

# Water Connection



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

Volume 17, Number 1  
Summer 2000

## Waking Up to the Wonders of Wetlands

**P**resident Clinton's decision to request an additional \$30 million for wetlands restoration in fiscal year 2001 is yet another sign of the dawning realization that our nation has for too long neglected one of its most productive natural areas.

We have all seen bumper stickers, ice cream containers and tie-dye t-shirts bearing the rallying cry "Save the Rain Forests!" But did you know that wetlands follow closely behind rain forests in the sheer volume of biodiversity they support? Thanks to their complexity of habitat and abundance of provided nutrients, wetlands are home to more than 5,000 species of plants and 190 species of amphibians.

With changing weather patterns conspiring to produce catastrophic flooding and intense coastal storms, the role of wetlands in flood and erosion control is finally coming to light. Wetlands protect us from flooding by absorbing stormwater and releasing it slowly. Their root systems and location between high ground and water bodies make them a natural defense against erosion.

People, too, derive important benefits from wetlands. Wetlands filter out sediment and pollutants from our water, giving us cleaner water for drinking and recreation. And the economic benefits of wetlands-centered fishing, recreation and hunting add billions of dollars to the economy.

The importance of wetlands cannot be overstated. And yet, the nation continues to lose a hundred thousand acres of wetland each year. To help increase our readers' knowledge and appreciation for wetlands, this issue of Water Connection offers an overview of regional and national issues regarding the protection and utilization of wetlands.



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**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.

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Volume 17, No. 1  
Summer 2000

*Water Connection* is NEIWPCC's newsletter. It is free of charge, and is published three times per year. Articles are submitted by NEIWPCC staff, as well as other environmental professionals. *Water Connection* is funded by a grant from the Environmental Protection Agency.



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Do you ever wonder about what NEIWPCC really does? Our projects? Our history? The answers to these questions and more are at [www.neiwppc.org](http://www.neiwppc.org). With information about our training sessions, education programs, watershed projects, and workgroups, as well as a national and regional meeting calendar, our web site has it all.

During 2000, [www.neiwppc.org](http://www.neiwppc.org) has been extensively redesigned. If it has been a while since you saw the page, you have not seen the page. Take some time to have a look today. And don't forget to bookmark us!

# America's Wetlands: Our Vital Link Between Land and Water

**W**etlands are indeed the vital link between water and land. "Wetlands" is the collective term for marshes, swamps, bogs, and similar areas found in generally flat vegetated areas, in depressions in the landscape, and between dry land and water along the edges of streams, rivers, lakes, and coastlines. Wetlands can be found in nearly every county and climatic zone in the United States. Most likely, a wetland exists in your neighborhood or very close to it.

Because they are so varied, wetlands can be difficult to recognize. Some are wet all of the time, some may look completely dry most of the time. Our ideas of what a wetland should look like may not include all types of wetlands. Some wetlands are large and some are very small. Many have been altered by human activities such as farming, ranching, and the building of roads, dams, and towns.

Wetlands have often been regarded as wastelands—sources of mosquitoes, flies, unpleasant odors, and disease. People thought of wetlands as places to avoid or, better yet, eliminate. Largely because of this negative view, more than half of America's original wetlands have been destroyed—drained and converted to farmland, filled for housing developments and industrial facilities, or used to dispose of household and industrial waste.

As people understand ecological processes better, attitudes towards wetlands change. We now know that wetlands are, in fact, valuable natural resources. Whether drier or wetter, bigger or smaller, wetlands provide important benefits to people and the environment. Wetlands help regulate water levels within watersheds; improve water quality; reduce flood and storm damages; provide important fish and wildlife habitat; and support hunting, fishing, and other recreational activities. Wetlands are natural wonderlands of great value.

## What Are Wetlands?

Wetlands are areas where water covers the soil, or is present either at or near the surface of the soil all year or for varying periods of time during the year, including during the growing season. Water saturation (hydrology) largely determines how the soil develops and the types of plant and animal communities living in and on the soil. Wetlands may support both aquatic and terrestrial species. The prolonged presence of water creates conditions that favor the growth of specially adapted plants (hydrophytes) and promote the development of characteristic wetland (hydric) soils.

Wetlands vary widely because of regional and local differences in soils, topography, climate, hydrology, water chemistry, vegetation, and other factors, including human disturbance. Indeed, wetlands are found from the tundra to the tropics and on every continent except Antarctica. Two general categories of wetlands are recognized: coastal or tidal wetlands and inland or non-tidal wetlands.

Coastal wetlands in the United States, as their name suggests, are found along the Atlantic, Pacific, Alaskan, and Gulf coasts. They are closely linked to our nation's estuaries, where seawater mixes with fresh water to form an environment of varying salinities. The salt water and the fluctuating water levels (due to tidal action) combine to create a rather difficult environment for most plants. Consequently, many shallow coastal areas are unvegetated mud flats or sand flats.

Some plants, however, have successfully adapted to this environment. Certain grasses and grass-like plants that adapt to the saline conditions form the tidal salt marshes that are found along the Atlantic, Gulf, and Pacific coasts. Mangrove swamps, with salt-loving shrubs or trees, are common in tropical climates, such as in southern Florida and Puerto Rico. Some tidal



freshwater wetlands form beyond the upper edges of tidal salt marshes where the influence of salt water ends.

Inland wetlands are most common on floodplains along rivers and streams (riparian wetlands), in isolated depressions surrounded by dry land (for example, playas, basins, and "pot-holes"), along the margins of lakes and ponds, and in other low-lying areas where the groundwater intercepts the soil surface or where precipitation sufficiently saturates the soil (vernal pools and bogs). Inland wetlands include marshes and wet meadows dominated by herbaceous plants, swamps dominated by shrubs, and wooded swamps dominated by trees.

Certain types of inland wetlands are common to particular regions of the country:

- > bogs and fens of the northeastern and north-central states and Alaska
- > wet meadows or wet prairies in the Midwest
- > inland saline and alkaline marshes and riparian wetlands of the arid and semiarid west
- > prairie potholes of Iowa, Minnesota and the Dakotas
- > alpine meadows of the west

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- > playa lakes of the southwest and Great Plains
- > bottomland hardwood swamps of the south
- > pocosins and Carolina Bays of the southeast coastal states
- > tundra wetlands of Alaska.

Many of these wetlands are seasonal (they are dry one or more seasons every year), and, particularly in the arid and semiarid West, may be wet only periodically. The quantity of water present and the timing of its presence in part determine the functions of a wetland and its role in the environment. Even wetlands that appear dry for a few months—such as vernal pools (see page 8)—often provide critical habitat for wildlife adapted to breeding exclusively in these areas.

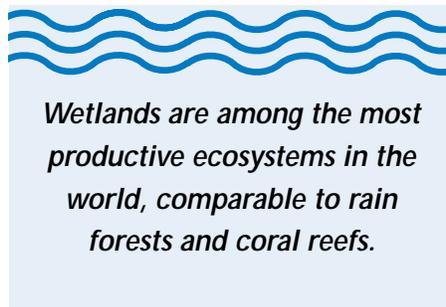
**Wetlands and Nature**

Wetlands are among the most productive ecosystems in the world, comparable to rain forests and coral reefs. An immense variety of species of microbes, plants, insects, amphibians, reptiles, birds, fish, and mammals can be part of a wetland ecosystem. Physical and chemical features such as climate, landscape shape (topology), geology, and the movement and abundance of water help to determine the plants and animals that inhabit each wetlands. The complex, dynamic relationships among the organisms inhabiting the wetland environment are referred to as food webs. This is why wetlands in Texas, North Carolina, and Alaska differ from one another.

Wetlands can be thought of as “biological supermarkets.” They provide great volumes of food that attract many animal species. These animals use wetlands for part of or all of their lifecycle. Dead plant leaves and stems break down in the water to form small particles of organic material called “detritus.” This enriched material feeds many small aquatic insects, shellfish, and small fish that are food for larger predatory fish, reptiles, amphibians, birds, and mammals.

