The Volunteer Monitor
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The Business of Partnering

by Steve Landry

Around this part of the Merrimack River watershed, winter Wednesday evenings are Bug Nights. The place to be is the local high school laboratory, where Upper Merrimack Monitoring Program (UMMP) volunteers sit peering into dissecting scopes, identifying macroinvertebrates collected the preceding summer.

At the conclusion of the last Bug Night of the year, we treat ourselves to a celebratory dinner. This year we chose our local Indian restaurant. As I looked around the table and reflected on how this diverse group of people had become involved with UMMP, I saw some analogies between the restaurant and our monitoring program. Like the restaurant, UMMP offers a variety of choices. Our volunteers and supporters can select from a range of activities and commitment levels. And like our waiter, who was skillfully helping those new to Indian cuisine select dishes they were comfortable trying, we work with potential partners to figure out how our "products" can help them meet their needs and goals.

STEVE LANDRY

UMMP volunteers enjoying Bug Night at St. Paul's School lab.

Getting down to business

UMMP was born (or hatched, as we prefer to say) nine years ago as a project of the Upper Merrimack River Local Advisory Committee, a volunteer organization that provides a local voice in state government. Michele Tremblay and I, both members of the committee, took charge of designing and running the monitoring program. While I was busy making decisions about site selection and monitoring methods, Michele applied her experience in business and sales to the pressing question of how the program would be supported financially. Thanks in large part to following some basic business precepts, today UMMP—an all-volunteer program with no paid staff—is financially self-sufficient and self-sustaining, and continues to evolve and expand. We enjoy a solid foundation of support from partnerships with a wastewater treatment plant, a school, local municipalities (four towns and two cities), and our Adopt-a-River-Site sponsors.

Making it work for both

One of the first rules of negotiation is to speak from a position of strength—you're not begging for a handout, you're offering an opportunity. "It's not a partnership if people are throwing money at you because they feel sorry for you," Michele says. "Partnership is when it works for both." Making it work for both begins with talking to potential partners about outcomes, products, and "what's in it for them."

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The Volunteer Monitor

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Contacting the Editor:
Please send letters and article ideas to Eleanor Ely, Editor, 50 Benton Ave., San Francisco, CA 94112; 415-334-2284; ellieely@earthlink.net.

Subscriptions & Back Issues:
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Editor: Eleanor Ely
Editorial Board: Geoff Dates (River Network, Vermont), Linda Green & Elizabeth Herron (University of Rhode Island Watershed Watch), Steven Hubbell (Lower Colorado River Authority, Texas), Abby Markowitz (Tetra Tech, Inc.), Alice Mayio (U.S. Environmental Protection Agency), Jeff Schloss (New Hampshire Lakes Lay Monitoring Program), Jerry Schoen (Massachusetts Water Watch Partnership), Christopher Swarth (Jug Bay Wetlands Sanctuary, Maryland)
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Next issue

The next issue, Winter 2005, will focus on the topic of data quality. What can volunteer monitoring programs do to ensure that data quality is good enough for intended uses? How can they document that quality? Thorough and transparent documentation of data quality becomes especially important when data are shared.

The above questions being rather weighty, it seems desirable to balance out the issue with some creative ideas for making monitoring fun. Please contact the editor with article ideas on any of these topics (see "Contacting the Editor" at left).

Letters to the editor

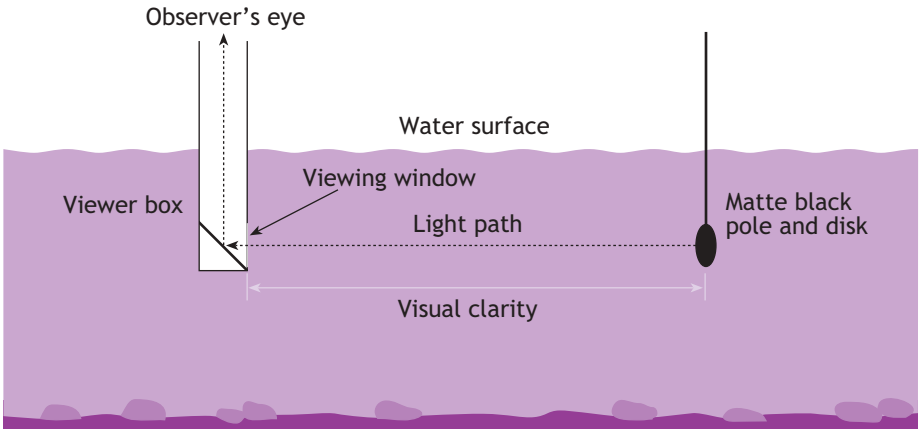
Horizontal clarity methods from New Zealand

In the most interesting article on "Measuring Clarity" in the Winter 2004 issue, I noticed that the visual clarity approaches mentioned (Secchi disk, transparency tubes) all involve *vertical* viewing, which has several flaws.

1. For *in situ* measurements (e.g., measurements made with a Secchi disk), relatively deep water is required, ideally 50% greater than the visual range.
2. Vertical observations may not be very meaningful in optically stratified waters.
3. Vertical observations are theoretically inferior because the sighting range is influenced by the vertical light gradient within the water.

In view of the above considerations, in New Zealand we have developed methods for *horizontal* visibility measurement that is independent of the vertical light gradient in water. Furthermore, we use a black target that reflects no light, so that visibility is independent of ambient lighting, unlike reflective targets such as the Secchi disk (see http://dipin.kent.edu/black_disk.htm). In practice a black-painted disk is used as the target, and is observed horizontally through an underwater periscope (see diagram). It is most convenient to have two observers, who stretch a tape measure between them, but it's also feasible for one observer to clip the disk to a stable structure and pay out the tape to the visual range. The method can be used in very shallow waters, and is particularly suited for streams and swimming beaches. It is less convenient for observations from boats in deeper waters.

The black disk visibility method is well established in New Zealand, having been used, for example, in our National Rivers Water Quality Network since its inception in 1989. Based on this experience, Davies-Colley and Smith (2001) recommended that black disk visibility should supplant turbidity in water quality standards, being cheaper, more precise, and immediately environmentally relevant. Recent research by scientists working in diverse fields confirms the utility and robust character of the black disk visibility method. For example, Zanevald and Pegau (2003) proposed "horizontal visibility of a black target to be the standard for underwater visibility" based on their confirmation of the fundamental optical character of the



Schematic of horizontal black disk visibility measurement in water. The visual clarity or "visibility" of the black disk is the light path *in water* from the face of the black target to the transparent window of the viewer box. (Redrawn from Smith and Davies-Colley, 2002.)

measurement using precise optical instrumentation. (For other citations please contact the author.)

I was involved in developing a low-cost analog of the *in situ* black disk method for New Zealand's Stream Health Monitoring and Assessment Kit (SHMAK). (See www.landcare.org.nz/SHMAK/index.html.) This kit—for measuring a variety of biological, physical, and chemical stream quality parameters—was developed by the National Institute of Water and Atmospheric Research (NIWA) with Federated Farmers, New Zealand's leading farming organization. The SHMAK method for measuring water clarity uses a 1-meter-long clear plastic transparency tube that is held horizontally while a small black disk is moved to the visual extinction point using an aquarium magnet cleaner (see photo).

SHMAK clarity is identical to black disk visibility over a limited visual range (turbid waters) (Kilroy and Biggs, 2002). In contrast, observations with vertical transparency tubes, such as those discussed in the Winter 2004 issue of *The Volunteer Monitor,* may not simulate *in situ* vertical visibility observations (e.g., Secchi depth) mainly because the presence of the tube interferes with the light field within the water it contains. This is of concern because people may think, mistakenly, that a clarity tube with a Secchi pattern on the bottom provides a visibility measurement equivalent to the Secchi depth. Moreover, the *Volunteer Monitor* article showed a variety of different styles of vertical transparency tubes currently in use. Vertical measurements made with different tubes are likely to differ from each other as well as from the Secchi depth. If so, different vertical clarity tubes may give *different* results on the *same* water—a recipe for confusion!

I believe that cross-comparison of different vertical clarity tubes in a wide range of waters is urgently needed to see if they reproduce standard *in situ* visibility (Secchi depth). Discrepancies between tubes are likely to be most pronounced in humic-colored (brown) waters with steep vertical light gradients. If indeed different tubes give different readings, then the only satisfactory long-term option might be for one particular clarity tube to be adopted (arbitrarily) as the standard so that *all* visibility measurements are comparable even if not identical to Secchi depth.

The "kiwi" transparency tube is the only method that incorporates horizontal viewing and so is unaffected by the vertical light gradient in the contained water. As the only method that has been referenced to a standard *in situ* visibility method (Kilroy and Biggs, 2002) and to the fundamental optics of waters, the SHMAK tube is a candidate to replace vertical clarity tubes. For detailed instructions on constructing the tube, or for reprints of articles cited below, please contact the author.

HELEN RICKETTS

Participants in a community-run river monitoring program in New Zealand measure water quality using the SHMAK clarity tube.

Rob Davies-Colley
National Institute of Water and Atmospheric Research (NIWA)
New Zealand
r.davies-colley@niwa.co.nz

References:

Davies-Colley, R.J. and D.G. Smith. 2001. Turbidity, suspended sediment, and water clarity: A review. *Journal of the American Water Resources Association* 37 (October):1085-1101. (See http://awra.org/jawra/papers/J00083.html to purchase, or contact r.davies-colley@niwa.co.nz for a reprint.)

Kilroy, C. and B.J.F. Biggs. 2002. Use of the SHMAK clarity tube for measuring water clarity: Comparison with the black disk method. *New Zealand Journal of Marine and Freshwater Research* 36(3):519-527. (Contact c.kilroy@niwa.co.nz for a reprint.)

Smith, D.G. and R.J. Davies-Colley. 2002. If visual water clarity is the issue, then why not measure it? Proceedings of the National Water Quality Monitoring Council Annual Conference, Madison, Wisconsin, May 19-23, 2002. (See http://dipin.kent.edu/black_disk.htm.)

