



# Nonpoint Source News-Notes

May 2007, #81

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



## Special Focus Issue: American Wetlands

May is American Wetlands Month



The U.S. Environmental Protection Agency (EPA) and its partners in federal, state, tribal, local, nonprofit, and private sector organizations once again celebrate May as “American Wetlands Month.” American Wetlands Month is an annual celebration of the vital importance of wetlands to the nation’s ecological, economic, and social health. It also celebrates efforts to conserve these invaluable habitats. To raise citizen awareness and inspire action, EPA and its partners are honoring the 2007 National Wetlands Award winners at a ceremony in May. The partners are also offering ideas for activities that citizens could undertake to celebrate American Wetlands Month, such as wetland restoration and clean up projects, lectures, and festivals.

**Late Breaking News** - At press time, EPA announced the release of two new online watershed tools:

- ◆ **Nonpoint Source Outreach Toolbox** ([www.epa.gov/nps/toolbox](http://www.epa.gov/nps/toolbox)), a compendium of resources to create locally-relevant watershed outreach; features a searchable catalog of 800 outreach products.
- ◆ **Watershed Plan Builder** ([www.epa.gov/owow/watershedplanning](http://www.epa.gov/owow/watershedplanning)), an interactive site to aid in developing watershed plans from many key online data resources; released as a fully functional test site.

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#### Calendar

## National Wetlands Awards Presented in May

A diverse panel of wetland experts assembled at the Environmental Law Institute in March to select the winners of the 2007 National Wetlands Awards. This year's winners hail from all regions of the country and exemplify the extraordinary commitment and innovation that is so instrumental to conserving wetlands in the Nation's communities. "These wetland champions are restoring and protecting one of America's greatest natural assets through education, conservation, and dedication," said Benjamin H. Grumbles, EPA's Assistant Administrator for Water. "Their profiles, both in courage and in stewardship, show us all how to meet the President's national goal of increasing, not simply maintaining, the quantity and quality of our wetlands."



Photo by Elinor Osborn

**A black tern feeds its chick in New York's Salmon Creek marsh.**

The 2007 awardees are: *The Brockway Family*, a family from Iowa that has enhanced and restored over 250 acres of wetlands on their land; *Jeanne Christie*, a national leader in the development of local, state, and national wetland programs; *Paul Keddy*, a wetland ecologist and professor at Southeastern Louisiana University who has developed strategic plans for scientific wetland restoration; *Jeff Nania*, who, as director of the Wisconsin Waterfowl Association, has led the restoration of thousands of acres of wetlands; *Lynda Saul*, the Wetlands Program Manager at the Montana Department of Environmental Quality who established the Montana Wetlands Council with more than 400 members state-wide; and *Alice Wellford*, a wetlands advocate and community organizer based in Richmond, Virginia. Collectively, the award winners have conserved thousands of wetland acres and have mobilized hundreds of other individuals to contribute to wetland conservation. In May, they will take a well-deserved break from their efforts to receive their awards at a ceremony on Capitol Hill.

Program co-sponsors—the EPA, the Environmental Law Institute, U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, USDA Forest Service, USDA Natural Resources Conservation Service, Federal Highway Administration, and NOAA National Marine Fisheries Service—hope that recognizing wetland leaders for their efforts will inspire others to follow their example. For more information on the National Wetlands Awards Program, the 2007 awardees, or the May awards ceremony, please contact the Environmental Law Institute at 202-939-3247 or [wetlandsawards@eli.org](mailto:wetlandsawards@eli.org). Information is also available online at [www.nationalwetlandsawards.org](http://www.nationalwetlandsawards.org).

## How Can I Celebrate American Wetlands Month?

In addition to recognizing national heroes, EPA is encouraging interested individuals and groups to plan activities and events that raise awareness and build support for protection and restoration. Celebratory activities and events that have traditionally been planned in conjunction with American Wetlands Month include recreational outdoor activities, wetland and/or stream monitoring and clean up, award ceremonies recognizing heroes, lectures, presentations, public displays, and festivals. EPA also posts American Wetlands Month information on its Web site ([www.epa.gov/owow/wetlands/awm](http://www.epa.gov/owow/wetlands/awm)) and encourages groups that are planning local, regional, or national events to provide event information. For more information about EPA's American Wetlands Month efforts,

please contact Kathleen Kutschenreuter (202-566-1383, [kutschenreuter.kathleen@epa.gov](mailto:kutschenreuter.kathleen@epa.gov)) or Gregg Serenbetz (202-566-1253, [serenbetz.gregg@epa.gov](mailto:serenbetz.gregg@epa.gov)), or call the toll-free Wetlands Helpline at 1-800-832-7828.

The Izaak Walton League of America also offers a variety of tools to help groups celebrate American Wetlands Month, including a weekly newsletter *Wetlands Sights and Sounds*. Their theme this year is "Alien Invaders: Invasive Species and Wetlands." For more information, visit their Web site at [www.iwla.org](http://www.iwla.org).

Additionally, International Migratory Bird Day (May 12, 2007) is a wonderful opportunity to celebrate and support migratory bird conservation. This year's theme is "Birds in a Changing Climate." More information on events taking place can be found at [www.birdday.org](http://www.birdday.org).



**Bald cypress trees dominate the wetland landscape in Louisiana's Atchafalaya River basin.**

Finally, American Wetlands Month is a perfect time to learn about and visit the 22 U.S. sites (covering nearly 3.2 million acres) on the Ramsar List of Wetlands of International Importance. The Ramsar Convention is an international treaty that aims to halt the worldwide loss of wetlands and to conserve those that remain. The Treaty's 154 contracting parties have designated more than 1,600 wetland sites worldwide, totaling more than 300 million acres. To learn more, go to [www.fws.gov/international/ramsar/usprofiles.htm](http://www.fws.gov/international/ramsar/usprofiles.htm) or [www.ramsar.org/wwd/7/wwd2007\\_index.htm](http://www.ramsar.org/wwd/7/wwd2007_index.htm).

## Commercial Mitigation Bank Becomes Wetlands Educational Center



The shaded area represents the Flint Creek watershed, a tributary of the Tennessee River.

North Alabama's first private wetlands mitigation bank was officially deeded to the Morgan County Commission in July 2006, and is now serving as an education center. In 1998, Robinsong Ecological Resources, Inc. purchased and began restoring 657 acres of prior-converted farmland back to hardwood bottom wetlands. Over the course of the next eight years, the company completed the restoration effort and sold wetland credits to local entities that needed them to offset wetland impacts due to construction elsewhere. This innovative effort not only allowed restoration of environmentally-degraded farmland area back into a functioning ecosystem, but it also supported the local economy and created a lasting educational resource for the community. This event marks a new chapter in Alabama's wetlands conservation effort.

Up until the early 1900s, the area making up the Flint Creek Wetland Mitigation Bank (FCWMB) was a wetland, performing valuable functions in the Flint Creek watershed. Flint Creek is one of the largest watersheds in the Wheeler Basin of North Alabama's Tennessee River. In the early 1900s, the wetland was clear-cut and drained and converted to agricultural use. Before it was altered, the wetland had helped to absorb and slow the floodwaters from Flint Creek—this had helped to protect downstream areas from flooding. The wetlands had also filtered excess nutrients, sediment, and other pollutants from floodwaters and runoff before this water reached Flint Creek. Finally, the wetlands provided habitat for a wide range of species including endangered fish and wildlife.

By the 1990s, the drained wetland area had been serving as agricultural land for close to 100 years. It was home to 1,000 head of cattle and more than 500 acres of sorghum crops. The cattle had free access to the creek, which contributed to streambank erosion and allowed direct nutrient input to Flint Creek. The fields still occasionally flooded, but the land no longer served to filter or slow floodwaters. According to Foy Kirkland, Morgan County NRCS District Conservationist, "Prior to the authorization of the wetland mitigation bank, approximately 524 acres of the farm that were managed for silage crops contributed an estimated 15 tons per acre per year of sediment to the downstream watershed." Nutrients and pathogens on the land adhered to the sediment and flowed directly into the creek.

The nonpoint source pollution flowing off of this farmland contributed to an already severe water quality problem in Flint Creek. By 1992, dissolved oxygen levels in the creek failed to meet Alabama's water quality standards for fish and aquatic life designated use. In the same year, nearby communities were affected as swimming in Flint Creek was deemed to pose health risks due to high pathogen counts. High nutrient levels forced the city of Hartselle, Alabama to abandon an intake and water treatment facility on the creek. Flint Creek's poor water quality led EPA to select the Flint Creek watershed as one of the pilot sites for U.S. EPA's now well-known Clean Water Act Section 319 Program. A description of this early 319 project is available at [www.epa.gov/nps/Section319III/AL.htm](http://www.epa.gov/nps/Section319III/AL.htm). Although largely successful, the pilot project was but a first step toward the restoration of the entire Flint Creek watershed.

### *Robinsong's Contribution*

Additional assistance for Flint Creek came in 1998, when Cynthia Robinson of Robinsong Ecological Resources, Inc. chose a 657-acre site next to Flint Creek for Alabama's first privately owned wetlands mitigation bank. The company first secured a loan to buy the property from a local farmer. Then, an agreement was reached between Robinsong and the Morgan County Commission. Robinsong committed to restore the area back to wetlands, and agreed to deed it to the county after the FCWMB wetland credits were sold. The Morgan County Commission agreed to provide perpetual care for the wetland.

Soon after completing the land purchase, Robinsong deeded four acres of the land to Morgan County to compensate the county for its offer to care for the site in perpetuity. On that four-acre site, the county built a facility to house the offices of the USDA-Natural Resources Conservation Service (NRCS), the Morgan County Soil and Water Conservation District (SWCD), and the Flint Creek Watershed Conservancy. These offices now serve as the base of operations for educational activities in the Flint Creek Mitigation Bank.

### What is a Mitigation Bank?

A mitigation bank is an instrument that allows a compromise between the need to protect local environments and the economic needs of local communities. Banks are created to allow individuals, companies, and municipalities a place to buy pre-approved credits to mitigate the impact of building projects on wetlands. Credits are issued for large-scale wetlands restoration projects (such as at Flint Creek). These projects conserve a large section of naturally occurring wetlands that can have a direct, positive impact on local ecosystems. These areas may have previously been slated for development or destruction but are preserved by the credit bank system. The larger the area, the greater the number of credits issued. Companies or municipalities wishing to expand in areas that may affect other wetlands buy credits from existing banks.

Wetlands banks are useful for a variety of reasons. From a conservation standpoint, centralized, large-scale mitigation banks are more efficiently monitored than smaller, scattered banks. These larger areas create more viable habitat for species of plants and wildlife than a number of smaller, disconnected sites. From a business standpoint, banks are useful because they reduce the wait time for wetlands credits. Projects can proceed in a matter of days instead of weeks or months. For more information about wetlands mitigation banking, see [www.epa.gov/owow/wetlands/facts/fact16.html](http://www.epa.gov/owow/wetlands/facts/fact16.html). To view the federal government's final policy guidance regarding the establishment, use, and operation of mitigation banks for the purpose of providing compensation for adverse impacts to wetlands and other aquatic resources, see [www.usace.army.mil/cw/cecwo/reg/mou/mitbankn.htm](http://www.usace.army.mil/cw/cecwo/reg/mou/mitbankn.htm).

### Overcoming a Century of Neglect

Wetland restoration at the Flint Creek site began in November 1999. The process involved both undoing previous damage to the wetlands area and installing new earthworks to mirror the previous natural landscape. First, Robinsong bulldozed the earthworks that were draining the area. More than 30 ditches were plugged and transformed into ponded areas. After the original hydrology was restored, Robinsong planted 160,000 native hardwood trees. The company also planted native grasses on the exposed soils of over-grazed pasturelands. Finally, Robinsong established riparian buffers along the streambanks.

When mitigation efforts were finally complete, Robinsong spent five years monitoring and documenting the conditions of the site's vegetation, soils, and hydrology. The Army Corps Wetland Mitigation Bank Review Team also visited the site annually to conduct random checks for monitoring accuracy. At the end of the five-year period, the Army Corps team found that the site met all performance standards and granted permission for Robinsong to sell credits.

### Rapid Recovery

During the monitoring period, Robinsong noted a number of rapid improvements in the site. First, the Soil Conditioning Index (SCI) improved dramatically, from a score of -1 before restoration to a score of +0.3 after restoration. The SCI is a soil quality prediction tool developed by the USDA NRCS to estimate whether applied conservation practices will result in maintained



The Flint Creek Mitigation Bank area prior to restoration in 1998.



