The New England Interstate Water Pollution Control Commission Newsletter

Water Connection

Volume 18, Number 1
Winter 2002

Boott Mills South, 100 Foot of John Street, Lowell MA 01852-1124

Rain, Rain, Go Away

Nothing is more peaceful than a hard, steady rain slapping against the windowpanes, more magical than a snowstorm billowing beneath the streetlamps. But once that rain has fallen and that snow has melted, where does the water go?

Many communities have drainage systems that whisk away the water that flows from our roofs, down our driveways, and into our streets. Yet some drainage systems, hampered by old age, outmoded design, improper maintenance, and equipment failure, can be overwhelmed by the stormwater from a fierce rain or a spring melt. These drainage system failures can damage rivers, lakes, and property and can pose serious health risks.

As we enter this winter season, full of grim potential for destructive storms, this issue of Water Connection offers information on drainage system failures and what we can do to prevent them.

Connecticut ◆ Maine ◆ Massachusetts ◆ New Hampshire ◆ New York ◆ Rhode Island ◆ Vermont

NEIWPCC

Over 50 Years . . .

- Coordinating Interstate Water Quality Programs
- Training Environmental Professionals
- Providing Public Education & Outreach

New England Interstate Water Pollution Control Commission

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Who We Are

For more than 50 years, NEIWPCC has coordinated regional water pollution control programs, trained environmental professionals and raised public awareness of water quality issues in the six New England states and New York. NEIWPCC's Environmental Training Center provides training courses throughout the region to help communities meet their water pollution control goals.

Subscriptions

Subscription information for NEIWPCC publications is available by contacting us at the address above.

Water Connection

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Button Up Your Overcoat: *Protecting Our Nation's Water Bodies from Wet Weather Discharges*

"Wet weather discharges" refers collectively to discharges into water bodies and treatment facilities that result from precipitation events, such as rainfall and snowmelt. Wet weather discharges include stormwater runoff, combined sewer overflows (CSOs), and wet weather sanitary sewer overflows (SSOs). Stormwater runoff accumulates pollutants such as oil and grease, chemicals, nutrients, metals, and bacteria as it travels across land. CSOs and wet weather SSOs contain a mixture of raw sewage, industrial wastewater and stormwater, and have resulted in beach closings, shellfish bed closings, and aesthetic problems.

Stormwater discharges are generated by runoff from land and impervious areas such as paved streets, parking lots, and building rooftops during rainfall and snow events that often contain pollutants in quantities that could adversely affect water quality. The Environmental Protection Agency has recently expanded its efforts to protect waterways from polluted stormwater runoff with its Stormwater Phase II requirements (see page 6).

Combined sewer systems are sewers that are designed to collect rainwater runoff, domestic sewage, and industrial wastewater in the same pipe. Most of the time, combined sewer systems transport all of their wastewater to a sewage treatment plant, where it is treated and then discharged to a water body.

During periods of heavy rainfall or snowmelt, however, the wastewater volume in a combined sewer system can exceed the capacity of the sewer system or treatment plant. For this reason, combined sewer systems are designed to overflow occasionally and discharge excess wastewater directly to nearby streams, rivers, or other water bodies.

These overflows, called CSOs, contain not only stormwater but also untreated human and industrial waste, toxic materials, and debris. They are a major water pollution concern for the approximately 900 cities in the U.S. that have combined sewer systems.

EPA's CSO Control Policy, published April 19, 1994, is the national framework for control of CSOs. The policy provides guidance on how communities with combined sewer systems can meet Clean Water Act goals in as flexible and cost-effective a manner as possible (see page 9).

Properly designed, operated, and maintained sanitary sewer systems are meant to collect and transport all of the sewage that flows into them to a publicly owned treatment works. However, occasional unintentional discharges of raw sewage from municipal sanitary sewers occur in almost every system. These types of discharges are called SSOs.

SSOs have a variety of causes, including but not limited to severe weather, improper system operation and maintenance, and vandalism. EPA estimates that there are at least 40,000 SSOs each year. The untreated sewage from these overflows can contaminate our waters, causing serious water quality problems. It can also back-up into basements, causing property damage and threatening public health.

EPA is proposing to clarify and expand permit requirements for 19,000 municipal sanitary sewer

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NEIWPCC OFFERS EMERGING WET WEATHER ISSUES TRAINING

In response to recent Environmental Protection Agency (EPA) efforts to increase their regulatory focus on combined sewer and sanitary sewer overflows, NEIWPCC will offer courses this spring on Combined Sewer Overflow (CSO) and Sanitary Sewer Overflow (SSO) issues. The courses will cover topics such as:

- **An update of the regulatory requirements in managing stormwater discharges.**
- **A description of the Wet Weather/Combined Sewer/Sanitary Sewer/Water Pilot Project Grant Program.**
- **Guidance for developing a municipal wastewater collection system capacity management, operation, and maintenance program.**
- **A guide for developing a wet weather operating plan for a wastewater treatment plant.**

For more information on these or other courses, please contact Don Kennedy at *dkennedy@neiwpcc.org* or (978) 323-7929.

PROTECTING OUR WATER BODIES
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collection systems in order to reduce SSOs. The proposed SSO Rule will help communities improve some of the nation's most valuable infrastructure—our wastewater collection systems—by requiring facilities to develop and implement new capacity, management, operations, maintenance and public notification programs (see page 8).

Water pollution resulting from stormwater runoff, CSOs, and SSOs degrades surface waters making them unsafe for drinking, fishing, swimming, and other activities. The Stormwater Phase II rule, the CSO Control Policy, and the SSO Rule are all efforts under the National Pollutant Discharge Elimination System (NPDES) permit program being taken to protect our nation's water bodies from wet weather discharges. As authorized by the Clean Water Act, the NPDES permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. Since its introduction in 1972, the NPDES permit program is responsible for significant improvements to our nation's water quality.

Information for this article was taken from the EPA's website: **http://www.epa.gov**

Seeing I to I: *Solving Infiltration/Inflow Problems in Your Sewer Collection System*

by Mike Jennings

Sewer collection systems (sewer systems) perform the critical task of collecting sewage and other wastewater from places where people live, work, and recreate and of transporting it to the treatment facility for proper treatment and disposal. However, since these systems are hidden from view, many people do not fully appreciate the important function that the sewer system provides in protecting public health. Public awareness of sewer systems tends to increase during wet weather events when evidence of sewer system overload becomes visible.

