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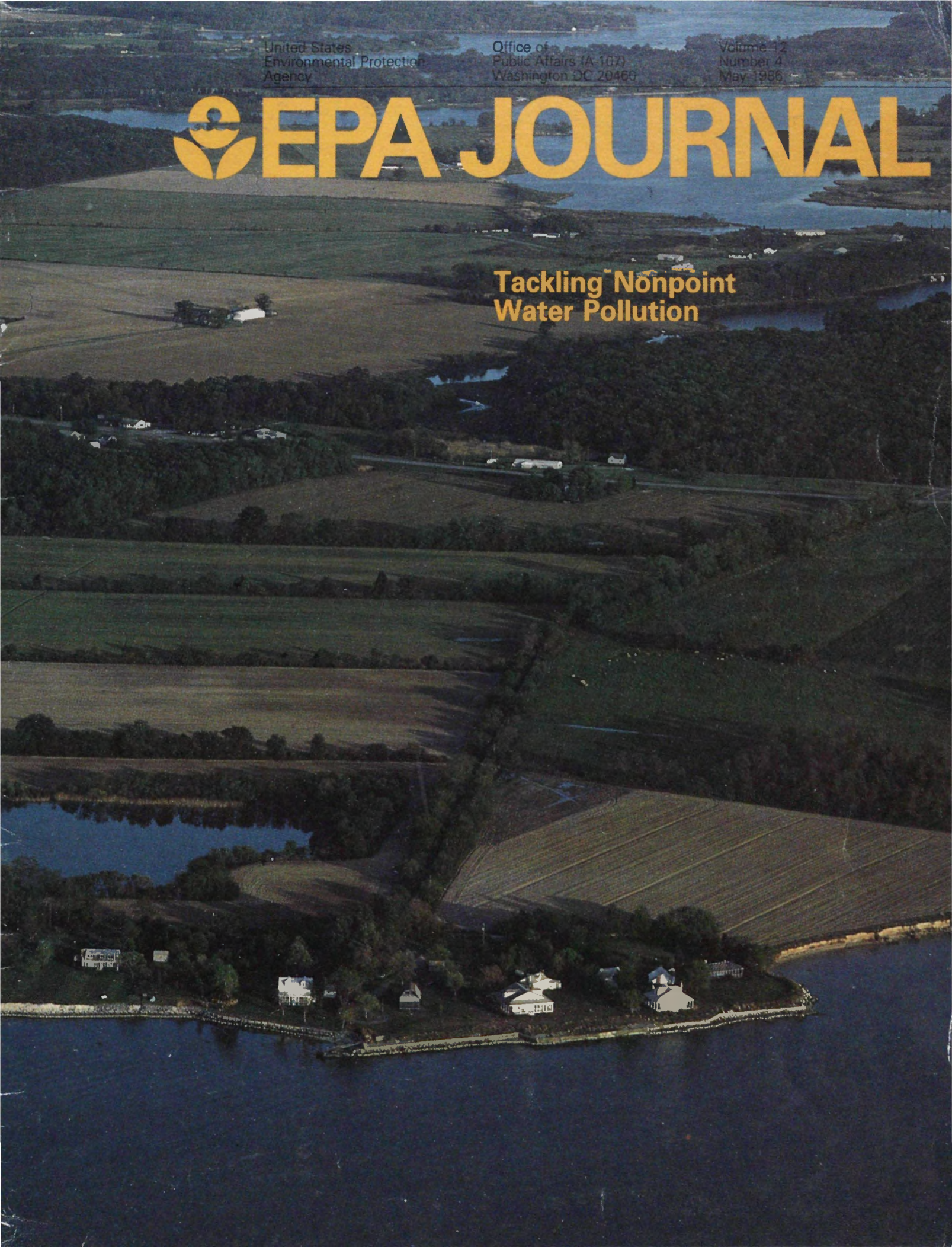
Tackling Nonpoint Water Pollution



USDA Soil Conservation Service

Conservation tillage to reduce soil disturbance and runoff in Carroll County, MD. Using a method called "double cropping", farmers can simultaneously plant a new crop as the old one is harvested.

Tackling Nonpoint Water Pollution

It was once widely believed that we could achieve clean water by stopping the pollution coming out of the pipes of waste dischargers. Today we know that successful water cleanup must also deal with so-called "nonpoint" sources, which range from soil erosion to runoff from city streets. This issue of the *EPA Journal* examines nonpoint source water pollution.

Leading off the issue, EPA Administrator Lee M. Thomas discusses what it will take to control nonpoint source pollution. The Agency's Assistant Administrator for Water, Lawrence J. Jensen, describes nonpoint source pollution and the essential role of individuals in cleaning it up.

Some efforts are already under way around the country to control nonpoint runoff. One feature reports on Wisconsin's experience with a special control program; another describes an innovative approach to handling urban nonpoint sources in Bellevue, WA. Also featured is an article about the establishment of a buffer zone to diminish the flow of runoff pollutants into Chesapeake Bay, and a report on a mobile laboratory being used in Pennsylvania to help farmers use fertilizer more selectively and thus curb pollution.

Payoffs from efforts to save inland lakes from pollution runoff are described in an article focusing on lake cleanup in the Midwest. Pollution in Kesterson Wildlife Refuge in California is discussed as an example of severe nonpoint source problems. The dramatic reduction of nonpoint source pollution in a Utah reservoir that supplies drinking water and provides recreation is described.

Major new incentives in the 1985 U.S. farm law which could lead to a big reduction in nonpoint pollution from farms are explained and another report profiles a demonstration project aimed at tracing agricultural runoff as it affects ground water in the Big Spring Basin in Iowa.

In a *Journal* forum, eight experts offer their views on a widely debated question: What level of government should be responsible for the cleanup of nonpoint source pollution?

Concluding the issue are two regular features—Update and Appointments. □

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Front cover: Aerial view of the Chesapeake Bay area. Photo by Cameron Davidson, Folio, Inc.

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Why Worry About Nonpoint Pollution?

by Lee M. Thomas

Over the past decade we have established, at great cost, an efficient system to control industrial liquid waste and municipal sewage. We have revived many lakes and streams that had seemed beyond resuscitation. Since 1972, of 354,000 stream miles on which we have information, some 13 percent have improved, about three percent have declined, and the rest have stayed the same.

So it seems we are holding the line against water pollution. Considering the rise of economic activity and population during the interim, this is an impressive accomplishment. But it is not good enough. We've lost some momentum and accomplished less than we set out to do. The Clean Water Act doesn't tell us to just hold the line. It requires us to make the nation's waters literally fishable and swimmable.

Nonpoint pollution is the direct result of our past land-use habits.

Much of the reason for our failure to reach this goal is that we have not controlled nonpoint source pollution. Six out of ten EPA regions say that nonpoint sources are the main cause of poor water quality. And there is increasing evidence that nonpoint source pollution is a threat to ground water.

It is hard to single out specific nonpoint polluters because they are spread all over the landscape: farmers, developers, all of us. Nonpoint pollution is the direct result of our past land-use habits, so a solution will only emerge through more efficient and rational means of land management.

EPA intends to do all it can to help federal agencies address nonpoint problems on lands under their jurisdiction. However, direct federal regulation has never been a major factor in local land-use decisions. Indeed, any attempt at control from Washington would be an administrative nightmare. And the financial resources would be impossible to come by under current conditions.

Fortunately, the nonpoint problem is being recognized in many different parts of the nation, both by state and local governments and the private sector.

Wisconsin has an innovative cost-sharing program to ensure water quality in selected watersheds through the control of both urban and rural nonpoint sources. Vermont helped set up a system of self-policing by the lumber industry, with heavy emphasis on technical assistance, education, and continuous monitoring of industry practices. Bellevue, WA, is controlling runoff in developing areas.

In Oregon, grassroots collaboration by oystermen and dairy operators has introduced best management practices (BMPs) at over half of the Tillamook Bay area's dairies. Shellfish bed closures are much less frequent and coliform counts in streams draining into the bay have dropped significantly.

I could mention dozens of similar cases, but I'd like to see thousands more like them. We're trying to do our part. EPA's Nationwide Urban Runoff Program has helped 26 metropolitan areas to control nonpoint sources with new, creative measures. We are cooperating with the Department of Agriculture to implement the Rural Clean Water Program, installing BMPs in 20 pilot watersheds across the country. We are supporting nonpoint source demonstration projects in the basins of the Great Lakes and Chesapeake Bay.

In addition, EPA formed an interagency task force that recommended a new national policy on nonpoint pollution in December 1984 to protect surface- and ground-water resources. Each federal agency on the task force developed its own nonpoint strategy, and those strategies are now gradually being implemented.

Coordination and re-orientation of existing resources are essential if we are to have any chance at all of coping with this problem. About $10 billion was spent on resource and environmental protection during the last fiscal year by the Corps of Engineers, the Soil Conservation Service, the Forest Service, the Bureau of Land Management, and other federal agencies. Surely we can refocus these resources to help control nonpoint pollution: the potential leverage is incalculable. States and localities should certainly insist that federal agencies accelerate their efforts. EPA will heartily support such state and local nonpoint initiatives.

Nonpoint control demands the courage to persist and not just throw up our hands because the job is so immense.

I am cautiously optimistic at this point. The water protection professions are becoming more adaptable and imaginative, and we anticipate many more interdisciplinary efforts like our Chesapeake Bay project targeted to a variety of point and nonpoint problems on various scales from neighborhoods to whole regions.

We expect substantial continuing evolution at EPA, too. For the past decade we have concentrated on major engineering programs to control sewage and industrial pollution. Now the challenge is in devising better means of public education, technical assistance, and social innovation to address multidimensional problems. We confront a diffuse, problematical task of mobilizing institutional resources and community commitment. Nonpoint control demands political or organizational savvy of a very high order, plus the courage to persist and not just throw up our hands because the job is so immense.

Looking at how far we have come already, I know we're going to hang in there until we reach our goal. Environmental protection is never easy. But by the year 2000, in EPA's 30th year, I trust we will be looking back with great satisfaction on a job well done. □

(Thomas is Administrator of EPA.)

How People Matter in Nonpoint Cleanup

by Lawrence J. Jensen

USDA Soil Conservation Service

Lack of proper grading and stabilizing measures led to constant erosion and sediment deposits in this subdivision. Runoff from such everyday activities as construction and land development can be a major source of nonpoint pollution, and controlling it will require communities to make wise land-use decisions.

Recently, I had the opportunity to tour the area around Heber City, Utah. Heber City is nestled in a verdant valley in the Wasatch Range at one end of Provo Canyon. The Provo River rushes through the valley, supplying this picturesque farming town with the water required to keep the valley green and productive. Dairy farming is also a major activity here—Heber Valley dairy products are famous throughout the intermountain West—and several dairies are located directly on the many streams that carry runoff from the nearby mountains into the Provo River.

After the Provo River completes its run through the Heber Valley, it empties into Deer Creek Reservoir. Waters stored here supply upwards of 30 percent of the drinking water required by 7,000,000 plus residents living 40 miles away in the arid Salt Lake Valley. In addition, the waters of Deer Creek Reservoir provide endless hours of recreation and enjoyment to numerous residents and visitors.

Because water is central to so many human activities, multiple use of this resource, such as occurs in Heber, is not unusual. In places like this, it is important that "upstream" users manage the resource properly so that "downstream" uses are protected.

As in countless areas throughout the country, the Heber Valley society and economy could not thrive without a plentiful supply of water, and Salt Lake would face a serious water deficit without the reservoir. However, the beauty and abundance of the setting obscure the fact that this scenic and vital water resource had been threatened. As rain and irrigation water washed over the fields, they were not only bringing vitality to crops but also carrying into the ground water and into surface streams and rivers fertilizers, pesticides, and herbicides. Streams coursing gently through dairy lots, were not only providing sustenance to cows, but also carrying away alarming quantities of nitrates. These pollutants eventually were ending up in the reservoir and had become serious cause for concern to both Heber City and Salt

(Jensen is EPA's Assistant Administrator for Water.)

