The Volunteer Monitor

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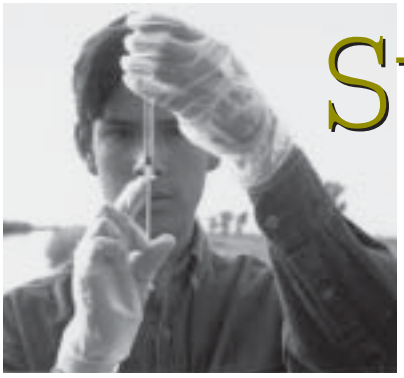

Success Stories

Inside

The Volunteer Monitor

The Volunteer Monitor is a national newsletter, published twice yearly, that facilitates the exchange of ideas, monitoring methods, and practical advice among volunteer monitoring groups.

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FROM THE EDITORIAL BOARD

"Success"

In this issue we focus on a particular kind of volunteer monitoring success: instances where volunteer-collected data brought about a tangible result by discovering a problem, documenting high water quality, measuring an improvement, or revealing a trend or pattern. In evaluating stories for possible inclusion in the issue, we asked, Did the monitoring lead to a demonstrable outcome?

Some people objected that our criteria were too narrow—"painfully uninclusive," one put it. They said, We have dedicated volunteers who've monitored their lake for years but not seen any big change or problem. Aren't they sucessful? They said, We did side-by-side comparisons with professionals and our monitors came through with flying colors. Doesn't that count as success? They said, We doubled the number of sites we monitor, designed our own home-made sampling devices, published our results in an attractive brochure that we distributed to the community. Aren't these successes?

Yes, yes, and yes. Those are all successes, unquestionably. Yet it also seems useful and valuable to pose the narrower question that we asked for this issue. Volunteer monitoring's broader kinds of accomplishments have been celebrated often, in these pages and at volunteer monitoring conferences. Examples where volunteers' data made a clear difference are a little harder to come by, but they are out there—and now some of them, at least, are in here, in this issue. We were excited and heartened to learn about the numerous and varied ways volunteer monitoring information has been used, both by the monitoring groups themselves and by a variety of watershed managers and scientists. We hope you will be, too.

Coming Soon!

October 18th is National Water Monitoring Day

Join in the celebration of the 30th anniversary of the Clean Water Act by participating in National Water Monitoring Day this October 18th (the day the Clean Water Act was signed into law).

Government agency and volunteer monitors, including students and the general public, will take to their local waters on or about October 18th to sample a core set of water quality parameters, including temperature, pH, turbidity, and dissolved oxygen. All protocols, equipment, and monitoring methods are welcome. Those who've never tested their water before can use a simple four-parameter kit available for $16.75 from the Year of Clean Water Website at *www.yearofcleanwater.org.*

To participate, register your monitoring location at the Year of Clean Water Website before October 18th. Once you collect your National Water Monitoring Day data, enter it immediately on the same Website. That data will be available to all and will be used to issue a report on the event.

National Water Monitoring Day will also feature water festivals, educational events, and widespread press coverage. This will be a great opportunity to inform your community about your monitoring program, build partnerships with state and local agencies, and celebrate the accomplishments of your volunteers and of the Clean Water Act.

continued at right

THE STEWARDSHIP FACTOR:

A (Slightly) Dissenting View

by Steven Hubbell

I agree that the use of volunteer data to protect and improve water resources is an important accomplishment worthy of acclaim. I am also convinced that involving citizens in environmental monitoring promotes individual environmental stewardship in ways that have yet to be adequately communicated, and that, due to the sheer cumulative volume of this influence, cannot help but exceed the impact of those rare occasions where water quality improvements can be quantitatively demonstrated.

Volunteer monitoring programs that don't have a handy "how we saved the river" story to print should be encouraged to learn that in a recent survey distributed to our monitors, about two-thirds (20 out of 31 respondents) reported that participation had increased their stewardship behavior a great deal, one-third said it had influenced them somewhat, and only one person reported no influence. In written comments, many respondents mentioned increased awareness of watershed issues—for example: "I am more aware of pollution, such as fertilizers getting in the water"; "... more aware of where our drinking water comes from"; "... more aware of how common household products affect watersheds."

When asked whether their involvement had influenced others, more than half of the respondents gave examples to demonstrate their belief that it had. Asked whether volunteer monitoring was accomplishing their objectives, 100 percent reported that it was. The average duration of monitoring involvement reported by survey respondents was 3.5 years.

These responses reinforced our belief that volunteer monitoring does, indeed, quantifiably impact personal behavior. If we can agree that fostering responsible stewardship is a worthwhile investment, then we will also appreciate that the range of volunteer monitoring "success stories" is delightfully more rich and textured than simply the "data use" stories. It is in the marriage of credible data use and increased stewardship behavior that the true potential and vitality of citizen monitoring begins to emerge.

Steven Hubbell is Program Coordinator for the Lower Colorado River Authority's Colorado River Watch Network in Austin, Texas, and a member of The Volunteer Monitor editorial board. To request a copy of the survey and results, please email steven.hubbell@lcra.org.

NATIONAL WATER MONITORING DAY, continued

Planning is being spearheaded by America's Clean Water Foundation and a steering committee representing government agencies and volunteer monitoring organizations. Check out *www.yearofcleanwater.org* for updates. Volunteer monitoring program coordinators with questions about National Water Monitoring Day should also feel free to contact Alice Mayio, EPA National Volunteer Monitoring Coordinator, at mayio.alice@epa.gov; 202-566-1184.

PUBLICATIONS FROM EPA

The U.S. Environmental Protection Agency (EPA) has produced a number of publications to assist volunteer monitors. The following are available at EPA's volunteer monitoring Website, www.epa.gov/owow/monitoring/vol.html. Starred publications may also be ordered, at no charge, from the National Service Center for Environmental Publications, 800-490-9198.

Starting Out in Volunteer Water Monitoring. EPA 841-B-98-002, 1998. Fact sheet.

***Proceedings of the Sixth National Citizen's Volunteer Water Monitoring Conference.** EPA 841-R-01-001, 2001. Papers from 56 presentations and workshops. 216 pages. Proceedings for previous conference also available.

***National Directory of Citizen Volunteer Environmental Monitoring Programs, 5th Edition.** EPA 841-B-98-009, 1998. Information on 772 volunteer monitoring programs across the nation. 247 pages. Updated online version available at EPA's volunteer monitoring Website (see above).

***The Volunteer Monitor's Guide to Quality Assurance Project Plans.** EPA 841-B-96-003, 1996. Guidance for developing a quality assurance plan to document volunteer monitoring lab and field procedures. 59 pages.

***Volunteer Wetland Monitoring: An Introduction and Resource Guide.** EPA 843-B-00-001. Not a methods manual, but offers resources and advice. Available from Wetlands Helpline, 800-832-7828.

METHODS MANUALS

Volunteer Lake Monitoring: A Methods Manual. EPA 440-4-91-002, 1991. 121 pages.

***Volunteer Stream Monitoring: A Methods Manual.** EPA 841-B-97-003, 1997. 210 pages.

Volunteer Estuary Monitoring: A Methods Manual. Jointly prepared by EPA and The Ocean Conservancy. Available online at www.epa.gov/owow/estuary/nep.html.

Protecting a Postcard-Perfect Lake


JEFF SCHLOSS

by Eleanor Ely

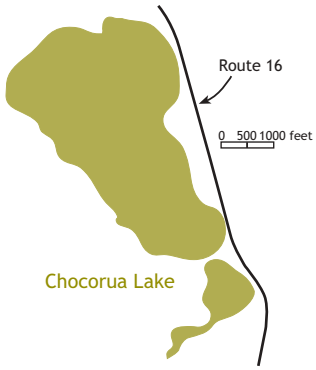
The view across Chocorua Lake, with Mount Chocorua mirrored in the pristine waters, graces many a New Hampshire brochure, calendar, and postcard. Not only is Chocorua one of the state's most-photographed lakes, it's also one of the best protected. Thanks to conservation easements that require houses to be set back, most of the perimeter is forested, protecting both views and water quality. In addition, Chocorua is one of just three lakes in New Hampshire on which motorized watercraft are banned.

But even the most carefully tended scenic treasure can still be vulnerable. Wanting to keep close tabs on water quality, and knowing that the state environmental agency monitored Chocorua Lake only occasionally, the Chocorua Lake Association (CLA) signed on in 1979 as one of the first participants with the University of New Hampshire's newly created Lakes Lay Monitoring Program (LLMP). CLA volunteers measure Secchi depth, temperature, and chlorophyll weekly during the summer, and phosphorus (an important nutrient in lakes) sporadically.

Signs of trouble

In 1994, Toby Page, one of the CLA volunteer monitors, was graphing the data and noticed that Secchi depth had declined by about 20 percent over the lifetime of the monitoring program, and that

chlorophyll readings had increased. "On a hunch," he says, he took samples of the runoff from a public-access beach adjacent to Route 16, a state highway that closely borders the eastern side of the lake. Testing at the LLMP lab revealed phosphorus concentrations as high as 28 ppb (parts per billion). By comparison, the background phosphorus level in pristine streams around the lake is about 4 ppb.



Page says, "I had never before paid attention to the gullies running across the beach after storms. All of a sudden they took on a new meaning. I realized there was a runoff problem from Route 16."

With the help of Ken Kyle of the New Hampshire Department of Transportation and Rick Ellsmore of the Natural Resources Conservation Service, CLA members mapped a system of 22 culverts under Route 16 that fed runoff from a mile of the highway, as well as from the surrounding hillside, directly into Chocorua Lake.

EVEN THE MOST CAREFULLY TENDED SCENIC TREASURE CAN STILL BE VULNERABLE.

Further evidence of the highway's contribution of sediment and phosphorus came from several "synoptic surveys"—blitzes during which CLA members sampled 40 or so areas around the lake in the space of a few hours. At the LLMP lab, the samples were analyzed for phosphorus, which is a good marker for sediment because it clings tightly to soil and other particles. The snapshots showed that phosphorus levels were higher in places where runoff from the culverts entered the lake.

Working toward a solution

At this point, says Page, the Association "got serious" about finding a solution to the runoff problem. Page sought advice from LLMP coordinator Jeff Schloss, who recommended that as a first step the Association should try to get the lake classified as "Category I" (a designation indicating that a water body is impaired or faces imminent threats). That classification would allow the lake to qualify for state funds for restoration. Using their data as evidence for declining water quality, CLA succeeded in obtaining the Category I listing in 1998.

CLA then enlisted help from a wide variety of key players, eventually getting 12 agencies involved. Schloss says, "The major key to success was that the Association talked to everyone right from the start—state agencies, planning agencies, the town." With all the groups at the table, Page says, "things started to snowball." However, there was a small hitch: the state Department of Transportation (DOT) was unwilling to commit funds to mitigation without stronger evidence that runoff from Route 16 was a significant contributor to the problems.

Strengthening the case

To provide the evidence that DOT wanted, CLA and LLMP teamed up to perform a "nutrient budget" to quantify the total amount of phosphorus loading to the lake from all sources. Such a study, which requires comprehensive data on both phosphorus levels and water inputs, traditionally costs $100–250,000 if carried out by a government agency or a consulting firm. But in this case, extensive assistance from CLA volunteers and University of New Hampshire students kept the cost under $10,000. CLA volunteers collected and preserved hundreds of water samples from runoff sites and tributaries; these were later analyzed for phosphorus by LLMP. The volunteers also monitored staff gages in tributaries, collecting stream height data to

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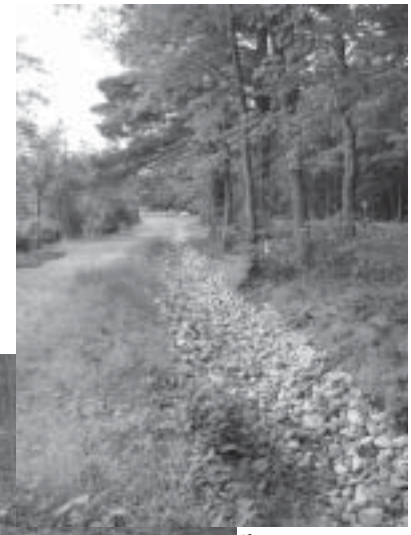
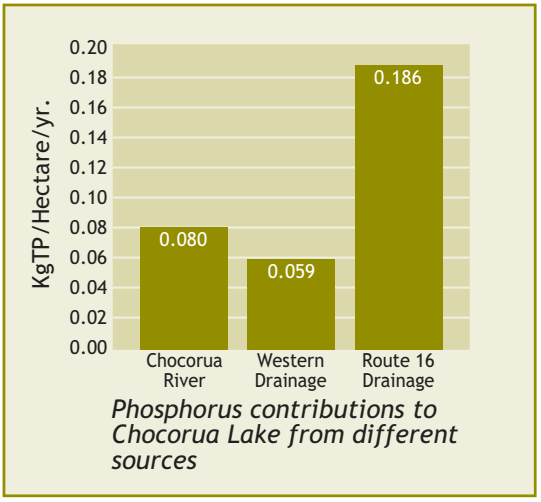

JEFF SCHLOSS


JEFF SCHLOSS

Highway runoff to Chocorua Lake has been dramatically reduced since the Department of Transportation installed diversion ditches (above) and swales (above right).

