

Connecticut Department of Environmental Protection  
Bureau of Water Protection & Land Reuse  
Planning & Standards Division  
79 Elm Street  
Hartford, CT 06106-5127

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# CONNECTICUT NONPOINT SOURCE MANAGEMENT PROGRAM 2005 ANNUAL REPORT



**Nonpoint Source (NPS) occurs when rainfall, snowmelt, or irrigation, runs over land or through the ground, picks up pollutants, and deposits them into rivers, lakes, and groundwater. NPS pollutions also includes adverse changes to the vegetation, shape, and flow of streams and other aquatic systems.**

**2005 CT DEP Nonpoint Source Annual Report**

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## **I. INTRODUCTION**

The Connecticut Department of Environmental Protection (CT DEP) Nonpoint Source (NPS) Program works to abate known water quality impairments and prevent significant threats to water quality from nonpoint source pollution. A significant strength of the program is its networked approach to nonpoint source management. CT DEP has formed partnerships with a wide range of public agencies, industry organizations, and private (citizens) groups to implement nonpoint source management. Connecticut's NPS Program is well-balanced, with an appropriate mix of statewide programs and geographically targeted watershed projects. The state NPS Program includes all the components required under the federal Clean Water Act (CWA) Section 319(h) (Nonpoint Source Management Programs).

### Resources

The CT DEP NPS Program is supported by both federal and state funds. The CT DEP Bureau of Water Protection and Land Reuse (BWPLR) administers grants funded under the Clean Water Act (CWA) Section 319(h). From FY90-05, Section 319 grants totaling just over \$17million have supported 363 projects and CT DEP NPS Program staff salaries. Of the 363 projects, 134 are still active, and CT DEP closed out 22 projects in 2005. Since FY97, 25-30 percent of the total Section 319 allocation to Connecticut has been awarded as part of the state's Performance Partnership Grant (PPG), primarily to support NPS Program-related staff positions. In FY01, Congress increased the national Section 319 appropriation from \$200 million to \$238 million to improve states' capacity to address waters impaired by NPS pollution. In FY05, \$800,000 was awarded under the PPG, and \$1,233,847 was awarded under a separate "categorical" grant to support 19 projects. The categorical grant funds include \$557,200 for base or statewide programs, \$430,339 for watershed projects and \$146,308 for watershed-based planning (Coginchaug River Watershed). The project funds are generally targeted to watersheds identified by the state as impaired (i.e., not meeting state water quality standards), and/or for which the development of total maximum daily load (TMDL) analyses are required. The FY05 grant also included \$100,000 for the tenth and last year of the Jordan Cove Urban Watershed National Monitoring Project. This 10-year long-term monitoring project is part of the U.S. Environmental Protection Agency's (EPA) Section 319 National Monitoring Program, and is the only such project focusing on runoff from residential development.

CT DEP State funds support staff in other units that are involved in various aspects of NPS management. State bond and other special legislative acts provide funds for special projects and grant programs targeting specific resources. Coastal Zone Management Act (CZMA) funds, awarded by the National Oceanic and Atmospheric Administration (NOAA), support CT DEP Office of Long Island Sound Programs (OLISP) nonpoint source management efforts in the coastal area. Numerous other funding sources, from other federal and state agencies, and private foundations, are utilized when available.

## **II. CT DEP NPS MANAGEMENT STRUCTURE**

The NPS Program is responsible for coordinating the NPS management activities of various units throughout the CT DEP, as well as those being conducted by other state, county, and municipal organizations with the state. Numerous NPS Program activities are implemented by the BWPLR, which is organized into three divisions with the following responsibilities:

Planning and Standards Division (PSD): Adopts water quality standards and classifications for the state's surface and groundwater resources; monitors and assesses the quality of water resources; administers the TMDL program, watershed, and lakes management programs; conducts NPS Program planning and coordination; manages the planning, design, construction and permitting of municipal sewage treatment facilities; administers the state's revolving fund, the Clean Water Fund (CWF); and provides support functions for the other bureau divisions for necessary planning, program development, and technical and administrative assistance.

Inland Water Resources Division (IWRD): Regulates activities in the state's inland wetlands, watercourses, and flood plains, including oversight of municipal Inland Wetland Agencies; enforces the state's inland wetland and floodplain protection statutes; manages allocation of water resources through diversion permitting; and prevents or

mitigates natural disasters through flood warning, emergency recovery efforts from flooding, and dam safety programs.

Office of Long Island Sound Program (OLISP): The CT DEP Office of Long Island Sound Programs (OLISP) also has NPS management responsibilities. OLISP administers the state's Coastal Zone Management Program, and is responsible for developing and administering in conjunction with the BWPLR, the state Coastal Nonpoint Pollution Control Program (CNPCP) pursuant to Section 6217 of the Coastal Zone Act Reauthorization Amendments (CZARA). OLISP also is responsible for administering statutes related to coastal NPS problems, including the state's Tidal Wetlands Act and Structures, Dredging, and Fill Act.

Remediation/Sites Clean-up: The Remediation Division oversees the investigation and remediation of environmental contamination and the redevelopment of contaminated properties. The Division's goal is to clean up contaminated sites to meet Connecticut's Remediation Standards Regulations, which ensure that human health and the environment are protected. The Remediation Division staff, along with the help of Licensed Environmental Professionals (LEPs), oversee the clean-up of hundreds of contaminated sites across Connecticut.

There are also several other CT DEP units that perform NPS Program support activities. The CT DEP Office of Communication and Publications supports outreach and education on NPS issues to municipal agencies, the general public and teachers. The Office of Information Management (OIM) houses the department's Geographic Information System (GIS) staff, whose members are responsible for collecting and digitizing all manner of data relevant to water resource management in the state. The GIS Office is responsible for coordinating GIS activities that involve CT DEP and other federal, state, and local government agencies. Over the past couple of years, the GIS Office has expanded its program to include GIS activities and issues that relate specifically to NPS management.

## **Program Coordination**

The CT DEP NPS Program Coordinator is responsible for the overall management of the program, and for coordination of state, regional, and local NPS management activities. This involves working closely with EPA, the USDA Natural Resources Conservation Service (NRCS), the University of Connecticut Cooperative Extension System (UConn/CES), the soil and water conservation districts, and other NPS Program partners. The coordinator is also responsible for the technical review, ranking, and implementation of all Section 319 NPS grant-supported projects, including reporting on progress to EPA, coordinating NPS meetings, and organizing issue-based groups involved in NPS management.

One of the major tasks of the NPS Coordinator is working with CT DEP Watershed Management and Coordination (WMC) Program staff to identify, prioritize, and oversee watershed projects being conducted by local organizations, including the Connecticut soil and water conservation districts (SWCDs) and their partners. The NPS Program Coordinator continues to ensure that Connecticut's program meets the requirements of CWA Section 319 and associated state statutes and regulations.

In 2005, Section 319 funds in the PPG were used to support the following staff: NPS program coordinator, fiscal administrative officer, two watershed coordinators, two subsurface staff, one full time employee for NPS/stormwater inspections and one position in each of the following programs: water quality monitoring, stormwater permitting, and data management (305[b]). These staff help integrate NPS Program goals and objectives into their own programmatic areas.

CT DEP is an active participant in the New England Interstate Water Pollution Control Commission's (NEIWPCC) NPS Work Group. The purpose of the work group is to promote technical transfer among NPS managers at the federal, state, regional, and local levels in the New England states, and New York.

## **Monitoring and Data Management**

Section 319 funds support two staff positions in the water quality monitoring and data management unit: the Volunteer Monitoring Coordinator and the 305(b) Coordinator. The Volunteer Monitoring Coordinator assists in

evaluating and assessing water quality data, and provides assistance to volunteer monitoring organizations to improve data quality. This includes working closely with monitoring programs funded under section 319, like the Connecticut River Watch Program, and the Earthwatch (formerly Harborwatch/Riverwatch) program in the Norwalk River watershed. One of the major program responsibilities is to review and assist with the development of Quality Assurance Project Plans (QAPP), which assure the scientific reliability of data collected for these federally funded projects. DEP and EPA must approve these plans. This program has fostered the development of a volunteer monitoring database linked to a Geographic Information System, and improved evaluation of volunteer data.

The **2005** summary report for the Rapid Bioassessment by Volunteer Monitors (RBV) in Wadeable Streams and Rivers has recently been added to the DEP web page under the Bureau of Water Protection and Land Reuse, volunteer monitoring heading ([http://www.ct.gov/dep/cwp/view.asp?a=2719&q=325606&depNav\\_GID=1654](http://www.ct.gov/dep/cwp/view.asp?a=2719&q=325606&depNav_GID=1654)). This program enables citizen groups to collect useful data for DEP by combining the utility of invertebrate indicators with a non-technical methodology. Prior to sampling, a three-hour training session was held. In **2005** over 200 individuals participated in this water quality-monitoring program. Participants have included watershed associations, college ecology classes, town conservation commissions, and sporting clubs.



Number of monitoring locations	<b>68</b>
Number of waterbodies monitored	<b>85</b>
Number of individual participants	<b>215</b>
Number of groups	<b>19</b>
Number of groups participating for the first time	<b>5</b>
Number of returning groups	<b>14</b>

Data collected according to the RBV protocol can be used as a screening tool to identify stream sections with either very high or very low water quality. The documentation of key indicator organisms in a section of a stream provides a record of the benthic community present for a collection date and time. **Since the program inception in 1999 just over 200 river miles of fully supporting river miles have been used in the 305(b) water quality report to Congress.**

The primary responsibility of the 319-funded 305(b) Coordinator is to assemble available information and prepare a biennial "Water Quality Report to Congress" or 305(b) Report, as required under Section 305(b) of the federal Clean

Water Act (CWA). To make water quality assessments, the CT DEP relies primarily on its own monitoring data, and data generated by the U.S. Geological Survey. Volunteer, municipal, academic, and Project SEARCH monitoring data are also incorporated into water quality assessments if the data meet certain quality standards. The 305(b) coordinator also worked closely with TMDL staff to prepare the 2004 Connecticut Impaired Waters List, which is required by Section 303(d) of the CWA and was generated as a subset of 305(b) assessed waters

## **Outreach and Education**

The CT DEP Office of Communication and Publications administers several environmental education programs, including Project WET (Water Education for Teachers), and Project SEARCH. Project WET assists teachers in integrating water quality lessons into their standard curricula. The first four years of Project WET were supported by section 319 funds. In 2000, funding support for this highly successful program was shifted from section 319 to the State.

In 2005, Kellogg Environment Center staff, DEP staff and trained WET facilitators and volunteers conducted numerous workshops, festivals, and training program. Kellogg staff, WET facilitators and volunteers worked with students across the state and trained numerous educators to use Project WET materials.

**Project SEARCH** is a joint program of the CT DEP and Science Center of Connecticut, which provides equipment, training, and technical support to high school and selects middle school teachers who have incorporated a water quality-monitoring program as part of their science curriculum. Funding for this program, which was initiated through a National Science Foundation grant, is now provided by CT DEP General Funds and section 319.

In 2005, Project SEARCH continued to work with teachers and students from over 81 public and private high schools and middle schools across Connecticut to collect water quality data on rivers and streams within their communities. Schools sampled water chemistry, assessed habitat quality, including potential NPS pollution, and surveyed benthic macroinvertebrate communities, in the fall and spring at their monitoring sites. SEARCH staff conducted 109 site visits including 84 field sampling trips to provide technical support to teachers and collect replicate data for the project QAPP, 14 classroom training sessions on SEARCH methods, 5 planning meetings with teachers establishing new SEARCH programs in their curricula, 4 GIS training sessions for teachers, and participation in 2 career days.

SEARCH staff presented a 3-day workshop in August to train new teachers entering the program. A total of 10 teachers participated in the SEARCH workshop. A complete hands-on overview of the program was conducted to build teacher confidence with implementing the techniques with their students. This year one student attended the workshop to prepare for her senior project which is centered around SEARCH protocols and monitoring a local stream. An estimated 90-100 teachers and 2,000-2,400 students in grades 9-12 participated in SEARCH activities throughout the calendar year of 2005.