Not all sewer systems are created equal. Many cities and towns in the U.S. have aging sewer systems that are deteriorating or in desperate need of repair. Some older communities still use brick sewers built more than a century ago. While modern systems generally handle rainwater and sewage from homes and businesses in different pipes, some older systems have "combined" sewers that carry both flows together. In communities where the systems are separated, there will generally be a stormwater drainage system and a sanitary sewer system. While sanitary systems are not specifically designed to carry stormwater, stormwater and groundwater do enter these systems.

Overflows and Back-ups

Under normal conditions, collection systems can generally deliver wastewater flows to the treatment plant without incident. During certain wet weather events (i.e., extreme storms, series of rapidly occurring storms, severe snowmelt, storm events during high groundwater conditions), expanded flows can overwhelm the collection system. As the volume of wastewater carried increases beyond the capacity of the system, "overflows" and "backups" can occur.

A sewer system overflow occurs when wastewater exits a sewer system at manholes or other structures and flows across roadways and private property. Wastewater that overflows a sewer system generally flows into natural low areas such as basements, depressed yards, wetlands, water bodies, or drainage culverts. Overflows can occur in combined systems (combined sewer overflow or CSO) and sanitary systems (sanitary sewer overflow or SSO).

Many combined systems have built-in mechanisms that act as relief points by letting excess flows leave the system upstream of the sewage treatment plant. These mechanisms divert untreated or minimally treated sewage into the nearest body of water. This serves to prevent sewage from backing-up into homes and onto area

streets, but it does so at considerable cost to local water quality.

A sewer system backup occurs when wastewater enters a building or home through the existing plumbing. Backups can occur during extreme storm events when the stormwater inflow overwhelms a sewer system causing sewer surcharging. If the elevation of wastewater in the sewer system rises high enough, backflow of wastewater into buildings may occur. Basement plumbing fixtures are particularly susceptible to backups.

Overflows and backups of wastewater are serious public health threats and cause damage to public and private property. A major factor in preventing overflows and backups in both combined and sanitary systems is the reduction of infiltration and inflow.

Infiltration and Inflow

What is infiltration? The term infiltration is used by wastewater professionals to describe the excess water that sometimes seeps, trickles, or flows into old or damaged collection systems from the surrounding soil. For example, high groundwater or water remaining in the soil after rain or snowmelt often can infiltrate into sewer pipes, manholes, and service connections that have deteriorated, cracked, sagged, or collapsed.

Some older sanitary sewers may in fact have been designed to accept infiltration in order to remove water from areas that may suffer flooding from a high groundwater table. Other failing sewer systems may provide the same function, though inadvertently. Sewer rehabilitation projects must address this potential problem, as residents are likely to blame the rehabilitation for "causing" groundwater flooding.

What is inflow? Additional unwanted water can also enter collection systems from aboveground sources. During storms or snow thaws, for example, large volumes of water may flow into systems through leaky manhole covers or illicit stormwater/wastewater connections. In addition, private residences may have roof, cellar, yard, area, or foundation drains inappropriately connected to the sewer system. Any extra water flowing into wastewater collection systems from aboveground sources, either intentionally or unintentionally, is referred to as inflow.

When collection systems are old and in disrepair, it is often very difficult to determine exactly how much of the extra wastewater in the system is the result of inflow versus infiltration. When uncertainty exists, wastewater professionals usually refer to the overall problem as "I/I." The combined I/I contribution robs the system of much needed storage and carrying capacity during wet weather events.

In extreme cases, pipes can collapse or burst causing pavement to buckle.

Along with diminished sewer capacity, I/I problems within the sewer system can cause damage to the pipes and infrastructure of the collection system. Damage can result from the pipes being forced to transport larger volumes of flow than they had been designed to handle. In extreme cases, pipes can collapse or burst causing pavement to buckle. I/I damage to sewer pipes can also allow wastewater to contaminate groundwater and drinking water sources.

There are also increased operational costs associated with treating the additional volume of wastewater resulting from I/I. Pumps and pump stations are forced to work longer and harder resulting in increased maintenance costs, increased power consumption, increased treatment chemical use, and decreased lifespan.

Finally, I/I associated overflows (CSOs and SSOs) may expose municipalities to the potential of incurring regulatory penalties. Under their CSO and SSO prohibition policies, state and federal environmental protection agencies can impose monetary fines to municipalities that fail to control overflows.

Detection, Rehabilitation, and Prevention

Collection system owners and operators have an assortment of tools they can use in order to detect I/I problems within the sewer system. These tools, often used during a sanitary sewer evaluation survey, include flow-monitoring devices, smoke tests, dye tests, and closed-circuit television inspections. Surveys are conducted in areas prone to overflows and backups or as proactive system operation and maintenance procedures.

A variety of rehabilitation options are available when areas affected by I/I within a collection system are identified. Options include, but are not limited to, excavation and replacement of the damaged components, chemical and cement grouting of the affected area, and polymer lining of damaged components. Cost and disruption of service are factors that municipalities need to consider when choosing rehabilitation options.

Residents can also help in controlling I/I. Redirecting roof drains, sump pumps, and foundation drains away from sanitary or combined sewer systems can make the greatest impact. These drainage systems should be redirected overland or towards stormwater collection systems. Conserving water at home and using low-flow plumbing devices will also help to lessen the workload of I/I affected collection systems. Finally, reducing the use of toxic chemicals in and around the home and eliminating the disposal of these chemicals to the sewer system will minimize the environmental damage associated with overflowing sewer systems.

Everything that gets poured down a household drain, dumped in a catch basin on the street, or simply tossed onto the curb will eventually get washed into the sewer system. When the system is overloaded by storm events, these materials can be discharged directly into local rivers, streams, ponds, estuaries, and wetlands. From there, the next stop for these materials may be your kitchen faucet. So dispose of materials properly and take steps to reduce the amount of flow into your collection system.

For more information on Infiltration/Inflow, please contact Mike Jennings at* mjennings@neiwpcc.org *or (978) 323-7929.

Information for this article was taken from Pipeline Spring 1999 Volume 10, No. 2 published by the National Small Flows Clearinghouse 1-800-624-8301 (www.nsfc.wvu.edu).

A Bigger Umbrella: *The New Phase II Stormwater Rule*

The U.S. Environmental Protection Agency (EPA) has expanded its stormwater program to now include smaller communities, smaller construction projects, major wastewater treatment facilities, and community vehicle maintenance practices. The new requirements, called the Stormwater Phase II rule, are the next steps in EPA's efforts to protect waterways from polluted stormwater runoff.

Since 1990, Phase I of the program has used permits issued under the National Pollutant Discharge Elimination System (NPDES) to control stormwater runoff from municipalities serving populations of 100,000 or more, construction activity disturbing five or more acres of land, and ten categories of industrial activity.

