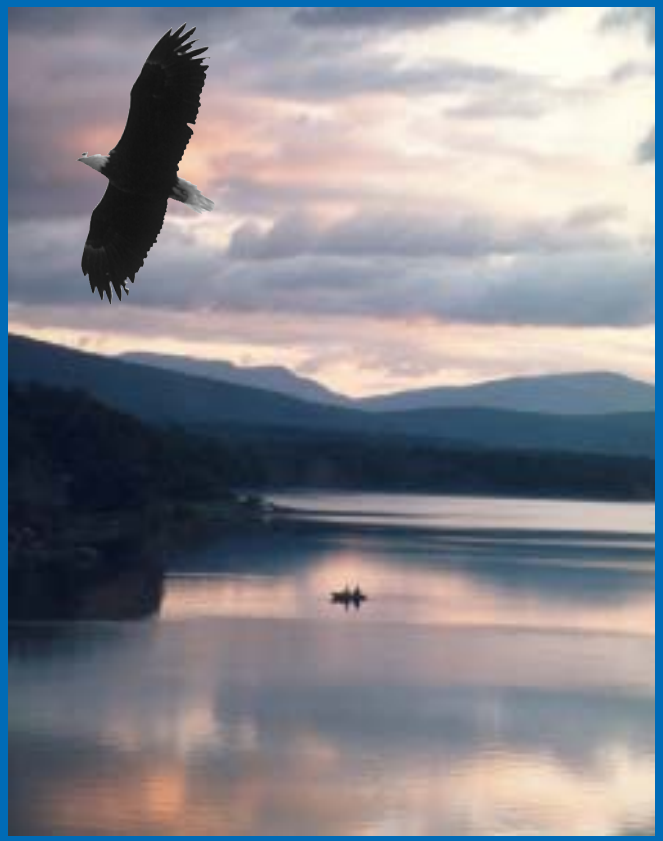


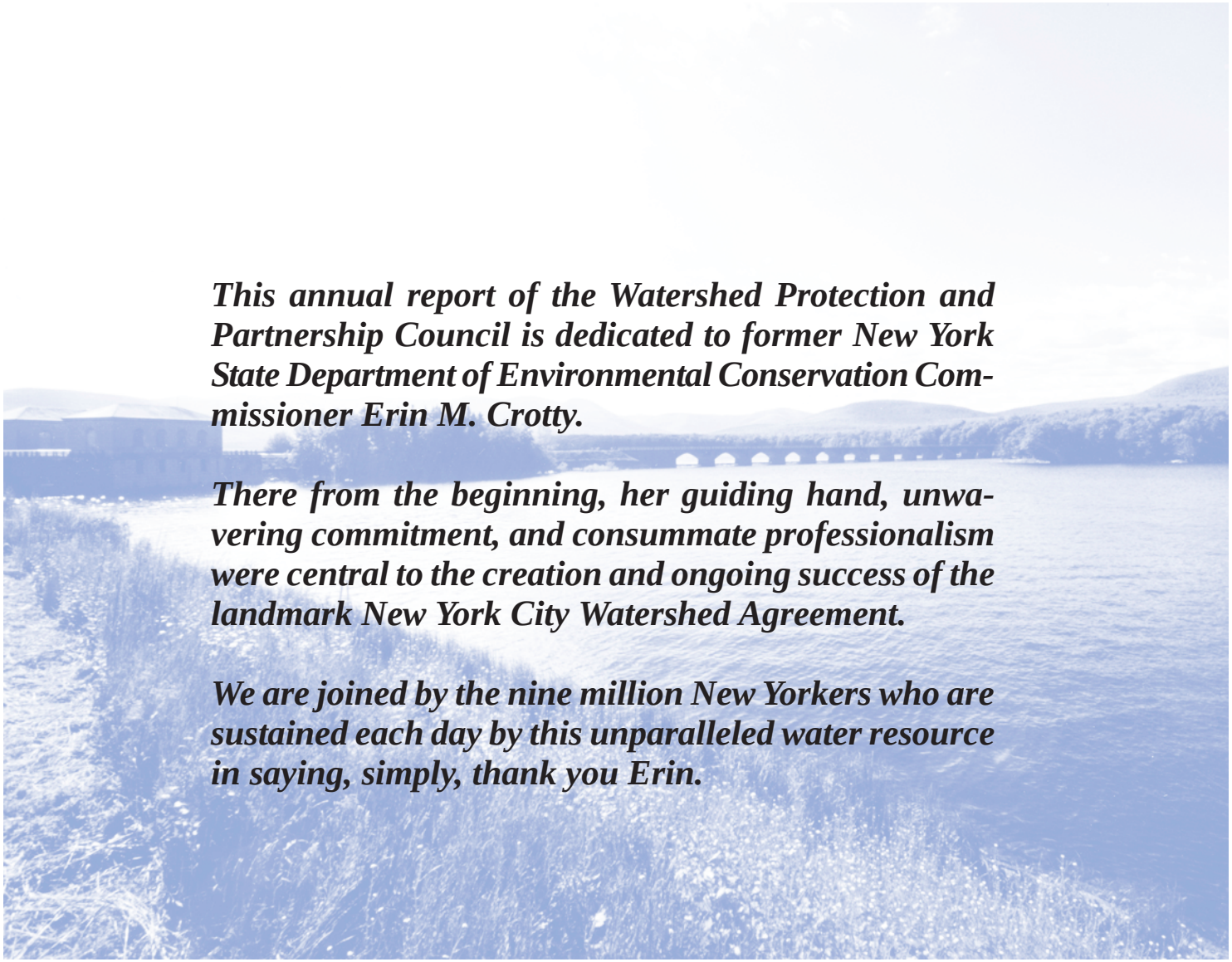
WATERSHED PROTECTION AND PARTNERSHIP COUNCIL

2004

WATERSHED PROTECTION AND PARTNERSHIP COUNCIL

George E. Pataki, Governor

Annual Report



This annual report of the Watershed Protection and Partnership Council is dedicated to former New York State Department of Environmental Conservation Commissioner Erin M. Crotty.

There from the beginning, her guiding hand, unwavering commitment, and consummate professionalism were central to the creation and ongoing success of the landmark New York City Watershed Agreement.

We are joined by the nine million New Yorkers who are sustained each day by this unparalleled water resource in saying, simply, thank you Erin.

TABLE OF CONTENTS

WATERSHED PROTECTION AND PARTNERSHIP COUNCIL'S MISSION

The Watershed Protection and Partnership Council represents and provides a working forum for the diverse interests that share the common goal of protecting and enhancing the environmental integrity of the Watershed, the social and economic vitality of its communities and the quality and quantity of the water that sustains them.

MESSAGE FROM GOVERNOR GEORGE E. PATAKI

STATE OF NEW YORK
EXECUTIVE CHAMBER
ALBANY 12224

GEORGE E. PATAKI
GOVERNOR

April 11, 2005

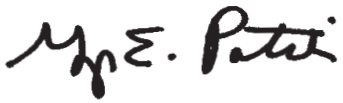
Dear Members of the Watershed Protection and Partnership Council:

Allow me to extend my sincere thanks and congratulations to you on your accomplishments regarding the New York City Watershed in 2004. In particular, I would like to acknowledge a significant achievement in the renewal of the partnership between the Watershed Partners and the Federal Government through the re-authorization of Federal funds to monitor the effectiveness of the Watershed Agreement; a strengthened relationship and pledge of further support from the United States Army Corps to secure additional funds to support high-priority water quality improvement projects throughout the Watershed; and the continued implementation of the vital water quality protection programs in the Watershed Agreement and the 2002 Filtration Avoidance Determination.

It has been seven years since the historic and landmark Watershed Agreement was signed by the Watershed partners. Since then, a tremendous amount of progress has been made by all the Watershed partners through their dedication, commitment, and hard work in protecting the largest unfiltered drinking water supply in the nation, while ensuring the economic vitality of the upstate Watershed communities. Without this collective and collaborative effort, the Watershed Agreement could not have achieved the success it has today.

On behalf of all New Yorkers, and in particular the nine million New Yorkers who depend on this drinking water supply every day, I thank you for your devotion and commitment in protecting this irreplaceable natural resource. I wish you all the best as you continue to aid in the implementation of the historic Watershed Agreement.

Very truly yours,



printed on recycled paper

WATERSHED PROTECTION AND PARTNERSHIP COUNCIL MEMBERS

CHAIR
Erin M. Crotty, *Commissioner, NYS Department of Environmental Conservation*

Randy A. Daniels, *Secretary of State*
James Walsh, *Governor's Office*
Darren Suarez, *NYS Senate*
Julia Mallalieu, *NYS Assembly*
Ronald Tramontano, *NYS Department of Health*
Amy Schoch, *NYS Empire State Development*
Ruth A. Moore, *NYS Agriculture & Markets*
Philip Sweeney, *EPA-Region II*
Jeffrey D. Freidlander, *NYC Mayor's Office*
Michael A. Principe, Ph.D.,
NYC Department of Environmental Protection
Wilfredo Lopez, *NYC Department of Health*
James F. Gennaro, *NYC Council*
Andrew M. Alper, *NYC Economic Development Corporation*

Gretchen Dykstra, *Commissioner*
NYC Department of Consumer Affairs
Jonathan A. Ballen, *NYC Business Community*
Ronald L. Wozniak, *Dutchess County*
John Lynch, *Putnam County*
Gerard E. Mulligan, *Westchester County*
Richard Knabel, *Westchester Water Consumer*
Alan Rosa, *Catskill Watershed Corporation*
Ward Todd, *Catskill Watershed Corporation*
Georgianna Lepke, *Catskill Watershed Corporation*
Leonard Govern, *Watershed Business Community*
Fred Huneke, *Watershed Agricultural Council*
Robert F. Kennedy Jr., *Environmental Parties*
Cathleen Breen, *Environmental Parties*

WPPC EXECUTIVE DIRECTOR
William C. Harding

SECRETARY OF STATE RANDY A. DANIELS

Randy A. Daniels
Secretary of State

Again this year I am pleased to review the many accomplishments of the landmark New York City Watershed Agreement. Whether it is helping Watershed municipalities develop land use and growth management tools through the Department of State's Master Planning and Zoning Incentive Awards Program, working with New York City and local communities to preserve thousands of acres of open space throughout the New York City Watershed, or teaching our children about the importance of protecting precious water resources, this partnership continues to be an unqualified success.

Looking at this 2004 Watershed Protection and Partnership Council Annual Report, we see the highlights of the many winning strategies comprising the Agreement. Behind the scenes and on the ground, scores of dedicated partners are working hard each day with pride and diligence to make it all happen.

We have together taken great strides in the important areas of upgrading and modernizing our aging water and wastewater infrastructure, restoring the splendor of storm-ravaged mountain streams, and developing cutting-edge scientific discoveries to advance the science of watershed protection. Efforts are continuing by the New York State Department of Environmental Conservation to update maps of critical wetland areas to protect them from destructive encroachment. Family farms throughout the Watershed are being enhanced and preserved for future generations through agricultural and forestry initiatives that, literally, are bearing fruit.

Thus, I invite everyone to take a look at this most informative report, and to join me in thanking our federal, state and local partners for another year of solid accomplishment. I wish you much future success and pledge my continuing support for the protection of this unparalleled natural resource.

Very truly yours,

Randy A. Daniels

A MESSAGE FROM THE EXECUTIVE DIRECTOR

William C. Harding
Executive Director, WPPC

The principle upon which the Watershed Agreement was created - partnership - embodies the promise that the quality of life for residents of the Watershed, and the quality of water for millions of New Yorkers must be forever linked. During 2004, the accomplishments of this historic initiative continue to mount, and the partners continue to communicate and successfully face challenges together.

The role of the Watershed Protection and Partnership Council is still evolving and adapting in order to most effectively respond to the divergent perspectives that form the partnership. Due in large measure to the cooperation and constant efforts of the parties to the Agreement, I am proud to report that our goals of becoming a central point of communication, providing a problem solving forum, and coordinating Agreement implementation activities, have all become day to day realities.

Please allow me to thank the Council members and all of our partners for their constant cooperation with the offices of the WPPC. The WPPC Annual Report is the product of the collaborative efforts of our many Watershed partners and agencies, and could not be done without their support. My gratitude goes especially to Jean Noel here in our offices, and to Tom Snow, DEC's NYC Watershed Coordinator for their many contributions to this annual review. I should also note the invaluable expertise of Debbie Ritzko and Jane Hamm from DOS Administrative Rules, for making the report a reality.

Again, many thanks to all involved for your dedication and honest hard work toward making this historic endeavor an unqualified success.

Respectfully,

William C. Harding
Executive Director, WPPC

Water for the City that Doesn't Sleep

New York City's water supply system provides 1.4 billion gallons of high quality drinking water to more than 9 million New Yorkers each day. The NYC Watershed covers over 2,000 square miles and extends 125 miles north and west of the City. A total of 19 reservoirs supply drinking water to the City. The Watershed is composed of three systems: the Catskill, the Delaware and the Croton. Together, the Catskill and Delaware systems provide up to 90% of the City's water supply and originate West of the Hudson River (WOH) in portions of Delaware, Greene, Schoharie, Sullivan and Ulster Counties. The older Croton system, which came on line in 1842, is located East of the Hudson River (EOH) in portions of Westchester, Putnam and Dutchess Counties. It typically supplies the remaining 10% of the City's water supply but has provided up to 30% in times of drought.

Ensuring the Health of 9 Million New Yorkers

Responding to public health concerns spawned by outbreaks of water borne illnesses, such as giardia where 5,000 citizens of Luzerne County, Pennsylvania were sickened in 1983, the United States Congress approved the federal Safe Drinking Water Act (SDWA) to mandate that the United States Environmental Protection Agency (EPA) address drinking water quality. In 1989, EPA mandated filtration of all the nation's surface water supplies. An exception was allowed only for those supplies that have a comprehensive watershed management program to ensure that a high quality of drinking water can be maintained. For these systems, EPA can grant a Filtration Avoidance Determination (FAD). City, State and federal entities believed that the high quality of water in the City's Catskill and Delaware systems can achieve the stringent requirements of the SDWA regulations upon the adoption of more comprehensive watershed management measures.