The Flint Creek Mitigation Bank area in the summer of 2005, after restoration and monitoring was complete.

or increased levels of soil organic matter. The positive SCI score indicates that the soil organics matter levels are predicted to increase, which typically means improvements in soil quality.

In addition, the vegetation on the site thrived beyond initial expectations. Before and during the time that the land was farmed, natural processes had deposited some native seeds. In functioning wetlands these seeds would form each year's new growth. Without the proper growth conditions a "seed bank" had formed. After Robinsong restored the wetland hydrology, the native seeds sprouted and quickly re-colonized the land. Foy Kirkland adds, "With the land cover change to trees and grasses, a quality wildlife habitat was created and a 523-acre filter was restored. This area now contributes less than one ton of sediment per acre per year and also removes sediment and nutrients from hundreds of acres upstream."

Although monitoring has shown that restoration efforts have improved the hydrology in the FCWMB, sediment and nutrients from poorly managed agricultural areas upstream of the new wetland area continue to pollute Flint Creek itself. As a result, Flint Creek does not meet standards for dissolved oxygen, nutrients, and pathogens, and remains on Alabama's list of impaired waters. Hopefully, water quality will improve further as state, local, and federal partners in the area continue to promote nonpoint source management projects throughout the Flint Creek watershed.

### *Reaping the Rewards*

Once the Army Corps certified that the FCWMB met the five-year performance standards in 2005, all of the bank's 429 hardwood bottom wetlands credits became available. The Army Corps had determined the number of credits available at the FCWMD using a ratio method. More credits were allowed when converted cropland was restored to wetland, while fewer credits were given for land that may have already served some wetland functions prior to restoration.

To purchase credits from FCWMB, a permit holder within the same watershed had to purchase two acre/credits for each acre of proposed wetland impact. The "extra" mitigation is to compensate for the temporal loss of wetland function during that period of time when the impact happens and the function of the credit is fully realized.

FCWMB credits were sold to airports, state government, municipalities, and retail stores whose growth continues to aid the burgeoning north Alabama economy. The Alabama Department of Transportation (ADOT) was one of the major buyers—purchasing nearly half of the available credits to offset the proposed impacts of the upcoming Huntsville Bypass. All available credits were sold by July 2006.

### *Converting Wetlands to a Classroom*

Now back to its original hardwood bottomland wetland condition, the FCWMB land serves as an open-air classroom for Morgan County and surrounding communities. The Morgan Soil and Water Conservation District offers a series of hands-on wetland educational programs for people of all ages. Groups from local schools and civic organizations come to the site to learn how to monitor water quality, sample for macroinvertebrates, and plant trees and native grasses. Visitors also enjoy identifying plants and animals during "Wetlands Walks." Groups frequently help to build bluebird houses, wood duck boxes, and osprey nesting platforms to enhance the wildlife habitat in the wetland. An area that was once degraded and unhealthy now serves as a valuable tool used to educate future generations of conservationists.

The Flint Creek Wetlands Mitigation Bank is a wonderful example of how economic viability and environmental protection can be successfully balanced. The FCWMB area has once again become a functioning ecosystem that supports its native wildlife population. The wetlands credits that FCWMB provided have supported growth of local economies while preserving a part of the watershed vital to maintaining a clean and healthy water supply. Such a positive force is a valuable tool in future water quality conservation efforts and can serve as a model for others.

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## Saving Coastal Louisiana

Hurricanes Katrina and Rita unleashed cataclysmic destruction on Gulf Coast areas in 2005 and cast a renewed spotlight on Louisiana's chronically atrophying coast. In the aftermath of the hurricanes, responding to a presidential call to accelerate the study of options to prevent future catastrophes, an independent working group of scientists and engineers developed a report called *A New Framework for Planning the Future of Coastal Louisiana after the Hurricanes of 2005* (available online at [www.umces.edu/la-restore](http://www.umces.edu/la-restore)).

The report's authors confirm that a combination of levees and a sustainable coastal landscape will best protect Louisiana from hurricanes and storms. This conclusion reinforced long-standing ecosystem protection efforts in southern Louisiana. However, the authors decried the singular emphasis on ecosystem restoration in earlier coastal restoration plans. (See the *Nonpoint Source News-Notes* Issue #75 article "Looming Economic Losses Energize Louisiana's Coastal Restoration," at [www.epa.gov/NewsNotes/issue75/75issue.pdf](http://www.epa.gov/NewsNotes/issue75/75issue.pdf), for information on selected earlier plans.) To be effective, the authors of the new report said, ecosystem restoration efforts must be linked to hurricane protection and navigation needs. Only such a combination would create needed synergies for funding and integrated planning. Therefore, the report recommends implementing coastal landscape-restoration projects at strategic sites that would buffer against storm impacts. In addition, the report specifically advocates strategies for introducing sediment to build land features and nourish wetland substrates.

### *Supporting Land Barriers with Sediment*

Sediment replenishment is crucial to countering the alarming pace at which the characteristic landforms of southern Louisiana's coast—marshes, barrier islands, swamps, and underwater shallow berms—are being encroached by the sea. These physical features are the first line of defense against storms from the Gulf of Mexico. Evidence from the 2004 Indian Ocean tsunami corroborates other data that show that barrier islands and wetlands dampen storms' impacts, providing a buffer against wind and wave action and storm surges. Even underwater sediment berms and platforms help break waves, reducing their energy and their destructive potential. Vegetation, both near-shore and along the coast, provides additional frictional drag and wave attenuation.

In the aftermath of Katrina and Rita, scientists are considering bold strategies to move sediment to areas where it is needed to build up wetland areas. One strategy, using pipelines to deliver sediment, is gaining attention both for the pace of its land-restoration results and for its innovative application of old engineering techniques. In this approach, sediment is dredged from river channels or the bottom of the Gulf and is pumped through pipes (sometimes over distances) to a restoration site, where it creates new land and nourishes existing marshes. Pipeline sediment delivery is also one of the best available methods to *pinpoint* land restoration at targeted sites that may help to buffer vulnerable population centers and infrastructure.

Pipeline sediment delivery helps to put dredged sediment to beneficial use (in this case, for wetland restoration—see box). At the receiving end of a continental-scale watershed, Louisiana can benefit from the sediment that erodes from the upper Mississippi River sub-basin. EPA is actively working with the U.S. Army Corps of Engineers and other stakeholders to find beneficial uses for sediment

dredged from the lower Mississippi River and Gulf of Mexico. Kerry St. Pé, Director of Barataria-Terrebonne National Estuary Program (BTNEP) in Thibodaux, Louisiana, says that the 22 million cubic yards of silt that is currently dredged annually—for navigation alone—could be delivered by pipeline systems to southern Louisiana's eroding coastal landforms.

Three successful projects—West Bay, Port Fourchon, and the Timbalier Island Dune and Marsh Restoration Project—illustrate the promise of pipeline sediment delivery. In 2003, engineers used pipeline sediment delivery to restore marshes at West Bay. West Bay is

#### **Wetland Restoration Offers Many Watershed Benefits**

Wetland restoration exemplifies the multiple benefits of the watershed approach, emphasizes John Ettinger of EPA Region 6, Marine and Wetlands Section. He notes that it provides structural integrity for the natural ecosystem; healthy habitat; socio-economic benefits through fisheries, recreation, flood attenuation, flood storage, and land protection; and the ability to absorb pollutants, nutrients, and stormwater from urban development. For more information, see [www.epa.gov/owow/wetlands/restore](http://www.epa.gov/owow/wetlands/restore).

southeast of New Orleans, where the Mississippi River is channeled out into the Gulf. Wetlands here might help to buffer the city. However, because the river is contained for navigation, West Bay wetlands weren't being replenished by sediment deposition from the river. Eroded by periodic storms over time, they had given way to open water. To build up one fragmented marsh site, engineers cut a diversion outflow from the river toward the West Bay, and then pumped the sediment dredged from this process through pipes to the targeted restoration site. In a matter of weeks, the sediment settled into new landmass, and open water was replaced with solid land.



**As a diversion is dredged from the Mississippi River (on the right) to the West Bay, the sediment slurry is pumped through pipes to the West Bay restoration site (Photo credit: U.S. Army Corps of Engineers New Orleans District).**

The land re-vegetated naturally, as is common with many of the area's marsh creation sites, explains Andrew Barron, BTNEP Water Quality Program Coordinator. "Birds and water bring in enough seed to vegetate the mud flats." The \$22.3 million pipeline sediment delivery project jump-started the land building process. Now, the newly accreted West Bay wetlands will continue to be replenished with sediment that flows through the diversion channel during high river stages.

Another pre-2005 hurricane season project showed the potential benefits of pipeline sediment delivery. BTNEP worked with The Greater Lafourche Port Commission to build a 750-acre ridge-wetland complex north of Port Fourchon by piping in sediment dredged from the port. The sediment bolstered sandy berms and built up natural ridges and wetlands. The newly accreted areas were then planted with trees and grasses. This physical land barrier, which was completed in May 2005, helped protect Port Fourchon from Hurricane Rita.

In addition, EPA sponsored pipeline sediment delivery on the Timbalier Island Dune and Marsh Restoration Project to stabilize an eroding barrier island south of Terrebonne Bay. The project pumped 4.6 million cubic yards of sand to the island and its surrounding marshy areas from a dredging point in the Gulf of Mexico. The project added approximately 400 acres to the island, and came in \$3.5 million under budget at \$16.7 million, when it was completed in June 2005. Although the hurricanes of 2005 battered the island, in its pre-restored state the island would have fared far worse. In fact, scientists had expected the island to disappear completely by 2050. Aerial

### **Starved for Sediment: Why Louisiana's Coastal Landforms Are Disappearing**

When the Army Corps of Engineers built levees on the Mississippi River, the most important physical input for an entire coastal deltaic ecosystem—river silt—was cut off; it could no longer be delivered to the wetlands behind the levees during high-flow periods. (In its pre-engineered state, the river's alluvial silt deposition compensated for natural geologic subsidence of the coast.) In the river itself, locks and dams in the upper river system has reduced the amount of sediment reaching the lower river and available for distribution in the delta.

Louisiana's bayou country is the gateway to a wealth of energy sources and deep, straight navigation and oil-and-gas canals (lined by levees) were cut into these areas. The canals crosscut freshwater marshes and swamps, impounding wetlands and introducing saltwater from the Gulf. Additional evidence suggests that oil and gas extraction from subsurface reservoirs during the 1960s and 1970s might also have led to increased local subsidence. Other drainage canals, dug into river backswamp areas during development, have also created land subsidence. As the underlying sediment in these drained areas de-waters, it compacts, oxidizes, and lowers elevation. Without fresh sources of sediment, these drained areas remain at low elevation, easily flood, and retain floodwater. Historically, many of these backswamps have also been logged for cypress timber, leaving the sediment exposed and without stable root structures to prevent erosion.

With the hydrologic backbone of this ecosystem and its supply of sediment so physically altered, land is submerging. Once inundated, low-lying swamps degrade over time into marshland with shallow rooted vegetation. Without fresh supplies of silt, marshes disintegrate into open water—land loss by slow drowning. As the base elevation drops, the land's sea-facing margins face not only daily encroachment by open Gulf waters, but periodic battering by hurricanes and storms. Sometimes, barrier islands and sections of coastline are overpowered or displaced by single storm events. The current land loss rate in Louisiana is estimated to be at least 50 acres/day, or 24 to 35 square miles annually.

***"The current land loss rate in Louisiana is estimated to be at least 50 acres/day, or approximately 24 to 35 square miles annually."***

images of the island in its pre- and post-restoration, as well as post-2005-hurricane stages, are available on line at [www.epa.gov/region6/6wq/ecopro/em/cwppra/timbalier](http://www.epa.gov/region6/6wq/ecopro/em/cwppra/timbalier).

### *Multiple Methods to Accrete Sediment*

Federal and state agencies, researchers and scientists, and national-level scientific review panels are considering other techniques besides pipeline sediment delivery to restore wetlands and coastal areas. Each technique has varying amounts of information and analysis available, so engineering answers are inevitably open for debate. Although a patchwork of wetland restoration projects were authorized and funded under the Breaux Act, their selection and progress are often caught up in the competing economic interests of stakeholders such as cypress loggers, the shipping industry, oil and gas interests, and oyster fishermen. The long approval process for coast-saving projects at the federal level is another snag for projects from existing restoration plans.



