new england water environment association

WETLANDnews

... A Publication of the NEWEA Wetlands Committee

Summary of 1998 Annual Meeting

The Wetlands Committee of NEWEA organized a technical session at the annual conference in January 1998, "Balancing Wetlands and Water Supply Projects." The session was attended by consulting engineers and scientists, agency representatives and municipal officials. The speakers for the session represented professionals from the regulatory, public and private sector covering the following topics:

C. *MEPA Regulations Related to Water Supply Projects and Wetlands*, R.J. Lyman, Director, MEPA Unit

C. *MWRA Capitol Improvement Projects and Wetlands*, Pam Heidell, MWRA Program Manager

C. *Wetland Permitting Difficulties associated with Water Supply Projects*, Jennifer Doyle-Breen, Metcalf & Eddy

C. *Wetland Restoration in Water Supply Areas*, Ingeborg Hegemann-Clark, The BSC Group

The following article presents abstracts for the technical topics covered during this session.

WHAT IS NEWEA?

Established in 1929, the New England Water Environment Association, Inc. (NEWEA) is a not-for-profit organization, dedicated to the preservation of water quality and water resources, whose objective is the advancement of fundamental knowledge and technology of design, construction, operation, and management of waste treatment works and other water pollution control activities. With over 2,600 members from each of the six New England states, NEWEA is a member association of the Water Environment Federation (WEF), an internationally renowned professional organization. To learn more about NEWEA and the wetlands committee, check out our homepage at www.newea.org.

WETLAND RESTORATION AND WATER SUPPLY ISSUES

Ingeborg E. Hegemann
The BSC Group, Inc.

The science behind the restoration and creation of wetlands is constantly evolving. Restoration or creation within or adjacent to a water supply adds yet another dimension to the design, permitting, construction, and monitoring of restored wetlands. Two recent restoration projects in Massachusetts, each approximately 1.3 acres in area, were discussed in terms of regulatory requirements and the approach to construction. Construction of the two sites was completed in the fall of 1997 and, therefore, monitoring of the restoration areas has not been initiated. However, a discussion of the monitoring requirements outlined the goals and objectives of the projects.

MWRA CAPITOL IMPROVEMENT PROJECTS AND WETLANDS

Pamela Heidell, Program Manager
Massachusetts Water Resources Authority

The Massachusetts Water Resources Authority has embarked upon a major program of capital improvements to ensure that treatment, transport, and storage of water meets water quality standards and complies with state and federal regulatory requirements. Components of the program include the construction of 17.5 mile long MetroWest Water Supply Tunnel, the 405 million gallon per day Walnut Hill Water Treatment Plant, and the Norumbega Reservoir Covered Storage Project, one of several projects which would replace existing open distribution

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WHAT IS THE WETLANDS COMMITTEE?

The NEWEA Wetlands Committee comprises environmental professionals from regulatory agencies, consulting firms, and public authorities who are interested or involved in wetland issues. The commitee meets every few months to discuss changes in federal and state wetland policies and regulations and to plan various activities including wetland technical sessions and conferences, wetland-related publications, and wetland-related outreach to NEWEA members, students or the general public. The only requirements for joining the Wetlands Committee are: 1) all members must be members of NEWEA/WEF; and 2) all members must commit to actively participate in committee meetings and responsibilities. For more information, or to be added to the Wetlands Committee mailing list, please call Bob Erickson at 978/371-4246 or Elizabeth Haffner at 978/658-4048.

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reservoirs. The projects are in various stages of design and implementation, but common elements have been the integration of wetland protection concerns into design and construction as well as the extensive alternatives analysis which was undertaken to arrive at preferred and permittable designs. Wetlands impacts associated with these large projects are not insignificant, but nevertheless reflect the balancing of multiple concerns. Trade-offs, wetland impacts, and mitigation are being addressed in a broad public area, given the attention to wetland resource alteration provided under Massachusetts Environmental Policy Act, the fact that two of the three projects cross municipal lines with multiple Conservation Commission reviews, and all three projects trigger both DEP and Corps of Engineer screening or individual permit review. The paper addressed in greater detail the elements of the projects; wetland resource considerations; and the regulatory and public participation processes which shape project design, permitting, and implementation.

