Nonpoint Source
News-Notes
October 2009, #88

The Condition of the Water-Related Environment
The Control of Nonpoint Sources of Water Pollution
The Ecological Management & Restoration of Watersheds

Notes on the National Scene

EPA Water Quality Video Contest Entertains and Educates

Lights, camera, water—action! The U.S. Environmental Protection Agxency's (EPA's) Office of Wetlands, Oceans and Watersheds recently held its first water pollution video contest. EPA invited the public to develop and submit short videos that would educate the public about water pollution and offer simple steps that individuals and communities can take to improve and protect water quality. The agency encouraged people to submit videos on a wide variety of topics, including low impact development, wetlands, marine debris, watershed management, water quality monitoring, polluted runoff and other water-related topics. The contest deadline was Earth Day, April 22, 2009 and video judging is now complete.

A pervious concrete road project in Minnesota attracts national attention. See article on page 14.

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EPA Water Quality Video Contest Entertains and Educates (continued)

EPA received more than 250 entries covering a wide variety of topics. EPA selected two winners: one for a short, 30- or 60-second video that can be used as a public service announcement, and another for a longer, one- to three-minute video. Each winner received a $2,500 cash award, and their videos are now featured on EPA's Web site (www.epa.gov/owow/videocontest.html).

Winning Videos

The winner in the 30- to 60-second video category is "Protect Our Water—Check Car for Oil Leaks" submitted by Lucas H. Ridley of Trenton, Georgia. This video succinctly and clearly illustrates one easy step people can take to protect local waterways—proper motor vehicle care.

The winner in the one- to three- minute video category is "Dastardly Deeds and the Water Pollution Monster" submitted by Nora Kelley Parren of Hinesburg, Vermont. This video uses collage art made from discarded paper to explain how stormwater runoff can pollute local waterways and what people can do to prevent pollution.

This video, "Protect Our Water—Check Car for Oil Leaks," submitted by Lucas H. Ridley of Trenton, Georgia, won EPA's water quality video contest in the 30- to 60-second video category.

This video, "Dastardly Deeds and the Water Pollution Monster," submitted by Nora Kelley Parren of Hinesburg, Vermont, won EPA's water quality video contest in the one- to three-minute video category.

EPA honored another 22 videos with honorable mentions—these videos may be accessed through EPA's video contest Web site. Want to see more? Most of the contest entries may be viewed on EPA's YouTube channel at www.youtube.com/groups_layout?name=EPAOWOWContest.

Videos Are Available for Distribution

EPA plans to use the videos to help reach more people with water messages. As part of the contest requirements, entrants agreed to allow EPA to use and distribute the videos for any educational purpose. Patty Scott, with EPA's Office of Wetlands, Oceans and Watersheds, has been exploring ways to publicize and share the videos. The word is getting out, she explains. "I've been receiving requests from county and local governments to use the videos on Web sites and public/cable TV stations." Because of the number and diversity of videos submitted, governments can usually find multiple videos that address the specific problem or problems facing their locality. Check it out today!

Agencies Act to Reduce Harmful Impacts from Coal Mining

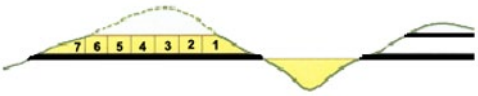
Multiple federal agencies recently joined forces to significantly reduce the harmful environmental consequences of Appalachian surface coal mining operations ("mountaintop mining"), while ensuring that future mining remains consistent with federal law. In June 2009 the U.S. Department of the Interior (DOI), U.S. Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (Corps) signed a Memorandum of Understanding (MOU). The MOU outlines an interagency action plan that coordinates agencies' regulation of Appalachian surface coal mining. This action plan includes a set of short-term actions to be implemented in 2009 to existing policy and guidance, and a longer term process for gathering public input, assessing the effectiveness of current policy and developing regulatory actions.

What is Mountaintop Mining?

Mountaintop coal mining is a modern, large-scale surface mining practice that removes mountaintops to expose coal seams, and then disposes the associated mining overburden in adjacent

valleys—"valley fills." Valley fills occur in steep terrain where disposal alternatives are limited. Mountaintop coal mining operations are concentrated in eastern Kentucky, southern West Virginia, western Virginia, and scattered areas of eastern Tennessee. In 1998, the U.S. Department of Energy estimated that 28.5 billion tons of high quality coal remain in the Appalachia coal mining region.

Step 1. Layers of rock and dirt above the coal layer (called overburden) are removed.



Step 2. The upper seams of coal are removed and the spoils (dirt, rock) are placed in an adjacent valley.

Step 3. Draglines excavate lower layers of coal with spoils placed in spoil piles.

Step 4. Regrading begins as coal excavation continues.

Step 5. Once coal removal is complete, final regrading takes place and the area is revegetated.

Mountaintop mining involves these five basic steps. More details are available at www.epa.gov/region3/mtntop.

When the layers of rock and dirt are dumped into the adjacent valleys, changes can occur in the character and quality of the aquatic resources downstream of the valley fills. Studies show that more than 1,200 miles of streams have been directly impacted by mountaintop mining and valley fills. Results from these studies are featured in the "Programmatic Environmental Impact Statement on Mountaintop Mining/Valley Fills in Appalachia" (www.epa.gov/region3/mtntop/eis2005.htm), developed by EPA, in conjunction with the Corps, DOI's Office of Surface Mining and Fish and Wildlife Service, and the West Virginia Department of Environmental Protection. EPA Region 3 staff has also studied the effects of mining on aquatic resources and reported their findings in another document, "Downstream effects of mountaintop coal mining: comparing biological conditions using family- and genus-level macroinvertebrate bioassessment tools," available at www.epa.gov/region3/mtntop/pdf/downstreameffects.pdf.

The studies showed that:

- Mineral (zinc, sodium, selenium, and sulfate) levels in the water increased, negatively impacting fish and macroinvertebrates and shifting populations to be less diverse and comprised of more pollutant-tolerant species.
- Streams in watersheds below valley fills tend to have greater base flow.
- Streams are sometimes covered up.
- Wetlands are, at times inadvertently and other times intentionally, created. These wetlands provide some aquatic functions, but are generally not of high quality.
- Forests may become fragmented (broken into sections).
- The regrowth of trees and woody plants on regraded land might be delayed because the soil is compacted.

MOU Will Reform Approach to Mountaintop Mining Regulation

The short-term actions outlined in the June 2009 three-agency MOU are intended to reform the regulation of mountaintop coal mining under the two primary environmental laws governing this mining practice. For example, on July 15, 2009, the Corps issued a public notice proposing to modify Nationwide Permit 21 to preclude its use to authorize the discharge of fill material into streams for surface coal mining activities in the Appalachian region, and sought public comment on the proposed action (comment period ended August 15, 2009). In addition, the Corps and the EPA will take immediate steps under the Clean Water Act (CWA) to minimize environmental harm by a implementing these actions in 2009:

- Requiring more stringent environmental reviews for pending and future permit applications for surface coal mining;
- Strengthening permit reviews under CWA regulations (Section 404(b)(1)) to reduce the harmful direct and cumulative environmental impacts of surface coal mining on streams and watersheds;
- Strengthening EPA coordination with states on water pollution permits for discharges from valley fills and state water quality certifications for surface coal mining operations; and
- Improving stream mitigation projects to increase ecological performance and compensate for losses of these important waters.

Agencies Act to Reduce Harmful Impacts from Coal Mining (continued)

Also in 2009, DOI will reevaluate and determine how DOI's Office of Surface Mining Reclamation and Enforcement will more effectively conduct oversight of state permitting, state enforcement and regulatory activities under Surface Mining Control and Reclamation Act. DOI will work with the U.S. Fish and Wildlife Service to develop CWA guidance to ensure that wildlife resources and endangered species are protected.

Mining companies remove the top layers of mountains to expose coal seams located deep within.

A mountain valley is completely filled with mining spoils from adjacent mining area. The site has been graded and planted with a ground cover.

Concurrent with these short-term actions, the three agencies have agreed to embark on a comprehensive, coordinated review of their existing respective regulations and procedures governing mountaintop coal mining under existing law. The agencies will create an interagency working group to promote ongoing federal collaboration and ensure the Action Plan achieves results. As these reforms are implemented, the agencies will seek to involve the public and guide federal actions through public comment and outreach.

EPA and the Corps have also established a formal process through which they will better coordinate environmental review of pending CWA permits for surface coal mining activities in Appalachian states. Formally know as Enhanced Coordination Procedures (ECP), this review process will allow the agencies to ensure that CWA permit decisions are fully consistent with sound science and the law, reduce adverse environmental impacts, provide greater public participation and transparency, and address pending permits in a timely manner.

Pursuant to the ECP, EPA evaluated 791 pending CWA Section 404 permit applications between June and September 2009 and identified those for which water quality and/or regulatory compliance issues remain. EPA based its determinations on the Section 404(b)(1) Guidelines, available at www.epa.gov/owow/wetlands/pdf/40cfrPart230.pdf. The Section 404(b)(1) Guidelines establish a number of requirements for determining whether to issue a Section 404 permit and what conditions to place in a permit. On September 30, 2009, EPA released a final list of 79 permit applications that would require further coordination between the Corps, the mining company and EPA before the permit could be approved. EPA determined that all of the permits on the list showed the potential to violate one or more of the requirements in the Section 404(b)(1) Guidelines. EPA further concluded that some applications are clearly not ready for processing, and that others are likely to be readily resolved upon further discussion with the Corps. Concerns with each permit will be addressed during a 60-day review process triggered when the Corps informs EPA that a particular permit is ready for discussion.

Mountaintop Mining—Recent Articles

For a detailed look at the mountaintop mining controversy from the perspective of residents and industry representatives in a small West Virginia town, read "Mining the Mountains," by John McQuaid, printed in the January 2009 issue of Smithsonian magazine. This article is available online at www.smithsonianmag.com/science-nature/Mining-the-Mountain.html.

For a more general article that includes satellite photos and maps, see "Coal Controversy in Appalachia," by Rebecca Lindsey. The National Aeronautics and Space Administration's (NASA's) Earth Observatory published this article online in December 2007 (see http://earthobservatory.nasa.gov/Features/MountaintopRemoval).

Agencies Act to Reduce Harmful Impacts from Coal Mining (continued)

MOU Supports Appalachian Communities

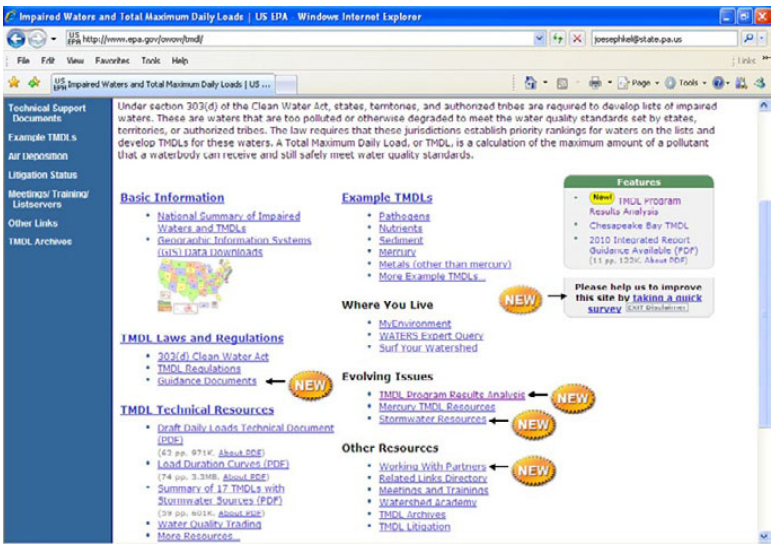
The MOU also seeks to work beyond surface mining permit review and approval processes. The MOU specifies that federal agencies will work in coordination with appropriate regional, state and local entities to help diversify and strengthen the Appalachian regional economy and promote the health and welfare of Appalachian communities. The interagency effort will have a special focus on stimulating clean enterprise and green jobs development, encouraging better coordination among existing federal efforts, and supporting innovative new ideas and initiatives. For more information, see www.epa.gov/owow/wetlands/guidance/mining.html.