Photo credit: Shea Penland,  
Pontchartrain Institute for Environmental Sciences

**Sediment dredged from the bottom of the Gulf is piped in to build elevation on Timbalier Island, a barrier island off Terrebonne Bay.**

Diversions that reconnect rivers with wetland areas are a hallmark technique to restore Louisiana's deltaic coast—a reversal of the levee logic that dominated river engineering in the 20<sup>th</sup> century. Diversions are cut into the Mississippi River's levees to siphon freshwater into wetlands and induce deposition of river silt. While it has been demonstrated that diversions can deliver sediment, at a gradient that decreases with distance from the diversion outlet, there are questions about the rate of sediment supply and whether running the diversions at full capacity would draw down water levels and affect navigation in the main stem of the

Mississippi River. Although diversions have proved successful in the more natural hydrology of the Atchafalaya River basin, that same approach for the Mississippi is more contentious. Economic activities and cultural land uses vested in the existing river arrangements make it difficult to change river volume or salinity gradients (which can be modified by diversions).

A large river diversion, called the Third Delta Conveyance Channel, was first proposed in 1994 and is still under consideration. It would siphon off water from the Mississippi River west of New Orleans near Donaldsonville, Louisiana, and funnel this water directly south. The channel would be split about halfway to the Gulf to send water and sediment into the Barataria and Terrebonne basins. While technically feasible for delivering sediment according to modeling studies, the drawbacks of this option include enormous costs, technical uncertainties, and political hurdles.

An October 2006 reconnaissance evaluation of the Third Delta by the Louisiana Department of Natural Resources estimated total construction costs of \$8.7 billion (a figure which doesn't include additional operational costs, lock and control structures, or flood protection levees). The average cost would be \$29 to \$31 per cubic yard of sediment.

As the Third Delta evolves it would consume large amounts of land including precious cypress-tupelo swamp; introduce freshwater to oyster and shrimp fisheries in the estuaries (historically a source of legal battles in the state), and reduce flow in the main channel of the Mississippi River. Detractors also point to its potential as a reverse funnel: an inward storm surge could flush in Gulf waters and cause flooding. Additionally, after the flow channel is initially dug, it would still take a long time to mature into a fully functioning freshwater and sediment conveyance. In fact, according to the reconnaissance evaluation, the Third Delta would take a full 60 years after construction to yield a total land gain of 59 square miles.

“Pipeline delivery of sediment could be quicker and less disruptive to existing cultural uses than large-scale diversions,” says St. Pé. “A series of high-capacity pipes can be run through existing canals, rights-of-way, under natural ridges and bayous, and directed to targeted restoration sites.” Disturbance is focused on sediment borrow sites (e.g., the Mississippi River bottom sediments located outside the navigational channel) and doesn't involve reengineering existing land settlement patterns or changing salinity gradients in the wetlands. Sediment delivery is also ideal for creating marsh, ridges, and barrier islands in parts of coastal Louisiana that do not have river diversions.



According to the reconnaissance evaluation, large-scale pipeline sediment delivery system throughout the Barataria and Terrebonne basins would cost between \$9 and \$32 billion (least to most aggressive land-building alternatives) over a 50-year time period to build a total of 159 to 418 square miles of land. (The average cost would be \$7.50 per cubic yard of sediment.)

### **Nuts and Bolts of a Sediment Pipeline**

A pipeline dredge is a specialized vessel capable of removing sediment from depths as much as 70 feet. The dredge carries a suction pipe mounted on an arm that extends into the water; the pipe is outfitted with a 32-foot-wide dustpan head (like on a vacuum cleaner) or an 8- to 9-foot diameter cutterhead—an array of blades that rotates like a drill bit. The pipe moves along the river bottom, sucking up sediment and propelling it through a pipeline.

The sediment flows because it is in slurry form (mixed with water) and because of the force from both powerful pumps on the vessel and booster pumps along the pipeline. The rate of sediment flow is adjusted according to the sediment particle size being dredged and is also modulated by pipeline pump placements.

Sediment is either piled up or sprayed into a thick layer directly onto marsh. As water in the slurry drains out, sediment settles into new landmasses. Often it must be contained while it settles. Another important aspect is that, as in nature, these new landforms are not necessarily permanent structures and work best with periodic sediment replenishment.

A variety of coastal restoration solutions are on the table; planners and stakeholders now must determine the appropriate solution, ensure that it offers multiple benefits, and most importantly, gains social and political concurrence, which is key for funding. “In this regard, time is of the essence,” says St. Pé. “This is the fastest-disappearing land mass in the world.” Re-creating land masses rapidly using sediment pipeline delivery should not only be seen as a short- and intermediate-term solution for reversing land loss. Rather, pipeline delivery could be one of the only flexible and workable strategies capable of countering the rate of land loss in southern Louisiana in a time frame that meets that area’s urgent need. For information about this and other methods of sediment replenishment along the Gulf Coast, see the following resources:

- [www.lacoast.gov/watermarks/2005-08/index.htm](http://www.lacoast.gov/watermarks/2005-08/index.htm)  
(Special Issue of Watermarks on Sediment Transport)
- <http://dnr.louisiana.gov/crm/coastalfacts.asp>  
(Louisiana Coastal Resources)
- <http://el.erdc.usace.army.mil/dots/budm/budm.cfm>  
(Beneficial uses of Dredged Material)

*[For more information, contact Andrew Barron, Water Quality Program Coordinator, Barataria-Terrebonne National Estuary Program Office, 320 Audubon Drive, North Babington Hall Room 105, Nicholls State University Campus, Thibodaux, LA 70301. Phone: 985-447-0868; E-mail: [andrew@btnep.org](mailto:andrew@btnep.org)]*

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## *Draft National Nutrient Guidance for Wetlands Available*

The U.S. Environmental Protection Agency (EPA) has prepared a draft manual to help states and tribes establish water quality criteria and standards for nutrients in their wetlands. The manual, *Draft Nutrient Criteria Technical Guidance Manual: Wetlands* (EPA-823-B-05-003), provides scientifically defensible guidance that states, tribes, and territories can use to assess the nutrient status of their wetlands. It also offers technical assistance for developing regionally-based numeric nutrient criteria for wetland systems. EPA released the manual in December 2006 for solicitation of scientific views, data, and information from the public. Although the comment period has closed, the draft manual will remain available online at [www.epa.gov/waterscience/criteria/nutrient/guidance/wetlands](http://www.epa.gov/waterscience/criteria/nutrient/guidance/wetlands) until the final manual is issued.

The development of nutrient criteria is part of an initiative by the EPA to address the problem of cultural nitrogen and phosphorus pollution (excess nutrients caused by human activities). Nitrogen and phosphorus pollution is not new; however, traditional efforts controlling nutrient pollution have been only moderately successful. Specifically, efforts to control responses to excess nitrogen and phosphorus in waterbodies that have multiple nutrient sources (point and nonpoint sources) have been less effective in providing satisfactory, timely remedies for nutrient pollution-related problems. EPA hopes that the development of numeric criteria will aid efforts to control nitrogen and phosphorus loading by providing clear numeric goals for nutrient concentrations. Furthermore, numeric nutrient criteria provide specific water quality goals that will help researchers design improved best management practices.

## What are Nutrient Criteria? How are they Developed?

Nutrient criteria are numerical values for both causative and response variables associated with preventing and assessing nitrogen and phosphorus pollution. EPA expects that states and tribes will use these criteria to help identify problem areas, serve as the basis of state water quality standards for nutrients, and evaluate success in reducing cultural eutrophication. The guidance manual describes the following elements of wetland nutrient criteria development:

- **Classification of Wetlands**—The guidance describes classification strategies for nutrient criteria development including one or more of the following: physiographic regions, hydrogeomorphic class, water depth and duration, and/or vegetation type or zone.
- **Sampling Design**—The guidance describes three sampling approaches: Probabilistic sampling, Targeted/tiered approach, and BACI (Before/After, Control/Impact).
- **Criteria Development**—The guidance presents three methods for use in developing nutrient criteria: (1) Identifying reference systems for each established wetland type and class based on either best professional judgment or percentile selections of data plotted as frequency distributions; (2) Refining classification systems, using models, and/or examining system biological attributes to assess the relationships among nutrients, vegetation or algae, soil, and other variables; and (3) Using or modifying published nutrient and vegetation, algal, and soil relationships and values as criteria.

### Report is a Part of a Series of Nutrient Criteria Documents

In 1998, EPA published a report entitled *National Strategy for the Development of Regional Nutrient Criteria*. This report outlined a framework for development of waterbody-specific technical guidance that can be used to assess nutrient status and develop region-specific numeric nutrient criteria. The *Draft Nutrient Criteria Technical Guidance Manual: Wetlands* is one in a series of documents supporting the National Nutrient Strategy. EPA has already released the companion Nutrient Criteria Technical Guidance Manuals (see [www.epa.gov/waterscience/criteria/nutrient/guidance](http://www.epa.gov/waterscience/criteria/nutrient/guidance)) for rivers and streams (2000), lakes and reservoirs (2000) and estuarine and coastal marine waters (2001).

[For more information, contact Amy Parker, USEPA, Ariel Rios Building, 1200 Pennsylvania Avenue, N.W., Mail Code: 4304T, Washington, DC 20460. Phone: 202-566-1341; E-mail: [parker.amy@epa.gov](mailto:parker.amy@epa.gov)]

### Other EPA Wetland Resources

In 2005, EPA released *National Management Measures to Protect and Restore Wetlands and Riparian Areas for the Abatement of Nonpoint Source Pollution*. This document, available at [www.epa.gov/owow/nps/wetmeasures](http://www.epa.gov/owow/nps/wetmeasures), provides technical assistance on the best available and economically achievable means to reduce pollution from surface water and groundwater. In addition, EPA has published several modules to give states and tribes “state-of-the-science” information to help them develop biological assessment methods to evaluate the ecological condition of wetlands and nutrient enrichment. The following modules (in PDF format) are either complete or in the planning stages. To download them, visit [www.epa.gov/waterscience/criteria/wetlands](http://www.epa.gov/waterscience/criteria/wetlands):

1. Introduction to Wetland Biological Assessment
2. Introduction to Wetland Nutrient Assessment  
(not yet available)
3. Study Design for Monitoring Wetlands
4. Developing Metrics and Indexes of Biological Integrity
5. Wetlands Classification
6. Volunteers and Wetland Biomonitoring
7. Developing an Invertebrate Index of Biological Integrity for Wetlands
8. Using Vegetation To Assess Environmental Conditions in Wetlands
9. Using Algae To Assess Environmental Conditions in Wetlands
10. Using Amphibians in Bioassessments of Wetlands
11. Biological Assessment Methods for Birds
12. Wetland Bioassessment Case Studies
13. Vegetation-Based Indicators of Wetland Nutrient Enrichment
14. Land-Use Characterization for Nutrient and Sediment Risk Assessment
15. Biogeochemical Indicators (not yet available)
16. Nutrient Load Estimation (not yet available)
17. Wetland Hydrology (not yet available)

## Wetlands Reduce Hormones in Hog Wastewater

An Agricultural Research Service (ARS)-led team has discovered that constructed wetlands may help reduce hormones in wastewater from hog farms. ARS, the U.S. Department of Agriculture's chief scientific research agency, has done other research on the effectiveness of constructed wetlands for the removal of nitrogen and phosphorus from agricultural runoff. This new work addresses increasing concerns that hormones from livestock waste and other sources are being discharged or are running off into waterbodies, where the hormones can disrupt the normal functions of the endocrine system in fish and other aquatic life.

In 2004 and 2005, the team studied whether constructed wetland wastewater treatment cells at a North Carolina swine facility could successfully reduce the levels of hormones found in the waste. The facility, which belongs to North Carolina Agricultural and Technical State University at Greensboro, supports a "farrow-to-finish" swine operation for 100 to 150 pigs. The team analyzed the waste for reproductive hormones—estrogens and androgens (including testosterone) and their metabolites. First, wastewater from the facility went into a manure pit, then into a series of lagoons for microbial degradation. Next, the effluent was pumped into one of four wetlands. The wetland cells use a "marsh-pond-marsh" type of construction in which both ends of a 40-meter long cell are



Two of the research facility's four wetland treatment cells are shown here.

populated by plant life such as cattails and bulrushes, and the middle is a 30-inch deep open pond. Finally, the treated water is pumped into a storage pond until it can be land applied or recycled to flush manure from the barns.

The researchers collected samples of the wastewater stream before it entered a wetland cell and then as it left the wetland cell. They analyzed the water samples for hormones, including a naturally secreted estrogen called estradiol, using liquid-chromatography mass-spectrometry analysis and an assay test called the E-screen. The E-screen assesses whether human mammary cells multiply when exposed to estrogenic compounds and is quantified relative to estradiol equivalents. These analyses revealed that the wetlands treatment reduced both estrogenic activity and estradiol by 83 to 93 percent.