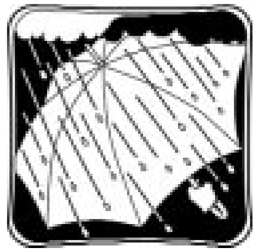
Phase II of the program, enacted in October 1999, now covers:

- Municipalities in "urbanized areas" with populations under 100,000
- Construction activity disturbing one or more acres of land
- Publicly owned wastewater treatment plants treating one million gallons per day or more
- All community vehicle maintenance practices

Phase II affects municipalities in three basic ways. In general, the deadline for obtaining permit coverage for each is March 2003. To avoid permitting, municipal "industrial" facilities must submit a Conditional No Exposure Exclusion certification by March 2003.

Small Municipal Separate Storm Sewer Systems

Under Phase II, hundreds of urbanized communities in New England with populations under 100,000, as well as institutions (such as public universities, prisons, and state highway facilities) with separate storm sewer systems, will be regulated. To comply, the regulated communities will have to develop comprehensive storm water management programs that include:



- Educating and involving the public
- Finding and removing illicit connections
- Controlling runoff from construction sites during and after construction
- Preventing stormwater pollution at municipal industrial facilities

Municipal Industrial Facilities

Municipal industrial facilities include municipal highway garages, other community vehicle maintenance practices, and wastewater treatment facilities that treat at least one million gallons per day or that have an approved pretreatment program.

All municipal industrial activities, even those located in communities not covered under Phase II as separate storm sewer systems, will need to obtain general permit coverage by March 2003 or secure an exemption. To qualify for an exemption, facilities will have to certify that their industrial operations are not exposed to stormwater. These exempted operations may include sand/salt storage and vehicle wash water.

Construction Projects

Under Phase II, the federal threshold for construction projects subject to stormwater runoff control dropped from those that disturb five acres or more to those that disturb one acre or more. This means that many more construction projects, whether performed by municipalities (e.g., road reconstruction) or contractors/developers permitted by municipalities (e.g., housing construction), will be subject to stormwater management requirements.

Outreach

Due to the large number of new parties and operations regulated, EPA New England is planning extensive outreach in partnership with the states and a variety of organizations. One such outreach effort undertaken in collaboration by EPA New England, state agencies, and other sponsors consisted of two large conferences/technology trade shows that took place on Nov 30, 2000, in Manchester, New Hampshire, and on Dec 4, 2000, in Sturbridge, Massachusetts. These conferences, which provided an overview of Phase II, attracted about 300 participants each.

Smaller, more localized events geared at different aspects of and audiences for Phase II are planned in the New England states where the stormwater program is still federally administered (Massachusetts and New Hampshire) and in other states where the environmental agencies wish to collaborate with EPA. (Entities affected by the Phase II program will have to meet the federal deadlines and requirements at a minimum, regardless of which state they operate in.)

To receive notice of future events, please email or phone one of the listed contacts. To find out more about Phase II requirements, consult the EPA Headquarters Stormwater Phase II Web site at *www.epa.gov/owm/sw/phase2.*

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The Coming Storm: *The New England States Prepares for Phase II*

by Jennifer Hunter

The Phase II Final Rule for stormwater regulates discharges from small municipal separate storm sewer systems (MS4s), construction projects affecting one to five acres, and other activities not covered by Phase I regulations. The Environmental Protection Agency (EPA) Region 1 serves as the permitting authority for the National Pollution Discharge Elimination System (NPDES) programs in Massachusetts and New Hampshire. The other New England states and New York are the permitting authorities in their respective states. All delegated states, as well as EPA, will be issuing general permits in December 2002, to which MS4s can apply for coverage. MS4s also have the option of applying for individual permits, provided they meet the minimum requirements of the program.

Implementation Challenges

Phase II implementation brings with it many challenges. Permitting authorities must identify and designate small MS4s, construction activity, and other activities to be regulated; develop any state-specific permit requirements and designation criteria beyond the minimum program requirements outlined by the federal regulations; issue, inspect, and enforce permits; and provide compliance assistance to regulated entities.

At a minimum, stormwater program permits require applicants to develop pollution reduction plans that employ six control measures: (1) public education and outreach, (2) public participation, (3) illicit discharge detection and elimination, (4) construction site runoff control, (5) post-construction stormwater management, and (6) pollution prevention and "good housekeeping" activities for municipal operations.

MS4s must have programs in place, monitoring plans enacted, and reports submitted according to a schedule outlined by federal regulations. MS4s and other entities must obtain permit coverage by March 10, 2003, and have five years to implement their approved stormwater management plans.

Getting the Word Out

Currently, states are informing affected municipalities about the program and its requirements to help them gear up for permit applications. The Massachusetts Department of Environmental Protection conducted twenty meetings across the state to provide each of the 189 regulated communities the opportunity to learn of Phase II requirements and have their questions about the program

answered. Other states and the EPA are conducting workshops and meetings to assist the construction industry and MS4s with Phase II compliance, to describe elements of a stormwater management plan, and to identify types of best management practices (BMPs) for each of the minimum control measures.

Identifying and communicating program requirements to affected entities other than municipalities and the construction industry has been more difficult. States are still in the process of identifying and establishing guidance to assist schools, military bases, prisons, highway departments,

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NEIWPCC'S STORMWATER WORKGROUP PREPARES FOR PHASE II

NEIWPCC's Stormwater Workgroup has met thrice this year to discuss Phase II stormwater implementation issues. Consisting of members from the six New England states, New York, and EPA, the workgroup provides a forum for members to exchange ideas and discuss approaches to meet the challenges of Phase II implementation.

Workgroup members share information on the current status of their programs; strategies for incorporating Phase II activities with other water quality programs; workshops and training programs for municipalities and other target groups; ideas and materials for outreach activities; and legal, financial, and regulatory updates potentially affecting stormwater programs.

Approaches towards implementation are slightly different in each state, but concerns about staff, financial resources, and time limitations are common for all programs. This makes the information exchange component of workgroup meetings even more valuable. States benefit from learning how others are implementing various program activities and about which resources are available or soon to be available.

For more information on the Stormwater Workgroup, contact Jennifer Hunter at **jhunter@neiwpcc.org** *or 978/323-7929.*

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and other state and federal facilities that must comply with program requirements.

Rhode Island is in the process of soliciting and addressing comments received on their general permit through the Public Notice process. The state is wrapping up its second Public Notice period after completing the first round last summer and making changes to the general permit based on comments received. The other states and EPA Region 1 plan to Public Notice their general permits by early summer, so they can incorporate comments and finalize permits in time for the December 2002 issuance.