EPA's Total Maximum Daily Load Web Site Redesigned

The U.S. Environmental Protection Agency (EPA) recently revised its "Impaired Waters and Total Maximum Daily Loads" (TMDLs) Web site to better serve federal, state and local agencies and the general public. The new Web page, found at www.epa.gov/owow/tmdl, features an overview of the Clean Water Act (CWA) section 303(d) program activities, highlights new technical resources and provides easier access to program resources such as EPA's new Water Quality Assessment and TMDL Tracking and Implementation System (ATTAINS) Web site.

EPA revamped the Web site to make it easier for a variety of audiences to navigate and to distinguish between two key activities—the process of listing impaired waters under CWA section 303(d) and that of actually developing the TMDLs. New features of the site include:

- A "TMDL Stormwater Resources" page (www.epa.gov/owow/tmdl/stormwater), which describes several stormwater-source TMDLs developed by states. The site also highlights innovative approaches that states are using to address stormwater-related pollution problems and offers lists of TMDL- and stormwater-related contacts at EPA headquarters and EPA regions.
- A "Working with Partners" page (www.epa.gov/owow/tmdl/partners), which describes and offers links to TMDL stakeholder resources that are funded in part by EPA grants. Examples of resources offered include an audio version of EPA's "The ABC's of TMDLs for Stakeholders" Webcast, the Water Environment Federation's "Third Party TMDL Development Toolkit," Virginia Tech's "TMDL Knowledgebase Clearinghouse" and other resources. This page also highlights ongoing interagency coordination efforts.
- A new CWA section 303(d) "Guidance" page (www.epa.gov/owow/tmdl/guidance.html), which offers guidance on the CWA section 303(d) program itself, provides instructions for assessing, listing and reporting waterbodies as required under CWA section 303(d), and outlines the processes for developing TMDLs.
- A "TMDL Program Results Analysis" page (www.epa.gov/owow/tmdl/results), which communicates information about TMDL program results to technically specialized audiences, including TMDL developers, state water programs, academia, other federal agency programs and EPA water quality staff. The TMDL Program Results Analysis Project is a multi-year effort directed at measuring and analyzing programmatic and environmental results of the program. This area of the Web site provides a CWA Impaired Waters Program Pipeline navigation feature, fact sheets, EPA reports, EPA grantee reports and publications, datasets and other Web sites related to this effort.



EPA's Revised "Impaired Waters and Total Maximum Daily Loads Web" page has been updated to provide improve people's access to resources.

EPA's Total Maximum Daily Load Web Site Redesigned (continued)

EPA will soon add a "TMDLs at Work" page highlighting successful waterbody restoration efforts that have included TMDL activities as an important part of the process. To help refine the page further, EPA invites visitors to complete a short survey found on the main site. (Go to www.epa.gov/owow/tmdl and click on the survey link under the "Features" bar on the right side of the page.)

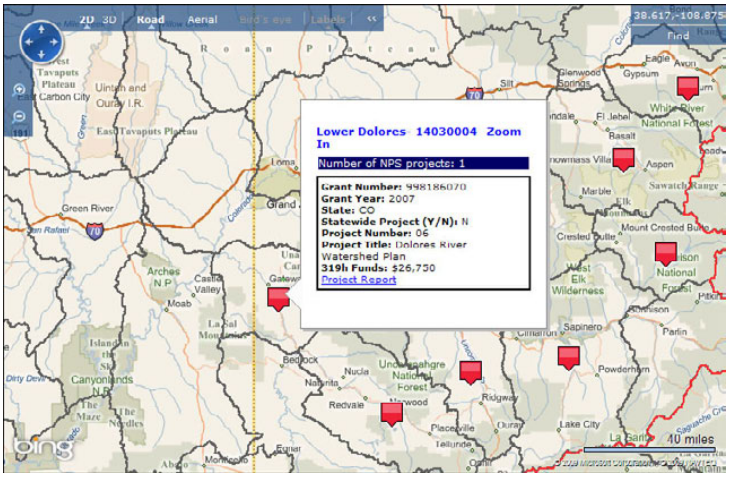
New Tools Available to Find Nonpoint Source Project Information

In keeping with the federal government's goal of greater transparency, the U.S. Environmental Protection Agency (EPA) is providing easier public access to information about Clean Water Act (CWA) section 319-funded nonpoint source (NPS) projects. Each year, EPA provides funding to support state NPS programs in the form of CWA section 319 grants. EPA tracks information about the projects funded under section 319 in its Grants Reporting and Tracking System (GRTS, often pronounced "grits").

GRTS pulls grant information from EPA's centralized grants and financial databases and allows the grant recipients to enter detailed information about the individual projects funded under each grant. State grant recipients enter basic project information, including the start and end dates and amounts and sources of funding (including matching funds). Recipients can also describe the environmental results of their NPS implementation projects. Key environmental attributes include the type of NPS pollution being addressed, the best management practices (BMPs) being implemented, and any expected reductions in NPS pollution or other improvements to water quality achieved as a result of the project.

Data Now Accessible to the Public

While EPA has been collecting this information from state grantees for years, the data has been used primarily by EPA and state governments to help manage NPS programs, evaluate performance, report to the U.S. Office of Management and Budget, respond to Congressional inquiries, and so on. Now, EPA has added two new search tools to the GRTS Web site that allows watershed groups, researchers and the general public to view and learn about current and previous state- and EPA-funded nonpoint source projects.



This GRTS Map Viewer image shows example results for a query in Colorado. Boxes denote locations of NPS projects. In the example noted in the pop-up box, $26,750 in CWA section 319 funding helped to support development of the Dolores River Watershed Plan in the lower Dolores River watershed.

The first new GRTS search tool is a criteria-based query. This method is best for finding CWA section 319 projects that meet certain conditions. For example, a user might search specifically for NPS projects that restore riparian areas in Washington, address agricultural pollution in Colorado, or control urban runoff in South Carolina.

The second new search tool is the interactive map, which enables users to browse for or query project information by watershed. Users simply click on the Find feature, and then the Pan and Zoom buttons to navigate to the location of interest, and the CWA section 319 projects will appear, summarized by watershed. At a regional scale, projects are displayed by subbasins (8-digit hydrologic units), and at a local scale, by subwatersheds (12-digit hydrologic units).

Both new tools return a list of projects with links to summary reports for each. The summary reports contain the following information:

- Project description, methods and objectives
- Start and end dates (actual or projected)
- Amounts and sources of funding (includes CWA section 319 and other federal, state or local funding)

New Tools Available to Find Nonpoint Source Project Information (continued)

- Project status (e.g., "on schedule," "completed," etc.)
- Type of project (e.g., BMP implementation, educational, water quality monitoring, etc.)
- NPS category of pollution (e.g., agriculture, urban stormwater, animal feeding operations)
- Watershed (8- or 12-digit hydrologic unit codes)
- TMDL status (e.g., "implementing a TMDL," "developing a TMDL," etc.)
- Best management practices
- Pollutant load reductions

GRTS includes information on more than 17,600 NPS projects across the United States. Check them out at www.epa.gov/nps/grts.

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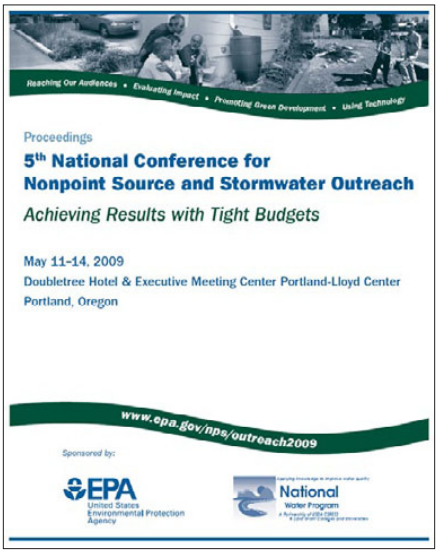
Nonpoint Source and Stormwater Outreach: Achieving Results with Tight Budgets

In May 2009, people from around the country came together to share ideas and information at the Fifth National Conference for Nonpoint Source and Stormwater Outreach in Portland, Oregon. The theme of the 2009 conference was "Achieving Results with Tight Budgets." The conference explored practical, current examples of successful outreach programs and projects through facilitated training sessions, workshops, presentations with interactive discussion, group exercises and networking events. The conference served local, regional, state and federal professionals tasked with educating various audiences on nonpoint source pollution, stormwater pollution, protecting watersheds and promoting sustainable behavior changes in challenging economic times.

The conference took place in the midst of the deepest economic downturn since the Great Depression. Local and state travel freezes across the nation severely curtailed attendance. Despite this, the conference still drew attendees and presenters from 31 states, two countries and two U.S. territories. Most of the attendees represented state and local government agencies and organizations.

Conference Information Available Online

Fortunately for those who could not attend, conference organizers have compiled a comprehensive proceedings document, along with copies of presenters' PowerPoint presentations, and made them available online at www.epa.gov/nps/outreach2009. "Those who attended found the conference stimulating and are looking forward to creatively applying their experiences locally to improve and protect their environment," noted Don Waye, conference liaison for the U.S. Environmental Protection Agency's Nonpoint Source Control Branch. "Those who were not able to attend but who take the time to peruse the conference proceedings can also benefit."



The conference proceedings document, as well as electronic presentations, can be accessed at www.epa.gov/nps/outreach2009.

The agenda included a day of pre-conference workshops on May 11, three days of presentations (May 12–14), and an optional tour of Portland's low impact development sites on the final day (May 15). Conference highlights include a keynote address from noted social marketer and acclaimed author Nancy Lee, who spoke on "Social Marketing in Tough Times: Show Them the Pounds per Penny" and a luncheon presentation on Portland's Project DX: "Animating Local, Private, Green Stormwater Action" (see News-Notes issue #86 for an article about Project DX). Conference sessions focused on the following topics:

- Promoting Green Development – with specific sessions on using community-based outreach, mass media, and municipal and other programs
- Creative Outreach Methods
- Using Research to Reach Our Audiences
- Municipal Separate Storm Sewer System (MS4) Partnering
- Reaching Our Audiences through University-Based Outreach Programs

- Pictures, Cartoons & Beyond
- Using Research to Pave the Way for Low Impact Development
- Research Perspectives into Greener Residential Yards
- Panel Discussion: Overcoming Barriers to Changing Landscape Behaviors
- 21st Century Challenges and Opportunities

Participants also enjoyed numerous workshops, including one explaining how the Nonpoint Education for Municipal Officials (NEMO) program educates communities about stormwater; one featuring different types of technology available to communicate your messages—"Pixels and Mashups and Blogs, Oh My! Integrating New Technology into and Effective Nonpoint Source Outreach Program;" and one teaching how to transfer data to maps (D2M).