Water quality data was collected from 98 sites on 77 rivers and streams. SEARCH staff collected 92 replicate samples for the project's Quality Assurance/Quality Control (QA/QC) analysis, and prepared an annual report, *Project SEARCH: Water Quality Data Summary Report 2005*, that summarized the results of the stream surveys. SEARCH staff have successfully integrated NPS issues into the data collection sheet the schools use for these activities. Several schools have started to collect this information in addition to their other data. New teachers receive training on the use of the sheet and discuss NPS issues and sources during the summer workshop. Several schools have completed the integration of a GIS land use/cover mapping component to the program to facilitate understanding of NPS issues with the schools. The students will be able to generate watershed maps of their stream with land use types highlighted and connected to water quality.

## **Geographic Information**

The NPS Program receives GIS support services from trained Bureau of Water Protection and Land Reuse (BWPLR) staff and from the Office of Information Management (OIM). GIS services relevant to NPS management include maintaining the NPS Online Viewer and the DEP GIS Data Download websites, assisting NPS Program

staff both with the use of desk top GIS and with materials and guidance for GIS projects, producing updated data layers and maps of Aquifer Protection Areas and Ground Water Quality Classifications.

### III. PROGRAM HIGHLIGHTS

#### FY 05 Completed Projects

In 2005, grantees completed nineteen nonpoint source projects.

- University of Connecticut Integrated Pest Management significantly reduced the use of pesticides and fertilizers in the Quinebaug/Shetucket basins by implementing integrated crop and pest management practices and Nutrient Management training programs with 16 entities (businesses/farms/green industry/schools) in six commodities; vegetables, greenhouse crops, nursery crops, fruit crops, field corn and turfgrass. Reduced pesticide applications by 25% (1077.7 pounds of active ingredient=A.I.) on 738 acres and nitrogen use by 64% (24,200 pounds) on 254 acres in the watershed.
- DEP Fisheries restored 440 feet of stream habitat restoration on the lower Blackledge River in Colchester.
- Farmington River Watershed Association restored an actively eroding 200-foot section of streambank on the Farmington River in Barkhamsted to protect the road, improves aquatic habitat through reducing excessive sedimentation and increase habitat structure, re-establish the river bank with native vegetation.
- North Central Conservation District completed the Business Outreach Program in the Hockanum River Watershed reaching 70 private businesses that became “Business Partners” during the life of the project. The business Partners agreed to use stormwater BMP’s at their facilities.
- CT DEP developed training modules for the Connecticut Stormwater Quality Manual.
- Connecticut River Coastal Conservation District developed a web site for its Connecticut River Watch Program to heighten awareness of ongoing activities and accomplishments, and help market the program to potential new participants. See <http://www.conservect.org/ctrivercoastal/riverwatch/index.htm>
- USDA Natural Resource Conservation Service designed and installed swales to improve the quality of water entering stream systems and to improve aquatic habitat. Construction of the 400+ foot drainage swale allows for removal of sands and pollutants contained in the runoff from a state road, thereby improving the water quality in the ponds and associated waterways.
- Rivers Alliance set up and managed two grant years of a Watershed Assistance Small Grants Program (WASGP) for capacity building (for new or struggling watershed associations) which also included implementation projects (for larger or well-established associations).
- The Norwalk River Watershed Initiative with the Southwest Conservation District drafted a booklet that documents riparian restoration work in the Norwalk River Watershed. The booklet contains background information on the watershed, the Initiative, and the importance of riparian habitat; case studies of about nine habitat restoration projects in the watershed; and basic guidelines and “lessons learned” for local planning and implementation of successful restoration efforts.
- USDA Natural Resource Conservation Service provided design and permit application preparation services for 4 water quality measures in the Wharton Brook State Park, North Haven and Wallingford, Connecticut. This project demonstrated the use of varied measures including stream bank stabilization, buffers and wetlands to improve water quality in Wharton Brook leading to the Quinnipiac River.
- Connecticut DEP Office of Long Island Sound completed the Clean Marina small grants program. The program provided small competitive grants to marina operators for BMP implementation. This cost-share assistance provided incentives for marina and boatyard operators to control nonpoint sources of pollution at their facilities.
- Earthplace, a citizen’s water quality monitoring group Westport continued monitoring the Norwalk River for the 7<sup>th</sup> year from July 1<sup>st</sup>, 2004 to June 30<sup>th</sup> 2005. Ten sites which represent the most impaired areas along the length of the river were monitored. The main pollutants to be tested for were fecal coliform and *E.coli* bacteria. Dissolved oxygen and conductivity will also be tested.

- Central Connecticut Regional Planning Agency completed the Pequabuck River Watershed Management Plan – Bristol, Burlington, Farmington, Harwinton, Plainville and Plymouth, CT. The project engaged stakeholders from the six-town watershed area for coordinated development of a watershed management plan.
- Connecticut River Coastal Conservation District’s River Watch Program continued to assess and improve programs within the Connecticut River basin (Mattabesset, Hockanum, Eightmile, Salmon and Farmington River Regional Basins).
- The Southwest Conservation District along with the Norwalk River Watershed Initiative hired a watershed coordinator to facilitate the participation in the Norwalk River Action Plan. The coordinator established and maintained contacts with the local and regional print and electronic media; prepared and released press releases, as well as a regular newspaper column related to the Committee’s Watershed activities; and maintained a web site.
- Eastern Connecticut Conservation District conducted Inland Wetlands Training for commissioners in eastern Connecticut. The training consisted of both a classroom segment and a field segment, designed to explain and demonstrate to the commissioners how wetlands delineations are done, and clarify the requirements of the different levels of permits.
- Connecticut Conservation District’s continued to provide NPS technical assistance on a watershed basis to municipalities and agricultural producers. They provide site plan reviews; recommendations for BMPs; management of NPS pollution and erosion and sedimentation control issues; assist with watershed management planning; technical services on a watershed basis; and support changes required by new regulations.
- Quinnipiac River Watershed Association (QRWA) hired staff to promote the goals of the (QRWA) and their NPS efforts to protect and improve the Quinnipiac Watershed. The QRWA’s goals are to educate the public about the Watershed; enhance recreational access; improve wildlife and fish habitat to the River; organize canoe trips and hikes; coordinate river cleanups; and organize watershed monitoring and restoration activities.
- USDA Natural Resource Conservation Service installed two instream habitat enhancement measures for resident fish species of the Norwalk River, Wilton, CT. This project demonstrated the implementation of instream habitat features to provide both low and high flow refuge for resident stream fish. These projects are located within town parks (Merwin Meadows and Schenck’s Island), both of which are heavily used by the local community and are within a stream reach recently classified by the DEP as a Class III Wild Trout Stream.

## IV. WATERSHED MANAGEMENT PROGRAM

### Watershed Management

The CT DEP has been in a comprehensive, multi-media “watershed approach” for almost a decade now. CT DEP has developed a watershed management strategy that establishes the framework within which the CT DEP will work through a networked approach with federal, state, and municipal government and non-government agencies and organizations to conduct watershed management and strengthen the state’s ability to control nonpoint source pollution. The CT DEP has organized and focused base program staff, establishing five “major basin” coordinators, and continues to target grant funds based on watershed priorities.

Consistent with this approach, CT DEP offers competitive annual Section 319 grants to watershed initiatives for the priority watersheds, and to statewide NPS initiatives for transfer to local watershed management efforts. Basins DEP has targeted in the past include the Norwalk, Quinnipiac, Hockanum, Mattabesset, Pequabuck, Scantic, Sasco, and Fenger River watersheds. New focused watershed management initiatives are underway for the Little, Quinebaug and Shetucket rivers in the Thames River basin, the Pomperaug River in the Housatonic River basin, the Niantic in the Southeast coastal basin, the Saugatuck in the Southwest coastal basin, the Coginchaug in the Connecticut basin and other priority watersheds. The watershed approach is also being used to restore lake water quality, building upon studies and plans developed with funds provided by the state Lake Water Quality Grant Program, the federal Clean Lakes Program (pursuant to section 314 of the C.W.A), and Section 319 grants.

The NPS Coordinator works closely with Watershed Management and Coordination (WMC) staff and other NPS Program partners to select and manage watershed projects for Section 319 funding. Generally, the goals and objectives for watershed programs include the protection, restoration and improvement of water quality, habitat for fisheries and other wildlife, and recreational opportunities. As described in the state's *Enhanced State Nonpoint Source Management Program*, watershed management priorities are determined by a variety of mechanisms, including watershed assessments, the Consolidated Assessment and Listing Methodology (CALM) reporting, and targeted NPS assessments. The primary purposes of the CALM data analyses are to determine the extent that all waters are attaining water quality standards, to identify waters that are impaired and need to be added to the 303(d) list, and to identify waters that can be removed from the list because they are attaining standards. The CT DEP WMC Section administers river and lake watershed management programs in cooperation with other CT DEP programs, other state and federal agencies, and nongovernmental organizations. The WMC includes coordinator positions for the five major river basins, to oversee and coordinate watershed management activities there: Thames, Connecticut, Housatonic, Central Coastal, and Southwest Coastal Basins. The watershed program addresses NPS-related water quality problems on a comprehensive basis throughout an entire watershed. The following is a brief summary of these efforts and the role of the WMC basin coordinators:

- coordinate CT DEP base program activities in priority watersheds;
- serve as liaison between CT DEP and other state and federal agencies, municipalities, citizen groups, watershed associations, and other partners;
- assist in the development of comprehensive basin overview reports, watershed assessments, TMDLs, and watershed management plans;
- provide education and outreach on watershed issues, including the CT DEP web site, fact sheets, meetings, workshops, and conferences;
- help manage NPS control projects financed in part with funds from the federal Clean Water Act Sections 319, 604(b), 104(b)(3), and state River Restoration Grants; and NPS education and outreach, and capacity building for nongovernmental organizations.

CT DEP continues to encourage the growth of new and existing non-governmental watershed organizations, partnerships and initiatives in priority watersheds, by directing funds to the Rivers Alliance of Connecticut to administer the Watershed Assistance Small Grants Program (WASGP). The WASGP was established in 2002 through the Section 319 (FY '01) program to provide small grants to start up and growing organizations, and those who have not had ready access to some of the more traditional sources of funding. In this program, 27 watershed groups have been active in watershed management activities related to NPS pollution education and controls, water monitoring, and water resource and land-use management and education. The program is well received and effective at improving watershed protection and reducing NPS pollution. During 2005, CT DEP emphasis continued on completing progress on previously provided assistance grants, and preparing for a new round of grants in 2006. The Rivers Alliance is also assisting CT DEP in developing and promoting model municipal tools and regulatory options to reduce and control NPS pollution. CT DEP and Rivers Alliance are focusing on an in-depth study of towns' needs, useful tools, model regulatory language and non-regulatory efforts that will be suitable for towns to adopt or modify as they see necessary.

Other watershed management initiatives during 2005 include:

- Continue to evaluate and implement CT DEP watershed management strategies to improve watershed management and strengthen the state's ability to control NPS pollution including coordination of DEP programs that influence land use development, creating stronger municipal relationships, offering assistance to municipalities making land use decisions, and promoting low impact development tools;
- examining a long-term approach to solving complicated water quality impairments in the main stem tributaries in Thames basin;
- working with NPS Coordinator to focus on 303(d)-listed impaired waters, causes and sources of impairments, and implementation projects to fix impairments;

- begin developing a watershed management plan model in the Niantic River basin, which covers all 9 elements of an EPA watershed-based plan, build out conditions, and other CT DEP NPS and watershed management assessment, planning and implementation needs.

Connecticut's soil and water conservation districts ("Conservation Districts") have an integral role in nonpoint source (NPS) pollution by delivering technical assistance and to municipalities and landowners. Technical and educational services provided include erosion and sedimentation control, management and controls of NPS pollution, management of storm water runoff, promotion of watershed management with recommendations for best management practices.