EPA Efforts

EPA is providing Phase II implementation assistance through its stormwater Web site, *www.epa.gov/npdes/stormwater*. The Web site includes Phase II program fact sheets and guidance documents; menus of BMPs; measurable goals guidance for MS4s; links to related Web sites and publications; information on training and outreach efforts; case studies; permitting information; and federal rules and regulations.

EPA Region 1 has developed Virtual Technology Trade Shows through its Center for Environmental Industry and Technology. These newly developed on-line trade shows, located at *www.epa.gov/region01/steward/ceitts/*, feature the latest technologies for treating stormwater and residential wastewater. In addition to technologies, the site contains background information on stormwater and Phase II, links to other helpful resources, and information on the states' permitting programs and regulations, including links to states' Web sites for Phase II.

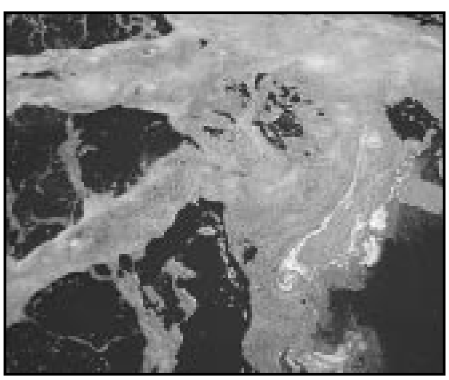
For more information on NEIWPCC's Stormwater Workgroup, contact Jennifer Hunter at* jhunter@neiwpcc.org *or (978) 323-7929.

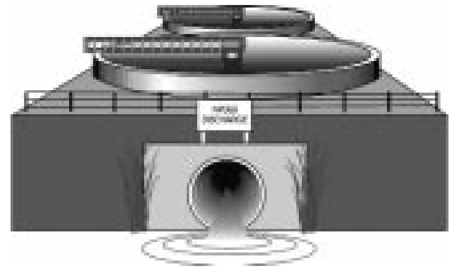
Plugging Up the Overflow:
EPA's SSO Rule

by Laura Blake

Tracy Mehan, the Assistant Administrator for the EPA Office of Water, directed the Office of Wastewater Management to move forward on the Sanitary Sewer Overflow (SSO) Notice of Proposed Rulemaking. As part of EPA's commitment to the public's right-to-know, the proposed SSO rule would require that the general public, as well as health and community officials, be notified immediately of any sewage overflow that may be threatening to public health.

The development of these rules resulted from the fact that in 1999 close to 1,500 of the nation's beach closures and health advisories were due to sewage overflows. These overflows present threats to public health and cause severe economic decline due to significant loss of tourism dollars.





A sanitary sewer overflow occurs when there is a release of sewage from a collection system, including pipes, before it reaches a municipal wastewater treatment plant. Sewer overflows are a chronic and growing problem. Many of the nation's urban sewage collection systems are aging. Some sewers are 100 years old. Many systems have not received the necessary maintenance and repair that keeps them functioning properly.

SSOs are prohibited in order to protect public health, prevent public and private property damage, and prevent damage to natural resources, such as surface waters, fish/shellfish beds, and groundwater. The goals of the proposed rule are to:

- Reduce health risks of SSOs
- Improve quality of waters in the U.S.
- Clarify what is expected of municipal collection system owners/operators
- Provide a clear mechanism for evaluating performance
- Improve oversight capability of permitting authority
- Protect infrastructure

The proposed rule focuses on overflow prevention; overflow notification; and capacity assurance, management, operations, and maintenance programs. The rule also makes room for flexibility in program implementation, which would allow site-specific responses to SSOs and activities appropriate and applicable to individual systems. EPA estimates that this rule would impose an additional total cost for all municipalities of $93.5 million to $126.5 million each year, including costs associated with both planning and permitting. A collection system serving 7,500 people would need to spend an average of $6,000 each year to comply with this rule.

Sewer overflows are a chronic and growing problem. Many of the nation's urban sewage collection systems are aging. Some sewers are 100 years old.

A range of resources is available on the EPA Office of Waste Management web page *(http://www.epa.gov/owm/)* to help municipalities and states implement the proposed SSO rule in an effective and cost-efficient manner. These resources include:

- Compliance monitoring and assistance tools
- Guidance for permit writers
- Fact sheets, case studies, and technical guidance for communities
- Educational materials and training
- Sample overflow response plans
- Model ordinances and legal authorities
- Technical research data and reference list
- SSO web page on the EPA Office of Waste Management website

For more information on the SSO rule, contact Laura Blake at **lblake@neiwpcc.org** *or (978) 323-7929.*

Watch Your Step:
Implementing the CSO Policy

by Don Kennedy

Combined sewers, remnants of the country's early infrastructure, were built to handle both sanitary and stormwater flows. During dry weather operation, combined sewers transport sanitary waste to wastewater treatment plants and receiving streams. However, during periods of heavy rainfall or snowmelt, stormwater flows into the system, causing a Combined Sewer Overflow (CSO).

Carrying toxic materials and debris, the stormwater from a CSO pollutes receiving streams and overloads treatment plant capacities. The Environmental Protection Agency (EPA) estimates that roughly 950 communities serving about 40 million people are impacted by CSOs. The majority of these communities are located in the Northeast and Great Lakes Regions.

Carrying toxic materials and debris, the stormwater from a CSO pollutes receiving streams and overloads treatment plant capacities. The EPA estimates that roughly 950 communities serving about 40 million people are impacted by CSOs.

In April 1994, the EPA issued the CSO Control Policy. The policy, included in the National Pollutant Discharge Elimination System (NPDES) framework, addresses the contribution of pollution from combined sewers.

The EPA has published several draft guidance documents to develop and implement the policy. The documents include a number of steps for the CSO community to follow that assure long-term control planning and adherence to water quality based standards. The implementation of the policy includes the regulatory and CSO community collectively drafting, reviewing, and then executing the Long Term Control Plan (LTCP).

The policy is executed in the following steps:

STEP 1. The NPDES Authority issues a permit requiring NMCs and LTCP. In order to control CSOs, the EPA requires permittees with combined sewers to sufficiently document and control these occurrences. A permit, or other enforceable mechanism, is issued that requires the CSO community to implement the Nine Minimum Controls (NMCs). The Nine Minimum Controls require:

- Proper operation and regular maintenance programs for systems with CSOs
- Maximization of collection systems for storage
- Review and modification of pretreatment requirements to minimize CSO impacts

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THE CSO POLICY *from page 9*

- Maximization of flows to publicly-owned treatment works for treatment
- Prohibition of CSOs during dry weather
- Control of solid and floatable materials in CSOs
- Pollution prevention
- Public notification of CSOs and their impacts
- Monitoring to effectively characterize CSO impacts

Additionally, the immediate development of a Long Term Control Plan is required to assure compliance with the Clean Water Act and state Water Quality Standards (WQS). They require CSO permittees to consider site-specific nature of CSOs, to evaluate the cost effectiveness of a range of control option/strategies, and to coordinate this plan with the NPDES and state authorities responsible for reviewing and revising the state's WQS.