The functions of a wetland and the values of these functions to human society depend on a complex set of relationships between the wetland and the other ecosystems in the watershed. A watershed is a geographic area in which water, sediments, and dissolved materials drain from higher elevations to a common low-lying outlet or basin—a point on a larger stream, lake, underlying aquifer, or estuary.

Wetlands play an integral role in the ecology of the watershed. The combination of shallow water, high levels of nutrients, and primary productivity is ideal for the development of organisms that form the base of the food web and feed many species of fish, amphibians, shellfish, and insects. Many species of birds and mammals rely on wetlands for food, water, and shelter, especially during migration and breeding.



Wetlands’ microbes, plants, and wildlife are part of global cycles for water, nitrogen, and sulfur. Furthermore, scientists are beginning to realize that atmospheric maintenance may be an additional wetlands function. Wetlands store carbon within their plant communities and soil instead of releasing it to the atmosphere as carbon dioxide. Thus wetlands help to moderate global climate conditions.

**Wetlands and People**

Only recently have we begun to understand the importance of the functions that wetlands perform. Far from being useless, disease-ridden places, wetlands provide values that no other ecosystem can, including natural water quality improvement, flood protection, shoreline erosion control, opportunities for recreation and aesthetic appreciation, and natural products for our use at no

cost. Wetlands can provide one or more of these functions. Protecting wetlands in turn can protect our safety and welfare.

**Water Quality and Hydrology**

Wetlands have important filtering capabilities for intercepting surface-water runoff from higher dry land before the runoff reaches open water. As the runoff water passes through, the wetlands retain excess nutrients and some pollutants, and reduce sediment that would clog waterways and affect fish and amphibian egg development. In performing this filtering function, wetlands save us a great deal of money. For example, a 1990 study showed that, without the Congaree Bottomland Hardwood Swamp in South Carolina, the area would need a \$5 million waste water treatment plant.

In addition to improving water quality through filtering, some wetlands maintain stream flow during dry periods, and many replenish groundwater. Many Americans depend on groundwater for drinking.

**Flood Protection**

Wetlands function as natural sponges that trap and slowly release surface water, rain, snowmelt, groundwater and floodwaters. Trees, root mats, and other wetland vegetation also slow the speed of flood waters and distribute them more slowly over the floodplain. This combined water storage and braking action lowers flood heights and reduces erosion. Wetlands within and downstream of urban areas are particularly valuable, counteracting the greatly increased rate and volume of surface water runoff from pavement and buildings.

The holding capacity of wetlands helps control floods and prevents water logging of crops. Preserving and restoring wetlands, together with other water retention, can often provide the level of flood control otherwise provided by expensive dredge operations and levees. The bottomland hardwood-riparian wetlands along the Mississippi River once stored at least 60 days of floodwater. Now they store only 12

days because most have been filled or drained.

**Shoreline Erosion**

The ability of wetlands to control erosion is so valuable that some states are restoring wetlands in coastal areas to buffer the storm surges from hurricanes and tropical storms. Wetlands at the margins of lakes, rivers, bays, and the ocean protect shorelines and stream banks against erosion. Wetland plants hold the soil in place with their roots, absorb the energy of waves, and break up the flow of stream or river currents.

**Fish and Wildlife Habitat**

More than one-third of the United States' threatened and endangered species live only in wetlands, and nearly half use wetlands at some point in their lives. Many other animals and plants depend on wetlands for survival.

Estuarine and marine fish and shellfish, various birds, and certain mammals must have coastal wetlands to survive. Most commercial and game fish breed and raise their young in coastal marshes and estuaries. Menhaden, flounder, sea trout, spot, croaker, and striped bass are among the more familiar fish that depend on coastal wetlands. Shrimp, oysters, clams, and blue and Dungeness crabs likewise need these wetlands for food, shelter, and breeding grounds.

For many animals and plants, like wood ducks, muskrat, cattails, and swamp rose, inland wetlands are the only places they can live. Beaver may actually create their own wetlands. For others, such as striped bass, peregrine falcon, otter, black bear, raccoon, and deer, wetlands provide important food, water, or shelter. Many of the U.S. breeding bird populations—including ducks, geese, woodpeckers, hawks, wading birds, and many songbirds—feed, nest, and raise their young in wetlands. Migratory waterfowl use coastal and inland wetlands as resting, feeding, breeding, or nesting grounds for at least part of the year. Indeed, an international agreement to protect wetlands of international importance was developed because some species of migra-

Major Causes of Wetland Loss and Degradation		
Human Actions		Natural Threats
> Drainage	> Runoff	> Erosion
> Dredging steam channelization	> Air and water pollution	> Subsidence
> Deposition of fill material	> Changing nutrient levels	> Sea level rise
> Diking and damming	> Releasing toxic chemicals	> Droughts
> Tilling for crop production	> Introducing nonnative species	> Hurricanes and other storms
> Levees	> Grazing by domestic animals	
> Logging		
> Mining		
> Construction		

tory birds are completely dependent on certain wetlands and would become extinct if those wetlands were destroyed.

**Natural Products for Our Economy**

We use a wealth of natural products from wetlands, including fish and shellfish, blueberries, cranberries, timber, and wild rice, as well as medicines that are derived from wetland soils and plants. Many of the nation's fishing and shellfishing industries harvest wetland-dependent species; the catch is valued at \$15 billion a year. In the Southeast, for example, nearly all the commercial catch and over half of the recreational harvest are fish and shellfish that depend on the estuary-coastal wetland system. Louisiana's coastal marshes produce an annual commercial fish and shellfish harvest that amounted to 1.2 billion pounds worth \$244 million in 1991. Wetlands are habitats for fur-bearers like muskrat, beaver, and mink as well as reptiles such as alligators. The nation's harvest of muskrat pelts alone is worth over \$70 million annually.

**Recreation and Aesthetics**

Wetlands have recreational, historical, scientific, and cultural values. More than half of all U.S. adults (98 million) hunt, fish, birdwatch or photograph wildlife. They spend a total of \$59.5 billion annually. Painters and writers continue to capture the beauty of wetlands on canvas and paper, or through cam-

eras and video and sound recorders. Others appreciate these wonderlands through hiking, boating, and other recreational activities. Almost everyone likes being on or near the water; part of the enjoyment is the varied, fascinating lifeforms.

**Status and Trends**

**Current Situation**

The lower 48 states contained an estimated 103.3 million acres of wetlands in the mid-1980s. This is an area about the size of California. An estimated 170-200 million acres of wetland exist in Alaska-covering slightly more than half of the state-while Hawaii has 52,000 acres. Next to Alaska, Florida (11 million), Louisiana (8.8 million), Minnesota (8.7 million), and Texas (7.6 million) have the largest wetland acreage.

In the 1600s, over 220 million acres of wetlands are thought to have existed in the lower 48 states. Since then, extensive losses have occurred, with many of the original wetlands drained and converted to other uses. From the 1950s to the 1970s was a time of major wetlands loss, but since that time the rate of loss has decreased. Today, less than half of our original wetlands remain, and recent trend estimates show that wetlands are still being degraded and lost. Recent estimates on non-federal land indicate that the rate of loss is between 70,000 and 90,000 acres annually

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Between the mid-1970s and the mid-1980s, approximately 3.3 million acres of inland freshwater wetlands were destroyed, and the amount of coastal wetlands decreased by 71,000 acres. Inland forested wetlands, primarily in the southeast, were impacted the most during this time, with a loss of 2.5 million acres. Approximately 900,000 acres were converted from forested wetlands to other wetland types (through logging and other activity). Conversion to agricultural use was responsible for 54 percent of the losses, drainage for urban development for 5 percent, and development for 41 percent. In addition to these losses, many other wetlands have suffered degradation of functions, although calculating the magnitude of the degradation is difficult.

These losses, as well as degradation, have greatly diminished our nation's wetlands resources; as a result, we no longer have the benefits they provided. The increase in flood damages, drought damages, and the declining bird populations are, in part, the result of wetlands degradation and destruction.