Zanevald, J.R.V. and W.S. Pegau. 2003. Robust underwater visibility parameter. *Optics Express* 11(23):2997-3009. (See www.opticsexpress.org.)

Response:

I agree with Rob Davies-Colley's recommendation that black disk visibility (as well as perhaps water clarity determined by other methods) should be considered as a water quality standard with its own merit for better defining the aquatic habitat, especially since turbidity is a theoretically weak measurement with many complications in method and interpretation.

It's also true, as Davies-Colley notes (see point 1 above), that conventional Secchi disks may bottom out, a problem that can be avoided by "going horizontal." For moderate-depth waters that are not deep enough for a conventional Secchi measurement, a *vertical* black disk can also be useful because it disappears from view sooner.

It is theoretically correct that vertical Secchi measurements are subject to influence by ambient lighting (point 3), an effect that is more pronounced in deeper waters. However, our university field team has found that even in pristine waters there is excellent correlation between deep Secchi readings made with a viewscope and underwater light extinction measured with electronic sensors on both sunny and cloudy days (i.e., under varying ambient light conditions).

As for point 2 ("Vertical observations may not be very meaningful in optically

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stratified waters"), I would argue that the choice between a horizontal or vertical method for measuring clarity in a lake depends on why you are taking the reading. Often Secchi depth is used as an inexpensive surrogate for other parameters (chlorophyll in some systems, sediment in others) and also as an estimator of lake trophic state. For such purposes, a vertical Secchi measurement is an advantage because it integrates the character of the potentially stratified or heterogeneous water column. If stratification is present, a horizontal measurement will be less representative of overall conditions than a vertical measurement. It would also give a less accurate estimation of the photic depth, which some volunteer monitoring groups and researchers use to determine the sample-collection depth for other parameters. Moreover, many lake volunteer groups collect integrated water samples of the upper layer of water, and the vertical Secchi depth (or black disk depth for that matter) should correlate better to that type of sample. For over 15 years our team has done comparisons of the surface (0.5 m), integrated (surface to just over the thermocline), and metalimnetic (thermocline) chlorophyll concentrations, and we usually find the surface levels to be well below the integrated results.

The above arguments in favor of vertical clarity measurements in stratified waters don't apply in streams and rivers, where the water is usually well mixed. The SHMAK tube offers many practical advantages. By incorporating a movable target, it avoids the inconvenience of adjusting the water level in the tube, as required by current models of vertical transparency tubes. Also, a horizontal tube could potentially be longer, permitting clarity measurement in very clear waters. Stream monitoring groups considering adding water clarity monitoring to their program should seriously consider the horizontal SHMAK tube.

While Davies-Colley is correct in pointing out that the New Zealand tube is the only transparency tube method that has been rigorously referenced to a standard *in situ* method, volunteer monitoring groups that are currently using vertical transparency tubes should not be concerned about the validity of their data. As discussed in the *Volunteer Monitor* article in the previous issue, clarity measurements from several different models of vertical transparency tubes have been shown to correlate strongly with TSS and turbidity measurements (Anderson and Davic, 2004). Thus, while in theory better measurements may be made using the New Zealand tube, practically speaking, vertical transparency tube measurements serve well when calibrated within a given watershed or ecoregion.

However, for the reasons stated by Davies-Colley it is extremely important that any given program stick to one model design. It would be advantageous to set a standard diameter and tube length for such instruments to allow for comparisons across programs, but given the wide range of waters I can understand how one group that mainly deals with productive waters might prefer a shorter tube than the monitoring effort that deals with more pristine waters and requires a longer tube. Additional empirical studies may offer conversion factors for each tube design.

Jeff Schloss
University of New Hampshire Center
for Freshwater Biology and
UNH Cooperative Extension
jeff.schloss@unh.edu

Reference:
Anderson, P. and R.D. Davic. 2004. Use of transparency tubes for rapid assessment of total suspended solids and turbidity in streams. *Lake and Reservoir Management* 20(2):110-120.

Vertical transparency tube with movable target

Thank you for the excellent review of transparency measurement in your Winter 2004 issue. My work with the Harpeth River Watershed Association convinced me that the transparency tube is the best way to introduce nonscientists to water quality measurements because it is intuitive, immediate, and has no "black-box" aspects. We found that transparency was well correlated with turbidity in our basin, and I'd like to encourage your readers to develop calibration curves of their own based on natural water samples.

I came up with another variant of the transparency tube, inspired by the movable target used in the horizontal New Zealand tube. My design uses a vertical tube with a mini-Secchi disk as the target. At first I tried using a magnet as the New Zealanders do, but since it was difficult to find a strong enough magnet for use in a vertical tube I switched to raising and lowering the target with a cord. In comparison with the vertical tube with an outlet at the bottom, this variant is faster to use, you don't need to stoop to fiddle with the outlet valve, and you don't wind up working in a puddle. Moreover, you can leave the same sample of water in the tube for a series of people to measure, and running the target up and down the tube keeps the sediment in suspension.

The target is on the top of a cylindrical sinker made from a $2^1/_4$-inch-long section of PVC pipe filled with nails and hot glue for weight. The diameter of the PVC pipe should be a little smaller than the inside diameter of the acrylic transparency tube. For our tubes, $1^1/_4$-inch pipe was the best fit. From the sinker, a nylon cord runs up the tube, over a pulley that clips on the top edge of the tube, and down to a counterweight on the outside. I used a small water bottle for the counterweight so that its weight could be adjusted to balance the sinker. Transparency is measured down from the water surface to the top of the target. I can send photos and drawings to anyone interested in trying this design.

Tim Diehl
U.S. Geological Survey
Nashville, TN 37211
thdiehl@usgs.gov

What's Volunteer Time Worth?

Ever need to put a dollar value on your volunteers' time—for example, when calculating in-kind match for grant funding? According to Independent Sector, the estimated average value of volunteer time was $17.19 per hour for 2003 (see www.independentsector.org). However, this value varies dramatically by state. A state-by-state listing on the website shows that a volunteer hour in Washington, DC, is worth more than twice as much as a volunteer hour in Montana.

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For local municipalities, who often are not able to do as much water testing as they would like—or any, in some cases—UMMP's big selling point is our data. By monitoring bacteria, macroinvertebrates, habitat, and (sometimes) water chemistry at 11 sites, we are able to offer municipalities a specialized service. In return, the municipalities provide annual financial support. Both UMMP and its communities get value added from the partnership. Each year, UMMP data are reported to town commissions and city councils, who then have the opportunity to discuss results and take appropriate actions if needed.

Partnering with a local school was a natural fit. UMMP needed laboratory facilities for Bug Nights, and the partnership provided the school with lots of educational opportunities, including student participation in Bug Nights, incorporation of UMMP field activities into the science curriculum, and "guest lectures" by UMMP coordinators. Our first school partner was Franklin High School; later Bug Nights were moved to St. Paul's School in Concord because of its more centralized location. Scott Reynolds of St. Paul's points out some additional benefits of the partnership: "As a landowner within the Merrimack River watershed, our school directly benefits from UMMP activities through improved river quality," he says. "We also consider our partnership with UMMP as a component of our land stewardship mission, and use the program as a model for the ability of volunteers to make a difference."

Adoption

Our newest partnership venture is our Adopt-a-River-Site program, which we started in 1998 as a way to ensure long-term financial support. River site adopters (mainly local businesses) pay an annual adoption fee of $300. They also have the option to get more actively involved by participating in monitoring at their site. So far, every one of our adopters has elected to take part in activities such as collecting bacterial samples or deploying rock baskets for collecting macroinvertebrates. [*Note:* For more on rock baskets see page 6.] This is where the power of partnerships pays incredible dividends—UMMP gains not just critical financial support but also many new volunteer monitors.

Don't be shy

I have to admit that asking businesses to pay an "adoption fee" to sponsor an UMMP site was completely Michele's idea. Like many people involved in nonprofit organizations, I was gun-shy about going out and asking for money, finding it more comfortable to write a grant proposal. But dependence upon grants has definite drawbacks. Often when applying for a grant you find yourself trying to match a particular funder's guidelines. Instead of pursuing your own mission, you mold yourself to theirs. With the Adopt-a-River-Site program, UMMP is in control—we designed a program that adopters buy into. Another big plus is that our site adopters, unlike most grantmakers, are with us for the long term. So far every one of them has renewed their commitment each year. (And by the way this zero percent attrition rate goes for all our other partnerships as well.)

STEVE LANDRY

Franklin Wastewater Treatment Facility employees Robyn Panciocco (left) and Vicki Whittemore process UMMP's *E. coli* samples, and David Yeo deploys rock baskets and collects bacteria samples. The UMMP certificates usually hang in the plant's lobby.

Enlightened self-interest

Our first river site adopter was the Franklin Wastewater Treatment Facility (FWTF), which adopted two sites—the two that bracket their outfall. This was an easy sell because the facility was already a strong supporter of our program and had been analyzing our bacterial samples since 1995. FWTF became one of our most active site adopters, participating in both bacterial and macroinvertebrate sample collection. "For us, it's enlightened self-interest," says FWTF director Randy Monti. The monitoring that the plant performs under its discharge permit doesn't include macroinvertebrate surveys, and paying a consultant to do that work would be very expensive. Monti says, "Partnering with UMMP gives us a wonderfully economical way to find out how much good our $3-million-per-year facility is actually doing."

Listen and learn

Finding sponsors for the other nine sites took a little more time and effort. Here Michele's business savvy really paid off. As she puts it, "When you talk to a business like a business, they know you mean business."

We used a consultative approach, which means really listening to people, learning about their business, finding out what their particular needs are and what your project can offer to help them meet those needs. Different partners will make different selections from your "menu." One of our site adopters is a very small company whose two owners wanted a way to channel their philanthropic environmental ethic into something concrete and local. Other Adopt-a-River-Site sponsors appreciate the value to their employees, who love volunteering to help the river. And everyone likes the public-relations value. One of the coolest things for me is to visit an Adopt-a-River-Site sponsor and see all their annual certificates of appreciation from UMMP framed and prominently displayed in their lobby.