STEP 2. The NPDES Authority forms a coordination team that oversees the LTCP process. The coordination team identifies issues, sources of information, and provides technical support. At a minimum, the team should comprise decision-making representatives from the CSO community, the State Water Director's office, the NPDES, the water quality standards authorities, and the EPA.

STEP 3. Coordination Team agrees on process and scope of LTCP. The objective of this step is to assure early agreement among team members about key milestones and scope of the LTCP

STEP 4. Community develops a draft LTCP with public involvement. The CSO community evaluates cost, constructability, performance, water quality benefits, and consideration of sensitive areas for each control scenario. Other sources of pollution are also identified which may preclude attainment of water quality standards.

STEP 5. Draft LTCP is reviewed and accepted by State and EPA, as deemed appropriate. The CSO community submits the draft LTCP to both the NPDES authority and the State Water Director. Both parties review the draft and evaluate its potential to support water quality standards. If the draft LTCP is insufficient, the NPDES authority returns the draft for revision.

STEP 6. NPDES Authority approves priority controls beyond the NMCs common to the preferred alternative approved for the community to implement. An example of a priority control would be eliminating a reoccurring CSO to a bathing area. Implementation of these controls should begin as soon as the analysis of the alternatives has been accepted.

STEP 7. The State proposes water quality standards revisions and holds a public hearing. To reach this step, the CSO community, NPDES Authority, and State Water Director have agreed that the LTCP contains adequate data and information to support selection of the CSO controls, or they have identified needed revisions to the water quality standards.

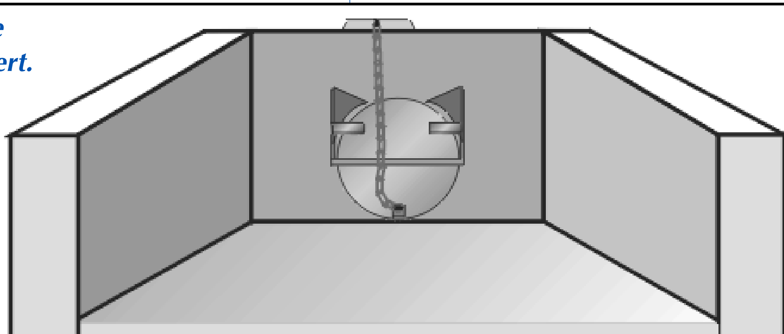
STEP 8. EPA takes final action on WQS revisions. Before the revisions can be used for Clean Water Act programs, EPA must approve a new or revised standard within 60 days or disapprove within 90 days.

STEP 9. Draft LTCP is revised, as necessary. At this point, the public hearing process and other events leading up to the draft LTCP should result in the selection of a CSO control program, or any needed revisions to the water quality standards.

STEP 10. NPDES authority accepts LTCP and revises permit. The NPDES authority coordinates the review of the revisions and, if appropriate, approves the final LTCP.

STEP 11. Approved final LTCP is implemented. The CSO community implements the control measures of the LTCP and requires these controls in its NPDES permit or other enforceable mechanism. The LTCP also contains a post-construction operational plan and a compliance-monitoring schedule to ensure compliance with the Clean Water Act.

For more information regarding the CSO Policy, please contact Don Kennedy at **dkennedy@neiwpcc.org** *or (978) 323-7929.*



CSO gate and culvert.

IS YOUR WATERSHED THREATENED BY CSOS?

There are 900 communities across the United States with combined sewer systems. Combined sewer overflows can present water pollution concerns for these communities. To find out which communities operate combined sewer systems, view the EPA's list of such communities at ***www.epa.gov/npdes/pubs/cso_cities.pdf.*** To view the EPA's CSO Control Policy, visit ***www.epa.gov/npdes/regulations/csopd.htm.***

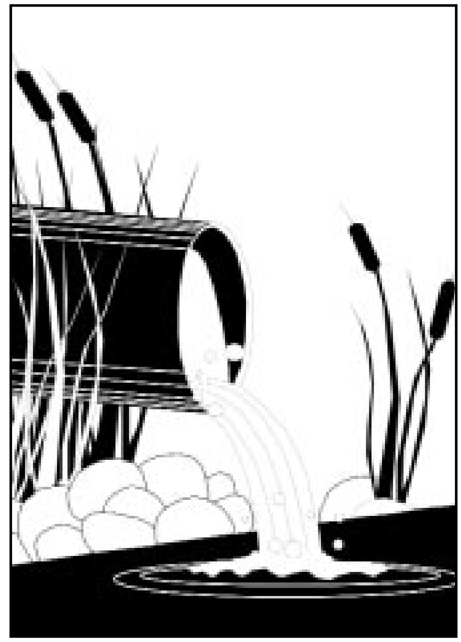
To Serve and Protect: *Using Wetlands for Stormwater Treatment*

by Beth Card

Last April at a New England Interstate Water Pollution Control Commission (NEIWPCC) Wetlands Workgroup meeting, the participating states conducted a hearty question and answer session regarding the use of wetlands as a stormwater detention basin. During the discussion, two Environmental Protection Agency (EPA) documents were suggested as a reference: "Protecting Natural Wetlands: A Guide to Stormwater BMPs" and "Natural Wetlands and Urban Stormwater: Potential Impacts and Management."

As wetlands have a natural water quality improvement function, there has been a tremendous amount of interest in using wetlands to treat runoff from urban areas, agricultural lands, and other pollutant sources. While wetlands do provide valuable water quality protection for downstream rivers, lakes, and estuaries, the quality of the wetlands themselves should also be protected, per the Clean Water Act.

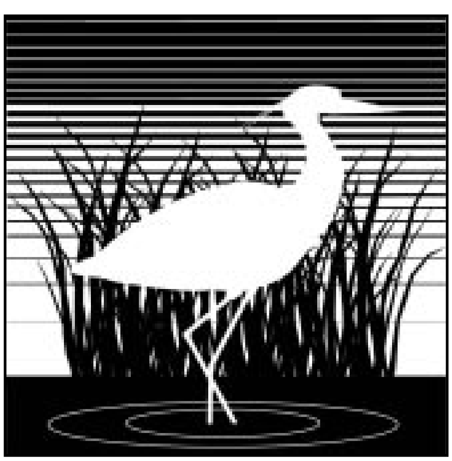
Even so, this does not mean that wetlands should never be used for stormwater treatment. During the past few decades, the planned use of wetlands for meeting wastewater treatment and water quality objectives has been seriously studied and implemented in a controlled manner. The functional role wetlands serve in improving water quality has been a compelling argument for the preservation of natural wetlands and, in recent years, the construction of wetlands systems for wastewater treatment.