Lake water-quality officials, although efforts are under way to solve the problem and are meeting with success (see story on page 15).

By describing water use in a rural setting like Heber, I do not mean to suggest that pollution resulting from productive, diverse, everyday human activity is only a rural or agricultural problem. Road grime, cleansed from city streets by showers and snows, consists of all sorts of noxious pollutants and is but one example of waterborne, water-threatening pollution that results from everyday living in the city.

The similarity, then, between the urban and rural versions of this pollution is that they both result from everyday human activity. And they are introduced into our environment from diverse and diffuse sources. No matter where it occurs, pollution such as I have described is characterized by the fact that it does not emanate from specific pipes or other identifiable point sources. For this reason, it has collectively come to be known euphemistically as "nonpoint source" pollution.

Even though 45 states have identified nonpoint sources of pollution as creating water quality problems in their states, actual nonpoint polluters in each of these states are, in most cases, individuals going about their business in routine, day-to-day fashions. Control of this pollution requires regulators at every level of government to answer the question: "How can we entice these individuals to manage their activities and their everyday lives in such a way that nonpoint pollution is abated?"

There is no doubt that controlling nonpoint pollution will require resolve by individuals in individual settings. Nevertheless, EPA has done much toward increasing awareness and providing assistance whenever and wherever it can. One area in which EPA has been active is federal facilities management. The federal government controls millions of acres of land in both rural and urban settings. This provides a steward accountable for activities that take place on these lands. I feel strongly that federal facilities should fulfill their stewardships in exemplary fashion. Only as this is done will nonpoint pollution from these facilities be controlled.

The similarity, then, between the urban and rural versions of this pollution is that they both result from everyday human activity.

In that regard, in March of 1984 EPA convened a federal/state/local Nonpoint Source Task Force which issued its final report last January. Already, there has been significant progress. Here are some examples:

- The Secretary of Defense and the Administrator of EPA signed a joint resolution promising cooperation between the two agencies in abating pollution in the Chesapeake Bay area. Over 60 military installations covering approximately 400,000 acres in Virginia, Maryland, Pennsylvania and the District of Columbia are affected by the resolution. Benefits of this agreement are just beginning to be realized as the bay makes its comeback.

- The Army Corps of Engineers is currently reviewing the training materials used in over 200 courses to assure that they incorporate materials related to nonpoint source pollution. The Corps hopes to play a leadership role in designs for nonpoint pollution control through its civil construction activities.

- The U.S. Forest Service is working with individual states to ensure program coordination between Forest Service activities and state water quality programs.

- An assessment of the 201 counties in the Tennessee Valley Authority (TVA) region found that in 80 of these counties water quality was reduced due to agricultural activities. TVA also cited 65,000 acres of abandoned coal and non-coal mine lands as probable sources of nonpoint pollution. Authorities are now focusing on the worst offenders.

Several states have shown that they are willing to take on the challenge of nonpoint pollution control. Sixteen states and the Discrict of Columbia have regulatory programs to address construction site runoff, and all coal mining states have regulatory programs under the Surface Mining Control and Reclamation Act. Urban runoff, filled with exhaust residues, oils, salts, and many other noxious substances, is being controlled through local regulations in several states.

I have stressed that individuals can make a difference, and I want to conclude by reiterating this point. State, local, and federal authorities can place some restrictions and controls on large and blatant offenders such as construction sites and airports. But, ultimately, the control of nonpoint source pollution will require individuals to make wise decisions in their everyday lives.

Whether in rural settings or in dense urban centers, our decisions to control the fumigation and fertilization of our lawns, our decisions to conserve water around the house, our decisions to use environmentally safe detergents when we wash our cars and clothes, our decisions to fix the oil leaks in our cars, in short, our decisions whether or not to properly manage our activities and land uses will ultimately determine the extent to which nonpoint pollution will be controlled.

Water is one of the most basic building blocks of our civilization and culture. But it can also transport almost any pollutant introduced into it. For a long time, we ignored this and polluted our waters almost mercilessly. We have made great strides in reversing that trend and are heading toward restoring our waters to "fishability," "swimmability," and "drinkability." Unless we turn our energies and convictions toward controlling the nonpoint pollution that is a natural byproduct of our daily activities, we may jeopardize that progress. □

Wisconsin Rallies Against Runoff Pollution

by Jeff Smoller

In the late 1960s, western Wisconsin fishermen in the know had the lowdown on Vance Creek: it might be rated as a class one trout stream but it definitely was not the place to go for first class action. Vance Creek was the victim of nonpoint source pollution.

A survey by the Wisconsin Department of Natural Resources summarized the causes: seven significant livestock operations, six miles of eroding streambank, more than 200 acres of stream-bordering cropland losing more than four tons of soil an acre per year. No wonder brown and brook trout populations were in trouble.

In 1978, the Wisconsin Legislature found its efforts to fund and enforce ugraded point source pollution abatement were attacking only half the problem. In fact, urban interests that were making their own wastewater treatment systems improvements felt it was time their rural cousins joined the fight for clean water. With strong support from professional, urban, and business interests, the Wisconsin Fund Nonpoint Source Pollution Abatement Program was created. Eight years later it is recognized as one of the country's more successful and creative nonpoint source efforts.

The Wisconsin program is built on the extensive survey, planning, and coordinating work initiated under Section 208 of the federal Clean Water Act. It provides significant amounts of state dollars to help private landowners install the land management practices needed to reduce runoff.

The program relies on interagency cooperation and citizen involvement to overcome some of the psychological and institutional barriers that have long plagued nonpoint programs. For example, while there are clear criteria for selecting which watersheds merit "priority" status, the specific recommendations that trigger funding come not from "on high" but from representative regional and statewide advisory groups.

Projects are implemented locally, not at the state level. Municipalities and land conservation committees, acting on behalf of their county boards, administer and carry out the projects. Responsibility is divided among local, state, and federal interests. Financial resources and credit are shared.

"If you're looking for a neat and clean package with centralized control, you'd better look elsewhere," explained state nonpoint coordinator John Konrad. "But if you want to see a working program in which local people have ownership, we think we have something good."

That "something good" has already given Wisconsin a return on its investment though the nonpoint program is less than 10 years old.

Soil loss on the targeted cropland acres has been halved.

Since 1979, the program has identified 29 priority watersheds where planning has begun or actual on-land improvements are in place. They are clustered in a region that stretches from Green Bay on the northeast, to the Illinois state line on the south, to the St. Croix River on the west.

Although this region contains 130 watersheds where erosion and contaminant runoff threaten water resources, "we realized early on that we needed to target our attention," Konrad continued. "We couldn't shotgun it. There simply wasn't enough money or enough time to do everything for everybody."

Konrad emphasized that, while much of the initial attention was focused on the rural nonpoint problems, urban and suburban efforts are under way as well.

In the Milwaukee area, for example, the Department of Natural Resources (DNR) is spearheading a cleanup that local officials hope will mesh with a multi-million dollar point source program. The ultimate payoff will be a further revitalized downtown tied to the city's river system and fabulous lakefront.

In the Madison area, a critical watershed to the west of the capital city's largest and most treasured lake—Lake Mendota—has made the cleanup list.

Important new breakthroughs also are being tested. In the famous Door County vacation region, nonpoint land management practices will be tied to a ground-water protection scheme required because of the area's thin soil layer on top of fractured bedrock.

While the state and local team has a long list of management practices eligible for cost-sharing, only those practices that are best suited for local conditions are selected. So the Wisconsin program avoids past pitfalls that sometimes resulted in land managers using conservation aids to promote production goals, not conservation.

"While Wisconsin has made a significant dollar commitment to nonpoint pollution control," Konrad said, "we want to make every dollar count for as much as it can. So we work hard to target and tailor the practices to meet local conditions."

In the Vance Creek case, for example, 90 percent of the livestock units determined to be a source of the pollution problem are now under cost-share agreements funding waste control measures. Some 68 percent of the most erodible streambank has been or is being fenced. Soil loss on the targeted cropland acres has been halved.

The resulting improvement in the Vance Creek water quality has been significant.

The number of brown trout identified during a DNR stream stocking survey increased by 40 percent in two years. For brook trout, the increase was even more dramatic: a 250 percent increase in fingerlings and a 900 percent increase in adults.

The fish manager's report in 1983 said the Vance Creek gain represented "a good trout fishery in terms of both number and size." And, although "there could be many reasons for this change, such as natural fluctuations, there is a visible improvement in fish habitat and it is very likely that some of the improvement is because of the fencing"

The Vance Creek story, like the rest of Wisconsin's nonpoint story, is still incomplete, however. Some individuals within the watershed are still not participating, and local persuasiveness will have to be called upon again.

This time, Konrad muses, perhaps the delighted local trout anglers can help provide new, even more persuasive arguments to bring the remaining non-participants into the Vance Creek cleanup effort. □

(Smoller is Director of the Bureau of Information in the Wisconsin Department of Natural Resources.)

Nonpoint Pollution: It's Urban, Too

by Pam Bissonnette

Gas and electric, sewer and water—utilities to most people are simply the grungy and expensive underpinnings of modern life. But in Bellevue, WA, our utilities have gone beyond meters and pipes to include streams, lakes, and wetlands. Thanks to our unique urban storm water program, Bellevue citizens may be the only city dwellers in the country who can take the day off to fish in the drainage system.

The Bellevue Storm and Surface Water (SSW) Utility was established in 1974 because of citizen concern that we were losing our cherished network of city streams and lakes. Its mission was to manage storm and surface water to protect water quality, prevent property damage, preserve and enhance wildlife habitat, and provide for the health, safety, and enjoyment of citizens. This was no small task, but we think we're succeeding. Not only have there been no fish kills for the last couple of years, but salmon are once more running in our city streams.

Bellevue is a relatively young city. That means we don't have the problem of combined storm/sewer systems. What we *do* have is a lot of land development—which means buildings, parking lots, and roads. These impervious surfaces cannot absorb precipitation. Instead, rainfall rushes into receiving waters during storms, causing flooding and erosion. And because it isn't filtered slowly through the soil, the runoff also carries pollutants picked up from the surface over which it travels and from rainfall in the atmosphere. The result is clogged, polluted waterways.

(Bissonnette is Director of the Storm and Surface Water Utility in Bellevue, WA.)

Bellevue's Storm and Surface Water Utility was created to address these problems. Essentially a regulated drainage system, it consists of an integrated network of pipes and stream channels to carry the runoff, and a series of lakes, wetlands, ponds, and detention basins to store it. Our basic concept is to use the natural surface water drainage system to carry and dispose of runoff without degrading the natural habitat.

In Bellevue, WA, our utilities have gone beyond meters and pipes to include streams, lakes, and wetlands.

Just like conventional utilities, the SSW is financed through service charges and bond issues, and its rates and budgets are reviewed by an advisory commission to the city council. Unlike other utilities, however, our SSW is heavily involved in land-use planning issues, particularly for sensitive corridors.

SSW's major source of revenue is a utility service charge, based on an assessment of each property's contribution of runoff to the drainage system; where controls have been established on a property, commensurate rate reductions are granted. All properties, including undeveloped and publicly owned property, participate in the service charges.

During its first five years, the SSW focused almost exclusively on erosion control and runoff volume and velocity. In the course of developing our programs, however, we realized that we needed more and better data on regional weather and land forms and on storm runoff quality controls. When EPA's National Urban Runoff Program (NURP) began in 1979, Bellevue asked to join the study.

Bellevue was one of 27 cities nationwide that participated in NURP. For six years, we monitored runoff for sources of contamination and effects on receiving waters, particularly Kelsey Creek. We instituted practices such as street sweeping, drainage system maintenance, and runoff detention and compared them for their effects on water quality.