Districts work within communities by partnering with various public and private stakeholders to formulate and implement watershed management plans and local initiatives to preserve the health of watersheds. Partners include among others, Department of Environmental Protection, Natural Resources Conservation Service, municipalities, regional planning entities, as well as natural resource and land preservation groups. Throughout 2005, Conservation Districts used their base section 319 funds to provide assistance to municipal leaders, commissions, and staff, and residential, commercial, and agricultural land users:

- (1) providing technical information and assistance on natural resource problems by preparing site plan reviews and on-site inspections, and providing recommendations for management of NPS pollution, erosion, sedimentation controls, and storm water management;
- (2) planning and presenting technical assistance, natural resource training workshops and hands-on assistance to land use decision makers and landowners on, for example, channel restoration and restoration of stream banks; management of erosion and sediment control, nutrient management, stormwater management; best management for forestry practices, and integrated pest management; and
- (3) providing on-call detailed information and recommendations a.) to ensure protection of wetlands, streams, rivers, groundwater, watersheds and land from storm water run-off, and b.) to address problems resulting from the lack of erosion and sedimentation controls.

## **Southwestern Coastal Basin**

### **Western Coastal Basin**

#### Norwalk River

The Norwalk River Watershed Initiative (NRWI) was formed in late 1995 as a partnership between CT DEP, EPA (Region 1 and Long Island Sound Office), NRCS and the seven watershed municipalities. Other NRWI partners include Norwalk River Watershed Association, UConn/CES, South West Conservation District, Save the Sound, Mianus Chapter of Trout Unlimited, South Norwalk Electric and Water (formerly the Second Taxing District Norwalk Water Company), EarthPlace, and the Maritime Aquarium at Norwalk. The goals for this Initiative include: conducting detailed assessments of both water quality and quantity, habitat, recreational opportunities, land use/cover, and existing management efforts; and development and implementation of comprehensive, community-based management strategies and programs.

NRWI developed the *Norwalk River Watershed Action Plan* as part of the initiative, which municipalities have been using as a guide in their local land-use decision-making. In response to the Action Plan, municipalities have altered some development proposals to increase buffer widths between new construction and the river, and reduce the amount of new impervious surface.

A concerted effort was undertaken resulting in the publication of a 2004 Supplement to the 1998 Action Plan, the goal being to identify tasks completed, and further refine goals and plans which can reasonably be completed in the next five years.

The Norwalk River Watershed Coordinator is funded by the seven municipalities in the watershed and the Fairfield County Community Foundation. The Coordinator also participates in, and is supported by the Filter Project and will provide a leadership role in implementation of a resident Canada Goose management plan. This position provides

technical and administrative support to the NRWI Advisory Committee, and direct public outreach efforts to inform residents and municipal officials about NRWI activities and opportunities to participate.

NRWI accomplishments in 2005 and 2006 include:

- CT DEP published a final TMDL for the Norwalk River and its tributaries, for indicator bacteria. Considerable public comments were received and incorporated. CT DEP has undertaken a Stressor ID Study focusing on areas of known Aquatic Life Use Support impairments near wastewater discharges and impoundments. The goal is to pinpoint causes for these impairments to allow implementation of solutions, as well as to fine tune criteria used in permitting of point and nonpoint source discharges.
- EarthPlace's Harbor Watch / River Watch (HW/RW) program has secured funding from 319, municipal, and private sources to enable them to continue citizen water quality monitoring. They continue to deliver regular reports to DEP on Norwalk River water quality. Citizen monitoring has focused on determining the origin of elevated bacteria levels to help direct management activities, including establishment of a Total Maximum Daily Load (TMDL). Volunteer monitors have done intensive follow-up and identified pollution sources including apparent failed septic systems as well as identifying several areas where high waterfowl populations have led to high coliform bacteria counts in the river. HW/RW has provided DEP with time sensitive data relative to significant events affecting water quality including wastewater treatment plants failures, a dam drawdown which was managed inappropriately resulting in problems with sedimentation, and fishkills, low dissolved oxygen levels, and extremely low flows for a five-day period when the low level gates were closed to refill the pond.
- NRCS and the City of Norwalk, with assistance from CT DEP, have completed riparian restoration of a section of eroded streambank on the Silvermine River, near the Silvermine School in Norwalk. This 319-funded project incorporates stone structures to restore and enhance fish habitat, as well as provide hydraulic stability to this section of stream, which has been downcutting and moving laterally. The new habitat enhancement structures have functioned effectively during low and extremely high flow events. The NRWI worked with a local Boy Scout troop to do additional streambank plantings at the site as well.
- Partially funded using 319 funds, the City of Norwalk and the Soundkeeper have implemented the Filter Project with support from EPA, CT DEP, and the Fairfield County Community Foundation. 275 catch basin inserts were installed. Public education and outreach are a vital component of the project as well. Save the Sound organized an MS4 workshop for municipalities in 2006 as part of the effort. Initial monitoring indicates the basins are successful at removing both sediments and bacteria through use of a polymer sponge material.
- NRWI has chosen to focus on resident Canada Goose management as a mode to reduce nonpoint source pollution. An educational workshop was held with DEP Wildlife Division staff, as well as a follow-up presentation by Greenwich, and a contractor who specializes in resident Canada Goose control. A five-stage draft plan has been developed. The NRWI's strategy will involve egg oiling or adulling, harassment, and education to not feed wild populations. Future 319 funding will be sought to implement stage 5 which will involve training interested municipal employees and private property owners in both the Norwalk and Saugatuck River watersheds.
- The NRWI Coordinator completed and published a Riparian Restoration Brochure highlighting accomplishments by NRCS, CT DEP, and the Mianus Chapter of Trout Unlimited to restore over 7,000 linear feet of stream channel and riparian buffers to protect water quality and improve coldwater fish habitat. A Yale graduate student presented research findings on macroinvertebrate populations as an indicator of degree of success in restored streambanks. Restoration at Merwin Meadows Park and Schenck's Island has been completed. Invasive plants continue to be monitored and removed at all restored sites.
- The NRWI Coordinator completed and published a State of the Watershed report.
- A fisheries bypass channel has been constructed around the dam at Cannondale. The Mianus Chapter of Trout Unlimited and NRCS completed the work using 319/WHIP funds.
- The Maritime Museum at Norwalk continues to display a permanent exhibit focusing on the problem of nonpoint source pollution in the Norwalk River watershed. The 319-funded exhibit includes a sixteen-minute video detailing the problem and suggesting what watershed residents can do to help reduce NPS pollution.

- 319 funds are supporting the final engineering design and permitting for removal of the Strong Pond dam at Merwin Meadows Park. Estimated dam removal cost will be driven by sediment de-watering, removal, and disposal costs. Total costs are estimated to be 1 million dollars for the construction phase.
- DEP has secured an agreement with ConnDOT to fully fund a project, to be completed by NRCS, which will provide an engineering design, easements, and permits for the removal of the Flock Process Dam, just south of the Merritt Parkway in Norwalk.
- CT DEP and the towns of New Canaan, Wilton, and Norwalk have cooperated to hand pull *Hydrilla*, an exotic invasive aquatic weed with potential to reduce habitat with its dense growth. The weed was discovered in Parting Brook and has spread downstream into the Silvermine River. *Hydrilla* has been eradicated at three sites in Connecticut, and an eradication effort for the Northeastern States is being considered. This may not be feasible in a moving stream environment.

#### Saugatuck River

A new Watershed Partnership has been organized in the Saugatuck River watershed, with leadership by the Nature Conservancy, participation by eleven towns, Aquarion Water Company of Connecticut, State and Federal agencies, Harbor Watch/River Watch, Nutmeg Chapter of Trout Unlimited, and other non-profit organizations. The eleven towns in the watershed have signed a Conservation Compact. The partnership has already made progress on many fronts including nonpoint source pollution prevention, habitat preservation and restoration, and anadromous fisheries restoration. A watershed flow study is proposed which will include recommendations for reservoir operations to optimize water quality, habitat values, and potable water supplies.

#### Sasco Brook, Mill and Rooster Rivers

Sasco Brook is located in the Southwest Eastern Regional drainage complex and flows south to Long Island Sound. The watershed lies in Fairfield County almost entirely within the towns of Easton, Westport, and Fairfield. Land use in the lower watershed is dominated by high-density commercial and light industrial development (particularly along the U.S. Route 1 and I-95 corridor) and in the upper watershed by low-density residential development and open space. There also are a significant number of horse farms within the watershed. Despite being densely developed, there are currently no permitted point source discharges in the watershed. The primary NPS pollutants of concern are nitrogen and bacteria, resulting from urban stormwater, animal waste runoff, septic systems and residential lawn care products. In 1999 the CT DEP developed a TMDL for nonpoint source bacteria and an implementation plan. Using section 319 funds and other federal and state funding sources, the CT DEP is currently working to implement the plan with the municipalities of Westport and Fairfield, NRCS, Harbor Watch River Watch and the South West Conservation District.

A revised TMDL Analysis was published by CT DEP in 2005, covering Sasco Brook, Mill and Rooster Rivers, and Ash Creek. A draft Watershed-Based Management Plan is being developed for Sasco Brook by the town of Westport. Harbor Watch River Watch will complete their final year of State-supported detailed water quality monitoring in support of the TMDL.

The Town of Fairfield has installed three additional swirl concentrator devices: two in the Mill River watershed, and another in a small coastal stream, as well as additional catch basin retrofits. An Earth Day Fair in Fairfield was well attended. NRCS, DEP, and Sasco Brook Water Pollution Abatement Committee provided educational materials on nonpoint source pollution and the TMDL.

#### Byram River

The Byram River is located in the Southwest Western Regional drainage complex and flows south directly into Long Island Sound. The watershed lies within the towns of Greenwich and Stamford, and also in Westchester County, New York in the towns of Port Chester, Rye, and Armonk. Land use in the lower watershed is dominated by high-density residential and commercial development and in the upper watershed by lower density residential development. The primary NPS pollutants of concern are bacteria and nitrogen, resulting from illicit wastewater connections, urban stormwater, animal waste runoff, septic systems and residential lawn care products. Historically, problems in this River have been difficult to address due to jurisdictional issues between two states, two EPA regions, two Army Corps Districts, and municipal and county governments on both sides. At the request of, and with funding from CT DEP, the Interstate Environmental Commission has initiated an intergovernmental project to investigate and resolve sources of high fecal coliform bacteria in the river. They have identified three major

drainage outflows in Port Chester, New York, serving Westchester Avenue, Purdy Avenue, and the former Marvel Mystery Oil Site where illicit discharges and sanitary sewage overflows, cross connections, and leaks appear to be significant problems. The Westchester County Health Department and the Town of Port Chester New York are working on more detailed analyses and remediation of the problem. Several illicit discharges have been identified and eliminated, with more expected in the coming year. New York DEC will begin to enforce their MS4 permit in 2008.

The Town of Greenwich has conducted numerous meetings with Byram River watershed citizens. The initial concern was streambank stability, erosion, sedimentation and flooding. Like most small coastal streams in the SouthWest Coastal Basin, increased impervious surfaces in the watershed have caused changes in the stream hydrograph during storm events, which has resulted in significant changes in channel morphology. The town is working with citizens and the Flood and Erosion Control Board to identify, prioritize and study problem areas in greater detail.

#### Darien Coastal Watersheds (Goodwives, Noroton, Tokeneke Rivers. And Stony Brook)

These small coastal watersheds are unique because they are very densely developed and are connected directly to Gorham's Pond and Holly Pond, which are tidally-influenced impoundments. The chief concern of the local residents is the high volume of sediment that has been deposited in these coastal ponds in the last 30 years. These streams are located in the Southwest Western Regional drainage complex almost entirely within the towns of Darien, New Canaan and Stamford. Land use in the watershed is mostly high-density residential development with a commercial strip along the Route 1/I-95 corridor. These watersheds are small in area and subject to very low mid-summer flows. The primary NPS pollutants of concern are sediments, nitrogen, and bacteria, resulting from urban stormwater, animal waste runoff, septic systems and residential lawn care products. Several local environmental organizations hired a consulting firm to conduct a watershed study focusing on addressing the sedimentation problem and improving stormwater quality.