Using constructed wetlands to treat stormwater is likely to become a much more common practice as there is an elevated need for reducing non-point source pollutant loadings to achieve compliance with National Pollutant Discharge Elimination System Phase II, as well as with the total maximum daily load regulations. According to EPA, "Constructed wetlands treatment systems are engineered systems that have been designed and constructed to utilize the natural processes involving wetland vegetation, soils, and their associated microbial assemblages to assist in treating wastewater. They are designed to take advantage of many of the same processes that occur in natural wetlands, but do so within a more controlled environment."

With this heightened reliance on natural and constructed wetlands, states all over the U.S. will be responsible for regulating and coordinating wetlands and stormwater programs. Many communities have begun to reassess their management strategies for stormwater as a result of the establishment of the Phase II stormwater permits.

For example, the New Hampshire Department of Environmental Services has draft mitigation rules in place that address the use of constructed wetlands for treatment. The Connecticut Department of Environmental Protection (CT DEP) has funded monitoring of several Best Management Practices around the state, including four stormwater treatment systems, and a combined wet pond/wetland system at Lake Whitney in Hamden. While monitoring has not yet been completed on the stormwater systems, the Lake Whitney demonstration project proved very successful at removing pollutants from an approximately twenty-acre residential area. As a result, CT DEP is promoting the use of similar systems around the state and expects similar results.

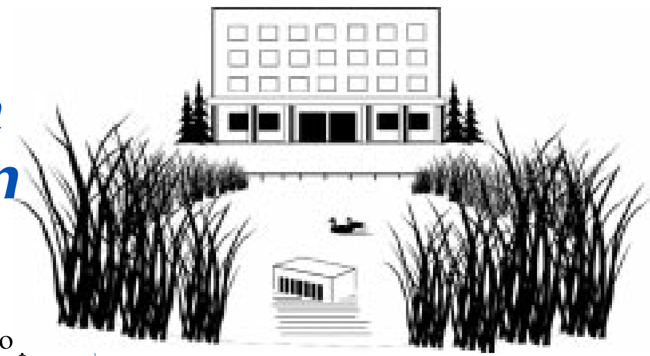


Although wetlands have improved the quality of polluted water that flows through them, it is crucial to remember that most wetlands cannot withstand the long-term discharge of contaminated stormwater without suffering negative impacts to their integrity and the valuable functions that they provide. Through the Wetlands Workgroup, NEIWPCC will continue to follow new trends in the use of wetlands to treat stormwater, while at the same time promoting the necessity of wetlands conservation.

For more information on the Wetlands Workgroup, contact Beth Card at* bcard@neiwpcc.org *or 978/323-7929.

Getting the Ammonia Out!

A Pilot Project to Assess Ammonia Reduction in a Wastewater Lagoon



by Wes Ripple, NH DES Wastewater Operations Specialist, and Tom Groves, NEIWPCC

Aerated lagoon systems for wastewater treatment are commonly used in rural states where land is plentiful and population densities are low. In New Hampshire, for example, about one-third of the facilities that treat sewage and other wastewater use lagoon-based systems. This pilot project describes the efforts of a New Hampshire Department of Environmental Services (NH DES) research project in Exeter that holds nationwide implications for small communities facing similar situations.

Getting The Ammonia Out

In recent years, many lagoon systems have been required to remove ammonia from their treated effluent. Ammonia, a form of nitrogen, is a common component of wastewater resulting from the biological decomposition of organic matter. Ammonia can be toxic to aquatic life when it is discharged into small receiving streams with low dilution. To meet a federal ammonia removal requirement, the degree of treatment must increase substantially. Unfortunately, lagoon systems are not designed to accomplish this task. Lagoons are passive in nature and provide adequate treatment of the wastewater, but generally do not offer advanced treatment of the effluent.

Ammonia can be removed biologically through a process known as nitrification. This process encourages the growth of specialized nitrifying bacteria that convert ammonia to a more stable and non-toxic form of nitrogen called nitrate. Nitrifying bacteria are present in wastewater. However, these "good" bacteria usually do not accumulate enough in aerated lagoons because they tend to through the lagoons and go out with the treated effluent. Moreover, it is very expense to convert a lagoon to another treatment system that retains nitrifying bacteria and allows the bacteria population to build, such as an activated sludge system. The City of Rochester recently completed an upgrade of its lagoon system at a cost of $16 million. While this effort is commendable, it is not an affordable option for many smaller communities.

How Do We Build A Better, Cheaper Mousetrap?

A two-year DES research project at the Exeter wastewater treatment lagoons, partially funded by the New England Interstate Water Pollution Control Commission (NEIWPCC) through a Municipal Wastewater Pollution Prevention (MWPP) Grant from EPA Region 1, was designed to evaluate the feasibility of using a fixed film artificial media to retain and enhance the growth of nitrifying bacteria. Commonly called a biological holdfast system, the media provides a large amount of surface area to which the nitrifying bacteria can attach. Provided with the right conditions, the bacteria reproduce in such numbers that they will be able to remove most of the ammonia in the wastewater. Once they grow and attach to the media, they will stay in the wastewater stream and not wash away and be lost with the rest of the effluent.

So What's All This Media Hype?

NH DES is evaluating two types of media in this research project to determine their results in warm and cold weather. A small test module (4,000 gallon tank split into two side-by-side compartments of 2,000 gallons) is being used. The test module takes a feed of approximately 2,000 gallons per day (gpd) of wastewater in the winter and 17,000 gpd of wastewater in the summer from the final lagoon and runs it through above ground media module tanks. The wastewater needs a longer detention time (i.e., lower flow rate) to achieve nitrification in the colder weather; therefore, the flows are reduced in the winter through the module.

One form of media is specifically manufactured for wastewater treatment and goes by the trade name of Biomatrix. The second media is scrubbing pad material manufactured by the 3M Company. Simply stated, it is the same material used on the back of abrasive kitchen sponges.

Flow to the units is provided through a submersible pump located in the effluent sampling manhole of the final lagoon. Flow is split between each of the pilot treatment units. The flow traverses through the tanks in plug flow fashion and exits via discharge piping back to the final lagoon. Throughout the spring, summer, and fall, the tanks will be outside, exposing them to the elements. During winter operations, the tank will be housed in an all-weather shelter. Tanks will be insulated with two-inch thick Styrofoam sheets to protect from freezing.