What we found for Bellevue was surprising: street surfaces and the drainage system were *not* the major sources of sediment or pollutants to receiving waters, and neither street sweeping nor drainage system cleaning nor on-site detention basins had any measurable effect on water quality. Receiving waters instead were found to suffer more from frequent high flows, stream scour and erosion, sedimentation, and direct dumping of toxic materials than from any other causes. It was the habitat *adjacent* to the streets and drainage channels that was causing the majority of the problems. We had to look beyond the typical public works practices to develop source controls, in-stream quantity and quality controls, and even runoff treatment.

Because of our strong commitment to maintaining and enhancing water quality, we've amended the city's comprehensive plan to reflect these needs. The plan designates and ranks beneficial uses for various bodies of water and provides guidance for land-use planning. Most importantly, it also backs up policy with a strict inspection and maintenance program.

One of our best examples of how the plan is working is a business park built by the Boeing Corporation. Covering 155 acres, it's a compendium of state-of-the-art runoff controls, including artificial wetlands, oil separators, secondary containment systems, detention ponds, and

A fish ladder in Kelsey Creek in Bellevue, WA. The stream also doubles as part of the city's storm water drainage system. The city has tried to maximize the use of natural streams for its drainage system, while maintaining their natural beauty and reducing nonpoint source pollution.

emergency contingency plans. Since it was built, the system has held up well under two "hundred-year" storms.

By developing a plan early, we were able to anticipate federal regulations controlling the discharge of urban runoff. These regulations basically apply the permit requirements of the National Pollutant Discharge Elimination System (NPDES) to urban storm water. With our plan in place, we expect to receive our permit this year.

But we still have a lot of work. We are currently revising and upgrading our routine sampling program and instrument sampling stations. We need to increase our maintenance of detention facilities for runoff from publicly owned property. And, while we already inspect private detention systems for operation and maintenance, we want to expand inspection to all aspects of private drainage system discharge.

We've also been inventorying all elements of the drainage system for the city's Automatic Mapping and Planning System (AMPS). Our geo-data base already includes locations, elevations, conditions, and maintenance history, and will eventually include land-use and water-quality data. We will also begin a study to determine representative loadings from different land uses. This information, along with the continuous rainfall and flow records we already maintain, will eventually help us model the total nonpoint loadings from the Bellevue service area.

But our most important program may well be our public education program. The SSW was formed in large part because of citizen concern over Bellevue's lakes and streams, and we depend on that concern to help us implement our programs. Our 24-hour, seven-day-a-week Spill Response Program, for example, averages 800 to 900 calls per year from people reporting instances of midnight dumping or improper disposal; our oil recycling program, begun five years ago, is now so successful that all we provide is publicity.

Bellevue citizens may be the only city dwellers in the country who can fish in the drainage system.

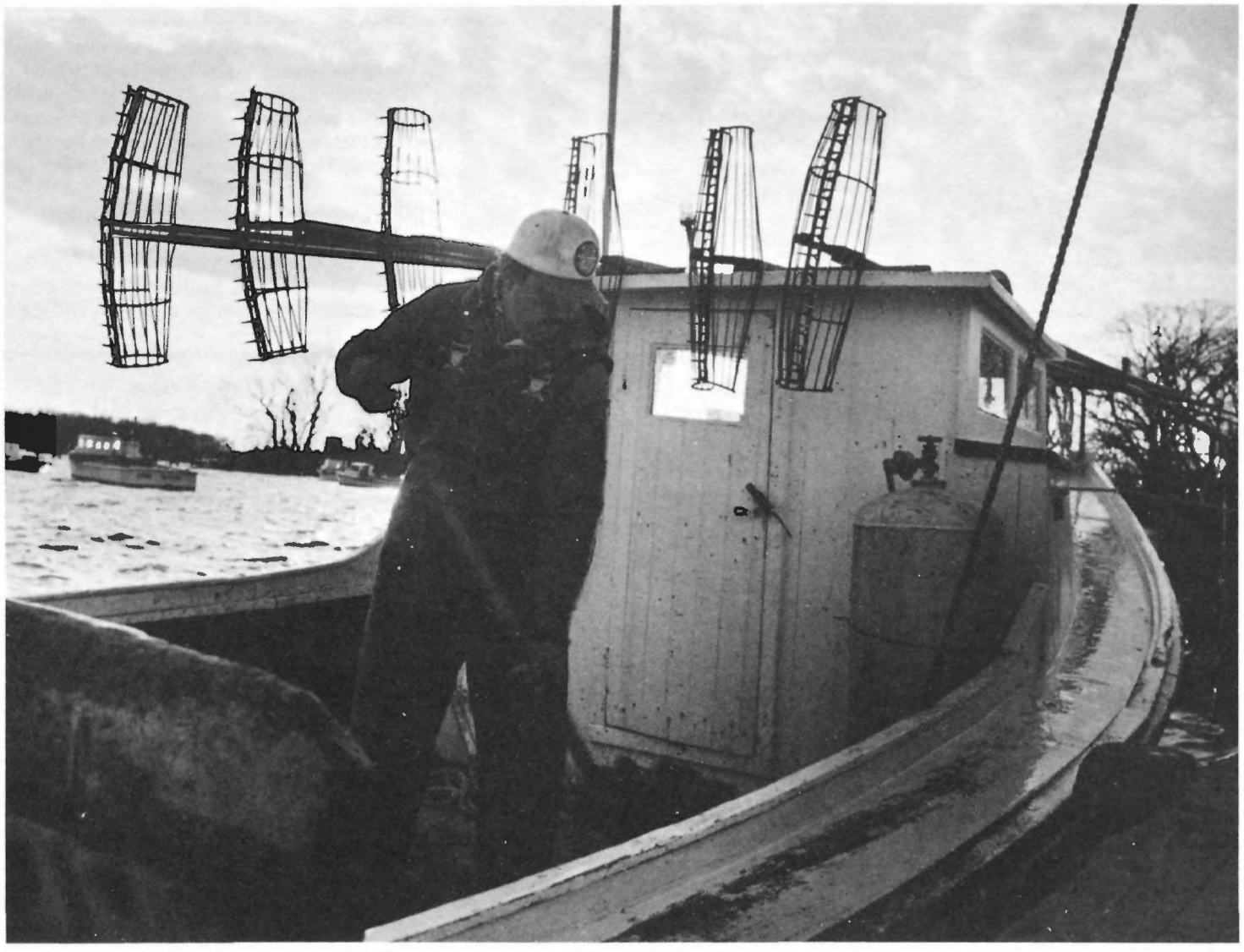
Last year, the SSW began a household hazardous waste pickup day. With the voluntary cooperation of local disposal companies, over 40 55-gallon drums of hazardous materials were collected from residents and disposed of properly. We hope to continue this event at least annually.

In addition to programs that give people clear alternatives to dumping and other harmful activities, we've also sponsored workshops and water-related educational events with schools, garden clubs, and fishing and sport groups.

All these programs require funding, but Bellevue is fortunate in already having strong financial and community support. We expect to be able to comply with our urban storm water permit, and we welcome the permit as a tool to help us in meeting our own water quality goals. □

Using Buffer Zones to Battle Pollution

by J. Kevin Sullivan



M. E. Warren/CBF

A traditional Chesapeake Bay workboat. The unique lifestyle and shellfishing methods of the Chesapeake watermen are threatened by declining bay productivity caused in part by nutrient runoff.

(Dr. Sullivan is the Scientific Advisor for the Chesapeake Bay Critical Area Commission.)

In the last few years, the Chesapeake Bay has been the subject of a great deal of publicity, most of it negative. Declines in the bay's fish and shellfish stocks, signs of over-enrichment, and low oxygen levels caused by excessive nutrients and high concentrations of toxic substances in certain areas have alarmed many people who depend on the bay for a livelihood or use it for recreation.

As reported in the *EPA Journal* (December, 1985), a federal-state partnership, the Chesapeake Executive Council, was formed to address these problems. The Council has developed a Chesapeake Bay Restoration and Protection Plan to begin the long process of returning the bay to its former levels of resource abundance and productivity.

One of the key elements of Maryland's efforts in the plan is the Chesapeake Bay Critical Area Law. Passed in 1984 by the Maryland General Assembly, the law established a Commission authorized to develop criteria for guiding local land-use decisions in what is known as the "Critical Area." This is a 1,000-foot wide strip of land around the bay's shoreline and along its tributary streams, up to the head of tide. The criteria are intended to protect water quality and conserve fish, plant, and wildlife habitat.

In considering the kinds of criteria or regulations that it would propose, the Critical Area Commission was mindful of the findings of the General Assembly: that the Bay's shoreline and adjacent lands constitute a valuable and sensitive part of this estuarine system where human activity can have an immediate and adverse impact on water quality.

The Commission was also aware that, in the Maryland portion of the Chesapeake, much of the nitrogen, phosphorus, and sediment entering the bay originates in land runoff, not from municipal or industrial sewage treatment plants. As one approach for reducing the impact of land runoff, the commission adopted the concept of strips of vegetation called "buffers" along the shoreline and at the edge of tributary streams.

The concept of vegetated buffers is not new. They have been established in a number of shoreline protection programs in other states and regions. In some areas, buffers were established partly for scenic or aesthetic purposes. This approach is sometimes used to shield recreational areas or scenic roads from intensive logging activities. In other areas, such as the Pinelands National Reserve in New Jersey, buffers have been adopted for water quality and habitat protection purposes, functions of particular interest to the Critical Area Program.

An extensive review of potential buffer functions was undertaken in order to determine which of these would be appropriate for the Chesapeake Bay shoreline. The Commission determined that buffers, if established, could perform many beneficial functions:

As one approach for reducing land runoff, the Commission adopted the concept of strips of vegetation called "buffers" along the shoreline.

- Filter pollutants from upland runoff.
- Protect stream water quality.
- Prevent disturbance to wetlands, shorelines, and stream banks.
- Conserve plant and wildlife habitat.

The scientific basis for some of these beneficial functions has been well documented. For example, stream-side vegetation affects the stream in important ways, including shading, which reduces water temperature, supplying food sources for aquatic organisms (i.e., seeds, plant litter, and insects), and retarding the erosion of stream banks.

The filtering function of buffers is less understood. Clearly, buffer vegetation could physically block sediments or other eroding particulate material. Also, dissolved nutrients in runoff could be taken up by buffer vegetation and transformed into plant tissue before entering streams. In examining this issue, the Commission was aware of research on the effectiveness of buffers, particularly those composed of forest vegetation. Studies conducted in Maryland by Drs. David Correll and William Peterjohn of the Smithsonian Institution indicated that a forested buffer located between farm fields and a stream can remove 80 percent of the nitrogen in the runoff before it enters a stream. Similar studies in North Carolina showed an 80 percent reduction in the amount of nitrogen leaving agricultural land as it passed through a forested buffer.

Obviously, the width and composition of a buffer will determine its ability to provide water quality and habitat protection benefits. The appropriate width will vary, depending on the resources being protected and the type of activity or disturbance that is being buffered. For example, a minimum 150-foot buffer has been recommended between septic systems and streams where nitrate pollution is a problem. For wildlife habitat protection, a 300-foot corridor or buffer is used in certain instances. For commercial logging on flat land, a 50-foot buffer is often recommended. In assessing these factors, and the beneficial functions of a buffer, the Commission decided that a minimum 100-foot buffer width would be appropriate for Maryland conditions, but that the buffer should be wider where there are steep slopes.

The Commission's final regulations, which were approved by the Maryland General Assembly in March 1986, require counties and municipalities in the Critical Area to establish a minimum 100-foot buffer along their shorelines and streams.

Within the buffer, most new structures, roads, septic systems, parking areas and other impervious

surfaces, and new mining operations are prohibited. The only kinds of new development allowed are water-dependent facilities such as marinas or public recreation areas.

Even here, those features of a project which do not need to be located at the water's edge (i.e., a parking lot or restaurant) must be set back beyond the 100-foot buffer. The regulations also require that the buffer be maintained in, or returned to, natural vegetation. The Maryland Forest, Park and Wildlife Service has already begun to recommend buffers in their forest management programs. The Commission hopes that the buffer area will eventually develop into forest vegetation where possible.