People's Choice Awards Held at the Outreach Conference

Conference attendees helped to select the People's Choice Awards after gathering for a delicious farm-to-table dinner at Meriwether's Restaurant in downtown Portland. Meriwether's is one of the few restaurants in the United States that grows its own produce—planting and harvesting the majority of the vegetables used in the restaurant on their very own five-acre farm (only 11 miles from the restaurant). The People's Choice Awards ceremony highlighted exceptional radio and video public service announcements (PSAs) that focus on nonpoint source and stormwater messages. Awards were given to the PSAs that received the greatest audience response in each category. To view the winning PSAs, see www.epa.gov/nps/outreach2009/pca.html.

Conference participants selected winning PSAs at the People's Choice Awards night.

EPA recently conducted a follow-up survey and found that conference participants overwhelmingly agreed that the knowledge they gained from the conference was extremely valuable and useful. In fact, many people have already begun to implement some of the new ideas in their communities. Waye believes that the information exchanged at the conference will benefit many communities across the country. "We learned from our keynote speaker, Nancy Lee, that we should view our outreach efforts from the standpoint of pounds of pollutants reduced per dollar spent," said Waye. "While many of us feel challenged to justify the cost of doing outreach in tough economic times, Nancy exhorted us to demonstrate that effective outreach is one of the soundest investments that we should make. The health and restoration of our waterways deserve no less."

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Notes from the States, Tribes, and Localities

Promising New Practice Reduces Turbidity Levels from Construction Sites

Fighting construction-related erosion and sedimentation problems? North Carolina State University (NCSU) researchers have found that natural fiber check dams (FCD) enhanced with polyacrylamide (PAM) remove significantly more sediment from runoff than do rock check dams—a commonly used sediment control practice—and for about the same cost or less.

PAM, a synthetic organic polymer that causes sediment to clump together, is used by water treatment plants as a flocculant to remove suspended solids as part of the water purification process. PAM has also been widely used for years in irrigated agriculture to control erosion and manage infiltration. In recent years scientists have begun realizing PAM's potential for wider applications.

Using PAM to Control Construction Erosion

Over the past decade NCSU's Dr. Rich McLaughlin, associate professor of soil science, has led efforts to design and test numerous innovative erosion and sediment control techniques for

Promising New Practice Reduces Turbidity Levels from Construction Sites (continued)

construction sites. McLaughlin's team is continually refining techniques to better remove the small, lightweight sediment particles such as clays and fine silt that often remain suspended in construction site runoff water for extended periods of time and are commonly discharged into local waterways.

In 2006 McLaughlin partnered with the North Carolina Department of Transportation (NCDOT) to conduct an erosion control study on two road-widening construction projects in North Carolina's mountains. McLaughlin's team included numerous students, NCSU soil science extension associate Scott King, and Dr. Greg Jennings, professor and extension specialist in biological and agricultural engineering. For the purposes of the study, the team divided the first roadway project site into three hydrologically isolated sections, each with one of the following treatments installed in the drainage ditch next to the road:

1) A standard best management practice (BMP), consisting of narrow sediment traps in the ditch along with rock check dams,
2) Natural FCDs consisting of a mix of straw wattles and coir (coconut fiber) logs, or
3) FCDs with granulated, anionic PAM added to each. Once rain begins to fall, the PAM forms a jelly that adheres to the fibers of the FCD and slowly dissolves over time.

The experiment was repeated at the second road-widening project site. However, since this site was smaller, it was divided into only two sections—one using standard BMPs and the second using FCDs with PAM.

What is Polyacrylamide (PAM)?

PAM is a term describing a wide variety of polymers based on the acrylamide and acrylate molecular units. When linked in long chains, these units can be modified to result in a net positive, neutral or negative charge on the PAM molecule. The positively charged, or cationic, PAM molecules, are not used for erosion control because they can be toxic to fish and other aquatic organisms if they spill into water bodies in sufficient concentrations. The negatively charged, or anionic, PAM molecules, are not generally toxic to aquatic organisms at working dosages and are widely used in furrow irrigation agriculture. PAM is available as a crystalline powder, an emulsion or a solid block and is nontoxic to humans and to other species in the environment. (This information is adapted from the 2006 NCSU fact sheet *SoilFacts: Using Polyacrylamide (PAM) to Reduce Erosion on Construction Sites*. For the complete text, see www.soil.ncsu.edu/publications/Soilfacts/agw439-61_low-res-060106.pdf.)

Project data show that using FCDs, particularly those with PAM added, significantly reduced turbidity and total suspended solids in the runoff water. Data from site #1 showed that the standard erosion control BMP yielded runoff water with a turbidity of 3,813 nephelometric turbidity units (NTUs), 202 NTU for the FCDs-only and 34 NTU for the FCDs with PAM. The average discharge turbidity at site #2 was 867 NTU for the standard BMPs and 115 NTU for the FCDs with PAM. Further, the study showed that after a storm, sites that used standard BMPs lost an average of 944 pounds of sediment—compared with only 1.8 pounds of sediment lost at sites utilizing FCDs with PAM. A paper showing detailed study results was published in the March/April 2009 edition of the *Journal of Soil and Water Conservation*.

The researchers' cost analysis showed that using FCDs with PAM is comparable in price to a standard rock check dam. Although supplies for the rock check dam cost less than the FCDs with PAM, installing rock check dams cost more because heavy equipment is needed to haul and place the rock, explains McLaughlin. "FCDs can be carried in the back of a pickup truck and installed within minutes." Plus, unlike rock check dams, FCDs do not need to be removed, adds McLaughlin. They can remain in place until they degrade naturally, by which time the site will have been revegetated and stabilized. FCDs offer aesthetic and safety benefits as well—they look more natural along the roadside and will not damage cars that might accidentally drive into the ditch.

Study's Success Boosts the Use of New Practice in NC

Thanks to the convincing results of the FCD with PAM study, NCDOT is slowly transitioning to using FCDs as the agency's new preferred best management practice. "Turbidity in runoff water will drop significantly even if NCDOT uses plain FCDs instead of rock," explains McLaughlin. "Adding PAM will reduce turbidity even further."

For the past few years McLaughlin's and Jennings' group has offered certification and re-certification courses for individuals who install erosion and sediment control practices for NCDOT

(agency staff and private contractors). Course materials address erosion and sediment control for a wide range of construction applications, including using groundcovers such as mulch or erosion blankets, building temporary sediment basins with skimmers, and using FCDs (with or without PAM). Every year approximately 1,500 people attend the course from North Carolina and beyond. The team also presents at numerous workshops and meetings.

People frequently question McLaughlin and his team about whether PAM, a synthetic chemical, can be discharged safely into streams. McLaughlin notes that using PAM is safe when used at the typical BMP best dose range of one to three parts per million (ppm). To put this number into perspective, he explains that wastewater treatment plants are permitted to treat their finished water with 1 mg/L (equivalent to 1 ppm) of PAM prior to discharging the water the streams. Plus, "acute toxicity is very low," he notes. "High doses—more than 400 ppm—are needed to kill typical organisms," Chronic toxicity values (as derived from a seven-day chronic exposure test) are also one to two orders of magnitude higher than typical dosing, he adds. Since most storm flows occur in hours rather than days, chronic exposure to PAM is unlikely.

This photo shows a series of FCDs sprinkled with PAM successfully slowing runoff during a rainstorm at the study site.

McLaughlin believes that applying FCDs with PAM throughout the construction site is a good choice for developers. "It is more efficient to deal with sediment at its source rather than rely solely on a sediment basin," he explains. Although NCSU research has shown that using sediment basins with skimmers can reduce turbidity by as much as 99 percent over other types of sediment basins, the water that empties into local waterways often still has a turbidity of more than 1000 NTU. To reduce turbidity further "you need to consider using PAM," he explains. "Applying FCDs with PAM in the drainage ditches throughout the site removes sediment efficiently and almost always works."

For a detailed look at how FCDs and PAM can be incorporated into a construction site near you, see *SoilFacts: Fiber Check Dams and Polyacrylamide for Water Quality Improvement*, a fact sheet developed by the North Carolina Cooperative Extension and available for download at www.soil.ncsu.edu/publications/Soilfacts/AG439-71W.pdf. The fact sheet offers detailed instructions and pictures describing how to install and maintain FCDs and how and where to add PAM.

[For more information, contact Dr. Rich McLaughlin, Professor and Extension Specialist, Department of Soil Science, Box 7619, 100 Derieux Street, North Carolina State University, Raleigh, NC 27695. Phone: 919-515-7306; E-mail: rich_mclaughlin@ncsu.edu]

Ordinance Improves Huron River Quality—Restrictions Spread Nationwide

Many government entities are finding ways to reduce residents' use of lawn fertilizers that contain phosphorus. Some governments choose to pass laws or ordinances prohibiting the use of fertilizers that contain phosphorus except in special cases, such as on new lawns or when a soil test indicates that phosphorus is needed. Others are increasing education efforts to help residents better understand that fertilizer with phosphorus is not always necessary. Evidence suggests that these endeavors are making a difference. The City of Ann Arbor, Michigan, for instance, has seen phosphorus levels in the Huron River drop an average of 28 percent after it enacted a phosphorus ordinance in 2006.

Numerous local governments across the country have phosphorus restrictions in place. For example, several counties in Michigan have passed countywide ordinances limiting or banning the use of fertilizer that contains phosphorus. The city of Ann Arbor, Michigan passed a strict phosphorus ordinance in 2006 after a total maximum daily load (TMDL) study on the Huron River showed that the city had to reduce the amount of phosphorus discharged from the city's watershed. Ann Arbor's ordinance prohibits application of phosphorus except when a soil test shows that it is needed, or when planting a new lawn. It prohibits applying fertilizer within 25 feet of any waterbody. Ann Arbor also prohibits any manufactured fertilizer application prior to April 1 or after November 15 unless the soil temperature at a depth of 2 inches has been measured, and is greater

Ordinance Improves Huron River Quality—Restrictions Spread Nationwide (continued)

than 37 degrees Fahrenheit. Additionally, the city requires all commercial fertilizer applicators to register annually; plus, the applicators must provide at least one copy of a city-published manufactured fertilizer informational pamphlet to each customer.

Similarly, to comply with phosphorus TMDLs requirements, the New Jersey Department of Environmental Protection (NJDEP) is mandating that more than 100 New Jersey municipalities adopt local ordinances prohibiting the use of fertilizers containing phosphorus except under special circumstances (see ordinance details at www.state.nj.us/dep/watershedmgt/DOCS/TMDL/Fertilizer Application Model Ordinance.pdf). The state is also working to reduce fertilizer application statewide. In April 2008, NJDEP signed a Memorandum of Understanding (MOU) with two major fertilizer producers to address phosphorus use in lawn fertilizers. By signing the MOU, the fertilizer producers agreed to reduce the amount of phosphorus in their lawn fertilizer products, distribute these products in garden centers statewide and work with the New Jersey Department of Environmental Protection to develop strategies to educate the public about proper selection and use of lawn fertilizer. For more information, see "Recent Partnership Limits Phosphorus in New Jersey Fertilizer," on page 12 of *Nonpoint Source News-Notes* issue 86, available at www.epa.gov/NewsNotes/pdf/86issue.pdf.