Steps to Partnership

Recognizing the need for a new collaborative approach to make a FAD possible, in 1995, Governor George E. Pataki tasked key State representatives to reach out to Watershed stakeholders. These stakeholders worked tirelessly over the next two years to develop a cooperative framework to address water quality protection. On January 21, 1997, the historic "New York City Watershed Agreement" was signed, which cemented a partnership among New York City, New York State, EPA, environmental representatives and the 80 Watershed host communities. This landmark agreement formed a new partnership to protect New York City's Watershed, yet ensured the economic vitality of the Watershed communities. This innovative, cooperative Watershed protection program is the first and only of this magnitude in the nation.

The Council - Where the Partners Meet

The Watershed Protection and Partnership Council (WPPC) was created under the Watershed Agreement to provide a regional forum to aid in the long-term protection of the City's drinking water quality and the economic vitality of the Watershed communities. The 27 members of the Council represent a broad-based, diverse group of interests. Consisting of representatives from the Watershed stakeholders, the Council continues to bring the parties together, as partners, to share information and reports of progress as well as to identify issues of concern. It also provides a resource for dispute resolution. The Council's 16 member Executive Committee anchors the organization while the Technical Advisory, East of Hudson Advisory and the East of Hudson Sporting Advisory Committees contribute sound technical support. NYS Department of Environmental Conservation (DEC) Commissioner Erin M. Crotty provided exemplary leadership as chair of both the full Council and the Executive Committee into 2004. Executive Director William C. Harding and staff from the NYS Department of State (DOS) skillfully manage the day-to-day operations.

New York City Rules and Regulations

The New York City Watershed Rules and Regulations work in concert with existing federal, State and local environmental regulations, providing comprehensive long term protection of the City's drinking water and minimizing, to the extent feasible, adverse impacts on the Watershed communities.

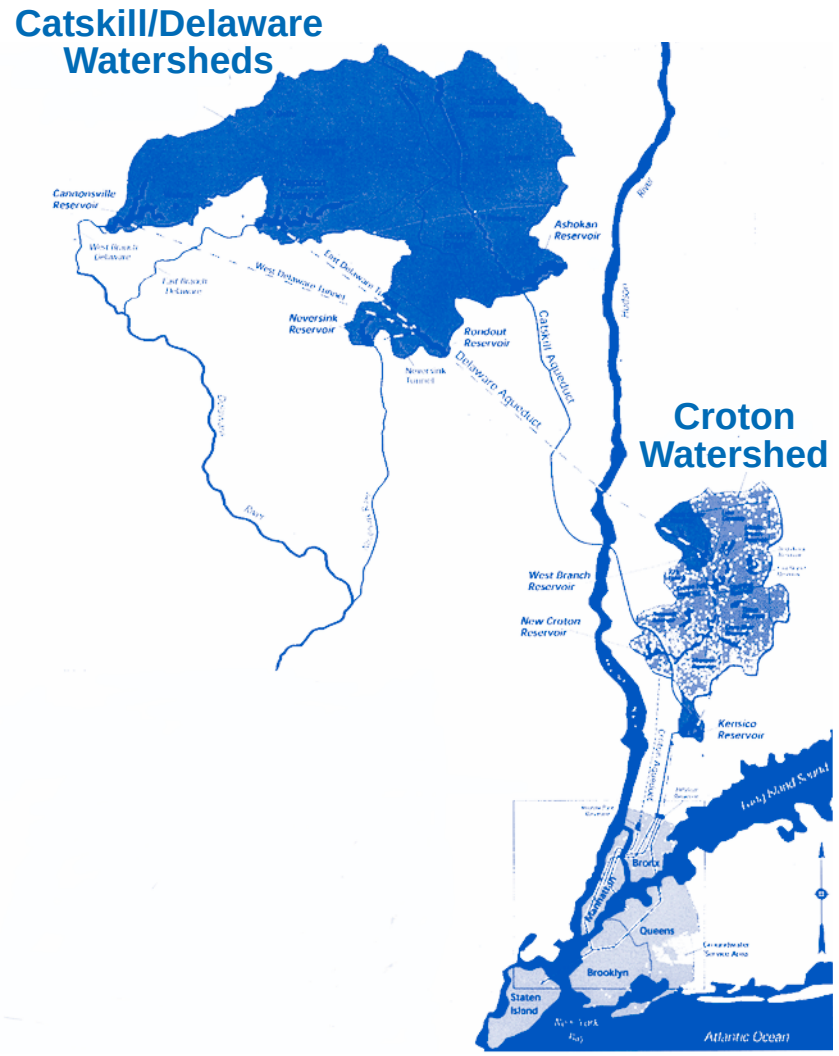
The Regulations

- prohibit or restrict the construction of Wastewater Treatment Plants (WWTPs) in Watershed basins deemed to have excess phosphorus or coliforms;
- prohibit discharges in wetlands;
- require prior approval for all new septic systems and prohibit such systems within certain areas;
- require the study of appropriate siting distances for septic systems and the use of galley type systems;
- prohibit new impervious surfaces in certain areas;
- require stormwater pollution prevention plans for stormwater discharges;
- prohibit or restrict the location of new hazardous or petroleum subsurface tanks; and
- require existing WWTPs to implement microfiltration and phosphorus removal measures within five years and require any new plants to implement these measures.

The regulations include certain exemptions from these restrictions for activities within existing concentrated communities, such as hamlets and villages, to encourage any new development to be focused in these areas, reducing the likelihood of environmentally unfriendly sprawl. Compliance with environmental regulations in the Watershed is ensured through a rigorous and coordinated program including project design and review, inspection and enforcement.

Project Design and Review

Projects proposed in the Watershed are reviewed by the NYC Department of Environmental Protection (DEP), State and local authorities to ensure conformance with the Watershed Rules and Regulations, as well as State and local laws. The State Environmental Quality Review Act (SEQRA) process also is used to coordinate the interests and comments of various agencies and to maximize the effectiveness of analysis for projects in the Watershed.



New Sewage Treatment Infrastructure Program

Paragraph 122 of the Watershed Agreement established a New Sewage Treatment Infrastructure program (NIP) which identifies, in order of priority of greatest water quality benefit, 22 communities in the WOH portion of the Watershed that are eligible to receive funds for the construction of wastewater treatment facilities. New York City provided $75 million to fund this program.

The 2002 FAD recognized the importance of continuing this program to ensure the long-term protection of the New York City drinking water supply. The City agreed to extend this program beyond the original commitment of $75 million and will fund wastewater systems in two additional municipalities, Phoenicia and Prattsville. The City also agreed to fund a Community Wastewater Management Program which will address wastewater issues in five other communities. The Community Wastewater Management Program is an outgrowth of the New Infrastructure Program. Under this program, the City will provide sufficient block grant funding to support the implementation of wastewater solutions, which can include septic maintenance districts, community, or cluster septic systems.

New Infrastructure Program

Four of the top five priority community projects identified in the Watershed Agreement had nearly completed their projects in 2004. These communities include Andes, Hunter, Windham and Roxbury. The wastewater treatment plants (WWTP) were completed in Andes, Hunter and Windham, with startup operations underway. The sewer collection system was completed in Andes and was near completion in Hunter and Windham. (As noted below, completion of the Hunter and Windham plants and substantial progress with their collection systems allowed initial steps to be taken to connect certain Upgrade projects to these new municipal facilities.) Roxbury completed construction of a collection system and force main connection with the New York City-owned plant in Grand Gorge. The Village of Fleischmanns completed its facility design in 2004 and received bids for the construction of the WWTP and collection system.

Under the November 2002 FAD, the City agreed to provide funding for Prattsville and Shandaken (Phoenicia). Prattsville progressed with its design and submitted preliminary design documents for review by years end. Phoenicia selected a new design consultant and is currently in the design phase.

Community Wastewater Management Program

This program is administered by CWC to address the wastewater issues in up to five more hamlets included in the original Watershed Agreement list of 22 communities identified as needing wastewater handling solutions. In 2004, an engineering firm was hired to coordinate planning and development for systems in Bovina, Hamden, Bloomville, Boiceville and DeLancey. Construction started in Bovina on a community septic system with 12 leach fields and two 25,000-gallon settling tanks to serve 74 households and commercial structures. A manual to assist municipalities in planning and developing such projects was produced in conjunction with the Hamden project using a grant from the Appalachian Regional Commission. GIS and/or aerial mapping was conducted for Hamden, DeLancey, Bloomville and Boiceville.

EFC assisted the Catskill Watershed Corporation (CWC) with reviewing a request for qualifications and proposal (RFQ/RFP) for professional services that were used to select a consultant for the Community Wastewater Management Program. The consultant is currently developing the program that will address the wastewater issues in five more communities listed in the Watershed Agreement. The CWC's Community Wastewater Management Program will utilize the Strategic Wastewater Planning Study prepared by EFC as a guide for the planning activities in this new program.

EFC made some 55 disbursements during 2004, amounting to more than $19.65 million paid to New Infrastructure Communities for eligible program costs. To date, more than $50.56 million has been disbursed for New Infrastructure projects.

Septic System Rehabilitation and Replacement

Established under paragraph 124 of the Watershed Agreement, the $13.6 million septic rehabilitation program repairs or replaces failing septic systems serving single- or two-family homes in the WOH portion of the Watershed, ensuring that wastes from these systems do not enter the City's water supply. Phase II of this program, funded with an additional $15 million from the City, was approved as part of the 2002 FAD, which also created a Septic Maintenance Program, funded at $1.5 million.

During 2004, the Septic System Rehabilitation and Replacement Program was expanded once again, to include approximately 1,300 properties whose septic systems are located within 100 feet of a watercourse or within 500 feet of a reservoir or reservoir stem. A total of 251 septic system repairs and replacements were paid for through the program in 2004, bringing the total number of systems repaired or replaced since 1997 to 1,925.

Following a pilot period, the Septic Maintenance Program which provides pump-outs and inspections of residential septic systems serving one- and two-family households was instituted Watershed-wide in 2004. The program is restricted to properties which received CWC-funded septic systems at least three years previously. As of December 31, 2004, 64 septic tanks were inspected and pumped, with homeowners reimbursed 50% of eligible costs.

Septic tank replacement underway at a home in the Town of Wawarsing, Ulster County.

A research project, the Septic Monitoring Program, began full construction in 2004 with the installation of the program's first 14 alternative and conventional residential septic systems. Partially funded by a DEC grant from federal Safe Drinking Water Act funds, the project is coordinated by the CWC. Five septic treatment technologies will be installed on up to 38 sites, and 20 of those sites will be selected for evaluation to determine which systems offer the most effective treatment for varying soils and terrain. An advisory committee made up of members of the regulatory and scientific community is consulting with CWC staff on sampling and testing protocols and other aspects of the project.

Stormwater Infrastructure Retrofits

Pursuant to paragraph 125 of the Watershed Agreement, existing stormwater infrastructure problems are addressed through the Stormwater Retrofit Program. Under the Watershed Agreement, the City of New York committed $7.625 million to support this program which funds the design, construction, implementation, and maintenance of stormwater control measures or "best management practices" (BMPs) to address problems from existing stormwater runoff within the WOH Watershed.

Ralph Swenson of the NYC DEP inspects a CWC-funded silt retention basin, part of a Stormwater Retrofit proiect designed to treat runoff from an expanded parking lot at the Clark Companies campus in Delhi, Delaware County.

The 2002 FAD required the City to continue this successful program, and the City committed an additional $6.3 million to the CWC to sustain historic project activity levels. The City also agreed to develop and fund a new component of the Stormwater Retrofit Program that will support a community-wide stormwater infrastructure assessment and planning program, committing $1.25 million to support this initiative.

Eight projects costing $531,537 were completed under the Stormwater Retrofit Program in 2004. They addressed stormwater runoff at three municipal road projects and two business sites, and made possible the purchase of programmable ice controls for a fleet of county-owned sand and salt spreader trucks. In an effort to facilitate stormwater grant applications, a rule change authorized in 2004 dispensed with the annual retrofit grant deadline to allow proposals to be submitted anytime during the year.

Ten Community-Wide Stormwater Infrastructure Planning and Assessment Grants were awarded in early 2004 in the first round of this new assessment initiative. Funds will help municipalities identify infrastructure problems and prioritize improvement and repair needs, so that they can apply to CWC for Stormwater Retrofit funds to implement necessary improvements.

Stormwater Research

The CWC is working with DEP to evaluate effluent water quality in three stormwater treatment devices installed at different locations using Stormwater Retrofit Program funds. Effluent samples will be analyzed to determine pollution removal efficiency of these distinctly different devices.

Future Stormwater Controls

As provided in paragraph 128 of the Watershed Agreement, the City of New York provided $31.7 million to fund new stormwater measures required by the Watershed Rules and Regulations, but not otherwise required by Federal or State law in the WOH Watershed. This program funds the design, construction, implementation, and maintenance of stormwater controls required for new construction.

Six projects funded in whole or in part by the CWC were closed out in 2004 and early 2005. CWC reimbursed project owners $452,258 for expenses associated with these stormwater controls. The projects ranged from a community bicycle path to a library expansion project to a new public safety building. CWC also began to reimburse operation and maintenance expenses for some of its previously-funded stormwater control systems in order to maintain their efficiency and extend the useful life of these projects.

A foundation drain was part of an extensive Future Stormwater project funded by the CWC at the new Windham Country Store, Greene County.

Stream Management

Under paragraph 127 of the Watershed Agreement, the City committed $3 million for a stream management program to work in partnership with the WOH Soil and Water Conservation Districts (SWCDs) to develop stream management plans and stream restoration demonstration projects in priority streams. In light of the tremendous success of the Stream Management program, the current FAD greatly expands this program. The City of New York committed an additional $22.8 million for this endeavor.

The objective of the Stream Management program is to increase stream system stability through development and construction of demonstration projects, and to enhance long-term stream stewardship through increased community participation.