The study revealed that (a) in absolute terms, the highway was not the biggest contributor of phosphorus, but (b) in terms of both the size of its drainage basin and the amount of its water inflow, it was contributing three times as much as any other source. These findings persuaded DOT to install a variety of structures, including diversion ditches and culvert extensions, to reduce the amount of highway runoff reaching the lake.



Phosphorus contributions to Chocorua Lake from different sources

"I WOULD HAVE BEEN HAPPY TO SEE A 50 PERCENT REDUCTION IN PHOSPHORUS. INSTEAD WE'RE RUNNING BETWEEN 84 AND 92 PERCENT."

Mission accomplished

Most of the highway work was completed by the summer of 2000. Improvement has been dramatic. "I would have been happy to see a 50 percent reduction in phosphorus," says Schloss. "Instead we're running between 84 and 92 percent reduction at the restored areas."

At the July 2000 dedication ceremony for the restoration project, Sherry Godlewski, a Watershed Coordinator at NH Department of Environmental Services, praised the volunteers, calling them "the hub of the wheel that made the project a success" and stating that "they provided the factual data on which decisions were made."

For more information contact Jeff Schloss, NH LLMP, UNH Cooperative Extension, 224 Nesmith Hall, 131 Main St., Durham, NH 03824; jeff.schloss@unh.edu; 603-862-3848.

Other LLMP Successes

The Lake Chocorua project is not the first major success story of the NH LLMP. Over its 24 years of operation the program has chalked up many accomplishments:

- In-lake nutrient samples used to improve landscaping practices, reducing impacts of a shoreline condominium development (Lake Winnipesaukee).
- Lake monitoring efforts a major reason for highway route changes around a wetland bordering a LLMP-monitored lake (Baboosic Lake).
- Sediment runoff problems at construction site revealed by post-storm-event lake water clarity monitoring; led to issuance of cease-and-desist order (Newfound Lake).
- LLMP monitoring results allowed lakes to receive assistance through the Clean Lakes Program (Beaver Lake, Flint's Pond).
- Sewer system bonds passed using LLMP chlorophyll and nutrient monitoring information (Beaver Lake, Baboosic Lake).
- Vegetated buffer zones and shoreline setbacks expanded for shoreland park athletic fields due to LLMP nutrient and bacteria results (Naticook Lake).
- Poorly planned, high-impact development projects scuttled by volunteers using LLMP data (Beaver Lake, Squam Lake, March's Pond, Swain's Lake).
- "No-rafting" zone (prohibits dense congregations of moored boats) posted in shallow bay based on weekend-versus-weekday nutrient level monitoring by LLMP volunteers (Winnipesaukee).
- LLMP participants empowered to get involved in local boards and commissions (about two dozen individuals we know of, and probably others we have not heard about).

—Jeff Schloss

Sewers get ATTENTION

by Abby Markowitz

Like many East Coast urban centers, Baltimore has a 100-plus-year-old sewer system, plagued with chronic leaks and undetected breaks, that runs directly under streams, following the course of their channels. Two years ago most Baltimoreans didn't know that their city's streams routinely contain sewage bacteria at levels over 10 times—and sometimes over 100 times—the state standard of what is considered safe for public health in recreational waters (200 fecal coliform bacteria per 100 mL).

Although the City has 10 years of data clearly indicating very high fecal coliform levels throughout Baltimore's watersheds, there were few—if any—warning signs posted to alert people to the problem. That is, until volunteers of the Herring Run Watershed Association (HRWA) became involved in monitoring the stream. Rich Hersey, HRWA's Executive Director, says, "It wasn't until the City's Health Commissioner was confronted with evidence collected by volunteers, corroborated by the Johns Hopkins Center for Water and Health and publicized on the front page of the *Baltimore Sun*, that workers actually nailed large red warning signs to streamside trees throughout the watershed."

In 2000, HRWA volunteers took part in two projects to assess bacteria levels in streams. In April they began using a simple LaMotte "GREEN" kit to monitor fecal coliform levels biweekly at 26 sites. Initial results showed 92 percent of samples exceeding the state standard. Then Kellogg Schwab, a scientist at the Center for Water and Health at the Johns Hopkins School of Public Health, heard about the project and asked the volunteers if they would be interested in collaborating on an investigation of fecal contamination in Baltimore waters. Schwab was initiating a study to evaluate different indicators of fecal pollution and also investigate ways to determine whether contamination is of human or animal origin. Volunteers collected water samples that were analyzed at the Center's lab for fecal coliform bacteria, *E. coli*, enterococci, and bacteriophages (viruses that infect bacteria).


DAN DILLON

Student collects sample for bacteria testing.

Armed with the data from both studies, HRWA called a reporter from the *Baltimore Sun*. On Sunday, March 4, 2001, the newspaper's front page headline read "City's Streams a Health Hazard." The article detailed the efforts of HRWA to monitor the stream, publicize the unsafe levels, and advocate for warning signage and city-wide infrastructure repairs. It also noted that city agencies were aware of the problems and had, in fact, been monitoring bacteria levels for 10 years without seeing any improvements. As a result of the publicity, Baltimore officials immediately posted polluted-water signs along all city streams.

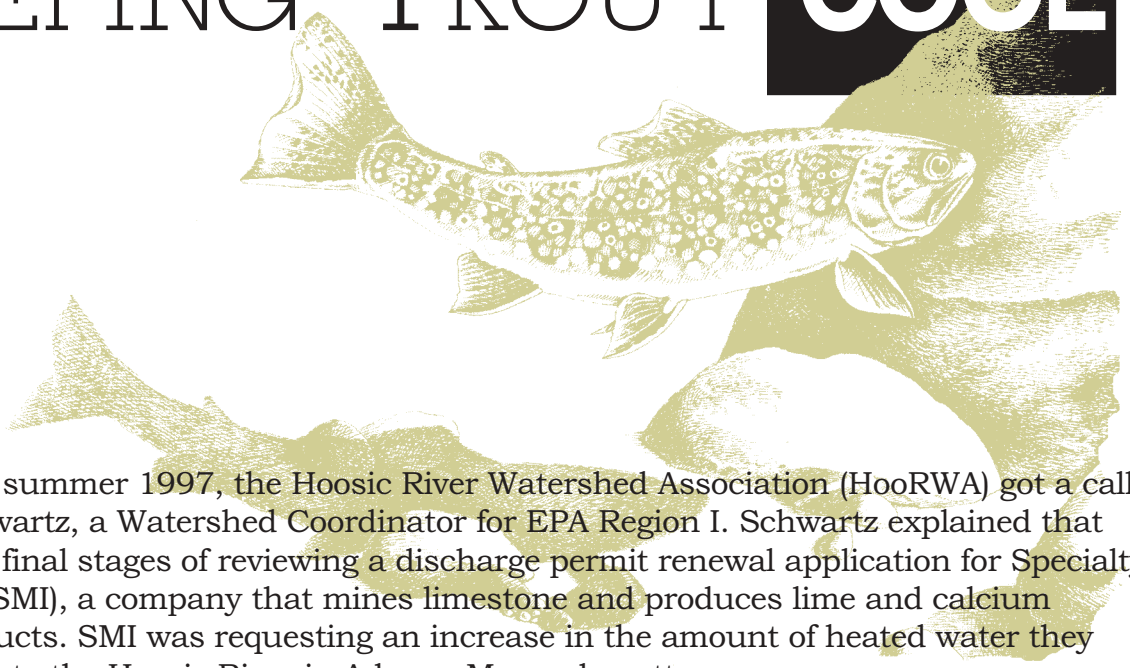
In Herring Run, volunteer monitors used their own data to publicize a serious problem and successfully advocate for both immediate and long-term changes. Through the collaboration with Johns Hopkins, the volunteers have also become directly involved in ongoing studies that will improve the ability to assess fecal contamination in urban waters. According to both Schwab and Hersey, these experiences have increased HRWA's confidence in its own data and bolstered the organization's credibility with watershed residents, the media, and government officials. In addition, the group's work over the last two years has given HRWA a place at the table where ideas are discussed and decisions are made.

Postscript: Over the past several months, the City has been involved in negotiations with the U.S. Environmental Protection Agency and the Justice Department, which were threatening to sue Baltimore for Clean Water Act violations related to the failing sewer system. The City and the federal government have now settled, and City officials are gearing up to repair the entire system by 2014, at a cost of close to one billion dollars.

For more information contact Richard Hersey, Executive Director, HRWA, 4337 Harford Rd., Baltimore, MD 21214; 410-254-1577, watershed@herringrun.org; www.herringrun.org; or Kellogg J. Schwab, Assistant Professor, Johns Hopkins Bloomberg School of Public Health; 410-614-5753; kschwab@jhsph.edu.

Abby Markowitz is a Senior Environmental Scientist at TetraTech, a resident of the Herring Run watershed, and a member of the Herring Run Watershed Association.

Keeping Trout COOL



by Eleanor Ely

One day in late summer 1997, the Hoosic River Watershed Association (HooRWA) got a call from Myra Schwartz, a Watershed Coordinator for EPA Region I. Schwartz explained that EPA was in the final stages of reviewing a discharge permit renewal application for Specialty Minerals, Inc. (SMI), a company that mines limestone and produces lime and calcium carbonate products. SMI was requesting an increase in the amount of heated water they could discharge to the Hoosic River in Adams, Massachusetts.

Only a few days were left in the comment period, Schwartz said. Did HooRWA want to comment?

Yes, HooRWA did indeed want to comment. Eight years earlier the group had conducted a detailed study of thermal problems in the affected section of the river. They had collected temperature data three times a week from late June through early October at 11 locations, including sites above and below the SMI discharge.

Upon receiving the EPA call, HooRWA quickly gathered more temperature data to confirm that the thermal problems still existed, then sent EPA a letter summarizing their findings and concerns. These included:

1. The 1989 study found that SMI's discharge raised the river's temperature by 1.25°F on average; during low water the average increase was 1.8°F. On numerous occasions, water temperatures below the discharge site were in the 72–77°F range.
2. SMI's discharge was not the only source of warming, or even the most important source. HooRWA's 1989 data revealed that the town's flood-control structures, built in the 1950s by the Army Corps of Engineers, warmed the water by as much as 7°F on warm sunny days.
3. Local Trout Unlimited members had reported to HooRWA that they caught three species of wild trout in the river, including the stretch near the SMI discharge. Trout are coldwater fish that do best between 46 and 66°F; a temperature of 75°F is potentially lethal for some species.

The letter stated HooRWA's belief that water temperatures in the river were placing the trout fishery

> "HooRWA brought up issues we hadn't even considered."

at risk, in violation of the antidegradation provisions of the state water quality standards. HooRWA also recommended that SMI should not "bear the entire burden" and urged EPA to take a holistic watershed approach. Specifically, HooRWA recommended that EPA explore ways to mitigate the

effects of the flood-control structures.

"HooRWA brought up issues we hadn't even considered," says Schwartz. "First, they made us aware of the trout fishery, and second, they triggered attention to the flood-control structures, which ultimately led to a whole ecosystem restoration project."

The discharge permit

HooRWA's evidence for an existing trout fishery was backed up by the state Division of Fish and Wildlife. Even though the waters into which SMI discharges are not officially designated as a coldwater fishery, the state's water quality standards mandate that existing uses be protected. As EPA Water Quality Specialist Dave Pincumbe explains, this doesn't necessarily mean that coldwater criteria must be applied, but it does mean that protection of the trout must be a factor in setting discharge limits.

The recently completed draft permit for SMI allows for some flow increase while including a more stringent temperature limit than would have been the case without the HooRWA data. The permit limit is based on the assumption that the flood control structures will be modified to reduce temperature impacts. Thus it avoids placing an undue burden on SMI, in keeping with the holistic approach recommended by HooRWA.