Annapolis, Maryland recently became the first municipality in the Chesapeake Bay watershed to adopt an ordinance banning the use of fertilizer that contains phosphorus. Since January 1, 2009, residents have been required to use only phosphorus-free fertilizer, except in gardens, on newly established turf and in cases where a soil test shows a phosphorus deficiency. For more information, see www.annapolis.gov/upload/images/government/council/Adopted/o1008.pdf.

Why is phosphorus targeted?

In most freshwater systems (e.g., lakes, rivers and streams), phosphorus is a limiting nutrient. Other nutrients such as nitrogen and potassium are needed for freshwater plant growth, but they usually exist in adequate levels. In such systems, the availability of phosphorus controls the growth of algae, so even small amounts of phosphorus entering a waterbody go a long way toward stimulating runaway growth of algae and other aquatic plants.

When unnaturally high levels of phosphorus reach freshwater systems, plants can grow unchecked, causing a proliferation of algae and aquatic weeds to the detriment of other organisms that share the ecosystem. An overabundance of surface algae prevents sunlight from reaching underwater organisms that depend on this light. Often, this unsustainable growth of algae (called a bloom) reaches a critical mass that triggers a catastrophic die-off of the bloom. As the bloom decays and sinks, it depletes the essential free oxygen from the aquatic habitat, typically resulting in mass kills of desirable organisms. By limiting the amount of phosphorus applied in fertilizer, localities hope to reduce incidences of aquatic plant overgrowth and detrimental ecosystem effects.

Numerous local governments in Florida have passed fertilizer ordinances over the past decade to reduce nutrient pollution of surface waters. Building on the success of these ordinances, Florida passed a statewide law in June 2009 that requires all local governments to adopt a model fertilizer use ordinance as a minimum standard. This ordinance restricts or prohibits the application of fertilizer that contains nitrogen and phosphorus in certain areas and during certain times of the year.

Two other states have also passed laws prohibiting phosphorus in most fertilizer. Minnesota enacted a statewide law in 2005 prohibiting the use of phosphorus lawn fertilizer unless new turf is being established or a soil test shows a need for phosphorus (see www.mda.state.mn.us/protecting/waterprotection/lawncwaterq.htm). In April 2009, Wisconsin Governor Doyle signed the "Clean Lakes" bill (2009 Wisconsin Act 9). The bill established a statewide law prohibiting the display, sale and use of lawn fertilizer containing phosphorus, with certain reasonable exceptions (e.g., when establishing grass or when a soil test shows that phosphorus is needed). The law takes effect in April 2010, which gives retailers time to prepare. Although retailers will not be permitted to display turf fertilizer that is labeled as containing phosphorus, they may post a sign advising customers that turf fertilizer containing phosphorus is available upon request for qualified uses. To read the statute, see www.legis.state.wi.us/2009/data/AB-3.pdf.

Are the Regulations Reducing Phosphorus?

Minnesota has collected retailers' sales numbers since phosphorus laws went into effect in the Minneapolis/St. Paul area in 2003 and statewide in 2005. A 2007 report (see www.mda.state.mn.us/protecting/waterprotection/phoslaw.htm) found that the law substantially reduced phosphorus lawn fertilizer use. The report noted that the use of lawn fertilizers containing phosphorus decreased 38 percent between 2003 and 2006. By 2006 only 18 percent of lawn fertilizer for sale contained

Ordinance Improves Huron River Quality—Restrictions Spread Nationwide (continued)

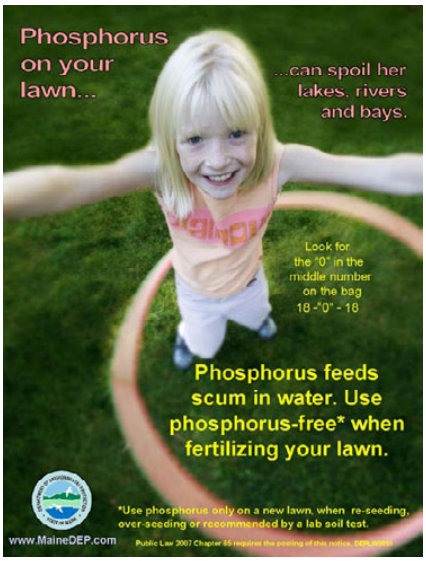
phosphorus. Additionally, Minnesota's law has not increased consumers' costs and has successfully provided a focus point for extensive yard care and water quality education.

One study completed in 2007 by the Minnesota Department of Agriculture found that runoff data were too variable in the years following phosphorus lawn fertilizer restrictions to indicate short-term trends in water quality (see www.mda.state.mn.us/protecting/waterprotection/phoslaw.htm). A paired watershed study completed for the Minnesota Water Pollution Control agency between 2004 and 2006 indicates that restricting the use of phosphorus lawn fertilizer reduces the export of phosphorus from urban residential developments by 12 to 15 percent. However, this study was complicated by a number of factors and addressed a limited area (see www.pca.state.mn.us/publications/stormwaterresearch-fertilizer.pdf).

Fortunately, compelling water quality data are now available from the city of Ann Arbor, Michigan, which adopted a phosphorus ordinance in 2006 in an effort to comply with TMDL requirements. A University of Michigan research team looked at a historical data set collected on the Huron River and compared it to data collected after the ordinance went into effect in 2007. Their analysis showed that phosphorus levels in the Huron River dropped an average of 28 percent in just the first year. Other water quality parameters, including nitrate, silica and colored dissolved organic matter, did not change systematically as did phosphorus levels. More details on the study, which was funded through EPA's Science to Achieve Results (STAR) program, are available at www.umich.edu/~hrstudy. The study's primary author, University of Michigan professor John Lehman, believes that the decline can be attributed to the passage of the ordinance in combination with the public education efforts and general increased environmental awareness among Ann Arbor residents.

Educating People about Fertilizer

Reluctant to prohibit its residents from using fertilizer with phosphorus, Maine instead passed a statewide law that it hopes will raise people's awareness and change their behavior. The law requires all fertilizer retailers to post educational signs. The signs, approved by the Maine Department of Environment, explain the link between phosphorus use and algae growth and discourage people from using phosphorus-containing fertilizer except on new or reseeded lawns. See www.maine.gov/dep/blwq/doclake/fert/phospage.htm for more information on Maine's law.



Maine fertilizer retailers are required by law to post this educational sign near fertilizer displays.

Some localities still rely completely on education to reduce the use of fertilizers that contain phosphorus. In 2006 the Lake Champlain Basin Program (www.lcbp.org) in Vermont, New York and Quebec began working with several partners in the watershed to pool resources and ideas to create a coordinated outreach message for both fertilizer consumers and retailers. In addition to promoting the use of phosphorus-free fertilizer with a "Don't 'P' on Your Lawn" message, this partnership has created other healthy lawn tips and encouraged local retailers to stock phosphorus-free fertilizers (see www.lawntolake.org).

These educational efforts appear to be making a difference. In Maine, a 2009 followup survey indicates that most fertilizer retailers are complying with the law—87 percent of surveyed stores had posted the educational signs as required. Plus, 97 percent of stores now offer phosphorus-free products. Anecdotal evidence suggests that more consumers are purchasing phosphorus-free products as a result. For more details on the survey, see the spring 2009 issue of Maine's *Nonpoint Source Times* at www.maine.gov/dep/blwq/newslet/npstimes/spring2009.pdf.

Many fertilizer retailers in the Lake Champlain watershed ask their salespeople to wear these "P-free" buttons to encourage consumers to ask questions.

The Lake Champlain Basin Program's education efforts are also paying off, notes Nicole Ballinger, the program's communications coordinator. "The amount of non-farm phosphate being sold in Vermont is decreasing and the number of phosphorus-free fertilizer items available for sale is increasing." In 2008, retailers reported 221 phosphorus-free items for sale, compared with 188 in 2007. Many of these retailers ask their salespeople wear "P-free" buttons and

have voluntarily posted informational brochures and posters in their stores to help educate consumers. For more information on how the "Don't 'P' on Your Lawn" effort fits into the overall management of the Lake Champlain system, see the 2008 State of the Lake report at www.lcbp.org/PDFs/SOL2008-web.pdf.

New York City Welcomes Back the Alewife

In spring 2009, the New York City Department of Parks and Recreation (Parks Department) announced that its scientists and community partners found several mature alewife, or river herring, migrating up the Bronx River—possibly the first time that this fish has been seen or recorded in the river in hundreds of years. In the mid-1600s the first dams were built on Bronx River, blocking upstream access to anadromous fish like alewife, as well as local fish. Plus, the Bronx River's water quality deteriorated over time as industrial and domestic wastewater effluent and urban stormwater runoff added pollutants into the system. Additional dams were built and the river channel was straightened and armored over the years, creating a habitat that could not support a diverse assemblage of native species. Fortunately, it appears federal clean water regulations and watershed restoration efforts over the past several decades have paid off. The Bronx River is clean once again and provides more diverse habitats that can support the fish that historically lived in it.

About Alewife

The alewife (*Alosa pseudoharengus*) are anadromous fish that spawn in rivers and tributaries from northeastern Newfoundland to South Carolina, but are most abundant in the mid-Atlantic and northeastern states. They live in the ocean as adults but swim into freshwater streams, rivers and lakes in the spring to spawn. After spawning, the adult fish return to the ocean. The eggs its leaves behind hatch into larvae and develop into juvenile fish. The juveniles remain in the freshwater system to feed and grow for up to four months. By mid-fall, the juveniles also migrate to the ocean and remain there for three to five years until they have reached reproductive maturity. These adults will then return to the same freshwater system where they were hatched.

Photo courtesy of Rocking the Boat

As part of a long-term effort to reestablish a native alewife population, the Parks Department introduced 201 mature alewife in the Bronx River upstream of the historic 182nd Street dam in 2006. They released an additional 400 alewife in spring 2007. Scientists believe that the fish captured below the dam in spring 2009 may be offspring from the fish introduced in 2006, or may be stray alewives that mistakenly swam up the Bronx River, seeking suitable upstream spawning habitat.

Alewife typically live five to seven years—beginning in the third year they return annually to the same river to reproduce. They travel up the river as far as they can and then spawn. In this case, the alewife are still blocked by the dam and would likely spawn in a couple of slack-water areas below the dam. "The river below the dam is not ideal habitat," notes Marit Larson, a project manager with the Parks Department, "but our ecologists think there is a chance larvae could survive."

The Parks Department plans to build a fish ladder to allow alewife to access the better spawning areas upstream of the dam. The process of designing and installing the fish ladder has taken longer than anticipated because of multiple complicating factors—not unusual for a dense urban area. In this case, the 182nd Street dam is not only a site of historical significance, it also serves as a boundary wall for the Bronx Zoo, so the design team is working with officials to ensure that the fish ladder won't compromise safety, security or history. "These factors make the fish ladder more expensive than usual and more difficult to fund," adds Larson. "However, we already have about one-third to one-half of the funding and have submitted proposals to help support the rest. We're optimistic."

The successful reintroduction and observation of alewives trying to migrate upstream is a testimony to the water quality and habitat

Students show off an alewife captured in April 2009 *(Photo courtesy of Rocking the Boat).*

New York City Welcomes Back the Alewife (continued)

restoration improvements that the river partners, including upstream municipalities, have completed along the Bronx River over the past several decades. "The returning herring that were caught and released shows that our efforts over these many years to return the Bronx River to health have worked," said Congressman José E. Serrano in a recent press release. "It's a great day for the Bronx environment." For more information on efforts to restore the Bronx River, see www.bronxriver.org or www.nycgovparks.org (search on "anadromous").