WETLAND PERMITTING DIFFICULTIES ASSOCIATED WITH WATER SUPPLY PROJECTS

Jennifer A. Doyle-Breen
Metcalf & Eddy

Water is a resource needed for a productive, well functioning wetland system, as well as for the ever-increasing populations of the New England cities and towns. Because water is integral to both wetland and human communities, obtaining state and federal wetland alteration permits can be particularly difficult for water supply projects. First, water supply projects frequently involve unavoidable wetland impacts since these types of projects invariably involve transfer of surface water or groundwater out of the natural environment in order to accommodate human consumption. Common wetland concerns associated with water supply projects include flooding associated with an increased reservoir area and the potential for well operations to lower groundwater tables. On-site mitigation for these wetland impacts can be difficult due to the fluctuating water levels that are typically associated with reservoirs or wells. In addition, diversion of water often raises concerns regarding impacts on downstream resources. Balancing the needs of people with the needs of wildlife can be a difficult issue to resolve when identifying appropriate downstream releases for a particular project. Other issues which can be difficult to resolve include identifying appropriate project and appropriate planning periods for water supply projects. For all of these reasons, as well as others, obtaining a state and/or federal permit for wetland alteration can be a particularly challenging and daunting task.

Two recent projects in New England illustrate many of the difficulties common to permitting water supply projects. The Town of Rockport, Massachusetts' attempts to expand its existing water supply reservoir have been abandoned due to significant and unavoidable wetland impacts as well as the cost and difficulty associated with implementing off-site wetland mitigation. Current plans to meet Rockport's water needs focus on brook diversions and the construction of a new reservoir. In Woonsocket, Rhode Island, a new pipeline is currently under construction which will convey water between an existing reservoir and the City's water treatment plant. Operation of the pipeline will require downstream release of water which the City had hoped to transport to its water treatment plant.

Assessing Wetlands Health Through Biomonitoring: A Regional Effort

For years, water quality professionals have been performing biomonitoring on rivers and streams in an effort to assess the health of these systems. Environmental biologists have become quite proficient at systematically examining the biological constitution of a river to ascertain its health. They have been so successful that many states are developing biocriteria, or water quality standards for rivers, based on biomonitoring. This method is an intuitive and useful tool for a trained biologist and manager.

Recently, the New England Interstate Water Pollution Control Commission (NEIWPCC) Wetlands Workgroup, consisting of state wetland programs, EPA Region I, US Fish & Wildlife Service, and the US Army Corps of Engineers, has committed to work with the U.S. Environmental Protection Agency (EPA) to test the idea of using biomonitoring in wetland systems.

The idea is a simple one. Macroinvertebrates, basically the bugs and worms found amongst the rocks at the bottom of a stream, depend on clean water to survive. Any number of pollutants or a combination of pollutants can make the water uninhabitable for macroinvertebrates. Polluted water is much more complex than the standard pollutants for which we normally test. Our normal water quality tests may not reveal the entire range of pollutants in a river, but if no bugs are present, something is definitely wrong. Biomonitoring has become a valuable tool in river assessment. Many believe these principles can be applied to wetland systems as well.

Each macroinvertebrate has a certain pollution tolerance level. By examining the type and abundance of macroinvertebrates present, a trained biolgist can determine the relative water quality. For example, a caddis fly larva can tolerate only a certain level of pollution, whether it's sedimentation, high nitrogen levels, or low dissolved oxygen. On the other end of the spectrum, worms can tolerate much more. So if you examine the macroinvertebrates present in a stream and see an abundance of caddis fly larvae, it can be inferred that the water is in good shape. If only worms are present,

a pollution impact is evident. Biomonitoring gives a long-term assessment of total water quality, not just a one-time indication.

Determining accurate and standardized sampling protocols, sorting methods and statistical evaluation for biological stream assessment took years to develop. Much trial and error was employed. However, now river managers can confidently infer water quality from its biological attributes.

Biomonitoring is by no means an assessment cure-all, nor is it a replacement for traditional monitoring techniques. However, it is a good screening tool to identify problems. Once it is determined that a negative impact is present, traditional water quality monitoring is needed to pinpoint the type of pollution.

With rivers, macroinvertebrates are the key to biological assessment. With wetlands, more complex systems are involved, but we have more clues to examine. Macroinvertebrates are not the only potential wetland indicators. The composition and health of aquatic plants and wetland dependent wildlife will also indicate wetland health. This is nothing new, as any wetland scientist can look at a degraded wetland and tell you something is wrong. Our goal is to organize these indicators and make some sense out of them. With this knowledge, we will be able to explain wetland health to the public in a logical and defensible manner. We will also have the benefit of experience gained by the river biologists in developing river biomonitoring techniques.

EPA chose to focus its efforts in the New England Region because all six states in the region possess strong wetland programs. Also, New England possesses an abundance of highly-qualified wetland professionals. To kick start the effort, NEIWPCC and EPA Region I will be hosting a two-day workshop in the fall. This program will bring together national experts and interested professionals from around the region. The goal is to bring everyone up to speed on wetland indicator techniques and educate wetland professionals on applying biomonitoring techniques to assess wetland health. Later, pilot projects in selected states will be performed to test some of the promising wetland indicator techniques that have already been developed.