Wetlands have been degraded in ways that are not as obvious as direct physical destruction or degradation. Other threats have included chemical contamination, excess nutrients, and sediment from air and water. Global climate change could affect wetlands through increased air temperature; shifts in precipitation increased frequency of storms, droughts, and floods; increased atmospheric carbon dioxide concentration; and sea level rise. All of these impacts could affect species composition and wetland functions.

Wetlands Protection

The federal government protects wetlands through regulations (like Section 404 of the Clean Water Act), economic incentives and disincentives (for example, tax deductions for selling or donating wetlands to a qualified organization and the "Swampbuster" provisions of the Food Security Act), cooperative programs, and acquisition (for example,

establishing national wildlife refuges). You can find out more about these mechanisms by calling the Wetlands Hotline (800.832.7828).

Beyond the federal level, a number of states have enacted laws to regulate activities in wetlands, and some counties and towns have adopted local wetlands protection ordinances or have changed the way development is permitted. Most coastal states have significantly reduced losses of coastal wetlands through protective laws. Few states, however, have laws specifically regulating activities in inland wetlands, although some states and local governments have non-regulatory programs that help protect wetlands.

Recently, partnerships to manage whole watersheds have developed among federal, state, tribal, and local governments; nonprofit organizations; and private landowners. The goal of these partnerships is to implement comprehensive, integrated watershed pro-

tection approaches. A watershed approach recognizes the inter-connect- edness of water, land, and wetlands resources and results in more complete solutions that address more of the factors causing wetland degradation.

The government achieves the restoration of former or degraded wetlands under the Clean Water Act Section 404 program as well as through watershed protection initiatives. Together partners can share limited resources to find the best solutions to protect and restore America's natural resources.

While regulation, economic incentives, and acquisition programs are important, they alone cannot protect the majority of our remaining wetlands. Education of the public and efforts in conjunction with states, local governments, and private citizens are helping to protect wetlands and to increase appreciation of the functions and values of wetlands. The rate of wetlands

How Can I Make a Difference?

- > Get involved-find out where wetlands exist near your home, try to learn more about them, and support education efforts.
- > Support wetlands and watershed protection initiatives by public agencies and private organizations.
- > Purchase federal duck stamps from your local post office to support wetland acquisition.
- > Participate in the Clean Water Act Section 404 program and state regulatory programs by reviewing public notices and, in appropriate cases, commenting on permit applications.
- > Encourage neighbors, developers, and state and local governments to protect the function and value of wetlands in your watershed.
- > Rather than draining or filling wetlands, seek compatible uses involving minimal wetland alteration, such as waterfowl production, fur harvest, hay and forage, wild rice production, hunting and trapping leases, and selective timber harvest.
- > Select upland rather than wetlands sites for development projects and avoid wetland alteration or degradation during project construction.
- > Maintain wetlands and adjacent buffer strips as open space.
- > Learn more about wetland restoration activities in your area; seek and support opportunities to restore degraded wetlands.
- > In New England, contact your local EPA office to find how you can participate in its "Adopt-a-Wetland" program.



loss has been slowing, but there is still work to do. Approximately 75 percent of wetlands are privately owned, so individual landowners are critical in protecting these national treasures.

### What You Can Do

Despite the efforts of governments and private conservation organizations, pressures that destroy wetlands will continue. The problems of degradation of wetlands from pollution, urban encroachment, groundwater withdrawals, partial drainage, and other actions also require attention.

Many opportunities exist for private citizens, corporations, government agencies, and other groups to work together to slow the rate of wetland loss and to improve the quality of our remaining wetlands. First, state and local governments need to be encouraged to establish programs to effectively protect wetlands, especially inland wetlands, within their borders. Second, because individual landowners and corporations own many of the nation's wetlands, they are in a key position to determine the fate of wetlands on their properties. Finally, all citizens, whether or not they own wetlands, can help protect wetlands by supporting wetlands conservation initiatives.

Wetlands are an important part of our national heritage. Our economic well-being and quality of life largely depend on our nation's wealth of natural resources, and wetlands are the vital link between our land and water resources. As wetlands are lost, the remaining wetlands become even more valuable. We have already lost many of our nation's wetlands since America was first settled. We must now take positive steps to protect wetlands to ensure that the functions and related values they provide will be preserved for present and future generations. 

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**Information reprinted from  
"America's Wetlands: Our Vital Link  
Between Land and Water," United  
States Environmental Protection  
Agency.**

## Biological Assessment of Wetlands

by Jeanne DiFranco, ME DEP, and Beth Card, NEIWPC

**W**etlands bioassessment has many potential applications. It can be used to assess the relative condition or health of a wetland; diagnose the type of human stress impairing a wetland; help define management approaches to prevent further damage and restore a higher level of health; evaluate the performance or success of wetland creation and restoration projects; develop and support water quality standards for wetlands; and track the long term condition of our region's wetlands resources.

Until recently, state agencies have relied largely on function/value assessments to evaluate wetlands for regulatory and planning purposes. Although functional assessment methods are important tools for wetland management, they do not directly measure the ecological health of wetlands or the effects of human activities on wetland biota.

In 1997, the Biological Assessment of Wetlands Workgroup (BAWWG) was established to improve methods and programs to assess the biological integrity of wetlands. The group con-

sists of wetland scientists from the private sector, universities, and federal and state agencies. It is coordinated by the EPA Office of Wetlands, Oceans and Watersheds in partnership with the EPA Office of Science and Technology.

Ongoing BAWWG topics include development of assessment methods, study design, data analysis techniques and wetland classification. BAWWG also provides a forum for peer review and collaborative projects.

In 1998, a New England counterpart (NEBAWWG) was organized by EPA New England to develop a regional wetland biomonitoring network, to sponsor and oversee state pilot projects, and to coordinate with and complement efforts of other biomonitoring groups. NEBAWWG includes representatives from the New England states, various federal agencies, universities, non-governmental organizations and the private consulting community. NEIWPC has been active in the NEBAWWG since its inception.

The New England states were selected by EPA to serve as a national  continued on page 8



**BIOLOGICAL ASSESSMENT OF WETLANDS** from page 7

model for wetlands biological assessment development because of their well established wetlands regulatory programs and biological assessment programs for rivers, streams, and lakes. These programs employ biocriteria at various levels of sophistication and development.

NEBAWWG was formed to assist in the development of biological assessment methods that accurately evaluate the biological integrity of wetland ecosystems. Specifically, NEBAWWG's near-term objective is to examine, develop and field test various monitoring methods and metrics used to assess wetland biological integrity. In addition, NEBAWWG is promoting a strong volunteer component into its program goals to compliment the states' efforts.

On February 16, 2000, in accordance with one of the major goals of NEBAWWG, NEIWPC, in conjunction with EPA-New England, sponsored a volunteer wetland-monitoring workshop. The workshop, held at the Antioch New England Graduate School in Keene, New Hampshire, was attended by state wetlands program staff from Rhode Island, New Hampshire, Vermont and Massachusetts, as well as various watershed groups and volunteer monitoring program organizers from around the country. Presentations at this workshop focused on topics that included current successful volunteer wetland monitoring programs, funding volunteer programs, quality assurance/quality control on data collected by volunteers, and the history of volunteer stream monitoring efforts.

NEIWPC will be working with EPA-New England and state wetlands program staff to support future NEBAWWG efforts. For example, in January 2001, NEIWPC and EPA will be sponsoring a two-day NEBAWWG conference in Portland, Maine. One of the highlights of this meeting will be the presentation of pilot project updates from state wetlands staff across the

country. There are many pilot projects involving the biological assessment of wetlands that are currently ongoing in New England (see sidebar for example).

These pilot projects will be consistent with the objective of the Clean Water Act: to maintain and restore chemical, physical and biological integrity of the nation's waters, including wetlands. To evaluate progress toward this objective, states are required to develop assessment programs for all water bodies within their boundaries.

Since the Act was passed in 1972, experience has shown that chemical cri-

teria alone are not sufficient to assess complex aquatic ecosystems. Biological monitoring has become an established tool to measure the health of rivers and streams, and is increasingly being applied in other waters. Biological assessment provides a direct, objective measure of wetland condition and can be used to evaluate impacts from human activities.