[For more information, contact Marit Larson, New York City Department of Parks and Recreation, 830 Fifth Avenue, New York, NY 10065. Phone: 212-360-1415; E-mail: marit.larson@parks.nyc.gov]

Pervious Pavement Project Gains Nationwide Attention

The eyes of the world, it seems, are on a $1.4 million paving project in Shoreview, Minnesota. Construction groups, civil engineers and public works officials have been touring the job site. Recently a group from Sacramento, California flew in to take a look at the project. "We have been talking to people from New York to California about this thing," said Mark Maloney, Shoreview's public works director. "It is very unusual to be involved with an infrastructure project that has that much national attention."

Crew installs a pervious concrete matrix in Shoreview, Minnesota *(Photo by Bill Klotz).*

The fuss is about "pervious concrete," a green technology that allows water to pass through instead of running off the surface, thus reducing the need for expensive storm water retention ponds and other infrastructure. Pervious concrete also provides a natural filter for polluted runoff—such as petroleum products—that would otherwise flow unimpeded into lakes, streams and rivers.

Pervious concrete isn't new; it has been used in Minnesota for at least five to 10 years, mostly on walkways, parking lots and the like. However, Shoreview is using the technology on a three-quarter-mile residential roadway—the first time, in Minnesota at least, that this type of concrete has been applied to a project of this size.

The project, which began in July 2009 and wrapped up in September 2009, features a seven-inch bed of pervious concrete on top of 18 inches of aggregate. The concrete doesn't contain fine sands. Instead, it's made up of a "concrete matrix" that's specially designed to allow water to pass through, according to Mendota Heights-based Cemstone, which is supplying 1,800 cubic yards of concrete for the project. "The water goes through the pervious concrete, gets in this layer of crushed aggregate, and naturally filters into the soil," said John Lee, a sales manager with Cemstone. "For lack of a better analogy, it looks like a Rice Krispies bar."

Why is the Shoreview Project Getting So Much Attention?

Shoreview, Minnesota is replacing less than a mile of residential street in a neighborhood adjacent to a lake. The city removed the existing street and its traditional stormwater drainage features completely and replaced it with pervious concrete (curb-to-curb). The road, which allows stormwater to pass right through, serves both as a road and a stormwater control feature. While pervious pavement costs more up front than conventional pavement, the cost savings over time could be considerable. If successful, the project could have huge implications for road and stormwater control projects across the country.

In a recent demonstration, crews put the concrete to the test by dumping 2,000 gallons of water on a finished portion of the street. The water "disappeared in about a minute," according to Lee. (To view this demonstration video, go to www.youtube.com/watch?v=j_z0xRPbExY.)

"When we go to the site, appearance-wise, the concrete looks remarkably well," Lee added. "The contractor has done an absolutely fabulous job. The appearance looks very uniform. As far as driving on it, and walking on it, it feels like a regular pavement."

The pavement isn't cheap; its upfront cost is about 50 percent more than traditional concrete, Lee noted. But he hastened to add that it's cost-effective considering that "you are getting a storm water management system" instead of just a driving surface. Maloney concurs. "When you net out what you don't have to build—mainly ponds and piping and catch basins and manholes—when you consider the cost of those things, it is almost a break-even," Maloney said. "We would not be doing the project if that weren't the case."

Research Indicates that Pervious Pavement Works Well in Cold Climates

Research on a pervious pavement parking lot at the University of New Hampshire has shown that the pavement's performance remained steady year round. While researchers observed conditions conducive to frost penetration in the filter media during the winter, the pores remained open and drained year round. As a result, freezing and thawing did not limit infiltration. This ability to maintain drainage minimizes freeze-thaw, which contributes to the porous pavement's durability. In practice, the lifespan of these lots can exceed impervious asphalt lots, which tend to lose structural integrity in northern climates due to frost heaving.

Additionally, researchers found that using porous pavement also reduced the need to apply sodium chloride for deicing in winter. Researchers observed that winter maintenance of porous asphalt requires between zero and 25 percent of the salt routinely applied to impervious asphalt to achieve equivalent, or better, deicing and traction. For more details, see the University of New Hampshire's Stormwater Center's 2007 Annual Report at http://ciceet.unh.edu/unh_stormwater_report_2007/treatments/porous_asphalt. The researchers developed a slide presentation detailing their findings; titled "Effects of Northern Climates on Stormwater Infiltration for Porous Pavements and Filtration Systems," it is available online at www.unh.edu/erg/cstev/Presentations/trb_09_roseen_cold_climate_filtration.pdf.

[Article text (not including boxes) was excerpted and adapted with permission from "'Pervious' technology on Shoreview road to drain storm water, control pollution," by Brian Johnson, printed in the September 1, 2009 online edition of Minnesota's Finance and Commerce *(www.finance-commerce.com) newspaper.]*

Notes on Watershed Management

Restoring a Watershed, One Neighbor at a Time

When Dorie and John Belisle left an automotive repair business behind in Florida and bought a farm in Washington State in 1995, they hoped to reconnect with nature and find community. Now, almost 15 years later, they have achieved more than that. The couple established a thriving apple orchard and has won awards for their sustainable farming practices. They got to know their neighbors and fell in love with their land. Before they knew it, they had become the leaders of a community effort to restore water quality in their local watershed.

The Belisles live in the 35-square-mile Tenmile Creek watershed, a tributary of the lower Nooksack River in northwest Washington. Tenmile Creek, along with numerous other waterbodies in the lower Nooksack River, has been designated as impaired by the Washington Department of Ecology (Ecology) for more than a decade. Comprehensive water quality monitoring in the late 1990s showed that numerous segments in the lower Nooksack River basin violated Washington's water quality standard for fecal coliform bacteria, temperature and dissolved oxygen. High fecal coliform levels polluted Portage Bay shellfish beds, causing the Lummi Nation of Native Americans to voluntary close the shellfish beds to harvesting in 1998.

In June 2000 Ecology developed a total maximum daily load (TMDL) that established fecal coliform bacteria pollution limits for waterbodies in the Nooksack River basin, including Tenmile Creek. To ensure protection of downstream shellfish beds, the TMDL established fecal coliform bacteria geometric mean targets that are more stringent than water quality standards. For example, Tenmile Creek's TMDL target is a geometric mean value of 39 colonies (col) of fecal coliform bacteria per 100 milliltiers (mL) of water—well below the state water quality standard of 100 col/100 mL. In 2001 Ecology developed a TMDL implementation plan for the lower Nooksack River that provided a framework for restoring water quality so that it meets all beneficial uses and allows the re-opening of the Lummi shellfish beds at Portage Bay.

Working Locally to Restore Tenmile Creek

One of the steps the state considered to reduce the amount of fecal coliform bacteria reaching the Nooksack River and its tributaries was to mandate wide streamside buffers. This is where

the Belisles began to get actively involved. "We, as farmers, were concerned about the prospect of additional regulations," explained Dorie Belisle. "We thought that there must be a better way."

Belisle worked with the Whatcom County Conservation District to organize a 2001 meeting of watershed landowners to discuss the health of Tenmile Creek and the potential for new regulations. "People were upset," she noted. "At first we just listened to their concerns. Then, we took the opportunity to educate them about the problem. Finally, we discussed options for how we could improve water quality without regulations. The landowners were very receptive." With this meeting, the Tenmile Creek Watershed Project was born. Soon after, the Whatcom County Conservation District secured a Clean Water Act section 319 grant from the Washington Department of Ecology to support Dorie Belisle as a part-time project coordinator to work directly with individual landowners.

These three pictures show the progression of a riparian restoration project along Fourmile Creek (a main tributary of Tenmile Creek). The project included reshaping the creek and planting numerous types of streamside vegetation. The plantings thrived, and the creek is now completely shaded.

Belisle's first step was to survey the community. She discovered that people did not want to attend meetings. Instead they wanted to talk directly to someone who could understand their farming challenges, help them find a way to protect water quality and be available if they have questions or problems. So, over the course of the next five years, Belisle visited numerous farming families throughout the watershed. Many people never think much about a creek that happens to run through their property, she realized. She'd bring maps to her home visits "to help people see the connections between what they do on their property and the areas downstream," she explained. "I'm a farmer, so I could relate to their concerns and give them a farmer's perspective." She listened to the landowners, walked their property with them and worked to find best management practices that would work. She explained how they could take advantage of the Conservation Reserve Program and Environmental Quality Incentive Programs to help with the improvements. She also emphasized how important it is to ensure septic systems are maintained properly.

Belisle relied on a "neighbor working with neighbor" approach, supplemented by widescale communication and education. Between 2001 and 2008 Belisle and the Whatcom Conservation District secured six grants to support her efforts in the Tenmile Creek watershed. She developed and mailed a dozen newsletters and a Tenmile Creek health status report to 2,500 residents with property within 150 feet of the creek—about a third of the watershed's population. She worked with the Whatcom Conservation District to host two workshops on septic system care and one workshop on small farm management. She hosted streamwalks for the neighbors of landowners who had implemented practices and were willing to share their experiences. She even collected a series of 12 oral history stories about life in the watershed and organized neighborhood gatherings to share the information. She helped to build a community of informed and concerned citizens within the Tenmile Creek watershed.

Neighbors' Efforts Improved Water Quality

Thanks to Belisle's leadership, landowners throughout the Tenmile Creek watershed planted more than 11 miles of riparian buffers, removed non-native species and established native shrubs on 12.5 miles of stream habitat, improved fish passage barriers, installed seven in-stream habitat improvement structures, installed fences to keep animals out of the creek while providing alternative ways of watering animals and implemented farm plans for better management. Belisle started a program called "Farmers Growing Trees for Salmon" in 2001, which continues today. Local farmers grow the trees and give them away to Whatcom County residents for water quality enhancement projects. Nooksack River basin landowners have planted more than 100,000 trees since the program began. See the Tenmile Creek Watershed Project site at www.whatcomcd.org/Watersheds/Tenmile/Tenmile.html for more details.

All the work is paying off. Fecal coliform levels in the uppermost segment of Tenmile Creek have been consistently meeting both the state water quality standard and the TMDL target. In fact,

Restoring a Watershed, One Neighbor at a Time (continued)

Ecology removed the upper Tenmile Creek segment from Washington's list of impaired waters in 2008. Monitoring data collected in 2009 at the lowermost segment of Tenmile Creek (creek's mouth) indicate that this segment is also meeting both the TMDL target and the state standard for fecal coliform bacteria. Data show that other water quality parameters, including dissolved oxygen and temperature, have also improved in Tenmile Creek.

The improvements in Tenmile Creek contribute to improved water quality seen in the lower Nooksack River and Portage Bay—by 2006, all of the Lummi Nation shellfish beds were re-opened for harvest. Pollution problems remain throughout the lower Nooksack River and its other tributaries, however. Even Tenmile Creek still has problems. Much work remains to ensure that water quality will continue to improve and that the shellfish beds can remain open.

Tenmile Creek is a Model for What Works

Local governments and resource agencies usually don't have the staff to keep up with the need for personal communication with landowners. That's why, just as Dorie Belisle always celebrated every best management practice her neighbors implemented, the Washington Department of Ecology (Ecology) and the Whatcom Conservation District continue to appreciate and celebrate the water quality improvements achieved by Belisle and her neighbors. Ecology's Steve Hood admires Belisle's efforts and credits her "neighbor working with neighbor education approach" outside of the regulatory realm for many of the improvements seen in Tenmile Creek. George Boggs, with Whatcom Conservation District, helped Belisle apply for the grants that helped to support the Tenmile Creek watershed restoration project. "Dorie's project was all about community...and it was very successful."