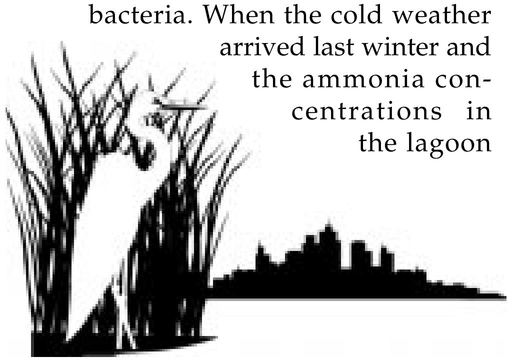
Each side of the pilot unit tank is separated into five compartments through the use of cross baffling. Each of the first four compartments on both sides contains one rack of media. Conventional fine bubble lagoon aeration tubing connected to a blower provides the aeration. The final compartments are not aerated and do not contain any media. The main purpose of these compartments is to provide a quiescent zone for the settling of sloughed solids. The effluent is monitored before and after it passes through the modules and subsequently discharged back into the lagoon.

It was theorized that the media would provide the bacteria with an environment where it could flourish. The project has shown that the bacteria stay attached to the media, allowing them to aid in ammonia removal, rather than being washed "down the drain" with the lagoon's treated effluent.

Big Savings Possible

The first winter of operation offered promising results. Unfortunately, the second winter of operation is casting doubts on the feasibility of this technology. Substantial algae growth has inhibited the formation of adequate populations of nitrifying bacteria, thus reducing the ammonia removal. It is thought that the media would perform better if it were placed further upstream in the process. By doing so, the media could take advantage of more consistent ammonia concentrations and potentially less algae growth.

In addition, the current pilot project places the media modules at the tail end of the process. Unfortunately, the Exeter Lagoon system nitrified so well on its own from August through November 2000 (NH_4<1.0 mg/l) that there was not enough food (ammonia) to sustain a population of nitrifying bacteria. When the cold weather arrived last winter and the ammonia concentrations in the lagoon effluent began to climb, there was not a sufficient population of nitrifying bacteria in the modules to oxidize the effluent. Essentially no reductions in ammonia concentrations were obtained.



This incident did not occur during the first year of operation. Normal winter NH_4 concentrations are 20 mg/l without the nitrifying media. In the previous year, the winter concentration was reduced to approximately 2 mg/l at temperatures down to 2-3 degrees C by using the modules. This represents an average ammonia reduction of about 90%. NH DES had hoped that moving the media modules to a better location (i.e., second lagoon) where the ammonia concentrations are higher would help to ensure an adequate population of bacteria year round and consequently provide better nitrification. NH DES experimented with this concept this spring, but unfortunately did not obtain any better results.

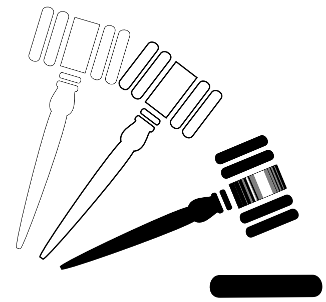
If this concept proves feasible, a full-scale application may be possible at a fraction of the cost of a conventional multi-million dollar lagoon upgrade similar to the Rochester example. This could save millions of dollars for small communities nationwide. When asked what was the biggest benefit of this type of system configuration, NH DES reported, "Aside from cost-savings, a lagoon system that has seasonal limits for ammonia will be capable of meeting its effluent limits earlier than a facility without the media filter."

This project will continue through one more winter of operation. NH DES has applied for a larger EPA grant to continue this research on a full or semi-full scale application within an actual lagoon as opposed to the smaller pilot module tanks.

***For additional information regarding this project, please contact Wes Ripple at* wripple@des.state.nh.us *or* (603) 271-2940.**

This article was adapted from the NH DES Environmental News, Nov/Dec 2000.

The U.S. Supreme Court Rules on Two Water Regulation Cases



SUPREME COURT CURTAILS REACH OF CLEAN WATER ACT

In voting to invalidate the Army Corps of Engineers use of the "migratory bird rule" to stop a group of Chicago suburbs from dumping garbage in an abandoned strip mine that now serves as a seasonal nesting site for waterfowl such as blue herons and ducks, the Supreme Court curtailed the federal government's power to regulate the nation's water. The ruling in Solid Waste Agency of Northern Cook County v. Army Corps of Engineers clarifies the reach of the Clean Water Act, preventing the federal government from asserting the right to regulate any body of water.

Critics of the ruling, passed by a 5-4 vote, worry that if environmental regulators interpret the ruling broadly, 20 percent to 25 percent of the country's water could lose federal protection. A statement issued by Carol Browner, the outgoing administrator of the Environmental Protection Agency, said the ruling "weakens America's ability to protect its wetlands." Meanwhile, Justice John Paul Stevens in his dissent wrote, "Today the court takes an unfortunate step that needlessly weakens our principal safeguard against toxic water."

Business groups, however, supported Chief Justice William Rehnquist's contention that the ruling would prevent "a significant impingement of the States' traditional and primary power over land and water use."

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Lowering the Boom: *The Charles River Sediment Study*

by Jennifer Hunter

The New England Interstate Water Pollution Control Commission (NEIWPCC) was involved with two projects to assess and improve water quality for the lower Charles River Basin in Boston. These projects will help the Environmental Protection Agency (EPA) Clean Charles 2005 Task Force to achieve its April 2005 goal—improving the water quality of the basin so that it will meet the standards suitable for fishing and swimming.

Sediment Study

Approximately ten percent of the sediment underlying U.S. surface waters is contaminated with enough toxic pollutants to threaten benthic (sediment dwelling) organisms, fish, fish-eating wildlife, and humans (EPA's Report to Congress, "The Incidence and Severity of Sediment Contamination in Surface Waters of the United States," 1998). Recognizing that contaminated sediments contribute to the Charles River's water quality problems, NEIWPCC, in cooperation with EPA Region 1 and Massachusetts Department of Environmental Management, sought to assess the extent of these contaminants.

The U.S. Geological Survey (USGS) conducted an extensive sediment study to determine the presence of contaminants and their potential harmful effects. The study involved water depth and sediment thickness measurements, surficial and core sediment sampling, and laboratory analysis of the samples. USGS's recently released report, "Distribution and Potential for Adverse Biological Effects of Inorganic Elements and Organic Compounds in Bottom Sediment, Lower Charles River, Massachusetts," provides details of the work performed and the findings. A limited number of copies are available from NEIWPCC. Additional copies of the report can be ordered from USGS. This report will assist the agencies involved in restoring the habitats and water quality of the lower Charles River.

Gunderboom Trial One, Magazine Beach. June 2000.