Stream restoration projects use bioengineering and natural channel design to reduce erosion and potentially decrease turbidity, lessen the threat of flood damage from erosion and improve stream ecology. The Stream Management Program (SMP) made substantial progress in 2004 towards accomplishing its extensive set of stream management plans and demonstration restoration projects. In 2004, management plans were completed in three additional sub-basins, bringing the total to five and extending the geographic area covered by a plan from 5 percent to 31 percent of the Catskill and Delaware Watershed. The SMP is on target for completing a total of nine management plans encompassing 65% of the West of Hudson watershed by April 2007.

Despite a second consecutive extremely wet field season, six of the planned thirteen demonstration projects are completed at this time.

Schedule for Stream Management Plans and Demonstration Restoration Projects in Priority Watersheds

Requirement	*Due Date*	*Status*
Broadstreet Hollow Stream Management Plan	12/31/02	Complete
Chestnut Creek Stream Management Plan	12/31/03	Complete
• Town Hall/Grahamsville Restoration Project	12/31/03	Complete
Stony Clove Creek Stream Management Plan	12/31/03	Complete
• Beecher Smith Property/Lanesville (T) Restoration Project	12/31/04	Complete
Batavia Kill Stream Management Plan	12/31/02	Complete
• Red Falls Restoration Project	12/31/06	In process
• Big Hollow Restoration Project	12/31/03	Complete
• Red Falls Monitoring Report	12/31/10	In process
West Branch Delaware Stream Management Plan	12/31/04	Complete
• Town Brook/Post Property	12/31/04	Complete
West Kill Stream Management Plan	12/31/05	In process
• Restoration Project (undetermined location)	12/31/06	In process
Esopus Creek Stream Management Plan	12/31/06	In process
• Woodland Valley	12/31/03	Complete
East Branch Delaware Stream Management Plan	12/31/07	In process
• Restoration Project (undetermined location)	12/31/07	In process
Schoharie Creek - including East Kill Stream Management Plan	4/30/07	In process
• Restoration Project (undetermined location)	12/31/07	In process

Regulatory Upgrade Program

Under paragraph 141 of the Watershed Agreement, the City pays the costs, including future added Operation and Maintenance (O&M) costs, of upgrades to existing WWTPs in the Watershed that are required by the Watershed Rules and Regulations. For the WOH portion of the Watershed, the City also agreed to provide up to $5 million to help pay for upgrades required under State Pollutant Discharge Elimination System (SPDES) requirements.

When complete, wastewater treatment plant (WWTP) upgrades will provide highly advanced wastewater treatment in the Watershed. The task of coordinating these complex projects with WWTP owners in the Watershed is enormous. Many of the owners are restaurateurs, hoteliers, camp operators, school administrators and managers of recreational facilities, not professional WWTP operators and construction specialists. DEP has proceeded diligently with this vast undertaking and provided step-by-step guidance on a host of engineering, operating, contracting and regulatory issues.

The 2004 focus was on completing upgrades for those WWTPs that had yet to implement Start Up and Performance Testing (SPT) or finalize an O&M Agreement. By the end of 2004, plants accounting for 97% of the total WOH flow had either achieved Functional Completion or were in the construction stage of the program. The remaining plants were in the process of finalizing their upgrade design.

EFC primarily focused on the WOH Regulatory Upgrades covered under the November 2002 FAD, as well as continuing work on several EOH projects. During the year, seven additional WOH projects completed construction and five EOH projects were authorized by DEP to begin construction. The seven completed WOH projects represented approximately 5% in additional permitted flow, bringing the total WOH flow which has been upgraded to new regulatory requirements to approximately 88%. The percentage increase was more modest than in the past because these WOH facilities are generally smaller facilities, such as seasonal resorts and individual businesses, compared to the higher priority, larger projects completed in past years.

EFC continued to assist the owners of several projects who had either selected a new engineer or had changed treatment technology. As discussed in last year's report, several projects were not progressing acceptably and the owners opted to hire a new engineer to assume responsibility for moving the project forward, starting with completion of upgrade design. Also, several other projects changed treatment technology to better accommodate the anticipated operating conditions. Though this created a temporary set-back in schedule, these projects continued to progress during 2004 with revised designs, which are expected to be completed in 2005.

With steady progress made by the NIP communities of Hunter and Windham, six of the seven Regulatory Upgrade projects identified for connection with these two communities initiated planning for their connections with the newly available community sewage collection systems. It is anticipated that all six will be connected in 2005, as Windham and Hunter startup their new wastewater treatment plants and complete the construction of their collection systems.

During 2004, EFC assisted DEP with the negotiation of seven O&M agreements for publicly-owned wastewater treatment plants in the Regulatory Upgrade Program. The negotiations are started once a facility has initiated construction. DEP is obligated to pay O&M costs associated with the upgraded components of the wastewater treatment plant.

EFC made some 297 disbursements during 2004, amounting to approximately $17.60 million paid to WWTP owners for eligible program costs. To date, the Regulatory Upgrade Program has paid approximately $83.34 million to upgrade and improve WWTPs in the NYC Watershed.

Phase II Municipal Separate Storm Sewer System program within the east of Hudson portion of the New York City Watershed

Stormwater runoff is generally viewed as a major source of non-point source pollution in streams, rivers, lakes, and reservoirs throughout the Nation. The New York City Watershed is no exception.

The United States Environmental Protection Agency's (EPA) Stormwater Phase II Rule requires that areas designated as MS4s develop a stormwater management program to comprehensively address stormwater runoff. The goal of the MS4 stormwater management program is to improve the nation's waterways by reducing the amount of pollutants that stormwater transports into storm sewer systems and into our waterways during storm events. Common pollutants transported by stormwater include oil and grease from roadways, pesticides from lawns, sediment from construction sites, and trash. When these pollutants are deposited into nearby waterways through MS4 discharges, they can severely impact the receiving waterbody and result in contaminated drinking water supplies, degraded aquatic life and wildlife habitat, reduced aesthetic quality and recreational use of the resource.

In 2000, the EPA promulgated Phase II of its Stormwater Rule. The Phase II Stormwater Rule extends to certain "small" MS4s which includes the entire EOH portion of the New York City Watershed. Under the Phase II Stormwater Rule, MS4s are required to develop a stormwater management program that is comprised of six elements that, when implemented in concert, are expected to result in significant reductions of pollutants discharged into receiving waterbodies.

During 2003, DEC issued statewide Construction Activity and MS4 permits. In conjunction with this initiative, DEC hired the Center For Watershed Protection (CWP), to assist in developing a strategy for addressing stormwater runoff within the EOH portion of the New York City Watershed. The CWP was charged with identifying additional measures above and beyond the statewide MS4 program requirements that could be implemented in order to address water quality issues within this area.

The CWP prepared a report which contained a number of detailed recommendations on what additional requirements may be necessary to address stormwater runoff and phosphorus concerns within the EOH Watershed. DEC in turn convened a Watershed stakeholder group to review the CWP's recommendations and requested comments and feedback from the Watershed stakeholder group on how it should proceed.

DEC met with the Watershed stakeholders and municipal officials from Putnam and Westchester Counties throughout 2004, and received a number of comments on its initial proposal. The DEC is currently in the process of reviewing these comments and plans to reconvene the Watershed stakeholders and Municipal Officials to present its final proposal. This should be completed in 2005.

Federal Funding

Safe Drinking Water Act (SDWA) — *Recognizing the importance of ensuring that all sectors of government (federal, State, and local) effectively commit to the implementation of the Watershed Agreement, paragraph 164 references an enhanced water quality monitoring and surveillance program. Governor George E. Pataki worked with members of the New York Congressional Delegation, particularly Congressmen James T. Walsh and Sherwood L. Boehlert, to fashion appropriation language authorizing funding to undertake the water quality monitoring and surveillance program. Resulting from all their efforts, the Safe Drinking Water Act of 1996 includes language directing the Environmental Protection Agency to monitor the effectiveness of the Watershed Agreement by authorizing up to $15 million annually over seven years to demonstrate compliance with the Watershed Agreement. This authorization expired in 2003 and through all the hard work of Governor Pataki and the New York State Congressional Delegation, the Safe Drinking Water Act was re-authorized in 2004 for another seven years at $15 million annually.*

Safe Drinking Water Act funding requires a 50 percent non-federal match.

Water Resources Development Act (WRDA) *— In addition to the Safe Drinking Water Act, Governor George E. Pataki also worked with members of the New York Congressional Delegation to include language in the Water Resources Development Act authorizing funding to undertake water quality related construction projects within the Watershed. The Water Resources Development Act of 1996 includes language directing the United States Army Corps of Engineers to work with the State of New York and financially support water quality improvement projects and ongoing watershed protection efforts identified in the Watershed Agreement. Resulting from the Governor's and New York State Delegation's efforts, the Water Resources Development Act of 1996 contains language authorizing up to $42.5 million to assist local governments in their implementation of activities to protect the Watershed. Through these funds, upstate communities have been able to construct or improve much needed sewage treatment facilities, address stormwater runoff and support numerous other important water quality improvement initiatives.*

Water Resources Development Act funding requires a 25 percent non-federal match.

The federal appropriations under the Safe Drinking Water Act and the Water Resources Development Act since Federal Fiscal Year 1997 are demarcated below:

Federal Appropriations for the New York City Watershed

Federal Fiscal year	SDWA	WRDA
1997	$ 1.0 million	0
1998	$ 2.0 million	$ 5.0 million
1999	$ 2.0 million	$ 2.0 million
2000	$10.0 million	0
2001	$ 8.0 million	$ 3.0 million
2002	$ 3.0 million	$ 3.0 million
2003	$ 5.2 million	0
2004	$ 5.0 million	$ 2.0 million
Total	**$33.2 million**	**$15.0 million**

A brief overview of all SDWA and WRDA projects funded to date is included as Appendix A.

Freshwater Wetlands Map Amendments within the New York City Watershed

Wetlands play a critical role in maintaining and enhancing water quality. In New York State, not all wetlands are directly regulated under Environmental Conservation Law Article 24 Freshwater Wetlands Act. Only those wetlands 12.4 acres or greater and smaller wetlands identified as of "unusual local importance" (ULI) that are specifically identified on the Department's Article 24 Freshwater Wetlands Maps, are regulated by the State of New York. The Act also allows the DEC to regulate activities within 100 feet of the wetland.

To ensure the Department has the most accurate Article 24 Freshwater Wetlands Maps within the New York City Watershed, in 1998, the DEC undertook a comprehensive wetland remapping effort in the WOH Watershed.

In 2004, the DEC completed its remapping effort in Westchester County. This effort resulted in the addition of 3,363 acres of wetlands and includes 36 new wetlands greater then 12.4 acres, 75 smaller wetlands identified as of unusual local importance, and amendments to 72 existing State-regulated wetlands. Concurrently, the DEC commenced its Watershed remapping field work in Putnam and Dutchess Counties and plans to finalize this initiative in 2005.

Typical wetland area being added to the State's Article 24 regulatory maps through the map amendment process.

The WPPC Technical Advisory Committee (TAC) Report on Total Maximum Daily Loads (TMDL)

As part of the WPPC's "Priority Recommendations for MOA Programs", developed during it's Five Year Review of the Watershed Agreement, the WPPC TAC was asked to:

- Review the Interim Phase II Non Point Source Total Maximum Daily Load (TMDL) Implementation Report prepared by DEC.
- Make recommendations to DEC on how to finalize the Interim Report to ensure the development of individual basin plans for phosphorus TMDL implementation (EOH).
- Identify how local communities will be involved in developing site specific projects to achieve TMDL goals, and
- Suggest a mechanism for evaluating the effectiveness of the implementation program over time.

The TAC reviewed documents and materials from federal, State, and City sources, existing regulations, and numerous other associated technical/institutional materials. During 2004, following thirteen months of study, the TAC issued its report to DEC.

In brief summary, the TAC report discusses:

- Technical guidelines for allocating Phosphorus load reductions in the Croton System.
- Differing scenarios for allocations, based on more stringent wasteload allocations for WWTP's.
- A calculation of existing Phosphorus loads, and necessary load reductions by reservoir basin, and by municipality.
- The technical influence of "additional considerations", such as Northern Westchester Diversion, and changes/fluctuations of reservoir Phosphorus concentrations.
- Information and management practices required to develop individual management plans for each basin.
- Particulars of a watershed-wide outreach and stakeholder information program.
- Technical assistance and training to wastewater treatment plant operators to optimize phosphorus reduction capabilities.
- The inclusion of recommended minimum conditions in any applicable Stormwater Permit for EOH MS4's.
- An MS4 identification program.
- A recommendation that the TAC should assume the role of a "facilitative oversight body" in order to provide an ongoing, technically oriented, implementation mechanism to assist DEC and local communities in meeting TMDL goals.
- Specific time frames for implementing all recommended actions.
- Possible funding sources for implementation costs.
- Elements of a plan for evaluating and monitoring the effectiveness of the implementation program.

DEC is currently conducting outreach with respect to an active TMDL implementation program.

The report is available on the WPPC website www.dos.state.ny.us\watershed\wppc.htm.

Finally, our thanks go to the TAC members who worked with their usual diligence and expertise:

TAC MEMBERSHIP:

Prof. Nicholas L. Clesceri, Ph.D, P.E., TAC Chair
Environmental Engineering Program Director
Rensselaer Polytechnic Institute

James Luke, P.E., Chief Engineer
NYC Department of Health

Jack Dunn, P.E.
NYS DOH

René VanSchaack, Exec. Dir.
Greene County Soil/Water Conservation District

Kenneth Markussen, P.E.
NYS DEC- Division of Water

Michael Budzinski
Putnam County Health Department

Bridget Barclay
Assistant Director
Dutchess Co. Water & Wastewater

Dean Palen, Public Health Director
Ulster County Health Dept.