Belisle retired as watershed coordinator for the Tenmile Creek project in 2008 when the Whatcom Conservation District's final Tenmile Creek grant expired. The project has remained unfunded since then. Belisle has suggested forming a Tenmile Creek nonprofit organization or forming a Tenmile Creek Watershed Improvement District funded through a special tax and grants. Neither idea has gained much traction—yet. In the meantime, Belisle continues to talk to her neighbors when they stop by her orchard store, and whenever possible, she encourages them to remain active in protecting Tenmile Creek. Although the project might be over, the trust and cooperation built within the local watershed community will continue indefinitely.

[For more information, contact Dorie Belisle, BelleWood Acres, 231 Ten Mile Rd., Lynden, WA, 98264. Phone: 360-398-9187; E-mail: doriebelisle@yahoo.com]

Agency Expands Efforts to Protect the Nation's Forests

Climate change, catastrophic fires, disease and pests have all led to declining forest health in recent decades. The resulting impact on watersheds, the climate, local economies, wildlife and recreation recently prompted the U.S. Department of Agriculture (USDA) to offer a revised vision for the U.S. Forest Service—one that emphasizes conserving, managing and restoring forests.

This forested watershed helps support a clean river where children can play.

In an August 2009 speech, Agriculture Secretary Tom Vilsack outlined his vision for the future of the United States' forests. "Our nation's forestlands, both public and private, are environmental and economic assets that are in critical need of restoration and conservation," said Vilsack. "By using a collaborative management approach with a heavy focus on restoring these natural resources, we can make our forests more resilient to climate change, protect water resources, and improve forest health while creating jobs and opportunities."

The new approach to managing forests has several goals related to watershed protection and restoration, including securing and protecting the nation's water supply. Watersheds with a large proportion of forest cover are more likely to be associated with good water quality, with forests protecting soil, moderating streamflow, supporting healthy aquatic systems and sustaining good water quality. According

Agency Expands Efforts to Protect the Nation's Forests (continued)

to the USDA, healthy forests provide immeasurable benefits to the country's water supplies. Consider these statistics:

- Nearly 87 percent of all of the country's fresh water supply originates from forests and agricultural lands and more than 200 million people rely on their drinking water from public and private forests and grasslands;
- 53 percent of the nation's total water supply originates from public and private forest lands;
- More than 900 cities rely on national forest watersheds;
- 3,400 public water systems serving 66 million people in 33 states are supplied by watersheds with Forest Service land;
- Public and private forests in the 20 Northeastern and Midwestern states help to protect more the 1,600 drinking water supplies supplying more than 4 trillion gallons per day to households of more than 52 million Americans;
- 80 percent of the forest area in the United States is outside of the National Forest system;
- The estimated annual value of water from national forests for in-stream uses is at least $3.7 billion.

Putting the Vision into Action

USDA has already begun implementing projects to achieve Secretary Vilsack's new vision for the Forest Service. Through the American Recovery and Reinvestment Act, Congress is funding 512 projects that will create jobs restoring the nation's private, state and national forests. Nearly 170 of these projects will help maintain forests to reduce the potential for fires. Meanwhile, 30 of these projects, funded at $57 million, will promote the development of biofuels from woody biomass to help private sector businesses establish renewable energy infrastructure and create green jobs.

Vilsack wants the Forest Service to develop new planning rules to guide national forest management. He also wants the Forest Service to work closely with the USDA's National Resources Conservation Service (NRCS) to integrate conservation efforts. "The 2008 farm bill provides new opportunities to use existing conservation programs and to focus those resources on the most pressing problems facing family-owned forests."

Emphasizing Public-Private Cooperation

With more than 80 percent of the nation's forest area in the outside of the National Forest system, the new vision seeks to increase public-private cooperation, noted Vilsack. "This will require a new approach that engages the American people and stakeholders in conserving and restoring both our national forests and our privately-owned forests." The Administration's plan calls for the Forest Service to play a leading role in developing new markets to sustain the economic viability of forest stewardship and provide landowners with economic incentives to maintain and restore forests.

New Forest Service Approach Complements EPA's Healthy Watershed Initiative

In early 2009, the U.S. Environmental Protection Agency (EPA) launched a new Healthy Watersheds initiative to encourage local and state agencies to be proactive and place a stronger emphasis on protecting their remaining healthy watersheds as a way to save money and the environment. Like Secretary Vilsack, EPA recognizes the environmental and economic value of healthy, forested watersheds. A 2004 survey of 27 different water treatment utilities showed that protecting aquifer recharge zones and surface water sources reduces drinking water treatment costs. For every 10 percent increase in forest cover of the source area, the chemical and treatment costs decreased by 20 percent (see www.ci.slc.ut.us/Utilities/NewsEvents/pdf/Op0504_1.pdf). Further, forest cover loss was found to be the most important factor in degrading streams with low levels of loss being sufficient to substantially alter hydrological and biological stream conditions (see "Forest cover, impervious surface, and the mitigation of stormwater impacts," published in 2002 in the *Journal of the American Water Resources Association* and available online at http://faculty.washington.edu/dbooth/Booth_Hartley_Jackson_JAWRA.pdf). For more information on EPA's Healthy Watersheds initiative, see www.epa.gov/healthywatersheds. This Web site provides tools and information that states, local governments and others can use to identify and protect healthy watersheds.

Agency Expands Efforts to Protect the Nation's Forests (continued)

"The Forest Service must not be viewed solely as an agency concerned only with the fate of our national forests but must instead be acknowledged for its work in protecting and maintaining all of America's forests, including state, tribal, and private ones," said Vilsack. "Our shared vision must adopt an all-lands approach, requiring close collaboration with the NRCS and its work on America's private working lands." For more information on how the Forest Service intends to implement changes, see www.fs.fed.us/video/tidwell.

Reviews and Announcements

Agricultural Census Information Now Available By Watershed

Analyzing agricultural trends in your watershed just got easier, thanks to a new effort by the U.S. Department of Agriculture's National Agricultural Statistics Service (NASS). For the first time ever, NASS has published a document outlining the Census of Agriculture information at the watershed level (www.agcensus.usda.gov/Publications/2007/Online_Highlights/Watersheds). The Census of Agriculture provides a complete count of the nation's farms and ranches and the people who operate them. It serves as the only source of uniform, comprehensive agricultural data for every state, county and major watershed in the nation. The watershed-based Census report includes agricultural data on approximately 75 items (crop types, fertilizer use, etc.). For instance, in the Allegheny River watershed, the Census shows that farmers applied insecticides on 98,834 of 1,711,914 total farmed acres in 2007—compared to 91,646 of 1,660,635 farmed acres in 2002.

Airport Deicing Rule Proposed

The U.S. Environmental Protection Agency (EPA) is proposing to control contaminated wastewater runoff from aircraft and pavement deicing operations at more than 200 commercial airports nationwide. Discharges from deicing operations at airports can drain to nearby rivers, lakes, streams and bays and contaminate water, reducing oxygen levels, and have a harmful effect on wildlife, nearby residential areas and parkland. EPA estimates that six major airports, which are among the largest users of aircraft deicing fluid, would likely install centralized deicing pads to comply with the proposed requirements. Airports using lesser amounts of deicing fluid would collect 20 percent of the spent fluid with technologies such as glycol recovery vehicles. The estimated 50 airports that currently use urea to deice runways would use more environmentally-friendly deicers, or reduce the discharges of ammonia from continued use of urea. A number of airports in the country already comply with the proposed requirements. EPA estimates that complying with regulations will reduce the discharge of deicing-related pollutants by approximately 44.6 million pounds per year. EPA is accepting public comments on the proposed rule through December 28, 2009. For more information, see www.epa.gov/guide/airport.

Atmospheric Sources of Nitrogen Biggest Contributor in Southeast

The U.S. Geological Survey (USGS) National Water Quality Assessment (NAWQA) program assessed total nitrogen loads and yields in streams throughout the southeastern United States using the USGS watershed model SPARROW (Spatially Referenced Regression On Watershed Attributes). Results from the southeast regional total nitrogen SPARROW model indicate that atmospheric deposition is the largest source of nitrogen delivered annually to many estuaries along the South Atlantic and Gulf Coasts, such as Mobile and Apalachicola Bays (see http://water.usgs.gov/nawqa/pubs/nitrogen_loads for more details). The regional model integrates federal, state and local agency monitoring data from 2002 at 321 stations. The geospatial data describes nitrogen sources (fertilizer, animal waste, and urban inputs, atmospheric deposition and wastewater discharges) and watershed properties (soil characteristics, precipitation and land cover). Combining more calibration sites and refined geospatial data significantly improved results compared to previous SPARROW models.

Bacteria in Recreational Waters—Literature Reviews

EPA is updating its recreational water quality criteria for pathogens and pathogen indicators—final criteria are expected in 2012. As a first step, EPA completed two literature reviews in 2009. The first document, "Review of Published Studies to Characterize Relative Risks from Different Sources of Fecal Contamination in Recreational Waters," describes the existing information available to characterize the relative risks of human illness from various sources of fecal contamination in recreational waters. The second document, "Review of Zoonotic Pathogens in Ambient Water," provides a summary of information on waterborne zoonotic pathogens that come primarily from warm-blooded animals. Both documents are available at www.epa.gov/waterscience/criteria/recreation.

Big Apple Releases Street Design Manual

The New York City Department of Transportation recently released its Street Design Manual, which provides policies and design guidelines for city agencies, design professionals, private developers and community groups to improve streets and sidewalks throughout the city's five boroughs. The manual emphasizes a balanced approach that gives equal weight to transportation, community and environmental goals (such as expanding usable public open space, minimizing impermeable surfaces and maximizing vegetation on streets). The manual is available online at www.nyc.gov/html/dot/html/about/streetdesignmanual.shtml.

Enhanced Aquatic Ecosystem Simulation Model Released by EPA

EPA's Office of Science and Technology just released an enhanced version of the aquatic ecosystem simulation model AQUATOX. This PC-based ecosystem model predicts the fate of nutrients and organic chemicals in water bodies, as well as their direct and indirect effects on the resident organisms. AQUATOX Release 3 contains many enhancements that increase the realism and utility of the model. For more information, see www.epa.gov/ost/models/aquatox.

EPA Begins Testing Pesticides for Endocrine Disruption

EPA recently issued the first list of pesticides to be screened for possibly disrupting the endocrine system. Endocrine disruptors are chemicals that interact with and possibly disrupt the hormones produced or secreted by the human or animal endocrine system, which regulates growth, metabolism and reproduction. EPA issued test orders to the manufacturers of 67 pesticide chemicals during summer 2009 to determine whether their chemicals may disrupt the endocrine system. Testing, conducted through the Endocrine Disruptor Screening Program (EDSP), will be expanded over time to cover all pesticide chemicals. For more information, see www.epa.gov/scipoly/oscpendo.

EPA Document Analyzes Benefits of Using Green Roofs for Stormwater Control

EPA recently released a new document describing the results of a Pennsylvania project that evaluated green roofs as a stormwater management tool. Project results indicate that the green roofs are capable of removing 50 percent of the annual rainfall volume from a roof through retention and evapotranspiration. Rainfall not retained by green roofs is detained, slowing peak flows downstream. Green roof runoff contains concentrations of some nutrients and other substances, but levels are comparable to other planted systems. Due to the volume reduction, actual nutrient loadings from green roofs are less than loadings from asphalt roofing runoff. To read more, see "Green Roofs for Stormwater Runoff Control" (February 2009), available online at www.epa.gov/nrmrl/pubs/600r09026/600r09026.pdf.