Local groups have successfully implemented numerous projects involving dredging of small ponds in the watershed with private and municipal funding. They are seeking a cooperative approach that will involve CT DEP, ConnDOT, grassroots groups, private and corporate funding to expand the scope of this work to several larger impoundments. Additional focus has been placed on source reduction at the State and Municipal level. The local plan does not account for increased sediment loading due to channel morphology changes resulting from higher peak flows, instead allocating sediment sources to external sources such as road sand and construction-related erosion. For this reason, their plans may not be sustainable in the long term without very large repeated financial commitments.

#### Mianus River

DEP Watershed program staff have attended meetings of the Mianus River Watershed Council. The Council is working on producing a Watershed Management Plan. Several issues that will be likely to be addressed include water diversions, impact by the growth of intensive lawncare including irrigation as well as runoff of fertilizers and lawn chemicals, septic systems, unchecked growth in the watershed, and issues involved with interstate watersheds spanning two EPA regions. This organization has an impressive record with implementing major land preservation projects.

#### Greater Bridgeport Watershed Alliance

Several meetings were held including a slide presentation and discussion of issues in the Greater Bridgeport watersheds. The Ash Creek Conservation Association has worked on conservation issues in the estuary. In addition there is significant interest in developing a planned flood management project in the Ox Brook watershed in Bridgeport with DEP and federal money. There is some controversy due to a potential residential development, which may impact the ability of this project to move forward.

## **Housatonic River Basin**

#### Housatonic Mainstem

Originating near Pittsfield, MA, the Housatonic River flows south for approximately 150 miles through western Massachusetts and Connecticut before entering Long Island Sound at Stratford and Milford, CT. Altogether, the Housatonic watershed encompasses almost 2000 square miles in Connecticut, Massachusetts and New York. In Connecticut, the approximately 1200 square mile “Housatonic Major Drainage Basin” can be further subdivided into the following 10 “Regional Drainage Basins”: Housatonic Main Stem, Aspetuck, Blackberry, Candlewood, Hollenbeck, Naugatuck, Pomperaug, Shepaug, Still and Tenmile. The northern half of the Housatonic watershed is relatively rural, characterized by small towns, farmland and forest. The southern half of the Housatonic watershed tends to be more urbanized and industrial.

The Housatonic has been extensively harnessed for hydroelectric power generation. In Connecticut, Northeast Generation Services Company operates five hydroelectric facilities on the Housatonic River: Falls Village, Bulls Bridge, Rocky River (associated with Candlewood Lake), Shepaug (dam forms Lake Lillinonah) and Stevenson (dam forms Lake Zoar). A new license covering all of these facilities was issued by the Federal Energy Regulatory Commission (FERC) in June 2004. The license includes a Water Quality Certificate issued by CT DEP. In addition to these five plants, a sixth, privately operated hydropower facility is associated with Derby Dam (dam forms Lake Housatonic).

To date, the major issues affecting water quality of the Housatonic River in Connecticut have revolved around eutrophication, dissolved oxygen levels and PCBs. The first two issues are primarily associated with the three lower impoundments on the river – Lake Lillinonah, Lake Zoar and Lake Housatonic. It has been found that excessive amounts of phosphorus from upstream sources are causing serious algal blooms in these lakes. Reduction in phosphorus levels at upstream wastewater treatment plants, as well as the disappearance of some point sources, have helped to lower nutrient levels and improve water quality. However, eutrophication problems persist, particularly in Lake Lillinonah.

The Housatonic PCB issue was first identified in the late 1970’s and is primarily associated with releases from the General Electric Company (GE) facility in Pittsfield, MA. As a result of a Consent Decree, approved by the U.S. District Court in October 2000, involving GE, U.S. EPA, the State of Connecticut, Commonwealth of Massachusetts and other federal entities, clean-up of PCBs in the most heavily contaminated portions of the river (close to the GE facility) is underway.

The Housatonic River and the lands within its watershed constitute an important recreational resource. There are hundreds of acres of public recreation land within the watershed, including the Appalachian Trail, which runs along the river for five miles between Kent and Cornwall. In Connecticut, the northern portion of the river offers catch-and-release Trout Management Areas, Smallmouth Bass Management Areas and seasonal Class I-IV whitewater boating opportunities. Meanwhile, the four lakes in the watershed - Lillinonah, Zoar, Housatonic and Candlewood - are popular areas for boating, fishing and swimming. In 2001, the Housatonic Main Stem was officially designated by the State as the “Housatonic Riverbelt Greenway”. It is hoped that this planning designation will encourage towns and other groups to work together and create a contiguous greenway along the river corridor.

During 2005:

- As part of Housatonic River GE-PCB remediation project, U.S. EPA finalized the Human Health and Ecological Risk Assessments for the “Rest of River” section, which includes Connecticut. This triggered the development of “Interim Media Protection Goals” by GE. These achievements represent important steps toward the determination of whether additional PCB clean-up actions will be undertaken downstream of the first two miles of river that are currently being remediated.
- As per the CT DEP-GE Cooperative Agreement, General Electric submitted to CT DEP a PCB monitoring report for fish and aquatic benthic invertebrates for the Housatonic River in Connecticut, prepared by The Academy of Natural Sciences of Philadelphia. Overall, the results show that PCB levels in fish and invertebrates remain about the same as in other recent study years, and levels are generally much lower than found in earlier studies.
- A final Diagnostic Feasibility Study for Lake Lillinonah was submitted by Lake Lillinonah Authority to CT DEP in December 2005. This study was undertaken with a CT DEP Lake Management Program grant to look at water quality and contributing point and nonpoint sources of nutrients from the surrounding and upstream watershed areas.

- As required by their new FERC license, Northeast Generation Services Company began to develop environmental compliance plans for the operation and management of their five Housatonic hydropower developments. Many of these plans will address NPS issues related to hydromodification such as minimum stream flow and dissolved oxygen levels.

### Shepaug River

The Shepaug River basin drains a 155+ square mile area that encompasses portions of 12 towns. The watershed stretches approximately 29 miles from Cornwall, Goshen and Litchfield in the north to Roxbury, and Bridgewater and Southbury in the south. The Shepaug River flows into the Housatonic River just 2 miles upstream of the Shepaug Dam. Since the last 3 miles of the Shepaug are impounded as a result of the dam, this lower reach of the Shepaug is considered part of the lake and is known as the “Shepaug Arm” of Lake Lillinonah. In the northern half of the Shepaug watershed there are two water supply reservoirs and several large lakes including Bantam Lake, the largest natural lake in Connecticut.

The Shepaug watershed is relatively rural, characterized by forest, small towns and a diminished but persisting agricultural community. The scenic landscape makes this region a popular location for secondary as well as primary homes. As a result, residential and associated commercial development are exerting a steady and growing pressure on the land and water resources of the watershed. There are several active land trusts and other conservation entities in the region, which, among other things, have protected considerable stretches of land along the Shepaug and Bantam Rivers and around Bantam Lake. In 2001, the area along the Shepaug River through the towns of Washington and Roxbury received official State greenway designation.

Bantam Lake, a valued fishery and popular water-based recreational resource, has also been a long-standing focus of attention in the Shepaug basin due to problems with algal blooms and nuisance weeds. Naturally eutrophic by virtue of its physiography and evolution, Bantam Lake has experienced increased eutrophication due to human activities in the watershed contributing excess nutrients to the lake. During the mid-1970’s through the early 1990’s, CT DEP worked to eliminate point source discharges of treated sewage effluent from the upstream watercourses, which feed the lake. Extensive dredging was also done in selected portions of the lake. These measures greatly improved lake water quality and checked the spread of aquatic weeds. However, management of this naturally eutrophic lake is an on-going process. For example, water chestnut, an invasive aquatic plant, was recently identified as an emerging issue that could affect habitat and recreation.

In 2005:

- An agreement and stipulated judgement was reached between the City of Waterbury, the Town of Washington, the Town of Roxbury, the State of Connecticut and other parties regarding managed flow releases from the Waterbury reservoir system in Warren and Litchfield into the Shepaug River. Funding for infrastructure improvements must be found in order to make this agreement effective and parties are actively seeking this. Improved flows will help restore the aquatic ecological health of the river, particularly during the drier months of the year.

## **South Central Coastal Basin**

### **Quinnipiac Regional Basin**

The Quinnipiac Regional Watershed covers an area of 165 square miles, located in 12 towns (Bristol, Cheshire, East Haven, Farmington, Hamden, Meriden, New Britain, New Haven, North Haven, Plainville, Southington, and Wallingford). The Quinnipiac River itself flows 38 miles southward from the Plainville - New Britain border and enters Long Island Sound from New Haven Harbor. The watershed is heavily urbanized and faces several problems including stormwater discharges, contaminated sediments, habitat degradation, low flows during summer months, and flooding.

The Quinnipiac River Watershed Association (QRWA) has received several Section 319 grants for outreach projects aimed at engaging the public and identifying NPS pollution through numerous streamwalks. Their second funded streamwalk surveyed approximately 25 miles of stream with volunteers. Subsequent 319 funding supports the analysis of this data and identification of areas of concern in need of restoration. Additional 319 funding is slated to help develop technical solutions for these problem sites. Included among these projects are outreach and education components for property owners and municipal officials.

The QRWA's most recent grant award expands the streamwalk education and outreach program to include installation of storm drain markers, identification of impaired stream buffers and coordination of replanting efforts, and conducting Rapid Bioassessment monitoring at targeted restoration sites.

The QRWA is also completing tasks as part of their past Quinnipiac River Clean-Up grant by erecting "no dumping" signs and providing public education to municipal officials about the results of their previously funded trash and litter survey.

The QRWA has also received a Section 604b grant for developing a stream buffers guide for riparian homeowners that will also provide tools for landowners on how to preserve the Quinnipiac Greenway.

The QRWA has diligently pursued an easement for construction of a fish ladder at Wallace Dam on the Quinnipiac River in Wallingford. This is the first obstruction to fish passage on the river.

The Quinnipiac Watershed Partnership (QWP) received a Section 319 grant through the South Central Connecticut Regional Water Authority for its Executive Director, among other things, to mirror the successful NPS education and outreach program that the North Central Conservation District implemented with its local businesses, which focused on promoting stormwater best management practices.

The Habitat Work Group of the QWP identified areas along the Quinnipiac River in the Meriden Gorge as impaired and contributing to NPS, which the USDA Natural Resources Conservation Service (NRCS) and CTDEP Fisheries evaluated and developed into a Section 319 grant proposal. The proposed project to reduce sedimentation and enhance fish habitat will be integrated into the City of Meriden's trail reconstruction project.

#### Wharton Brook Subregional Basin

The Wharton Brook watershed covers 7.65 square miles, the majority of which lies within the Town of Wallingford. Its confluence with the Quinnipiac River is just to the west in North Haven. The area is highly developed with a high percentage of imperviousness. As typical for most urbanized watersheds, sources of NPS pollution are construction, erosion and sedimentation, land development, urban runoff and storm sewers, and other unknown sources. Allen Brook, a tributary, is especially affected by golf course runoff and wildlife, specifically geese.

As an outcome of the Habitat Work Group of the Quinnipiac Watershed Partnership, the USDA Natural Resources Conservation Service (NRCS) and CTDEP Fisheries identified and developed a Section 319 grant proposal to stabilize a large bend along Wharton Brook in Wallingford in Wharton Brook State Park. Additional work includes bank stabilization and buffer plantings at the confluence with Allen Brook, and construction of a stormwater renovation area shortly downstream. The project has been designed and permitted, and construction is planned for late summer 2006.

A TMDL (Total Maximum Daily Load) for indicator bacteria was prepared for Allen Brook Pond at Wharton Brook State Park in Wallingford; stormwater is the major contributor.