We do everything we can to publicly recognize our site adopters. Their names are prominently featured on all UMMP education and outreach materials, displays, and presentations. Recognizing

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"Macroinvertebrates on the Rocks—*Scrubbed* Not Stirred, Please"

When the Upper Merrimack Monitoring Program (UMMP) got underway back in 1995, we discussed various collection devices for macroinvertebrates. The kick-net method has tremendous appeal for a volunteer program because it requires only one visit to the site. It also allows for sampling different microhabitats within a stream reach. However, kick-net sampling is best suited for riffle area habitats on wadeable streams and rivers. The upper Merrimack River has very few riffle areas, and several of the UMMP sites are accessible only by canoe. For macroinvertebrate sampling in deep, slow-moving waters with a sandy or muddy bottom, you need to use an artificial substrate such as a multiplate sampler (e.g., Hester-Dendy) or rock basket. We decided to use this approach, even though volunteers have to visit sites twice, once to deploy the device and once to retrieve it.

STEVE LANDRY

We chose rock baskets rather than multiplate samplers for a couple of reasons. The rocks mimic the natural substrate better and provide larger spaces for the bigger macroinvertebrates. (Dobsonfly larvae can get as big as 6 inches in the river!) Also, the New Hampshire Department of Environmental Services (DES) uses rock baskets.

We purchase our rock baskets from Water Monitoring Equipment and Supply (www.watermonitoringequip.com). They are made from heavy gauge steel wire coated with a black vinyl sealant for corrosion protection, and resemble small lobster traps. We fill the baskets with 3"-6"-diameter non-crushed stones in order to closely mimic the natural gravel and cobble found along the bottom of the upper Merrimack River. Baskets are placed on the stream bottom and attached by means of a small loop to a piece of steel rebar driven into the bottom. The loop is tied to the rebar with a plastic cable tie.

With help from Kathy Brockett, Laurel Brown pounds rebar into the stream bottom, then slips the rock basket over the rebar. The company Brown works for, Public Service of New Hampshire, has adopted two river sites.

Each year, in the middle of June, UMMP volunteers paddle, kayak, wade, or snorkel to their sites to deploy the baskets, which then reside on the river bottom (hopefully undisturbed!) for a period of seven weeks, in accordance with EPA and DES protocols. When the volunteers return to collect the critters that have colonized the "rock condos," they detach the cable tie and lift the basket into a sieve bucket for transport to shallow water. There, rocks are carefully removed from the basket one by one, gently scrubbed with a brush, and inspected to ensure that all macroinvertebrates have been removed. Once all the rocks have been processed, the invertebrates, vegetation, and any other debris are transferred from the sieve bucket to a jar of 70 percent alcohol for preservation. Samples are stored until Bug Nights begin in January, where sample sorting and identification to the family level is conducted by UMMP volunteers.

In general, we've had very good success utilizing rock baskets. This method standardizes the sampling procedure, an important advantage when you have multiple stations and volunteer teams. If 10 or 11 teams went out to sample with kick-nets, the variability in sampling techniques, habitats selected, and time devoted to each replicate could be quite drastic and skew results. Volunteers are trained in rock basket retrieval methods each year, and each UMMP team has a "Team Leader" who is well versed in the protocols described in the UMMP QA/QC Plan approved by EPA.

Because rock baskets are left in place for a significant period of time, they become part of the river, developing a "memory" that can give you additional clues to river health—clues that kick-netting would miss. For example, after seven weeks the basket may be covered with filamentous algae or half buried by sediment from an upstream outfall, or it may have snagged a fragment of an exotic invasive plant species. Our rock baskets have led us to discover invasive plant infestations and severe erosion problems.

Another potential advantage of rock baskets is that they can be suspended in the water column and do not have to rest on the bottom at all. This is extremely useful when sampling very deep water. Luckily, sites along the upper Merrimack River allow for rock baskets to be placed directly on the bottom,

although at some sites canoes and snorkel gear are required for deployment and retrieval.

I'm constantly amazed at how many organisms colonize the UMMP rock baskets each year. We have collected EPT taxa (mayflies, stoneflies, and caddisflies) from every site every year, and over 50 families of macroinvertebrates have been identified in UMMP samples to date. Crayfish are quite common at many of the deeper and slower-moving river sites, and I don't think the void spaces on a multiplate sampler would provide good refuge for these large invertebrates. Many crayfish and other invertebrates such as dobsonfly larvae often crawl out of kick nets during sampling.

The one drawback we have experienced is that the baskets are subject to disturbances and vandalism. UMMP rock baskets are placed strategically to avoid canoe put-ins, popular fishing spots, swimming areas, etc. After the first year, we discontinued marking the rock baskets with buoys, which seemed to arouse curiosity and increase the rate of disturbance. UMMP volunteers now try to integrate rock baskets into the surroundings as inconspicuously as possible.

Some people have raised concerns that rock baskets really only measure colonization capacity and don't reflect the actual taxa present at a site, or the true river quality. The UMMP does conduct qualitative habitat assessments at each site following EPA and DES protocols, and we consider the habitat assessment score along with macroinvertebrate community scores when making river assessments. At UMMP sites, poor habitat assessment scores correlate directly with poor macroinvertebrate community diversity and density, while high habitat scores correlate with high diversity and density.

By using rock baskets, is the UMMP missing out on organisms that burrow into the river sediment? Are we excluding some microhabitats and flow regimes that would be sampled by a kick-net? I'm not entirely sure how to answer those questions, and I think the debate over what sampling methodology is best can be argued from many different angles.

Is it difficult to organize volunteers to deploy rock baskets and then retrieve them seven weeks later? The answer to that for our program is no. There's nothing quite like sitting around a sieve bucket on the shore of your favorite UMMP site scrubbing off rocks with other volunteers. The best part comes when passersby ask what you are doing and you get to say, "I'm cleaning up the river one rock at a time."

—Steve Landry

Resource

Dates, Geoff and Jack Byrne. 1997. *Living Waters: Using Benthic Macroinvertebrates and Habitat to Assess Your River's Health*. River Network. Includes detailed information about using artificial substrates, including rock baskets and multiplate samplers. 200 pages. $25 ($20 for River Network partners). Order at www.rivernetwork.org/, or call 503-241-3506, ext. 391. *Note:* A fully revised edition is due out by January 2005. Visit the River Network website to order a copy or view the online version.

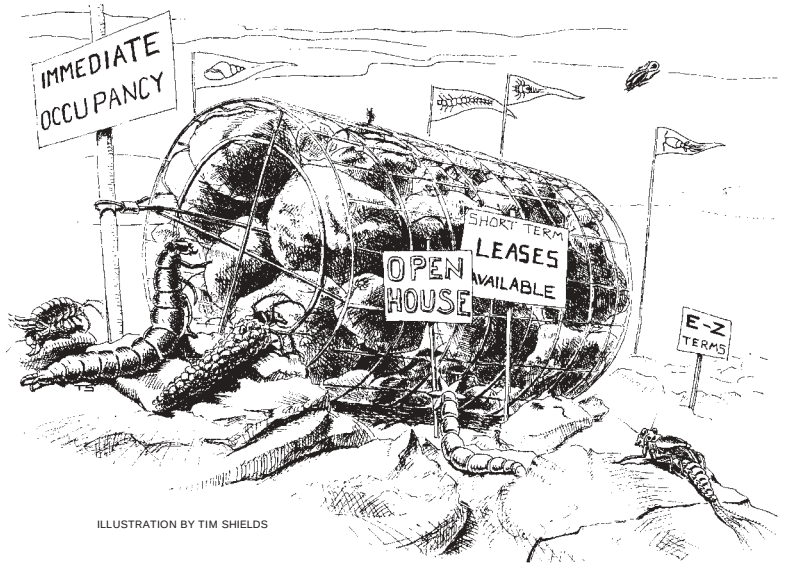

ILLUSTRATION BY TIM SHIELDS

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that the media are always reluctant to be a free vehicle for advertising, when working with media we look for ways to legitimately incorporate the sponsors into the story, such as having one or two volunteers from the adopting sponsors talk about their participation.

Reaching beyond the choir

Adopters represent a wide diversity of businesses, from a payroll agency to a bank to a hydroelectric producer. Occasionally we have been criticized for working with companies that may not have the most environmentally friendly practices, but as Michele says, "If you only work with like-minded organizations that are singing the same song as you, then you're not doing your job because you haven't reached those people that need to hear your message."

Bottom line

By following a business plan, identifying potential "customers," and "marketing" our vision, we have created a diverse partnership base that has made UMMP successful and sustainable. We can almost guarantee that any watershed group that tries thinking like a business will quickly realize they have a more diverse and appealing product line than they suspected. Remember that people want to contribute to something they believe in. They want to feel connected to their local water resources and be involved in protecting them, and a volunteer monitoring program provides a very tangible way to accomplish these things.

Offer your partners a diverse menu with their needs in mind and most likely they will join you for dinner and even stay for dessert!

Steve Landry is UMMP Sampling Supervisor. For more information contact the UMMP office at 603-796-2615 or visit www.merrimackriver.org.

Capturing Storm Runoff:
Russian River First Flush

by Eleanor Ely

It was a dark and stormy night. And at 26 sites around the Russian River watershed in northern California, teams of drenched and sleep-deprived volunteers were collecting samples from tributary streams to find out what pollutants the storm's "first flush" was delivering.

Every storm has a first flush—the first few hours of runoff, which carry the highest load of pollutants—but this first flush was special. Northern California has a Mediterranean climate, with dry summers and rainy winters. The storm that started just before midnight on November 6, 2002, was the first rain to fall on the Russian River watershed since the previous May. As it washed over roads, parking lots, and roofs, it was picking up pollutants that had been accumulating all summer.

BETTY ANDREWS

In the wee hours of the night, the Santa Rosa Creek First Flush team tests a water sample for pH.