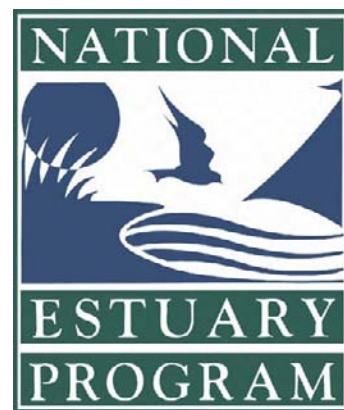
The team reported their findings in the December 2006 issue of *Environmental Science and Technology* (<http://pubs.acs.org/journals/esthag>). For a summary of the findings, see [www.ars.usda.gov/research/publications/publications.htm?SEQ\\_NO\\_115=196240](http://www.ars.usda.gov/research/publications/publications.htm?SEQ_NO_115=196240). The paper's authors include Nancy Shappell and Lloyd Billey with the ARS Biosciences Research Laboratory in Fargo, N.D.; Dean Forbes and G.P. Reddy of North Carolina Agricultural and Technical State University at Greensboro; and Terry Matheny, Matthew Poach, and Patrick Hunt at the ARS Coastal Plains Soil, Water and Plant Research Center in Florence, SC.

*[This article was adapted from a December 18, 2006 USDA Agricultural Research Service press release. For more information, see [www.ars.usda.gov/is/pr/2006/061218.htm](http://www.ars.usda.gov/is/pr/2006/061218.htm).]*

## National Estuary Program Celebrates its 20th Year

This year marks the 20th Anniversary of the U.S. Environmental Protection Agency's (EPA) National Estuary Program (NEP). The NEP is a successful community-based program designed to restore and maintain the ecological integrity of estuaries of national significance. There are 28 NEPs, each with a Director and staff, working with local stakeholders to improve the health of their estuary.

Established under the 1987 Clean Water Act Amendments, the NEP is a unique voluntary program that operates through partnerships among EPA and other federal, state, and local organizations;



industry; academia; environmental and business groups; and community residents. The NEP brings this diverse set of individuals and volunteers together to create and implement a plan with specific actions designed to improve water quality, habitat, and living resources in and surrounding the estuary.

### *How Does the NEP Protect Estuaries and Coastal Watersheds?*

The flexible and collaborative nature of the NEP has allowed the development of many innovative approaches to address problems. These approaches are uniquely tailored to local environmental conditions, and to the needs of local communities and constituencies. At the same time, the national structure provided by the NEP has facilitated the sharing of successful management approaches, technologies, and ideas.

#### **What is an Estuary?**

An estuary is a partially enclosed body of water along the coast where freshwater from rivers and streams meet and mix with salt water from the ocean. Estuaries and the lands surrounding them are places of transition from land to sea, and although influenced by the tides, they are protected from the full force of ocean waves, winds, and storms by such landforms as barrier islands or peninsulas.

Estuarine environments are among the most productive on earth, creating more organic matter each year than comparably sized areas of forest, grassland, or agricultural land. The tidal, sheltered waters of estuaries also support unique communities of plants and animals, specially adapted for life at the margin of the sea. Many different habitat types are found in and around estuaries, including shallow open waters, freshwater and salt marshes, swamps, sandy beaches, mud and sand flats, rocky shores, oyster reefs, mangrove forests, river deltas, tidal pools, and sea grasses. For more information about estuaries, see [www.epa.gov/owow/estuaries/about1.htm](http://www.epa.gov/owow/estuaries/about1.htm).

The NEPs employ available regulatory tools to address point and nonpoint source pollution, as well as innovative restoration and protection methods and techniques to address habitat loss and degradation.

Actions in each plan could include supporting improved local comprehensive planning and better building codes to protect water resources, monitoring water quality, restoring wetlands and other critical habitats, holding a workshop to inform homeowners about failing septic systems, or providing technical assistance to communities regarding stormwater management.

Each NEP works using an inclusive collaborative decision-making process to deliver on-the-ground action. This makes the NEP an important model for protection and management of coastal and non-coastal watersheds.

#### *What Has the NEP Accomplished?*

The 28 National Estuary Programs are demonstrating success in improving environmental conditions, securing and leveraging funds, and improving public education and citizen participation through outreach efforts. These results were obtained via the strong relationships NEPs have forged with a diversity of private, local, state, and federal partners. Successes include:

- **Environmental Results:** Since 2000, the NEPs have protected or restored more than one million acres of habitat through activities such as land acquisition, installation of fish passages, repair of tidegates, enhancement of shellfish beds, and removal of invasive plants. The types of habitats protected and restored include tidal wetlands, forests, meadows, and streambanks, among many others.
- **Leveraging Funds:** By developing strategic alliances, the NEPs have leveraged approximately \$16.50 for every \$1 of EPA funding. As a result, nearly \$1.11 billion through individual, private, local, state, and federal partnerships over the past few years (2003–2006) has been generated. These additional resources have been used primarily for wastewater treatment and land acquisition projects.
- **Reaching and Involving the Public:** Informing and educating the public about estuaries, and including the public in the decision-making process is a strong underpinning of the NEP and essential to the continued improvement of these vital resources. Each NEP has engaged community members through a variety of means such as: (1) public meetings to define problems and design actions, (2) hands-on involvement in volunteer water quality monitoring or restoration, and (3) “State of the Estuary” conferences to provide information on progress being made by the NEP to improve conditions in the estuary.

## Celebrating 20 Years!

A number of events will take place to celebrate the NEP's 20th Anniversary. The EPA is planning a public open house at a NEP site during the summer of 2007 (location to be determined). In addition, an EPA Watershed Academy webcast is scheduled for September 19, 2007 that will focus on the wetland protection and restoration efforts taking place in Louisiana's Barataria-Terrebonne

Estuarine Complex. In February 2007, EPA held a webcast on the NEP and implementation of Total Maximum Daily Loads at the local level. This can be viewed online at [www.epa.gov/owow/watershed/wacademy/webcasts](http://www.epa.gov/owow/watershed/wacademy/webcasts).

For the latest information on the open house and other 20th Anniversary events, see the NEP Web site at [www.epa.gov/owow/estuaries](http://www.epa.gov/owow/estuaries) or contact Nancy Laurson at 202-566-1247 ([laurson.nancy@epa.gov](mailto:laurson.nancy@epa.gov)).

### Where Can I Get More Information?

More detailed information about the NEPs' innovative approaches to watershed management during the past 20 years can be found in the 2005 NEP handbook *Community-Based Watershed Management: Lessons from the National Estuary Program* ([www.epa.gov/owow/estuaries/neprimer/handbook.htm](http://www.epa.gov/owow/estuaries/neprimer/handbook.htm)). This document explains how the 28 NEPs organize and maintain effective citizen involvement efforts, collect and analyze data, assess and prioritize problems, develop and implement management plans, and communicate results of program activities. The NEP experience outlined in this document can benefit watershed initiatives in both coastal and non-coastal areas.

### Estuaries in the National Estuary Program

The following 28 estuaries participate in the NEP. For more information about any of these, please see [www.epa.gov/owow/estuaries/find.htm](http://www.epa.gov/owow/estuaries/find.htm).

- Albemarle-Pamlico Sounds, North Carolina
- Barataria-Terrebonne Estuarine Complex, Louisiana
- Barnegat Bay, New Jersey
- Buzzards Bay, Massachusetts
- Casco Bay, Maine
- Charlotte Harbor, Florida
- Coastal Bend Bays and Estuaries, Texas
- Lower Columbia River Estuary, Oregon and Washington
- Partnership for the Delaware Estuary, Delaware, New Jersey, and Pennsylvania
- Delaware Inland Bays, Delaware
- Galveston Bay, Texas
- Indian River Lagoon, Florida
- Long Island Sound, New York and Connecticut
- Maryland Coastal Bays, Maryland
- Massachusetts Bays, Massachusetts
- Mobile Bay, Alabama
- Morro Bay, California
- Narragansett Bay, Rhode Island
- New Hampshire Estuaries, New Hampshire
- New York-New Jersey Harbor (Harbor Estuary Program), New York and New Jersey
- Peconic Bay, New York
- Puget Sound, Washington
- San Francisco Estuary, California
- San Juan Bay, Puerto Rico
- Santa Monica Bay, California
- Sarasota Bay, Florida
- Tampa Bay, Florida
- Tillamook Bay, Oregon

Please note that the Chesapeake Bay is protected under its own federally mandated program, separate but related to the National Estuary Program.

[For more information, contact Nancy Laurson, EPA Office of Wetlands, Oceans and Watersheds-NEP, 1200 Pennsylvania Avenue, NW, EPA West, Mail Code 4504T, Room 7114, Washington, DC 20460. Phone: 202-566-1247; E-mail: [laurson.nancy@epamail.epa.gov](mailto:laurson.nancy@epamail.epa.gov)]

## Notes on the National Scene

### EPA Simplifies Data Submittal and Sharing Over the Internet

The U.S. Environmental Protection Agency's (EPA) STORET program recently released the Water Quality Exchange, or WQX. This new data transfer system makes it easier for states, Indian tribes, and others to submit and share water quality monitoring data over the Internet. With WQX, groups who collect water quality data no longer need to use EPA's STORET database to submit their information to the National STORET Data Warehouse. WQX, in essence, uses new Web technology to bring data sharing into the 21st century.

Also newly available is a Web-based Watershed Summary tool designed to help water quality managers and the public use the information in the National STORET Data Warehouse. The Watershed Summary allows users to create a summary report for an individual watershed. It shows the types of data in the Warehouse for that watershed (such as metals, nutrients, or pesticides data),



### **What is the STORET Data Warehouse?**

The National STORET Data Warehouse is an operational repository being actively populated with water quality data submitted by states, tribes, universities, and others, and managed by EPA. Beginning in 1998, EPA provided the Oracle-based STORET database software, designed for personal computers, to organizations across the country to encourage their submittal of water quality monitoring data to the Warehouse.

Along with the National STORET Data Warehouse, the EPA also maintains one other archive containing water quality information for the nation's waters: the Legacy Data Center (LDC). Prior to 1998, STORET operated on a mainframe only, and the LDC serves as its static, archived repository. It contains historical water quality data dating back to the mid-20th century and collected up to the end of 1998.

The STORET Data Warehouse contains data collected beginning in 1999, along with older data that has been properly documented and migrated from the LDC. Both repositories contain raw biological, chemical, and physical data on surface and ground water collected by federal, state and local agencies, tribes, volunteer groups, academics, and others. All 50 states, territories, and jurisdictions of the U.S. are represented in these repositories.

Each sampling result in the LDC and in the STORET Data Warehouse is accompanied by information on where the sample was taken (latitude, longitude, state, county, Hydrologic Unit Code, and a brief site identification), when the sample was gathered, the medium sampled (e.g., water, sediment, fish tissue), and the name of the organization that sponsored the monitoring. In addition, the STORET Data Warehouse contains information on why the data were gathered; sampling and analytical methods used; the laboratory used to analyze the samples; the quality control checks used when sampling, handling the samples, and analyzing the data; and the personnel responsible for the data. Both the LDC and STORET Warehouse are Web-enabled and available to the public. With a standard Web browser, you can browse both systems interactively or create files to be downloaded to your computer. For more information, see [www.epa.gov/storet](http://www.epa.gov/storet).



who has entered the data, the period of record for the data, and the amount of data available. The user can then download the specific data needed for that watershed.

### *WQX and the National STORET Data Warehouse*

EPA developed the National STORET Data Warehouse to store and make available water quality data collected by federal agencies, states, tribes, watershed organizations and universities. A chief goal of the Warehouse has always been to encourage data sharing and to support national, regional, and local analyses of water quality data collected around the country. EPA will continue to maintain the Warehouse to ensure that data of documented quality are available across jurisdictional and organizational boundaries.

Until now, to upload water quality data into the Warehouse, users needed to operate the STORET database. This was cumbersome and difficult for many states and tribes. The new WQX is a data transfer framework that eases this process for chemical, physical, and fish tissue data. Data in the Web-accessible Warehouse can then be more easily shared with others across the nation. Ease of use will also encourage more states and tribes to transfer their data to the Warehouse, where it will be of value to federal, state, and local water quality managers and the public.

WQX improves the flow of data into the STORET Warehouse by using new Web technology and standard processes on the National Environmental Information Exchange Network (a partnership among states, tribes, and EPA that allows efficient and secure data sharing—see [www.exchangenetwork.net](http://www.exchangenetwork.net)). Data may be transmitted through the Exchange Network to the Warehouse from any database, once the database fields are “mapped” to the Warehouse structure. For diagrams of WQX flow and structure, see [www.epa.gov/storet/WQX\\_factsheet.pdf](http://www.epa.gov/storet/WQX_factsheet.pdf).