EPA Releases Guidance on Environmental Models

EPA has released a guidance document that provides recommendations for the effective development, evaluation and use of models in environmental decision making once an environmental issue has been identified. This new resource also provides greater transparency of EPA's use of models and guidance on the use of proprietary tools and software. For more information, see EPA's Council for Regulatory Environmental Modeling (CREM) Web site at www.epa.gov/crem.

Estimating Atrazine Levels in a Stream Near You

The USGS recently added a new online mapping and graphing tool that shows predictions for stream concentrations of atrazine, one of the most heavily used herbicides in the United State (see http://water.usgs.gov/nawqa under "Featured Highlights"). The predictions are based on a USGS statistical model—referred to as Watershed Regression for Pesticides (WARP). This model also provides key statistics for each selected stream, including the probability that atrazine may exceed a water-quality benchmark of potential concern, and a level of confidence and uncertainty associated with each estimate. This release is the first in a series of statistical models for atrazine and other pesticides. The models are based on monitoring in 112 streams from 1992–2001. The model accounts for watershed characteristics that affect the occurrence of pesticides in streams, such as agricultural pesticide use and natural features including soils, hydrology and climate.

Extreme BMP Makeover Report Available

In June 2009, the nonprofit Center for Watershed Protection released a technical report that outlines the results of a performance survey of nearly 200 stormwater best management practice (BMP) facilities in urban areas throughout Virginia's James River watershed. The report, entitled "Stormwater BMPs in Virginia's James River Basin: An Assessment of Field Conditions and Programs" (see www.cwp.org/Resource_Library/Center_Docs/SW/ExtremeBMP/extrmbmp_tech_rprt09.pdf) is part of the Center's Extreme BMP Makeover project. At each BMP site, field teams looked for indicators of erosion, clogging and structural problems at the inlets and outlets; conditions directly downstream of the BMP; health of vegetative cover; signs of improper flow paths of water; maintenance issues; interesting design features and more. The Center's technical report describes the survey results and provides numerous recommendations, including BMP design issues (geometry, pre-treatment mechanisms, soil media, etc.); BMP construction issues (grading, sizing of BMP, elevation issues, etc.); BMP maintenance issues (sediment deposition, vegetation health, etc.); and programmatic issues (plan review process, inspections of BMPs).

Invasive Species Expert Directory Available

The Aquatic Nuisance Species (ANS) Task Force now offers a publicly-accessible database designed to help people find invasive species experts. Available at www.anstaskforce.gov/experts/search.php the database will guide users to a state contact that can find the requested information or identify the invasive species. If state contacts can't answer a user's question, they will find additional experts who can. The ANS Task Force is an intergovernmental organization (10 federal agency representatives and 12 ex officio members) dedicated to preventing and controlling aquatic nuisance species.

Minnesota Promotes Low Impact Development

In spring 2009 the Minnesota Legislature added language about low impact development to state natural resources law (HF 2123, Omnibus Environment and Natural Resources Bill). The new law requires that the Minnesota Pollution Control Agency (MPCA) develop performance standards, design standards or other tools to enable and promote the implementation of low impact development and other stormwater management techniques. The new law sets aside a funding provision of $500,000 to develop these standards and tools. In response, MPCA has begun a project called "MIDS: Minimum Impact Design Standards," the goal of which is to develop calculation methodologies that will allow designers and reviewers to more easily apply innovative stormwater management techniques in developments. The process will also yield an ordinance package that communities can adopt. For more information, see www.co.washington.mn.us/client_files/documents/phe/ENV/GW-MIDSSummary.pdf.

Music with an Invasive Species Message

Research shows music can influence how people respond to messages, influencing memory and recall, emotion, information processing, attitudes and even behavior. Bret Shaw, Environmental

Communication Specialist for University of Wisconsin Extension and Assistant Professor in the Department of Life Sciences Communication, worked with a group of singers and songwriters to produce a series of songs to help prevent the spread of aquatic invasive species in Wisconsin and beyond. The songs were reviewed by natural resource professionals to assure the claims are scientifically accurate and that recommendations are consistent with current laws. Listen to the songs at www.uwex.edu/erc/music.

National AgLaw Center Opens New Virtual Reading Room

The National AgLaw Center's library of subject-based online reading rooms (http://nationalaglawcenter.org/readingrooms) has expanded. Each virtual reading room contains a comprehensive list of current electronic resources for an agricultural or food law topic. Links are provided to major statutes, regulations, case law, Federal Register Digest reports, Center-published research articles, government publications, Congressional publications and numerous other research resources. Also contained in each virtual reading room is an overview article that provides a thumbnail sketch of the history and development of that subject. Links to the other rooms are provided on the left side of each reading room. Recently added resources are posted at the top of the applicable sections. The Center just added a Water Law Reading Room (http://nationalaglawcenter.org/readingrooms/waterlaw), which deals with issues such as allocation, irrigation and other problems common to agriculture's use of water. The room contains specific information related to the interplay between water and agriculture.

National Water Program Guidance Available

In June 2009, EPA released the final fiscal year 2010 National Water Program Guidance (see www.epa.gov/water/waterplan/fy10.html). This guidance describes water program priorities and strategies, including the suite of water performance measures and their targets, for the period October 1, 2009 through September 30, 2010.

New Tool Helps Estimate LID Implementation Costs

In partnership with EPA, the Water Environmental Research Foundation (WERF) has developed a new suite of cost tools to address vegetative roofs, rainwater catchment systems and bioretention facilities. These tools provide a framework to help estimate capital costs, operation and maintenance costs, and life-cycle net present value. The tools can serve as a format for cost reporting for past, current and future projects, and also provide users with planning-level cost estimates. These new tools complement an existing suite of whole life cost models for retention ponds, extended detention basins, swales, and permeable pavement developed under a previous WERF project. To access the complete set of tools and accompanying user's guide, visit www.werf.org/bmpcost. To view an archived EPA Webcast about the tool, go to www.epa.gov/npdes/training, scroll to the "Green Infrastructure" section on the bottom and click on "Site Planning and Design Considerations & WERF Cost Tool."

Nutrient Concentrations in Streams Hold Steady

In May 2009, USGS released "Nutrient Trends in Streams and Rivers of the United States, 1993–2003" as part of USGS' National Water Quality Assessment Program. The USGS assessed trends in streamflow and concentrations and loads of total phosphorus, total nitrogen and nitrate for the period from 1993 to 2003 in selected streams and rivers of the United States. The report showed that phosphorus and nitrogen concentrations remained relatively stable from 1993 to 2003 in about half of the streams assessed. The pattern did vary in some regions, including increases in phosphorus in more than half of the streams assessed in the Mississippi/Atchafalaya River Basin. To view the report or to access maps, see water.usgs.gov/nawqa/pubs/nutrient_trends.

Online Game Encourages Kids to Go Outside

The U.S. Fish and Wildlife Service recently launched a new online video game designed to encourage kids to go outside and learn about the environment. Designed for children ages 8 to 11 years old, "Neighborhood Explorers" is accessed through the Service's "Let's Go Outside!" Web site (www.fws.gov/letsgooutside). The journey begins when you meet three children who gather in a tree house at the beginning of the school year and talk about all the fun outdoor environmental activities they did over the summer. They form a Neighborhood Explorers Club, called the NX Club, and share information about planting gardens with native plants, backyard bird watching and urban wildlife. By exploring the tree house with the cursor, children can learn about endangered species, conservation heroes and threats to the natural world. Then children can take part in a jeopardy-style trivia game that tests what they've learned. The game includes other activities such as recording nature sightings, finding a missing praying mantis in the midst of an urban neighborhood and identifying birds in a variety of habitats. Children can earn patches for completing the game and for documenting environmental projects and local wildlife in their communities, thus reinforcing the connection between the virtual and natural worlds.

O Wow! EPA Water Office Tweets

EPA's Office of Wetlands, Oceans and Watersheds (OWOW) is now posting on Twitter, an online social networking site that allows users to receive news and information in near real time. OWOW uses Twitter to share updates about water programs and important water-related information and events. To follow OWOW on Twitter, go to www.twitter.com/EPAowow.

Pond and Wetland Management Guidebooks Online

EPA just released "Stormwater Wet Pond and Wetland Management Guidebook," a new resource targeted at local government agencies. This guide, available at www.epa.gov/npdes/pubs/pondmgmtguide.pdf, provides the inspector, program manager, designer and owner with information about common stormwater pond and wetland maintenance problems and possible solutions. This guide will help communities develop an integrated stormwater management system which includes properly maintaining existing wet ponds and wetlands, exploring retrofit opportunities and implementing low impact development design principles. A series of Web-based tools supplement the guidebook and are available on the nonprofit Center for Watershed Protection's Stormwater Manager's Resource Center Web site (go to www.stormwatercenter.net, click on Program Resources, then STP Maintenance). A separate, but similar guidebook, "Maintaining Stormwater Systems: A Guidebook for Private Owners and Operators in Northern Virginia" (2007), is available online from the Northern Virginia Regional Commission at www.novaregion.org/DocumentView.aspx?DID=1675.

Report Calls Flame Retardants Concern to Coastal Ecosystems

In April 2009, the National Oceanic and Atmospheric Administration scientists issued a report stating that polybrominated diphenyl ethers (PBDEs), chemicals commonly used in commercial goods as flame retardants since the 1970s, are found in all U.S. coastal waters and the Great Lakes, with elevated levels near urban and industrial centers. Significant sources of PBDEs introduced into the environment include runoff and municipal waste incineration and sewage outflows. Other pathways include leaching from aging consumer products, land application of sewage sludge as bio-solids, industrial discharges and accidental spills. For more information, see www.noaanews.noaa.gov/stories2009/20090401_ecosystems.html.

Report Evaluates Decentralized Stormwater Controls

The Water Environmental Research Foundation (WERF) released "Decentralized Stormwater Controls for Urban Retrofit and Combined Sewer Overflow Reduction: Phase 2," a research report that evaluates strategies for incorporating decentralized controls into an infrastructure

management system. Case studies and design templates provide alternatives for adoption of decentralized controls. The research team, led by Neil Weinstein of the Low Impact Development Center, evaluates economic methods for assessing environmental costs and benefits and provides guidance for modeling decentralized controls with commonly used stormwater models. To view the report, visit www.werf.org, click on "Search Research Publications and Tools" on the top bar, and enter "03SW3a" into the project number box.

Smart Growth Guide Released

In partnership with the U.S. National Oceanic and Atmospheric Administration, Rhode Island Sea Grant, and the International City/County Management Association, EPA has released "Smart Growth for Coastal and Waterfront Communities." This interagency guide builds on existing smart growth principles to offer 10 specific development guidelines for coastal and waterfront communities. EPA and its partners hope the guide will help coastal and waterfront communities tackle threats from sea level rise, stronger hurricanes, flooding and other challenges. The new interagency guide describes tools and techniques for applying smart growth guidelines and includes case studies illustrating the guidelines in action. The guide is aimed at planners, local government officials, developers, nonprofit groups and coastal and waterfront residents, and is available for free download at http://coastalsmartgrowth.noaa.gov. For more information, see www.epa.gov/smartgrowth/sg-coastal.html.