Jeffrey Gratz
NYC Watershed Team Leader
US Environmental Protection Agency

Michael Principe, Ph.D, Deputy Commissioner
NYC Department of Environmental Protection

Gerard E. Mulligan, Commissioner
Westchester County Department of Planning

Alicia Terry
Director of Planning
Schoharie County Planning & Development Agency

Ralph Huddleston, Senior Vice President
Carpenter Environmental Associates

Luis R. Marcos, M.D., President
NYC Health & Hospitals Corporation

Other report contributors:

Kimberlee Kane, Ph.D
NYC Department of Environmental Protection

Michael Meyer
NYC Department of Environmental Protection

John Lynch
Director of Planning
Putnam County Planning Department

Sabrina Charney
Westchester County Department of Planning

Maureen Krudner
US Environmental Protection Agency

Land Acquisition

Article III of the Watershed Agreement, the Land Acquisition program, is one of the most effective and crucial tools for permanently protecting the City's drinking water supply. The goal of the Land Acquisition program is to ensure that undeveloped, environmentally sensitive Watershed lands remain protected. The Land Acquisition program allows the City to purchase title to, or conservation easements on, environmentally sensitive undeveloped lands.

The City must pay fair market value for these lands and is responsible for municipal property taxes once they are under City ownership. Most importantly, the City has agreed to only acquire land from willing sellers, and to notify Watershed towns or villages of its intent to purchase properties within their borders. The Watershed Agreement stipulated that the City will seek a 10-year water supply permit from DEC to acquire additional Watershed lands. On a priority basis, over time, the City will solicit owners of 355,050 acres of eligible land for the Catskill and Delaware Watersheds and has committed $250 million for the purchase of lands within these Watershed areas. In the Croton Watershed, the City originally agreed to expend $10 million for land acquisition, and in 2004 committed an additional $25 million. The State of New York has committed a total of $7.5 million to acquire water quality sensitive lands within the Croton Watershed.

With the issuance of the 2002 Filtration Avoidance Determination, the City was requested to set aside an additional $50 million for land acquisition above and beyond the funds already committed under the Watershed Agreement.

During 2004, there were both formal solicitation goals to meet as well as "resolicitation" goals, as required under the 2002 FAD. During 2004, DEP completed solicitation of 47,800 acres, the final solicitation goal required by both the FAD as well as the Watershed Agreement and Water Supply Permit. This brings total acres solicited to 385,762, substantially beyond the eight-year requirement of 355,050. In addition, the DEP-established internal annual goal of resoliciting owners of 89,000 acres was surpassed by 10,000 acres.

During the last eight years, the City has increased its land holdings dramatically compared with pre-1997 ownership patterns. In Rondout, a high priority basin, the City has multiplied its buffer lands by five times. In West Branch/Boyd's Corners, another critical basin, buffer lands have been multiplied by 12, while in Schoharie there has been more than a 9-fold increase; in Ashokan, City-owned buffer lands have almost been tripled.

At of the end of 2004, a total of 700 purchase contracts comprising 51,454 acres were secured by DEP program-wide (signed to purchase contract or closed) in the Cat/Del at a cost of $141 million (excluding "soft" costs of roughly $14 million). Of these, 590 projects totaling 41,349 acres have been acquired (closed), with the remaining 110 projects totaling 10,105 acres under purchase contract. Of these, 590 projects totaling 41,349 acres have been acquired, with the remaining 110 projects totaling 10,105 acres under purchase contract.

During 2004, 14 easements totaling 2,584 acres were signed to purchase contract by DEP and 10 easements totaling 1,342 acres were closed. This brings DEP's easement program in the Cat/Del to 53 easements totaling 8,245 acres closed or under contract.

In 2004, the DEC purchased a conservation easement on an 111-acre parcel in the Town of Lewisboro, Westchester County and purchased a 291

acre parcel in the Town of Patterson, Putnam County. The Lewisboro parcel consists of five old field habitats and contains over 50 percent wetlands. The parcel will be open to a wide array of passive recreation activities including hiking, birdwatching and horseback riding.

The Patterson parcel is located within the Great Swamp, which is one of the largest freshwater wetland in New York State and is the largest wetland of its type in southeastern New York. The Great Swamp flows kirectly into the East Branch Resevior. In addition to providing critical water quality protection, this parcel retains vital habitat for avian and aquatic species, and is an outstanding educational and recreational resource.

DEC also received a second batch of conservation easements from the City of New York. This submission covered approximately 130+ parcels throughout the Watershed. The DEC is currently working with the Office of the Attorney General in processing these easements and expects them to be executed and recorded in 2005.

Recreational Opportunities

The undeveloped lands that the City owns or is purchasing can provide tremendous recreational opportunities for outdoor enthusiasts. In fact, for many of the Watershed communities, such activities represent a way of life that they would like to see continued. Yet, the City's priority for managing these lands is to ensure that they have adequate security to prevent anything from adversely impacting the City's water supply. Thus, it is compelled to carefully evaluate potential recreational opportunities. The City requires permits, which are available at no cost, for recreational users of its lands.

The City continued to make lands available in 2004 under its access permit system. Currently, there are almost 83,437 valid access permits, with over 9,756 DEP hunting tags issued in 2004. The amount of lands available to the public continued to increase with a total of 69,802 acres open for various uses.

In 2004, hunting access was made available on 32,788 acres of DEP lands. The City has also continued cleaning up abandoned boats along the shores of the reservoirs, and is in the process of updating its rules and regulations for recreational use.

Sporting Advisory Committees (SAC)

Paragraph 115 of the Watershed Agreement created an EOH SAC that reports to the Council, and paragraph 118 created a WOH SAC that reports to the CWC. The Committees make recommendations to the City regarding potential recreational use opportunities on newly acquired lands.

In addition to generating recommendations to DEP regarding appropriate recreational uses for properties acquired under the City's Land Acquisition program, SAC meetings provide a valuable opportunity to interface with DEP Land Acquisition and Stewardship staff to discuss concerns and ideas relative to the entire process of recreational use. It also allows SAC members to bring local community concerns and preferences to the attention of DEP staff. During 2004, DEP continued the process of updating its Rules and Regulations for Recreational Use of City-Owned Property, and completed the associated public outreach process. Also, the SAC reviewed 10 parcels submitted by DEP for acquisition totaling 254 acres plus two parcels for conservation easements of 178 acres during 2004.

Master Planning and Zoning (MP&Z) Incentive Awards Program

The MP&Z program was established pursuant to Paragraph 152 of the Watershed Agreement and is administered by the Department of State. The program is designed to aid WOH municipalities "in the development of community development tools and any necessary local laws to enhance Watershed communities while protecting water quality". Eligible projects include preparation or updating of a comprehensive plan, establishment or revision of community development tools and local laws, and the creation of a strategic capital investment management plan for hamlets, villages, and other potentially developable areas within the Watershed.

This program was expanded to the EOH Watershed in its fifth year and has now awarded $1,405,000. The fourth and fifth rounds have also included projects centered on stormwater runoff management and increase eligible individual project funding from $10,000 to $25,000.

To date, 39 of 55 eligible WOH and 18 of 26 eligible EOH communities have participated, each receiving funding under at least one of the three flexible categories. To be eligible, a municipality need only have a portion of its land area within the Watershed. The MP&Z Program, along with its technical assistance component, has been instrumental in enabling the communities to leverage additional funds, recruit professional services, and develop strategies which strengthen the economy while protecting water quality. Below are four success stories from different Watershed communities.

Lewisboro, Westchester County (EOH)
The Town of Lewisboro developed and adopted environmental control ordinances which have a direct bearing on land conservation, protection of sensitive natural resources, water quality protection, and preservation and protection of wetland and watercourses, and which are aimed at reducing adverse environmental impacts associated with uncontrolled or poorly planned development.

The Town of Lewisboro also used MP&Z to update their 1985 Comprehensive Plan by establishing an Open Space Plan component. This also provided a basis for the development of specific zoning and environmental regulatory tools related to maintaining and protecting water quality conditions within the Town, the NYC Watershed lands and Westchester County.

New Castle, Westchester County (EOH)
The Town of New Castle used its Geographic Information System (GIS) to plot all storm water related infrastructure located in the New York City Watershed and the Indian Brook Watershed. Approximately three quarters of New Castle lies in the NYC watershed. Capturing field data and plotting the information on a GIS based system enabled the Town to manage its stormwater facilities, assuring that long term operation and maintenance is properly planned and implemented.

Roxbury, Delaware County (WOH)
The Town of Roxbury is a premier Watershed community because it has promoted a sense of place through history, recreation, tourism, culture and the arts and enhanced the region's economic health without compromising water quality protection. Foremost in this effort is the revitalization of Kirkside Park, for which the Town received $10,000 under MP&Z to undertake a feasibility study for the park's reconstruction. Roxbury also received $10,000 to update its comprehensive plan, $15,000 for a strategic capital investment plan for two historic barns adjacent to the park, and $15,000 to develop a wellhead protection plan.

At the time the feasibility study to reconstruct the park was funded and undertaken, very little of the park's original design remained. Yet, a poll of the Town's residents underscored the widespread support to return the park to it's original splendor of 100 years ago. The Town engaged the services of a historic landscape architect to ensure the integrity of restoration was in keeping with original design. Officially titled *Kirkside Park: Historic Analysis, Existing Conditions, and Schematic Planning*, the study outlines the necessary steps to again afford the public the enjoyment of this historic and centralized civic greenspace. Project components are divided into the path system, the bridges, the gazebo, the retaining walls, the plantings, the soccer field rehabilitation, and the rest rooms. Restoration tasks and associated cost estimates are outlined, providing a sense of which parts of the project could be accomplished by volunteers.

Since completion of the study, the Town has incorporated the goals of the park's revitalization into the comprehensive plan, and has leveraged over $600,000 in grant funds and cash contributions into the park's restoration. Accomplishments include the construction of five rustic bridges, 1000 lineal feet of dry-laid stream bank walls, 2500 lineal feet of walking paths, a regraded and restored ballfield, and a large portion of the horticultural restoration. The list of individual and business contributors exceeds 600 and the in-kind volunteer time is estimated to be over 10,000 hours.

Hobart, Delaware County (WOH)
This village along the West Branch of the Delaware River has updated both it's comprehensive plan and zoning law using $15,000 from MP&Z. A major goal of the plan is to improve the quality of life in the village center and attract more employees of Tyco Healthcare, a major pharmaceuticals manufacturer located in Hobart, to live in and near the village. Although the company employs over 600 people, many of these workers do not live in the village.

"Each community's unique and diverse stories are part of the larger chapter of American heritage, culture and values. It is by visiting and experiencing these special places that we have an opportunity to touch the past, and can best understand how the past touches us." Gale Norton, Secretary of the Interior from the press release designating Roxbury as a Preserve America Community.

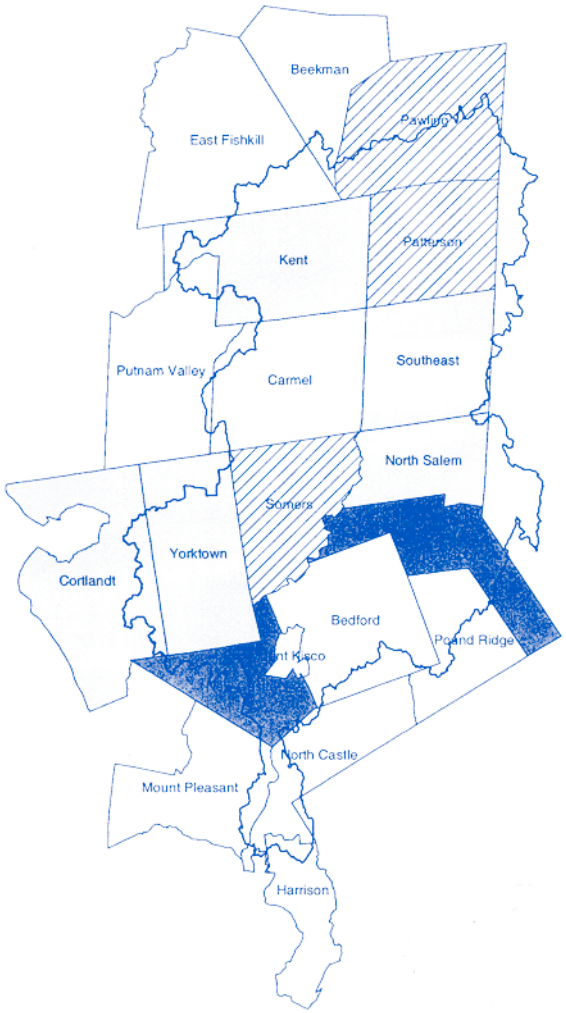
The comprehensive plan has identified the need to enhance the appearance of the "Central Square", or heart of the downtown. In support of this strategy, Hobart was awarded a Technical Assistance Grant in the amount of $12,250 from the Governor's Office of Small Cities.

These funds are being used to advance landscape and streetscape projects along Main Street and Railroad Avenue in the Central Square district. Central Square occupies a key location between Tyco and Main Street, and it incorporates Memorial Park, the Community Center, the newly constructed Town of Stamford offices, and a portion of the Catskill Scenic Trail. Similar to Roxbury, the presence of the Scenic Trail in Hobart helps diversify the sense of place and brings travelers into the downtown area.