**For more information about NEBAWWG activities, contact Matt Schweisberg at EPA New England, 800.372.7341 or Beth Card at NEIWPC, 978.323.7929.**

**MAINE BIOLOGICAL ASSESSMENT PILOT PROJECT**

The Maine Department of Environmental Protection, an active participant in both the BAWWG and NEBAWWG workgroups, is currently conducting a pilot project to develop wetland bioassessment methods.

The major objectives of the Maine pilot project are:

- > To develop biological monitoring protocols for freshwater wetlands
- > To examine differences in wetland community structure along a gradient of human disturbance
- > To identify candidate metrics to assess wetland biological integrity

The pilot study area is located in the Casco Bay watershed in southern Maine. Since development pressure is high in this region, it provides an ideal location to examine the effects of human activities on wetland condition.

Initial fieldwork for the project began during the summer of 1998. Wetlands were targeted to encompass a range of human disturbance, including potential reference (minimally-disturbed) sites. Study sites were confined to freshwater wetlands having permanently or semi-permanently flooded water regimes.

Twenty wetlands were sampled each summer for the past three seasons (1998-2000), comprising 37 different sites to date. Maine DEP staff collected aquatic macroinvertebrates using both quantitative and qualitative sampling methods. In addition, water and sediment samples were analyzed for a suite of physical and chemical parameters. Habitat information, human disturbance ranking, and dominant plant species were recorded in the field, along with measurements of water temperature, dissolved oxygen and conductivity. Algae and diatoms were also sampled as part of a collaborative project supported through an EPA Headquarters Cooperative Agreement undertaken by Dr. R. Jan Stevenson of Michigan State University.

Results are currently being analyzed to identify wetland attributes that show predictable changes in response to human activities such as development. These attributes will then be tested on a broader geographic scale for potential use as biological metrics.

It is anticipated that the methods developed during the pilot project will support creation of a state wetland bioassessment program.

## Vernal Pools

by Cheryl Daigle, University of Maine

The more intriguing rituals of Spring are not ones that most people observe. These rituals have their beginning on warm rainy nights early in the season, beneath the forest floor and leaf litter. The ground will have thawed. Water will have begun filtering through layers of pine needles, decaying leaves, and soil, weaving its way through the maze of tunnels created by woodmice, voles, and other small mammals. As the water and the warmth of longer and hotter days trickles ever downward, the mole salamanders begin making their way upward. On the forest floor, woodfrogs have been released from their winter freeze, protected by special chemicals in their body throughout the long, cold months. These amphibians are preparing to begin their annual trek to where the most important rituals commence—their breeding pools.

In the Northeast, these breeding pools go by a variety of terms: vernal pools, ephemeral wetlands, temporary ponds, or seasonal woodland pools, depending on the region and who is describing them. New England ecologists have settled upon the term 'vernal pools,' which has come to mean a very specific type of wetland primarily defined by the animals that use these pools for breeding. Here, vernal pools are defined as seasonal or semi-permanent wetlands, without predatory fish, that provide essential breeding habitat for wood frogs, fairy shrimp, and the mole salamanders. These pools can be found in a variety of settings—as depressions in upland forests, in floodplains alongside rivers, in wet meadows, and as part of large wetland complexes. Because they typically dry up in late summer to early fall, vernal pools are especially vulnerable to destruction caused by building development or other human disturbances.

The male woodfrogs are usually the first amphibians to make their move



from the forest. The easiest way to locate the vernal pools they inhabit is to listen for their characteristic mating

behavior occurs at night, but may also occur during the day in undisturbed locations.

Spotted salamanders, blue-spotted salamanders, and Jefferson salamanders are woodland salamanders that spend much of the year underground, taking advantage of the tunnels created by small mammals (hence the name 'mole salamanders'). Along with the woodfrogs, these salamanders have adapted over time to rely on vernal pools for breeding success. After they emerge from the ground in early spring, they will migrate up to half a mile on warm, rainy nights to vernal pools, often to the very pool where they were born. The males usually arrive first. When the females arrive the salamanders engage in mass courtship rituals called congressing, which stimulates the males to deposit spermatophores on the pool bottom. The females pick up the spermatophores in their cloaca, and then deposit the fertilized eggs onto twigs and plants about eight to ten inches under the water surface. Once they have deposited their eggs, the adult salamanders typically wait for the next rainy night, when they return to their woodland home.

The early part of the salamanders' life cycle is also timed to coincide with

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*Because they typically dry up in late summer to early fall, vernal pools are especially vulnerable to destruction caused by building development or other human disturbances.*

call, which sounds like quacking ducks. These calls attract other male and female woodfrogs to the vernal pool, where they mate. The females lay their eggs while clasped by the male woodfrog; at the same time, sperm is released. In the process, the fertilized eggs are attached to submerged twigs or plants, and most are deposited in large communal masses in one area of the pond. The adults emerge from the pool after breeding to return to the cool, moist woods. The deposited eggs hatch into tadpoles, which transform into adults sometime within the next six to fifteen weeks, depending on where the pool is located. Typically, calling and

**VERNAL POOLS** from page 9

the seasonal nature of these pools. Within three to eight weeks, the eggs hatch into larvae. Larvae are entirely aquatic and breathe through gills. As they develop over the next two or three months, they eat insect larvae, small aquatic worms, and crustaceans that live in the water. The young adults leave the vernal pool once they have lost all traces of their gills to find a home in the nearby woodlands. They do not return to the vernal pool to breed until about two to four years later, after they have matured. (Another member of the mole salamanders, the marbled salamander, differs in that it lays its eggs on land, in sites that are later flooded. The female stays with the eggs until they hatch). Salamanders can live up to fifteen years of age.

While these amphibians sometimes do breed in permanent wetlands, the risk of predation is higher and reproductive success is very low. The loss of vernal pools in an upland area will inevitably lead to the loss of the amphibian species that depend on them, and a decrease in overall biological diversity. Amphibians serve a very important role in the larger woodland system as food for other animals. The wood frogs and mole salamanders spend over 11 months of the year foraging and hibernating in the woodlands, meadows, and other upland areas surrounding the vernal pools. As predators of insects, spiders, and other invertebrates, they contribute to the litter decomposition and nutrient cycling that occurs there. Amphibians in general are declining worldwide, and there is increasing concern over how to monitor and protect them. Many vernal pool dependent amphibians in the Northeast are already listed as endangered or threatened species.

Vernal pools are also an important part of the upland landscape for other animals—wetland-dependent turtles, small birds, and small mammals rely on these pools for water, food, and as a resting place between occasional migrations from one upland area to another, or between more permanent

**On March 31st through April 1st, NEIWPCC, in conjunction with EPA-New England, sponsored a two-day symposium at the University of Rhode Island for 500 attendees on vernal pool ecology in the northeast. The symposium fostered an appreciation and understanding of vernal pool ecosystems and their importance as prime breeding and developmental habitat for thousands of species world wide.**

**The symposium focused on biology, land use, regional protection efforts, and existing educational activities that have taken place at varying levels. It allowed participants to meet valuable contacts and hear numerous speakers from many disciplines outline their recent work. In addition, participants gained knowledge of vernal pools and the need for protection efforts among the New England states and New York.**

ponds. Green frogs, leopard frogs, red-spotted newts and other amphibians that breed successfully in permanent wetlands, may also be found in vernal pools throughout the wet season. These wetlands serve as 'stepping stones' throughout the landscape, supporting the diversity of animal life that exists in a particular region. Protection of vernal pools, as well as the surrounding uplands, is essential to conservation of woodland amphibian populations and the many different wildlife values associated with vernal pools. ~

**Reference: *Maine Citizen's Guide to Locating and Documenting Vernal Pools* (Maine Audubon Society, 1999)**



*Wetlands in the News*

**Clinton Administration Proposes Doubling Support for Wetlands Conservation**

The Clinton administration's fiscal year 2001 budget proposal to Congress will request that current funding for wetlands restoration be doubled to \$30 million. The money would support the North American Wetlands Conservation Fund (NAWCF), whose activities have protected 1.3 million hectares of U.S. wildlife habitat, according to a statement by Vice President Al Gore. NAWCF is administered by the U.S. Fish and Wildlife Service.