The buffer is only one of many elements of the Critical Area Program. The program also provides for the protection of important plant and wildlife habitats, redirects development away from sensitive natural resource areas, and requries new residential, commercial, and industrial projects to minimize adverse impacts on water quality.

And this program, in turn, is only one of many far-reaching initiatives adopted by Maryland to substantially reduce the amount of pollutants entering the Chesapeake Bay from land runoff and from treatment plants. Only through application of the land management practices fostered by these initiatives will it be possible for the Chesapeake Bay to remain the "crown jewel" of the nation's estuaries. □

Managing "Tail End" Pollution on the Farm

by Larry R. Nygren,
Dale E. Baker
and Christina M. Hunt

(The following article describes another example of efforts to reduce nonpoint source pollution in the Chesapeake Bay Basin.)

When does an embarrassment of riches turn into a problem?

In the case of manure, it's when dairy farms in southeastern Pennsylvania produce more manure than they have cropland to efficiently use it on. For example, one dairy farm can produce a pile one foot deep, 60 feet wide, and 500 feet long within a few months. It's a classic case of too much of a good thing. And an overabundance of nutrients is thought to be contributing to the demise of Chesapeake Bay.

The waste problems of a dairy farm in Lancaster County, PA, may seem a long way from the slow death of the Chesapeake Bay, but they are much closer than the miles might suggest. Manure is an excellent source of nutrients, especially nitrogen, phosphorus, and potassium. That's why it has been used for millenia as a fertilizer. But when more is applied than crops can use, or it's applied in the wrong manner at the wrong time, then the nutrients runoff into both ground and surface waters, where they encourage the growth of oxygen-demanding plants and algae. The lower the oxygen levels, the lower the variety and complexity of aquatic life.

This is what is happening in the Chesapeake Bay. Dissolved oxygen levels are decreasing, and with them, valuable yields of fish, shellfish, and other aquatic species.

To combat this situation, the states surrounding the bay have begun a regional cooperative effort to protect and improve the water quality and living resources of the bay. Pennsylvania's primary emphasis is on controlling its excess nutrient contribution.

The Susquehanna River drains more land area in Pennsylvania than any other state in the Chesapeake Bay basin and contributes about 50 percent of the bay's fresh water inflow. Forty percent of the nitrogen and 21 percent of the phosphorus entering the bay comes via the Susquehanna River, and soil and water tests indicate that a major portion of these nutrients are getting into the Susquehanna from agricultural runoff.

One method of reducing this runoff is to improve nutrient (for example, animal manures and commerical fertilizer) management on farms. Participating farmers contract with the state to apply only the amount of nutrients that tests show they need and to implement best management practices (BMPs) that will help control excess nutrients. In return, Pennsylvania will pay a maximum of 80 percent, up to $30,000 per landowner, of implementing the BMPs.

To give farmers the numbers they need to do their part, Pennsylvania has developed a demonstration "mobile nutrient laboratory" equipped to perform laboratory tests for manure composition and soluble nitrate-nitrogen, phosphorus, and potassium in soil and water samples. Set up in a converted Winnebago camper, the lab is also a roving state-of-the art computer center capable of performing field-by-field analyses of the proper nutrient levels needed to achieve expected crop yields based on a program developed by the Cooperative Extension Service. Farmers can see right away what their soil is like and how much nutrients are needed. One farmer in the program, for example, discovered that the nutrient value of his manure was enough to cut his commercial fertilizer bill in half. Eventually, the Cooperative Extension Service hopes to have the computer program available in every county agent's office.

A water quality management goal under consideration is to achieve between 50 to 100 pounds of nitrogen per acre remaining in the upper four feet of soil at the end of the growing season. With appropriate assumptions, these levels of residual nitrogen should not lead to excess nitrate-nitrogen in ground water. The concentrations of nitrate-nitrogen should not exceed 10 to 20 milligrams per liter of water leaching from the soil. A similar goal for water soluble phosphorus is being examined that will achieve no more than 0.2 milligrams per liter of water leaving the tilled surface soil.

Of course, controlling excess nutrients is simply one of many beginning steps in the complicated process of saving the Chesapeake Bay. But the lab may help farmers, and the State of Pennsylvania, do their part. □

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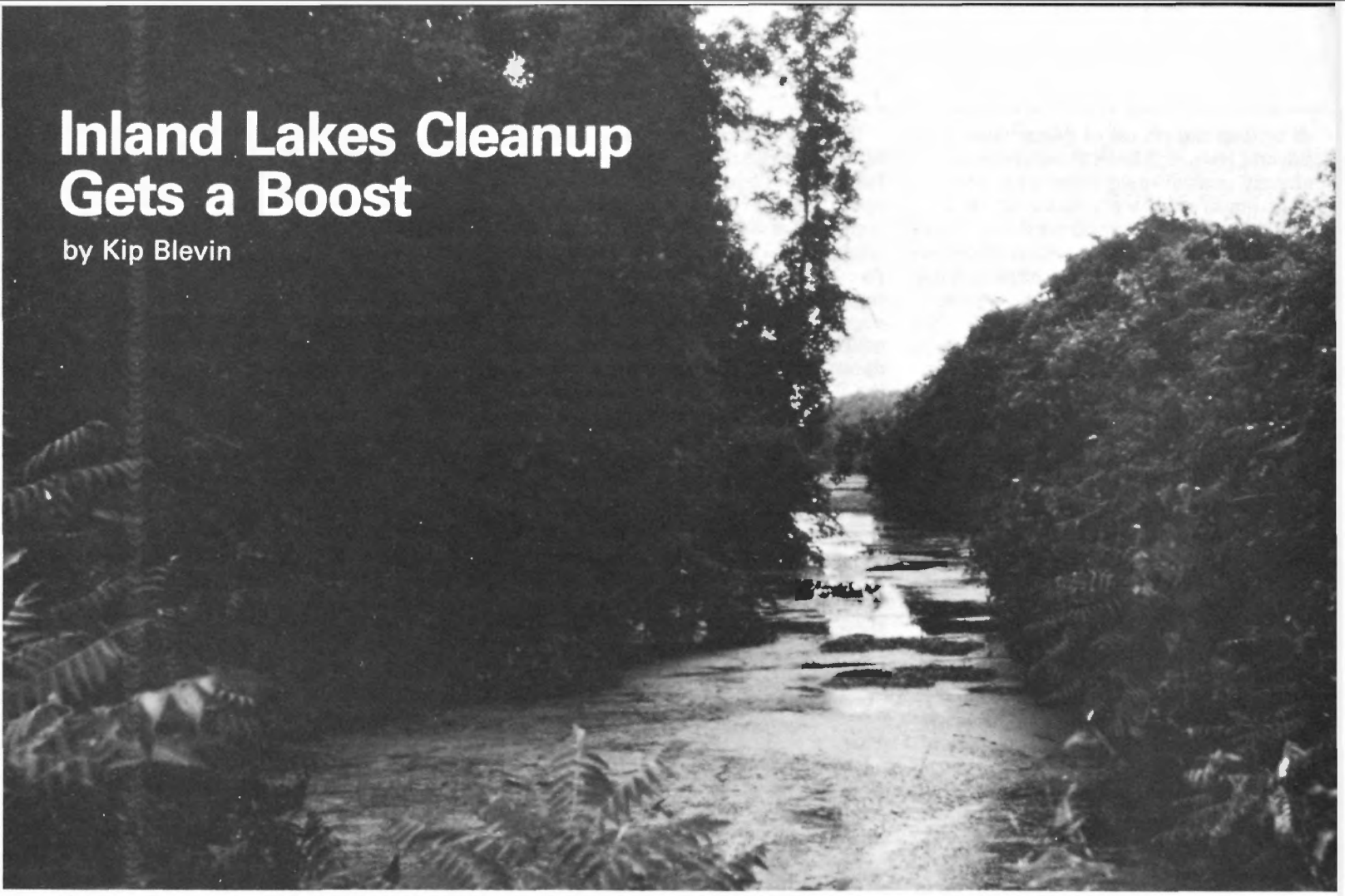
Inland Lakes Cleanup Gets a Boost

by Kip Blevin



Kip Blevin

Algae-clogged stream entrance. Runoff from livestock and agricultural operations had led to severe eutrophication problems in many inland lakes, such as Big Stone Lake on the Minnesota/South Dakota border.

The lake water here is warm. But a young cisco senses something cold, foreboding; a presence, an ominous ripple in the current. Bluegills flee as a dark shadow looms overhead. The ugly, elongated shape with the dark brown vertical stripes on its sides appears languid, almost gentle in its movements.

As it approaches the bottom, its white underbelly neatly brushes the pale green broad-leaved pond weed. A flick of its forked tailfin scatters silt, a few water fleas, and a large dragonfly nymph. The lone, seemingly sedentary figure is lurking now, concealed in the shade among the vegetation. The muskellunge is old, moody, and, at 55 pounds, easily the largest predator in the lake.

Suddenly, an aptly named 14-inch sucker appears out of nowhere. The muskellunge reflexively opens its long duck-like jaws, darts, and in an instant takes the bait, making the day of an excited young fisherman. The taut 35-pound test line gets a workout as the wily old-timer rushes, lies still, leaps—anything to remove the hook lodged deep in its hard, bony lower jaw. And then, the inexperienced angler allows the line's tension to slacken just long enough to guarantee an empty creel this day.

Until recently, waterfront delights like fishing could have been lost forever in some inland lakes. Runoff from nonpoint sources in agricultural and urban areas had fostered heavy plant growth that was slowly choking the life out of many lakes in the Midwest.

But some of these beautiful waters, where recreation once thrived for millions of people each year, are beginning to regain their former status as a mecca for water sports enthusiasts. This rebirth is in large part the result of a federal, state, and local partnership which has produced 37 Clean Lakes Projects in the last nine years.

EPA's Region 5 has thousands of lakes, most of which are located in Minnesota, Wisconsin, and Michigan. Unfortunately, recent surveys indicated 80 percent of the region's assessed lakes are either moderately or severely affected by nonpoint sources of pollution. Their problems have received relatively little attention from state and federal agencies because pollution control funds and personnel traditionally have been directed toward municipal and industrial point sources.

Historically, the Agency's Clean Lakes Program has focused on treating the *symptoms* of a dying lake. While actions such as dredging and weed harvesting enhance recreational potential in the short term, they are extremely costly and often do not address the basic *causes* of eutrophication, which include agricultural and urban runoff, municipal and individual waste disposal systems, destruction of wetlands, runoff from construction sites, and other developmental activities.

Declining funding since 1981 forced Region 5 to reevaluate this approach. After taking a fresh look at the problem, Region 5 concluded that solving lake problems means eliminating the causes

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as well as the effects of degradation. Several state and federal programs already control many types of nonpoint pollution. And the region could use its scarce Clean Lakes Program dollars most effectively as catalysts to attract funds, technical expertise, and organizational ability from these and other programs, mobilizing this combination into a comprehensive lake and watershed treatment program.

The underlying principle is very simple: the condition of an inland lake is a reflection of the condition of its watershed. Three examples that reflect this principle are Lake Le-Aqua-Na, Big Stone Lake, and the Clearwater Chain-of-Lakes. Each is in a different stage of development and each exemplifies federal, state, and local cooperation and innovation at its best.

Lake Le-Aqua-Na is a publicly owned lake in Stephenson County in northwestern Illinois. Almost completed, the renewal of this lake demonstrates creative interaction among the agricultural community, the state water pollution agency, and local landowners.

The state park that surrounds the lake supports a variety of year-round activities, including fishing, camping, picnicking, hiking, and winter sports. Yearly park attendance ranges from 300,000 to 350,000 visitors. But runoff from crop and pasture lands within the watershed was causing severe eutrophication and sedimentation problems.

Through the joint efforts of Region 5 and six local and state agencies, local landowners began stabilizing Waddems Creek, which empties into the lake. Over a 3-year period, farmers installed terraces on farms throughout the watershed and introduced watershed management practices such as conservation tillage. Additional measures included weed harvesting, excluding livestock, and stabilizing the shoreline. Lake and tributary monitoring were specifically designed to check the effects of these management practices.