## **Connecticut River Basin**

The Connecticut River basin is the largest watershed in New England, comprising approximately 16,000 square miles and 8 million residents in parts of four states and Canada. The river flows south from near the U.S.-Canada border to Long Island Sound. The Connecticut River basin accounts for approximately 28 percent of Connecticut's land area and about 70 percent of the freshwater flowing into the Sound each year. In 1998, the Connecticut River

was selected as one of 14 "American Heritage Rivers" by the President of the United States. The entire river is also designated as the Silvio Conte National Fish and Wildlife Refuge, and the estuarine portion on Connecticut is designated as a "wetland of international significance" by the RAMSAR Convention on Wetlands of International Importance. Because it is the largest source of freshwater (and along with it, many pollutants) to Long Island Sound, the Connecticut River basin remains one of the state's highest priorities for NPS management.

### **Scantic Regional Basin**

The Scantic Regional Watershed covers an area of almost 114 square miles, of which 83 are in Connecticut. It flows in a southwesterly direction from Massachusetts before entering the Connecticut River north of Hartford. The watershed encompasses parts of six towns - Somers, East Windsor, Enfield, Stafford, South Windsor, and Ellington. Land use in the watershed includes agriculture, mixed residential, light industry, and forest. Water quality problems include turbidity and sedimentation resulting from agricultural runoff and urban development, nutrient enrichment, and, to a lesser degree, bacterial contamination.

The North Central Conservation District (NCCD) received a Section 604(b) grant to develop maps of terrace escarpments (a highly erodible land form) for the towns of Enfield, South Windsor, East Windsor; hold workshops for town officials and residents, including a Power Point Presentation; and develop brochures for homeowners explaining the limitations of owning land abutting terrace escarpments.

The NCCD, in cooperation with UConn and assistance from CTDEP, USDA Natural Resources Conservation Service (NRCS), and USGS, mapped and created a database identifying state-wide soil and surficial conditions of 75 terrace escarpment erosion sites previously inventoried by NRCS, through a Section 319 grant. Eroding soils and their underlying stratified glacial deposits are potential nonpoint sources of sedimentation and siltation. Watershed management programs may be improved by understanding and anticipating the location of these potential sources of pollution.

### **Broad Brook Subregional Basin**

The Broad Brook Watershed covers nearly 16 square miles, mostly in Ellington and about one fourth in East Windsor. Predominantly undeveloped or pastureland, this area has been impaired by nutrients, organic enrichment/low DO and pathogens, likely caused by agricultural sources.

The US Geological Survey (USGS) received a Section 319 grant to investigate the sources of nitrogen and other nutrients in ground and surface water in the Town of Ellington for the development of best management practices (BMPs) and a TMDL.

### **Farmington Regional Basin**

The Farmington Regional Watershed covers 607 square miles in two states, including sixteen Connecticut towns (Avon, Barkhamsted, Bloomfield, Bristol, Burlington, Canton, Colebrook, East Granby, Farmington, Granby, Hartland, New Hartford, Simsbury, West Hartford, Windsor, and Windsor Locks). Beginning in the rural Berkshire Mountains in Massachusetts, flowing through the Connecticut highland region and Farmington Valley, then out to the Connecticut River in Windsor; it provides 100% of the drinking water for over 600,000 people living in the Greater Hartford area and the Farmington Valley. The main stem of the Farmington River and the West Branch flows for 81 miles, and overall receives over 35 million gallons per day of treated wastewater from 9 publicly owned sewage treatment plants. The watershed is 2/3 forested, with equal amounts of agriculture and development, and supports abundant recreational opportunities; unique fish, wildlife, and plant habitats; hydropower generation; and is the first River in Connecticut to have a section federally designated as Wild & Scenic - one of only six in New England.

The Farmington River Watershed Association (FRWA) received a Section 319 grant for streambank restoration and fisheries habitat improvements along the West Branch of the Farmington River. A portion of the funds was used to contract for an assessment of the stability of the river's banks within the 14-mile reach of the Wild & Scenic section. That completed report resulted in the identification of numerous potential sites for bank stabilization. Most of the areas that show signs of erosion and need for either restoration and/or bank stabilization are due to recreational use of the river or roadways and drainage problems adjacent to the river.

The Farmington River Coordinating Committee (FRCC), the stakeholder group (consisting of the National Park Service, CTDEP, Metropolitan District Commission, FRWA, and the towns of Hartland, Barkhamsted, New Hartford, Canton and Colebrook) that has been delegated by Congress to oversee implementation of the Upper Farmington River Management Plan for the Wild & Scenic section, has contracted with the Northwest Conservation District to provide several hands-on workshops for local Departments of Public Works, local Land Use Boards, and others to improve the areas' efforts to prevent degradation to wetlands and waterways.

#### Pequabuck River Subregional Basin

The Pequabuck River watershed lies in the Central Connecticut Valley and collects drainage from both the Poland River and Coppermine Brook Subregional Basins, eventually discharging to the Farmington River. The Pequabuck River watershed alone is 29 square miles, but combined with the Poland and Coppermine watersheds totals nearly 58 square miles. This larger area covers six towns (Bristol, Burlington, Farmington, Harwinton, Plainville and Plymouth) and has three Water Pollution Control Facilities (WPCF) discharging their effluent into the Pequabuck River. Although there has been a drastic reduction in bacteria and nutrients since the late 1980s, much work still needs to be done to improve the water quality of the river. E-coli bacteria levels still exceed the permissible limit for non-contact recreation and nitrogen is present in a significant amount. The Pequabuck River serves as a water source for various industrial and recreational purposes, as well.

The Central Connecticut Regional Planning Agency received a Section 604(b) planning grant to prepare the Pequabuck River State of the Watershed Report which provided the basis for the development of the Pequabuck River Watershed Management Plan, funded through a Section 319 grant. A Stakeholders Committee formed in September 2004 from municipal representatives, volunteers from the six watershed communities (Bristol, Burlington, Farmington, Harwinton, Plainville and Plymouth), the Pequabuck River Watershed Association and the Farmington River Watershed Association, developed strategies to improve the problems they had identified in the State of the Watershed Report, including selecting the appropriate party for implementing those actions.

The Farmington River Watershed Association (FRWA) received a Section 319 grant to conduct volunteer training and streamwalks along the Pequabuck River for visual observation and evaluation.

#### **Hockanum Regional Basin**

The Hockanum Regional Watershed encompasses 77 square miles in north central Connecticut and is a major tributary of the Connecticut River. It originates in the hills near Shenipsit Lake in Ellington and flows southwesterly into the Connecticut River Valley to its confluence with the Connecticut River in East Hartford. The Hockanum River is approximately 25 miles long, draining large portions of Manchester, Vernon, Ellington, and Tolland, and smaller portions of East Hartford, South Windsor, Bolton, Stafford, Glastonbury, and Somers. The major water quality issues include high turbidity and floatables, organic enrichment and algal growth, and elevated bacteria in various reaches of the Hockanum River and its impoundments. It gets progressively worse as it flows through the increasingly urbanized landscapes of the major population centers of Vernon, Manchester, and East Hartford. Potential sources include municipal point sources (landfills and wastewater treatment plants), urban runoff and storm sewers, agriculture, channelization and habitat modification, and erosion and sedimentation.

The North Central Conservation District received a Section 604(b) planning grant to prepare a State of the Watershed Report for the Hockanum River. The report may assist in the preparation of the TMDL.

The North Central Conservation District received Section 319 and River Restoration grants to construct improvements of stormwater outfalls, bank stabilization, fish habitat enhancement, and river access on the Hockanum River in the Rockville section of Vernon. Permits are pending.

The North Central Conservation District received a Section 319 grant to conduct NPS education and outreach to businesses within the Hockanum River Watershed, persuading 70 private businesses to adopt a variety of stormwater best management practices. District staff worked with area municipalities to integrate materials used in the Business Outreach Program with municipal efforts associated with the NPDES permit process.

The Friends of the Hockanum River Linear Park, the Hockanum River Watershed Association, and other watershed groups, together with the North Central Conservation District and the Connecticut River Watch Program, are actively involved in protection and restoration efforts throughout the watershed.

### **Mattabeset Regional Basin**

The Mattabeset Regional Watershed has a drainage area of almost 109 square miles over more than ten towns (Berlin, Cromwell, Durham, Guilford, Middlefield, Middletown, Newington, New Britain, Rocky Hill, and Southington) and the Mattabeset River itself is a major tributary to the Connecticut River. The Mattabeset River flows for 18 miles in a southeasterly direction before entering the Connecticut River just north of Middletown. Land use in the watershed is nearly 50% forest cover and high-density urban development, with commercial development right up to the riverbank in many cases. Water quality and biological monitoring have documented significant degraded biological activity due to sedimentation, mostly as a result of urban development.

The Town of Berlin received a Section 319 grant to install a stormwater retrofit at Chestnut Lane in a residential subdivision that discharges directly to the Mattabeset River. The project required regrading of the outlet channel, installation of turf matting and a scour outlet pad to stabilize the site.

The Connecticut River Coastal Conservation District obtained a Section 319 grant to help implement NPS reduction recommendations made in the Management Plan for the Mattabeset River Watershed. The District selected an area of erosion which receives stormwater runoff from Main Street (a.k.a. Route 71) in Berlin, where the discharges are scouring the embankment of Railroad Pond on the Mattabeset River. Plans to stabilize the area include regrading the outlet channel, installing geotextile fabric, establishing vegetation, and constructing an energy dissipation-scour pad.

The Connecticut River Coastal Conservation District also received a Section 319 grant to develop and implement a site-specific restoration plan to address elevated turbidity and bacteria levels in Willow Brook, a tributary to the Mattabeset River. The 500-acre watershed for the project site is mostly a rural-residential area. The goal is to reduce NPS pollution impacts (e.g. road sand, silt and sediment, and nutrients) and streambank erosion while restoring and enhancing riparian aquatic habitat.

The North Central Coastal Conservation District received a Section 319 grant to restore streamside buffers with plantings at four sites in the Town of Berlin along the Mattabeset River. The project includes public educational workshops and materials.

In May 2005, the Department adopted a Total Maximum Daily Load (TMDL) Analysis for the Mattabeset River Regional Basin. The TMDL provides the framework for restoring impaired waters by establishing the maximum amount of a pollutant, in this case indicator bacteria, that a waterbody can receive without adverse impact to fish, wildlife, recreation, or other uses. It establishes a benchmark to measure the effectiveness of BMP implementation. In accordance with the Municipal Separate Storm Sewer (MS4) General Permit for Stormwater, regulated municipalities are required to modify their Stormwater Management Plans to implement the TMDL within four months of TMDL approval by EPA. It is recommended that municipalities focus their revised Stormwater Management Plans on the TMDL waterbodies within the basin.

Achievement of the TMDLs is directly linked to incorporation of the provisions of the MS4 permit by municipalities, as well as the implementation of other BMPs to address nonpoint sources. Nonpoint sources of *E.coli* bacteria in the Mattabeset River Regional Basin include failed collection systems, urban runoff and storm sewers, waterfowl, agriculture, and failed or inadequate septic systems. BMPs for the management of NPS sources include nuisance wildlife control plans, pet waste ordinances, septic system testing and maintenance, and farm animal waste management systems.

### **Coginchaug River Subregional Basin**

The Coginchaug River watershed has a drainage area of 28 square miles (predominantly in Middlefield, Durham, Middletown, and Guilford) which is about half undeveloped and the rest equally divided between agriculture and development. The Coginchaug River is the major tributary to the Mattabeset River, and flows northerly where its confluence is just west of the Connecticut River. Indicator bacteria is the major impairment with suspected sources

being agriculture, crop-related sources, intensive animal feeding operations, natural sources, waterfowl, and other unknowns.

In response to the FY '05 Section 319 Request for Grant Proposals, the USDA Natural Resources Conservation Service (NRCS) submitted a proposal to develop a watershed-based plan for the Coginchaug River Watershed. The plan will satisfy Section 319 guidance and provide broader benefits to federal and state watershed management efforts in Connecticut and the NRCS Watershed Planning Process. The plan will strengthen the likelihood that practices used to address systemic causes of water quality impairment will be considered, evaluated, and implemented, not only to meet individual pollutant standards and criteria, but to satisfy related physical and biological management needs to the extent possible.