Under a voluntary partnership program, the proposed funding would leverage at least \$30 million in additional, nonfederal funds through a matching funds requirement, the White House said. Typical projects undertaken in the partnership program include acquiring and restoring wetlands, which then are managed as wildlife conservation areas by private organizations or government agencies. For more information on NAWCF programs, see the U.S. Fish and Wildlife Service Web site at [www.northamerican.fws.gov/nawcahp.html](http://www.northamerican.fws.gov/nawcahp.html).

**Information provided by "Water Environment & Technology," (703) 684-2400.**



**Nation's Streams and Wetlands to Be Restored through Community-led Efforts**

The National Association of Counties, the National Fish and Wildlife Foundation and the Wildlife Habitat Council have awarded over \$575,000 to 55 community-led conservation projects throughout the country. The Five Star Restoration Grant Program will provide \$5,000-\$20,000 grants to community-based partnerships for support of wetland

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# New York State Tidal Wetlands Trends Analysis

by Dave Fallon, NYSDEC, Fred Mushacke, NYSDEC, and Evan Picard, NEIWPC

Recognizing that “tidal wetlands constitute one of the most vital and productive areas of our natural world” and seeking to “preserve as much as possible of these remaining wetlands in their present natural state and to abate and remove the sources of their pollution,” the New York State legislature passed the Tidal Wetlands Act, Article 25 of the Environmental Conservation Law, in 1973. The Tidal Wetlands Act provided for administration of wetland impacts directly by the state.

In order to evaluate the effectiveness of the state’s tidal wetlands program in protecting total acres of wetlands, a tidal wetlands trends analysis is being conducted by Dave Fallon and Fred Mushacke of the New York State Department of Environmental Conservation (NYSDEC) and Evan Picard of the New England Interstate Water Pollution Control Commission.

The analysis is using color infrared aerial photography and geographic information system (GIS) technology. GIS technology allows geographic data, such as aerial photography, to be computerized. Using GIS a tidal wetlands line can be drawn on a scanned aerial photograph. This information will be checked by visiting the sites.

The analysis has shown that New York’s wetlands regulations have been very effective in protecting tidal wetlands from filling and direct destruction. In Shinnecock Bay and Moriches Bay on Long Island there was a gain of over 250 acres of wetlands due primarily to a landward movement of high marsh. There was no detectable loss of wetlands to filling or direct destruction.

However in Jamaica Bay, New York City, there has been a significant loss of over 400 acres of *Spartina alterniflora* marsh grass. This marsh has been replaced by open water. The causes of this loss are under investigation. Erosion and rising sea level have definitely been a factor. More detailed



results should be available in the fall. Funding for the Jamaica Bay study is provided in part by the Environmental Protection Fund, through New York State Department of Environmental Conservation’s Hudson River Estuary Program.

To date, the tidal wetlands trends analysis has resulted in the following conclusions and recommendations:

1. Since 1974, New York’s Tidal Wetlands Program has been successful in protecting tidal wetlands against filling and direct destruction.
2. Since 1974, the main mechanism of

tidal wetland destruction areas has shifted from direct action such as filling to a slower more chronic damage resulting in marsh areas being replaced by open water.

3. Tidal wetlands trends analysis utilizing GIS technology should continue every 5 years using aerial infrared photography at 1 inch = 1000 feet.
4. Efforts should be increased to manage wetlands areas in response to changes in tidal influence.
5. Studies should be conducted to determine the causes of wetlands changes. ~



**For further information contact Dave Fallon ([djfallon@gw.dec.state.ny.us](mailto:djfallon@gw.dec.state.ny.us), 631.444.0464), Fred Mushacke ([fmmushac@gw.dec.state.ny.us](mailto:fmmushac@gw.dec.state.ny.us), 631.444.0465) or Evan Picard ([empicard@gw.dec.state.ny.us](mailto:empicard@gw.dec.state.ny.us), 631.444.0429). You can also visit the web site at [www.dec.state.ny.us/website/dfwmr/marine/twhome.htm](http://www.dec.state.ny.us/website/dfwmr/marine/twhome.htm).**



Honking loudly, four Canada geese explode out of the cove of the Great Marsh as I walk into the second nesting field. My quest continues along the edges of the hayfield. White eggshells are scattered on the dark earth a few yards from nesting activity of the previous night. A nest has been dug out, dirt thrown far from the hole . . . the shells of five eaten turtle eggs rest on the open earth.

This will become a familiar sight-the predation has begun.



**30 September, 11 AM.** *A hot September day, in the 80's; a few dancing breezes pick up as the hours pass . . . soft blue sky, hazy on the horizon, blurred drifts of small, scattered clouds. For a brief time at least, summer retakes the heavens, though the colors in the landscape cannot go unnoticed.*

Six screened-over nests remain here in the Digs, and I will continue to make daily checks of them until the ground begins to freeze. Most likely, any hatchlings in them are bound for overwintering in the nest, in which case I will leave them untouched and see what fate awaits them next spring. I do not think the placement of screens over the site, moments after the nesting mother left, could influence whatever is to happen with the turtles in the eggs beneath, so any observations I am able to make will constitute valuable field data.

When I dug into the nests I had transferred to my back fields, I found baby painted turtles waiting within, except for one nest in which none of the eggs had developed. Fully pipped, huddled as close together as their eggs had been, perfect little turtles lay in the earth, awaiting some message other than the intrusion of my carefully digging fingers. Some were still encased in their eggshells, with head and feet right at the doorway. Each was ready to leave on a moment's notice, each capable of digging out quickly and scrambling to the marsh, as soon as he was beckoned.

How incredible it seems that the hatchlings remaining in their nests out here in the Digs, completely developed, could sit quietly in the earth all these sun-filled days of late August and September and not be compelled to stir forth. In silence and darkness they will wait, as the warmth slowly leaves the earth surrounding them. Cold nights, chill rains, then cold days and nights together will slow down the metabolism of these unmoving turtles, and their weeks-long sleep of warmth will slip into a months-long sleep of cold. The ground will freeze around them and hold them in place as though they were encased in iron. Unless the coming winter conditions are unduly harsh, they will survive this, seedlike, until they are on the other side of the season of ice, when the call will finally come, and they will venture forth with the earth's springtime melting. 



## David M. Carroll and NEIWPC

by Beth Card, NEIWPC

**D**avid M. Carroll has recently put his well-honed tracking skills to work for NEIWPC during the 1998 and 1999 field seasons investigating the populations of three species of wetland dependent rare turtles-wood turtles, spotted turtles, and Blanding's turtles-under threat in New Hampshire.

The focus of David's investigation has been to locate populations of the three turtle species, evaluate their habitats, and make recommendations on ecosystems that should be targeted for habitat protection. This involves documenting both the wetlands and the uplands used by the turtles during their regular life cycles. While these species depend on wetlands to survive, they also need upland areas to lay eggs and regularly use upland areas for travel as they move to other aquatic habitats.

David's research plays a significant role in the challenging work of habitat preservation. According to David, "Spotted and Blanding's turtles are excellent indicator species for complex high-quality wildlife habitat (including high water quality) wetland mosaics of swamp, shrub swamp, marsh, fen, vernal pool and stream corridors integrated with riparian and upland habitats." David has also noted that "wood turtles indicate healthy river and stream environments in association with riparian and upland zones featuring heavy cover and habitat complexity."

David's work with NEIWPC has enhanced turtle and wetlands habitat investigations of the Lamprey River "Wild and Scenic River" study and of the Great Bay partnership initiative. The Great Bay initiative, consisting of EPA, New Hampshire Fish and Game Department, the University of New Hampshire, and the New Hampshire Audubon Society, is identifying and prioritizing wetlands in 10 towns near Great Bay for their importance to reptiles and amphibians. 