Compared to STORET, WQX requires a more streamlined set of data elements, yet still provides for complete reporting of water quality monitoring data of documented quality, from field measurements and observations to samples and sub-samples. EPA continues to require data owners to document the quality of the data they submit. This information is critical to states and other users who define the data quality objectives they need to support water management decisions.

### *Next Steps*

EPA is continuing to work with its partners to improve the sharing and use of water quality data. In summer 2007, EPA plans to launch new Web services that will improve accessibility to data. These Web services will allow users to incorporate data from the STORET Warehouse into their own specialized applications such as water quality modeling, data analysis, priority setting and decision making, or public information. EPA will also continue to make improvements to WQX. By spring 2008, EPA expects that WQX will be able to migrate the full range of water quality data, including biological, physical habitat, and toxicity data. Over the next three to four years, WQX will become the primary means of submitting water quality monitoring data to EPA.

*[For more information, visit [www.epa.gov/storet](http://www.epa.gov/storet) or contact the STORET team at [storet@epa.gov](mailto:storet@epa.gov).]*

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## *“Bold” EPA Vessel Surveys Coastal Waters*

A boat that once searched the ocean in the name of national security is now patrolling for pollutants and monitoring ocean conditions. In 2005, the U.S. Environmental Protection Agency (EPA) launched the Ocean Survey Vessel (OSV) *Bold*, a converted U.S. Navy Tactical Auxiliary General Ocean Survey vessel. The OSV *Bold* replaced EPA’s aging OSV *Peter W. Anderson*. Like its predecessor, the OSV *Bold* serves as a platform from which EPA scientists gather data critical to guiding the Agency’s coastal and ocean protection programs. The OSV *Bold*’s mission is to monitor and assess impacts on ocean and coastal waters from land- and ocean-based human activities and naturally occurring ecological disturbances and provide information and data to policy and decision-makers that are implementing ocean and coastal pollution control and prevention programs.



**The OSV *Bold* at sea.**

The OSV *Bold* is EPA’s only oceanic and coastal monitoring and assessment vessel. The EPA maintains another vessel, the *Lake Guardian*, which monitors the Great Lakes (see box on next page). The *Bold* is 224 feet long and 43 feet wide and has a cruising speed of 11 knots and a range of 3,000 nautical miles. The *Bold* operates in the waters of the Atlantic and Pacific Oceans, the Gulf of Mexico, and the Caribbean Sea. The ship can support a compliment of up to twenty scientists, including scientists from EPA regions, program offices, and headquarters, or other agencies that design and conduct monitoring surveys on the *Bold*. In addition to the scientific staff, the ship operates with a contractor crew of nineteen. All surveys are conducted under the supervision of an EPA certified OSV *Bold* Chief Scientist.

### *Working Aboard the OSV Bold*

EPA scientists aboard the OSV *Bold* perform a variety of functions including: surveillance in connection with the implementation of statutorily required monitoring and assessment programs, evaluation of the effects of pollution, special pollution studies, oceanographic and biological studies, data collection and laboratory analysis, and training of professional personnel. For instance, the *Bold* supports EPA divers who monitor various sensitive habitats, such as coral reefs, for evidence of pollution impacts from regulated and non-regulated sources. The OSV *Bold* also monitors for impacts from dredged material dumping, wastewater discharge, waste disposal, hazardous material spills, air deposition, and nonpoint source pollution including stormwater runoff. The *Bold*’s scientists also monitor the impacts of ecological disturbances such as red tides, algal blooms, and hypoxia.

The OSV *Bold* allows scientists to monitor and assess the effects of human activities on U.S. coastal waters through a number of avenues. The scientists collect oceanographic data using various vehicles,

including state-of-the-art sampling, mapping, and analysis equipment such as side scan sonar, underwater video, water sampling instruments, and sediment sampling devices. These devices and equipment are used to collect samples of water, sediment, and fish and other organisms. EPA also uses the *Bold* to train SCUBA divers as part of its dive program and uses small boats and equipment to support these operations for monitoring surveys.

### *Science in Action*

In 2006, the OSV *Bold* performed several surveys of the Gulf of Mexico's hypoxia zone, an area characterized by extremely low levels of dissolved oxygen that prevent survival of fish and other aquatic species. Scientists believe the hypoxia is caused by an overabundance of nutrients entering the Gulf from both point and nonpoint sources in the watershed. This nutrient overload triggers excessive algal growth, which in turn results in reduced sunlight, loss of aquatic habitat, and

a decrease in oxygen dissolved in the water. The *Bold*, in support of the Mississippi River Basin and Gulf of Mexico Hypoxia Task Force, performs the surveys to gather data to help evaluate the water quality and benthos in the Gulf, explains Kennard Potts, the *Bold's* EPA Program Manager. "The *Bold* is helping us to assess and visualize the growth of the hypoxia zone over time." Potts expects this mission to continue in 2007.

Last year the OSV *Bold* also supported efforts to assess and protect fragile coral reefs. EPA completed the first phase of a biological survey in St. Croix, U.S. Virgin Islands (USVI) to help form a long-term monitoring strategy for development of coral reef biocriteria. Using the *Bold* as a platform for operations, EPA and USVI personnel completed physical and biological measurements of 62 stations around St. Croix. Data from the biological survey are being used in a proposed Rapid Bioassessment Protocol. For more information, see [www.epa.gov/bioindicators/coral/coral\\_biocriteria.html](http://www.epa.gov/bioindicators/coral/coral_biocriteria.html).

### **Lake Guardian Surveys the Great Lakes**

The Research Vessel (R/V) *Lake Guardian* is EPA's survey vessel on the Great Lakes, performing many of the same functions as the OSV *Bold*. The R/V *Lake Guardian*, operated by the EPA's Chicago-based Great Lakes National Program Office, conducts monitoring programs that sample the water, aquatic life, sediments, and air to assess the health of the Great Lakes ecosystem. The *Lake Guardian*, at 180 feet long and 40 feet wide, is slightly smaller than the OSV *Bold*. The R/V *Lake Guardian* has been operating on the waters of the Great Lakes for the past 13 years. The ship collects data for approximately seven months each year. For more information, see [www.epa.gov/glnpo/monitoring/guard/ship.html](http://www.epa.gov/glnpo/monitoring/guard/ship.html).

### *Spreading Science through Education*

In addition to the primary monitoring and assessment objective, the OSV *Bold* also offers educational opportunities for the public. Open house events provide scientists and researchers with the opportunity to share news on issues related to ocean and coastal pollution and about state-of-the-art oceanographic monitoring techniques. The *Bold* also acts as a floating laboratory and live classroom and holds tours, open houses, demonstration surveys, and study-on-board programs for students and teachers. "The open houses have been extremely popular," adds Potts. "If the media gets the word out about the ship being available for tours, we often have hundreds of people on board learning about the ship's oceanographic capabilities and the environmental threats to the health of our oceans and coastal waters. Busloads of students from local schools arrive for tours. All of the visitors appreciate being able to speak directly to the scientists to learn about their monitoring and assessment projects."

The *Bold* has a full schedule in 2007. In early 2007, the *Bold* worked off the coast of Florida and Georgia. In April, the vessel headed to the Gulf of Mexico to study hypoxia. In May, it travels to Maryland's Baltimore Harbor and will work along the northeastern coast until the end of July. In August, the *Bold* returns to the Gulf of Mexico to perform additional hypoxia surveys. In October, the *Bold* is scheduled to leave for the Caribbean Sea, and will work there until its return to Miami at the end of December. EPA will host a number of open houses during the year, including in Florida (April), Maryland (May), and Connecticut (May), and Rhode Island (July). EPA maintains an updated travel schedule for the *Bold* on its Web site ([www.epa.gov/bold](http://www.epa.gov/bold)). Check it out to see when the *Bold* will be in a harbor near you!

*[For more information, contact Kennard Potts, USEPA, (4504T), 1200 Pennsylvania Avenue, N.W., Washington, DC 20460. Phone: 202-566-1267; E-mail: [potts.kennard@epa.gov](mailto:potts.kennard@epa.gov); Web: [www.epa.gov/bold](http://www.epa.gov/bold)]*



## National Coastal Condition Report III Available for Comment

In March 2007, EPA released the draft National Coastal Condition (NCC) Report III. The report describes the ecological and environmental conditions in U.S. coastal waters. It summarizes the condition of ecological resources in the estuaries of the United States and highlights several exemplary federal, state, tribal, and local programs that assess coastal ecological and water quality conditions. Like the first NCC report released in 2001, and the second in 2005, this report rates the overall condition of U.S. coastal waters as fair to poor, varying from region to region. It represents a coordinated effort among EPA, the National Oceanic and Atmospheric Administration, the U.S. Geological Survey, the U.S. Fish and Wildlife Service, and coastal states. The public is invited to submit comments on the report until May 8, 2007. For more information, and to download the report, see [www.epa.gov/owow/oceans/nccr3](http://www.epa.gov/owow/oceans/nccr3). EPA expects to release the final report in March 2008.

## Notes from the States, Tribes, and Localities

### Missouri Programs “Show-Me” the Good News

Some residents in the “Show-Me State” are happily showing off their newly implemented environmentally friendly landscaping. The cities of Springfield and Columbia, Missouri have both launched programs called “Show-Me Yards & Neighborhoods,” designed to raise awareness about stormwater runoff and to help residents and lawn care companies adopt environmentally responsible alternatives to traditional lawn care. Both educational programs have enjoyed great success.

These programs are local adaptations of “Florida Yards & Neighborhoods,” a program developed by the University of Florida Cooperative Extension Service in 1994 (<http://hort.ufl.edu/fyn>). A 2003 *News-Notes* article highlighted the program—see “Beautiful Yards and Clean Water—It is Possible” in *News-Notes Issue #71*, available at [www.epa.gov/NewsNotes/issue71/71issue.pdf](http://www.epa.gov/NewsNotes/issue71/71issue.pdf). The Web sites for the Missouri programs are: Springfield—[www.springfieldmogov.org/showmeyards](http://www.springfieldmogov.org/showmeyards), and Columbia—[www.gocolumbiamo.com/PublicWorks/StormWater/show\\_me\\_yards.php](http://www.gocolumbiamo.com/PublicWorks/StormWater/show_me_yards.php).

### Program Reaches Many Via Multimedia

Like the original program, Show-Me Yards & Neighborhoods (SMY&N) relies on many different public outreach avenues. SMY&N uses workshops, educational materials, Web-based information, articles in the newspaper, reports on TV, word-of-mouth, and “neighbor to neighbor” yard signs to inform and educate homeowners and lawn care companies about environmentally friendly lawn and landscape practices. Both Columbia and Springfield have developed short video segments about SMY&N principles—which are aired regularly on each city’s municipal government cable channel and are available online (Springfield: [www.springfieldmo.gov/community/smy/YardRXSeries.html](http://www.springfieldmo.gov/community/smy/YardRXSeries.html); Columbia: [www.gocolumbiamo.com/TCC/Video/video?video=39](http://www.gocolumbiamo.com/TCC/Video/video?video=39)).

The City of Springfield started its program in 2002, in response to ongoing water quality problems in local lakes and rivers. Springfield adapted the key elements from Florida’s program that would help reduce nutrient runoff from yards in Missouri. Springfield focused their efforts on reaching and educating both homeowners and lawn care professionals—those people who applied nutrients to lawns every day. Springfield staff developed a SMY&N Lawn Care Professionals Certification Program and began offering workshops and training.

“We approached lawn care companies and presented SMY&N to them as a marketing tool,” explained Barbara Lucks, Springfield’s SMY&N coordinator. “By obtaining certification, companies could show homeowners that they are committed to protecting the environment and the health of those using the lawn—including kids and pets.” The city encourages that certified companies, whenever possible, educate their customers and members in the use of environmentally sound lawn care practices. “The response was overwhelming,” added Lucks. “Both the lawn care companies and the homeowners have been happy with the program.” Lucks hopes to expand the program in the future to require additional training on an annual basis.

## Reaching Homeowners in Two Cities

By 2005, the City of Columbia, Missouri, located 170 miles to the north, had noticed the success of Springfield’s program. With Springfield’s help, Columbia was soon able to implement a program of its own. For now, Columbia is choosing to target homeowners only, but plans to expand the program to target lawn care companies in the near future.