The proposal includes: basic identification of watershed characteristics, impairments, chemical, physical and biological concerns, causes/sources of impairment, water quality and biological potential and goals, watershed protection goals, and general direction and prospects for management with specific attention paid to the 303(d) listed impairment and the LISS TMDL goal for nitrogen.

NRCS will compile data and information for the Coginchaug River watershed and generate GIS-based maps of land uses and land cover types relevant to EPA's nine criteria for watershed-based plan development. Landscape features and characteristics will then be examined to assess the spatial relationships between impairments and land use/land cover types. This analysis will be the foundation for determining, in consultation with DEP and the ad hoc watershed committee, the potential for pollutant load reductions related to the impairment, load reduction goals, and other features and benefits essential to sound watershed management and healthy biological conditions in the stream network. The plan will describe the BMPs that will be needed to achieve the load reductions, as well as provide an estimate of the technical and financial assistance funds needed to implement the plan.

### **Eightmile Regional Basin**

The Eightmile Regional watershed is located to the east of the Connecticut River near the state's coastline. Its name originated from being eight miles from the mouth of the Connecticut River. The watershed contains over 62 square miles of rolling forested landscape with over 150 miles of undegraded rivers and streams, large areas of unfragmented habitat, high water quality, and unimpeded stream flow, making it a unique example of an intact and functioning watershed ecosystem in Southern New England. The watershed is almost entirely located within three towns (East Haddam, Salem, and Lyme), who have recently completed a study with the National Park Service, DEP, The Nature Conservancy, and local land trusts for possible designation as a component of the National Wild & Scenic Rivers System. Designation is being pursued for the entire watershed area.

One of the criteria to obtain federal designation requires the Eightmile River Wild & Scenic Study Committee to develop a watershed management plan that must receive public support. The draft plan was presented and accepted by all three towns' land use commissions in Fall 2005, and subsequently approved by each town. The plan makes specific recommendations on how to protect water quality: short term actions (Tier 1) to be adopted within 6-12 months; and longer term actions (Tier 2) that may take 2-5 years to implement.

#### Tier 1:

- Adopt a River Protection Overlay Zone for all perennial streams and rivers in the Eightmile River Watershed that provides a 50-foot protection area along small headwater streams, and a 100-foot protection area along larger streams;
- Set a maximum impervious surface goal of 10% for any sub-basin within local the watershed and 4% for the entire Eightmile River Watershed as a whole. In addition, each community supports working with the Eightmile River Committee to: 1) refine modeling of current and future impervious levels, 2) use the modeling to predict future increases in imperviousness in each town, and 3) adopt appropriate tools to address limiting impervious surface increases to meet impervious surface goals.

#### Tier 2:

- Require the design, implementation and maintenance of all new stormwater systems to be consistent with the 2004 CT DEP Stormwater Quality Manual;
- Complete a Stormwater Management Plan for each municipality's stormwater system as described in the State's General Permit for Stormwater from Small Municipal Separate Stormwater Systems (MS4);

- Adopt the University of Massachusetts guidance for watercourse crossings (an approach that is promoted by the Army Corps of Engineers' New England District).

The result, regardless of obtaining Wild & Scenic designation, is a concerted collaborative and cooperative effort by the three towns to control NPS pollution through public education and outreach and planned efforts to minimize imperviousness, provide riparian buffer protection, and adoption of stormwater BMPs.

## **Thames River Major Basin**

The Thames Major Drainage Basin comprises nine regional drainage basins: Thames Main Stem, French, Five Mile, Moosup, Pachaug, Quinebaug, Shetucket, Natchaug, Willimantic and Yantic. The upper reaches of the Quinebaug River and the French River are located in south-central Massachusetts, and smaller percentages of the French, Fivemile, Moosup and Pachaug basins originate in neighboring Rhode Island. The northern half of the basin is relatively rural, characterized by small towns, farmland and forest, although a variety of pressures have caused the disappearance of many farms and privately-owned forest lands. The southern half of the basin trends to more urbanized and industrial land uses where urban redevelopment and suburban expansion has occurred. Recent development and expansion of two Tribal Nations casino resorts has created a national tourism destination area, and proximity to urban areas of Hartford, Springfield and Providence has increased development pressures. A large-scale redevelopment proposal for the Norwich State Hospital property in Preston/Norwich and associated transportation improvement proposals are recent additions to regional development pressures.

Significant accomplishments in 2005 included the following:

### **French River Basin**

The Town of Thompson Together coalition, along with the Massachusetts-based French River Connection and other watershed stakeholders, began to discuss water quality and watershed issues along the French River, and across State boundaries, in 2005. Existing State and Federal agency water monitoring data was shared; a pilot citizen monitoring project started in Dudley, Oxford and Webster, MA; a CT DEP Open Space grant was awarded to Town of Thompson for property on North Grosvenordale Pond on the French River; the Thompson Open Space and Conservation Committee inventoried water and natural resources in this river basin; and the Thompson Hydropower Development Committee secured a State grant for a study hydropower generation opportunities at the Wiltonville, North Grosvenordale, Mechanicsville, and other dam sites along the French River main stem. Due to increased community support and interest in water resources management along the French River, CTDEP funded a 319 grant to USDA-NRCS to design and develop community support and participation in a riparian buffer project on a highly visible municipal parcel along the river, with the project slated for completion in 2007.

### **The Town of Thompson:**

This tri-watershed community (French/Quinebaug/Fivemile) received a Partnership grant from the Quinebaug-Shetucket Heritage Corridor towards the development of a 2.5-mile Quinebaug River walking trail by the Town and on U.S. Army Corps of Engineers lands. This trail and the car-top launch and parking area were all completed in 2005. The Thompson Trails Committee completed additional trail inventories, worked with the Conservation and Open Space Committee to update an Open Space Inventory and Plan, and participated in a large-scale river cleanup along the French and Quinebaug Rivers in 2005.

### **Quinebaug River Basin**

#### **Town of Brooklyn:**

- The implementation phase of the Day Street-Westview Drive stormwater quality management project was 85% completed in 2005. This included acquisition of a conservation and drainage easement within a privately owned parcel to provide for a significant portion of the designed stormwater treatment train in the upper watershed. Installations included a sediment forebay and water quality swale in one area, a large serpentine water quality swale in a second area, several deep sump catch basins along two residential streets, and a downstream detention basin. Targeted local outreach, final grant reporting and technology

transfer outreach to area communities will be completed in 2006. The Town has leveraged this project to attract an additional State grant to design a downstream Town Park that receives this treated stormwater and improved access along the Quinebaug River.

**Town of Pomfret:**

- The Town and ConnDOT developed a public water access to the Quinebaug River at the Route 101 bridge crossing. This project supplies a much-needed appropriate access location along the mid Quinebaug River.

**Eastern Connecticut Conservation District (ECCD):**

- The Section 319-funded Standardized Farm Field Mapping Project was 50% completed in 2005 with targeted education brochures developed and distributed to eligible farmers in the Quinebaug River Basin, focusing on land applications of dairy manure and evaluating manure management options. Two farmers were selected to participate in the detailed mapping and record keeping training. This grant-funded project will be completed by mid 2006, and will work with farmers not enrolled in the EQIP nutrient management program of USDA-NRCS. The objectives include producing standardized maps of field locations, acreages, and soil test results and application data that will help reduce nutrient loading from farm fields that may impact downstream waterbodies in these river basins.
- A *Phragmites* (reed grass) control project began in 2003-at Roseland Lake, in the Muddy Brook/Little River sub-regional watershed of Woodstock that reduced the invasive non-native wetland plant by nearly 95%. The project was conducted by the CTDEP Wetland Habitat Management Program. The Roseland Park Trust, the Roseland Lake Homeowner's Association, the Town of Putnam Water Authority and other lake stakeholders continue to provide financial support for the project, and are working on reclaiming swimming and other water recreation opportunities along the Roseland Lake frontage. A third and final year of *Phragmites* removal was conducted in 2005 and the project was deemed a success in removing nearly all *Phragmites* stands along this waterbody. Continued outreach will continue to engage local stakeholders in ongoing monitoring and management. CTDEP will likely modify its 2006 CALM document assessment of this impaired waterbody segment to reflect this successful invasive species management work.
- A Rapid Bioassessment for Volunteers workshop was conducted in November within the Town of Thompson. This training built upon local community engagement for water quality monitoring and planning, with a pilot project planned for in 2006.

**The Green Valley Institute (GVI):**

- A partnership of the Quinebaug-Shetucket Heritage Corridor, (QSHC) Inc., the University of Connecticut College of Agriculture and Natural Resources, University of Massachusetts Extension System, and new partner the Nature Conservancy, the GVI was created to document, plan for and protect the resources of The Last Green Valley (encompassing nearly all of the Fivemile, French, Moosup, Natchaug, Quinebaug, Pachaug, Shetucket, and Willimantic regional basins of 35 communities in northeastern Connecticut and south-central Massachusetts). In 2005:
  - ⊖ 3 specific Partnership grants were awarded for natural resource-based State Greenway applications, a dam removal feasibility study, and a river greenway small boat access guide.
  - ⊖ Efforts in 2005 to address a major theme of the QSHC Inc. (natural resources) included the following compilation:  
68 GVI short courses, workshops and training sessions were attended by 1379 Corridor community leaders, landowners and others;
    - ⊖ Family Farm and Forest workshops attracted 42 landowners and 19 others from 15 towns and 6 land trusts, resulting in 2,217 additional acres of land being permanently protected, or in process of doing so, bringing up the total acreage preserved to 5,156 acres in the Corridor since 2001;
    - ⊖ GVI and the Nature Conservancy (TNC) partnered in 2005 to create a full time Land Conservation Coordinator in the Last Green Valley, which supported the majority of this year's land protection agreements in the Corridor;

- ⊖ GVI also developed a fact sheet series on 4 community planning topics, distributed at workshops and posted on the GVI website;
- ⊖ GVI continued with 4 additional community resource inventories, up to 21 communities since 2001;
- ⊖ Two new municipal Conservation Commissions were created with GVI assistance, bringing up to 10 Corridor communities with new or reactivated conservation commissions since 2001;
- ⊖ GVI assisted 5 of the 7 towns in the Natchaug River Basin to actively work on conservation planning, and worked with TNC to apply for natural resource-based State Greenway designations along the Natchaug, Mount Hope and the Fenton River corridors;
- ⊖ Two of these communities also worked with GVI to conduct on-the-ground surveys of storm drains and sand and salt runoff sites of concerns in these river corridors.
- ⊖ A survey of past workshop participants indicated that 73% have actively supported open space planning in their towns, 53% have discussed pros and cons of community growth management with others, and 45% have promoted smart growth strategies. Extensive and frequently revised information is posted on the GVI website at: <http://thelastgreenvalley.org/gvi>

#### **Quinebaug River Team (QRT):**

- In 2005 the QRT became an active sub-committee of the Natural Resource and Agriculture Committee in The Last Green Valley. QRT was formed to protect, improve and bring attention to the natural, historic and recreational resources of the Quinebaug River. Members of the Team have conducted a Phase I Visual Resource Inventory of the river corridor in *Thompson, Putnam, Pomfret, Killingly and Brooklyn*. The Phase II inventory in *Canterbury, Plainfield, Sterling, Griswold, Lisbon, Preston, and Norwich* is scheduled for summer, 2006. With time, some skill, and organization development, this subcommittee may provide regional communication and umbrella coordination potential as the local watershed advocate for the Quinebaug River main stem.

Audubon Society Center at Pomfret received a Rivers Alliance of CT Watershed Assistance Small Grant (funded by the 319 program) to monitor impaired waterbodies in northeast Connecticut. Grant-supported training and administration compiled 178 hours of volunteer monitoring of 16 miles of streams, 10 wetlands and identification of 11 amphibian species. This grant project with focus in the Quinebaug River basin was completed in 2005 but will receive additional funding and partnership agreements with area stakeholders to expand monitoring with priority impaired waterbodies in the Quinebaug, French and Natchaug River basins.

