cost: \$595. Topics include economic and ecological approaches to sustainable resource management, resolving public and private legal and economic interests and objectives, methods for predicting economic cost of saving resources and ecosystems such as salmon habitat, and assessing tradeoff choices. "CFE" credit available.
- 14-18 *Water Quality and Aquatic Ecosystems (short course)*, Pullman, WA. Contact: WSU Conferences and Institutes, 208 Van Doren Hall, Washington State University, Pullman, WA 99164-5222. (509) 335-3530. FAX: 335-0945.

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Cost: \$895. Includes overview of physical, chemical, and biological aspects of aquatic ecosystems; hydrological cycle; watershed and stream interactions; eutrophication; effects of point and nonpoint source pollutants; geomorphic alterations; fish habitat impacts; field study; laboratory processing; and land management. "CFE" credit available.

- 27-30 *Second International Conference on Groundwater Ecology*, Atlanta, GA. Contact: John Simons, General Chairperson, EPA, Ground Water Protection Div., (4602), 401 M St., SW, Washington, DC 20460. (202) 260-7091.

April

- 10-13 *Toxic Substances and the Hydrologic Sciences*, Austin, TX. Contact: AIH, 3416 University Ave., SE, Minneapolis, MN 55414-3328. (612) 379-1030. FAX: 379-0169. Sponsored by the American Institute of Hydrology. Topics include USGS's Toxic Substances and Hydrology Program, estuarine hydrodynamics and water quality, field methods in contaminated hydrogeology, aquifer remediation in the presence of NAPLs, toxic substances in surface waters, the hydrology of the 1993 Mississippi Flood, watershed hydrology, hydrogeology of low-level radioactive waste management, and the Edwards Aquifer of central Texas.
- 17-20 *Responses to Changing Multiple-Use Demands: New Directions for Resources Planning and Management*, Nashville, TN. Contact: Ralph H. Brooks, General Chairperson, Tennessee Valley Authority, Water Management, Evans Bldg., Rm. 1W 141, Knoxville, TN 37902. (615) 632-6770. American Water Resources Association Annual Spring Symposium. Topics will include water use trends, water resources forecasting, hydrologic modeling, GIS tools, water pricing policies, water allocation, water law, BMPs, environmental impact mitigation, reservoirs, and hydropower licensing.
- 17-20 *The Coast: Organizing for the Future*, Charleston, SC. Contact: Leigh Handal, S.C. Sea Grant Consortium, 287 Meeting Street, Charleston, SC 29401. Sponsored by the Coastal Society. Topics include management, policy, and legal issues; wetlands and estuarine governance; science and technology issues; pollution and environmental mitigation; status and trends of coastal resources; recreation; marine education; habitat issues; erosion; and fisheries management.
- 20-22 *Second Environmentally Sound Agriculture Conference*, Orlando, FL. Contact: Wendy Graham, University of Florida, PO Box 110570, Gainesville, FL 32611-0570. (904) 392-9113. FAX: 392-4092. E-Mail: graham@agen.ufl.edu. Sponsored by the Institute of Food and Agricultural Sciences at the University of Florida. Topics: surface and ground water management, wildlife and habitat preservation, air pollution, and the urban/agriculture relationship.
- 25-29 *The International Land Reclamation and Mine Drainage Conference and the 3rd International Conference on Abatement of Acidic Drainage*, Pittsburgh, PA. Contact: Debbie Lowanse/Bob Kleinmann, U.S. Bureau of Mines, PO Box 18070, Pittsburgh, PA 15236. (412) 892-6708. FAX: 892-4067. Co-hosted by U.S. Bureau of Mines, the Office of Surface Mining, U.S. EPA, and Tennessee Valley Authority. Topics include acid mine drainage prediction, chemical and biological treatment of AMD, geotechnical engineering in mined areas, mine closure/bond release, mine chemistry, mine hydrology and groundwater protection, mine soil productivity, mine subsidence, mine waste management and characterization, regulations and policy issues, reclamation of derelict/abandoned mined lands, revegetation case studies, slope stability/erosion control, wetlands on mined lands, and wildlife/habitat restoration.

Calls For Papers — Deadlines

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- 10 *Water Environment Federation's 67th Annual Conference and Exposition*, Chicago, IL, October 16-20, 1994. Contact: Maureen Novotne, Water Environment Federation, 601 Wythe Street, Alexandria, VA 22314-1994. (703) 684-2400. Abstracts due by January 10, 1994. Topic is surface water quality and ecology. Sessions will include "Coastal Water Quality Issues," "Environmental Monitoring & Assessment," "Sediment Quality Criteria Issues," and "Watershed Management in the Great Lakes."
- 21 *Stormwater Management and Modeling*, Toronto, Ontario. Contact: Evelyn James, CHI, 36 Stuart St., Guelph, ON, Canada, N1E 4S5, February 28 – March 4, 1994. (519) 767-0197. FAX: 767-2770. Abstracts and requests for displays due January 21, 1994. Three hands-on workshops on the SWMM model and a two-day conference. Conference is sponsored by the ASCE Water Resources Council, U.S. EPA, Ontario Ministry of Environment and Energy; the workshops are sponsored by CHI.

February

- 11 *Animal Wastes and the Land-Water Interface*, Fayetteville, AR, July 16-19, 1995. Contact: Patti Snodgrass, Arkansas Water Resources Center, 113 OH, University of Arkansas, Fayetteville, AR 72701. (501) 575-4403. Abstracts due February 11, 1994.

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

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