In both cities, homeowners are invited to attend a SMY&N workshop via advertisements and direct mailing. If a Columbia, MO homeowner wishes to participate in the program but is unable to attend a workshop, he or she is directed to an online tutorial site maintained by South Carolina’s “Carolina Yards & Neighborhoods” program. South Carolina’s program, also based on the Florida Yards & Neighborhoods program, offers a comprehensive *Carolina Yards & Neighborhoods Workbook* that can either be printed out or read online at [www.clemson.edu/cyn](http://www.clemson.edu/cyn).

Once trained, the homeowner uses a “Show-Me Yardstick” to evaluate his or her yard and yard care practices. Using a scorecard (see box), the homeowner adds “inches” for each beneficial practice he or she implements (or has already implemented). A yard that measures up to at least 36 inches qualifies as a Show-Me Yard. The evaluation covers nine key categories—watering, mulching, recycling, wildlife, controlling yard pests, placing plants appropriately, fertilizing, controlling stormwater runoff, and managing landscapes along stream or rivers.

<b>Rate Your Yard!</b>	<b>Score</b>
Mow high- 3 to 4 inches or highest setting	5"
Sharpen mower blade at least once per summer	2"
Never mow more than 1/3 of the height of your lawn	2"
“Don’t Bag It”- Leave clippings on lawn. Mow over leaves in the fall.	3"
Overseed bare spots in early spring or early fall.	2"
Measure your yard (one adult pace = approximately 3 feet).	5"
Use organic herbicide/pre-emergent (such as corn gluten or 20% vinegar)	5"
Use a rain gauge to track rainfall and avoid unnecessary watering	1"
Install a rain barrel	5"
Install a rain garden	8"
Percent of yard in tree cover with no bare soil underneath (2" per 10% of yard, 10" max)	2"
Identify pests before taking action	3"
Reduce use of lawn chemicals by changing cultural practices, and apply according to directions.	5"
Have a soil test done. Apply nutrients per recommendations.	8"
Check streets & sidewalks after applying lawn products; sweep excess into lawn, not the street.	3"
Properly dispose of old lawn care products at household hazardous waste collection site.	4"
Clean up pet waste on lawns.	2"
Compost or mulch yard waste, grass clippings and/or leaf litter at home.	3"
Include native plants (1" per 10% of yard, rounding up)	1"
Mulch circles beneath trees and around beds.	3"
Replace synthetic landscape fabric with natural fiber such as newspaper.	2"
Required: Attend a Show-Me Yards workshop OR complete an online tutorial at <a href="http://www.clemson.edu/cyn/nine.html">www.clemson.edu/cyn/nine.html</a> .	6"
<b>Total</b>	

**Homeowners in Columbia, MO, use this scorecard to see if their yard qualifies as a “Show-Me Yard.” The homeowner circles all of the practices he or she implements, totals up the circled numbers, and mails the card back to the program office. Everyone who returns a card receives a free “Show-Me Yards & Neighborhoods” rain gauge. Homeowners who score at least 36 inches are awarded a “Show-Me Yard & Neighborhoods” certificate and win the opportunity to post a sign in their yard for a 2-week period.**

In the City of Columbia, homeowners are given a scorecard that they complete and submit to the city by mail. “The scorecard is a learning tool,” explains Mona Menezes, Stormwater Outreach Manager for the City of Columbia. “We don’t mind if someone doesn’t score 36 inches.” All people who submit a scorecard receive a free rain gauge, designed with a ruler on the side that indicates the proper mowing height (3 to 4 inches in Columbia). To recognize those homeowners who do score 36 inches, the City of Columbia sends them a certificate of recognition in the mail and posts a “Show-Me Yard” sign in their yard for two weeks. Each sign includes a brochure holder with written information so passersby can find out more. Springfield’s recognition programs are similar. Membership in the Springfield-Greene County “Choose Environmental Excellence” program is an extra perk for Show-Me Yards and Neighborhoods qualifiers (see [www.ci.springfield.mo.us/community/cee](http://www.ci.springfield.mo.us/community/cee) for more information about this partnership of business, government, and private citizens acting together to improve environmental awareness).

### *I See the Signs...*

The yard signs helps increase program visibility, explains Menezes. “People in the neighborhood are intrigued by the sign and come over to see what it is all about. This ‘neighbor-to-neighbor’ outreach is very successful in increasing program participation.” In fact, the program is now entering its third year, and participation in workshops continues to grow. The last workshop in 2006 attracted 100 people; the one just held in February 2007 had almost 200 participants. “This program is a wonderful tool to reach the general public about nonpoint source pollution. Our free workshop covers eight hours of instruction over three evenings. It seems like a lot of time—yet people just keep coming.”



This “Show-Me Yards & Neighborhoods” sign draws welcome attention to an environmentally friendly yard.

Although the two cities’ programs share many of the same central elements, each program is independent. Menezes sees these differences as beneficial “We are targeting different audiences in different communities; we will be able to learn from each other as our programs evolve. A big part of our success, both here and in Springfield, was in forming strong partnerships with local professionals, university extension, lawn care companies, and Clean Water Act section 319 Water Quality projects.” Menezes and Lucks hope to work with the University of Missouri’s Extension Offices and eventually expand Show-Me Yards and Neighborhoods statewide.

*[For more information, contact Mona Menezes, City of Columbia, Public Works, P.O. Box 6015, Columbia, MO 65205. Phone: 573-817-6447; E-mail: [mona.menezes@GoColumbiaMo.com](mailto:mona.menezes@GoColumbiaMo.com). You may also contact Barbara Lucks, City of Springfield, P.O. Box 8368, Springfield, MO, 65801. Phone: 417-864-2006; E-mail: [blucks@ci.springfield.mo.us](mailto:blucks@ci.springfield.mo.us)]*

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## **Notes on Education**

### *Secret Agent Worms Launch Stormwater Education Web Site in ‘007*

Once only available undercover—in books, that is—the University of Illinois’ infamous Secret Agent Worms can now be found online at [www.secretagentworms.org](http://www.secretagentworms.org). The Secret Agent Worms is an innovative soil and water educational program geared toward third through fifth graders that is being created by the university’s extension office and funded by the U.S. Environmental Protection Agency (EPA) through section 319 of the Clean Water Act. The program’s heroes are Jane Blonde (Agent 009) and her partner Napoleon Soil (Agent 001)—two zany worms who try to save the world from evil M.U.D. agents. The worms work for the top-secret, underground spy organization known as E.A.R.T.H., or Espionage Agents with Really Terrific Hair. Lessons on soil and water are weaved throughout their book-based and online adventures.

#### *A Tool for Students and Teachers Alike*

The new Web site is “loaded with flash-animated goodies—thanks to illustrator/ animator Brian Cook,” explained Doug Peterson. Peterson is not only the creator and writer for the Secret Agent

Worms, but is also a regular writer for the popular VeggieTales children's book series. "The Web site is divided into two sides—one side for teachers and the other for kids," he added. "The teachers' side of the site explains how to use the Web site in the classroom, supplies teachers with all kinds of soil and water information, and even includes the latest national and state data on soil erosion and lake and river conditions."

Teachers are invited to lead their students through the "E.A.R.T.H. Agent Training Program" to teach them the basics of soil and water. For those teachers who want to go all-out, the Web site offers Secret Agent Worm items for sale that could serve as fitting rewards: E.A.R.T.H. rub-on tattoos, E.A.R.T.H. membership cards, or Secret Agent Worm book-marks. Once the students are "trained," the teacher can lead them through the site's interactive soil and water game, "Rocket and Roll."



The "Rocket and Roll" game combines education with fun.

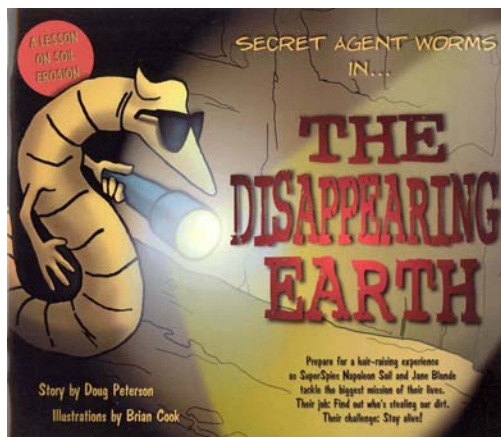
In "Rocket and Roll," kids must free Jane Blonde from the evil clutches of M.U.D. Kids are asked multiple-choice questions, drawn randomly from a pool of more than 70 questions on soil and water. For every question that the kids answer correctly, Jane Blonde moves one step closer to freeing herself. For every question that they get wrong, Agent 009 is one step closer to being blasted off into space. "With the Secret Agent Worms, we're trying to add a dose of excitement to the subject of soil and water without scrimping on the science," adds Peterson.

The kids' portion of the Web site includes E.A.R.T.H. Central, "a high-tech communications center deep underground where the Secret Agent Worms begin and end every mission." Here, kids can

access the Rocket and Roll game, view Slime Theater (coming soon), visit the Worm Store, and enter the Secret Vault. The vault is loaded with over 70 (poorly kept) "top-secret" files on five primary topic areas: soil erosion, soil health, stormwater pollution, lakes and rivers, and worms. The vault is a place where kids can click their way through fun questions and answers, such as:

- "How are erosion and stormwater pollution kind of like Austin Powers?"
- "What does it mean to "drain the rain" and "lose the ooze?"
- "What layers of soil would you pass if you tried to dig to China?"
- "What is the "water cycle," and what does it have to do with dinosaurs?"

The answer to each question is designed to both educate and keep kids interested. The answer box always includes a picture—such as a photograph showing erosion during a rainstorm—to help readers visualize the topic. The Secret Vault can also be accessed directly from the Web site's "Rocket and Roll" game if players need help answering soil and water questions.



*The Disappearing Earth* and *Beneath the City of Ooze*, Secret Agent Worms' two full-color adventure books, are designed for third through fifth grade readers.

### Back to the Books

The idea for the Web site was sparked by the success of the Secret Agent Worms' two full-color adventure books for third through fifth grade readers—*The Disappearing Earth* and *Beneath the City of Ooze*, also funded by the EPA. *The Disappearing Earth* tackles the problem of soil erosion, while *Beneath the City of Ooze* explores the polluted urban runoff that reaches lakes and rivers through storm sewers. The Secret Agent Worms program offers two curricula—soil erosion and stormwater—built around these books. Both books can be ordered online individually or as part of a teacher's packet or hands-on science kit.

[For more information, contact Doug Peterson, Communications Specialist, University of Illinois at Urbana-Champaign, Information Technology and Communications Services, 62 Mumford Hall, 1301 W Gregory Dr MC-710, Urbana, IL 61801. Phone: 217-333-9444; E-mail: [dgpeters@uiuc.edu](mailto:dgpeters@uiuc.edu); Web: [www.secretagentworms.org](http://www.secretagentworms.org)]

## **Reviews and Announcements**

### *Animation Tool Aids Visualization of NPS Pollution*

An online animation is available to help people visualize the effects of agricultural runoff in watersheds. Using U.S. Environmental Protection Agency Clean Water Act section 319 funds, the Minnesota River Basin Data Center at Minnesota State University-Mankato recently collaborated with the Minnesota Pollution Control Agency to create an educational tool called the “Interactive Hydrograph,” available at [http://mrbdc.mnsu.edu/mnbasin/mnbasin\\_overview.html](http://mrbdc.mnsu.edu/mnbasin/mnbasin_overview.html). In the interactive animation, visitors navigate their mouse along growing-season dates on a hydrograph, to see spikes of rainfall runoff along with water clarity measurements (represented by photos and transparency tube depth measurements). For each runoff event, percentage of total seasonal sediment load is also shown. With three sites—an agricultural field drain, an adjoining ditch, and a nearby river—the animation demonstrates the nuances of water quality stress due to sediment erosion from agricultural land. The collaborators used discharge and water quality data collected from a Minnesota Department of Agriculture monitoring site between March and September 2005. The animation also offers background information and project highlights.

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### *CDC Releases Waterborne Disease Report*

In December 2006, the Centers for Disease Control (CDC) released the report *Surveillance for Waterborne Disease and Outbreaks Associated with Recreational Water—United States, 2003-2004*. This report summarizes data from the Waterborne Disease and Outbreak Surveillance System, which tracks the occurrences and causes of waterborne disease and outbreaks (WBDOs) associated with recreational water. During 2003 and 2004, a total of 62 WBDOs associated with recreational water were reported by 26 states and Guam. Illness occurred in 2,698 persons, resulting in 58 hospitalizations and one death. The median outbreak size was 14 persons (range: 1 to 617 persons). To view the report, see [www.cdc.gov/mmwr/preview/mmwrhtml/ss5512a1.htm](http://www.cdc.gov/mmwr/preview/mmwrhtml/ss5512a1.htm).