Quinebaug/Shetucket River Watershed Integrated Pest Management (IPM) and Nutrient Loading Demonstration Project: Through a Section 319 NPS grant, UConn's Department of Plant Sciences and Cooperative Extension Service continued in 2005 to recruit IPM project cooperators in several agricultural commodity areas to reduce the use of pesticides and fertilizer.

#### **Little River Sourcewater Protection Plan**

A plan was developed by a local volunteer team during a nearly year-long process to protect the Little River watershed which supplies drinking water for much of the Town of Putnam and public water supply wells in Woodstock. The team was supported by the USDA Sourcewater Protection Program, Sourcewater Specialist, and included a cross-section of stakeholders. A management plan was developed to address the lack of hard data and mitigate known potential contamination sources. Major plan elements included: a comprehensive evaluation of the watershed, agricultural best practices, protection of key watershed lands, education and outreach, and a focus on both Roseland Lake and Muddy Pond waterbodies. The Plan recommends formation of a standing committee to evaluate plan implementation progress and modifications over time. Plan elements are being addressed with a Section 319 NPS grant for innovative manure injection application on sensitive agricultural lands, baseline watershed water monitoring by the regional health district, targeted outreach and education talks, interpretive signage and events, application for State Greenway designation for the Little River corridor, and collaborate land protection efforts amongst towns of Putnam and Woodstock, local land trusts, State agencies, and the Putnam Water Department. Plan summary posted on Town of Putnam website (under Water and Sewer Dept, Information) at: <http://www.putnamct.us/new/waterandsewer.htm>

#### **Moosup River Basin**

The Borderlands Project, initiated by the Nature Conservancy (TNC) in 2001, focuses on the Pawcatuck Borderlands forests and has since expanded by the Rhode Island Economic Policy Council and basin communities to include 20 towns on the Rhode Island and Connecticut border, and includes the Moosup River basin in Connecticut and Rhode Island. A research project to identify priorities for ecologically-based land conservation was completed in 2005 with support from a new landscape target initiative of TNC. High priority parcel mapping in this watershed revealed that aquatic habitat ranks strongly in several alternative conservation strategies. The greatest threats to overall health of the area include future development, interruption of free-flowing streams, sewer discharges, roads and associated road runoff. Several headwaters and aquatic buffer areas most valuable to protect given these threats were identified and acquisition methods and agencies were provided. Formation of a bi-state watershed council is encouraged to address these watershed-scale conservation planning priorities.

### **Natchaug River Basin**

The Naubesatuck Watershed Council received a 319-funded Rivers Alliance of Connecticut grant to develop a river plan of Conservation (phase 1 data collection). All preliminary data was collected and plans were developed for late summer streamwalk assessments. A part time coordinator was hired to assist with development and implementation of an action plan to address more watershed-based planning and management opportunities.

### **Shetucket River Basin**

- The CTDEP Diadromous Fish Restoration program approved final plans for fish passage facilities at Northeast Generation Company's (NGC) hydroelectric dam in the Taftville section of Norwich, and for Norwich Department of Public Utilities hydropower generation facility at the upstream Occum Dam. Fish passage facilities were completed at each site in late 2004 and operational for the spring 2005 migratory fish runs. Additional work continued for downstream passage and modified eel passage in late 2005. Migratory river herring can travel up the Thames watershed to the base of the Scotland Dam, which will incorporate fish passage plans as part of a FERC hydropower license reissuance by 2012.
- CT DEP continued to stock Atlantic salmon surplus broodstock in the Shetucket River in Fall 2005 to expand a popular recreational fishery between Occum and Scotland Dam.

### **Willimantic River Basin**

#### **Willimantic River Alliance (WRA):**

- A 319-funded watershed assistance small grant was awarded to the Alliance by Rivers Alliance of Connecticut for the development of a watershed-wide website ([www.willimanticriver.org](http://www.willimanticriver.org)), and development of incorporation paperwork to become a formalized nonprofit conservation organization. In 2005 WRA did officially incorporate as a 501(c)(3) non profit organization, elected a board of directors, initiated a Plan of Work, and completed a website complete with a revised River Greenway and Recreation Guide, posted at: [www.willimanticriver.org](http://www.willimanticriver.org) . The WRA organization began researching information and seeking opportunities to review and comment on larger development proposals, NPDES wastewater permitting reviews, and water supply planning and management proposals, and assessments behind the newly listed impaired Eagleville Brook, all mainly in the UConn-Storrs campus area. The Alliance is also supporting streamwalk assessment work being conducted by the Eastern Connecticut Conservation District, by providing stakeholder contact information and access to a watershed-wide communication network.

#### **Willimantic Whitewater Partnership (WWP):**

WWP is a newly-established stakeholder organization with a focus on the downtown Willimantic section of the Willimantic River.

- WWP's vision is to connect the City to the river by creating a world-class whitewater recreational park and a riverside park connecting historic, art and enterprise zones, joining three rail-trail recreational corridors, and restoring ecological and fisheries features through the removal or breaching of dams.
- WWP received a Partnership grant from the Quinebaug-Shetucket Heritage Corridor, Inc. to study lower Willimantic River sediments behind 2 dams that may be proposed for breaching or removal in support of the Willimantic Whitewater Park. Technical assistance and guidance is being provided by CTDEP, by a NOAA Habitat Restoration grant program, and by consulting firms and others offering in-kind services.

- In 2005 the WWP received a Rivers Alliance of Connecticut grant to develop a broader membership and outreach campaign, currently at 150 members. The Partnership is a key supporter of the (now) annual Willimantic RiverFest, which attracts over 500 people.
- A new small boat access site was developed at the Eastern CT Railroad Museum property to support the annual River Fest (where 80-100 boaters travel the Willimantic River for 8 miles) and now provides the last safe takeout location on the lowermost river before the downstream dams and falls. Active Partnership planning in this lowermost river segment is opening community interests and discussions with regards to better stormwater management practices and planning from the small urban center.

### **Thames River Main Stem/Basinwide**

#### **Thames River Basin Partnership (TRBP):**

- A FY2005 319 NPS grant was executed through the Eastern CT Conservation District (ECCD) for a part-time coordinator (20 hr/wk) to assist in implementing the Partnership's Plan of Work and in expanding outreach capabilities. The Steering Committee received a grant from the Quinebaug-Shetucket Heritage Corridor, Inc to support an additional 5+ hours/week for this coordinator to establish and promote a volunteer water monitoring network in the Corridor. The Partnership Steering Committee began development of a job posting and applicant reviews in late 2005, expecting to hire someone by Spring 2006.
- The 2005 Thames River Floating Workshop was held outside of the Thames River Estuary, and focused on West Thompson Lake on the upper Quinebaug River. The workshop was attended by officials from DEP, the US Geological Survey, the Town of Thompson and the Army Corps of Engineers, along with 40 land use commissioners, water managers, land and water conservation organization representatives, and past workshop participants, all representing upper (including Massachusetts communities for the first time) and lower Thames basin stakeholders. An on-land set of presentations about West Thompson Lake and regional water quality investigations was followed by on-water tour of West Thompson Lake and sampling demonstrations by USGS personnel. The Partnership hosted a Thames Basin Diadromous Fish Passage Presentation and Tour of the established Greenville and new Taftville Dam facilities, led by DEP and Northeast Utilities staff. The TRBP 2005 Plan of Work is posted at the expanded website: [www.thamesriverbasinpartnership.org](http://www.thamesriverbasinpartnership.org). Newly posted resource information for Thames Partnership participants and a broader watershed stakeholder audience were included in 2005, including: a link to the USGS publication, Thames Science Plan, a link to the USGS-CT Science Center website for real time daily stream flow conditions in the Thames River Basin, links to existing stream restoration and estuary habitat restoration projects within the Thames River basin, and an expanded listing of upcoming workshops, training sessions and relevant events in the region and across Connecticut.

#### **U.S. Geological Survey/CT District Office (USGS):**

USGS continued conducting an analysis, the Quinebaug River Nutrient and Algal Dynamics Study, to 1.) calculate the loads of total phosphorus and total nitrogen that discharge from the Quinebaug River into the Shetucket and upper Thames Rivers, 2.) record and document changes in water quality as a result of primary productivity and regulation in the watershed, and 3.) to document the occurrence, distribution and types of algae in the Quinebaug River. Load estimates for priority nutrients will be revised using the USGS Loadset software program. The project will compile and interpret yield estimates for subbasins and sequential downstream main stem drainage areas. This project began in 2005, with a draft report expected in late 2006 and a completion in 2007.

One focus in 2004 was the development of a Thames River Basin Plan of Work (Science Plan). Its objective is furthering the understanding of hydrologic and water quality processes that will support management within the basin. The Science Plan outlines water quality investigations that will provide information necessary for the CTDEP to develop water quality management and restoration strategies for nutrient-related problems in the Thames River Basin. The CT 319 program used the science plan to prioritize funding for important projects.

USGS trend analyses indicate that total phosphorus in the Quinebaug River has decreased substantially since the 1970s.

USGS continued several studies of water quality impairments at West Thompson Lake in Thompson on the Quinebaug River. Using 319 funds, the USGS continued its investigation to develop a conceptual phosphorus budget for this Army Corps of Engineers Flood Control Project river impoundment. The results of this investigation are anticipated to support TMDL calculations for West Thompson Lake, listed as an impaired water body segment for aquatic life support and primary contact recreation.

A parallel investigation also using 319 funds began in 2005 to determine daily and seasonal loads into West Thompson Lake. The objectives include determining variations in stream nutrient concentrations, determining how daily fluctuations in nutrient concentrations and discharge affect daily load estimates, and evaluate the effects of streamflow regulation on the accuracy of nutrient load estimates based on current sampling schedules. Recent increases in phosphorus concentrations in the late 1990s may be due to increased nonpoint source contributions from urbanizing landscapes within the Quinebaug River Basin. See <http://pubs.usgs.gov/sir/2004/5094/>.

- USGS completed a study that characterized the relation between nutrients and primary productivity in the Quinebaug River Basin (see: <http://pubs.usgs.gov/sir/2004/5227/>).

#### **The Eastern Connecticut Resource Conservation and Development Council (RC&D):**

The RC&D continued successful implementation of their Plan of Work. The Plan focuses on agriculture, livable communities, and greenways. NPS management projects included:

- Supporting legislation for GIS open-space mapping to assist communities with smart growth initiatives;
- Partnering with the Ecological Landscaping Network to assist landowners in implementing ecological landscape practices;
- Leading the effort to identify and connect the many fragmented and local greenways;
- Fostering the development of inter-municipal greenway groups along river corridors through at least 4 regional mapping workshops with targeted land use commissions and land trusts, and leveraging assistance from CTDEP, Green Valley Institute and the Thames River Basin Partnership; and
- Continuing support for the Environmental Review Team that assists towns' and developers' site plan reviews for major land use proposals.

#### **Southeast Coastal Major Basin**

Jordan Cove Urban Watershed National Monitoring Program Project:

The project team held a completion ceremony for this ten-year project in October at the project location in Waterford. Agency representatives from U.S. EPA, CT DEP, University of Connecticut College of Agriculture and Natural Resources, town representatives and key department staff, project developer representatives, homeowner association representatives, State legislators and others heard summaries about the effects of subdivision development on water quality and quantity between traditional subdivision development and a subdivision with best management practices incorporated into the design, construction and long term operation. Post-construction monitoring of the BMP neighborhood portion indicates the volume of stormwater runoff decreased significantly and resulted in reduced pollutant loadings to downstream water resources (including Jordan Cove). A study of several different driveway surfaces indicates that stormwater runoff and mass export of pollutants was greater from the asphalt than the paving stones, and greater from the pavers than the crushed stone driveways. An important component of this research is outreach to municipal commissions, developers and the public. Lessons learned are being shared with target audiences through talks, trade journal articles, peer-reviewed publications, conferences and websites. The current project website is posted at: <http://www.canr.uconn.edu/jordancove/>.