By their very nature, wetlands are complex systems, both physically and politically. With successful completion of this effort, the New England states will have a valuable assessment tool that is both accurate and intuitive, allowing the public to better understand wetlands' vital functions as well as allowing managers to make sound and defensible management decisions.

- Scott Lussier, NEIWPCC

Massachusetts River Basin Teams: Applying the Watershed Initiative

The Massachusetts Department of Environmental Protection's (DEP) Office of Watershed Management (OWM) spearheaded a Watershed Initiative in the early 1990s to collect and share water resource information, assess the impacts of various activities to water resources, and develop and apply actions to protect and enhance water resources across the state. The Initiative is based on a phased approach in five-year cycles and will be implemented by watershed teams. The team concept is critical to the success of the Initiative by providing a central clearinghouse for collecting and analyzing information. OWM staff and others throughout DEP pool their knowledge and skills within a specific watershed and are therefore able to better understand the relationship between water quality and quantity, and between point and nonpoint source pollution in that watershed. Twenty basin teams were established as of spring of 1998, with team leaders selected in 19 of those teams.

The OWM was established to centralize five primary functions within a watershed that were previously performed on an independent basis. These functions include water resources monitoring and assessment, water withdrawal permitting, nonpoint source pollution control, grant programs for water quality projects, and wastewater permitting under the National Pollutant Discharge Elimination System (NPDES) program. The five-year cycle is as follows:

Year One - Starting at the outset and continuing throughout the five-year cycle, the watershed team solicits input from the general public in order to better understand water quality and quantity goals and desired uses for both surface and ground waters within that watershed. This outreach program is also essential to garnering local support for watershed protection through non-point source controls and water conservation.

Year Two - The watershed teams implement water resource surveys in year two and develop the scope of the field analysis which may include assessment of water chemistry, macroinvertabrates, sediment, and fish tissue, depending on the critical issues within each watershed and the resources available for assessment.

Year Three - Assessment is the cornerstone of year three. Where appropriate, activities in this year include the determination of site-specific water quality criteria, calculation of total maximum daily loads, and load/wasteload allocation derivation. In-stream flow requirements are also developed in this phase. One tool which is likely to assist teams in completing their assessment is a Geographic Information System (GIS) based computer model, which is being developed by Camp Dresser & McKee Inc. under contract to DEP. This model will allow analysts to predict the affects of different pollution abatement scenarios on water quality. It will also assist the team in identifying, and focussing on, efforts that will have the greatest environmental and economic benefit.

Year Four - Watershed management recommendations are formulated during year four based on the assesssment results in year three and meetings held with the wastewater discharge and water withdrawal permittees. Final NPDES and Water Management Act permits are also issued. Targeting of priority waterbodies for implementation of BMPs or other controls is also accomplished.

Year Five - A key component of successful implementation is the award of non-point pollution competitive grants per Section 319 of the Clean Water Act. Through the State Revolving Fund, DEP will also fund projects that abate non-point source pollution. The success of the watershed team's completion of each of the five year-long phases will also be measured in this last year of the program.

The team concept is being implemented across the state by the Executive Office of Environmental Affairs (EOEA) in an effort to strengthen the Initiative. In addition to OWM, teams include representatives from the Division of Water Supply; Office of Coastal Zone Management; Department of Fisheries, Wildlife, and Environmental Law Enforcement; Office of Technical Assistance; Metropolitan District Commission; and Department of Food and Agriculture. Membership of some teams has also gone beyond EOEA boundaries, drawing representation from the Massachusetts Highway Department; Massachusetts Water Resources Authority; regional planning agencies; conservation districts; and watershed associations. This network of environmental groups will provide watershed communities with the support they need to maintain, enhance, and restore their valuable water resources.

- Jane Wheeler, Camp Dresser & McKee Inc.

Detention Ponds and Treatment Wetlands: A Solution to Reducing Phosphorous Loads to a Multi-Reservoir Water Supply System?

Previous studies have demonstrated that treatment wetlands, in series with detention ponds, can reduce phosphorous loads to receiving waters and thereby improve water quality. Significant land acquisition and engineering costs, however, dictate the need for a predictive model to analyze the effectiveness of pond/wetland systems on water quality in large watersheds. Such a model was developed for the series of 12 reservoirs that comprise New York City's Croton water supply system. The 12 reservoirs collectively hold approximately 330 billion liters of water and drain a total area of 600 square kilometers. During wet years, approximately 10% of the New York City water supply is drawn from New Croton Reservoir, the terminal receiving reservoir of the Croton System; as much as 30% is drawn during droughts.