Soil loss to date has decreased from an average of 5.1 tons per acre to 2.0 tons per acre, a total sediment reduction of 4,560 tons per year. In addition to reducing sedimentation, a low energy pumping unit was installed to circulate flow in the lake and increase the dissolved oxygen. This unit prevented a fish kill during the 1985/1986 winter. "This should provide the lake with a higher potential to establish a warm water fishery," said Tom Davenport, regional nonpoint source coordinator.

Big Stone Lake lies on the Minnesota/South Dakota border. The lake is a multipurpose resource used for sport-fishing, swimming, boating, commercial fishing, irrigation, industrial cooling, and flood storage. Because of its sport-fishing and water-based recreation Big Stone Lake has been an important resort and vacation area for nearly 100 years. Nowadays, however, a dense crop of blue-green algae occupies the lake continuously from early July to late October. In the past 20 years, seven of 16 resorts have closed, and most of the remaining resorts along the lake have reduced their services.

The land in the Big Stone Lake watershed is used mostly for grain and hay production and pastures that support live-stock operations. Erosion from cropland and runoff from animal feeding operations are major sources of algae growth and sediment in the lake.

Runoff from nonpoint sources was slowly choking the life out of many lakes in the Midwest.

The lake cleanup is a case study in the advantages of working together. This project required the cooperation of EPA offices in Chicago and Denver, two states, five counties, and a multitude of local units of government and government agencies. Ironically, the same organizational complexity that once threatened the project is now recognized as an asset, allowing the program the flexibility necessary to overcome obstacles to water quality improvement.

EPA involvement began when Region 8 provided funds for South Dakota to work on the lake's problems. Although South Dakota and Minnesota recognized that improving the lake's water quality needed the involvement of both states, Minnesota at first did not participate because of concerns about South Dakota's management approach. EPA's two regional offices helped to allay these concerns.

They both played a crucial role in speeding up negotiations, cutting through red tape, finding solutions to the problems that emerged, and helping state agency staffs sell the project to the rest of their agencies. The merging of the different state approaches has led to a stronger project.

At present, South Dakota is concentrating on feedlot management and storage of peak runoff in the Whetstone River subwatershed. Minnesota is emphasizing a conservation tillage demonstration program and wetland restoration.

In the *Clearwater Chain-of-Lakes* in Minnesota, heavy amounts of nutrients from point and nonpoint sources had stimulated algae growth and depleted life-giving oxygen in the lakes. Although three municipal wastewater treatment plants and a cheese factory no longer discharged their wastewater to the lake chain, water quality remained in relatively poor condition. It was clear that nonpoint runoff needed to be controlled.

The cheese factory had formerly discharged its wastes into a wetland, and that discharge had supersaturated the soil to the level that the wetland was adding 35,000 pounds of phosphorus to the lake annually. Isolating the wetland and severely curtailing its discharge reduced its release of phosphorus to 1,000 pounds a year. Further nonpoint controls on other sources reduced phosphorus levels in the lake from 86,000 to 52,000 pounds a year.

The last stage of the project is just beginning. This work will concentrate on controlling the runoff from cropland, significantly reducing the amount of nutrients that reaches the lakes. The local project sponsor is a watershed district whose boundaries include portions of three counties. A consortium of federal, state, and local water pollution control and agricultural agencies will carry out the final stage of this comprehensive lake protection program.

According to Charles H. Sutfin, Director of Region 5's Water Division, "As these examples demonstrate, the states in Region 5 are responding to the region's lake watershed management strategy with good, well-planned inland lake projects. The region will continue to encourage states to redirect their programs to work with Department of Agriculture agencies to carry out non-structural, watershed-based solutions. Region 5 is committed to improving and protecting its inland lakes, and will continue to give program and technical support to the states."

Funding is currently scarce, but a number of cost-effective approaches are available to enterprising communities and states that wish to protect or improve their resources. In fact, the scarcity of federal and state funding for lake improvement has led to better, more comprehensive, and less costly solutions. With these solutions will come, perhaps, more opportunities to catch (and land) the elusive muskellunge. □

Kesterson: Nonpoint Nightmare

by Roy Popkin

In the fabled "fertile crescent" formed by the Tigris and Euphrates rivers, a great civilization once blossomed, due, many historians believe, to a thriving agriculture based on irrigation. But the flower may have contained the seeds of its own destruction. The decline of this and other early civilizations in the Middle East is often attributed to crop failures resulting from a buildup of toxic salts in the soil, a buildup caused by poorly conceived or non-existent systems to drain the land.

Today, in California's San Joaquin Valley, modern man is striving to determine if his science and technology can overcome the same problem that caused many an ancient civilization to vanish. The valley's Kesterson Wildlife Refuge and Reservoir has become a latterday laboratory in which the answer to the questions raised thousands of years ago is still, and urgently, being sought.

The future of an entire civilization is not at stake in this modern version of man's battle with the unpredicted harmful impact of water supply systems he created, but if a way to deal with the polluted drainage waters isn't found, the owners of farmland covering up to 40,000 acres may be the first to go. And one estimate says the long range impact could ultimately affect the entire San Joaquin Valley. The underground water supplies of nearby communities and surface waters providing drinking water to a much larger area, including Los Angeles, could be contaminated.

The major villain in this nonpoint pollution-caused water supply nightmare is selenium, an inorganic chemical that has been in the rocks and soils of California since the Cretaceous Geologic Age 135 million years ago. Contributing to the pollution is another geologic fact of life that long predates the farmers in the San Joaquin Valley. Many millions of years ago the area was under an ocean which left behind not only salts, trace metals, and chemicals, but also an impermeable stratum of clay which remains underneath the surface soil being farmed today.

Ironically, selenium is an important element in the daily diet of man and beast. As a food additive, it can be purchased in health food stores. In the 14th century, Marco Polo reported on cattle disease problems in China which seemed to have been caused by a shortage of selenium in the diet of the Oriental livestock. Selenium problems have been known in the American West for more than a century.

If the level of selenium in drinking water or food is too high, it is dangerous to fish, birds, and other wildlife and can cause serious health problems for human beings. As a toxic chemical, the amount of selenium permitted in drinking water is regulated by the EPA under the Safe Drinking Water Act.

Kesterson's selenium problems cannot be attributed to "perfidious" chemical manufacturers or agricultural interests. They are, in fact, the result of agricultural irrigation methods that have been used in the western part of our nation since farming first began in California's fertile valleys.

The San Joaquin Valley is considered to be one of the world's most productive farmlands. It only recently became the focus of concerns about nonpoint toxic trace metal pollution. It was the discovery that the irrigation drain system designed to carry off the salts was also carrying selenium and other toxic substances that triggered the current anti-contamination efforts.

The story actually begins in 1960 when Congress authorized the San Luis unit of the Central Valley irrigation project. The legislation also authorized the Interior Department's Bureau of Reclamation (USBR) to provide drainage disposal facilities on the west side of the valley.

As new irrigation waters became available to the farmers on that side of the Valley, the USBR began building drainage facilities to deal with the potential for salt buildups and subsurface waterlogging which could trap salts and other contaminants between the valley's underlying clays and the farms above them. The original plan called for moving the subsurface drainage through the San Luis Drain, which was to be a 188 mile concrete-lined canal from Kettleman City to a discharge point in the Sacramento-San Joaquin Delta. From there it would eventually reach San Francisco Bay. But environmental, fiscal, and political pressures brought construction to a halt after less than half the drain had been built. Residents of the San Francisco Bay area feared the drain waters would carry excessive levels of pesticides and high concentrations of boron, another naturally occurring substance found in the valley. Strangely, selenium was not a matter of concern at that time, even though early geologic reports had noted its presence in the soil.

Construction funds ran out at the end of the first 82-mile segment. With the work at a halt, the bureau sought interim measures for dealing with the large quantities of drainage water already flowing through the completed portions of the system. Regulating reservoirs were built near Gustine as part of the drain. It was decided to use them as evaporation ponds. The 12 shallow ponds cover approximately 1,200 acres to an average depth of four feet. Completed in 1971, they were designated the Kesterson Reservoir. Although originally intended to be a flow-regulating marsh for the entire San

Irrigation drainage in the San Joaquin Valley has released toxic amounts of selenium from subsurface soils, contaminating the Kesterson Reservoir and poisoning the wildlife there. An interim solution to the problem has been a hazing program to scare wildfowl out of the refuge.

Bureau of Reclamation

(Popkin is a writer/editor in the EPA Office of Public Affairs.)

Luis Drain, they became its terminus. The Kesterson National Wildlife Refuge was created around the reservoir to take advantage of the water supply. But, because Western water rights law generally assigns highest priority to agricultural and municipal uses, the Kesterson Refuge must depend on agricultural drainage sources to maintain its wetlands habitat for migratory birds and other wildlife.

Since 1972, Kesterson has been managed by the U.S. Fish and Wildlife Service (USFWS). Until 1978, the water stored there was mainly from local surface runoff, but, as farmers installed underground systems that discharged into the San Luis Drain, the majority of the water reaching Kesterson was subsurface agricultural drainage, and, as it turned out, laden with selenium and other toxic trace elements. By early 1985, 7,000 acre-feet of largely toxic-laden drainage water was flowing annually into the reservoir.

Alerted by water quality data gathered by the Bureau of Reclamation, the Fish and Wildlife Service began watching the refuge to see if the drain water was affecting the wildlife. Gary Zahm, who became manager of Kesterson and other nearby federal wildlife areas in the western valley in 1981 told a *Washington Post* reporter he immediately knew that something was wrong. "I didn't see the diversity of life. I didn't see muskrats, crayfish, or turtles. After 18 years of working in marshes, it just didn't look right."

He found only mosquito fish. A biological study he requested found the water laden with selenium at a level of 4,200 parts per billion (ppm), 400 times the level considered safe for drinking by EPA standards. The fish tested had 53 parts per *million*, believed to be the largest amount of selenium ever found in live animals, fish, or birds. The biologists also found deformed water bird embryos and nestlings. Again, selenium poisoning was the cause.

Obviously, the selenium levels found at Kesterson could be a threat to human health if they leached into underground water or spilled over into rivers that provided drinking water to California homes.

It was clear that action had to be taken to prevent further damage to wildlife and, ultimately, to protect drinking water resources. USFWS immediately began a hazing program to drive birds away from the area. The state of California ordered the Department of the Interior to clean up Kesterson and to take the steps necessary to prevent leaching or overflows by 1988.

Bureau of Reclamation

Drainage ditch typical of California's Central Valley irrigation project. To prevent waterlogging and salt buildup, pipes carry subsurface flows through an 82-mile drainage system that discharges in the Kesterson National Wildlife Refuge.

Early in 1985, in response to the strict requirements of the Migratory Bird Treaty Act, Secretary of the Interior Don Hodel ordered the San Luis Drain closed despite strong objection from farmers who fear the eventual destruction of their arable lands if the salts and other pollutants cannot be drained after irrigation.

Orderly plugging of the drain is now under way although there are many questions that need to be answered before Kesterson Reservoir can be cleaned up. And the problem with disposing of contaminated drainage water from the farms in the area still remains.

To understand exactly what is happening at Kesterson and to develop effective long-term solutions, the Interior Department and the state of California have initiated an intergovernmental study program that cuts across many disciplines and involves several bureaus and agencies, with an advisory role for the National Academy of Sciences. The study has two major goals—protection of human and wildlife health and maintenance of agricultural production. At the same time, the Interior Secretary directed the Department's bureaus to look for other areas where similar conditions might be developing. As part of Fish and Wildlife's continuing concern with environmental quality, an inventory of the entire range of contamination concerns was already under way. Some of the concerns identified in a report released to Congress in February 1986, came from agricultural drainage outside of the refuges, but only Kesterson was identified as needing immediate corrective action. The Bureau of Reclamation also conducted a review of projects providing drainage waters to wildlife refuges and found no situations similar to Kesterson.