At their sites, the volunteer teams watched for a drop in conductivity, a rise in water level, and/or an increase in murkiness as indications that storm runoff had reached the site. Then, working by the light of headlamps, Coleman lanterns, car headlights, or nearby street lights, they collected their first set of water samples. Thirty minutes later, they collected a second set, and 30 minutes after that, a third. Then they delivered their samples to the nearest event "hub." From the local hubs samples were taken to the Event Center (housed at the Sotoyome Resource Conservation District) to be logged in, then driven by volunteer couriers to the two participating labs.

Over the next few days, volunteers worked feverishly to analyze the samples for phosphate, nitrate, ammonia, turbidity (by turbidimeter), and total suspended solids (by filtration and weighing). The nutrient analyses had to be completed within a two-day holding time. The North Coast Regional Water Quality Control Board (Regional Board) not only made their lab facilities available for the event but provided staff who worked shoulder to shoulder with the volunteer lab crew. Meanwhile, other samples were analyzed for bacteria (*E. coli* and total coliform) and the pesticide diazinon by staff at the Region 9 EPA lab .

Behind all this intense activity lay months of planning and preparation by Revital Katznelson, Regional Citizen Monitoring Coordinator for the State Water Resources Control Board. After the storm hit, Katznelson put in three straight 12-hour days, mainly supervising and coordinating the lab analysis. "They were crazy days—long and hard," she says, "but at the end I felt exhilarated by our success." In any case, Katznelson had only herself to blame for the ordeal, since it was she who had originally proposed the idea for first flush sampling to the Regional Board.

By any measure, the 2002 Russian River First Flush sampling event was ambitious, especially for a first-time effort. Geographically, it stretched from Ukiah some 70 miles south to Cotati. Eighty sets of samples were collected and more than 100 volunteers were involved at various stages, including sample collection, sample transport, lab analysis, and data management. And yet things went remarkably smoothly. Volunteer teams were successfully mobilized and deployed to every planned site, and all the samples were analyzed or preserved within the appropriate holding time.

Growing pains

The following year, Russian River First Flush got bigger—more volunteers, more sites, more samples, more parameters tested, more labs. In some ways, it also got better. For example, the designation of a Volunteer Coordinator and a Lab Coordinator helped greatly with volunteer recruitment and training for both field sampling and lab analysis. But once the event got under way, the organizers began to realize that perhaps they had bitten off a little more than they could chew.

The reasons for the expansion are easy to understand. The first year's event had generated so much enthusiasm that 285 volunteers signed on to participate in 2003. Meanwhile, a new lab partner had come on board with an offer to analyze samples for lead, copper, and zinc.

Mobilizing the volunteers was actually not too difficult, and field sampling also went pretty smoothly even though 34 sites were sampled—up from 26—the previous year, and a total of 130 sets of samples were collected. It was when all those samples arrived at the lab that problems began. "In the first few days I

put in 63 hours in the lab," says Sharon Marchetti, the Lab Coordinator. "I admire what we accomplished, but I wouldn't want to put the volunteers through that again."

The experience of 2003 provided an important lesson: Don't grow too big too fast. Or, in the words of Russian Riverkeeper Don McEnhill, who participated in sample collection as well as serving as "Weather Person" and helping with event coordination, "You need to determine your capabilities based on your budget and your analytical abilities, and at a certain point you have to say, we have the capability to process this many samples, and we won't take one more."


SHARON MARCHETTI

Volunteers work hard to process and analyze Russian River First Flush samples.

Logistics and lessons learned

With two years' experience under their belts, the First Flush coordinators have a very good idea of what it takes to quickly mobilize upwards of 100 volunteers to capture scientifically valid data about a natural phenomenon whose timing is unpredictable. The following logistical and practical details should prove useful to anyone interested in sampling storm events.

"Roles and tasks" list

Behind innocuous-sounding task descriptions like "train volunteers" or "prepare sampling kits" there lurks a thicket of small details—things like finding sites to host trainings, or soliciting donations of supplies and equipment. For the 2003 event Katznelson prepared a detailed "Roles and Task List" spelling out the exact tasks for each role (i.e., Volunteer Coordinator, Team Leader, Lab Coordinator) before, during, and after the event.

Getting partners on board

As a large-scale event with virtually no budget, Russian River First Flush has depended heavily on the collaboration of partner organizations. The Regional Board not only offered their lab facilities but helped with data interpretation and presentation. Two other laboratories, one at EPA Region 9 and the other at the regional wastewater treatment plant, analyzed samples for free. Several local agencies and organizations provided sites for volunteer training and/or served as event "hubs"; the Weather Service in Monterey helped with storm tracking; various laboratories and local businesses donated or loaned supplies or equipment; and numerous community organizations recruited their members as volunteers.

According to Katznelson, no arm-twisting was required. Agencies and community nonprofits alike had a strong interest in learning more about the constituents in first flush runoff, as well as in collaborating on a basinwide project. Once the event got rolling, it gathered momentum and excitement. McEnhill says, "When you go to local businesses and tell them you have over 200 community people involved, plus all the partnerships, they are very impressed and they want to be part of it. For instance, Yardbirds House and Garden gave us $500 worth of plastic tubs."

AS A LARGE-SCALE EVENT WITH VIRTUALLY NO BUDGET, RUSSIAN RIVER FIRST FLUSH HAS DEPENDED HEAVILY ON THE COLLABORATION OF PARTNER ORGANIZATIONS.

Volunteer roles

First Flush volunteers were offered a choice of roles. Those who preferred to stay dry could staff the Event Center; those who didn't want a midnight wakeup call could sign up for lab analysis or data entry. Most, however, opted to go out and collect samples. Apparently the discomfort and inconvenience of this job were offset by its attractions—suspense, adventure, and a spirit of camaraderie.

Dry run

Because a classroom training session can't fully prepare volunteers, McEnhill likes to accompany teams to their site for a dry run. After spreading out the supplies from the sampling kit, he says, "Picture it's the middle of the night, you're 300 feet down the dirt trail from where you parked your car, it's dark, it's raining. You're going to have to write your sample time on this jar." At that point volunteers start asking each other, "Who's got a headlamp—or a lantern?" They begin to understand the importance of labeling their sampling vials ahead of time. Likewise, the lab crew needs hands-on training in the lab using actual equipment.

Site selection

"You have to sample where there is runoff," says Katznelson. This might sound obvious, but even if a storm starts at the same time over the whole watershed, runoff will arrive much sooner in areas with a lot of impervious surfaces than in undeveloped areas where water can soak into the ground. For the Russian River First Flush, sample collection had to take place within a 12-hour window to ensure that all samples could be transported to laboratories within holding time. So it was very important to select sites that had a good chance of receiving runoff

continued on next page

FIRST FLUSH, continued

quickly. (This is one reason why the volunteers sampled in urban locations rather than in the "wine country" for which the region is famous.)

Extra bodies for backup

Since the arrival time of the first storm is unknown, volunteers are essentially on call for up to five or six weeks. Some volunteers are available only during the day, others only at night, and most have various other obligations. The First Flush coordinators aimed to have about eight volunteers on the sample collection team for each site to ensure that at any time, seven days a week, 24 hours a day, at least three people would be available. Because Team Captains have the sampling kit for their team, it's especially important for them to have an official backup person to whom they can transfer the kit if they leave town.

Mobilization system

The Russian River First Flush event defined three levels of alert:

- Yellow Alert: Weather system may arrive in 2-4 days.
- Orange Alert: System with > 40% chance of > 0.2" of rain forecast within 24 hours.
- Red Alert: It's a go!

Once the decision is made to go to Red Alert, the Weather Person calls the "Hubsters" (coordinators for local hubs), who call the Team Captains, who call the volunteers and tell them to stand by. When Team Captains see local signs of runoff, such as water moving from road to gutter, they give crew members the final "get moving" call.

An important "lesson learned" was that every person should have a copy of the entire phone tree, since the chain can have a weak link.

Fickle weather

Deciding when to call Red Alert can be the hardest part of a first flush sampling event. McEnhill, who served as Weather Person for both years, says that in 2002 the weather was "textbook perfect"—a big storm over the entire watershed ended the long drought.

By contrast, the 2003 rainy season started with a couple of spotty storms. "It was really torturous making the decision," recalls McEnhill. "With the second storm we were all ready to go to Red Alert when we got word from the Weather Service Office in Monterey that we would probably only get 30 percent coverage over the watershed. So we decided not to sample." The decision meant missing the first flush at some sites, but going ahead would have meant that many sites would have had no runoff at all. "You can only do this once," points out McEnhill.

Adapt to conditions on the ground

With storm sampling, you have to be flexible. If a team arrives at their site and finds that the bank is too slippery, they move their station. If they wait a long time without seeing runoff, they look for a nearby place that has flow. [*Note:* This may not apply to every storm sampling effort. In some cases it may be important to sample from an exact predetermined location.]

The big picture: Outcomes

The Russian River First Flush event has value on several levels. First are the benefits to the participants themselves. "I can't think of a better way to engage people in caring for their watershed than dragging them out in the middle of the night to make observations of their creek," says McEnhill.

Then there is the value of the data. Findings of problematic levels of diazinon the first year led to the First Flush organizers applying for (and receiving) a grant that will make it possible to test for two additional pesticides and add source tracking. First Flush data are also of great interest to multiple users, such as the Regional Board, cities, stormwater permittees, and EPA, none of whom could collect this kind of data on their own.

Finally, and perhaps most important, is the event's potential to bring about change in the community. As Marchetti says, "When people read about the presence of a pollutant in a tributary, they don't see themselves in that story. They think it got there through industry or some other reason. We need to create the connection to that person."

One way to create that connection, Marchetti believes, is with the First Flush event report—not the full-scale scientific report, but a condensed, accessible version, that could be "a vehicle to inform, to educate, to change." Marchetti has begun assembling a group of First Flush volunteers to transform the 2002 scientific report into something more like a "community user's guide" that community groups could use for communicating with other organizations, developing pollution prevention strategies, and making presentations to municipalities about issues like development and land-use practices. Such a document would enable First Flush to have an even more far-reaching impact on the community and the watershed.