Photos by Dennis Pyburn

At nearly every location sampled, the USGS study found sediments contaminated above background concentrations. The contaminants were inorganic elements (such as chromium, copper, lead, mercury, nickel, silver, and zinc) and organic compounds (such as PCBs, organochlorine pesticides such as chlordane and DDT, and polyaromatic hydrocarbons). The sediment contaminants were found in concentration levels that pose a severe threat to benthic organisms living in or on the bottom sediment. However, bioavailability, and therefore toxicity, of many of the inorganic elements may be limited by the presence of sulfide minerals, which bind with inorganic elements.

According to the study, the sediment contaminants may have been deposited by runoff from streets, atmospheric deposition, inadvertent spills, combined sewer overflows, and illegal sewage discharges. It is very likely that the contaminants will persist at elevated concentrations in the bottom sediment for years to come because they are not readily broken down by naturally occurring environmental processes.

Innovative Technology Demonstration

A separate project is exploring the ability of a filter device to clean the water in a section of the Charles River to meet swimming standards. NEIWPCC, in cooperation with EPA, hired Gunderboom, Inc. to test its Gunderboom Beach Protection System (BPS)™ technology. The BPS is a full length curtain boom made of fabric that extends from the surface of the water to the river bottom and encircles the area to be "cleaned." It acts as a filter barrier that controls the migration of particulates and associated microbes. Once the boom is in place, water is pumped out of the area which forces water to flow back through the filtering material. Gunderboom systems have been used for a number of particulate control applications, including stormwater control, dredging, bacterial control, and surface drinking water supply protection.

Last summer, a demonstration was conducted during two 3-day periods at the Magazine Beach section of the Charles River. This beach was once a popular swimming area before the river was closed to swimmers. During the demonstration, the boom was set up and a bottom seal was established. Water was exchanged for a period of 1-2 hours. Water samples were taken, at half hour intervals, throughout a 4-hour period. The samples were collected for laboratory analysis of many parameters includ-

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As Long as You Have Your HEALTH: *Program Highlights from the Rhode Island Department of Health*

by Dana McCants, HEALTH

The Rhode Island Department of Health (HEALTH) has been quite busy implementing several Environmental Protection Agency (EPA) approved programs and regulations:

The Capacity Development Program, established by the 1996 Safe Drinking Water Act Amendments, is well into its first year of providing technical assistance and public education outreach to Rhode Island water systems. HEALTH administers three technical assistance grants: one for Operator Certification Training (awarded to New England Water Works Association); another for Consumer Confidence Report assistance to small water systems (awarded to Atlantic States Rural Water and Wastewater Association (ASRWWA); and a third to assist small water systems with the Drinking Water State Revolving Loan Fund application (also awarded to ASRWWA).

The Source Water Assessment Program (SWAP), also established by the 1996 Amendments, is designed to assess the threats to drinking water sources, "for the protection and benefit of public water systems, and to support monitoring flexibility." Under this program, HEALTH produces the assessments and provides them to the suppliers and the general public both in print and over the Internet.

HEALTH is working closely with the Department of Environmental Management to coordinate SWAP with the Wellhead Protection Program in order to maximize the benefits to both suppliers and municipalities.

Committees are forming to address land-use and water-quality issues, an essential aspect of implementing SWAP. Under the SWAP grant, University of Rhode Island Cooperative Extension and HEALTH have been reviewing and assessing existing land-use inventory data through environmental and planning groups. This data is combined with data from the Rhode Island Geographical Information System to produce full color maps and vulnerability assessments that will indicate the relative threats to water quality posed by land uses.

For additional information regarding:

Capacity Development
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SWAP
Contact Clay Commons at
ClayC@doh.state.ri.us (401) 222-7769.

Drinking Water State Revolving Loan Fund (DWSRF)
Contact Gary Chobanian at
GaryC@doh.state.ri.us or (401) 222-7768, or visit the HEALTH Website at
www.health.state.ri.us/environment.

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SUPREME COURT RULES *from page 13*

SUPREME COURT RULES IN FAVOR OF LANDOWNER IN WETLANDS CASE

After losing several battles in the Rhode Island court system seeking permission to develop eighteen acres of wetlands in Westerly, Rhode Island, landowner Anthony Palazzolo scored a victory when the U.S. Supreme Court ruled that the Rhode Island Supreme Court erred in rejecting Palazzolo's takings claim simply because he acquired title to the property after the challenged wetland regulations were enacted.

The roots of the case grew from the 1971 formation of the Rhode Island Coastal Resource Management Council, which designated salt marshes as protected coastal wetlands on which development is greatly limited. In the early 1980s, when Palazzolo applied to fill wetlands he had acquired and build a bulkhead, the Council denied his application because the proposed work was not consistent with the Coastal Resource Management Program guidelines for protection. In 1985, Palazzolo filed a new petition to fill eleven out of eighteen acres so that he may build a private beach club. The Council rejected this application as well, explaining that the proposal did not satisfy the standards for obtaining a special exception to fill a salt marsh, whereby the proposed activity must serve a "compelling public purpose."

Palazzolo filed an inverse condemnation action in Rhode Island Superior Court asserting that the state's wetlands regulations, as applied by the Council to his property, had "taken the property without proper compensation, thus violating the fifth and fourteenth amendments." Palazzolo alleged that the Council's action deprived him of all economically beneficial use of his property, making the denial a total taking, therefore allowing him to recover full compensation. The Rhode Island Superior Court found for the State and the Rhode Island Supreme Court affirmed that decision.

After the Rhode Island Supreme Court rejected his takings claim, Palazzolo sought review in the United States Supreme Court. On June 28, 2001, the U.S. Supreme Court ruled in favor of Palazzolo and remanded the case for further consideration of Palazzolo's Penn Central claim, which addresses the issue of whether preexisting regulations are relevant to the timing of land acquisition by the takings claimant.

CHARLES RIVER *from page 14*

PHOTO BY DENNIS PYBURN

ing total suspended solids (TSS), fecal coliform bacteria, and Enterococcus bacteria. Ambient measurements were taken for turbidity and secchi disk clarity.

The results of the demonstration, though inconclusive, are encouraging. An unforeseen challenge of maintaining an effective bottom seal affected the deployment and results. However, when a seal was maintained, water quality measurements appeared to improve for several of the parameters like turbidity, TSS, and clarity. Future deployments, tentatively scheduled for the summer of 2002, with a design that controls the factors that affected the boom's bottom seal will truly test this technology's ability to achieve "swimmable" conditions in a portion of the lower Charles River.

For more information on either of these studies, contact Jennifer Hunter at* jhunter@neiwpcc.org *or (978) 323-7929.

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