According to Pincumbe, who took the lead in preparing the permit, HooRWA's study played an important role. "We relied heavily on their data," he says. "They collected it over many weeks and at frequent intervals. Without it, we wouldn't have had the ability to substantiate the temperature impacts." Indeed, the draft permit specifically cites "the comprehensive temperature study conducted by the Hoosic River Association" and uses HooRWA's data to estimate a "worst-case" instream temperature. Pincumbe adds that he is not aware of HooRWA's data being questioned by anyone involved in the permit process. "They did a very professional job," he says.

Adams's 2.2-mile-long flood-control system includes this 1.2-mile paved concrete chute, along with other sections having earth or gravel channels with concrete walls or riprapping. Water flowing through the structures is spread out over an unnaturally wide, shallow channel with little or no shading. "The summer sun just bakes the water," says HooRWA Executive Director Lauren Stevens.

The flood-control structures

HooRWA's documentation of the dramatic warming caused by the structures has had far-reaching repercussions. "The volunteer monitoring data really opened up the box," says Tom O'Brien, the Hoosic River Watershed Team Leader for the state's Executive Office of Environmental Affairs (EOEA). "It got people to look at the river's thermal problems more creatively, on a watershed scale."

EPA invited the Army Corps of Engineers to come to Adams and investigate options for improving the structures through the Ecosystem Restoration Program, which authorizes the Corps to use federal funds to restore habitat degraded by existing Corps projects—essentially, to undo the mistakes of an earlier era. "Once the Corps got involved, the restoration project took on a life of its own," says Lauren Stevens, HooRWA's Executive Director. The project is now in the feasibility-study phase, with various approaches being evaluated to ensure that they won't compromise flood-control capacity. Some of the options go well beyond simply lowering the water temperature. For example, in one scenario advanced bioengineering techniques would be used to provide trout spawning habitat and hiding places, as well as give the channel a more natural appearance.

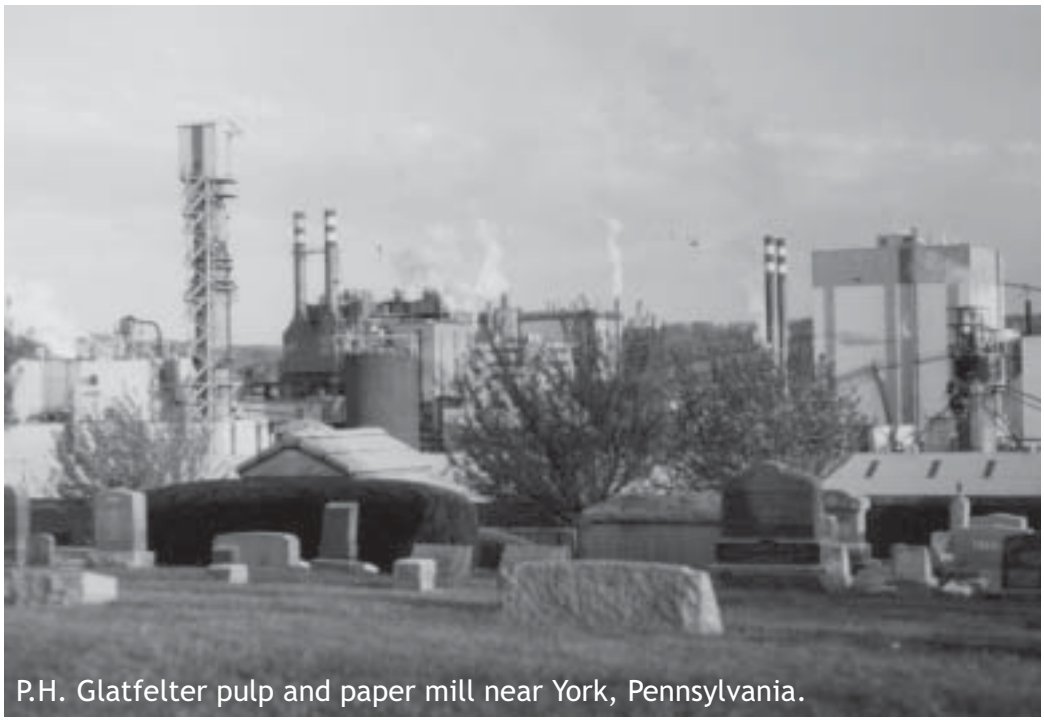
Back to life

HooRWA member Jerry Schoen, who helped collect the original data back in 1989, says that at that time the group distributed a report of their findings to government agencies and community groups, but there the matter rested. "It was frustrating," he says. "We knew we'd done a good job, but as an all-volunteer organization we didn't have the resources to follow through and push for action. Then when Myra's call came, our data emerged like a cicada from eight years underground. Seeing it come back to life and play a part in the rebirth of this urban river was a volunteer monitor's dream."

Lauren Stevens, Jerry Schoen, and Richard Schlesinger of HooRWA contributed to the writing of this article. For more information contact HooRWA at 413-458-2742.

The Case of the "Inky Stinky"

by Margo Andrews



JOHN KLUNK

P.H. Glatfelter pulp and paper mill near York, Pennsylvania.

In February of last year, a federal district court judge in Pennsylvania ruled against P.H. Glatfelter Company, a York-based pulp and paper mill, and in favor of a group of national, state, and local environmental organizations and activists, including the Codorus Monitoring Network (CMN) and its president and founding member, John Klunk. For decades, the mill had been discharging dark brown industrial wastewater into Codorus Creek. Often the discolored, malodorous discharge made up half the total volume of the small creek, earning it the local nickname of "the Inky Stinky." Volunteers with CMN began measuring water quality along the creek in 1990 and ended up engaged in an 11-year battle with the company and the state. Their efforts eventually forced corporate and state accountability and gave CMN a say in the use of settlement money earmarked for environmental improvements to the creek.

Local citizens formed CMN out of concern for the negative impact of Glatfelter's facilities on the creek. With support and training from the Chesapeake Bay Foundation and ALLARM (Alliance for Aquatic Resource Monitoring, based at Dickinson College), the volunteers conducted weekly testing for temperature, dissolved oxygen, nitrates, color, pH, and alkalinity. The monitoring showed reduced dissolved oxygen levels and higher temperature at the site just downstream of the discharge.

Permit battles

CMN members then decided to review the company's discharge permit and monitoring reports. This is when they learned of the

company's unlawful arrangement with the Pennsylvania Department of Environmental Protection (DEP) that had allowed violations of the federal Clean Water Act and the Pennsylvania Clean Streams Law to continue for years. Even though Glatfelter had consistently failed to meet color standards specified in its 1984 discharge permit and had also neglected to conduct impact studies and submit required technical reports, DEP had "administratively extended" the permit when it expired in 1989 and entered into an illegal side agreement that allowed Glatfelter to continue to exceed the 1984 permit limits.

At several DEP public hearings regarding the issuance of a new discharge permit, CMN members used their data to support their contention that color and temperature levels were altering the natural state of the creek. However, these efforts were unsuccessful and

> "Without the monitoring there wouldn't have been the activism."

the lenient standards were again upheld by DEP. Then, in 1999, John Klunk and CMN were contacted by the National Environmental Law Center and asked to stand as plaintiffs alongside other environmental groups (PennPIRG and the American Canoe Association) in a case against the plant. After the legal victory, Klunk commented, "The court ruling in our favor was clear vindication for our belief that the law should not allow such dramatically damaging discharges to continue. The company was violating the law and the state was not enforcing the law."

Under the August 2001 settlement, in addition to the $30 million in upgrades the company must implement by April 2004, Glatfelter was also obligated to establish a $2 million Codorus Creek Watershed Endowment to support environmental research, restoration, protection, and education. Klunk was asked to serve on the advisory committee that is now in the process of deciding how the money will be spent.

JOHN KLUNK

The mill's discharge into Codorus Creek.

Role of monitoring

As is often the case with volunteer monitoring data, the CMN data did not play an obvious and direct role in cleaning up the "Inky Stinky." The citizens' presentation of their data at the DEP public hearings did not change DEP's actions, and their data were not entered as evidence in the subsequent lawsuit. So, was the monitoring a waste of time? Definitely not, according to Klunk. First, he says, the monitoring was a tremendous educational tool for CMN members. "We were all kind of green," he says. "We didn't know anything about water quality or water testing. We would not have understood the problems with the discharge permit if we not had not been monitoring."

Second, the monitoring was a strong motivator. Klunk says, "When we saw our monitoring results—the lower dissolved oxygen and higher temperature—they made us feel very strongly that the discharge was impacting the creek and that this should not be going on." Finally, having the data in hand gave the group the confidence and expertise to go and testify at hearings. Bottom line, according to Klunk: "Without the monitoring there wouldn't have been the activism."

Thus, this story has many successes. CMN's regular volunteer monitoring not only led the group to investigate Glatfelter's permit, it also helped them establish credibility, enforce the Clean Water Act, and become influential decision-makers with a genuine say in the future of the creek.

Margo Andrews is an Environmental Scientist with Tetra Tech, Inc. She may be reached at 410-356-8993; Margo.Andrews@tetratech.com.

DREDGING IMPACTS:

Volunteer Data Clarify the Story

by Eleanor Ely

"For me the stunning thing was realizing I could have reached a wrong conclusion about the effects of a $1.2 million dredging project, had I had only our agency data to look at," says Robert Davic, an Environmental Scientist with the Ohio Environmental Protection Agency (EPA).

The project in question was a 1997-98 dredging of Sippo Lake that was partially funded by a U.S. EPA Clean Lakes Program grant administered by Ohio EPA. This publicly owned shallow lake, located in an urban watershed, had long been plagued with a heavy growth of coontail *(Ceratophyllum demersum)*, to the extent that boating was impossible.

The dredging followed a decade of attempts by the Stark County Park District, which manages Sippo Lake, to control the plant growth. From 1988 through 1989 triploid (sterile) grass carp were introduced to the lake, and from 1992 through 1995 plants were removed by mechanical harvesting. These methods were only partially successful, and the Park District had difficulty keeping up with the harvesting every year. In the hopes of achieving a long-term solution, the dredging project was undertaken with the goal of increasing average depth in the central part of the lake to 8–10 feet so that plants would not receive sufficient sunlight for optimal growth.

The dredging project removed about 250,000 cubic yards of bottom sediment and achieved its primary aim. Plant growth and biomass in the center of the lake were dramatically reduced, enabling lake users to enjoy recreational boating.

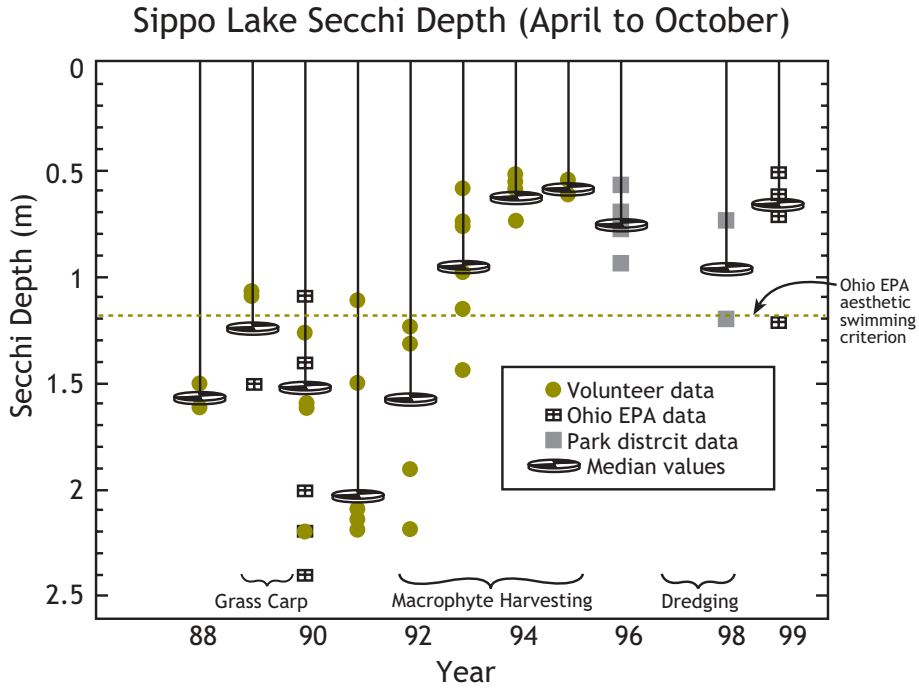
But did the recreational improvements come at a cost to water quality? That was the question Davic wanted to answer when he sat down in the summer of 2000 to prepare a report assessing the impacts of the dredging project. Pulling out a report summarizing the results of an Ohio EPA 1989-90 diagnostic study of Sippo Lake, he saw that the Secchi readings he had made in 1989 and 1990 were

OHIO EPA

Weeds in Sippo Lake.

about double what he had measured in 1999, a year after dredging was completed.