For more information on Russian River First Flush, contact Revital Katznelson, Clean Water Team Regional Citizen Monitoring Coordinator, California State Water Resources Control Board; rk@rb2.swrcb.ca.gov; 510-622-2470.

Useful Website from Cooperative Extension

For the past few years Cooperative Extension programs at the University of Rhode Island and University of Wisconsin, funded by a national grant, have been focusing on enhancing the capacity of Extension-associated volunteer monitoring programs. As part of the project, useful information and links have been posted on the Internet at www.usawaterquality.org/volunteer. For example, clicking on "Monitoring Equipment Suppliers" brings up a list of over 30 suppliers, with contact information and a brief description of equipment available from each supplier. The site also includes lots of helpful guidance, as well as links to volunteer monitoring manuals produced by different programs around the country.

One ongoing project is an annotated list of reports on comparisons between volunteer and professional monitoring methods and results. Reports received to date are posted at the website, and information about additional volunteer/professional comparison studies is being sought from the entire volunteer monitoring community (not just Extension-associated programs). Please send your information to lgreen@uri.edu (401-874-2905).

Low-Cost Storm Event Sampler

To collect storm event samples when they cannot be physically present at the site, researchers at the University of Wisconsin-Stevens Point (UWSP) use a "single-stage siphon sampler" that can be positioned to collect a sample at a given stream height. Some Wisconsin volunteers, including members of Trout Unlimited, have also used the device. Dick Stephens, the lab manager at the Water and Environmental Analysis Lab at UWSP, built the sampler based on a design originally published in 1961.

Although manual storm event sampling is generally preferable, the siphon sampler is very useful in situations where manual collection is not practical—for example, sampling at remote sites or sites that cannot be safely reached during a storm, or sampling at multiple sites with limited personnel. The other alternative is to use an automated sampler, which can be programmed to sample at multiple stream stages, but these run to $5,000 or more.

The sampler works on the siphon principle. When the stream level rises to the level of the intake nozzle, water enters the intake tube, but the sample bottle doesn't begin to fill until stream height reaches the top of the intake tube loop. Then the bottle fills quickly until the sample level inside the bottle reaches the inside end of the exhaust tube. At that point the sample level stops rising, leaving an air bubble between the top of the sample and the stopper. As the stream continues to rise, water moves up the inside end of the exhaust tube until stream height reaches the level of the exhaust port. Then air becomes trapped in the exhaust tube loop, creating an airlock that prevents additional sample from entering the bottle.

It is critical that the stopper be held tightly in place, which the UWSP model accomplishes by wedging the stoppered bottle tightly between the two bolts that run through the PVC tube.

Water pressure or turbulence can potentially displace the air bubble in the exhaust loop, allowing water to flow continuously through the sampler. Stephens explains that the higher the stream velocity, the higher the loop needs to be. The standard UWSP model has a 10½-inch exhaust loop, which is good for velocities up to about 3 feet per second. For use in faster-flowing streams, Stephens has made models with exhaust loops as high as 36 inches, but he says these get "a little unwieldy."

The bottles should be retrieved as soon as possible. If you don't see a large air bubble between the top of the water sample and the stopper, you know that something went wrong. Perhaps the stopper leaked, or the airlock was lost.

According to Stephens, the samples may be used for measuring suspended and dissolved solids, conductivity, total phosphorus, total nitrogen, pH, and total metals. If a glass (rather than polypropylene) sampling bottle is used, pesticides may also be measured. Stephens has done comparative testing of nutrient and suspended solids results with the samplers versus hand sampling and obtained essentially the same results. Because the water sample has been sitting in the bottle, it is not suitable for determination of temperature, dissolved oxygen, available nutrients (i.e., soluble reactive phosphorus, ammonia, nitrate), or bacterial counts.

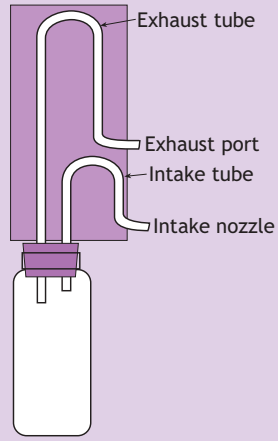
To interpret your data, Stephens emphasizes, it's best to know the streamflow. This is easy if you happen to be monitoring at a site that has a USGS streamflow gauge. "It's one thing to know you have 1 part per million phosphorus in the water," says Stephens, "but that doesn't tell you how much phosphorus is actually coming in from the surrounding watershed."

Many variations on the basic siphon sampler design have been created. To eliminate the potential problem of turbulence dislodging the airlock, some models carry the exhaust tube up to a point that remains above water at all times. This can be done by using flexible tubing which may be attached to a tall post or gauge.

Tim Diehl, a USGS hydrologist in Tennessee, has designed a "low-profile" model, with the sample bottle positioned horizontally, for use in shallow streams (for more information contact thdiehl@usgs.gov).

The UWSP sampler may be purchased for $40 from the UWSP Water and Environmental Analysis Lab; 715-346-4078; rstephen@uwsp.edu.

DICK STEPHENS



PHIL EMMLING

The University of Wisconsin-Stevens Point single-stage siphon sampler is made from PVC pipe, gray PVC tubing glued to a piece of PVC flat stock, a 500-ml polypropylene bottle, and a neoprene stopper that fits snugly into the neck of the bottle. The sampler is mounted by means of a hose clamp to a fencepost driven into the stream bottom or bank. The intake nozzle and exhaust port should face into the direction of flow. To get the most representative concentrations, the sampler should be deployed in a smoothly flowing part of the main flow. To sample at several different stages of a storm, two or three samplers may be placed at different heights.

In higher-velocity streams, the exhaust loop must be higher.

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Partnering to Train Teachers

by Barb Maynard

The Big Thompson Watershed Forum in Loveland, Colorado, didn't have much lead time to plan our 2002 National Water Monitoring Day event. In August we got a phone call from our local U.S. Geological Survey (USGS) office to say that there was a national focus by USGS to partner with others to celebrate the day, and asking whether we could put something together by October 18.

We could and did, but it would never have been possible without our many already-established partnerships. Running a monitoring program and being a voice for improved local water quality have enabled the Forum to develop a strong working relationship with just about everybody involved with water quality issues in our area. So when we began organizing our Monitoring Day event—a daylong educational program for high school students—we knew exactly which agencies and people to call. And when those people got our call, they were happy to sign on to help because they had worked with us before.

The day was a success, attracting over 90 students as well as members of the general public to hear talks and participate in hands-on demonstrations of monitoring techniques. However, we decided that training teachers rather than students would ultimately reach many more students, and the teachers would be able to incorporate the water lessons into their curricula all year long. So we began planning a program for teachers for 2003.

Thinking like teachers

To offer an event of value for teachers, we had to try to think like teachers, to be sure the day would be practical and useful for them. First and foremost, we designed lessons to fit with state education standards. For example, our session on the Winkler dissolved oxygen method incorporated ideas for chemistry and biology lessons.

We also had to be sure that the lessons would be feasible for teachers to use. Unfortunately, both financial and legal constraints have made it increasingly difficult for teachers to take students on field trips. Therefore, while we held our event on the Big Thompson River, with teachers donning waders to measure stream discharge and collect macroinvertebrates, the exercises were designed so they could be adapted for strictly classroom use. For example, water samples for *E. coli*, dissolved oxygen, or phosphorus can be collected ahead of time by teachers and the analysis done by students in the classroom. Teachers can also collect macroinvertebrates before class, although the students obviously miss out on observing the different microhabitats preferred by different species. Stream discharge measurement is probably the most difficult activity to bring into the classroom, but nonetheless some of the teachers seemed enthused about creating an applied math lesson from the calculations for converting meter revolutions to cubic feet per second of discharge.

To make the day logistically appealing, we asked the Thompson School District to provide substitute teachers to cover classes for the day, and we arranged for teachers to earn optional continuing education credit.

Finally, we assembled a 4-inch-thick resource binder for each teacher to keep. This binder contained background materials, handouts, and classroom exercises, as well as contact information for a number of local water experts willing to help teachers throughout the school year.

BIG THOMPSON WATERSHED FORUM

Teachers learning the Winkler method for dissolved oxygen.

Many hands make light work

As in the first year, the 2003 event (now called World Water Monitoring Day) required pulling together a huge diversity of resources and expertise from our many partners. Our promotional poster was created by a USGS graphic artist, and over a dozen presenters gave talks and led hands-on sessions.

Representatives from USGS and the Colorado Department of Water Resources taught teachers how to measure stream discharge and showed them how pouring water on an ordinary gravel road can be used as a model for flow

BIG THOMPSON WATERSHED FORUM

Nicole Vieira (right), an aquatic entomologist from Colorado State University, shows teachers the diversity of insects found in the Big Thompson River.

dynamics. Over lunch, a local water lawyer spoke about the complexities of Colorado water law. In the afternoon, the coordinator of River Watch (a statewide program involving high school students in water quality monitoring) led teachers through the dissolved oxygen test, a microbiologist from the EPA Region 8 Laboratory demonstrated the Colilert method for detecting *E. coli*, and an aquatic entomologist from Colorado State University led a session on macroinvertebrate monitoring.

The Thompson School District, where Forum coordinator Rob Buirgy teaches a class focused on water issues, has been wonderfully supportive of the Forum. For our 2003 World Water Monitoring Day event, the school provided spectrophotometers and other supplies for measuring phosphorus.

Having so many presenters afforded us several advantages. First, each presenter was responsible for only one topic, which lightened the load on everybody. Second, with several people presenting simultaneously, we were able to split the teachers into small groups. Finally, the teachers had the opportunity to meet a large number of local experts, all of whom could be called upon later in the school year for further guidance.

The feedback we got at the end of the day was overwhelmingly positive. Among the comments from teachers were: "Hands-on activities I can use tomorrow because they are so well organized," and "I was given enough information and materials to create a great river ecosystem unit." The person responsible for coordinating the event, Forum Program Director Janeen Simon, says, "All decisions were mutual decisions—that's what made my job so easy and fun."