Stream Corridor Restoration Tools Now Available Online

Over the past decade, the National Resources Conservation Service (NRCS) developed technical information about how to restore stream corridors and presented it through the National Engineering Handbook (NEH) 653, "Stream Corridor Restoration" and NEH 654, "Stream Restoration Design" (see www.nrcs.usda.gov/Technical/ENG/stream-docs.html). Following release of these documents, a team of stream restoration experts from all of the NRCS' technical centers were tasked with assembling and developing resources that will make stream restoration projects easier for people to implement. Although their efforts are still underway, a "one-stop" Web site for stream restoration is now available on the NRCS' National Design, Construction and Soil Mechanics Web site at www.ndcsmc.nrcs.usda.gov/technical/Stream. Here, users can find NRCS policy and guidance documents; useful links; publications, photographs, and drawings of various practices and treatments; workshop information and spreadsheet tools.

Study Assesses Mercury Levels in Nation's Streams

In August 2009, the USGS released the results of a study that assesses mercury contamination in fish, bed sediment and water from 291 streams across the nation. Scientists collected samples from 1998 to 2005 in streams flowing through a variety of settings, including agricultural, urban, undeveloped (forested, grassland, shrubland and wetland land cover), and mined areas. Scientists detected mercury contamination in every fish sampled in every stream. About a quarter of these fish were found to contain mercury at levels exceeding the criterion for the protection of people who consume average amounts of fish, established by the EPA. More than two-thirds of the fish exceeded the EPA level of concern for fish-eating mammals. The report, along with a press release, podcast and summary of major findings can be accessed at http://water.usgs.gov/nawqa/mercury.

Study Shows Further Evidence of Asphalt Sealcoat Dangers

New research conducted at the University of New Hampshire Stormwater Center (UNHSC) indicates that both coal tar-based and asphalt-based sealcoat may contribute to increasingly significant amounts of polyaromatic hydrocarbons entering waterways from stormwater runoff. UNHSC had a portion of the study parking lot coated with coal tar-based sealant, a portion coated with asphalt-based sealant, and left the remainder of the parking lot unsealed. The research team measured the PAH concentration in the water and sediments coming from the sealcoated and unsealed parking lot sections. Both types of sealcoat led to a surprisingly rapid increase in PAH concentrations in the initial runoff—up to 5,000 parts per billion (ppb), significantly higher than the 10 ppb

levels released from the unsealed lot, although concentrations decreased after several rainstorms. The PAH concentrations in the sediments mirrored these trends; the concentrations immediately downstream of the coal tar-sealed lot increased by nearly two orders of magnitude within the first year. For more information, see www.unh.edu/news/cj_nr/2009/apr/rz8sealcoat.cfm.

Supplemental Water Quality Standards Training Modules Released

EPA's Water Quality Standards Academy Online (www.epa.gov/waterscience/standards/academy) has posted two new supplemental topics modules for its "Basic Course: Key Concepts" online course. The first new supplemental module, "Listing Impaired Waters and Developing Total Maximum Daily Loads (TMDLs)," addresses how states and tribes identify and prioritize impaired or threatened waters, and how they develop pollutant loading analyses with a focus on meeting the water quality standards. The second module, "Monitoring and Assessment," covers the role of monitoring and assessment in the implementation of clean water programs, including reporting on the condition of the nation's waters and meeting the fishable and swimmable goals of the Clean Water Act. Both modules present text-based information across a sequence of Web pages. The module provides links to further information and resources, and offers a brief quiz at the end. To access the new modules, go to www.epa.gov/waterscience/standards/academy/supp.

Video Highlights Daylighting Project in Seoul Korea

A *New York Times* online video describing a successful effort to uncover a three-mile portion of Seoul, Korea's Cheonggyecheon stream is available for viewing online at http://video.nytimes.com/video/2009/07/16/science/1194841417596/in-seoul-an-ancient-stream-restored.html. This stream had been almost forgotten—buried under downtown roads for decades. Now, after a $384 million effort to "daylight" the stream by removing the pavement and restoring the stream channel, nature has returned to downtown Seoul. An article further describing this and other daylighting projects is available at www.nytimes.com/2009/07/17/world/asia/17daylight.html?_r=1.

Recent and Relevant Periodical Articles

Coasts Catch Fish Farming's Dirty Drift

By Dan Stober (http://news-service.stanford.edu/news/2009/february25/fish_sr-022509.html)

Printed in the February 2009 issue of *Stanford University News*, this article notes that early results from a new Stanford computer simulation based on sophisticated fluid dynamics show that the pollution from the fish farming pens will travel farther, and in higher concentrations, than had been generally assumed. Researchers are designing software to allow simulations of any site where sufficient digital mapping of the area already exists.

Freshwater Mussels Found in Cuyahoga River, Indicating Improved Water Quality

By Michael Scott
(www.cleveland.com/science/index.ssf/2009/08/freshwater_mussels_found_in_cu.html).

This article, printed in August 22, 2009 edition of Cleveland Ohio's *The Plain Dealer* newspaper, recounts the recent discovery of a living freshwater mussel in lower Cuyahoga River. The presence of the mussel indicates that water quality has improved in the Cuyahoga River – 40 years after the June 1969 river fire that gained national attention and helped to launch the modern environmental movement.

Nitrates in Groundwater

By multiple authors (www.swhydro.arizona.edu/archive/V8_N4/).

The July/August 2009 issue of *Southwest Hydrology* magazine focuses entirely on the subject of nitrates in groundwater. Nitrate, one of the most common groundwater contaminants worldwide,

leaches down to groundwater primarily from agricultural land uses and leaking sewer and septic systems. While some subsurface conditions naturally attenuate nitrate, the coarse-grained, oxygen-rich aquifers common in the southwest U.S. favor its persistence. This issue focuses on ways local governments in the southwest are tackling the problem.

Residential Car Washing

By Dan Smith and Hollie Shilley (www.stormh2o.com/september-2009/residential-car-washing.aspx).

Featured in the September 2009 issue of *Stormwater*, this article explores the challenges faced by local governments that are subject to National Pollutant Discharge Elimination System (NPDES) stormwater Phase II program regulations as they deal with the surprising amount of pollution introduced by residential car washing.

Web Sites Worth a Bookmark

EPA's New Stormwater Road-Related MS4s Web Site (www.epa.gov/npdes/stormwater/roads)

The EPA's NPDES Stormwater Program recently posted seven new Web pages focusing on stormwater runoff from roads. This new Web area is geared toward state, county and local transportation authorities that deal with transportation-specific stormwater issues. These pages include information on specific materials and practices that control stormwater; technical case studies; and links to NPDES stormwater transportation permits and Municipal Separate Storm Sewer System (MS4) stormwater programs, stormwater-related news coverage, and funding and training opportunities.

My Environment (www.epa.gov/myenvironment)

This Web site provides a wide range of federal, state and local information about environmental education. This EPA tool helps make a map of a user's community and links to data and information about water quality, water quantity, air quality, drinking water safety and toxic releases in the area. EPA designed the site to help answer questions about what is being done to protect the environment in local communities.

Nature and the Environment (www.loc.gov/teachers/classroommaterials/themes/nature)

The Library of Congress now offers a collection of resources that support education on nature and the environment. The multimedia resources include interactive tools for students, presentations, exhibitions, Webcasts, news and classroom materials for teachers. For example, teachers and students can study man-made and natural disasters, the origins of the American conservation movement, view Landsat photographs, use maps to trace the growth and unique features of the National Parks, and learn about nature writers and visual artists.

Riffle Fish (www.rifflefish.com)

Riffle Fish is an evolving "webumentary," or online documentary, about the plants, insects, mollusks, amphibians and fish that live in riffles, or areas of fast-moving water in streams with a rocky substrate. The site, developed and hosted by Ravenswood Media, provides interviews about the science of riffle ecology and the conservation efforts to preserve their biodiversity.

Web Soil Survey (http://websoilsurvey.nrcs.usda.gov)

The U.S. Department of Agriculture's Web Soil Survey site provides secure public access to the national soils information system. This site is a simple yet powerful way to access and analyze soils

data. Using an interactive map, a user first identifies a geographical area of interest. Next, the user selects the "Soil Map" tab to view or print a soil map, or selects the "Soil Data Explorer" tab to access soil data for the area and determine the suitability of the soils for a particular use. Items of interest can be saved in a report that can be added to the site's shopping cart.

Calendar

For an updated events calendar, see www.epa.gov/newsnotes/calendar.htm.

October 2009

10/27 — *Webcast: Working Together to Address the Effects of Climate Change on Water Resources*, offered by the EPA's Watershed Academy. For more information, see www.epa.gov/watershedwebcasts.

10/27–30 — *GIS Tools for Strategic Conservation Planning*, Shepherdstown, WV. For more information, see www.conservationfund.org/node/670.

10/27–31 — *North American Lake Management Society's 29th Annual International Symposium: Ensuring our Lakes' Future*, Hartford, CT. For more information, see www.nalms.org/nalmsnew/nalms.aspx?subcatid=42&Sid=3.

10/29–30 — *First Southeastern Water Trails Forum*, Chattanooga, TN. For more information, see www.southeastwaterforum.org/roundtables.

November 2009

11/2–4 — *5th Annual CASQA Stormwater Conference. Stormwater Management: Challenges and Solutions*, San Diego, CA. For more information see www.stormwaterconference.com.

11/2–6 — *Estuaries and Coasts in a Changing World*, Portland, OR. For more information, see www.sgmeet.com/cerf2009.

11/3–4 — *Securing Water for Nature and People in a Changing Climate*, Washington, DC. For more information, see www.worldwildlife.org/science/fellowships/fuller/fuller-symposium-2009.html.

11/3–5 — *2009 Mid-Atlantic Stream Restoration Conference*, Morgantown, WV. For more information, see www.canaanvi.org/canaanvi_web/events_ed.aspx?collection=cvi_workshops&id=819.

11/4–6 — *Water and Land Use in the Pacific Northwest: Integrating Communities and Watersheds Conference*, Stevenson, WA. For more information, see www.oregonwatersheds.org/events/upcomingevents/landandwaterconference.

11/5–6 — *Managing Wet Weather with Green Infrastructure Workshops*, Toledo, OH. For more information, see www.raingardeninitiative.org/infrastructure.html.

11/9–12 — *2009 American Water Resources Association Annual Water Resources Conference*, Seattle, WA. For more information, see www.awra.org/meetings/Seattle2009.

11/13–17 — *Restore America's Estuaries Conference*, Galveston, TX. For more information, see www.estuaries.org.

11/16–17 — *2009 Northeast States and Caribbean Islands Regional Water Program Private Well Symposium*, Portland, ME. For more information, see www.usawaterquality.org/nesci/2009Symposium.

11/17–19 — *WEPP Model Workshop for Watershed Assessment and Planning Applications*, Fayetteville, AR. For more information, see www.watershedconservation.org/WEPP_2009.html.

11/18 — *Webcast: Urban Watershed Forestry*, offered by the Center for Watershed Protection. For more information, see www.cwp.org/Webcasts.

December 2009

12/2–4 — *Innovations in Irrigation Conference*, San Antonio, TX. For more information, see http://irr.confex.com/irr/2009/cfp.cgi?password=t4rk3y4u.

12/7–11 — *Water Quality Standards Academy: Basic Course*, Arlington VA. For more information, see www.epa.gov/waterscience/standards/academy.

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