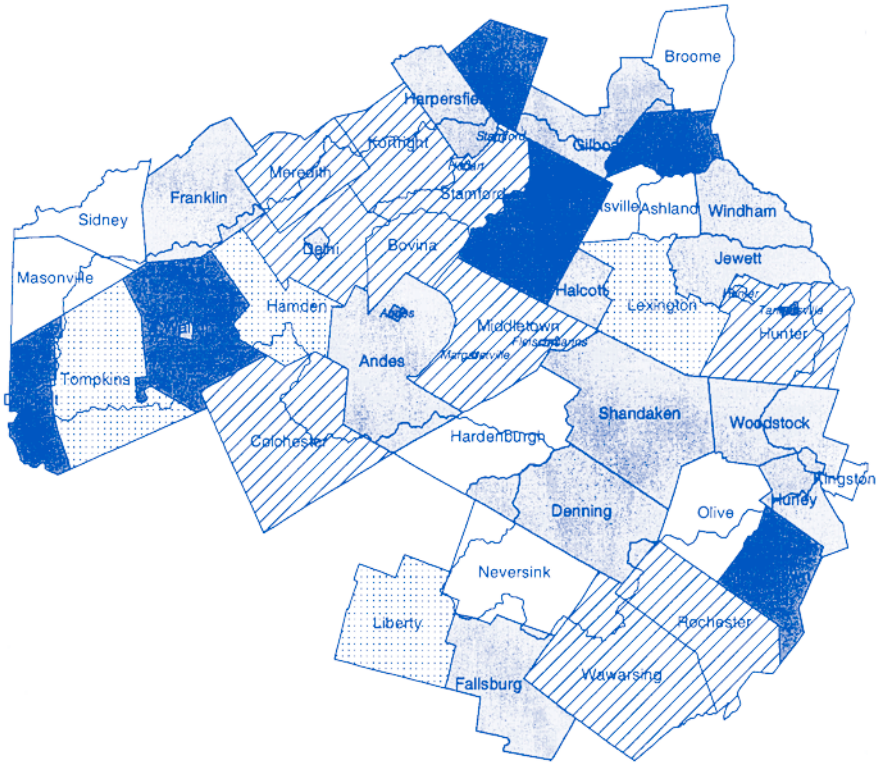
While the community of Hobart recognizes there is much work to accomplish in order to fully realize the visions in its comprehensive plan, it is also motivated by the progress made so far.

Funding Awards of the Master Planning and Zoning Incentive Award Program

East-of-Hudson Watershed (2003-2005)



West-of-Hudson Watershed (1999-2005)



Legend

- 0 $0
- 1 $1 - $10,000
- 2 $10,000 - $20,000
- 3 $20,000 - $50,000
- 4 $50,000 - $105,000
- WOH Watershed

Map produced by the Catskill Watershed Corporation and the New York State Department of State

Sources: NYS DOS MP&Z Program, NYS Legislative Commission on Rural Resources – A Survey of New York State Municipalities: Land Use Planning and Regulations.

Disclaimer: Catskill Watershed Corporation and New York State Department of State do not warrant or make any representation as to the accuracy of the information, which is subject to change without notice.

The Catskill Fund for the Future (CFF)

The CFF was created in paragraph 135 of the Watershed Agreement and is administered by CWC. Initially capitalized with $59.7 million from the City, the CFF provides loan and grant support for environmentally sensitive economic development projects in WOH Watershed communities.

The CFF continues to promote environmentally sensitive growth opportunities in WOH Watershed towns. In 2004, 18 loans valued at $3,467,000 were closed for projects which are expected to create 97 jobs over the next three years. Funds leveraged from other sources by these loans totaled $7,461,000, bringing the total investment of loans closed in 2004 to $10,928,000.

Loans ranged from $50,000 to $1 million, and were made to a variety of businesses, including two sports equipment suppliers, a well drilling company, a refuse and recyclables handler, a veterinarian, a meat and seafood wholesaler, several restaurants and motels, two convenience stores, and an auto body specialist. One regional hospital obtained a loan for an expansion project, and a non-profit revitalization corporation secured funds to purchase a new railroad car for the tourist excursion it operates.

As of December 31, 2004, 106 loans totaling $20,350,000 had been issued by the CFF since 1998.

In addition to the loan program, the CFF also awarded 26 Economic Development Grants in 2004. Proposals totaling $722,896 were funded to assist businesses, non-profit entities and municipalities planning projects to create or retain jobs, revitalize hamlets and main streets, spur cultural activity and assist natural resource-based industries. Grants will fund historic structure restorations and museum improvements, community signage, new façades, programming at two community centers, and assistance to art and theater organizations. Funds were provided to a farm for development of a distribution system for organic products, and to a food purveyor for a new truck. Assistance also went to a hotel to remediate a failed septic system while awaiting hook-up to a new municipal wastewater system.

In 2004, CWC decided to suspend the Grant Program because low-interest rates reduced interest revenue generated by the CFF, such revenue being used to fund the grant program. The suspension will prevent further erosion of the fund, and allow time for previous grant projects to be completed and final reports to be issued.

2004 Annual NYC Watershed Science and Technical Conference

One of the recommendations resulting from the WPPC Executive Committee's Five Year Review of the New York City Watershed Agreement in 2002 was to hold an annual conference to showcase the unprecedented amount of constantly developing science and technology in the New York City Watershed.

Thus the Annual NYC Watershed Science and Technical Conference brings scientists together to present research findings and data, to enhance technology transfer, and to increase coordination among the array of public and private entities working with Watershed science. It is hoped that such a forum will continue to provide a unique annual opportunity to pass along important scientific information to the public, interested parties, and other scientists working in the NYC Watershed and in similar arenas across the nation.

The second annual NYC Watershed Science and Technical Conference was held on September 21st and 22nd at the Fishkill Holiday Inn and Conference Center, and was a resounding success thanks to our partners and sponsors at DEC, DOH, DEP, CWC, the New York Water Environment Association (NYWEA) and the American Water Works Association (AWWA).

Attendance increased for the second straight year with 277 registrants for the two day event, including scientists, engineers, State and federal government agencies, local municipal officials and water and wastewater operators.

Participants heard a variety of programmatic updates from regulatory agency representatives and watershed partner entities, along with the presentation of 40 abstracts of new and emerging science developed primarily within the NYC Watershed. As a result of a nationwide call for abstracts earlier in the year, many more abstracts were submitted than could be presented, and the WPPC TAC was again called upon to select those to be used for the scientific agenda. This year presenters came from as far away as Boston, Florida and Ohio. A Compendium of Abstracts presented at the conference was designed and published by the Department of State, and distributed to all attendees.

The conference dinner program, "City Water Tunnel #3" - a one-woman play about work, water and the human spirit, written and performed by Marty Pottenger, was a highlight. Marty told the story, in the voices of workers and "Sandhogs", of the building of a new aqueduct for NYC's water supply.

There has been much positive feedback, and we have already begun the planning and site selection process for a bigger and better 3rd annual NYC Watershed conference, which will be back at the Fishkill Holiday Inn and Conference Center on September 21st and 22nd, 2005.

It is our hope that all who attended this year's conference were edified by the scientific data presented, and inspired by the dedication and hard work of those who, each day, advance our insight into the science of watershed protection.

Catskill Watershed Corporation (CWC)

Pursuant to paragraph 131 of the Watershed Agreement, the City provided $2 million, administered by CWC, for a public education program.

Public Information and Education Program

Twenty-three grants totaling $98,009 were awarded in 2004 to schools and organizations in the WOH Watershed and in New York City. Hundreds of students raised trout in classroom tanks and released them in upstate waters; learned about water quality and environment issues at outdoor education centers; planted tree seedlings along Watershed streams; constructed a wetland interpretive trail, established an after-school environmental conservation club and participated in other activities both in and out of the classroom. The program also provided a teacher training workshop, funded the rehabilitation of a popular theatrical presentation about the development of the City water system, and supported an oral history project documenting the involvement of several participants in the 1997 Watershed Agreement.

Outreach activities conducted by the CWC included sponsorship of a Watershed stream clean-up; coordination of the annual Catskills Local Government Day with the NYS Department of State; conducting two septic installation workshops for contractors; and distributing 4,000 bookmarks outlining stormwater pollution control tips for homeowners. In addition, the CWC installed road signs denoting the former locations of 26 communities claimed by New York City's WOH reservoirs.

New York City Department of Environmental Protection

In 2004, DEP introduced *Around the Watershed*, an 8-page newsletter mailed to the 80,000 property owners in the City's watershed and distributed at fairs and other community events. This publication offers stories about DEP's various water quality protection programs with an emphasis on their connection to the community and to residents' involvement. It will be produced regularly and is also available online at DEP's special watershed protection Web site, as are all other DEP printed materials.

In support of the Recreation & Stewardship Program, Spring and Fall editions of the *Watershed Recreation* newsletter were produced and mailed to the more than 50,000 DEP Access Permit holders and distributed at fairs and public events. In addition, a 64-page Hunting Guide, which included the Interim Conditions for Hunting on City-Owned Lands as well as maps of all the City-owned parcels open for hunting in the 2004 season, was prepared for mailing to the Access Permit holders who also received Hunting Tags.

Through the Watershed Office of Public Affairs *(WOPA)*, DEP takes a comprehensive approach to watershed education. DEP visits schools in New York City and watershed counties and offers students an educational, action-oriented, multi-disciplinary curriculum. DEP programs promote investigation, allowing students to analyze all factors, past and present, human and non-human, which affect the entire Watershed. DEP also organizes staff development for teachers, providing them with an opportunity to meet and work with DEP scientists, engineers, and environmental educators.

In 2004, *Trout in the Classroom* continued to be one of the most effective and popular classroom programs. DEP environmental educators visited over 40 schools in both East and West of Hudson watersheds. This program teaches stewardship and science through the rearing of brown trout. Classes receive hatchery-bred eggs in the fall and students monitor the life cycle of the fish and the water quality until the end of the school year

when the fish are then released into an appropriate stream. Through the aquaculture of brown trout, students discover the connections between aquatic systems, life cycles, water quality and drinking water.

DEP's watershed education program includes participation in major events in the region, especially county fairs. DEP's education staff provides visitors of these events with valuable information; offers workshops and demonstrations; and explains the role of DEP as a cooperative partner with its upstate neighbors and environmental groups. A variety of materials are distributed to the public including booklets, pamphlets and fact sheets about the water supply system, drinking water quality, the Whole Farm Program, wetlands, land acquisition and conservation easements, as well as other related materials. During the summer months, thousands of watershed residents visit the DEP education display booth, where they are presented with materials that explain the agency and its programs. In 2004, DEP participated in more than 50 events throughout the watershed.

Watershed Forestry

A Watershed Forestry Program, which promotes sustainable forestry in the WOH Watershed by providing education about BMPs for forestry to prevent water pollution, was established in paragraph 130 of the Watershed Agreement. This program also encourages private landowners to be good stewards of forest resources and educates the public about the role well-managed forests can play in protecting water quality.

East of Hudson Program

Putnam County Forestry Plan

Jeremy Shelbourne's first contact with the Watershed Agricultural Council's Forestry Program came in the mailbox: *Watershed Woodlands*, a semi-annual newsletter sent to landowners with ten or more forested watershed acres. For the last three years, this direct-mail piece has been sent to over 10,000 forest landowners to raise awareness about the values of the forest in keeping water clean and to encourage the development of written forest management plans.

After calling WAC's Yorktown Heights office, WAC forester Andy Hubbard joined the Shelbournes for a walk on their land in Southeast, a town in Putnam County. Their seventeen acres drain into some of the most pristine land in the Great Swamp area. Having owned their historic house on the site since the 1970s, their biggest challenge today is how to meet the rising tax bill on a parcel this size in their town. Later in the year, the Shelbournes took the opportunity to attend a landowner workshop held by WAC to see erosion control best management practices for forest roads "on the ground" at a local land club.

This year, the WAC Easements Program purchased easements on 9 farms, conserving over 3,350 acres of working watershed farmland. This brings the program's total conservation accomplishments to over 6,000 acres on farms in our communities.

The landowner goals for this plan were to use the property as open space, protect the natural resources (especially the native forest stands on the site), maintain the aesthetics of the site, and offset property taxes. A number of timber stands were identified in the plan, with recommendations for each including how to identify potential invasive species. WAC forester Andy Hubbard soon made a visit to the Shelbournes and advised them to become an American Tree Farm, a strategy that could potentially help ease their taxes.

And while the Nature Conservancy's Clough Nature Preserve sits to the north of this property, development pressure for septic-based apartments and housing is growing all around it at a brisk pace. As a result, the Putnam Land Trust has stepped in to preserve hundreds of acres in the area. With a good list of resource recommendations, the Shelbourne's forest management plan expanded their understanding of and contacts with other conservation players in the area.

Calling himself an optimist, Jeremy finds a lot of like minds in the community who appreciate the importance of land stewardship and are beginning to see the role that healthy forests play in the long-term health of the watershed— which also supplies his groundwater. He ended his story with this comment: "I have become aware of how important this tiny piece of land is." Many would agree that, for the next phase of Southeast's history, the best use for this forestland is in providing watershed protection.

West of Hudson Program

When asked to name a farm that would represent its accomplishments for 2004, WAC's Whole Farm Planning teams identified the Davis Farm. This 500-acre farm in Kortright operates as a dairy with about 90 cows and an equal number of young stock. The farm is run by Cecil and Carol Davis and their sons, Cecil Jr. and David, with the vision of maintaining a profitable, safe and attractive business that allows them the satisfaction of self-employment and working outdoors. At present, field crops of corn, alfalfa-grass, hay and silage are grown, with plans to expand if necessary to accommodate the younger generation if they choose to enter the business in the future.

One of the main goals of the Davis Whole Farm Plan was to improve manure handling. The Plan was created by the Davis' together with Garry Nightingale of USDA Natural Resource Conservation Service (NRCS) and WAC's Jim Hilson. To address high levels of phosphorus on the farm, the Whole Farm Plan called for the installation of a manure storage facility. With limited winter access to the fields, many of which were at high risk for erosion, the farm needed a safe place to store manure until spreading in spring.

To reduce the risks of pathogens like cryptosporidium and giarda from entering the water supply, calf health conditions were improved. Whereas before they were housed in a poorly ventilated area of the barn, separate hutches now keep the calves dry, happy and healthy while allowing the farmer to separate and spread young stock manure in lower risk areas.

The farm's Nutrient Management Plan maps out the most environmentally safe time and place to do that spreading, which can now take place a few times per year as opposed to everyday. Dale Dewing, Cornell Cooperative Extension Nutrient Management Team Leader, comments, "The Davis' have successfully followed their Nutrient Management Plan for the past few years, submitting their records every year for review, which has enabled them to accumulate a cost-share called the Nutrient Management Credit. They use this credit to offset the extra costs of owning and operating the manure handling equipment vital to carrying out the plan."

Excluding cows from the stream and stream banks was another main goal of this Whole Farm Plan. Through the Conservation Reserve Enhancement Program (CREP), the Davis' were able to install about 16.4 acres of riparian forest buffers along Wright Brook which flows into the West Branch of the Delaware River and eventually, the Cannonsville Reservoir. This entailed planting a variety of trees and shrubs on 11.8 acres including white pine, Norway spruce, white spruce and tamarack, as well as bayberry, cranberry, elderberry, and hazelnut.