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### *CWP Explores Impacts of Urbanization on Wetland Quality*

The Center for Watershed Protection (CWP) recently released *Direct and Indirect Impacts of Urbanization on Wetland Quality*, which is Article 1 of CWP’s Wetlands & Watersheds Article series ([www.cwp.org/wetlands/articles.htm](http://www.cwp.org/wetlands/articles.htm)). This article synthesizes more than 100 scientific studies on the direct and indirect impacts of urbanization on wetlands and the key role wetlands play in watershed quality.

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### *Endocrine Disruptor Forums Convened*

The Mid-Atlantic Regional Water Quality Program recently organized and conducted two forums (November 2006 and March 2007) focused on endocrine disruptors in the environment. The agenda and electronic copies of all the presentations from the forums, entitled “Endocrine Disruptors: What We Know & What We Don’t” and “The ABCs of EDCs” can be found at [www.mawaterquality.org/themes/ed.htm](http://www.mawaterquality.org/themes/ed.htm).

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### *EPA’s Ecological Benefits Assessment Strategic Plan Released*

In December 2006, the U.S. Environmental Protection Agency (EPA) released its Ecological Benefits Assessment Strategic Plan (EBASP). A collaborative effort across five different EPA offices, including its program offices for water and for solid waste, the EBASP helps answer questions such as “What benefits do people actually derive from clean air, water, and land?” EPA has traditionally been able to quantify human health benefits more easily than total ecological benefits when making regulatory decisions. The EBASP will help fill this gap by enabling the agency to more comprehensively address the full economic value of environmental protection. For more information, see <http://yosemite.epa.gov/ee/epa/eed.nsf/webpages/EcologBenefitsPlan.html>.

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## *EPA Issues Final Rule on Aquatic Pesticides*

The U.S. Environmental Protection Agency (EPA) issued a final rule clarifying two specific circumstances in which a Clean Water Act (CWA) permit is not required to apply pesticides to or around water. They are: (1) the application of a special class of pesticides directly to water in order to control pests; and (2) the application of a special class of pesticides to control pests that are present over or near water, where a portion of the pesticides will unavoidably be deposited to the water in order to target the pests. The action puts into effect a rule that confirms EPA's past operating approach that pesticides legally registered under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) for application to or near aquatic environments, and legally applied to control pests at those sites, are not subject to NPDES permit requirements. Clarifying when the CWA applies to pesticide use is critical because confusion over when a permit is required could hinder public health officials' efforts to prevent or respond to an infestation of mosquitoes that may carry the West Nile virus, or to control an invasive species that may damage valuable natural resources. For more information, see [www.epa.gov/npdes/agriculture](http://www.epa.gov/npdes/agriculture).

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## *First Annual Streamflow Summary Available*

A new U.S. Geological Survey (USGS) publication, *Streamflow of 2006—Water Year Summary*, explores changes in seasonal, regional, and national streamflow conditions over the course of 2006 and compares these to conditions recorded during the past 75 years. In 2006, some areas of the country experienced higher streamflow than usual. For example, parts of New England recorded their highest annual flows since 1930. At the same time, below normal conditions were prevalent in Texas and other states in the central and southern Great Plains, parts of the Southeast, and Alaska. Despite these regional highs and lows, USGS found that during 2006, streamflow conditions nationwide were relatively typical. The report is available online at <http://water.usgs.gov/waterwatch/2006summary>.

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## *Free Social Marketing Guide for Watershed Outreach*

A free guide for using social marketing to further watershed program goals is now available, courtesy of the Utah Department of Agriculture and Food. The book is titled *Getting Your Feet Wet with Social Marketing: A Social Marketing Guide for Watershed Programs*; it's available online as a 7.3 MB download at [www.ag.utah.gov/conservation/GettingYourFeetWet1.pdf](http://www.ag.utah.gov/conservation/GettingYourFeetWet1.pdf). The first eight chapters of this book walk the reader through the social marketing process using water examples from Utah and across the country. The final four chapters offer short case studies of successful water-related social marketing efforts. The appendices are filled with worksheets, checklists, lists of additional resources, and samples of research documents. Printed guides are available for a nominal fee through [www.lulu.com](http://www.lulu.com), a self-publishing Web site.

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## *Guide Advances Green Stormwater Management*

The Center for Neighborhood Technology recently released *Water: From Trouble to Treasure*, a pocket-sized field guide to help readers understand and advance green stormwater management, a critical component of a sustainable future. The guide gives community groups, homeowners, and others practical ways to capture raindrops where they fall that are simple, affordable, and can replace more costly conventional stormwater approaches. These green solutions include rain gardens, native vegetation, tree planting, rain barrels, and permeable pavement. The guide lays out a vision of restoring the natural ability of landscapes to manage stormwater. It offers immediate steps for groups to get started without extensive funding, expertise, or fear of adverse consequences. Green infrastructure can save homeowners, developers, and municipalities money while protecting water quality, recharging ground water supplies, and creating more enjoyable landscapes in the process. The guide may be downloaded at <http://greenvalues.cnt.org/downloads/trouble-to-treasure.pdf>.

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## *Landscape Irrigation WaterSense Label Now Available*

Just in time for the gardening season, U.S. Environmental Protection Agency (EPA) is now offering the WaterSense label for landscape irrigation. One of the first WaterSense labels has been issued to the Irrigation Association's (IA) Certified Irrigation Designer program and Certified Irrigation Contractor program. To earn the WaterSense label, IA's certification programs must test for the ability to design, install, and maintain water-efficient landscape irrigation systems, including tailoring systems to the surrounding landscape, selecting water-efficient equipment, tracking local climate conditions, and developing appropriate schedules for watering. IA's certified irrigation contractors and certified irrigation designers are now eligible to become WaterSense partners and may use the WaterSense partner logo to promote their water-efficient landscape and irrigation services to consumers. EPA is inviting professionals through these programs who share a commitment to water efficiency to become partners and help consumers save water and money while maintaining their yards. For more information, see [www.epa.gov/watersense](http://www.epa.gov/watersense).

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## *MS4 Evaluation Guide Released*

The U.S. Environmental Protection Agency (EPA) recently released its *Municipal Separate Storm Sewer System (MS4) Program Evaluation Guidance*, designed for use by NPDES authorities to evaluate the quality of Phase I and Phase II MS4 programs, for permit compliance, technical assistance, and other purposes. It can be used for comprehensive program evaluations, or for certain components. The guidance will also help MS4 program managers evaluate their own programs. The guidance is available for download at <http://cfpub.epa.gov/npdes/stormwater/munic.cfm>. EPA held a webcast on March 7, 2007 to introduce the guide. The archived webcast is available online for free at [http://cfpub2.epa.gov/npdes/outreach.cfm?program\\_id=0&otype=1](http://cfpub2.epa.gov/npdes/outreach.cfm?program_id=0&otype=1).

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## *New Invasive Species Cookbook Available*

Author Joe Franke has released *Invasive Species Cookbook: Conservation Through Gastronomy*, a cookbook featuring recipes using various plant and animal invasive species as primary ingredients. The book is available for \$24.95 from Bradford Street Press ([www.bradfordstreetpress.com](http://www.bradfordstreetpress.com)).

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## *NRI Results Released for 2003*

In January 2007, the U.S. Department of Agriculture's Natural Resources Conservation Service released state-by-state results on soil erosion, land cover, and land use for the conterminous United States from its 2003 National Resources Inventory (NRI). The NRI provides comprehensive and statistically reliable information on various natural resource conditions and trends on nonfederal lands. For more information, see [www.nrcs.usda.gov/technical/NRI](http://www.nrcs.usda.gov/technical/NRI).

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## *Number of "Dead Zones" Increasing Worldwide*

Recent scientific estimates indicate that the number of 'dead zones,' or low-oxygen areas, in the world's seas and oceans may have climbed to 200, up from an estimated 149 dead zones in 2004. Scientists believe a dead zone is caused by an overabundance of nutrients entering the waterbody, which triggers excessive algal growth, which in turn results in reduced sunlight, loss of aquatic habitat, and a decrease in oxygen dissolved in the water. Low oxygen levels in the water make it difficult for fish and other aquatic species to survive. Professor Robert Diaz at the College of William and Mary's Virginia Institute of Marine Science led the research team that developed the estimates. Diaz reported their latest findings at an international marine pollution meeting in Beijing in October 2006. For more information, see [www.unep.org/newscentre](http://www.unep.org/newscentre) and search on press releases from October 19, 2006.

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## *Primer Explores Water Quality Credit Trading in the Mid-Atlantic Region*

Water quality specialists from universities with the Mid-Atlantic Regional Water Program, anticipating a need for citizens to better understand pollution credit trading, have authored *A Primer on*

*Water Quality Credit Trading in the Mid-Atlantic Region*, a publication explaining water quality trading programs (available for free at <http://agenvpolicy.aers.psu.edu>). The pamphlet explains how dischargers may buy and sell credits that are generated by reducing pollution beyond state and federal requirements. The primer provides information needed to understand the benefits and challenges of water quality credit trading, the mechanics of a trade, and the questions that should be asked as states develop their programs.

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### *Roadside Weeds Video Available*

The U.S. Forest Service partnered with the National Forest System Invasive Species Program and others to develop a training video for road maintenance crews. This video, *Dangerous Travelers: Controlling Invasive Plants Along America's Roadways*, is designed to give road maintenance crews the basic knowledge and tools to help control invasive plants. The video outlines the best management practices that road crews should be following in their day-to-day operations, such as working with botany professionals for plant identification, developing inventory systems, mapping infestations, using mechanical removal, treating with herbicides, using weed-free products, employing maintenance techniques that reduce risk of spreading weeds, and cleaning equipment properly. *Dangerous Travelers* is the first in a new series of videos on best management practices for invasive species prevention. The video is available for viewing online at the national invasive species program Web site ([www.fs.fed.us/invasivespecies/prevention/dangeroustravelers.shtml](http://www.fs.fed.us/invasivespecies/prevention/dangeroustravelers.shtml)). A free copy of the video on DVD may be requested by contacting the USDA Forest Service, San Dimas Technology and Development Center, 444 East Bonita Avenue, San Dimas, CA 91773 (phone: 909-599-1267).

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### *Scrap Tires Found to Have Potential for Treating Stormwater*

Dr. Yuefeng Xie, associate professor of environmental engineering at Penn State Harrisburg, has developed a method that uses crumb rubber (produced by grinding waste tires) to successfully filter wastewater. Xie sees potential for using the lightweight crumb rubber filters to treat wastewater, ship ballast water, and stormwater. For more information, see "Scrap Tires Can Be Used to Filter Wastewater Penn State Researcher Shows," found on page 17 of the December 11, 2006 issue of Pennsylvania Environment Digest ([www.paenvironmentdigest.com/newsletter/docs/3/12-08-2006\\_449001.pdf](http://www.paenvironmentdigest.com/newsletter/docs/3/12-08-2006_449001.pdf)).

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### *Two New Water Quality Issue Briefs Available*

The National Association of Counties (NACo) recently released two issue briefs published with support from the U.S. Environmental Protection Agency (EPA). The first issue brief, *Using GIS Tools to Link Land Use Decisions to Water Resource Protection*, provides a list of commonly used GIS tools available to help county leaders link land use decisions to water resource protection. The brief also profiles five county case studies. The second issue brief, *Total Maximum Daily Loads (TMDLs): A Watershed Planning Tool for Counties*, provides local government staff and officials with information to help navigate the EPA's TMDL Program. TMDLs have been the impetus for many county-led or supported water quality improvement success stories, some of which are profiled in the issue brief. Both briefs are available on NACo's Web site at [www.naco.org](http://www.naco.org) (to quickly find these documents, enter the following numbers in the search box on the upper right: "21056" for the GIS brief; and "21026" for the TMDL brief).

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### *USGS Fact Sheet Explores Environmental Effects of Agriculture Practices*

The U.S. Geological Survey (USGS) recently released a fact sheet that summarizes the results of selected USGS research and monitoring projects that took place in agricultural landscapes. The fact sheet discusses the significant environmental and social issues that the USGS has found to be associated with agricultural production: changes in the hydrologic cycle; introduction of toxic chemicals, nutrients, and pathogens; reduction and alteration of wildlife habitats; and introduction of invasive species. To download a copy of the fact sheet—*Investigating the Environmental Effects of Agriculture Practices on Natural Resources: Scientific Contributions of the U.S. Geological Survey to Enhance the Management of Agricultural Landscapes*—see <http://pubs.usgs.gov/fs/2007/3001>.