# TEA-21: Here to Stay

by Beth Card, NEIWPC

On June 9, 1998, President Clinton signed into law PL 105-178, the Transportation Equity Act for the 21st Century (TEA-21). TEA-21 authorizes highway, highway safety, transit and other surface transportation programs for the next 6 years. It is a direct successor to the 1991 Intermodal Surface Transportation Efficiency Act (ISTEA).

In spite of TEA-21's complexity, this new law both leaves the groundbreaking reforms of ISTEA intact and provides new opportunities for innovation. Now that TEA-21 is here, the transformation of a 1950s-era highway building program to a flexible transportation program achieved in 1991 can no longer be called an aberration. The program has had bipartisan support upon its inception and, apparently, is here to stay.

Environmental streamlining is one issue that has been incorporated into TEA-21. One of the elements involved in environmental streamlining is establishing a coordinated environmental review process by which USDOT would work with other federal agencies to ensure that major highway and transit projects are advanced according to cooperatively determined time frames. This philosophy should allow states the option of including their environmental reviews in a coordinated environmental review process.

TEA-21 authorizes over \$200 billion to improve the nation's transportation infrastructure, enhance economic growth and protect the environment. TEA-21 creates new oppor-

tunities to improve air and water quality, restore wetlands and natural habitat, and rejuvenate urban areas through transportation redevelopment, increased transit, and sustainable alternatives to urban sprawl. TEA-21 also creates funding opportunities for a wide variety of water quality enhancement projects and contains additional water related environmental and planning provisions.

The following are the key water related provisions:

- > transportation enhancements
- > environmental restoration and pollution abatement
- > wetlands restoration
- > wetlands mitigation banking
- > environmental streamlining
- > transportation, community, and system preservation pilot project
- > transportation-environment cooperative research program
- > clean vessel act
- > metropolitan and state-wide planning

For more information regarding TEA-21 projects in your state, contact your State Department of Transportation or the Federal Highway Administration Division Office. You can also check out the TEA-21 User's Guide at [www.istea.org/guide](http://www.istea.org/guide).

**Sources:**

"TEA-21 and Clean Water", US EPA and the federal "TEA-21 User's Guide"

## Wetlands in the News

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and streamside restoration projects. Major funding for these grants is provided by the U.S. Environmental Protection Agency's (EPA) Office of Wetlands, Oceans and Watersheds of the Office of Water, and the National Marine Fisheries Service Community-based Restoration Program for select grants in coastal areas. Participating communities have committed nearly \$4.4 million in additional funding and resources to these programs.

Five Star Restoration projects involve a high degree of cooperation, with local government agencies, elected officials, community groups, businesses, schools, and environmental organizations all working together to improve local water quality and restore important fish and wildlife habitats. The winning projects were selected from a competitive pool of nearly 200 applications. Consideration for funding is based upon the program's educational and training opportunities for students and at-risk youth, the ecological benefits to be derived, and the project's other cultural and economic benefits to the community.

"This important initiative demonstrates the benefits of innovation in government and the power of public-private partnerships to address environmental challenges facing our country," said EPA's Administrator Carol M. Browner. "It brings together organizations that help educate and train at-risk youth with local businesses, citizen groups and government agencies to restore wetlands and rivers as valuable assets to communities across America."

"NOAA is proud to be a Five Star partner through our Community-Based Restoration Program," said National Marine Fisheries Service Director Penny

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### TEA-21 WORKSHOP

NEIWPC organized a one-day workshop that addressed how wetlands restoration will coincide with the key elements of TEA-21. At the workshop, state environmental and transportation agency staff had the opportunity to ask questions of Federal Highway department staff. For more information regarding future workshops, please contact Beth Card, NEIWPC, at 978.323.7929.

# Purple Loosestrife: A Colorful Threat to Our Wetlands

by Dennis W. Pyburn Jr.,  
NEIWPCC

**P**urple loosestrife (*Lythrum salicaria*) is a native of Eurasia. Particularly widespread in wetland sites throughout Europe, it is now also common in the United States.

The absence of natural enemies in North America has resulted in the rampant spread of purple loosestrife and the accompanying loss of wetland habitat. As this invader takes control of wetland habitats, it excludes native species such as cattails and redwing blackbirds as well as many others. With the development of the purple loosestrife monocultures, many native plants and animals are displaced.

Purple loosestrife was first introduced into North America along the eastern seaboard of the United States at least 200 years ago. The plant has had a broad range of herbal uses in Europe and may have been introduced to North America intentionally for such purposes as well as for horticultural use. Seeds could also have been introduced through ship ballast, livestock feed and bedding. By the early 1800s, purple loosestrife was already well established in the New England region.

Purple loosestrife has spread throughout North America, but is most common and abundant in the northeastern United States and adjacent Canada. Its spread has been aided, in particular, by the proliferation of roads and their accompanying ditches. These ditches provide long continuous stretches of habitats conducive to the spread of purple loosestrife. They also serve as connecting corridors between natural and disturbed wetland habitats. Roadside mowing of weeds and grasses likely has helped spread seeds and stem parts through mechanical means.

Owing to its lovely show of vibrant purple during mid-summer, purple loosestrife has commonly been transplanted to perennial gardens and summer cottage lots. It also has been used

in wildflower seed mixes. The plant's natural variability has allowed for the development of several cultivated varieties that have been sold through nurseries.

Purple loosestrife grows in a variety of habitats that are wet or moist for at least part of the year, forming the most robust and prolific growth in wet soils and shallows of marshes and become more widely spaced and less abundant in deeper open waters. The plant is most commonly found in roadside ditches, marshes, open swamps and moist meadows. It is known to form extensive stands covering many acres in meadows and marshes along the sides of rivers or in the floodplains near the mouths of rivers. In some areas, where adequate moisture is available in old fields, purple loosestrife has proliferated to such an extent as to form near monocultures occupying extensive areas of old pastures and meadows.

An herbaceous perennial, purple loosestrife reproduces sexually by seed and vegetatively through the formation of adventitious shoots and through the rooting of buried and cut stems. Cultivated varieties formerly thought to be sterile are now known to produce fertile seeds when cross-pollinated by wild plants. The hybrids so produced are also interfertile.

It has been estimated that a large robust plant could produce up to 2.7 million seeds. Seeds survive for a number of years within the soil seed bank. Disruption of the soil by mechanical removal of plants for control purposes results in buried seeds being brought to the surface. Seeds are able to germinate over a wide range of environmental conditions.

As purple loosestrife is so well established over a broad range of geography and habitat, a variety of control measures need to be considered. Most



PHOTO BY FRANK BRAMLEY, COURTESY NEW ENGLAND WILDFLOWER SOCIETY

control options to eradicate, halt or reduce populations of this species are only effective under certain conditions and have inherent limitations.

Physical controls of plants include hand pulling, cutting, mowing, cultivation, inundation, and fire. Because hand pulling and cutting is particularly labor-intensive, it is useful primarily for eliminating small numbers of plants that have just become established at a site. Under such conditions, there is only a small reserve of seeds in the soil and the subsequent removal of the few plants that might develop should effectively eradicate the species from the site.

Repeated mowing, cultivation and inundation may be effective in controlling purple loosestrife in meadows and pastures. These methods are probably not suitable in natural areas. Inundation requires considerably elevated levels of water that need to be maintained for several seasons. Such a control measure could potentially have a negative impact on native plants and animals at the site. Fires, unfortunately, do not burn at a high enough temperature to kill the root crown, especially when the soil is wet.

Chemical controls have limited application for this species. The main problem is that of restricting the effects of the herbicide to the target species. Triclopyramine has proved effective in controlling adult purple loosestrife stem densities but additional applications were found necessary to prevent the numerous seedlings from becoming

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established. Grasses were relatively unaffected by the level of treatment used. Sedges (*Carex* spp.) declined in numbers initially but recovered subsequently.

In terrestrial habitats, Roundup could possibly be used since it is effective on a broad range of species. SEE 2,4-D can also be used in terrestrial habitats to control purple loosestrife. It is not entirely clear whether these herbicides are cost efficient considering that they only provide temporary control.