Davic's first thought on reviewing those three years of Secchi data, which were all that EPA had collected, was that the dredging had had a significant negative impact, markedly decreasing water clarity in the lake. It was a reasonable enough assumption. Aquatic plants absorb some phosphorus and nitrogen from the water column through their leaves. When plants are removed, more of these nutrients are available in the water column to promote algal blooms. (Phosphorus is of greatest concern because it is the rate-limiting nutrient in most lakes.) In addition, reducing plant growth allows more sunlight to penetrate, which further encourages algal growth. So it is fairly common to see increased turbidity following lake dredging projects. Coontail, in particular, can have a dramatic effect on both nutrient levels and water clarity. Even though coontail anchors to the bottom, it has no true roots, so it gets all its nutrients from the water—thus, lakes with heavy coontail growth are often very clear.



DAVIC'S FIRST THOUGHT WAS THAT THE DREDGING HAD HAD A SIGNIFICANT NEGATIVE IMPACT

Davic wanted more data to verify his hypothesis, and he knew where to find it. Since 1988 Ohio EPA had funded a volunteer lake monitoring program coordinated by the Northeast Ohio Four County (NEFCO) Regional Planning and Development Organization. Each year, NEFCO sent a report to EPA with data on all the monitored lakes. Davic checked the reports and was pleased to find Secchi data from Sippo Lake for 1988 through 1995.

"I went through year after year of NEFCO reports, compiling and graphing the data, and that's when things began to fall into place," says Davic. "It became obvious that the water clarity had changed way before the dredging project." The NEFCO data only went through 1995, so Davic called the Park District and learned that an employee had "inherited" one of the NEFCO volunteers' Secchi disks and conducted Secchi readings in 1996 and 1998. The assembled data from all sources—EPA, NEFCO, and the Park District—clearly showed that water clarity had dropped during the period of mechanical harvesting and stayed at the lower level ever since (see graph). Apparently the harvesting, and perhaps the carp as well, had reduced plant density enough to increase algal growth and, thus, turbidity.

Davic's revised conclusion was that the dredging project alone did not have a significant impact on turbidity above and beyond what was already present. He had enough confidence in the volunteer data to include it in his official final report.

Davic says, "This example shows that citizen volunteers never know how their data will be used—thus the extreme importance of good training and consistent, long-term data collection." He adds that Ohio EPA routinely uses volunteer Secchi data from both NEFCO and the Ohio Lake Management Society's Citizen Lake Awareness and Monitoring (CLAM) program in its 305(b) report (the biennial water quality report that all states submit to U.S. EPA and Congress). "We put data from those two programs right in with the professional data, because we know it is of high quality," he says.

For more information on the Sippo Lake story contact Robert Davic, Ohio EPA, Division of Surface Water, Northeast District Office, Twinsburg, Ohio 44087; 330-963-1132; robert.davic@epa.state.oh.us.

To read more about lake vegetation and volunteer monitoring see The Volunteer Monitor *Fall 2000 (issue topic "Monitoring Flora").*

Opening CLAM FLATS

by Margo Andrews and Eleanor Ely

One hundred thousand acres. That's the total area of clam flats that have been opened for harvest over the past 12 years with the help of Maine volunteer monitors.

In Maine, harvesting of soft clams or "steamers" (Mya arenaria) is an integral part of the local economy in many coastal communities. For example, the St. George River estuary is worked by about 100 harvesters, many of whom rely on clamming as their sole source of income. So closures can pose a real hardship.

Paul Stevens, a member of the Long Island Water Quality Volunteers on Long Island, Maine, collects a sample using a "Whirl-Pak" bag (a special sterile sampling bag). The sample will be tested for fecal coliform bacteria at the Department of Marine Resources lab.

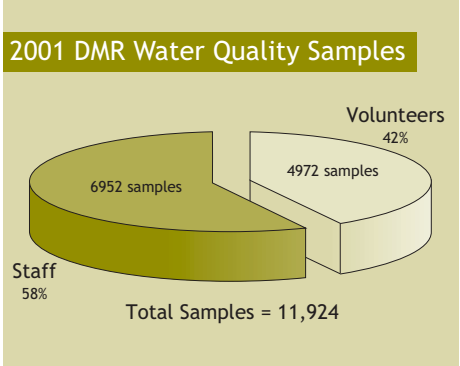
In the late 1980s, citizens from communities around the St. George River and Damariscotta River began approaching the Maine Department of Marine Resources (DMR) to see what could be done about clam flat closures. At the time, many areas were closed simply because of a lack of data. To protect the public from potentially contaminated shellfish, sites must be presumed polluted until proven safe. Classification as "open approved" requires, among other things, testing water samples for fecal coliform bacteria at least six times per year.

DMR did not have the staff to visit all 2,600 clam-flat sites stretched along the state's 5,000 miles of coastline. But if the citizens could collect the samples, DMR was willing to provide training, materials, and lab analysis. Thus was born the DMR Volunteer Water Quality Monitoring Program, which has been so successful that today citizen volunteers collect 42 percent of the water samples analyzed for fecal coliform by DMR.

"THERE'S A REAL DANGER THAT AREAS WOULD HAVE TO BE CLOSED IF SOME OF OUR 100-PLUS VOLUNTEERS WALKED OFF THE JOB."

At the end of each year through 1999, DMR was able to announce the opening of another 5,000 or 10,000 acres. The fact that those days of "headline-producing" annual announcements are now over is actually a testament to the success of the volunteer monitoring program, explains Sherry Hanson, Volunteer Coordinator for DMR. Hanson says, "Now we are close to having all areas open that can be open, barring a sudden technological breakthrough in sewage treatment."

Areas that had good water quality but were closed due to lack of data have been opened thanks to sample collection by volunteers. In areas that had water quality problems, volunteers have often gone beyond simple sample collection to help find and fix sources of contamination. For example, some citizens have been trained to help DMR conduct "shoreline surveys," which involve field checking sanitary facilities along the shoreline. Surveys can uncover sources of fecal contamination such as failing septic systems or domestic animals. Remedying these problems can improves water quality to safe levels so flats can be opened.



"A high level of trust"

Hanson is especially proud of DMR's relationship with volunteers in certain "conditionally approved" areas that are closed after rain events. These volunteers monitor rainfall with a gauge on their property and call DMR when rainfall exceeds 1 inch, so that DMR can close the area. Then they collect samples until counts return to acceptable levels. "This arrangement depends on a high level of trust between the volunteers and DMR," says Hanson. "It's also a lot of work for the volunteers. But without their dedication the flats would be permanently closed."

The work continues

At present less than 9 percent of Maine's coastline remains closed (as compared to about 15 percent in 1993.) Most currently closed areas have a pollution source that can't be removed, such as a sewage treatment plant. But that doesn't mean the volunteers' work is done. "The volunteers are just as important now in keeping areas open as they were in getting them open in the first place," says Hanson. "We still need samples six times each year. There's a real danger that areas would have to be closed if some of our 100-plus volunteers walked off the job." Fortunately the volunteers are showing no such inclination. Many are retired people with a keen interest in the local economy and the shellfish industry; some of them also serve on local shellfish committees. "Motivation is not a problem," says Hanson. "The volunteers know they're doing important work. They see a direct correlation with keeping the areas open."

Maine's commercial and recreational clammers dig soft-shell clams from intertidal mud flats along the coast. Clams are dug by hand, at low tide, using a short-handled rake. A full-time, skilled harvester can dig several bushels per tide and earn around $40,000 per year.

For more information: Sherry Hanson, Volunteer Coordinator, Maine DMR, West Boothbay Harbor, ME; 207-633-9401; sherry.hanson@state.me.us.

Margo Andrews is an Environmental Scientist with Tetra Tech, Inc. She may be reached at 410-356-8993; Margo.Andrews@tetratech.com.

To read more about bacteria testing, see The Volunteer Monitor *Fall 1998 (special section, "Bacteria Testing") and Fall 1997 ("Interpreting Fecal Coliform Data").*

Stuffed Clams & "Soupy" Ponds

by Eleanor Ely

Mix together chopped cooked quahogs (a large clam), bread crumbs, garlic, onions, and butter, stuff the mixture into a quahog shell, and bake. That's the recipe for a popular southern New England specialty known as a "stuffie." For a couple of Rhode Island ponds, it became more like a recipe for pea soup. When the ponds turned green and goopy from a bloom of blue-green algae, volunteer monitors traced the problem to waste products from commercial stuffie manufacturing.

LINDA GREEN

1990: Yawgoo Pond coated with scum from algae bloom.

The first pond to start turning into soup was Yawgoo, which experienced a major algal bloom in the summer of 1989. Fortunately, a volunteer monitoring program had begun just in the nick of time—one year earlier, when the Wood-Pawcatuck Watershed Association, in partnership with the University of Rhode Island (URI), created URI Watershed Watch. The volunteers began monitoring 14 ponds in southern Rhode Island, where they measured Secchi depth and dissolved oxygen, filtered water samples for chlorophyll, and collected other water samples for nutrient (phosphorus and nitrogen) analysis. Nutrient and chlorophyll analyses were performed at the Watershed Watch analytical support lab on the university campus.

On Yawgoo Pond, median Secchi transparency declined from over 3 meters in 1988 to just half a meter by fall of 1989, and median chlorophyll tripled (see graph). By the following summer, Yawgoo had deteriorated even further (with chlorophyll seven times 1988 levels) and similar problems were afflicting Barber Pond, less than a mile downstream.

The volunteers' data showed that almost all the other ponds in the program had actually experienced a *decrease* in chlorophyll level between 1988 and 1990. "This illustrates the value of monitoring throughout a watershed," points out URI Watershed Watch Program Director Linda Green. "We knew we had to look for a nutrient source that affected just those two ponds." One suspected source was the site of a recently closed stuffie plant located upstream of the ponds, which included several large unlined detention basins where liquid waste from the plant had been discharged. Clam liquor is high in phosphorus, and the plant had also used a phosphate-containing cleaning solution to scrub the shells.

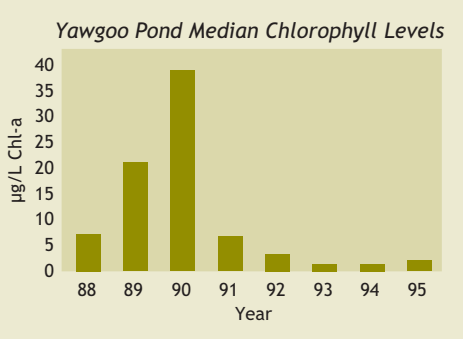
The volunteers decided to "bracket" the stuffie plant by

ELEANOR ELY

URI Watershed Watch interns check Secchi depth on Yawgoo Pond.

sampling the tributary stream both above and below the site. They expected to find higher phosphorus levels in the downstream site, but to their surprise phosphorus was high at both sites. Investigating a little further upstream, they discovered another stuffie-manufacturing operation, housed in two truck-trailer beds and completely hidden from the road, that apparently had recently opened.

At this point the Wood-Pawcatuck Watershed Association took their monitoring data to the state Department of Environmental Management (DEM), where they met a skeptical reception. "DEM told us that the results we were seeing were 'natural' for ponds in our area," recalls Green. But after editorials began appearing in the local paper, Green says, "DEM realized that there was a real problem. What's more, they realized that there was a 'squeaky wheel.'"



> "DEM collected their own samples, thinking they would disprove what we had found. Instead they obtained equivalent values."

The citizens held a large public meeting, at which the Watershed Watch data were presented and local farmers and long-term residents testified they had never seen the stream so green. "DEM had gone out and collected their own samples, thinking they would disprove what we had found," says Green. "Instead they obtained equivalent values, which—to their credit—they were willing to admit at the meeting."

DEM undertook an investigation, along with the State Department of Public Health. The end result was that the stuffie plant was closed for health violations. The very next year, chlorophyll levels in both ponds dropped sharply. "We were amazed at how fast the ponds recovered," says Green.

This episode gave a lot of credence to the fledgling URI Watershed Watch program and launched a productive relationship between the volunteers and DEM that has grown stronger over the years. Shortly after the "stuffie episode," DEM granted the Watershed Watch program funding to conduct a side-by-side comparison of volunteer and professionally collected data. The results confirmed that the volunteers' data were equivalent to that of professionals, enabling DEM to accept Watershed Watch data for use in 305(b) reports. More recently, DEM has also used Watershed Watch data to help decide whether a lake or pond should be included on the state's 303(d) list of impaired waters.