EPA does not have the authority to issue National Pollutant Discharge Elimination System (NPDES) permits for discharges composed entirely of return flows from irrigated agriculture. The state of California, to which the NPDES program has been delegated, does. It did require the Bureau of Reclamation to obtain such an NPDES permit and it was during studies designed to meet state requirements that the selenium problem was discovered.

EPA's Region 9 and Corvallis Environmental Research Laboratory have been involved in the review of protocols that may be used to establish site-specific water quality standards for the disposal site eventually proposed. In addition, Region 9 will participate on the technical committees that will review and direct assessments of the selenium problems and evaluations of the feasibility and environmental impacts of various treatment and disposal options.

While initial reports have been completed, much remains to be done. Interior's irrigation drainage task force has identified 19 sites in the West which merit further investigation. Selenium is only one of the potential contaminants of concern, but for Kesterson it is the key one.

Salinity is a classic nonpoint source pollution problem. Although farmers and irrigation engineers have learned a great deal about controlling it since the days of the Babylonians, salt buildup continues to present problems in irrigated lands throughout the world. The American West has dealt with the problem for decades, with solutions ranging from sophisticated but relatively expensive desalination technologies to simple changes in water application methods. If government water supply managers and scientists can successfully remove the selenium and other toxic chemicals from the Kesterson waters or find some way of diverting them from local agricultural and drinking water supplies, they will prove that the past does not have to be a prologue, and that modern man has truly found a way to deal with the kinds of nonpoint pollution sources that defeated his ancestors. □

A "Fitting Solution" at Snake Creek, Utah

by David Wann

The successful solution of an environmental problem is like a custom-made suit or a hand-knit sweater that fits just right. The good results more than justify all the hard work.

The Snake Creek project in North Central Utah offers a good example of such a "fitting solution." A variety of tailor-made best management practices (BMPs) there has dramatically reduced heavy phosphorus loading into Deer Creek Reservoir, the drinking water supply for people in the Salt Lake Valley and a recreational resource and irrigation water source. Extensive monitoring before, during, and after the introduction of the BMPs (1980 to 1985) has documented the results, but according to residents of the area, "You don't need scientific instruments to see that there has been a huge improvement."

From an environmental standpoint, the bottom line is the dramatic reduction in nonpoint source pollution.

This part of Utah doesn't fit the desert stereotype. It receives a lot of moisture in the form of snowmelt from the mountains, and it's an oasis of intensive dairy and alfalfa farming. In fact, the very lushness of these agricultural operations turned out to be a major contributor to the eutrophication of the reservoir.

The reason wasn't too hard to identify. Where there are cattle, there's also manure. The traditional method of dealing with manure had been to push it into irrigation ditches, which frequently flowed right through the barnyards. The technique was easy enough, but one of the prices paid for this convenience was the algal blooms down in the reservoir. Farmers were also getting rid of manure by applying it to frozen fields, which resulted in heavy nutrient runoff, especially in the spring.

Manure bunker installed to prevent runoff and provide a storage area. Through steps such as these, nonpoint source pollution is being curbed in Utah's Snake Creek Basin.

In 1979, the Snake Creek Basin was chosen as a project area under the Rural Clean Water Program sponsored jointly by EPA and the U.S. Department of Agriculture (USDA). With strong participation from the Mountainland Association of Governments, EPA, and USDA's Soil Conservation Service, the project set out to design some BMPs

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specifically tailored to fit the needs of the Snake Creek Basin.

Effective manure storage and handling was a fundamental consideration. To prevent runoff and serve as storage areas, manure bunkers were installed. Lagoons and pumping systems were designed to facilitate the drainage and subsequent application of manure slurry. The liquid wastes which accumulate in low spots are now pumped to storage lagoons, and then sprinkled onto the fields.

Closed culvert systems through the barnyards were also installed, as well as sturdy fences to keep cattle away from the creek. The revegetation of eroded slopes was also part of the plan.

Ray Loveless of the Mountainland Association of Governments and Jack Young from the Soil Conservation Service did much of the field work in the project. "We talked to farmers individually and never did try to twist any arms," says Loveless. "From start to finish, the project was voluntary and the farmers could drop out anytime they wanted." Adds Young, "We tried to show them that it was a benefit to their farms and to the environment of the whole area. Even though their operations had been polluting for a long time, it's against the law, and their habits had to change. We made pride an important ingredient and tried to demonstrate how using government funding could really upgrade their businesses." In many informal discussions, leaning against farmers' pickups, Young got the point across that cooperation was the best way to go.

Ultimately, contracts were signed with the owners of six medium and large-sized dairy operations. Under the terms of the contracts, the farmers could receive 75 percent of the cost of the BMPs up to $50,000, a figure which was exceeded in most cases. Because of the relatively small size of the project, the BMPs were implemented fairly quickly, and the Snake Creek project is one of the first completed under the Rural Clean Water Program.

Where there are cattle, there's also manure.

According to EPA's Roger Dean, who has been the project's manager since 1980, "Our work at Snake Creek seems to have been successful from several standpoints: water quality has significantly improved, the farms are now much more efficient operations, and a model for other similar projects has been created." Dean, who is Region 8's nonpoint source coordinator, sees the improvement in attitude as a major accomplishment of the project. Many of the farms in the area are second- and third-generation establishments, used to doing things the way they've always been done. The fact that the interagency task force was able to establish cooperative relations with the farmers, and what's more, produce such good results, has made a positive impression on residents.

It is apparent that the farms are now operating at a more efficient level. Herd sizes have increased on the farms, and the incidence of "hoof rot" from continuous exposure to manure has decreased. More efficient use can now be made of the fertilizer value of the manure, since access and handling is vastly improved.

But from an environmental standpoint, the bottom line is the dramatic reduction in nonpoint source pollution. Despite unusually high precipitation during the project, phosphorus loadings and fecal coliform numbers all indicate significant improvement, in some cases as high as 900 percent. Nonpoint source pollution tends to be a difficult problem to solve, but the Snake Creek project has demonstrated that effective, fitting solutions can be designed and implemented, and that by customizing the work, both sides can emerge as winners. □

New Farm Law Encourages Cleanup

by Wilson Scaling
and Milton Hertz

The Food Security Act of 1985 goes further than any previous farm bill in providing incentives for resource conservation.

A major feature in the Act is the Conservation Reserve. This competitive, voluntary program allows farmers to contract with the government to switch highly erodible cropland to grass or trees.

The objective of the reserve is to reduce soil erosion. In doing so, the reserve also will improve water quality and fish and wildlife habitat. Additional benefits will include some needed income support for participating farmers and some reduction in surplus commodities.

By 1990, we hope that at least 40 million acres will have been enrolled in the reserve and planted to grasses or trees. Between March 3 and March 14 of this year, farmers had their first chance to sign up for the reserve at Agricultural Stabilization and Conservation Service county offices across the nation. This first round of signups provided the opportunity for farmers to retire at least five million acres. The U.S. Department of Agriculture (USDA) has scheduled another signup for the 1986 crop year beginning May 5.

Provisions for enrollment are detailed:

- The land proposed for enrollment in the reserve must be certified as highly erodible cropland.

- The government will pay 50 percent of the cost of establishing permanent plant cover. Farmers who want to participate must submit bids for the annual payments they would accept from the government to enroll their land in the reserve. The bid must compete in a bidding pool. Some pools are statewide; others are further subdivided.

(Scaling is Chief of the Soil Conservation Service and Hertz is Acting Administrator of the Agricultural Stabilization and Conservation Service.)

USDA Soil Conservation Service

Row erosion in a cornfield. New provisions in the 1985 farm bill will disqualify farmers from certain USDA benefits if they fail to use conservation methods on highly erodible cropland.

- Once a bid has been accepted, the farmer cannot make any commercial use of the forage or trees on reserve lands as long as the contract is in effect. Hunting for fee, however, *is* allowed.

- Reserve rental payments to individual farmers are limited to $50,000 per year. Overall costs of the program may be some $5 billion over the first five years, but we expect that these costs will be offset by lower commodity program payments from reduced crop production.

- Farmers may withdraw land from the program and return it to crop production before their contracts expire only if they repay all government payments, with interest, including the cost share on establishing plant cover.

USDA Soil Conservation Service

We anticipate that farmers will choose to plant trees on about one acre out of every eight in the reserve—about five million acres overall. At roughly 500 trees to the acre, that could add up to 2.5 billion trees. And lands planted to trees would likely remain out of crop production for 25 years or more.

The reserve can help reduce nonpoint source water pollution. In six of the ten EPA regions, nonpoint sources are the main causes of water pollution. In almost every state, nonpoint sources contribute in some degree to impaired water quality.

Fortunately, most of our farmers are aware of the potential environmental damages associated with excessive soil erosion. They manage their farms well, so only a fraction of the potential damage to the environment actually occurs. Unfortunately, because of the scale of American agriculture, that fraction can cause real problems.

The Conservation Reserve will help turn some of those problems around. Only the most highly erodible and seriously eroding cropland is eligible for the reserve. This year, some 69.5 million acres—about 15 percent of all cropland in the nation—are eligible to be bid into the reserve. Retiring these highly erodible croplands will reduce total erosion and the delivery of sediment and farm chemicals to surface waters.

The reserve is a cooperative effort among government agencies at all levels, the local conservation districts, and farmers with eligible land:

- The Agricultural Stabilization and Conservation Service administers the program and pays the farmers.
- The Soil Conservation Service determines land classification and erosion rates and helps farmers prepare and apply conservation plans.
- The Forest Service and the state forestry agencies advise on tree planting.
- The state Cooperative Extension Services provide information and education support for the reserve.
- The local soil conservation districts approve all conservation plans.
- Some state agencies provide additional cost sharing with farmers.

The agricultural community has made a strong commitment to cleaning up the nation's waters. But we in agriculture cannot accept the responsibility for the entire rural nonpoint source control effort. We do not have the people or funds for that—and we do not have responsibility for all of the problem. But we can make a difference in agricultural areas by assisting farmers in installing and maintaining soil and water conservation practices, including best management practices (BMPs)

Besides the Conservation Reserve, the Food Security Act of 1985 also contains other provisions that will bring more consistency to our farm programs—and also help improve environmental quality. Under these provisions, farmers will no longer qualify for certain USDA program benefits if they fail to use conservation methods on highly erodible cropland.

The "sodbuster" provision applies to farmers who plow highly erodible land that was not in crop production during at least one of the five years before December 23, 1985, the effective date of the Food Security Act of 1985. The "swampbuster" subtitle applies to farmers who produce crops on converted wetlands that they drained after the act was passed. The "conservation compliance" provision applies to farmers who plant crops on

Erosion after spring rains on unprotected Iowa cropland. The Department of Agriculture's new Conservation Reserve program will reduce soil erosion by offering incentives for farmers to switch from crops to grass or trees on highly erodible land.

highly erodible cropland, even if it has been cropped for years.

Under conservation compliance, January 1, 1990, is the deadline for farmers to be following a conservation plan approved by the local conservation district. They have until 1995 to comply with the plan.

These provisions are not, as some have charged, attempts by the government to dictate land use. Land-use decisions are private matters. We do believe, however, that it is reasonable to withhold public funds—price support payments, in this case—from those who do not protect their land from soil erosion.

The conservation title of the farm bill had broad support in Congress and from farm and environmental groups even as its provisions were being hammered out. Many see it as an opportunity to give additional emphasis to soil conservation and nonpoint source pollution control.

Both on and off the farm, those interested in protection of our nation's resources are encouraged by the conservation title of the farm bill and will be watching—and contributing to—our progress in getting it in place. □

"Fingerprinting" Pollution at Iowa's Big Spring

by Julie Elfving

(The following piece explains a special project aimed at identifying and understanding agricultural nonpoint source pollution.)

Pollution of ground water by pesticides and nitrate from fertilizers is a major environmental concern in the Midwest. In Iowa, where agricultural chemicals are used on 60 percent of the state's land area, public and private drinking water wells that exceed public health standards for nitrate have been found throughout the state, and pesticides are found in ground water. In Nebraska, about 30 towns have excessive amounts of nitrate in their drinking water. Bottled water is provided to infants, and monthly well testing is required.