Three highly host-specific beetles have been approved for use as biocontrol agents of purple loosestrife. One is a weevil (*Hylobius transversovittatus*) that attacks the root system of purple loosestrife, and the two others are leaf-feeding beetles (*Galerucella californiensis* and *G. pusilla*). When these insects are present in high densities, they cause defoliation of mature plants, death of seedlings and the destruction of flowering spikes or prevention of their formation. Indications of successful introduction and control of purple loosestrife have been recorded at a number of release sites. The only concern is that there is no documented evidence of what may happen with the introduction of these other exotic species.

Since purple loosestrife is extremely difficult to control once established, the best defense against this noxious weed is the early detection and the prevention of its spread. Even minor disturbances can make areas highly vulnerable to purple loosestrife's overwhelming invasion. The first thread of purple that appears in the tapestry of a wetland landscape may foreshadow the destructive unraveling that is to come.

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## Wetland Engineers: The Beaver

by Dennis W. Pyburn Jr., NEIWPCC

**B**eavers' ability to change the landscape is second only to humans. By damming streams, beaver raise the water level to surround their lodge with a protective moat, and create the deep water needed for winter food storage in northern climates.

This flooding has profound ecological effects on the surrounding habitat. The flooding causes the deaths of some trees. The dead trees in turn provide shelter for various birds that otherwise would not inhabit the area. Water-loving plants thrive in and around the pond, and these provide food and shelter for a variety of animals.

The retention of water in the pond causes the local water table to rise, enhancing the growth of additional vegetation. The pond and surrounding wet area acts as a reservoir, preventing rapid runoff of water during rains and ensuring that the stream flows steadily throughout the year. The predictable stream flow allows trout to survive, and further downstream, it allows humans to plan agricultural activities.

When the pond fills with silt it becomes less useful to the beavers, and eventually the beavers may abandon the site and move further up or down stream. The abandoned pond gradually becomes covered with meadow grasses, and the resulting lush open area is productive of protein-rich grasses for moose and deer.

Since they breed once a year, require large streamside habitats, and leave home to establish their own territories upon maturation, beaver rarely overpopulate. In vast areas without trapping, beaver populations may peak, and then slowly drift down to a sustainable level.

Nonetheless, as beavers reclaim some of their natural territories lost to trapping and agriculture, conflicts with humans do arise. Beaver activity can cause flooding, water contamination,



dam failure, and property loss. How to control these problems without losing the benefits that beaver provide is a fiercely debated topic.

If beavers are removed from good habitat, others are apt to move in. For this reason, it is often best to focus on the problem, not the cause, when attempting to alleviate human/beaver conflict. Allowing the beaver to remain while addressing the specific problems their activities present helps preserve the many benefits beaver provide the environment without ignoring their destructive side effects.

Humans have recognized too slowly the importance of wetlands. Wetlands sponge up floodwaters, prevent erosion, raise the water table, and act as natural water purifiers. They are cradles of life—almost half of endangered and threatened species in North America rely upon wetlands. Beavers, though, have always known the value of a nice, wet place to live. With their help, maybe we can start to reclaim our vital wetlands.

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## Regulations Update

On December 2nd, NEIWPCCC hosted a meeting to allow the state Stormwater staff an opportunity to hear from Thelma Murphy, EPA-New England, an overview of the Stormwater Phase II Regulations which were signed on October 29, 1999. The briefing was also organized so that the states could ask Thelma questions as well as talk to each other regarding their respective programs. The details of the Phase II rule are discussed below.

Stormwater Phase II Regulations were signed on October 29, 1999. EPA's expectations are that the Storm Water Phase II regulations will cover the following:

- small municipal separate sanitary storm sewer systems (MS4),
- construction sites less than five acres, but greater than 1 acre,
- no exposure incentive for phase I industries, and
- removing the moratorium for industrial activities.

The final rule was published in the Federal Register on December 8th. From that date on it will be three years and 90 days until the permittees have to take action. In 13 years (3 years for the general permit development and two 5-year permit cycles), EPA will reevaluate the program in terms of BMP effectiveness and the TMDL/Storm Water ability to provide assurances that this is the best way to proceed.

The federal role in this process has been to develop the regulations, to provide oversight for the delegated states, and to provide implementation in the non-delegated states. EPA is in the process of developing a preliminary toolbox that will be out when the final rule is published. The final toolbox will be available prior to the general permit being established.

The state role involves the inclusion of the requirements of Section 402(p)(6) of the Clean Water Act and establishing the state statutory authority to



implement that section. The states will also be involved in processing criteria to evaluate and implement sources in urbanized areas of 50,000 people or more. The rule requires that the state evaluate communities outside urbanized areas so that there is consistency across the board.

The municipal role will also include MS4s associated with state and federally run entities (e.g., universities, hospitals, prisons). In addition, all roads with their own storm drainage system will need to be permitted. The municipality is responsible for what discharges into and out of the system. This means that the municipality will be writing and requiring ordinances within the plan that is developed. If an entity is not within the municipality's system, the municipality can tell that entity how the facility must be managed.

According to Appendix 6 of the final rule, it appears that more municipalities will be automatically included in the phase II process. Those municipalities which are included are required to develop a stormwater management program with the following six minimum measures:

1. public education and outreach
2. public involvement and participation
3. illicit discharge and detection and elimination
4. construction site runoff controls
5. post construction stormwater management in new development and redevelopment
6. pollution prevention and good housekeeping for municipal operations

For more information on the Stormwater Phase II Regulations, please call Beth Card, NEIWPCCC, at 978.323.7929 or e-mail her at [bcard@neiwpc.org](mailto:bcard@neiwpc.org).

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Dalton. "We fully support projects to maximize the benefits of working with Five Star partners and the public to restore and protect coastal habitat."

Additional funding is provided by the Gulf of Mexico Program, which is a partnership underwritten by EPA, the U.S. Fish and Wildlife Service, and Lockheed Martin Corporation. This is the second year that grants have been awarded under this innovative program.



### Groups Launch New England Wetlands Restoration Partnership

U.S. Sen. John F. Kerry (D-Mass.) on January 21 unveiled the New England Corporate Wetlands Restoration Partnership, an expanded version of a Massachusetts-based program launched last year by The Gillette Co., the Massachusetts Executive Office of Environmental Affairs, and the U.S. Environmental Protection Agency (EPA).

The New England Partnership will be funded jointly by private industry contributions and federal and state matching funds. It will be operated by a consortium of federal departments and agencies called Coastal America, with Gillette as its corporate leader. The Massachusetts program now has 15 corporate partners, each of which has pledged more than \$750,000 in cash and in-kind services for wetlands restoration, according to a statement issued by the U.S. Army Corps of Engineers, New England District. Membership in Coastal America, which was founded in 1992 to address environmental problems in U.S. coastal areas, includes the Executive Office of the President,

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# The Corps, the Courts, and the Clean Water Act

by Jennifer Dakin, NEIWPC

A dispute about the definition of “discharge” is at the root of the undoing of the Tulloch Rule, a regulation intended to beef up wetlands protection.

The story begins when Section 404 of the Clean Water Act was passed, authorizing the U.S. Army Corps of Engineers, with EPA oversight, to issue permits for the discharge of “dredged and fill material” into national waters, including wetlands. The permitting process requires applicants (typically developers) to demonstrate that they have taken steps to minimize wetland impacts and to contribute to wetland conservation as compensation for any unavoidable damage.

The Corps has historically exempted redeposits (“de minimis incidental soil movement occurring during normal dredging operations”) from the permit requirement. However, fearing that the permitting was not protective enough, the Corps issued a new regulation in 1993, the “Tulloch Rule,” which retracted the exemption. Since every bucket of dredged material is bound to lose a few drops, the rule effectively required the permitting of all excavations and dredging performed in wetlands.

The American Mining Congress and other trade associations involved in these activities challenged the Tulloch Rule and sought to have it invalidated at the D.C. district court. The plaintiffs argued that the Corps was going beyond its authority under the CWA in regulating the “incidental fallback.”

In 1997, the court ruled that since the net result of excavation is the removal of material, excavation should not be subject to discharge regulation. Tulloch was declared “invalid and set aside.” The U.S. Court of Appeals upheld the decision in June 1998 and the Corps and EPA issued a revised definition of “discharge of dredged material” the following year.