LINDA GREEN

1994: Yawgoo Pond is clean again!

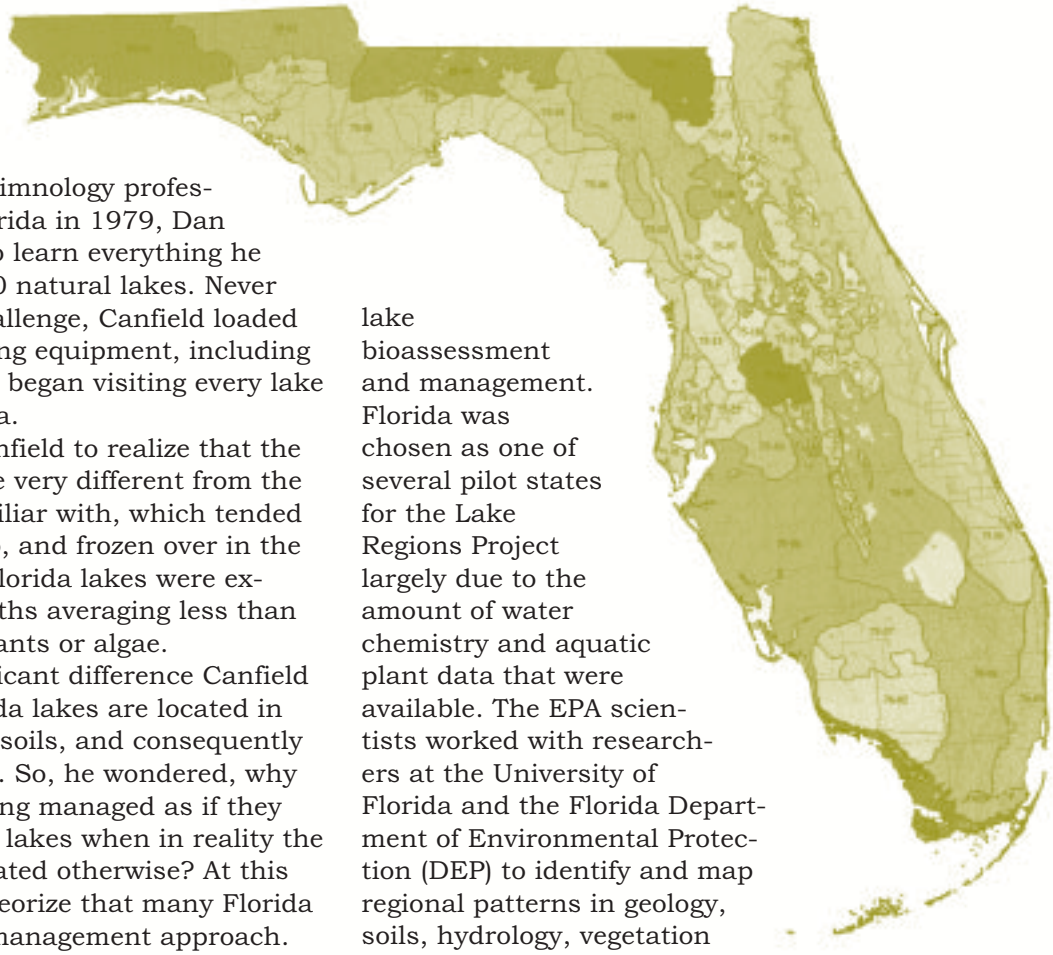
URI Watershed Watch now includes over 250 volunteers on more than 100 lake and streams sites statewide, and with grant support from DEM the program is expanding to additional locations where monitoring data are sparse or nonexistent.

For more information contact Linda Green, URI Watershed Watch, Coastal Institute, 1 Greenhouse Rd., University of Rhode Island, Kingston, RI 02881-0804; 401-874-2905.

To read about chlorophyll testing methods, see The Volunteer Monitor *Fall 2000, pp. 16–20.*

Strength in Numbers

by Amy Richard



Upon his arrival as a new limnology professor at the University of Florida in 1979, Dan Canfield was determined to learn everything he could about Florida's 7,800 natural lakes. Never one to shy away from a challenge, Canfield loaded up his truck with monitoring equipment, including his trusty Secchi disk, and began visiting every lake he could find to collect data.

It didn't take long for Canfield to realize that the lakes he was studying were very different from the northern lakes he was familiar with, which tended to be rather large and deep, and frozen over in the winter. In contrast, most Florida lakes were extremely shallow (mean depths averaging less than 15 feet) and often full of plants or algae.

However, the most significant difference Canfield noted was that many Florida lakes are located in areas with phosphate-rich soils, and consequently have higher nutrient levels. So, he wondered, why were these waterbodies being managed as if they could become low-nutrient lakes when in reality the geology of the lakebed dictated otherwise? At this point, Canfield began to theorize that many Florida lakes required a different management approach. He needed more data to be sure—but how does one scientist collect long-term data from hundreds of lakes without going broke? Gradually, Canfield became convinced that the way to gather lots and lots of data was by recruiting and training citizens throughout the state.

The Lake Regions Project

Eight years later, the sheer amount of data collected by Florida LAKEWATCH volunteers was so impressive that it caught the attention of scientists at the U.S. Environmental Protection Agency (EPA) who were beginning to develop a regional framework for lake bioassessment and management. Florida was chosen as one of several pilot states for the Lake Regions Project largely due to the amount of water chemistry and aquatic plant data that were available. The EPA scientists worked with researchers at the University of Florida and the Florida Department of Environmental Protection (DEP) to identify and map regional patterns in geology, soils, hydrology, vegetation (aquatic plants), and water chemistry.

In 1997, the project was complete. The resulting 47 Florida lake regions continue to provide a guidance for managing both individual lakes and groups of lakes around the state. As Canfield explains, the Lake Regions Project now makes it possible to illustrate, with hard numbers, regional patterns in lake chemistry. For example, low-nutrient lakes along the Lake Wales Sandhill Ridge (a geologic formation that stretches down the center of the state) are sensitive to nutrient increases, while

continued on page 20

Countless Ways to Use LAKEWATCH Data

by Amy Richard

Imagine. One million data points stored safely away in a database. Ready for use. Ready to help Floridians manage their lakes. Even in today's world, the number is impressive. In fact, *impressive* soon turns to downright AMAZING when one stops to think of the sheer amount of energy behind every single data point collected by Florida LAKEWATCH volunteers. For every single number in that database, some dedicated soul braved wind, waves, alligators, bugs—you name it—to collect water samples and Secchi depth measurements virtually every month on their lake or waterbody. Following are a few examples of how the accumulation of so many data points has helped folks achieve a variety of lake management goals.

Raising the bar

Water chemistry data collected by Florida LAKEWATCH volunteers on Lake Disston, in Flagler County, revealed that the lake was unusually pristine. In an effort to gain additional protection for their lake, residents petitioned for an Outstanding Florida Water designation.
They had no idea it would take eight years or that they would be the first grass-roots group in Florida to achieve this designation. (Previous designations had only come about due to the efforts of governmental entities.)
Volunteer Ann Moore says, "We feel that the most significant accomplishment is the fact that the LAKEWATCH data was substantial enough to convince state permitting agencies that this waterbody was unique and that the bar needed to be raised on future permitting standards."

Be careful what you ask for

A few years back, Lake Silver in Orlando, Florida, experienced drastic declines in water clarity. We know this thanks to volunteer monitoring efforts. Aquatic plant surveys (also conducted by LAKEWATCH) indicated that the clarity problems were related to a reduction in submersed aquatic vegetation. The culprit? Grass carp, a herbivorous species of fish, had previously been introduced into the lake to eat up nuisance plants. The fish did such a good job that a large portion of the submersed vegetation was removed, which eventually led to greater algae concentrations in the water column. This revelation resulted in a comprehensive lake management plan that included removing the grass carp and re-establishing submersed aquatic vegetation. According to Bruce Fallon, who was with the city's Stormwater Utility Bureau at the time, the fact that there was a monitoring program in place helped tremendously in obtaining funding for the Lake Silver restoration plan.

Scientific research

University of Florida (UF) educators, researchers, and students of all ages are finding a plethora of ways to use LAKEWATCH surface water chemistry data. Since the program began in 1986, LAKEWATCH data have been used or directly referenced in more than 40 reports, electronic databases, information circulars, and scientific studies and papers. In many instances, information gained from these endeavors is changing the way that lakes are being managed.

UF researchers recently used data from 360 LAKEWATCH lakes to write and publish a paper on how nutrients determine the amount of algae in Florida lakes. This information can be used to show lake managers how much they need to reduce nutrient concentrations in a lake to achieve a given level of algal growth. Researchers have also used LAKEWATCH data to study how nutrient levels in lakes correlate with both plant abundance and aquatic bird abundance.

In another study the volunteers' data were useful in demonstrating a strong correlation between lake area and depth and the potential for resuspension of bottom sediments. The study showed that large shallow lakes are much more susceptible to wind-induced sediment resuspension which, at times, can result in poorer water quality.

One UF limnologist is using what he's learned from the data to write a series of information circulars that are being read and used by citizens, students, and water management professionals across the state.

A Florida LAKEWATCH volunteer filters a water sample for chlorophyll testing.

FLORIDA, continued from page 18

down in the valleys are rich in phosphorus and less sensitive to nutrients.

This region-specific information has been a big help to citizens concerned about nutrients and lake water quality. If citizens learn that their lake will never be crystal clear because it is in a region with naturally nutrient-laden soils, they can turn their attention to other concerns that they can do something about. For example, once nutrients became a "non-issue" for citizens on the Tsala Apopka Chain-of-Lakes in Citrus County, they began to focus on bacterial contamination.

Lake regions also serve as a reference point. In other words, citizens need not feel overly concerned about nutrient fluctuations they may observe in their lake as long as levels fall within the ranges that have been established for that particular lake region.

Developing realistic standards

EPA has recently set stringent default criteria for phosphorus, nitrogen, chlorophyll, and Secchi depth for the whole southeastern portion of the U.S. However, the Lake Regions Project is helping the EPA and state water managers realize that they can't make one set of standards apply to the entire state of Florida, given the diversity of geologic regions. According to Jim Hulbert with the DEP, "The Lake Regions Project will play an instrumental role in helping to develop realistic numeric values for the four basic water quality parameters that the EPA will eventually require us to regulate on lakes statewide."

Amy Richard is _____for Florida LAKEWATCH, University of Florida, Gainesville, FL; 352-392-9617, ext. 228; arich@mail.ifas.ufl.edu.

STROKES DIFFERENT

Understanding regional differences helps lake managers set realistic goals. For example, the lake pictured above is located in a region where soils are high in the nutrient phosphorus, so it will naturally have more weeds and algae than a lake in a low-nutrient area, like the one in the photo at right. Attempts to make a nutrient-rich lake as clear as a low-nutrient lake will only lead to frustration.

Deciding where to put Buffers

by Laurie Sovell

For volunteers with the Minnesota Pollution Control Agency's (MPCA) Citizen Stream-Monitoring Program (CSMP), the phrase "tubing a river" takes on a new meaning. These folks use long, narrow transparency tubes to determine water clarity in streams once a week, plus after significant rainfall events, from April through September.

One group that participates in the program is the Big Birch Lake Association (BBLA), which relies on CSMP transparency data to help decide where grassy buffers should be planted to protect the lake from agricultural runoff.

In the early 1990s BBLA, in conjunction with MPCA, conducted a study to try to understand the cause of steadily declining water quality in Big Birch Lake. That decline had been documented by volunteers with a "sister" MPCA program, the Citizen Lake-Monitoring Program, who had seen average yearly Secchi depth drop from 13 feet in 1971 to 6 feet in 1994. The study pointed to Fish Creek as a major source of sediment and phosphorus; in fact, half the phosphorus entering Big Birch Lake came from this creek.

To remedy the problem, the Association worked with local farmers to design a program to reduce agricultural runoff into Fish Creek. An agreement was reached whereby farmers would plant 33-foot-wide grassy buffer strips along the creek in exchange for payment of $250 per acre per year to compensate for the land lost to cultivation. "It's a good deal for the farmers, and we get a lot of problems solved for very little money," says BBLA member Gene Waldorf.