In addition, an alternative spring-based watering system was established for the livestock, and fencing installed to direct them away from sensitive areas. Julian Drelich of USDA NRCS coordinated the project with Karen Clifford of Delaware County Soil and Water District who helped procure the plantings. "With the project now complete," Julian states, "the CREP area is a long, narrow stretch that protects all the watercourses on this farm."

To date, WAC and its partners have implemented over 3,500 best management practices on West of Hudson farms, including over 1,500 acres of stream buffers.

2004 WAC Highlights

Catskill Mountain Foundation, Inc., Hunter
WAC's partnership with Catskill Mountain Foundation (CMF) continued with a sponsorship of a second Wood Products Fair at the Mountain Culture Festival. The fair generates many commissions and business/ gallery leads for over 30 woodworkers from the Catskill region. CMF also used their grant award to host the Woodlander's Gathering which featured 3-days of educational programs for over 80 participants focusing on topics such as sustainable building, rustic design, and business writing.

Jonah Meyer, Kingston
Wood sculptor Jonah Meyer winterized a renovated, 1950's-era Service Station for use as a gallery/showroom for his and other local artists creations on Route 28 in Glenford. Funds will also allow Meyer to upgrade antiquated wood-working machinery in his Kingston furniture design workshop.

Romancing the Woods, Inc., Woodstock
WAC partnered with this nationally-recognized company to continue a marketing/advertising campaign, upgrade equipment and expand its product line to include peeled-bark interior furniture. Most of the cedar used in their designs is procured from the Catskill/ Delaware Watershed. Romancing the Woods, Inc.'s intricate gazebos, bridges and arbors are installed at several notable locations such as The Lion King Theatre at Walt Disney World and Frank Lloyd Wright's Fallingwater.

Katrock Woodworks, Grahamsville
Woodturner John Perrella blends various types of Catskill hardwoods, such as American beech, red maple, and black cherry into elegant patterns to create one-of-a-kind bowls. Through assistance from his forestry grant, Perrella sold out of his entire inventory at the regional craft shows he attended in 2004. The grant further assisted him in improving the safety of his workshop.

Howard Werner, Shokan
An acclaimed wood sculptor, Werner uses Catskill hardwoods unsuitable for conventional milling (i.e. crotched, burled, and spalted) to create various types of furniture and abstract designs with a chainsaw. Most notably, his works have appeared in the American Craft Museum and the Louvre in Paris, France. With his grant, he will be expanding a workshop and creating storage space to house wood and finished pieces in a temperature controlled environment.

Howard "Hoppy" Quick, Jr., Tree House Troll, Olivebridge
WAC continued a partnership with The Tree House Troll by costsharing a tool upgrade and the installation of a solar-kiln to improve the quality of his life-like, chainsaw bear carvings.

Alta Industries, Ltd., Halcottsville
In 2004, Alta became the first U.S. log home manufacturer to receive "Energy Star" certification for their efficient, energy-saving design. Alta is using its forestry grant to improve marketing efforts through web-based promotion and a virtual log home tour at www.altaloghomes.com. The grant also cost-shared the production of a new plan book for prospective customers and improved efficiencies through upgraded office technology infrastructure.

John Houshmand, Hobart / New York City
The WAC Forestry Program cost-shared the construction of a multi-lingual, online catalog at www.johnhoushmand.com to showcase the artist's designs. Houshmand networks with other woodbased businesses in the Catskills to procure and prepare wood for use in his self-titled "urban organic furniture". The pieces are finished and assembled at his workshop in the Watershed and then transported and sold through his showroom in Manhattan and several galleries in major cities in the US.

Steve Heller's Fabulous Furniture, Boiceville
Heller's quality reputation and a commitment to using locally harvested trees not suitable for traditional applications has warranted a new costsharing partnership to upgrade wood processing technology in his workshop. In 2004, Heller received several commissions from leads generated through the success of a previous forestry grant to build a website.

Noble Tree Gallery, Kingston
Opened in April 2004 on Route 28, owner Carolyn DeFelice has been exhibiting a wide variety of fine furniture in styles. DeFelice's WAC Forestry grant is helping to increase the gallery's exposure through an advertising and marketing campaign targeting the region's interior designers, homeowners, architects. Noble Tree will continue to serve as an outlet for locally produced furniture thereby enhancing the sales and marketability for Watershed wood products.

Hunt Country Furniture, Wingdale (Dutchess)
With over 90 employees and nation-wide distribution through commercial restaurant outlets and retail showrooms, 82-year old Hunt Country Furniture is planning a large expansion of their manufacturing facilities. Their award will increase production of a unique line of hardwood dining tables. Hunt Country is the first wood products manufacturer east of the Hudson River to receive a WAC Forestry Grant.

Hunt Country Furniture, Dutchess County

TWIGZ Natural Furniture, Holmes (Putnam)
After spending several years making rustic furniture in his spare time, Bill Olendorf recruited his daughter, Barbara — a former restaurateur — to form a business partnership. TWIGZ practices low-impact forestry by hand removing small-diameter saplings of yellow birch, black birch, and striped maple. WAC is cost-sharing with the company to expand their workshop, purchase new machinery, and launch a promotional campaign.

SUMMARY OF SAFE DRINKING WATER ACT PROJECTS

WASTEWATER RELATED PROJECTS

Project: Septic System Study
The Catskill Watershed Corporation (CWC) is conducting a project to study the effectiveness of alternative remediation technologies for existing malfunctioning or failing septic systems within the West-of-Hudson (WOH) portion of the New York City Watershed. Enhanced monitoring of rehabilitated septic systems is being conducted to evaluate best available technologies for the long-term control of wastewater from on-site septic systems. This project is focusing on research needs to improve septic system repair and replacement policies within the New York City Watershed.

Project: Septic System Monitoring
This project, conducted by the New York State Department of Health (DOH), will provide subsurface pathogen loading data to the CWC's Septic System Study. The project is focusing on the microbiological components of septic system effluent, including viruses and bacteria, to determine which systems represent the best available technology for use as on-site septic systems.

Project: Ribotyping of Sewers and Septic Systems
This project, implemented by the New York City Department of Environmental Protection (DEP), is a study on ribotyping of wastewater in sewers and septic systems. The project goal is to try to link septic and sewer wastewater to receiving waters and be able to better discriminate human fecal contamination from other sources of contamination. The project is using an automated system which evaluates DNA and RNA in *E.coli* to link septic systems and sewer sources to receiving waters to better discern between human fecal contamination from other sources of contamination. This process will allow DEP to identify water basins with possible human contamination.

NONPOINT SOURCE PROJECTS

Project: Town Brook Project Research Study
The New York State Department of Environmental Conservation's (DEC's) Town Brook Project Research Study is a multi-year project to evaluate landscape-level effects of land use on downstream water quality. Town Brook is located on the West Branch of the Delaware River Basin which terminates in the Cannonsville Reservoir. The DEC initiated its portion of this multi-agency, cooperative research study effort in 1998 by establishing a sampling site on the Town Brook to study base flow and event-oriented instream water quality. This included installation of telemetry, power lines and automatic instream samplers. The DEC continues to operate the monitoring station on this stream to sample for instream nutrient and sediment loads.

Project: Town Brook Best Management Practices (BMPs) Study
This study is being conducted by the Watershed Agricultural Council (WAC) to determine the effectiveness of several existing and proposed Best Management Practices for minimizing phosphorus losses to the Cannonsville Reservoir. The project is analyzing BMPs targeted for high phosphorus soils, stream bank fencing and riparian buffers, barnyard improvements, and the potential for subsurface transport of phosphorus below crop and pasture land.

Project: Trout Creek Monitoring Station
DEC is collecting data from monitoring station to be used to determine load estimates for three forms of phosphorus, two forms of nitrogen, and sediment for this tributary site in the Cannonsville Basin. The Trout Creek monitoring station, near the inlet of the Cannonsville Reservoir, accounts for 20% of the flow into this reservoir. This data will be provided to the DEP for use in refining their Generalized Watershed Loading Function model to predict material loading in the Cannonsville Reservoir Basin.

Project: Lowland Farm Monitoring Station
DEC will initiate sampling at the site which was established in partnership with Delaware County. This cooperative work is being conducted to study phosphorus losses primarily from agricultural lands and to study methods of reducing these losses through alternative agricultural management techniques. Instream nutrient loads will be measured on a monthly basis and during storm events.

Project: Delaware County Phosphorus Study
Delaware County is collecting and assessing phosphorus data throughout the Cannonsville Basin, including septic system, groundwater, stormwater and farm contributions. The study includes: modeling/mapping of critical source areas; soil phosphorus monitoring at the field scale; phosphorus monitoring in runoff at the field scale; assessment of phosphorus contributions from forests; farm point source monitoring; and improved climate data. One particular focus is an evaluation of measures for phosphorus control on farms through forage and feed management. The study involves integrated monitoring, modeling and assessment at the sub-field, field, and farm scale and at control sites.

Project: R. Farm Study
DEC and Cornell University are continuing research at the R. Farm site to investigate key phenomena that have been discovered as a result of recent work and to incorporate the early effects of the newest management changes into a simulation model. Sampling is being conducted to trace dissolved phosphorus in stream baseflow back to sources on land, using stream sediment and shallow groundwater sampling near the farm. A new weather station is being operated for another year and data being integrated into the simulation model. Sampling of concentrated phosphorus sources within the farm is also being conducted.

Project: Stormwater Best Management Practices Monitoring Demonstration
DEP is conducting a stormwater management practices monitoring demonstration project to gather pre- and post-construction monitoring data at two wetland extended detention basin sites. The project includes reviewing existing water quality data and conducting site evaluations to determine current water quality conditions, identifying additional data needs and water quality trends, including sources of contamination and characterization of pollutant loads. DEP will use this information to evaluate the effectiveness of the stormwater management practices installed and to develop methods that reduce non-point sources of pollution in these water supply watersheds being studied.

Project: Ambient Surface Water Monitoring - High Runoff Monitoring
The objective of this DEP study is to monitor two small catchments, approximately 100 - 200 acres in area, and evaluate the impacts on water quality from land use changes on the catchments. High runoff monitoring is to occur for approximately ten years, allowing for pre-construction, during-construction and post-construction monitoring. This evaluation involves monitoring on two streams that drain catchments where developments (one multi-use complex and one to be determined) are proposed to occur in the next few years, as well as on a reference catchment where no development is expected to occur. The water quality analysis performed includes total phosphorus, total dissolved phosphorus, nitrite-nitrate, dissolved organic carbon, and total suspended solids.

STREAM MANAGEMENT PROJECTS

Project: Greene County Turbidity Reduction
The Greene County Soil & Water Conservation District is conducting a multi-year project to reduce turbidity in the Schoharie Reservoir Basin. The Safe Drinking Water Act (SDWA) provides partial funding for the project which includes: formation of a stakeholder group; development of a conservation plant management program; development of a comprehensive manual on assessment and restoration for use by local municipalities, planning boards, and conservation groups; conducting three training sessions on turbidity reduction BMP and erosion control plans; and development of procedures for addressing turbidity. This project also continues work on a restoration demonstration project along the Westkill stream.

Project: Calibrating Bankfull Discharge at United States Geological Survey Gages
DEP is identifying and calibrating bankfull discharge at 11 active United State Geological Survey (USGS) gages. The project also includes the reactivation of five to ten inactive USGS gages for bankfull calibration.

Additional discharge measurements are being conducted at each site to develop a more accurate stage-discharge rating than would be possible using step-backwater surveys and related analyses.

Project: Reference Reach Design Geometry and Fluvial Processes
DEP is conducting a reference reach design project for development of design geometry and fluvial processes data for 10 reference stream reaches. As part of the study, crest stage gages are being installed, design parameter surveys are being conducted, geomorphic assessments of Level II, III and IV are being conducted, biological and aquatic habitat monitoring is being conducted, particle tracer analysis is being performed, implementation and monitoring of scour chains is being conducted, and sediment sieve sampling is being performed. Documenting the form and function of stable stream reaches, which effectively pass both flood flows and sediment will provide a valuable set of templates for stream stability restoration design BMPs.

Project: Stream Restoration Monitoring
DEP is conducting monitoring of the effectiveness of stream restoration demonstration projects at nine sites. The project includes monitoring of control sites and the nine reaches before and after the installation of BMPs. Crest stage gages are being installed and flow measurements taken. The monitoring includes geomorphic assessment, bed mobility dynamics, biological assessment, riparian characterization and aquatic habitat characterization.

EDUCATIONAL PROJECTS

Project: Westchester County Volunteer Monitoring
Westchester County is conducting a volunteer water quality monitoring program to track the physical, biological and chemical characteristics of the major Watershed and sub-Watershed areas throughout the County. The program is expanding monitoring efforts, and creating a Westchester County Lake Group and a Watershed Website.

Project: Streamkeeper Project
The Riverkeeper, in conjunction with Stroud Water Research Center and Hudson Basin River Watch, is conducting an ongoing school education program to promote an awareness of stream biodiversity and its connection with the landscape, as well as an understanding of local stream health and how it relates to local land use practices. This school based project provides students and teachers with insight on the environmental data they gather about their local streams using a curriculum kit called "The Leaf Pack Experiment," a non-invasive aquatic macroinvertebrate sampling kit and the "Hudson Basin Guidance Document" monitoring protocols.

WATER QUALITY STUDIES

Project: Key Point Sampling
Pesticide monitoring in selected reservoirs was initiated by the USGS in 2000 and has been continued to date. Water samples are being collected from 10 key points, which include all the reservoir outflows as well as inflows to the Kensico reservoir from the Delaware and Catskill aqueducts. These samples are being analyzed for a broad range of pesticides and establish long-term trends for changes in pesticides within the reservoir system over time.