The interagency, interdisciplinary Iowa Big Spring Basin Demonstration Project is a seven-year effort to test the ground-water consequences and economic viability of various agricultural management techniques. It will include various-sized demonstrations to document chemical movement, water quality, and crop production effects from a number of traditional and innovative agricultural practices. It will also include educational programs to help farm managers use fertilizers and pesticides more efficiently. There will be special emphasis on soil conservation combined with farm chemical management. Economic analysis and continuous evaluation of surface and ground water and related educational efforts concerning ground-water protective practices will be included.

Partially funded by EPA, the project involves all the state natural resources agencies, state university departments, local farmers, agribusiness organizations, and, in addition to EPA, the Federal Soil Conservation and Agricultural Stabilization and Conservation Services.

The Big Spring area is a unique "laboratory." It is dominated by cultivated agriculture. Nearly all of its ground water discharges at Big Spring, so chemicals leaching into the ground water eventually show up there. Early research shows nitrate concentrations have tripled in the last 25 years, paralleling a three-fold increase in use of nitrogen fertilizers. Toxic pesticides are being found in greater amounts than anticipated.

Ground water is a significant source of drinking water in this country, but heavy fertilizer and pesticide use has contaminated the ground water in some areas.

The $6.8 million Big Spring Project is considered one of the nation's most significant studies of the effects of agricultural practices on ground water. It seeks not only more definitive answers on the relationship between ground water and agricultural practices, but could also provide the economically stressed farmers with cost-saving information. □

(Elfving is a water quality planner in EPA Region 7.)

Nonpoint Control: A Forum

What level of government should be responsible for the cleanup of nonpoint source pollution? This is a crucial and widely debated question. EPA Journal

Robert Stafford

U.S. Senator (R-VT)
and Chairman,
Senate Environment and
Public Works Committee

The states and the federal government must share the responsibility for dealing with the nonpoint source problem.

States, in association with local entities such as watershed districts and councils of government, have the front line responsibility for evaluating the nature and sources of nonpoint source pollution and devising appropriate methods of control. Each state should develop a nonpoint source management program that targets problem areas and devises effective controls. In some cases, I expect, regulatory programs will be needed. States also have a responsibility to carefully review federal projects and programs to assure consistency with the states' nonpoint source control efforts. This review is needed to ensure that federal projects and programs do not inadvertently undercut state efforts.

The role of the federal government should be to provide technical and financial support. Research on best management practice and technology transfer and information sharing should be high priorities. And the federal government should provide funds to help states launch or upgrade their nonpoint programs. Federal agencies should adjust their projects and programs to ensure that they are not contributing to nonpoint problems.

These principles are embodied in both the House and Senate bills to reauthorize and amend the Clean Water Act, and I am confident they will work. We have seen the federal-state partnership pay off in nonpoint source pilot projects such as the St. Albans Bay project in my own state of Vermont. Similar partnership projects are under way in other states. A number of states have gone ahead without federal support to set up nonpoint programs because they have recognized the need, and they know that the public solidly supports clean water programs. The federal government needs to help these states expand their efforts and to ensure that other states begin now to deal with this important problem.

James L. Oberstar

U.S. Congressman (D-MN)
and Chairman,
House Subcommittee on
Investigations and Oversight

Nonpoint source controls are everyone's responsibility—federal, state, and local governments, local groups and organizations, as well as individual farmers and foresters, mining and construction companies.

Among the many groups with which I worked in developing the House legislation, the clear consensus was that nonpoint sources do not lend themselves to a national control program with national regulations and standards. Rather, state and local levels must develop controls to address local conditions.

The federal role, therefore, is to provide encouragement, both financial and other, to ensure that nonpoint sources will be addressed wherever they pose a serious threat to water quality and the goals of the Clean Water Act; to provide leadership in elevating nonpoint sources to a national priority; and to ensure that the federal investment is spent wisely and that implementation is moving forward expeditiously.

Design and implementation must be carried out at the local and state levels, with states working closely from the start with local agencies, such as conservation districts, Section 208 water quality management agencies, and watershed districts, as well as the individuals who will be involved in implementation.

Given the nature of nonpoint sources, and today's realities of limited resources and the call for a much lighter government hand, we will need the combined efforts and cooperation of all levels of government and the private sector, corporate and individual, to close the last major gap in the Clean Water Act, bring nonpoint sources under control, and protect and enhance the quality of America's waters.

Gary D. Myers

President
The Fertilizer Institute

Nonpoint source pollution is a complex challenge because there is no easy means to accurately measure a single nonpoint source's contribution to overall runoff. Further, any estimates of such pollution must consider specific

asked several of the leaders in this debate for their views. Their comments follow:

area conditions such as topography, climate, and land use. EPA's Chesapeake Bay Study showed that nonpoint sources surrounding the bay region lose almost 15 pounds of nitrogen per acre each year.

Possible sources of nonpoint pollution from agriculture are:

- animal waste
- bacteria in the soil
- commercial fertilizer applications
- dustfall
- natural plant decay
- precipitation
- soil

The specific contribution of each source is extremely difficult to determine at any one location, and varies from area to area.

The fertilizer industry—a vital link in our nation's food chain—supports a close working relationship with our agricultural producers to promote a strong American agriculture. Sound, cost-efficient farming practices and adoption of locally derived soil and plant nutrient conservation practices are essential steps in achieving this goal.

Best management practices (BMPs) that reduce soil erosion and promote conservation—such as conservation tillage, soil testing, timing of fertilizer application, strip cropping, cover crops, terracing, and buffer strips—are all highly effective in cutting losses of plant nutrients. Use of BMPs can reduce losses of nutrients to the environment, increase soil productivity, lower the farmer's cost of crop production, and improve crop production efficiency.

The fertilizer industry is continuing its efforts to provide information to farmers and the public about the benefits of essential and judicious fertilizer application, coupled with soil conservation management practices. For example, a vigorous cover crop, with its more extensive canopy and root system—whether it be a forage crop, idled cropland, or productive row crop—affords protection against soil and nutrient losses.

The future of essential crop production, farm production efficiency, and soil and nutrient conservation depends on the ability of our nation's farmers to expand their use of sound management practices. The fertilizer industry, therefore, supports efforts on the local level to encourage adoption of BMPs best suited to the unique conditions of that area.

Hope Babcock

Deputy Counsel
National Audubon Society

According to one of EPA's own studies, water running off farm fields, city streets, and construction sites contributes 50 percent of the pollution to our nation's water every year and is the leading water quality problem in our lakes and estuaries, with an estimated annual cost of more than $6.1 billion (e.g., adverse impacts to stream biology, recreation, water storage, navigation, flood damage, and water treatment capability).

Responsibility for implementing nonpoint source pollution control measures must depend upon a rational and politically comfortable division of authority among the three levels of government that make up our federal system. With few exceptions, the states have historically demonstrated that they do not have the will, resources, or, in some cases, the expertise to regulate nonpoint source pollution on their own. In the current fiscal environment with more responsibilities, but less money, being shifted from the federal to the state level of government, this record is not going to improve.

Any nonpoint source program must have the federal government as a major component to ensure that the problem receives sufficient national attention, that disparities do not arise among the states, and that effective controls are implemented in the field. This means that the federal government must set standards, oversee and enforce implementation of program requirements at the state level, and provide technical and financial assistance to the states in the nonpoint source program as it does for any other pollution control program. Should the states not be effective partners, the costs of nonpoint pollution warrant direct federal regulation of nonpoint source pollution.

Robbi J. Savage

Executive Director
Association of State and Interstate Water Pollution Control Administrators

State governments have the primary management responsibility for nonpoint source programs. State water quality managers, dedicated to the protection and enhancement of water quality nationwide, have known for decades that nonpoint source problems could be masked by the clearly evident and well defined impacts of point source pollution. At the request of EPA, the Association of State and Interstate Water Pollution Control Administrators (ASIWPCA) embarked on a national quality baseline study to document existing programs and evaluate future progress.

While ASIWPCA is convinced that effective management of the nonpoint source program requires states to have the lead, it is clear from survey results that control of nonpoint sources

demands an enhanced state/local/federal partnership. Because nonpoint source pollution is diffuse and usually caused by rainwater runoff from activities such as construction and agriculture, impacts vary widely. Hence a state-by-state, even a watershed-by-watershed, approach is most effective.

ASIWPCA documented that the majority of the nation's waters have minimal or no known impacts from nonpoint sources. However, nonpoint sources are affecting 165,000 river miles, 8.1 million lake acres, and 5,400 estuary square miles. And of assessed waters, seven percent of rivers and six percent of lakes are severely impaired. These impacts are significant and require action.

The results of the ASIWPCA project demonstrate that nonpoint sources are being addressed by state, federal, and local governments, as well as the private sector, and that solutions must be developed on a site-by-site basis considering the unique geography, geology, and climatic conditions along with the pollutants and sources involved. This kind of environmental management cannot take place from the shores of the Potomac. It can take place *only* at the state and local level.

Most environmental professionals agree that federal compliance deadlines and/or standardized regulations are not workable solutions to this diverse, intermittent, and localized pollution. But, because of the complexity of the problems, states cannot do the job alone. An effective partnership is essential:

- EPA technical assistance is needed.
- EPA and other federal agencies need to place a high priority on water quality-related nonpoint source pollution control to accomplish the goals of the Clean Water Act.
- Additional funding and staff resources are needed from all public and private sources.

The ASIWPCA project's findings have already been put to good use. For example, more funding has been secured for state activities, working relationships between state and federal agencies have been strengthened, state programs are becoming more effective, and public support has increased. Our organization is convinced that these efforts indicate that, while improvements are called for, the existing partnership is working and that this relationship should be supported and enhanced.

Neal Potter

Council Member
Montgomery County Council
Maryland

Nonpoint source pollution comes from everywhere—sewers, highways, farms. For this reason, the controls—and the community education—also need to be everywhere. Education, monitoring, and peer pressure are best organized on a local level. This means that cities, counties, soil districts, etc., must do most of the daily work.

But just as knowledge of the situation and peer pressure are local functions, the "back pressure" or resistance to regulation are most effective at this level as well. Favoritism and letting pollution run off onto somebody else is a likely weakness of a purely local enforcement system. The states must have a hand ensuring that local governments are doing their job and are not dumping their pollution on other people or jurisdictions.

In the same way, since most of our water courses are interstate, there is a need for federal standards and controls. Temptation is strong for state regulators to be lenient in the enforcement of difficult requirements on local businessmen and farmers. Farm states are reluctant to bear down on the use of fertilizers and pesticides; urban states may neglect stormwater runoff protection.

The federal and state governments must provide support for local cleanup efforts. The big expenditures for cleanup often come in jurisdictions (e.g., in worked-out mining areas) where revenue sources are inadequate.

Federal leadership is essential because most of the serious pollution is downstream from the pollution source. Those who have the greatest motivation for cleanup are often in a different jurisdiction from those who produced the problem. But the daily work that can bring success to the national effort is most efficiently and effectively carried out at the local level.

Robert Warrick

Farmer
Meadow Grove, Nebraska

In 1975, President Ford was in Omaha, Nebraska, holding one of his "White House Conferences," and Russell Train was then EPA Director. I was invited as a representative of the environmental community and asked a question about the cost of controlling nonpoint source pollution in the state of Nebraska. Mr. Train acknowledged the problem, but said the cost would be prohibitive, running into the billions of dollars, and even then might not be controlled completely. This impressed me, as I was delivering to him a proposal for one of the first demonstration projects to control nonpoint source pollution. I was then chairman of the Lower Elkhorn Natural Resources District. The demonstration project later proved that nonpoint pollution can be brought down to acceptable limits.

Since then, the Natural Resources District has moved ahead in actively involving landowners in a cooperative agreement with funding from local, state and federal sources in a program of soil conservation that is slowly achieving agricultural sediment control. While this is a voluntary program, it does give the public confidence that a soil conservation program can work with adequate funding and an active

partnership of federal, state, and local control.