The Surface Water Treatment Rule of the Safe Drinking Water Act applies to all water supply systems using surface waters and stipulates that surface waters must be disinfected and filtered unless certain requirements are met. One of the main parameters of concern that affects Croton water quality is phosphorus and its effect on eutrophication of New Croton Reservoir. To determine if reduced phosphorus concentrations could be achieved without filtration or with reduced filtration, watershed management practices, including construction of ponds/wetlands, were evaluated. The objective is to employ the natural ability of detention ponds to remove pollutants through physical (sedimentation) processes and wetlands to remove pollutants through physical, chemical and biological processes including absorption, microbial transformation, and volatilization. The ponds dampen peak flows and thereby increase the effectiveness of the downstream wetlands. The wetlands remove dissolved pollutants, such as phosphorus, which pass through the ponds. Treatment wetlands have rarely been employed for management of drinking water supplies, although the nutrient and solids removal functions of natural and constructed pond/wetland systems are well documented and commonly used for stormwater treatment.

Potential detention pond/wetland sites in the watershed of each reservoir were preliminarily identified based on a review of available maps (National Wetland Inventory maps, soil maps, topographical maps, land use maps, and others). The viability (less than 5% slope, a source of water, and no significant wetlands) of the potential sites were verified in the field and approximate boundaries of the 46 viable sites were located using a Global Positioning System (GPS). The land use within the catchment of each site was delineated on geographic information system (GIS) maps.

A model was developed to predict daily runoff, groundwater flow, and phosphorous loads from local catchments to the reservoirs and to the potential pond/wetland using rainfall data, land use information, and phosphorous export factors for different land use types. Phosphorus removal by each detention pond was modeled using a depth and settling velocity-dependent removal rate with a one-day time step. This model provided daily estimates of flows and phosphorus loads to the wetlands that would be constructed directly downstream of each pond. Phosphorous removal by each wetland was modeled as a function of the wetland's maximum hydraulic loading rate and influent phosphorous concentration, using parameters from a U.S. Environmental Protection Agency database of existing treatment wetland performance. Daily direct runoff loads to each reservoir (those not passing through a detention pond/wetland site) were also predicted, and wastewater treatment plant data was incorporated within each subwatershed to account for point source contributions.

For each reservoir the total annual phosphorous load was computed as the sum of predicted daily loads and upstream reservoir contributions. Following this, a model was applied to each reservoir to predict the resulting annual average in-reservoir phosphorous concentration, a function of the annual areal water load and annual areal phosphorous load. This analysis was completed in a cascading fashion for each reservoir in upstream to downstream order.

Model results indicate that constructing pond/wetland systems in the 120 hectares of viable sites has the potential to reduce annual total phosphorus loads to New Croton Reservoir by 876 kg/yr or

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7% of the total annual load. The ponds would treat approximately 20% of the surface water that is discharged to New Croton Reservoir. The estimates represent an upper bound on the amount of phosphorus which can reasonably be expected to be removed if all 46 sites in the 12 watersheds were utilized.

In summary, the construction of pond/wetland treatment systems would have a long-term, positive, minor impact on New Croton Reservoir water quality. The model developed to assess the effect of pond/wetlands on the Croton system is a useful wetlands/watershed planning tool that could easily be applied to other watersheds.

- Margaret McBrien and Sacha Henchman, Metcalf & Eddy; Dr. Kimberlee Kane, New York City DEP

REGULATORY UPDATES... from the New England States

Connecticut

http://dep.state.ct.us

In 1996, the Connecticut Legislature amended the Inland Wetlands and Watercourses Act to focus the decision making factors on wetland and watercourse impacts and established a mandatory public review period and opportunity for a public hearing for all applications for permits. The 1996 legislation also authorized, for the first time, a wetland agency to delegate approval authority over minor activities located in upland review areas.

Maine

http://www.state.me.us/dep/blwq

The DEP has proposed a "Stormwater Management and Erosion Control" law which will appear in Chapter 704, An Act to Reorganize and Redirect Aspects of the Site Location of Development Laws. These laws will be applied within "capacity" towns in organized areas. The law will focus on watersheds most at risk from new development and sensitive or threatened regions of watersheds.