Project: Pesticide Monitoring at Groundwater Baseflow for the Pepacton Watershed
The objective of this USGS project is to supplement water quality sampling for the Pepacton Watershed baseflow network in order to gain further understanding of sources of pesticides in the New York City reservoir system. Sampling is being coordinated with the groundwater (baseflow) monitoring network for the Pepacton Watershed. Samples are being collected from upland sites and valley-segment sites on two occasions - Summer and Fall.

Project: Croton Macroinvertebrate Monitoring
DEC is conducting a five-year in-depth research at 28 stream sites in the Croton basin to determine the source and impact of pesticides on the resident populations of algae and macroinvertebrates. This project is being coordinated with concurrent pesticide research by the USGS. The project is focused on five streams with the highest pesticide levels, determined by sampling in 2000.

Project: Croton Pesticide Monitoring
The USGS is conducting a study of pesticides in the Croton basin to relate the occurrence and concentrations of pesticides to a concurrent DEC study on macroinvertebrates in the Croton Watershed. These samples are being analyzed for a broad range of pesticides.

Project: New York State Department of Health Pharmaceutical Study
The DOH is undertaking a survey to determine the presence of selected pharmaceuticals in the source waters of the New York City water supply, including locations near the intakes to the City's distribution system. This survey is designed to develop initial information to address concerns raised in recent scientific and popular literature regarding the potential for contamination of potable water sources with pharmaceuticals.

Project: United States Geological Survey Pharmaceutical Study
The USGS is conducting a project to study pharmaceutical and other organic wastewater compounds at five wastewater treatment plants and six keypoints in the New York City Watershed. The study is assessing the occurrence and concentrations of these compounds in the New York City Watershed through two focused efforts: sampling keypoints of the New York City reservoir system, and sampling sewage effluent at select wastewater treatment sites and the receiving streams above and below the plant's outfall. The samples collected from the keypoint sites will allow for an assessment of these pharmaceutical and other organic wastewater compounds in the New York City water supply, and the samples collected from the sewage effluent sites will allow for the assessment of wastewater treatment plants as well as the effect of the wastewater treatment plants on the receiving stream water quality.

Project: Stroud Water Quality Monitoring
The Stroud Water Research Center is conducting a multi-year, integrated Watershed-wide monitoring program to address source and ecosystem impairment contaminant dynamics. The monitoring program is designed to compliment existing DEC and DEP monitoring programs which focus primarily on transport and symptom contaminant dynamics. The overall goal of the program is to establish a monitoring system that uses specific physical, chemical, and biological measures to measure, quantify and determine the amounts of specific contaminants and their sources in the Watersheds, and the current structure and function of key ecosystem parameters for the major streams and reservoirs in the study Watersheds.

Project: Algal Communities as Indicators of Stream Bed Instability and Restoration
The goal of this project is to establish a program for biological assessment of streambed instability, using periphytic algal communities. The project includes development of relevant sampling strategies, laboratory analyses and statistical evaluation. Algal communities from nine streams in the Delaware and Catskills systems of the New York City Watershed with stable, unstable and restored banks are being monitored. Samples are being collected before, immediately after major storm events and after a recovery period. Algal community composition and biomass are being correlated with stream channel conditions and magnitude of storm events. The effect of storms on algal succession is also being evaluated.

Project: Toxicity Identification Evaluation
The Toxicity Identification Evaluation project is being conducted by the DEC at wastewater treatment facilities that have previously exhibited a high toxicity concern but which do not have an obvious cause of toxicity. This is a follow-up to toxicity testing previously conducted in which quarterly chronic toxicity tests were performed. The total number of facilities to have their toxicity characterized, will be dependent on the extent of characterization required and chemical analyses performed.

Project: Baseline Assessment of the Biota of Birch Creek
DEC is conducting a project to study the macroinvertebrate and fish communities of Birch Creek in order to provide a baseline measure that can be used for comparison with post-development conditions. Sampling will be conducted for baseline metals, pesticides and polycyclic aromatic hydrocarbons screening and a comparative analysis will be conducted in order to determine the potential effects of proposed development.

SPECIAL STUDIES

Project: Predicting Future Water Quality from Land Use Change Projections in the Catskill-Delaware Watersheds
The State University of New York College of Environmental Science and Forestry and the Yale School of Forestry will complete the examination of the historic development of the Catskill-Delaware Watersheds landscape, including six reservoirs and contributing watersheds, in order to identify when and where changes in land cover/land use have caused significant changes in contaminants of concern to drinking water quality.

Project: Pesticide Manual Update
The modification of existing Pesticide Applicator Certification Manuals that are particularly relevant to the New York City Watershed and incorporation of these changes into the DEC Pesticide Applicator Certification exams is being conducted. Five different manuals are in the process of being updated by Cornell University. The updated manuals will be made available to pesticide applicators and public libraries located in the New York City Watershed. The updated Pesticide Applicator Certification manuals will also be available through Cornell University's Training Manual Distribution Center.

Project: Tracking Phosphorus Impacts from Lawn Fertilizers
DEP is contracting with local organizations to survey all homeowners within a reservoir basin regarding their typical lawn care practices, and offer free soil tests and lawn care literature. The information obtained will be used to assess: percent of homeowners who fertilize, percent of homeowners who use landscaper services, phosphorus content of the fertilizer used, and the relationship between fertilizer application and soil phosphorus concentrations. This type of Watershed-specific data is necessary to further management plans for phosphorus reduction in the Croton Watershed.

Project: Croton System Reservoir Model Development and Testing
This project continues development and testing of reservoir hydrothermal models for the EOH portion of the New York City drinking water supply. These models serve as in-house management tools for DEP, and will contribute to the effective management of this reservoir system. Model development and testing is being conducted for one-dimensional, hydrothermal models in the EOH system, resulting in a group of seven models which are fully calibrated and verified. Also, a two-dimensional model is being fully developed for the New Croton reservoir to predict vertical and longitudinal variations in thermal structure in order to support water quality management and engineering decisions.

Project: New Croton Reservoir Sediment-Nutrient Submodel
DEP is developing a mechanistic sediment submodel for the New Croton Reservoir that predicts sediment-water exchange in response to redox (predicted) conditions and deposition inputs of decomposable organic material (e.g., phytoplankton). The model will have the capability of predicting changes in sediment feedback from changes in the productivity of the overlying water column, and other ambient conditions. Other constituents released by the sediments, particularly Mn, Fe and color, which are of concern because of potential implications for color in downstream portions of the distribution system are being addressed. The model will be a valuable tool to guide effective management of the reservoir.

Project: Wetlands Remapping Initiative
To ensure that DEC has the most accurate Article 24 Freshwater Wetlands Maps within the New York City Watershed, a comprehensive wetland remapping effort within the EOH portion of the New York City Watershed is currently underway. This effort includes identification of wetlands that were not included on the State's wetland regulatory maps, but which met DEC's size criteria. As of 2005, the DEC has completed map amendments in Westchester County and efforts will continue over the next two to three years to revise Article 24 Freshwater Wetlands Maps within those portions of Putnam and Dutchess Counties that are within the New York City Watershed.

Project: Wetland Water Quality Functional Assessment
DEP, in conjunction with State University of New York College of Environmental Science and Forestry (SUNY-ESF), is conducting a two-

year study to characterize and assess the functions of wetlands located throughout the Catskill and Delaware Watersheds through a reference wetland-monitoring program. A total of 22 reference wetlands occupying terrene and lotic landscape positions throughout the Catskill and Delaware Watersheds are being studied. Base-flow monitoring is being initiated at each of the 22 sites, and a subset of the sites is being selected for storm flow monitoring. Vegetation, soil, and water table monitoring methodology is being developed and implemented to support biological and functional assessment of the 22 wetlands. Results of this monitoring program will enable DEP to determine baseline conditions and water quality functions of a number of wetland types. Information gained from this study will benefit the development of both regulatory and non-regulatory wetland protection and non-point source programs.

Project: Master Planning and Zoning Enhancement
The New York State Department of State's (DOS) Master Planning and Zoning Enhancement Program (MP&Z) is being used to provide financial assistance to municipalities for updating existing comprehensive plans to reflect land use goals consistent with the Watershed Agreement and to amend or adopt local land use regulations and environmental controls for Watershed and water quality protection. Strategic capital investment programs to address existing non-point sources of water pollution are being prepared, as are strategic capital investment and management plans for hamlets, villages, village extension areas, and other potential development areas within the WOH Watershed and for designated Main Street areas within the EOH Watershed.

Project: Disinfection By-Products Study
DOH is conducting an evaluation of disinfection by-products formation to develop a comprehensive database in relation to standard and alternative disinfection technologies, source water parameters, operational modes and land management. The results of the study will assist water quality regulators, environmental groups and the general public to find a balance between contemporary disinfection technologies and their associated health risk to provide safe and reliable drinking water.

Project: Pathogen Study
This study is being conducted by DOH to improve the methodology for oocyst concentration, recovery and detection. Using drinking water source samples from New York City's terminal reservoirs, DOH is working on a project to improve the methodology for detecting oocyst concentrations in ambient settings under low-flow and storm flow conditions. The ultimate objective of the study is to improve the methods for oocyst concentration, recovery and detection in storm water samples collected in an agricultural Watershed.

Project: Putnam County Groundwater Study
Putnam County is preparing a Groundwater Protection and Utilization Plan to provide a scientific basis for identifying the most appropriate lands for sustainable development within the County. The assessment provides municipalities with both bedrock and overburden aquifer maps and reports describing aquifer characteristics, including estimated sustainable groundwater utilization levels.

Project: Forest Health and Nutrient Controls Study
This project is part of an on-going assessment by USGS and other research organizations to study forest health, the role of soil nutrients, and the effects logging practices has on water quality within the WOH Watersheds. The study is continuing to monitor the effects of forest regrowth on water quality following clear-cutting in 1997. This study is also determining the effects of varying harvesting intensities on water quality, conducting a nutrient manipulation experiment to identify measurable indices of forest condition and integrating results of the three components with survey measurements to produce Geographic Information Systems (GIS) coverages of the Catskill and Delaware Watersheds. This information will provide spatial patterns of forest condition and the sensitivity of Watersheds to various levels of harvesting.

Project: The Collection and Analysis of Fecal and Sediment Samples for the Determination of *Cryptosporidium* genotypes and *Escherichia coli* Ribotypes in the New York City Watershed
DEP project will use genotyping techniques to subspeciate *Cryptosporidium* oocysts and *E. coli* from potential sources in the New

York City Watershed. The target matrices for this study are mainly fecal samples and sediment samples with the addition of some storm water samples. Fecal samples are being collected primarily from targeted wildlife species. Sediment samples are being collected mainly at sites where stream beds meet reservoirs - with transect samples out into the reservoirs. Water samples are being collected during storms at sites where historical data suggests a presence of *Cryptosporidium* oocysts. Detection of heterogeneous genotypes of *Cryptosporidium* oocysts and *E. coli* are being identified, and the genetic relationship among genotypes are being identified. All results are being compared to historical DEP data, as well as the library of data available at the Center for Disease Control and Prevention.

Project: Identification of Watershed Sources of E. coli
DEP project objective is to link *E. coli* isolates from New York City's Water Supply to potential sources of contamination within the Watershed. In order to accomplish this, DEP's collection of *E. coli* at Penn State University is being ribotyped. The DEP has been collecting *E. coli* from elevated keypoints, reservoirs, streams, geese and gull feces, human feces, wild and domestic animals feces and other potential sources of pollution since 1991. Since waterfowl have an increasingly important role as a contributing contaminant in the City's reservoirs, their addition to the RiboGroup libraries will increase confidence in making decisions on biological source tracking. The use of *E. coli* as an indicator organism may also allow the DEP to monitor other potential pathogens in the Watershed.

Project: Pathogen Occurrence and Transport Within the New York City Watershed
The objective of this DEP study is to provide a broad-based evaluation of the spatial variations in *Cryptosporidium* spp. and *Giardia* spp. (oo) cyst concentrations throughout the New York City Watershed. This is being facilitated through synoptic sampling of a wide range of localized catchments, integrated with the current monitoring programs of DEP. Based upon collected data, an attempt to identify point and non-point sources of (oo) cysts is being conducted in reservoir tributaries with elevated (oo) cyst concentrations. Targeted, pair-wise, sampling of integrator/indicator sites is being conducted when elevated concentrations are found. This sampling approach will provide an overall view of (oo) cyst transport within the Watershed, while identifying possible sources of contamination.

Project: Water Quality Data Analysis and Communication
This DEP project is being conducted to improve data analysis and information communication. The objective of the project is to automate the production of information for a broad audience and streamline access to it as much as possible for the 300,000 analyses representing more than 500 locations throughout the City's drinking water supply. The products of this project include: programming for Annual Reports, a condensed summary report of the scientific volumes devoted to the Evaluation of the Effectiveness of the Watershed Agreement programs, development of a Water Quality Information System and enhancement of the DEP's Intra/Internet. Improvements in the processing of data and availability of information will lead to more informed decision making for DEP managers and broader use of the information by other agencies and the public.

Project: Geographic Information Systems Infrastructure Upgrade and Geodatabase Development
One objective of this project is to provide technical support for the DEP's database development and System Administration and upgrading the DEP's GIS at their Kingston and Valhalla offices. The upgrade includes new server technology, workstations, and implementation of the ESRI geodatabase model. Also, this project is developing an improved Information Technology framework to better assess both the EOH and WOH regions of the New York City Watershed and display available Watershed hydrogeologic and water quality data. This project includes development of an enhanced three-dimensional (3-D) landscape GIS database, in order to assess variability of watershed structure and function at the landscape level. This database consists of digital elevations/slopes, land use drainage, cultural features, soil and vegetation, and other related environmental data. The system also incorporates easy-to-use GIS graphical user interface, and allows for distributed data capture and analysis at stakeholder agencies.

Project: Development and Implementation of a Groundwater Baseflow Monitoring Network for the Pepacton Watershed
This project is being conducted by USGS to define the hydrogeology of the valley-fill aquifer systems in the East Branch Delaware River valley, upstream of the Pepacton Reservoir. The distribution of the valley-fill aquifers is being mapped and data for these aquifers is being compiled. The groundwater quality is being characterized and an estimate of average annual recharge to the stratified drift is being made. A source water assessment delineation for select municipal wells in this basin is being prepared, including identification of potential threats to groundwater quality.