Barb Maynard is Assessment/Communications Program Manager for the Big Thompson Watershed Forum in Loveland, CO; 970-613-6163; bmaynard@btwatershed.org.

Buying Teachers' Time

Rob Buirgy, Coordinator of the Big Thompson Watershed Forum, spends 80 percent of his time working for the Forum and 20 percent teaching classes at Thompson Valley High School. Yet he is a full-time employee of the Thompson School District, which pays his salary and benefits. The Forum, in turn, reimburses the school district for 80 percent of his contract—in effect "buying" Buirgy's time.

In 1991, six years before the Forum was founded, Buirgy started doing water quality monitoring with his students. The monitoring eventually led Buirgy and the students to become involved in Colorado's regulatory process, which got the attention of many in the watershed. So when a group of stakeholders (local municipalities, counties, and a water conservancy district) began gathering interested parties to form a collaborative watershed protection organization, Buirgy was invited to participate.

Once the Forum was conceived, it became obvious that at least one paid staff member would be needed. It was at this point that Buirgy approached the Superintendent with the Forum's proposal to partner with the school district. Don Saul, the school Superintendent at that time, had the foresight to see the potential in this nontraditional relationship and was instrumental in designing a partnership that is cost-neutral for the school district.

"When you have a young organization without any paid staff," Buirgy says, "it's a real burden to deal with incorporation, tax-exempt status, and setting up payroll and benefits for employees. If you can find another organization that will 'sell' you one of their employees part-time, you can dodge the bullet of all those startup tasks and get off the ground fast." Buirgy points out that the partner or parent organization doesn't have to be a school; it could be a municipality or a nonprofit. But he adds that it may be hard to find a government entity or nonprofit that's politically acceptable to all stakeholders, while a school district is usually "squeaky clean."

The Thompson School District also provides the Forum rent-free office space and other in-kind support such as phone lines, high-speed Internet access, and technical support. Of course in any partnership both parties need to benefit. The Forum partnership provides the school district with an in-house watershed specialist and interdisciplinary curriculum advisor, monitoring equipment and training, guest speakers, and a high-profile way to connect students and teachers with the community.

Buirgy is not aware of any other watershed group that has a similar arrangement with a school or school district, which to his mind is a missed opportunity. "I think that people like me—teachers who are also involved in a watershed group—already exist in many communities," he says. "A small investment in formalizing the relationship can yield big payoffs for both parties."

A watershed organization looking for a stronger relationship with local schools and teachers would not necessarily have to follow the Big Thompson Watershed Forum model, in which a teacher who was actively involved with the watershed group took the initiative to approach the school. Another possibility (which Buirgy thinks few if any watershed groups have even considered) would be for an established watershed group to go to the school district and, as Buirgy puts it, "make a sales pitch for buying some teacher time."

[*Note:* Buirgy is interested in promoting similar partnerships between schools and watershed organizations. Please contact rbuirgy@btwatershed.org.]

Many Partners Many Possibilities

by Joanna Cornell

My childhood in Nigeria taught me that you know you have a water problem when your tap water is contaminated, when your tap water does not flow, when you have to travel to distant wells for water. In the late 1970s, when I was nine, our family immigrated to America. To me, America did not appear to have any water issues. The tap always flowed clear, and I could safely drink from public water fountains instead of having to carry a bottle of boiled and double-filtered water.

Even after I earned my first degree in environmental science, I still did not completely understand that in many communities rainstorms flush everything from car oil and fertilizer to sand and pet waste into storm drains which empty into streams that are often the source of drinking water.

In my various misconceptions I was not alone. The majority of Americans still do not know that streams rise after storms, nor why, nor where their drinking water comes from.

In 1996, in connection with my graduate studies at George Mason University, I conducted a biological assessment of streams in Fairfax County, Virginia. As a result of proactive planning in the late 1970s, the region's state-of-the-art wastewater treatment plant is located upstream of the water reservoir and contributes a consistent flow of treated and tested water. The county has one of the largest treated wastewater recycling programs in the country, and during times of low flow treated wastewater makes up a large component of water entering the water treatment plants. This is an affluent community whose residents depend on surface water as a drinking water supply. Therefore I assumed that macroinvertebrate data for local streams would be readily available.

Wrong again. Although there was a wealth of water chemistry data, a region dependent on its streams for survival had not taken the time to collect benthic macroinvertebrate data.

Much has changed since then. In 2001, the county completed its first countywide fish and macroinvertebrate stream survey, incorporating volunteer data to supplement agency data. Today we have

CANDY BARTOLDUS

KIM ANGELI

RANDY RANDALL

Top photos: Volunteers with the Northern Virginia Soil and Water Conservation District's stream monitoring program sample macroinvertebrates in all kinds of weather.

Bottom photos: Volunteer stream monitors Diana Saccone (left) and Laura Grape both work for Conservation District partner organizations (the Reston Association and Fairfax County, respectively) that assist with the District's monitoring program and use the data.

extensive databases about our streams, which are being used by county staff and residents to develop watershed management plans. A county that had few watershed-focused programs as late as the mid-1990s now has enough workshops, meetings, and events to fill every weeknight and weekend.

How did so much happen in a short amount of time? While it is impossible to capture all the synergies that have fueled interest in local watersheds, one thing is certain: these positive changes could not have occurred without partnerships.

Multi-partner network

As the coordinator of the Northern Virginia Soil and Water Conservation District's Volunteer Stream Monitoring Program, I am one of the links in the extensive network of partnerships that supports ongoing stream data collection, watershed education programs, and solution-focused planning in the county. (The Conservation District's volunteer program came into being in 1997 through the efforts and perseverance of one resident who was concerned about her local stream. I was hired in 2001 as the first paid stream monitoring coordinator.)

This partnership network took years to build and takes ongoing support to nurture. One thing I've learned is that partnerships are built on friendships, and friendships take time. I attend many meetings in order to initiate the relationships that build mutual trust and respect and lead to partnerships. Another essential for a successful multi-partner network is a coordinated means of communicating. The Conservation District sends out a weekly email calendar listing watershed-focused activities sponsored by various organizations in the region. The calendar is an outstanding tool for building partnerships and also demonstrating these partnerships in action.

Partners that our program works with include Fairfax County, several homeowners' associations, local environmental organizations like the Audubon Naturalist Society and the Potomac Greenways Coalition, various "friends of" groups, nature centers, schools, and George Mason University. In this brief article I will highlight just two of these: homeowners' associations and schools.

Homeowners' associations

Partnering with homeowners' associations is an excellent way to tap into ready-made networks and communication tools such as newsletters and meetings. Our monitoring program's partnership with the Reston Association has led to an extraordinary number of watershed-related activities. Reston, a large planned community with generous amounts of open space in natural areas, has a homeowners' association with over 50,000 members. The Conservation District co-leads monitoring workshops with the Association for residents.

The Reston Association developed, and has begun to implement, a watershed management plan based on an analysis that included volunteer-collected data. Many of the volunteer stream monitors were involved in the planning process and in helping gain community support for the plan. In addition to monitoring, these volunteers speak at environmental festivals, create brochures and presentations, and participate in stream cleanups.

As a result of the plan, the Reston Association has already restored a 1,000-foot section of badly eroded stream with support from the Conservation District, Virginia Department of Forestry, and Fairfax County Department of Public Works and Environmental Services. Each agency provided different resources, from the design plan to bulldozers. Recently, Reston residents voted watershed improvement their No. 1 funding priority.

School partnerships

Thousands of students have participated in the Conservation District's monitoring program at various levels. Some students volunteer with our program independently. In several schools, the monitoring program is incorporated into environmental science curricula or science honor society activities. We also lead special one-day outdoor programs for high school students, and often speak in classrooms.

DEBORAH BUFFINGTON

Fairfax County students at a macroinvertebrate monitoring workshop sponsored by the Conservation District Volunteer Stream Monitoring Program.

Involving schools in stream monitoring presents some special problems. Due to liability and time constraints, teachers are often hesitant to take students into the field. Transportation is expensive and requires multiple permission forms. Monitoring a stream near the school avoids some of these problems, but in urban areas such streams are likely to be impaired. In fact, our key problem in working with schools is the lack of healthy local streams. Students' enthusiasm wanes as macroinvertebrate diversity decreases.

While students can provide many hours of volunteer labor (often required for courses or community service require-

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The Dance:
Partnering with Corporations

by Vince Meldrum

Growing up in the disco era I learned early on that if I was going to have any luck in my social life I needed to be able to identify the right dance partners, and I needed to make sure that my newfound partners also enjoyed the experience. This meant that I had to be a good partner myself.

Today, as the leader of Earth Force, I'm still looking for the right partners—partners that can help our organization create community good. And I still have to make sure that those partners benefit from "dancing" with us.

Often nonprofits shy away from partnering with businesses or corporations because of concerns about having to accommodate the corporation's needs. However, contrary to what many people think, the need to accommodate the giver's needs is not limited to corporate partnerships. Funds from foundations require specific reporting structures, and many foundations have a disproportionate desire to invest in "new" initiatives rather than existing programs. Government sources typically require a fairly high level of reporting and matching of funds with private money.

The reason that most nonprofit managers are more comfortable generating funds from government and foundations is that most of us are more familiar with the accommodations required by those sources, and in many cases our organizations are structured to meet their needs. To be successful at corporate partnerships we will need to get just as good at accommodating the needs of that sector.

The vast majority of corporate representatives that I have met with over the last three years have expressed their desire to work with a nonprofit to build community good. Increasingly corporations see themselves as partners in the community projects they are supporting. A recent statement from Maureen Midgley, Plant Manager, General Motors Lordstown Assembly Plant, illustrates this view: "GM is a part of many communities throughout this country. As such, we have common social, economic, and environmental interests with the people who live in our communities."