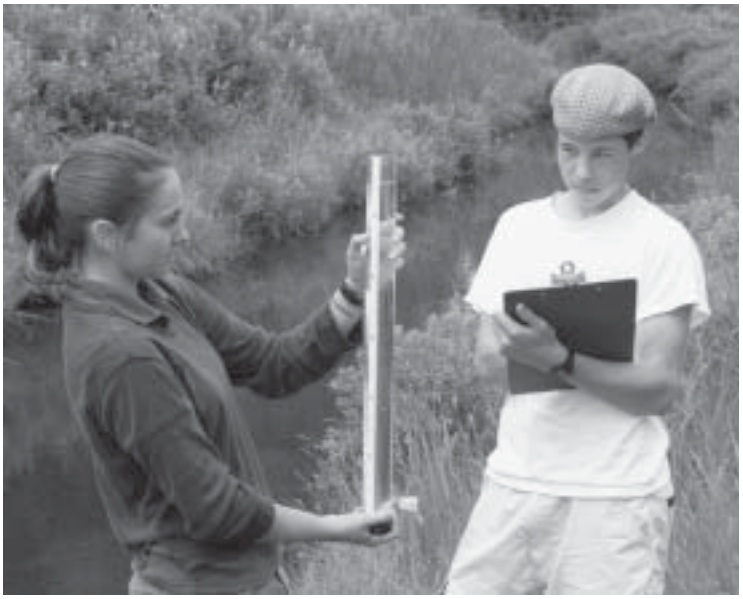
Of course the Association wants to be sure the buffers are placed in areas where they will do the most good, and this is where the transparency data come in. For example, Waldorf explains that he was monitoring two sites half a mile apart on Fish Creek and found that the downstream site had much lower transparency. Investigating further he came upon an agricultural drainage ditch that emptied into the creek between his two monitoring sites. When he checked transparency in the ditch, it was very low. Based on this information, BBLA worked with the landowner to install buffers along the ditch itself.

To date nearly 17 acres of buffer have been planted, and BBLA has also worked for improvements to septic systems and manure pits near the lake and its tributaries. Are all these efforts paying off? It appears that they are. Some CSMP monitors have tested phosphorus in Fish Creek and noted a decline. And out on the lake itself, the CLMP monitors have seen average Secchi depth increase to 9 feet.

"The lake looks much better," says Waldorf. "This spring it was the cleanest any of us could remember. Our goal is to get back to a Secchi depth of 13 feet . . . or more."

Laurie Sovell is the Coordinator of MPCA's Citizen Stream-Monitoring Program. She may be reached at MPCA, 1230 S. Victory Dr., Mankato, MN 56001; 507-389-1925; laurie.sovell@pca.state.mn.us.

To order transparency tubes see WaterMonitoringEquip.com



TOM LAWRENCE

The traditional Secchi disk used to measure transparency in lakes can't be used in most streams because of the current and the shallow water, but a "transparency tube" approximates the same method. It even has a miniature Secchi disk painted on the bottom. Users fill the "T-tube" with water (collected in a bucket), then use the release valve at the bottom to adjust the water depth until the Secchi image just appears.

Keeping Pollution at Bay

by Angie Bera and Maggie Craig

Volunteers for the Santa Monica BayKeeper's BeachKeeper Monitoring Program are proud of the role their efforts have played in the formulation of the draft 2002 TMDL to reduce bacterial contamination at Santa Monica Bay beaches during dry weather. The job of the Los Angeles Regional Water Quality Control Board, charged with the task of writing and implementing the TMDL, has become easier thanks to information provided by BeachKeeper volunteers.

Southern California's Santa Monica Bay watershed, which includes the densely populated Los Angeles area, is 49 percent urbanized and home to roughly 2 million people. With 33 percent of the watershed covered by impervious surfaces, what do you suppose poses the greatest threat to the health of the bay *and*, in turn, to the more than

TMDLs:

A NEW OPPORTUNITY FOR VOLUNTEER MONITORS

Over the past few years, water quality agencies around the country have been busy writing "TMDLs" for all water bodies designated as "impaired." A separate TMDL must be prepared for each individual pollutant that is causing an impairment. The letters TMDL stand for "total maximum daily load" and refer to the maximum amount of the given pollutant that the water body can receive and still meet water quality standards. In effect, a TMDL is a cleanup or restoration plan, since each TMDL report must include a plan for reducing the pollutant to acceptable levels.

The TMDL process is offering many opportunities for volunteer monitors to work cooperatively with local or state agencies and have their data put to use. The following examples, as well as several others, are described in detail in the Spring 2001 issue of *The Volunteer Monitor*.

- Based on Texas volunteers' bacteria data, two stream segments were placed on the state's list of impaired waters (303(d) list). Getting a water body "listed" is the first step in the TMDL process.
- In preparing a fecal coliform TMDL for the Runnins River, Rhode Island Department of Environmental Management used long-term fecal coliform data collected by volunteers to help calculate load allocations.
- For a sediment TMDL on the San Lorenzo River, volunteers in Santa Cruz, California, conducted stream cross-sections and longitudinal profiles, and surveyed roads.
- In a one-day "blitz," volunteers sampled storm drains along the Los Angeles River to gather information for bacteria, nutrient, and metal TMDLs.

50 million sun-seeking tourists who visit it each year? You guessed it—urban runoff, much of it channeled to the bay via storm drains.
Along with many other pollutants, urban runoff can contain very high levels of bacteria from a number of sources, including illicit connections and discharges, leaking septic tanks and sewer systems, overflows, and spills. During quarterly "snapshot" sampling events, BeachKeeper volunteers mobilize to collect water samples directly from flowing drains and creeks. The samples are then analyzed by BayKeeper staff for several parameters including total coliform, *E. coli*, and enterococci. A 2001 BeachKeeper data report showed that at least 50 percent of drains exceeded California's bacteria standards for total coliform and *E. coli* year-round from November 1999 to April 2001.


SANTA MONICA BAYKEEPER

Children playing in drainflow. Many drains in the Santa Monica Bay Watershed flow directly into the bay.

One of the first challenges in preparing the TMDL was identifying all the potential sources of bacteria. Luckily for the Regional Board, BeachKeeper volunteers had already mapped more than 500 coastal drains that may be contributing to the bay's bacterial contamination. Most disturbing, over 200 were located along the bay's Area of Special Biological Significance (ASBS), into which the discharge of all waste (stormwater or otherwise) is prohibited. A catalogue containing photos, narrative descriptions, and GPS coordinates for all of these drains accompanies the 2001 report. "We would never have had the resources to do the thorough inventory of the beach that BayKeeper has done, " says Reese DeShazo of the Los Angeles Regional Water Quality Control Board.

Citing the BeachKeeper's drain catalogue, the TMDL states that the status of nearly all the drains pinpointed by the BeachKeeper volunteers is unknown. It has required all municipalities within the Santa Monica Bay watershed to both determine ownership of the potential discharges and file reports with the Board detailing the nature of the discharges within 120 days of the TMDL's effective date. Also within that timeframe, the municipalities are required to identify and terminate all illegal discharges within the ASBS. Several cities have already contacted Santa Monica BayKeeper to gather the information needed (e.g., drain locations, water sampling results, GPS data) to begin to take steps to stop polluted runoff from reaching the bay.
As the TMDL process moves forward, BeachKeeper volunteers will continue collecting water quality data from the drains they have come to know so well. "BeachKeeper volunteers are ideally situated to assess whether drains in the ASBS have been eliminated and whether other drains across the bay have been properly diverted during dry weather,"says BayKeeper's Executive Director, Steve Fleischli. "We hope the Regional Board will use the BeachKeeper program as a tool to help ascertain future compliance with the TMDL."

Angie Bera is the BeachKeeper Program Coordinator at the Santa Monica BayKeeper. She may be reached at 310-305-9645 ext. 3; octopus@smbaykeeper.org.

Maggie Craig is an Environmental Scientist with Tetra Tech, Inc. She may be reached at 410-356-8993; Maggie.Craig@tetratech.com.

Other BeachKeeper Successes

The first monitoring effort by BeachKeeper volunteers led the BayKeeper to a City of Redondo maintenance yard where oily waste from street sweepers was flushed into storm drains. The yard was remodeled, a clarifier installed, and other improvements made to avoid the flow of waste to the storm drains. Later sampling showed that these changes eliminated the problem.

Subsequent BeachKeeper efforts provided evidence that City of Los Angeles sewers are leaking and Malibu septic tanks are contaminating Malibu Creek and Lagoon. Both issues are now the subject of Clean Water Act litigation and enforcement actions.

Being There

Simply putting more "eyes and ears" into the field to watch over a water body is one of the greatest values of volunteer monitoring. Many important discoveries are made during basic watershed surveys. At other times volunteers set out to monitor a particular parameter and serendipitously uncover an unexpected problem, just because they are there.

EYES, EARS, AND VOICE

When members of the newly formed PW^3 (Peachtree Woodall Whetstone Watershed Alliance) in Atlanta, Georgia, went on their first creek walk on Woodall Creek, they found an area where large pools of milky-gray water had formed around the mouth of a tributary and the creek bed was coated with a dense white substance. PW^3 member Jackie Echols took it upon herself to follow up, and later described her experience in the May/June 2000 issue of the Georgia Adopt-A-Stream newsletter, in an article entitled "PW^3—The Voice of Woodall Creek."

Over several weeks, Echols consulted multiple staff members in several branches of the Georgia Environmental Protection Division and was variously told that the problem was due to paint residue; to dust washing off plastic sandbagging pellets; or to a combination of industrial wastewater and combined sewer overflow. "Government agencies responsible for protecting the environment often put the most significant obstacles in the way of volunteer groups," comments Echols. "Finding that one person who is willing to help can make a big difference." Because of Echols's persistence, the cause was finally identified as a clogged sewer that was spewing raw sewage into the creek after repairs were made, PW^3 observed that the creek was running clear.

In this case, the eyes and ears did their job quickly, but the "voice" of Woodall Creek had to work long and hard before the problem was successfully resolved.

PW^3 is one of many groups participating in Georgia Adopt-A-Stream. For more information contact Georgia Adopt-A-Stream, Environmental Protection Division, Atlanta, GA; 404-675-1639; www.riversalive.org/aas.htm.

STUDENTS RESOLVE TWO PROBLEMS

Debbie Cooper's environmental science students at Westview High School in Portland, Oregon, discovered two problems—one they were looking for and one they weren't—at a mitigated wetland site. For several years Cooper has involved her students in restoration (removing exotic plants and planting natives) and monitoring at the site, which is located at Tualatin Hills Park and Recreational District headquarters.

In the course of their routine water quality testing, the students found high phosphorus levels in a stream after nearby playing fields were fertilized. As a result of the students' finding, the Park District switched to a different kind of fertilizer and also reduced the amount used.

The second problem the students found was something they didn't anticipate. One day when they were conducting a fauna study at their restoration area, they noticed steam rising from a culvert that was emptying into a stream. Going over for a closer look they saw that the warm water was rushing out from a drainage pipe, in such a large volume that it made up about half the flow in the small stream. The students collected a sample, and that was when they noticed a chlorine smell.

Chlorine was not one of the parameters they were equipped to measure, so Cooper had the sample analyzed for chlorine by the Oregon Department of

SWRP students conducting water quality tests.

Environmental Quality (DEQ). Sure enough the level was high—high enough to be lethal to aquatic life. DEQ informed Cooper that the Park District could be fined for polluting the stream, but the class did not want to go that route. Instead they talked to Park District maintenance workers and learned that whenever the park swimming pool was cleaned, or the filters were "backflushed," the pool water ran into the stream—although apparently only a few Park District staff were aware of this fact.

Once the students called attention to the problem

the District changed the pool's plumbing system so the water now goes to the sewage treatment plant. Cooper is proud that her class was able to solve this pollution problem through education, not regulation.

Debbie Cooper is a participant in the Student Watershed Research Project (SWRP). For more information on SWRP contact Saturday Academy at 503-748-1363; renfro@pdx.edu; www.swrp.org.

SILTATION FROM LANDFILL

"It took us several years of frustration and documentation to convince the state that their new landfill was having impacts on stream life," recalls Sherry Evasic, president of the Blue Heron Environmental Network in Berkeley County, West Virginia.

As part of the Izaak Walton League of America Save Our Streams program coordinated by the West Virginia Department of Environmental Protection (DEP), the group began macroinvertebrate monitoring of Back Creek and its tributaries in 1991. In one tributary, Kate's Run, volunteers noticed a heavy coating of white siltation coming from a discharge pipe that drained a sediment basin at the base of a recently constructed landfill. Monitoring revealed a healthy macroinvertebrate population in early spring but low counts in summer when water volume decreased and the silt became more concentrated. The group also noticed some deformed insect larvae, "soft" crayfish, and dead or dying aquatic vegetation.


SHERRY EVASIC

White silt in Kate's Run.