Project: Assessment of Factors Influencing Methylmercury Transformation and Uptake in Aquatic Biota in the Neversink Reservoir Watershed
The DEC is conducting a study to document mercury and methylmercury levels in water, sediments, macroinvertebrates and fish throughout the Neversink Watershed and determine the methylation efficiency (estimated as methylmercury/total mercury) of each site. The study is also measuring mercury and methylmercury levels in indicator macroinvertebrates and fish to determine extent and biomagnification of mercury in biota, and compare these results with other pertinent mercury and methylmercury uptake studies. Twelve sites within the upper Neversink Watershed are being assessed, of which two are headwater streams, two are headwater riparian wetlands, two are man-made ponds, two sites are on the upper main branch of the Neversink River, and four sites are Neversink reservoir sites.

Project: Golf Course Best Management Practices Study
This project is conducted by Cornell University to determine to what extent golf course superintendents and facility managers employ BMP to ultimately protect water quality and minimize off site impacts. The study is assessing the level of conformity to BMPs and potential influences on environmental quality by identifying golf courses with various management expertise and environmental management philosophy; conducting an exhaustive assessment of cultural, pest, and environmental management practices for conformity to BMPs; and, validating the impacts of completing Audubon International's Cooperative Sanctuary Certification program requirements. Additionally, the project is seeking to identify trends in current course management and identifying areas that need additional educational efforts to examine chemical contaminant concentrations.

Project: Cross Farm, Time Series Assessment Database for Phosphorus Evaluation
This Delaware County project will compile and assimilate data regarding the progress made in reducing the accumulation rate of soil phosphorus across farms in the Watershed Agriculture Program. The project will develop databases and interpretive software that will be used to make regular interpretations to adjust watershed-wide and farm-specific priorities in management programs and technical support.

Project: Recovery of *Cryptosporidium* from Water Samples
The DOH will conduct advanced development and evaluation of Aqueous Two-Phase Polymer Systems for the recovery of *Cryptosporidium* from water samples.

Project: Detection and Identification of Enteric Viruses
The DOH will develop methodologies to be used for the detection and subsequent identification of culturable human enteric viruses in source water samples collected at key sites within the NYC Watershed. The methods proposed are intended to provide a reasonably broad range of virus detection capability and subsequent virus identification.

SUMMARY OF WATER RESOURCES DEVELOPMENT ACT FUNDED PROJECTS IN PROGRESS

WASTEWATER RELATED PROJECTS

Project: Town of Patterson / Municipal Sewer System
The Town of Patterson has begun a project to design and construct a municipal wastewater collection and treatment system for the Hamlet of Patterson. The new system will incorporate two existing wastewater treatment systems, several subsurface sewage treatment systems and a new sewer district into one state of the art wastewater treatment plant. The design of the system has been completed, with construction scheduled for 2005.

Project: Town of Bovina / Municipal Sewer System
CWC, in cooperation with Delaware County and the Town of Bovina, is designing and constructing a community septic collection and treatment system to replace septic systems within the Hamlet of Bovina Center. Some of the household septic systems are failing, and repair or replacement is sometimes impracticable. The new treatment system will have a sub-surface discharge. The design has been completed, and construction commenced in the Fall of 2004. The construction for the collection system is to be coordinated with the construction of a stormwater runoff collection system, thereby eliminating the need to excavate the roadways twice.

Project: Village of Stamford / Inflow and Infiltration Reduction
The Village of Stamford is undertaking a project to create a wetland to collect stormwater runoff in an area that will not affect sewer lines, and a second project to replace a box culvert to prevent flooding which also affects sewer lines. The third project is to replace one of the holding lagoons which receives a large amount of infiltration, thereby reducing the storage capacity during storm events. Construction plans and contracts are in progress, with completion of the project expected by Summer 2005.

Project: Village of Walton / Inflow and Infiltration Reduction
The Village of Walton is planning a project to repair and/or replace sewage collection pipes in selected areas of the Village. The Village has previously studied the collection system, and repaired certain areas. This project will repair additional areas of the collection system, and reduce the volume of wastewater flow to the Village's wastewater treatment facility. Construction is planned for the 2005 construction season.

Project: Village of Brewster / Municipal Sewer System
The Village of Brewster is planning to install a new sewage collection in the Western Portion of the Village. This project will be the third phase of an overall project to provide sewage collection and treatment to areas of the village served by individual on site septic systems. The design of the collection system was funded through a previous WRDA grant. Construction is scheduled to begin in the Fall of 2005.

STORMWATER CONTROL PROJECTS

Project: Greene County / Schoharie and Stony Clove Watershed Planning
The Greene County Soil and Water Conservation District, in cooperation with DEC, is developing stream classification plans and digital flood plain maps. The project is using digital and LIDAR overflights incorporated into a GIS based computer system to inventory and classify streams. Along with the new flood plain maps, the end results of the project

should reduce the amount of traditional ground surveying needed to develop stream management plans. Project is in progress, with completion expected in Summer 2005.

Project: Town of Carmel / Stormwater Management Best Management Practices
DEP is planning to test the effectiveness of stormwater BMPs at two sites. DEP has sampled runoff before construction of the new or enhanced BMPs. After construction sampling will continue to determine the pollutant removal effectiveness of the two different BMPs. Construction on one site commenced in the Fall of 2004.

Project: Westchester County / Stormwater Management Study
The County of Westchester has agreed to study stormwater conveyance in a pilot watershed area. The result of the study will lead to implementation of BMPs to reduce the impact of impervious surfaces and incorporate stormwater conveyance to reduce the quantity and quality of pollutants in the stormwater runoff.

Project: Westchester County / Stormwater Education & Training
The Westchester County Soil and Water Conservation District is planning to develop stewardship and training for natural resources management in the areas of erosion and sediment control in the urban Croton Watershed. A series of technical workshops will be held at various locations throughout the Croton and Kensico Watersheds. Much of the information presented will be a result of the stormwater management study conducted by Westchester County.

PHOSPHORUS REDUCTION PROJECTS

Project: Delaware County / Phosphorus Reduction Study
Delaware County is in the midst of a project to determine sources of phosphorus within the Cannonsville Reservoir drainage basin. At the beginning of this project, the Cannonsville Reservoir basin was phosphorus restricted, thereby impairing initiatives that would promote economic growth within the sub-basin. A project goal was to determine the sources of phosphorus, and to develop management practices to reduce the amount of phosphorus entering the Cannonsville Reservoir so the basin would no longer be phosphorus restricted. The areas studied were agricultural, septic systems and highway systems. A GIS database was developed to support data collection. The project is almost completed, with the last of the studies to be completed by December 2005.

Project: Delaware County / Phosphorus Reduction Implementation
Delaware County has undertaken projects to reduce phosphorus runoff from sources determined in the phosphorus reduction study. A stormwater collection and treatment system (as determined in the highway system study) was designed and constructed in the Village of Walton during 2003. Additional collection and treatment systems are planned for Delhi and Bovina (the Bovina system is being constructed in conjunction with the community septic collection and treatment system project).

Project: Delaware County / Farm Phosphorus Management
WAC plans to construct a manure collection and storage system on a larger farm within the Cannonsville Reservoir basin. This is a project designed to reduce phosphorus runoff from a farm as determined in the phosphorus reduction study. Construction is planned for Fall of 2005.

Project: Delaware County / Farm Precision Feeding
Delaware County, in cooperation with Cornell University, is working on a project to reduce phosphorus runoff from farms by adjusting the feed of cattle. This is a project designed to reduce phosphorus runoff from a farm as determined in the phosphorus reduction study. The reduction study determined up to 40% of phosphorus occurring in manure could be reduced by adjusting feeding patterns on an individual farm, without decreasing milk output or health of dairy cattle. The project is underway with completion expected in 2006. The outcome of this project could lead to additional test projects elsewhere in New York State.

STREAM RESTORATION AND STABILIZATION PROJECTS

Project: Town of Prattsville / Schoharie Creek Stream Channel Improvement

The Greene County Soil and Water Conservation District, in cooperation with the Town of Prattsville, is undertaking a project to reduce flooding caused by ice jamming in the Schoharie Creek. The flooding also contributes to streambank erosion. The project will remove a berm and convert part of a forested flood plain into a wetland meadow. Design of the project has been completed, with construction started in the Fall of 2004.

Project: Greene County / Batavia Kill - Red Falls Stream Restoration

The Greene County Soil and Water Conservation District has plans to restore the streambed of a section of the Batavia Kill in the Red Falls area. The final design of the stream restoration project is near completion. At present, DEP has a turbidity monitoring project underway at Red Falls, which will be part of studying the effectiveness of the stream restoration project. The stream reach to be restored could be contributing as much as 50% of the turbidity in the Batavia Kill sub basin. Construction is planned for 2005.

Project: Town of Neversink / Chestnut Creek Stream Management Planning

DEP has undertaken a project to develop a stream management plan for the Chestnut Creek. The development of a stream management plan will provide integrated assessment and planning for water quality protection, flood hazard mitigation, stormwater management and habitat enhancement. The draft stream management plan was submitted in February 2004, and should be finalized by Summer of 2005. Part of the plan development was a stream restoration project funded by DEP, which was completed in October 2003.

Project: Town of Hunter / Stony Clove Stream Management Planning

DEP has embarked on a project to develop a stream management plan for the Stony Clove Creek. The draft stream management plan was submitted in February 2004, and should be finalized by Summer of 2005. Part of the plan development was a stream restoration project funded by DEP, which was started in July of 2003, and should be completed in 2005.

Project: Delaware County / West Branch Delaware Stream Management Planning

DEP, in cooperation with the Delaware County Soil and Water Conservation District, has undertaken a project to develop a stream management plan for the West Branch Delaware River. The draft stream management plan was submitted in December 2004, and should be finalized by Summer of 2005. Part of the plan development was a stream restoration project on Town Brook, which was completed in late Summer of 2004.

Project: Delaware County / Terrace Avenue and South Street Restoration Sites

The Delaware County Soil and Water Conservation District will undertake the restoration of severely eroded stream banks located in the Village of Walton. The two sites were identified in the draft stream management plan for the West Branch of the Delaware River. Construction is planned for the Summer of 2005.

Project: Greene County / West Kill Stream Restoration

The Greene County Soil and Water Conservation District is planning to repair some degraded stream reaches on the West Kill stream. This project is in cooperation with a New York City DEP project to develop a stream management plan for the basin. Repairs to the degraded areas of the stream will serve as a demonstration project of the stream management plan. Construction is planned for the 2005 construction season.

OTHER WATER QUALITY IMPROVEMENT PROJECTS

Project: Ulster & Putnam County / Forestry Best Management Practices

WAC is in the process of planning and implementing model forests to demonstrate a selection of forestry BMPs, and to monitor the effectiveness of sustainable forest management. A model forest has been implemented in Frost Valley, and two others are in the planning stages at Nimham Mountain and Mink Hollow.

Project: Westchester County / Pathogen Monitoring Study

DEP will expand upon an existing monitoring program to gain additional information on the distribution, concentration, transport and fate of *Giardia* spp. cysts and *Cryptosporidium spp.* oocysts in streams during storm events and other periods of high runoff. Expansion of the monitoring program should allow for: year round sampling, sampling in additional sub-basins, determination of which type of watershed land use generates greater loading of pathogens during storm events, and integration of data collected into a transport and fate model.

CONTACTS

WATERSHED PROTECTION PARTNERSHIP COUNCIL
William C. Harding, Executive Director
2 John Walsh Boulevard
Peekskill, NY 10566
914-734-1347 phone
914-734-1763 fax
1-877-513-WPPC toll free number

41 State Street - Suite 900
Albany, NY 12231
518-473-3355 phone
518-474-6572 fax

P.O. Box 380
Margaretville, NY 12455
845-586-3665 phone
845-586-3685 fax
www.dos.state.ny.us/watershed/wppc.htm

OFFICE OF THE GOVERNOR
Honorable George E. Pataki
State Capitol Building
Albany, NY 12224

NEW YORK STATE DEPARTMENT OF STATE
Randy A. Daniels, Secretary of State
41 State Street - Suite 930
Albany, NY 12231-0001

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Denise Sheehan, Acting Commissioner
625 Broadway
Albany, NY 12233-1010

NEW YORK STATE ENVIRONMENTAL FACILITIES CORPORATION
Thomas J. Kelly, President
625 Broadway
Albany, NY 12207-2997

NEW YORK STATE DEPARTMENT OF AGRICULTURE AND MARKETS
Nathan Rudgers, Commissioner
1 Winners Circle
Albany, NY 12235

NEW YORK STATE DEPARTMENT OF HEALTH
Antonia Novello, M. D., M.P.H.
Corning Tower
Empire State Plaza
Albany, NY 12237

NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL PROTECTION
Emily Lloyd, Commissioner
59-17 Junction Boulevard
Corona, NY 11368

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Alan J. Steinberg, Region 2 Administrator
290 Broadway - 28th Floor
New York, NY 1007-1866

CATSKILL WATERSHED CORPORATION
Alan Rosa, Executive Director
P.O. Box 569 Main Street
Margaretville, NY 12455

WATERSHED AGRICULTURAL COUNCIL
Fred Huneke, Chair
RR1 Box 24
NYS Route 10
Walton, NY 13856

PUTNAM COUNTY PLANNING DEPARTMENT
John Lynch, Commissioner
RR 9 Fair Street
Carmel, NY 10512

WESTCHESTER COUNTY PLANNING DEPARTMENT
Gerard Mulligan, Commissioner
432 Michaelian Office Building
White Plains, NY 10601

This report is a partnership endeavor. Information and data contained within were compiled from submissions by the signatory agencies to the historic 1997 Watershed Agreement and serve as the foundation for this report. It could not have been produced without their support and cooperation and their contributions are gratefully appreciated.

WATERSHED PROTECTION AND PARTNERSHIP COUNCIL


WATERSHED
PROTECTION
AND PARTNERSHIP
COUNCIL