Massachusetts

http://www.magnet.state.ma.us/dep

Densely Developed Areas Regulations (301 CMR 10.00) went into effect on February 20, 1998. The regulations establish a process for municipalities to seek designation of areas along perennial rivers and streams as "densely developed," thereby decreasing the width of the newly regulated Riverfront Area from 200 feet to 25 feet.

http://www.state.ma.us/mepa

The Massachusetts Environmental Policy Act regulations (301 CMR 11.00) have been revised and became effective on July 1, 1998. Among other changes, the revised regs contain new thresholds for Environmental Notification Forms and Environmental Impact Reports.

New Hampshire

http://www.state.nh.us/des

The Commissioner of DES adopted new Rules Governing Wetlands (Wt. 100-800) on April 18, 1997. In addition, the DES issued revised application forms Certification of Grandfathered Shoreline Structures (July 1997) and Standard Dredge and Fill Application (August 1997).

Rhode Island

http://www.state.ri.us/dem

Rhode Island DEM has amended their rules and regulations governing the administration and enforcement of the Freshwater Wetlands Act. The amendments primarily involve changes to exempt activities, which are activities allowed to occur in or near wetlands without a permit review. These revised regulations went into effect on April 23, 1998.

Vermont

http://www.state.vt.us

The Vermont Water Resources Board issued revisions to the Water Quality Standards which were adopted in April of 1997 and became effective on April 21, 1997. These revisions relate to updates of classifications in certain waterbodies.

US Army Corps of Engineers

http://www.usace.army.mil

The Corps issued a comprehensive General Permit for Vermont effective October 15, 1997. The New England District now has comprehensive Programmatic General Permits (PGPs) in place in each of the six New England states covering work with minimal impact on the aquatic environment. Up to 98% of all permits issued in New England are PGPs. The PGPs are based on the state thresholds for most categories of environmental impacts, and applicants generally need only file with the state. Applications appropriately covered under the PGPs are generally approved in less than 30 days.

US Environmental Protection Agency

http://www.epa.gov/owow/wetlands

EPA's National Pollutant Discharge Elimination System (NPDES) existing storm water program improves surface water quality by requiring a reduction in polluted runoff from sources such as industrial facilities, large and medium municipal storm sewers, and construction sites that disturb 5 or more acres. On January 9, 1998, EPA issued proposed Phase II of the NPDES storm water regulations, which will be finalized by March 1, 1999. Phase II would expand the existing program to smaller municipalities and construction sites that disturb 1 to 5 acres. In addition, on February 17,1998 EPA issued the final NPDES general permits for stormwater discharges associated with construction.

CALENDAR OF EVENTS

August 3 - 7, 1998	1998 International Water Resource Engineering Conference. Memphis, TN. Includes symposiums on Hydrology and Hydraulics of Wetlands and on Bank Stabilization Measures. Sponsored by the American Society of Civil Engineers. http://gwint1.gwi.memphis.edu/1998conf/home.htm
August 9 - 13, 1998	4th International Symposium on Environmental Geotechnology and Global Sustainable Development. Danvers (near Boston), MA. http://www.eng.uml.edu/Dept/CEEST
September 20, 1998	Wetlands '98: Integrating Wetland/Floodplain Ecosystems into Water Projects/Watershed Management. St. Louis, MO. Contact The Association of State Wetland Managers, PO Box 269, Berne, NY 12023 or email: aswmi@aol.com.
October 3 - 7, 1998	1998 Water Environment Federation Conference, Orlando, FL. For more information (202) 260-9545 or www.wef.org
October 21 - 23, 1998	Wastewater Treatment with AIWPS and Constructed Wetlands, Boston, MA. Contact ASCE Continuing Education (1-800-548-2723)
November 4 - 6, 1998	Wetlands Regulatory Workshop. Atlantic City, NJ. Contact Ralph Spagnolo, USEPA, 841 Chestnut Building, Philadelphia, PA 19107 or email: spagnolo.ralph@epamail.epa.gov
Late January, 1999	NEWEA Annual Conference, Marriott Hotel, Copley Square, Boston, MA. Check www.newea.org for info.
February 7, 1999	Annual Meeting of the New Hampshire Association of Wetland Scientists. The Courtyard, 1199 South Mammoth Road, Manchester, NH.
February 25, 1999	Annual Meeting of the Maine Association of Wetland Scientists. Maine State Grange, 146 State Street, Augusta, ME.
March 1 - 5, 1999	Stream Corridors: Adaptive Management & Design Sheraton Fallsview, Niagara Falls, Canada. The Second International Conference on Natural Channel Systems will present approaches of stream management profiles in Canada, Australia, United States and Europe. Contact: Patti Yound, Credit Valley Conservation, 1255 Derry Road West, Meadowvale, Ontario, Canada L5N 6R4 Phone: 905-670-1615 x 236 Fax: 905-670-2210 E-mail: cvc@mississauga.net

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