After several years of discussions between the Blue Heron Environmental Network and officials at West Virginia Department of Environmental Protection, an agreement was reached in1998 whereby the landfill would stop all garbage dumping in the area of the Kate's Run headwaters and fill in a sediment basin also located in the headwaters. Evasic reports that "now there's no more white silt in Kate's Run and everything is back to normal with the critters and plant life."

For more information contact Blue Heron Environmental Network, 304-754-8717; or WV DEP Save Our Streams Program, Charleston, WV; 304-558-2108; tcraddock@mail.dep.state.wv.us.

NEW MONITORS FIND PROBLEMS

by Aileen Winquist

Just over a year ago, the Department of Environmental Services (DES) in Arlington County, Virginia, initiated a volunteer program of stream macroinvertebrate monitoring. Already we have had some success stories!

On the morning of August 25, 2001, volunteers headed out for their second monitoring session on Donaldson Run, a small stream that flows directly into the Potomac River. On arriving at the site, the monitors were shocked to see dead eels and crayfish. When they began collecting samples they realized most of the macroinvertebrates were dead.

The monitors called the fire department, and the fish kill was traced upstream to a local golf course that had recently applied herbicide. A rainstorm a couple of days before the monitoring had washed the herbicide into the stream, killing the majority of the aquatic life. As a result of the stream monitors' quick action, U.S. Fish and Wildlife, the National Park Service, and local authorities are working with the golf course on improved management practices and restoration.

Another team, who were monitoring Little Pimmit Run, did not even have to wait for their second monitoring session to find a problem. On their very first visit to their site, they could hardly find any macroinvertebrates in the water samples. It became apparent that the majority of the aquatic creatures were dead, or barely alive, and as a result they were very hard to find in the samples. A County staff person who was out with the monitors that day took a sample back to the DES lab for testing. Chlorine levels were found to be high, and the problem was traced upstream to a leaking drinking water pipe. Now County staff are working on improved techniques for conducting water line flushing.

Aileen Winquist is an Environmental Planner for Arlington County DES. She may be reached at 703-228-3610; awinqu@co.arlington.va.us.

Vigilant Volunteers Fight Invasives

Early detection of infestations by aggressive nuisance species greatly improves the odds of control or eradication. The Fall 2000 issue of *The Volunteer Monitor* highlighted volunteers' successes in locating invasive aquatic species such as Eurasian watermilfoil, water chestnut, purple loosestrife, and zebra mussels. Since that issue was published, continued vigilance has led to more successes, a few of which are described here.

Weed Watching in New Hampshire

by Amy P. Smagula

In 2001, trained Weed Watchers spotted a small patch of what looked like milfoil in a small cove of Dublin Lake. They carefully collected a flowering specimen and brought it to the New Hampshire Department of Environmental Services (DES) laboratory where the plant was indeed identified as variable milfoil (*Myriophyllum heterophyllum*). The next day DES hand-pulled the patch and placed a benthic barrier over the infested portion of the lake. The patch is under control, and a full lake infestation has so far been thwarted.

That same year, Weed Watchers on Lake Sunapee also discovered a new infestation of variable milfoil. DES quickly responded with divers and benthic barriers. In a re-survey this year, DES found only a few stems of milfoil growing in the affected areas.

The New Hampshire Lakes Association recently established a Lake Host Program through which volunteers monitor 41 public access sites for boats or trailers unknowingly carrying exotic plants. After just three weeks in operation, the program reported stopping trailers with exotics attached at four lakes.

For more information: Amy P. Smagula, Clean Lakes and Exotic Species Coordinator, New Hampshire Department of Environmental Services; 603-271-2963; asmagula@des.state.nh.us.

Volunteers Dive In

by Laura Herman

Forest Lake residents spotted Eurasian watermilfoil in their lake last year. After they hired a contractor to chemically treat 3.5 acres of the outbreak, members of the Forest Lake Association donned scuba gear and snorkels to rake out the smaller beds and clear what the chemical missed. This year, the association has found only a few watermilfoil plants in the lake. They are planning follow-up diving and snorkeling to control any regrowth.

For more information: Laura Herman, Aquatic Plant Management Specialist, Wisconsin Department of Natural Resources; 715-365-8984; laura.herman@dnr.state.wi.us.

On the Lookout in Massachusetts

by Michelle Robinson

In 2001, residents on Long Pond in Barnstable became concerned when an unfamiliar aquatic plant began to grow at an alarming rate. It proved to be *Hydrilla verticillata*—the first discovery of this nuisance species in Massachusetts. Through the concerted efforts of citizens and agencies, the hydrilla was successfully treated and contained.

At a Massachusetts Weed Watchers Program training workshop, a volunteer brought in a "mystery sample" that turned out to be the first documented case of parrot feather (*Myriophyllum aquaticum*) in the state. Upon investigation, the Massachusetts Department of Environmental Management (DEM) learned that it had been deliberately planted by a company that was attempting to improve the pond's water quality. DEM is now working with the company to determine where else the invasive may have been introduced and to prevent its further use in water restoration projects.

For more information: Michelle Robinson, Aquatic Biologist, Massachusetts Department of Environmental Management; 617-626-1382; michelle.robinson@state.ma.us.

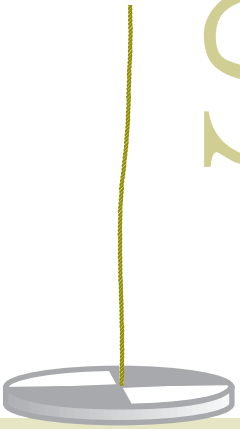
You're Never Too Young to Help!

by Ann Bove

In early August 2001, an 11-year-old girl who had learned about invasives in school brought home a suspicious plant that she had discovered in Great Hosmer Pond. After it was identified by the Vermont Department of Environmental Conservation (DEC) as Eurasian watermilfoil (*Myriophyllum spicatum*), volunteers and DEC staff immediately hand-pulled the plants and inspected the rest of the 155-acre pond. In 2002, concerned citizens, along with the town of Craftsbury, developed a DEC-funded management plan that includes continuing surveillance and hand-pulling as well as a comprehensive survey of the pond by scuba divers.

For more information: Ann Bove, Aquatic Biologist, Vermont Department of Environmental Conservation;

Secchi



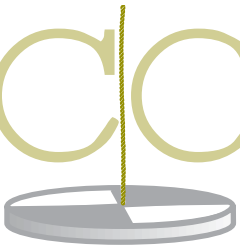
A Deceptively Simple Disk

Inexpensive to make, quick and simple to use—no wonder the Secchi disk is so popular with professional limnologists and volunteer lake monitors alike. The plate-size black-and-white disk, attached to a marked line, is lowered into the water until it just disappears. That point—the "Secchi depth"—is a measure of the water's clarity, or transparency.

Transparency is a more significant characteristic than it might seem, because it's usually a good indicator of the amount of algae and sediments in a lake—and algal growth and sediment from erosional runoff tend to be two of the top concerns for lake management. Algal growth, in turn, is encouraged by excess concentrations of the nutrient phosphorus and often phosphorus adheres to sediment particles, so Secchi depth serves as a proxy for phosphorus levels as well.

Because it is so easy, Secchi testing can be carried out frequently and over a long period of time. Large statewide volunteer lake monitoring programs in Minnesota, Maine, Michigan, Vermont, New Hampshire, New York, Wisconsin, Illinois, Rhode Island, and Florida have amassed 15-, 20-, or 25-year datasets.

Volunteer-collected Secchi data figure prominently in several success stories in this issue. Below are two more examples of what volunteers have accomplished with the help of this unassuming but mighty tool.



New Sewer System

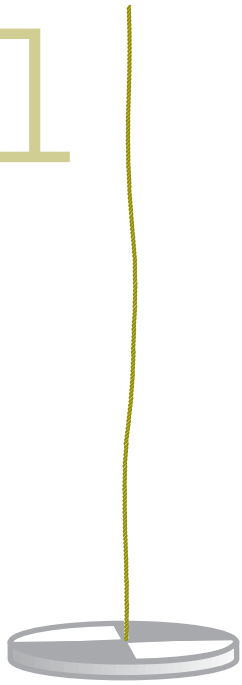
by Sandy Nickel

Over the course of 20 years of monitoring their lake as part of the Illinois Environmental Protection Agency (IEPA) Volunteer Lake Monitoring Program, the Lake Petersburg Association noticed a downward trend in Secchi transparency. In terms of statewide rankings compiled by IEPA, the lake dropped from #1 out of 126 in 1983, to #16 out of 134 in 1987, to #38 out of 166 in 1998. Nutrient input into the lake, leading to excess algal growth, was considered the most likely cause for the declining transparency.

As a first response, the Association worked with the Soil and Water Conservation District in the late 1980s to reduce sediment input by installing erosion control measures in incoming streams and helping area farmers implement low- or no-till programs.

However, the Association believed that to fully address the problem they would need to install a sewer system to replace the aging individual septic systems around the lake, which were a major source of nutrients. Using their Secchi data to help demonstrate the need for a sewer system, the Association obtained a $75,000 grant from IEPA for a feasibility study, followed by a $3 million "Illinois First" grant to construct the system. The Association expects the work to be completed, and all the homes to be hooked up to the new sewer system, by 2004.

Sandy Nickel is the IEPA Statewide Volunteer Lake Monitoring Program (VLMP) Coordinator for Illinois. She may be reached at 217-782-3362; sandy.nickel@epa.state.il.us.



Documenting Improvement

by Amy Picotte

Since the late 1980s, conservation districts in the Lake Carmi watershed have encouraged and supported farmers in efforts to reduce the amount of sediment and manure entering the lake and its tributaries. Measures taken have included building concrete holding pits for manure and installing gutters on barn roofs to direct runoff away from the barnyard.

The 20-year dataset accumulated by volunteer monitors participating in the Vermont Department of Environmental Conservation's Lay Monitoring Program is making it possible to document the beneficial effects of these agricultural practices. While changes are not always noticeable year to year, on the long scale the lake has definitely improved. Concentrations of both chlorophyll (a measure of the amount of algae) and phosphorus (a nutrient) have shown statistically significant decreases, and the annual average Secchi transparency has doubled, from 1.4 meters in 1984 to 2.9 meters in 2001.

Amy Picotte coordinates the Vermont Lay Monitoring Program. She may be reached at 802-241-3789; amyp@dec.anr.state.vt.us.

Success

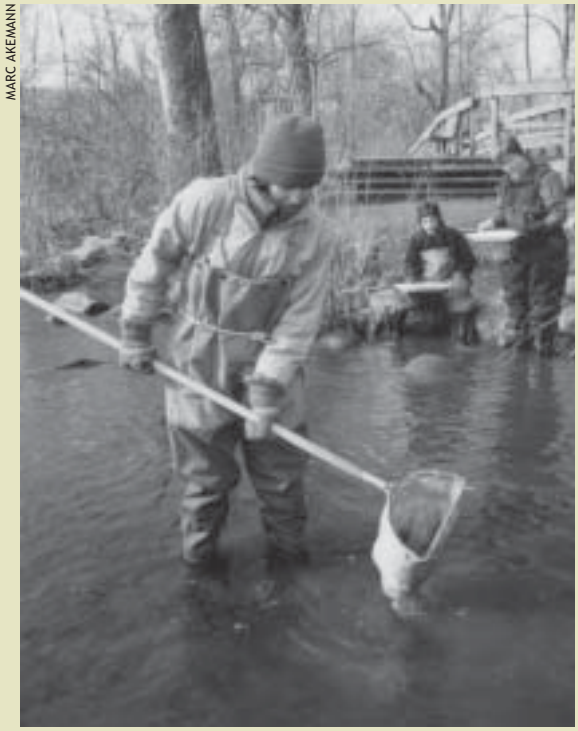
by Joan Martin

MARC AKEMANN

"Bugs" As Indicators of Stream Health

Like these HRWC volunteers, many volunteer monitors assess stream health by collecting and identifying aquatic macroinvertebrates. The crayfish shown here is a giant among macroinvertebrates, most of which are small insect larvae. While macroinvertebrates are by definition visible to the naked eye, a magnifying glass or low-power microscope is often needed to help with identification. The presence of pollution-sensitive "bugs" like caddisflies, stoneflies, and mayflies is a sign of a healthy stream.

To read more about macroinvertebrate monitoring, see The Volunteer Monitor *Spring 2000.*



MARC AKEMANN

1 Golf Course Design

The Ave Maria Foundation decided to develop a 640-acre parcel of lovely fields, forest, wetland, and a fen into a world-class golf course. Unfortunately, one of the highest-quality streams in the entire Huron River watershed flows through the parcel. Fortunately, the Huron River Watershed Council's Adopt-A-Stream Program had been monitoring the stream for eight years and we had evidence of its quality. It is also fortunate that the land is in Ann Arbor Township, which began about seven years ago to protect its natural resources. The Township required a thorough examination of the natural features on the parcel and appreciated receiving our monitoring data, which demonstrated the need for extra protection for this high quality creek.