Such attitudes on the part of corporations signal that we as nonprofits need to move away from the "they should give us money because we do good work" model to the "we have common goals that we can achieve together better than we can separately" model. Creating a partnership is fundamentally different from soliciting a gift. Most critically, partnering requires that both sides work to meet the needs of the other.

Creating a partnership has both risks and rewards. Among the risks is the chance that the reputation of your nonprofit will be affected by partnering with a corporation (and the reverse is true as well). Among the rewards are long-term relationships and continuing support.

In our experience at Earth Force we have found that there are four basic elements in creating successful long-term relationships with corporations:

- Find the right partner.
- Create a relationship that meets both parties' needs.
- Know how to dance.
- Don't dance with the wrong partner.

Finding the right partner

The key to finding the right partner is knowing what you want and don't want. Start with a little self-analysis. What does your organization hold sacred? Clearly define those values that are untouchable—values you won't compromise no matter what—and eliminate any potential partnership that

EARTH FORCE

GM mentor Ted Sulecki and a middle school student examine a river rock for macroinvertebrates in Wilmington, Delaware.

would require compromising those values. Corporate partnerships based on common values and goals will be both long-lasting and mutually beneficial.

Earth Force is a youth-driven organization that helps young people discover and implement lasting solutions to environmental issues in their community. National and local Youth Advisory Boards ensure that youth voice is present throughout the organization.

For our goals to be met, young people must be free to determine what problem they want to work on and how they want to address that problem, and everyone needs to understand that the goal is to change community policies and practices in an effort to create sustainable community change. Earth Force won't work with anyone that can't accommodate those needs. Over the years we have talked to a number of corporations that were interested in funding young people to work on a specific project in a specific manner. We were unable to work with any of them because that would have compromised one of our core tenets—youth voice.

Corporations that see themselves as an important part of their community and believe in the power of young people are a good fit for Earth Force. One such partner is Staples. Joy Errico, the Staples Foundation for Learning Supervisor, recently noted, "Staples Foundation for Learning partners with organizations that are in sync with our corporate values while echoing our charitable mission, which is to support nonprofits that provide educational opportunities for youth."

Meeting your organization's needs

Ask what your organization needs to be successful, and how a corporate partner could help. Money might be the first thing to come to mind, but it might also be the hardest to get. Don't forget the power of people—corporations are full of wonderful people who have a lot to add to your work. In addition, engaging those people gives you an ongoing connection to the corporation, which can generate long-term support.

The Earth Force/GREEN program, which involves youth in monitoring and other activities to protect rivers and other water resources, has a strong partnership with General Motors. About 250 GM employees (primarily environmental engineers) from 52 production facilities in different parts of the country participate directly in the program, visiting classrooms or even accompanying students to their monitoring sites. These professionals are ideally equipped to broaden the students' understanding of topics like the scientific principles behind monitoring tests, why quality control is important, and how to analyze monitoring data.

Meeting your partner's needs

Now ask what your corporate partner needs to be successful. A company may need to establish better relationships with its employees, or it may need to offer new services, or it might need a way to connect with local elected officials. Every corporation that we have worked with has viewed itself as an integral part of the community and feels a need to fulfill that goal.

EARTH FORCE

Tom Caltrider, a GM engineer, helps elementary school students in Dearborn, Michigan, with a chemical test.

How can your organization help meet these needs? Be creative in identifying your resources and packaging them to be attractive to potential corporate partners. For example, a local watershed organization's assets typically include a large amount of public goodwill, a positive association and identification with the resource that they are protecting, volunteers who are interested in the community and who are also consumers, members and volunteers that are influential in the community, and public outreach events.

> CLEARLY DEFINE THOSE VALUES THAT ARE UNTOUCHABLE—VALUES YOU WON'T COMPROMISE NO MATTER WHAT.

One of your greatest potential values to a corporation is your organization's ability to give the corporation's employees the opportunity to do meaningful community service. Employees get a great sense of satisfaction from this kind of involvement.

Partnering with a nonprofit can also provide companies with an opportunity to sit down at the table with elected officials in the context of doing good work together, which is very different from the context of arguing over a permit.

One caveat: Don't promise things you can't deliver. It's time for all of us to be honest about how much media attention we can realistically generate. How much media coverage do you generate for your organization now? What makes you think you can do more for someone else?

The more successfully you meet your partners' needs, the stronger your partnerships will be. As Kathy Havens Payne, Assistant Director State Farm Corporate Community Alliances, recently told nonprofit groups at an educational conference, "The best community/business partnerships are those

continued on next page

DANCE, continued

that combine community good and good business. While most businesses would prefer to support every good project that is proposed, the reality is that it is a better business decision to invest more into those projects that also address a business issue."

How to dance

The whole partnership dance—from meeting potential partners, to determining which ones are a good fit, to defining the specific details of the relationship, to ensuring that the partnership continues—requires a combination of serendipity and skill.

To begin with, remember that corporations are made of people, with varying interests. Don't automatically start your partner search at the company's official Community Relations Department. Often the first step is finding someone in the company who has a particular interest in what your organization does—for example, an individual who is already involved in volunteer monitoring. This person can then lead you to others in the corporation who have common interests.

Now the conversation can begin. The thing *not* to do is immediately sit down and write your new acquaintance a letter asking for money. One of my earliest social lessons was to get to know someone before I asked them to dance. The same principle applies to corporate partnerships. Create opportunities to talk to your contacts. Invite them to your events. In your conversations, talk about their needs and what they are trying to do in the community. Explore together whether it makes sense for your organizations to work together.

Once you decide to work together, proceed slowly. You might start by using the company's facilities for volunteer training, or encouraging company staff participation in monitoring or other events. Let the relationship build before you ask for a financial commitment.

If at all possible, develop a commonly owned set of metrics by which you will measure success. These performance measures will ensure that both sides get what they need and give both parties responsibility for the partnership's success.

Avoid dancing with the wrong partner

In troubling economic times, when managers of nonprofit organizations are increasingly scrambling to find the resources we need to do our work, there can be a rush to form a partnership out of need. The risk is that you partner with someone who doesn't share your values or who has a different vision for the program. Of all the reasons for a nonprofit/corporate partnership going bad, the lack of a common purpose or vision is probably the leading one.

At Earth Force, we have a formal screening process. Our partners cannot be involved in the production or sale of alcohol, tobacco, or firearms, nor can any subsidiary of theirs. This policy is vitally important to a youth organization. We also check a potential partner's environmental record.

In essence you ask yourself if you really want to dance with this partner. In one case Earth Force declined a potential partner because our Youth Advisory Board was uncomfortable with the fact that the company was under investigation for its child labor practices. Nothing creates short-term pain more than saying no to good money, but if you are not comfortable with a potential partner, it is better to just walk away.

In the end there is no easy answer to finding the right partner. If there is any lesson that Earth Force has learned over the last five years, it is to invest the time to do our work before becoming partners with someone. If you don't have the time, don't start the dance. The more certain we are that the corporation shares common interests and values, the more we can be sure that the partnership will be a successful one.

Vince Meldrum is President of Earth Force; 1908 Mount Vernon, 2nd floor, Alexandria, VA 22301; 703-299-9400; vmeldrum@earthforce.org.

Survey Confirms Newsletter Usefulness

An informal survey conducted via EPA's volunteer monitoring listserv confirmed that readers make frequent use of the information they find in *The Volunteer Monitor* newsletter. On a scale of 1 to 10, the "overall quality and usefulness" of the newsletter was rated at 9.2.

The majority of the survey questions asked about specific uses of the newsletter. Most respondents indicated multiple uses (average 6.3). A few specific findings:

- 85% of respondents used resources they learned about through the newsletter
- 72% used newsletter information in workshops, training sessions, or presentations
- 66% used the newsletter for networking
- Approximately one-third reported the following uses:
  - modifying monitoring methods or equipment, or adopting new methods
  - contacting equipment suppliers learned about through the newsletter
  - improving data quality, management, interpretation, or presentation
  - reproducing newsletter articles in a publication or on a website

When asked about "other uses" not specifically listed in the survey, many people spoke of the value of the newsletter in helping them feel connected to a larger network of volunteer monitors. Sample comments:

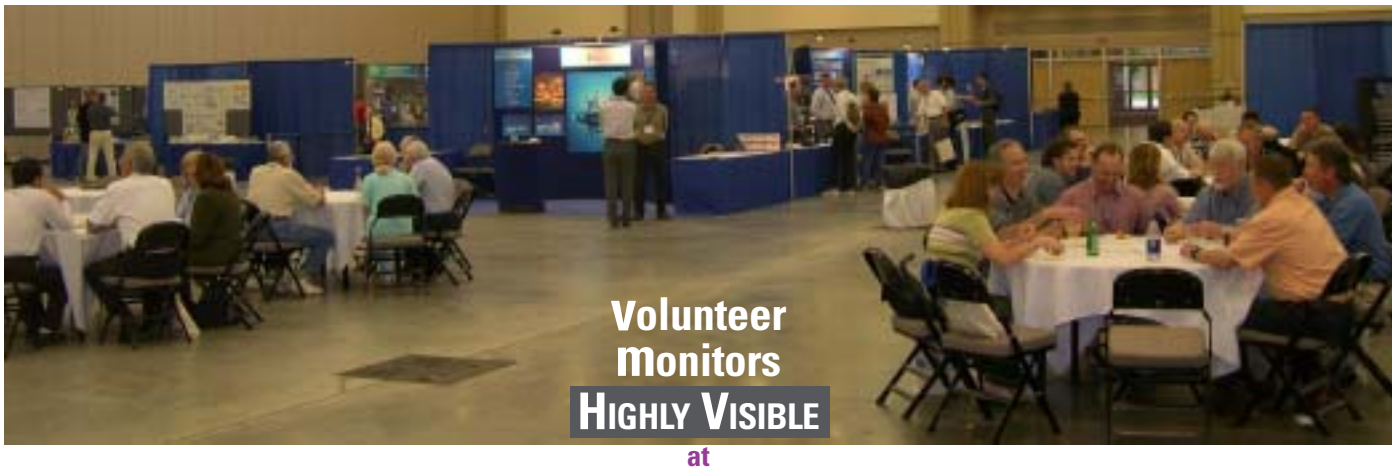
"Lets our volunteers know they are part of a larger community."