In Nebraska, since the largest single source of nonpoint pollution is soil sediment from agricultural land, the congressional passage of the 1985 U. S. farm bill opens a new chapter in soil conservation. Two major sections of the conservation program deal with controlling soil erosion. The Conservation Reserve will idle up to 40 million acres of highly erodible land, and the conservation compliance section will place conservation practices on land that is highly erodible.

These two sections, if fully and adequately implemented, will help greatly in controlling erosion of soil into the nation's rivers and lakes. It is important that adequate funding be available from local, state, and federal governments. The Soil Conservation Service is the agency that works with local farmers to place the conservation practices on the land. They are now faced with massive budget cuts by the Reagan Administration. Without a viable Soil Conservation Service, it is questionable if the conservation section of the farm bill can be properly implemented.

The successful control of soil sedimentation depends upon the local landowner and a cooperative agreement between local, state, and federal governments. If one of them abrogates responsibility, soil conservation is threatened. Hopefully, all will cooperate to properly implement the 1985 farm bill conservation section, thus helping to solve a major source of Nebraska's nonpoint pollution problem.

Forrest V. Schwengels

Iowa State Senator and Chairman, Senate Committee on Natural Resources

Nonpoint source pollution is contaminating the nation's surface-water and ground-water supplies. Contamination of these water supplies may affect your drinking water, your fishing spots, or your recreational streams and lakes.

The major source of nonpoint pollution is from chemicals commonly used on cultivated farmland. Chemicals such as fertilizers, insecticides, herbicides, and animal wastes are applied to the field and become a dispersed source of potential pollutants. The forces of nature, through precipitation and wind, transfer the contaminants into the surface waters and the ground water of our nation. Because nonpoint sources are so dispersed, it is not possible to pinpoint the specific location or source of the chemicals contaminating a particular body of water.

Solutions to nonpoint problems will only be achieved through the efforts and cooperation of farm operators. However, these farm operators cannot solve them on their own. The recent price squeeze on farm producers has forced more erodible land into production and intensified the dependence upon chemical aids to increase production and income. The economic squeeze also extends to state and federal funds for conservation practices and related programs.

It is necessary, therefore, for the states to educate farm operators on the seriousness of the problem. State and local governments must cooperate in providing educational programs to encourage and/or mandate acceptable levels of soil conservation and better chemical management to safeguard against contamination of water supplies.

Each state should provide a program through legislation to establish soil loss limits, to give technical assistance on chemical management, and to formulate long-range plans for achieving these goals. Program funding should be provided through a soil conservation department, and educational materials distributed to show farm owners and operators how to reduce soil loss, provide for better chemical management, and improve economic returns without a large investment.

Increased funding levels from both state and federal sources are needed to carry out these programs through the state and local structures.

Our goal should be to arrive at a state of non-depletion of soil and water quality by a specified date. A strong effort must be made to involve the media in this education effort, especially stressing the goal of water suitable for drinking, swimming, and fishing.

The federal government should be involved by passing a law requiring each state to develop a nonpoint pollution strategy which would come from the state plan. The funds should be channeled through EPA to support that program and to give incentives to states to develop nonpoint pollution programs on a watershed basis. □

Update

A review of recent major EPA activities and developments in the pollution control program areas.

AIR

GM Recalls

General Motors Corporation is recalling approximately 83,000 1980 model-year vehicles that are exceeding the federal hydrocarbon emissions standard.

The recall announcement settles legal proceedings between GM and EPA which started shortly after EPA ordered the automobile manufacturer to recall 186,000 cars in March 1984. Negotiations and additional testing by EPA resulted in a settlement of the litigation and GM's present recall of 83,000 vehicles with 5-liter engines. The remainder of the original 186,000 vehicles, which have 5.7-liter engines were not affected by the recall.

The affected GM vehicles are the 1980 Buick Riviera and the 1980 Oldsmobile Delta 88, Ninety-Eight, Toronado, and Custom Cruiser Wagon models equipped with 5-liter engines.

GM will remedy the emissions problem by modifying the ignition spark timing systems of the vehicles.

HAZARDOUS WASTE

Cleanups to Accelerate

EPA will immediately accelerate its Superfund hazardous waste site cleanup program with new funds recently approved by Congress and President Reagan.

Congress passed the interim funding measure giving the Agency $150 million to effectively restart the Superfund program.

The Agency was forced to delay work at 114 sites across the country, as well as scale-down some emergency response and short-term removal actions. Without the additional funding, the Agency was prepared to begin shutting down the program entirely.

As of this writing, Congress continued to debate a five-year renewal of the program in a House-Senate Conference Committee.

Appointments

Edwards

Sanderson

Knight

DeRemer

R. Augustus Edwards has been appointed EPA's Deputy Assistant Administrator for External Affairs. Edwards joined the Agency in January as an expert-consultant after 10 years on Capitol Hill, where he was an administrative assistant in the House of Representatives and the Senate. Prior to his work in the Congress, he was a reporter covering local, state, and federal government and politics for a daily newspaper in his home state of Virginia. Edwards will play a key role in EPA's communications efforts.

Richard E. Sanderson, who had served as Deputy Assistant Administrator for External Affairs since 1983, will serve as Associate to the Assistant Administrator for Negotiations, Office of External Affairs, and will specialize in negotiating ecological issues with other federal agencies. He has recently coordinated the conclusion of agreements between EPA and the Army Corps of Engineers on the definition of "fill material" and Section 404(q) of the Clean Water Act.

Margery (Peggy) Harlow Knight has been appointed Director of EPA's Office of Private and Public Sector Liaison. This office coordinates regulatory partnership with the states and liaison with environmental, citizen, and industry associations. She served as Deputy Assistant Director of the Office of Volunteer Initiatives at ACTION from 1982 to 1985. Mrs. Knight previously served at EPA from 1971 to 1972 and at the Federal Water Quality Administration from 1970 to 1971. She was Assistant for Congressional Relations to the Vice President from 1969 to 1970, and assistant to U.S. Senators Everett Dirksen and Peter H. Dominick from 1961 to 1968. She worked on the White House Staff from 1968 to 1969 and 1972 to 1973. She is an alumna of George Washington University.

Craig DeRemer has been appointed Director of EPA's Office of Congressional Liaison. He has served as Deputy Director and then Acting Director of the office since he joined EPA last year. He previously served on the staff of the Public Works and Transportation Committee of the U.S. House of Representatives from 1981 to 1985, where he had responsibility for key environmental legislation, including the Clean Water Act, Superfund, and water resources development. He served as a legislative specialist and water resources planner with the U.S. Army Corps of Engineers. DeRemer graduated magna cum laude from the State University of New York at Buffalo, and holds a master's degree in natural resources management from Colorado State University. □

PESTICIDES

Complaint Issued

EPA announced that it has issued an administrative complaint against Advanced Genetic Sciences, Inc., (AGS) of Oakland, CA and has suspended the firm's experimental use permits. An agency investigation confirmed that tests by the company on its genetically altered bacterial pesticide Frostban were conducted on an open rooftop rather than in an enclosed facility as required by EPA.

The agency is seeking a total of $20,000 in penalties for four violations under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA).

The violations include 1) the environmental release of two genetically engineered microbial pesticides, and 2) misrepresenting parts of applications for experimental use permits.

The AGS products contain genetically altered strains of naturally occurring bacteria. The natural bacteria, P. syringae and P. fluorescens, promote the formation of ice on plants by producing a protein which serves as a seed for the formation of ice crystals.

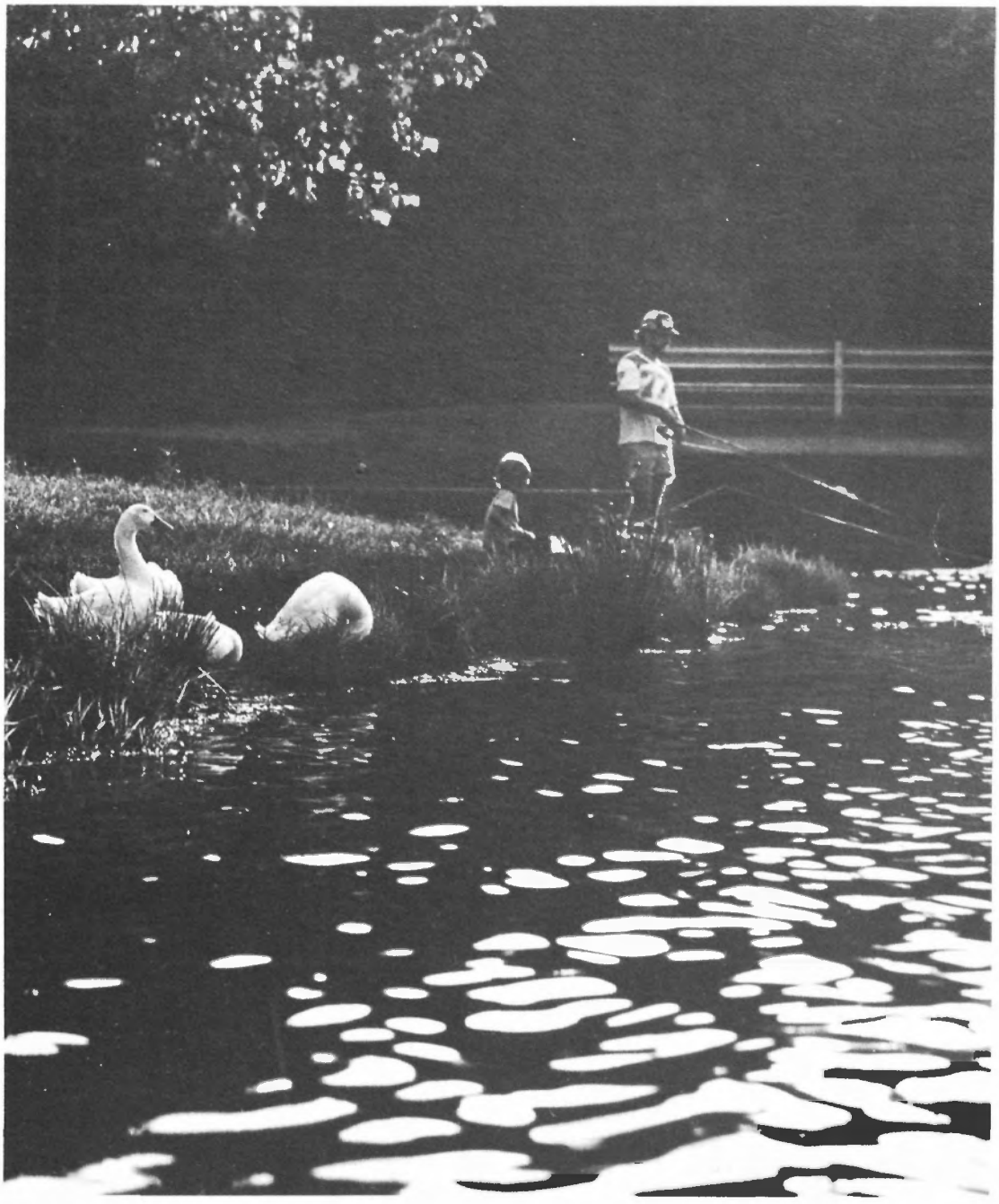
WATER

Estuary Program

EPA is adding San Francisco Bay and Albermarle/Pamlico Sounds (North Carolina) to a national program to protect and restore their water quality and aquatic resources.

The action will provide initial funding of $350,000 for the San Francisco Bay and $300,000 for Albermarle and Pamlico Sounds under the National Estuary Program.

The National Estuary Program began last year under a direct congressional appropriation of $4 million for four estuaries. It seeks to create a master environmental plan to control point and nonpoint (runoff) pollution. □



"The Clean Water Act doesn't tell us to just hold the line. It requires us to make the nation's waters literally fishable and swimmable."

Lee M. Thomas *(See story on page 2.)*

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