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## **Recent and Relevant Periodical Articles**

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### *Clean Waters and Agriculture: We Can Have It Both Ways!*

By USDA Agricultural Research Service scientists ([www.ars.usda.gov/is/AR/archive/aug06/water0806.htm](http://www.ars.usda.gov/is/AR/archive/aug06/water0806.htm)). This article, published in the August 2006 issue of USDA's *Agricultural Research* magazine, examines a variety of techniques currently being tested for their ability to help agriculture and waterways coexist in cost-effective, environmentally friendly ways.

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### *The Economics of Conservation Subdivisions: Price Premiums, Improvement Costs, and Absorption Rates*

By Rayman Mohamed, Wayne State University ([www.clas.wayne.edu/unit-inner.asp?WebPageID=274](http://www.clas.wayne.edu/unit-inner.asp?WebPageID=274)). This article, published in *Urban Affairs Review* (41(3): 376-399), examines price premiums, investment costs, and absorption rates for lots in conservation subdivisions versus those in conventional subdivisions. The results show that lots in conservation subdivisions carry a premium, are less expensive to build, and sell more quickly than lots in conventional subdivisions. The results suggest that designs that take a holistic view of ecology, aesthetics, and sense of community can assuage concerns about higher density. However, the potential negative consequences of conservation subdivisions require further study.

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### *Keeping Weeds in Check with Less Herbicide*

By Dale Shaner and Lori Wiles ([www.ars.usda.gov/is/AR/archive/aug06/weeds0806.htm](http://www.ars.usda.gov/is/AR/archive/aug06/weeds0806.htm)). This article, published in the August 2006 issue of the USDA's *Agricultural Research* magazine, discusses site-specific weed management (SSWM), which encourages farmers to limit the amount of herbicide they apply to a field. SSWM identifies which portions of the field require herbicide treatment and targets those areas for application. The researchers discuss a new software program called WeedSite that farmers can use to help evaluate the effects of SSWM for irrigated corn cropping systems.

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### *Ready to Trade: Pennsylvania Approves Policy to Exchange Nutrients.*

By Karl Blankenship ([www.bayjournal.com/article.cfm?article=2998](http://www.bayjournal.com/article.cfm?article=2998)). Printed in the February 2007 issue of the *Bay Journal*, the newsletter of the Alliance for the Chesapeake Bay, this article describes a new nutrient trading policy issued by the Pennsylvania Department of Environmental Protection. The policy allows wastewater treatment plants to offset nutrient discharges that exceed their new permit limits by purchasing "credits" from other facilities, or farmers. This newsletter article describes how the point-to-point source and point-to-nonpoint source trades will work, and outlines the positive and negative reactions from stakeholders.

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### *Stormwater Management and Mosquito Ecology: A Systems-based Approach Toward an Integrative Management Strategy*

By John R. Wallace ([www.stormh2o.com/sw\\_0703\\_management.html](http://www.stormh2o.com/sw_0703_management.html)). This article, printed in the March/April 2007 issue of *Stormwater* magazine, explores the link between various stormwater management practices (particularly detention versus retention ponds) and the proliferation of breeding mosquito populations.

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## **Web Sites Worth a Bookmark**

### *Ecosystem Based Management Tools Network ([www.ebmtools.org](http://www.ebmtools.org))*

The Ecosystem Based Management (EBM) Tools Network Web site provides comprehensive information about coastal and marine ecosystem-based management. The Web site offers a series of tools, including a searchable online EBM tool database, training and funding opportunities, coastal and marine data sources, and meetings and conferences on EBM tools.

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## Rivermap.org ([www.rivermap.org](http://www.rivermap.org))

RiverMap.org is an online database and interactive mapping system that highlights work by organizations and individuals to improve water quality and reduce practices in the Mississippi River Basin that contribute to formation of the “dead zone” in the Gulf of Mexico. More than 40 organizations and government entities have contributed to RiverMap thus far, providing information on their efforts to address hypoxia. Organizations contribute by completing a survey on the Web site, which adds the information into the database and makes it available online.

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## Robocow: The Aquifer Connection ([www.agr.gc.ca/pfra/flash/robocow2/en/robocow2\\_e.htm](http://www.agr.gc.ca/pfra/flash/robocow2/en/robocow2_e.htm))

Robocow, the award-winning star of Agriculture and Agri-Food Canada’s educational video “Robocow: Operation H<sub>2</sub>O” is back with a sequel: “Robocow: The Aquifer Connection.” This Web site offers a new flash animation educational video in which Robocow identifies and corrects threats to groundwater through the application of source water protection management measures. To view “Robocow: Operation H<sub>2</sub>O,” visit [www.agr.gc.ca/pfra/flash/robocow/en/robocow\\_e.htm](http://www.agr.gc.ca/pfra/flash/robocow/en/robocow_e.htm).

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## Science.gov 4.0 ([www.science.gov](http://www.science.gov))

This search engine specifically targets government science information and research results. Currently in its fourth generation, Science.gov provides search of more than 50 million pages of science information with just one query, and serves as a gateway to over 1,800 scientific Web sites.

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## Surf Your Gulf Watershed ([www.epa.gov/gmpo/surfgulf/basicinfo.html](http://www.epa.gov/gmpo/surfgulf/basicinfo.html))

To facilitate access to information specifically for the Gulf of Mexico, the U.S. EPA’s Gulf of Mexico Program Office (GMPO) has created this new Web site. The primary objective for the establishment of the Surf Your Gulf Watershed Web site is to provide the most detailed and up-to-date EPA-approved impaired waterbody list for managers, project officers, grantees, and stakeholders.

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## Calendar

For an updated events list, see the News-Notes online calendar at [www.epa.gov/newsnotes](http://www.epa.gov/newsnotes).

### May 2007

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|-------|---|
| 9-11  | <i>Working Waterways and Waterfronts 2007 Symposium</i> , Norfolk, VA. For more information, see <a href="http://www.wateraccess2007.com">www.wateraccess2007.com</a> .   |
| 13-17 | <i>Coastal Sediments 07: Coastal Engineering and Science in Cascading Spatial and Temporal Scales</i> , New Orleans, LA. For more information, see <a href="http://www.asce.org/conferences/cs07">www.asce.org/conferences/cs07</a> .   |
| 15-17 | <i>EnvironDesign 2007</i> , New Orleans, LA. For more information, see <a href="http://www.environdesign.com/attendees">www.environdesign.com/attendees</a> .   |
| 15-19 | <i>World Environmental and Water Resources Congress</i> , Tampa, FL. For more information, see <a href="http://content.asce.org/conferences/ewri2007">http://content.asce.org/conferences/ewri2007</a> .  |
| 18-22 | <i>River Rally 2007</i> , Stevenson, WA. For more information, see <a href="http://www2.rivernetwork.org/rally">www2.rivernetwork.org/rally</a> .   |
| 20-23 | <i>National Scenic Byways Conference</i> , Baltimore, MD. For more information, see <a href="http://www.bywaysonline.org/center/events/conferences/2007">www.bywaysonline.org/center/events/conferences/2007</a> .  |
| 20-23 | <i>National Forum on Socioeconomic Research in Coastal Systems: Challenges of Natural Resource Economics and Policy</i> , New Orleans, LA. For more information, see <a href="http://www.cnrep.lsu.edu/pdfs/CNREP_abstracts07.pdf">www.cnrep.lsu.edu/pdfs/CNREP_abstracts07.pdf</a> . |
| 20-23 | <i>Tenth National Watershed Conference</i> , La Crosse, WI. For more information, see <a href="http://www.watershedcoalition.org">www.watershedcoalition.org</a> .  |
| 20-25 | <i>International Conference on Ecology &amp; Transportation: “Bridging the Gaps, Naturally.”</i> Little Rock, AR. For more information, see <a href="http://www.icoet.net/ICOET2007.asp">www.icoet.net/ICOET2007.asp</a> .  |
| 21-23 | <i>New England Interstate Water Pollution Control Commission’s 18<sup>th</sup> Annual Nonpoint Source Pollution Conference</i> , Newport, RI. For more information, see <a href="http://www.neiwpc.org">www.neiwpc.org</a> .  |

## June 2007

- 2-6 *Western State Workshop: Strengthening the Roles of Land Trusts and Local Governments in Protecting and Restoring Wetlands and Riparian Areas*, Park City, UT. For more information, see [www.aswm.org/calendar/lt&lg/lt&lg2.htm](http://www.aswm.org/calendar/lt&lg/lt&lg2.htm).
- 3-8 *Charting the Course: New Perspectives in Floodplain Management*, Norfolk, VA. For more information, see [www.floods.org/norfolk](http://www.floods.org/norfolk).
- 4-6 *Sixth Annual Federal Environmental Symposium*, Bethesda, MD. For more information, see [www.fedcenter.gov/calendar/conferences/symposium2007](http://www.fedcenter.gov/calendar/conferences/symposium2007).
- 5-7 *Ninth Water Information Summit (WIS-9)*, West Palm Beach, FL. For more information, see [www.waterweb.org/wis9](http://www.waterweb.org/wis9).
- 5-9 *Fifth International Symposium on Digital Earth*, Berkeley, CA. For more information, see [www.isde5.org](http://www.isde5.org).
- 10-15 *Society of Wetland Scientists International Conference: Water, Wetlands, and Wildlife—Resolving Conflicts and Restoring Habitat*, Sacramento, CA. For more information, see [www.sws.org/sacramento2007](http://www.sws.org/sacramento2007).
- 20-21 *Increasing Groundwater Storage to Meet California's Future Demand: Challenges and Solutions*, Long Beach, CA. For more information, see [www.grac.org/gwstorage.asp](http://www.grac.org/gwstorage.asp).
- 23 *Nutrient Total Maximum Daily Loads (TMDL) Development Workshop*, Bellevue, WA. For more information, see [www.wef.org/nutrient-tmdl](http://www.wef.org/nutrient-tmdl).
- 24-27 *TMDL 2007*, Bellevue, WA. For more information, see [www.wef.org/ConferencesTraining/Conferences/SpecialtyConference/TMDL2007.htm](http://www.wef.org/ConferencesTraining/Conferences/SpecialtyConference/TMDL2007.htm).
- 25-27 *Emerging Contaminants of Concern in the Environment: Issues, Investigations, and Solutions*, Vail, CO. For more information, see [www.awra.org/meetings/Vail2007](http://www.awra.org/meetings/Vail2007).

## July 2007

- 21-25 *2007 Soil and Water Conservation Society Annual Conference: Conservation Challenges in a Changing Landscape*, Tampa, FL. For more information, see [www.swcs.org](http://www.swcs.org).
- 22-26 *Coastal Zone 07*, Portland, OR. For more information, see [www.csc.noaa.gov/cz](http://www.csc.noaa.gov/cz).

## August 2007

- 1-3 *10th Annual Southeast Watershed Roundtable: Sustaining Our Water Infrastructure through Watershed-Based Approaches*, Braselton, GA. For more information, see [www.southeastwaterforum.org](http://www.southeastwaterforum.org).
- 6-9 *Third International Conference on Environmental Science and Technology*, Houston, TX. For more information, see [www.aasci.org/conference/env/2007](http://www.aasci.org/conference/env/2007).
- 13-15 *International Conference on Karst Hydrogeology and Ecosystems*, Bowling Green, KY. For more information, see <http://hoffman.wku.edu/karst2007/k2007.html>.
- 20-21 *International Association of Science and Technology for Development (IASTED) International Conference on Water Resources Management*, Honolulu, HI. For more information, see [www.iasted.org/conferences/home-578.html](http://www.iasted.org/conferences/home-578.html).
- 20-23 *StormCon'07*, Phoenix, AZ. For more information, see <http://stormcon.com/sc.html>.
- 26-30 *National Nonpoint Source Monitoring Workshop: Monitoring For Decision Making*, Austin, TX. For more information, see [www.rivers.txstate.edu/NPS07](http://www.rivers.txstate.edu/NPS07).
- 27-29 *Wetlands 2007: Watershed Strategies to Protect and Restore Wetland's Ecological and Social Services*, Williamsburg, VA. For more information, see <http://aswm.org>.
- 29-Sep 1 *2007 Regional Water Symposium—Sustainable Water, Unlimited Growth and Quality of Life: Can We Have It All?* Tucson, AZ. For more information, see [www.swhydro.arizona.edu/symposium](http://www.swhydro.arizona.edu/symposium).

### Contribute to Nonpoint Source News-Notes

Do you have an article or idea to share? Want to ask a question or need more information? Please contact NPS News-Notes, c/o Don Waye, by mail at U.S. EPA, Mail Code 4503-T, 1200 Pennsylvania Ave., NW, Washington, DC 20460, by phone at 202-566-1170, or by e-mail at [waye.don@epa.gov](mailto:waye.don@epa.gov).

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