The fallout of this story of fallback is that Section 404 permits now apply

to dredged material only; dredged material, formerly known as bottom sediment, is exempt.

## Wilson's Developments:

In the late 1980s and early 1990s, Mr. Wilson, a land developer in Maryland, attempted the excavation of several parcels of land near the Chesapeake Bay. However, despite draining, ditching, and depositing truckloads of gravel on the land, wetland-loving plants continued to sprout through the fill.

The excavation failed because the sites were wetlands-wetlands that were well documented in the national inventory and on municipal and state topographical maps. Under Section 404 of the Clean Water Act their development required permitting from the U.S. Army Corps of Engineers. The luckless developer was prosecuted for and convicted of criminal violations of the CWA for his unauthorized dredging and filling of “waters of the United States.”

On appeal, Mr. Wilson challenged the conviction, arguing that Section 404 regulations do not apply to “isolated” wetlands. By definition, only waterbodies whose degradation *could affect* interstate or foreign commerce are considered to be “waters of the United States” subject to Section 404 permitting.

In December 1997, the U.S. Court of Appeals for the Fourth Circuit (Maryland, Virginia, West Virginia, North Carolina and South Carolina) overturned the decision in the case of *United States v. Wilson*, ruling that the Corps had indeed exceeded its authority by regulating wetland areas located many miles from the Chesapeake Bay and exhibiting no evidence of impact on that water body.

An upsurge of confusion and concern about the boundaries of federal control of wetlands prompted the Corps and EPA to issue a guidance document outlining Section 404 jurisdiction. The 1998 guidance made it clear that both agencies would continue to assert con-

trol over isolated water bodies, including isolated wetlands, on a case-by-case basis within the Fourth Circuit states. Water bodies would be linked to commerce (and hence, regulation) in numerous ways, including if the area was used by interstate travelers for recreation, by commercial fishing companies, or by migratory birds sought by hunters or birdwatchers. Water bodies would also be linked if they were protected by international treaty or federal law.

The guidance document's narrow interpretation of the Wilson decision has triggered more concerns about the Corps' and EPA's definition of a federally-regulated wetland as well as the adoption of a legal position that burdens the agencies with the oversight of millions of discrete wetland areas. For instance, last year, the National Association of Home Builders (NAHB) and the Peninsula Housing and Building Association of Newport News, Virginia, filed suit against the agencies, claiming that the criteria for linking wetland areas to interstate commerce was insupportable.

Clearly, although the Wilson parcels may remain undeveloped, the Wilson story continues to unfold and, for the time being, the implications for wetlands regulation remain as uncertain as the boundaries of federal jurisdiction. 

*More information on the Tulloch Rule is available from the Army Corps of Engineers' Revisions to the Clean Water Act Regulatory Definition of "Discharge of Dredged Material," available at:*

[www.wetlands.com/fed/fr10may99a.htm](http://www.wetlands.com/fed/fr10may99a.htm), and the Corps of Engineers/EPA Guidance Regarding Regulation of Certain Activities in Light of *American Mining Congress v. Corps of Engineers* available at [www.wetlands.com/fed/tulloch3.htm](http://www.wetlands.com/fed/tulloch3.htm).

*The information presented in this article regarding the Wilson Rule is from the Guidance for Corps and EPA Field Offices Regarding Clean Water Action Section 404 Jurisdiction Over Isolated Waters in Light of *United States v. James J. Wilson* available at [www.epa.gov/owow/wetlands/wilson.htm](http://www.epa.gov/owow/wetlands/wilson.htm).*

**Wetlands in the News**  
*continued from page 17*

EPA, and the U.S. departments of Agriculture, Air Force, Army, Commerce, Defense, Energy, Interior, Navy, Transportation, and Housing and Urban Development.

**For more information, call Sen. Kerry's office at 617.565.8519 (Boston) or 202.224.2742 (Washington, D.C.), or send email to john\_kerry@kerry.senate.gov. Information provided by "Water Environment & Technology," 703.684.2400.**



**Group Launches First Agricultural Wetlands-mitigation Bank**

The first agricultural wetlands-mitigation bank in the United States is being established on a southeast Missouri farm under a pilot project developed by the American Farmland Trust (AFT; Washington, D.C.), with the help of the U.S.

Department of Agriculture's Natural Resources Conservation Service (NRCS).

The farm's owner will restore 30 hectares of cropland to wetlands using money paid into the mitigation bank by other farmers to purchase wetlands credits. The Missouri landowner will be responsible for long-term management and maintenance and paying taxes on the property. In general, farmers can use the bank to purchase wetlands credits allowing them to convert wetlands on their property to agricultural uses; the money from such sales then is used to mitigate wetlands on other farmlands that are part of the mitigation bank.

NRCS provides technical assistance for restoring wetlands in the mitigation bank and holds the permanent conservation easement in each case to ensure continued protection of the property. For more information, call AFT at 202.331.7300 or send e-mail to [info@farmland.org](mailto:info@farmland.org).

**Information provided by "Water Environment & Technology," 703.684.2400.**



**Proposed Revisions to the Regulatory Definition of "Fill Material" and "Discharge of Fill Material"**

On April 20, 2000, a joint Army/EPA proposed rule was printed in the Federal Register proposing to revise the Clean Water Act Section 404 regulations defining the term "fill material." 65 Fed. Reg. 21292. The Army and EPA definitions of "fill material" currently differ from each other, and this has resulted in regulatory uncertainty and confusion. The proposal would amend both the Army regulations (33 C.F.R. 323.2(e)) and the EPA regulations (40 C.F.R. 232.2) to provide a single consistent definition. The proposal also would make conforming changes to the related definition of "discharge of fill material."

**For more information, contact Meg Snyder, EPA Headquarters, at 202.857.0166**

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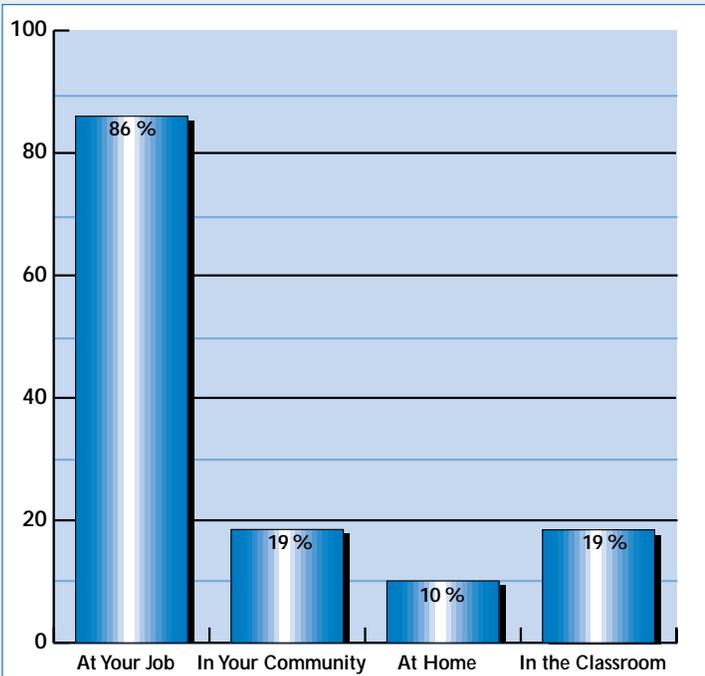
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# Reader Survey Results

Thank you to everyone who responded to our Reader Survey! The winner of the \$50 Gift Certificate was Ms. Carolyn Angell, a public school teacher in Camden, New York.

Nineteen percent of readers who responded to the survey joined Ms. Angell in listing their area of use of the information in *Water Connection* as "In the classroom." Nineteen percent listed "In your community" and ten percent listed "At home." The largest portion of our readers, 86%, listed "At your job" as the place they put their *Water Connection* subscription to work.



Thank you again for your responses. Look for more opportunities to voice your opinions in future issues of *Water Connection*!

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