"I use it to keep our program in tune with the most recent developments in citizen monitoring."

"Sometimes it's hard not to feel like a lone voice in the wilderness, and *The Volunteer Monitor* helps cure that feeling."

"I spent the first month of my new job reading the newsletter online."

We are always happy to hear feedback from our readers. Let us know what you like, what you don't like, what topics you'd like to see covered in upcoming issues, etc. Please send all comments to the editor at ellieely@earthlink.net.



LINDSAY ABRAHAM

Volunteer Monitors Highly Visible at NWQMC Conference

Volunteer monitoring was well integrated into the May 2004 National Water Quality Monitoring Council (NWQMC) conference in Chattanooga, attended by 435 people involved in professional and/or volunteer monitoring. Approximately one-fifth of the presentations were from representatives of volunteer monitoring groups. Two of the conference themes—"Promoting Collaborative Efforts" and "Ensuring Data Comparability"—were especially relevant to volunteer monitoring.

The mixing of volunteer and professional monitors, which led to a great deal of valuable cross-pollination and networking, was no accident. Several of the conference organizers (Linda Green, Abby Markowitz, Alice Mayio, and Jeff Schloss—all of whom, by the way, are members of *The Volunteer Monitor* newsletter editorial board) worked hard to encourage volunteer monitoring program coordinators to submit abstracts. And while several sessions were exclusively devoted to volunteer monitoring, volunteer monitoring presentations were also interspersed with professional presentations in a variety of sessions.

Two informal volunteer monitoring discussion sessions, attended by about 50 people, brought together volunteer monitoring representatives from all over the country for a supportive exchange of ideas and a chance to compare notes. A hot issue was the question of how to increase the acceptance of volunteer-collected data by outside users, especially local and state agencies. Suggestions included performing more side-by-side comparisons of volunteer and professional data, involving skeptics and critics in volunteer monitoring program planning and training, and publishing volunteer data in peer-reviewed journals. The North American Lake Management Society's journal *Lake and Reservoir Management* was recommended as being particularly receptive to volunteer monitoring-related articles.

Discussion session participants also had some good ideas for giving volunteer monitoring an even stronger presence at the next (2006) NWQMC conference—for example, setting aside special exhibit space for volunteer monitoring groups to demonstrate equipment, methods, websites, and monitoring results; and offering training sessions specifically targeted for volunteer monitoring coordinators on topics such as data management, statistics, and fundraising.

A summary of the two informal volunteer monitoring discussion sessions was reported back at the conference closing plenary session, further heightening the visibility of volunteer monitoring. The presentation included recommended actions NWQMC could take to support volunteer monitoring, such as publicizing volunteer monitoring successes, adding links to volunteer monitoring websites to the NWQMC website, and promoting the inclusion of volunteer monitoring on regional and state monitoring councils. A number of states have formed such councils to coordinate monitoring among various entities. While volunteer monitoring groups are prominently represented in some of these councils, in other cases they currently have little or no voice.

Watch this newsletter and the EPA's volunteer monitoring listserv for information on the 2006 NWQMC conference. (*Note:* To subscribe to the listserv, send a blank message to volmonitor-subscribe@lists.epa.gov.) Any progress toward a stand-alone national volunteer monitoring conference—something which has not occurred since 2000, due to funding difficulties—will also be reported in the newsletter and on the listserv.

The National Water Quality Monitoring Council was established in 1997 to improve water quality monitoring nationwide by promoting communication, collaboration, use of comparable methods, and other strategies to encourage the sharing and use of water quality data. For more information about the Council's products and activities, as well as abstracts and papers from the conference, see http://water.usgs.gov/wicp/acwi/monitoring/.

HERB BRASS

The Water Quality Data Elements Workshop livened up when participants donned party hats to identify themselves as "data generators" or "data users."

Subject Index, 1996-2004

Key to indexed issues:

Vol./no.	Date	Issue theme
8/1	Spring 1996	Managing a Volunteer Monitoring Program
8/2	Fall 1996	The Wide World of Monitoring
9/1	Spring 1997	Methods and Techniques
9/2	Fall 1997	Community Outreach
10/1	Spring 1998	Monitoring Wetlands
10/2	Fall 1998	Monitoring Estuaries
11/1	Spring 1999	Restoration
11/2	Fall 1999	Youth Projects
12/1	Spring 2000	Monitoring Fauna
12/2	Fall 2000	Monitoring Flora
13/1	Spring 2001	Clean Water Act
14/1	Winter 2002	Monitoring Beaches & Reefs
14/2	Summer 2002	Success Stories
15/1	Winter 2003	University Partnerships
15/2	Summer 2003	Focus on Fish
16/1	Winter 2004	Agency Partnerships
16/2	Summer 2004	Business, School & Community Partnerships

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Most recent issues of the newsletter can be ordered in quantity at a discounted price for distribution at workshops, events, etc. For information on availability and price, please contact the Distribution Office (see above).

Back issues starting with Spring 1993 are also available at www.epa.gov/owow/volunteer/vm_index.html

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MANY PARTNERS, continued from page 15

ments), they move, graduate, and/or lose interest. We have focused on forging partnerships with teachers to encourage a long-term relationship.

One of our most successful approaches to working with students has been our internship program. We work with one to three high school student interns at a time. Each internship is different, as each intern is different. My goal is to have the intern tailor the internship to fit his or her interests and talents. We don't ask interns to assist with paperwork, filing, or office tasks. At an initial meeting, I present interns with a wide variety of possible projects including writing articles, conducting interviews, assisting with monitoring workshops, using our watershed model to teach children about watersheds, and summarizing monitoring data.

Our current intern, Charlotte Seid, is unusually committed to our program. After serving as a volunteer monitor for a few years and becoming a certified stream monitor, she chose to intern with us for her entire four years of high school. Her success within our program has contributed to her self-assurance about her writing skills. Just recently, she won a national writing contest. Although most of our interns spend only a semester or less with our program, each walks away with new skills and a stronger understanding of environmental issues, and many have gone on to study environmental science.

The future lies in working together

Urban and suburban streams do not have to be dead, to be filthy, to be forgotten. Yet for the average American, getting involved in watershed protection is confusing. Who do you contact? What can you do? If you monitor, what is the best protocol? How can your actions have the largest impact?

One of the Conservation District's goals is to help provide the link to diverse activities that lead to clear results. In addition to monitoring, we support stream cleanups, storm drain stenciling, and other local watershed group activities. By connecting people to a network, we can provide them with options and support. Our region still has plenty of watershed problems and there's a long trail ahead, but the walk has begun.

Joanna Cornell is Coordinator of the Northern Virginia Soil and Water Conservation District Volunteer Stream Monitoring Program. She may be reached at joanna.cornell@fairfaxcounty.gov. See also www.fairfaxcounty.gov/nvswcd/monitoring.htm.

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RESOURCES

Florida LAKEWATCH Information Circulars

Florida LAKEWATCH continues to bring out new circulars in its informative ongoing series, "A Beginner's Guide to Water Management." The latest three booklets cover the topics of bacteria, fish kills, and color. These comprehensive publications contain detailed scientific information, including monitoring methods, in a format easily understandable to the general public. Earlier circulars in this series covered nutrients, water clarity, lake morphometry, and other topics.

All of these information circulars may be downloaded from http://lakewatch.ifas.ufl.edu/LWcirc.html. For a hard copy, contact Florida LAKEWATCH, University of Florida, Department of Fisheries and Aquatic Sciences, 352-392-4817; lakewat@ufl.edu.

Free Guidance on Outreach Campaigns

A newly updated version of *Getting In Step: A Guide to Effective Outreach in Your Watershed* provides a great deal of practical information for implementing campaigns to raise watershed awareness and influence behavior. The 100-page book discusses such issues as understanding your target audience, creating a message, and working with the media. A companion 35-minute video showcases four successful outreach programs. For free copies of the book and video, contact the National Service Center for Environmental Publications at 800-490-9198 or www.epa.gov/ncepihom; or download the book in PDF format from epa.gov/nps/outreach.html.

Publications from NALMS

The North American Lake Management Society (NALMS) book *Managing Lakes and Reservoirs* is a comprehensive 382-page guide to basic ecological concepts, problem identification, modeling, restoration techniques, and much more. Extensive tables compare the pros and cons of such management options as dredging, aeration, bottom sealing, drawdown, chemical treatment, and biological controls. Although relevant monitoring approaches are discussed, this is not a monitoring how-to manual. $33.95 ($27.16 for NALMS members) plus shipping.

The 176-page *Lake Pocket Book* covers lake ecology, aquatic chemistry, starting a lake association, developing a management plan, and more in easy-to-understand language. $14.95 ($11.96 NALMS members) plus shipping.

To order these or other NALMS publications visit www.nalms.org and click on "BookStore."

Listening to Watersheds

River Network's new book, *Listening to Watersheds: A Community-Based Approach to Watershed Protection*, brings together Western scientific approaches and the traditional tools and knowledge of Native communities. Intended primarily for tribal environmental departments that are beginning to design watershed assessment programs, the 100-page guide covers such topics as deciding the scope of the assessment, selecting indicators and sampling sites, designing a quality assurance program, and turning data into information. Order at www.rivernetwork.org/marketplace or call 503-542-8391. $25 ($20 for tribes and River Network partners) plus $4 shipping.

Biological Assessment of Wetlands

A Citizen's Guide to Biological Assessment of Wetlands: The Macroinvertebrate Index of Biological Integrity (IBI) is a newly published manual for use by volunteers in Minnesota's Wetland Health Evaluation Program. The 51-page guide includes field and laboratory protocols and pictorial keys to wetland invertebrates. A limited number of copies are available at no charge to volunteer monitoring program coordinators (only one copy per program, please) from john.genet@pca.state.mn.us.