Ave Maria has agreed to add a number of safeguards such as additional treatment of irrigation water and changes in the design of the course to protect the stream and the surrounding wetlands and forest. They have also agreed to hire the Huron River Watershed Council, to organize volunteers to monitor the stream during and following construction to ensure that it will remain free of pesticide residue and nutrients and that its flow will not be adversely affected by the frequent watering that is common on golf courses.

2 A Better Bridge

In 1999, for safety reasons, the Livingston County Road Commission needed to construct a new bridge over South Ore Creek. The Environmental Feasibility Assessment that they contracted out included our monitoring results. (The environmental firm's biologist was familiar with our program; he is one of our volunteers.)

We had been monitoring a site just downstream of the bridge since 1994 and had found that the creek is in very good shape there, unusually good for the Huron River system.

Mike Craine, Director of the County Road Commission, said that when he first read the assessment and realized that the creek not only was of high quality but also had hundreds of potential

QUARTET

advocates, his first reaction was unprintable, but his second thought was, "What an opportunity!" He designed the bridge in a way that should provide great improvements over the current situation. The new bridge is called a "free-span" since the supports are placed entirely out of the creek. This gives the 30-foot-wide creek 120 feet in which it can spread out during floods. While a free-span bridge is always more desirable, it is seldom built because it is much more expensive than a bridge over a culvert. Craine managed to find state funds to cover the extra expense for the County.

THERESA DAKIN

3 Puzzle Solved

Letts Creek in the Village of Chelsea presented the Adopt-A-Stream Program with a mystery for over a year. While our monitoring from 1992 through 1995 had indicated a healthy creek, starting in April 1996 the data documented a considerable decline in the aquatic populations, leading us to suspect a pollution problem. At times volunteers had noted an oil sheen and some oily residue in the creek. Calls to the Department of Environmental Quality (DEQ) indicated they also suspected a problem but had not been able to catch a spill in progress, which might allow them to trace the source.

Then, on April 12, 1997, a team of six people arrived at the Creek for the annual spring macroinvertebrate monitoring and found a coating of oil covering the surface and clotting the grassy banks. Realizing that they had an opportunity to try to solve the mystery, they called the DEQ Hotline from the home of a team member who lived nearby, then proceeded with sampling. They found almost no life at the site. Although the volunteers followed the oil upstream, heavy brush prevented them from finding the source.

Prompt investigations by the DEQ and the Department of Public Works revealed a leaking dumpster and failed sump system behind a screw manufacturing company in downtown Chelsea. After being alerted by the DEQ, the company immediately fixed the sump system, replaced the dumpster, and agreed to daily maintenance of the system. The DEQ reported that the next heavy rain brought no more oil into the stream.

4 The Most Profound Success

While the data provided by the Adopt-A-Stream Program have helped bring about numerous successes in river protection, I believe that moving people to sustained action is our most profound form of success. One of the best examples of this is the formation of the Malletts Creek Coordinating Committee (MC-3), a creek authority that reviews every construction and maintenance action pro

continued on page 32

Adopt-A-Stream

The Huron River Watershed Council's Adopt-A-Stream Program in southeastern Michigan is built around a study of the entire Huron River system, including the 125-mile mainstem and 23 tributaries. Sixty-nine study sites are monitored three times a year during one-day basinwide macroinvertebrate monitoring "events" that draw 120 - 150 people.

The monitoring events are designed so that people with no prior training or experience can participate. Working in teams of five or six (two of whom are trained) the volunteers collect and preserve samples of aquatic life at two study sites. Two weeks later, volunteers count the bugs and, with the help of professional aquatic entomologists who volunteer their time, identify the samples to the taxonomic family level.

STORIES FROM THE ARCHIVES

Naturally, over the years a good many volunteer monitoring success stories have appeared in of this newsletter. Some of these are retold briefly below. For the full version, see the appropriate issue (back issues are available at www.epa.gov/owow/volunteer/vm_index.html; or order hard copies from River Network, volmon@rivernetwork.org; 503-241-3506).

A Question of Trust

A large developer was seeking permits to develop a half-mile stretch of Puget Sound beach and 1,000 acres of uplands. At a public hearing, an expert witness for the developer testified that the beach was "virtually devoid of life."

Science teacher Susan Wertz took her 7th-grade biology class to the beach in question, where they found 85 species of intertidal animals and plants. At a later hearing, Wertz presented the findings. In her testimony she stressed the issue of trust: if the developer was buying experts to give incorrect testimony, what else might be falsified in their proposal? The permits were not granted. (Spring 1995, page 17)

Education Campaign

Delaware Riverkeeper Network volunteer monitors measured high phosphate levels on the Cooper River near Camden, New Jersey. They suspected lawn fertilizer as the source, and the Department of Environmental Protection agreed with this interpretation. To address the problem, Delaware Riverkeeper Network joined forces with two other environmental organizations and launched a massive public education campaign, including a press conference and the distribution of 8,000 doorhangers. Most impressive, the Camden County Municipal Utilities Authority agreed to place a letter about the problem into their billing statement—which reaches 87,000 Camden County residents. (Fall 1995, page 10)

Erosion Control Agreement

Can volunteer data stand up in court? While it's difficult to get volunteer data accepted in a formal court proceeding such as a lawsuit, such data are much more easily admitted into quasi-judicial proceedings such as legislative and administrative hearings.

In one such example, the Tennessee Scenic Rivers Association was able to use macroinvertebrate data collected by volunteers to help obtain a settlement in a dispute with two Tennessee agencies, the Department of Transportation (DOT) and the Department of Health and Environment (DHE). The Association charged that DOT had contaminated a local stream with massive amounts of silt during a bridge construction project. At a hearing the citizens presented evidence showing that the stream had a healthy population of macroinvertebrates above the bridge construction site but was essentially dead below the site. Faced with this and other evidence, the agencies agreed to a settlement. (Spring 1992, page 4)

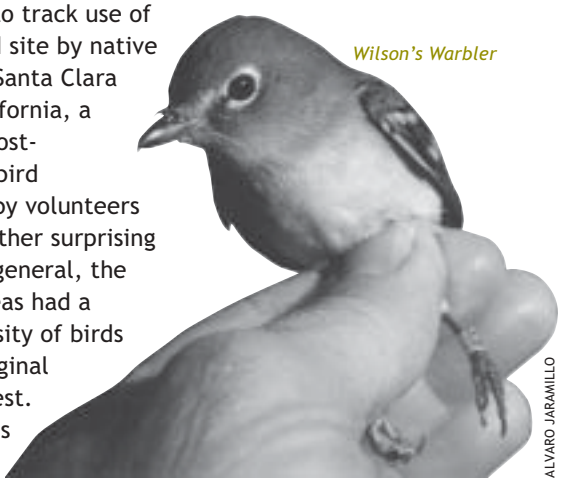
Beached Birds Reveal Problems

Since most dead birds found on a beach are marine species that live and die at sea, the corpses that wash ashore bear witness to offshore conditions. In July of 1981, volunteers with the Point Reyes Bird Bird Observatory's (PRBO) Beached Bird Project suddenly began finding bird carcasses in the hundreds on beaches where few or none had been found over the preceding ten years of monitoring. It turned out that the birds were being caught and drowned in gill nets, long nets that hang vertically in the water like invisible curtains. After six years of effort by PRBO and other organizations, the state of California approved legislation imposing strict regulations and closures on the gill-net fishery.

In the San Francisco Bay Area, the Gulf of the Farallones National Marine Sanctuary's Beach Watch volunteers have amassed nearly a decade of baseline data on both living and dead birds and mammals. According to Sanctuary Manager Ed Ueber, one tangible result has been a significant increase in the amount paid in oil spill settlements as reparations for damage to living resources. In the past, Ueber says, damages to wildlife were hard to prove because no baseline existed. (Winter 2002, page 10)

Birds and Restoration

How can the success of a restoration project be measured? One way is to track use of the restored site by native wildlife. In Santa Clara County, California, a decade of post-restoration bird monitoring by volunteers showed a rather surprising pattern: in general, the restored areas had a greater density of birds than the original riparian forest. The reason is not known



Wilson's Warbler

ALVARO JARAMILLO

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for sure, but Alvaro Jamarillo, who oversaw much of the study, speculates that younger, more actively growing trees may provide better habitat for insects that birds feed on. (Spring 2000, page 18)

Algae Surprises

For several years volunteers have been testing Maine's coastal waters for toxic algae. (Humans can become ill by eating shellfish that have ingested the algae.) The volunteers' unexpected finding of high levels of the potentially toxic alga *Dinophysis* spurred researchers to investigate further, which led to a second surprise—the discovery of *Prorocentrum lima*, another toxic alga. *P. lima* was previously unknown in Maine waters. (?Spring 2000,?page—)

Treatment Plant Upgrade

The San Marcos River is known across Texas for its crystal-clear waters, but in the late 1980s and early 1990s the river began to experience algal blooms that got worse year by year. The San Marcos River Foundation (SMRF) suspected that the city of San Marcos's antiquated sewage treatment plant was to blame. On investigating the plant's permit, SMRF members found that it was based on the state agency's computer model—which turned out to contain several inaccurate pieces of information. Whenever actual data for the San Marcos were not available, the model incorporated "Texas default values" based on the average value for rivers all over the state. For example, the volunteers noticed that the value used for depth was 1 meter. Using a homemade depth gauge, SMRF members took measurements at over 100 sites and found the average depth to be nearly 3 meters. Using this and other evidence, SMRF eventually won its battle to have the plant upgraded, and water clarity improved dramatically. (Spring 2001, page 10)

Setting Phosphorus Standards

On Vermont's Lake Champlain, data from the Vermont Lay Monitoring Program were used as the basis for establishing numeric standards for phosphorus in 1991. The citizens' Secchi, chlorophyll, and phosphorus data, collected since 1979, were the only long-term data for the lake.

The Lay Monitoring Program was able to provide two kinds of information to help establish the standards. One was the baseline data defining existing phosphorus levels at 35 stations on the lake. The other was information from a "user perception survey" in which volunteers rated the lake's physical condition and suitability for recreational enjoyment. Results for Lake Champlain showed that if the summer average total phosphorus concentration was below 0.014 mg/l, enjoyment of the lake was very rarely "substantially reduced." Based on these findings, the Vermont Water Resources Board established 0.014 mg/l as a starting point for developing the standards. (Spring 1994, page 18)

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posed in the "creekshed" for possible effects on Malletts Creek.

The MC-3 is a brainchild of the Malletts Creek Association, a group that grew out of the monitoring experience. It was the monitoring that awakened the members' interest in the creek and inspired them to actions that would improve creek health, and it was through the monitoring events that they met others who shared their concern.

Malletts Creek Association members spent two years writing a management plan for their creek. Their boldest recommendation was the creation of the MC-3, an official city committee, which has changed the way the city makes all decisions that affect the creek, including street repair, utility work, and plans for development. Participants on the MC-3 include rare mix of citizens and government personnel: city staff, the County Drain Commissioner, the Huron River Watershed Council, and the Malletts Creek Association.

The MC-3 is positioned to be very effective. It hears about development designs and construction plans while they can still be changed, and it has the ear of the department heads and the City Council. Already, water treatment systems have been placed in culverts when roadwork was done and parking lots have been redesigned to reduce the extent of impervious surface. At one MC-3 meeting, when someone from City Hall said, "We can't do that—it goes against the Building Code," a citizen member responded, "Then let's review the code"—and remarkably, the group IS reviewing the code.

A success like the creation of the MC-3 has the potential to generate a multitude of "success stories."

Joan Martin is the Adopt-A-Stream Program Director for the Huron River Watershed Council in Ann Arbor, MI. She may be reached at jmartin@hrwc.org; 734-769-5971.

Aquatic Invertebrate Field Guide

Virginia Tech entomology professor Reese Voshell's new book, *A Guide to Common Freshwater Invertebrates of North America*, was specifically designed to meet the needs of volunteer monitors and other non-experts. Voshell describes the book as "a classic field guide" rather than a technical key. Over 200 high-quality color and black-and-white illustrations help users identify nearly 100 aquatic invertebrates to family level. Also included are guidance on collection methods and an extensive (but nontechnical) section on biology. 442 pages; $29.95. Order from McDonald and Woodward Publishing Co., 800-233-8787; mwpubco@mwpubco.com; www.mwpubco.com.