#### **Save Ocean Beach, Inc.**

Save Ocean Beach, Inc. continued installation of the Alewife Cove Nature Trail along the Cove and on Ocean Beach property. An educational curriculum, tied to the diverse resources setting at this Park, was developed and utilized in the City of New London school system beginning in 2004 and continued through 2005. Ocean Beach Park is one of the few municipally-owned ocean beaches in Connecticut which is a popular spot each year. Several sensitive coastal habitats are easily accessible in the park and are threatened by intensive development proposals. In 2005 an unused Park building, associated with untreated stormwater runoff from an immense parking area, and with close access to the impaired waterbodies of Alewife Cove and Fenger Brook, was proposed for reuse as an area community and education center, with support from Connecticut College, CTDEP, and others.

### **Niantic River Watershed Protection Plan**

In 2005 CTDEP awarded a NOAA-OCRM coastal NPS management grant to develop a watershed protection plan for NPS-impaired Niantic River and its watershed (within towns of East Lyme, Montville, Salem and Waterford). A twelve-month planning process began in mid 2005 with a technical science workshop, interviews with town departments and government agencies. The project team then identified watershed stakeholders and held a series of public information workshops. The project outcome is expected to include a planning template that is transferable to other small coastal watersheds across Connecticut and along Long Island Sound. The project development is chronicled and updated on a website at: <http://www.kxchange.com/nrwp/>.

### **Town of Stonington**

The Town obtained a CT DEP Long Island Sound Fund grant to assess the feasibility of developing and implementing a stormwater utility. The project was completed in 2005, with the following findings (that are being studied by the Department and communities across Connecticut):

- Stonington is a typical small community with inadequate funding for stormwater management.
- Water quality is a major concern for the town, with seven waterbody segments listed by CTDEP as impaired, the majority of which are likely impaired due to stormwater discharges.
- Development of a stormwater utility would introduce a funding source and mechanism for properly addressing stormwater management and improving water quality
- There is currently no statutory mechanism in Connecticut to support municipal development of a stormwater utility. Recommended language for modification of State statutes and local statutes are made.
- The utility should be implemented within the context of the existing public works department.
- Development of a billing system will be the biggest obstacle for the town to overcome.
- Two user classes are recommended: residential and nonresidential, and no exemptions or credits offered.
- Development and implementation of a utility should be expected to occur over a five-year period.

### **Pawcatuck River Major Basin**

The Nature Conservancy (TNC) and the Rhode Island Economic Policy Council began in 2005 to formalize a watershed-wide conversation framed in smart growth and regional cooperation for the enlarged area known as the Borderlands. They had formerly focused on the unfragmented 136,000-acre forest land and critical watershed landscape area known by TNC as the Pawcatuck Borderlands. A one-day regional collaborative clinic was held in May that attracted nearly 100 people to share thoughts about the region's assets and challenges across the ten-town, two-state region. Among the clinic's outcomes was a call to improve coordination amongst conservation strategies. A preliminary action plan was developed and used to develop follow up workshops that focused on regional visioning, reports on regional cooperation and on smart growth, development of online map libraries, documents and natural resource-based priorities (including NPS management needs and success stories). The project is chronicled and communication amongst participants is enhanced with a project website posted at: <http://www.borderlandsproject.org/>

### **Wood Pawcatuck Watershed Association (WPWA)**

In 1999, WPWA was designated Watershed Council for the Pawcatuck by the RI Rivers Council, pursuant to RIGL 46-28-8, giving it legal standing to advocate on behalf of the Wood- Pawcatuck Watershed resource. This status was renewed in 2004 for an additional five years.

The Association worked with the Rhode Island Rivers Council in Spring, and then again in Fall, 2005 to conduct a watershed stewardship program. The objective is to teach interested citizens how to protect land and water resources in partnership with local land trusts and watershed councils. Participants learned hands-on techniques for water monitoring and protection, stormwater control, land protection and stewardship. Introductions were made to the federal Clean Water Act provisions for citizen actions, meeting local and state professionals responsible for implementing these programs.

## V. STATEWIDE MANAGEMENT PROGRAMS

### Inland Wetlands and Watercourses

#### Inland Wetlands Management

The Wetlands Management Section provides day-to-day support to all 170 municipal Inland Wetlands Agencies in the state. As the majority of land use decisions are made at the local level, one of the most important functions of the Wetlands Management Section is conducting the Municipal Inland Wetland Commissioners Training Program. The training program helps commission members and staff to understand their roles and responsibilities under the Inland Wetlands and Watercourses Act (IWWA). It also provides skills in the identification of wetlands, wetland functions, site plan review, impact analysis, permitting, and enforcement as related to the IWWA. The CT DEP wetlands program staff utilized numerous training materials in presenting the training program, including documents funded under Section 319.

The training program was used to notify all municipal inland wetlands agencies of necessary changes to their regulations due to significant 2004 statutory changes; as well as important pending court cases. Further, the training program provided a presentation on the newly published *2004 Connecticut Stormwater Quality Manual*, a Section 319 funded document.

In 2005:

- 423 total people participated in the training program, representing
- 70 municipal Inland Wetlands Agencies, of which
- 243 individuals attended at least one of the three program segments, with
- 54 of these individuals attending all three segments and therefore received a 2005 certificate of program completion.

Last year, CT DEP completed the training program for the *2002 Connecticut Guidelines for Soil Erosion and Sediment Control (Guidelines)*, which was funded in part by a 319 grant. The *Guidelines* are now out of print and a contract is being process to produce them on compact disk and to make them available on the Internet by spring of 2007. Once produced on CD, it is anticipated a second round of training on the *Guidelines* will be offered.

#### Water Allocation

The Water Planning Council (WPC) was established by Public Act 01-177 to study eleven issues which fall into two distinct areas of investigation: water company management and natural resource management. The WPC consists of Commissioners, or their designees, from 4 state agencies, the Department of Environmental Protection, Department of Public Health, Department of Public Utility, and the Office of Policy and Management. The Water Planning Council established three Committees to investigate issues identified in PA 01-177. All Annual Reports, minutes of WPC meetings, the Water Allocation Policy Planning Model, and several other important committee reports related to WPC activities are available on the Department of Public Utility Control website: [www.dpuc.state.ct.us/DPUCINFO.nsf/ByWaterPlanning?OpenView](http://www.dpuc.state.ct.us/DPUCINFO.nsf/ByWaterPlanning?OpenView).

#### Flood and Erosion Control Projects

The CT DEP Flood and Erosion Control program implements studies and capital repair projects to reduce or eliminate damage caused by flooding and erosion. CT DEP is allocated funding from the Connecticut General Assembly, and then awards grants on a cost-sharing basis with municipalities and special taxing districts. The CT DEP also provides technical assistance in cooperation with private consultants or government agencies like the NRCS and Army Corps of Engineers (ACOE).

CT DEP continued to administer two projects with the ACOE, a flood study of the Farm River in North Haven and the Salmon River Ice Control Project.

CT DEP administers the "Flood & Erosion Control" program. The state is working with the city of Meriden to cost share in the \$3,000,000 repair of Hanover Pond Dam in Wallingford. This repair is underway.

During 2005, IWRD assisted the ACOE in their investigation of a potential flood control project in downtown Westport. The ACOE contract for the ice control structure and adjacent sediment control structure on the Salmon River in Haddam and East Haddam will be completed in the fall of 2006.

The DEP has completed a dam design for the dam on Upper Lake Phipps in West Haven. This dam will be rebuilt through a cost sharing arrangement with the city and the incorporated homeowners association around the lake.

## **Lakes**

The goal of the Lakes Management Program is to protect and restore the ecological and recreational integrity of Connecticut's lakes and ponds through pollution prevention, pollution source abatement, and implementation of lake restoration technologies. The primary water quality concerns for Connecticut lakes are infestations of non-native aquatic plants and eutrophication. Eutrophication is a form of water pollution caused by excessive enrichment with plant nutrients, organic matter, and sediments. Symptoms of eutrophication include dense algal blooms, nuisance weed beds, and depletion of oxygen in bottom waters. These conditions limit recreational opportunities and diminish ecological values.

The technical components of a lake water quality improvement project are developed through baseline monitoring, diagnostic/feasibility studies, and engineering studies. Implementation includes watershed management to address land use issues and control active sources of pollution. In-lake management is used to remediate undesirable lake conditions that cannot be addressed by watershed management alone. The development of a successful lake management program is dependent on active community participation. CT DEP is very active in meeting and communicating with property owners, lake associations, and town officials to promote and assist in lake and pond management projects.

Lake and pond projects are funded through a variety of federal, state, and local funding sources. Federal and state funding sources generally place priority on lakes with public access for recreation. At the federal level, CWA Section 314 provided funding for statewide baseline water quality assessments, and matching grants for diagnostic/feasibility studies and lake restoration projects. Since the phasing out of Section 314 funding, Section 319 funds have supported nonpoint source pollution control projects in lake watersheds.

Connecticut DEP Lakes Grant Program funds lake restoration activities such as diagnostic water quality studies, land use planning, engineering feasibility studies, development of construction bid specifications, construction of storm water infrastructure improvements, dredging, and development of public education documents.

The last year funding was available for the Lakes Grant Program was 2001. Due to the absence of funds for several years, the Lakes Grant Program completed fewer projects in 2005 than it had in the past. In 2005 funds from the Lakes Grant Program were used to complete projects at Hatch Pond (Kent) and Park Pond (Winchester). Projects continued at Crystal Lake in Ellington.

In 2005 CWA Section 319 funds were used to begin developing a small grants program through the Connecticut Federation of Lakes. These grants will help small and new lake groups become established and provide funds for initial watershed assessments for these lakes.

CWA Section 319 funds were used by to develop the framework for a lakes probabilistic monitoring program. In 2005 DEP Bureau of Water Protection and Land Reuse continued working with the contractor Connecticut College to monitor the initial 20 lakes of a sixty-lake project and developed a QAPP. This probabilistic monitoring project is designed to assist Connecticut with developing nutrient criteria for lakes.

The Bureau of Water Protection and Land Reuse, in cooperation with the Division of Inland Fisheries, the Environmental and Geographic Information Center, and the Pesticides Group of the Waste Bureau continued a pilot program to control infestations of non native aquatic plants that are new to Connecticut. This program was funded

with \$16,000 from the SEP program and allows DEP to respond immediately to new infestations of non-native aquatic plants by pre-selecting a contractor who is on call to provide services.

## **Groundwater**

The CT DEP develops and implements ground water protection strategies for all ground water resources, including public water supply wells. This includes ground water quality standards and classifications, ground water resource mapping, water supply planning, discharge permitting, water diversion permitting, site remediation, land use regulation in certain aquifer areas, technical assistance, pollution prevention, and a host of NPS control programs. One of the new key components of this program is the Aquifer Protection Area (APA) Program, which provides comprehensive protection for major drinking water well fields in stratified drift aquifers. The APA Program requires mapping of the "areas of contribution" and "recharge areas" to major well fields and regulating land use in those areas to minimize the potential for contamination of the water supply.

Preliminary APA mapping has been completed for all the state's major well fields (127) and provides a rough estimate of the contributing areas. Inventories of potentially regulated facilities and agricultural activities have also been conducted. Final mapping is a further refinement and will define the APA, the area subject to land use regulation. To date, plans for data collection and analysis have been submitted for 77 well fields, and 68 have been approved. Final Level A mapping has been submitted for 43 well fields and 22 have been approved. GIS mapping of the APAs has been partially supported with FY93 and FY95-98 section 319 funds.

The APA Land Use Regulations were adopted in February, 2004, and a Model Municipal Ordinance, along with guidance documents and forms necessary for implementation of the APA program were published in June, 2005. CT DEP continues to develop guidance on materials management plans, stormwater management plans, site plan review, planning and zoning coordination, water utility assistance, and other local guidance.

Municipalities are beginning program implementation, and the first step is to appoint a municipal aquifer protection agency (through adoption of a local ordinance). Thus far, 68 of the 83 towns have passed the required ordinance, and CT DEP continues to work with the remaining municipalities to implement this first step. Additionally, 6 of the APAs have been adopted at the local level and implementation of the land use regulations is beginning.

In 2005, CT DEP:

- worked with internal and external work groups to issue the Model Municipal Ordinance to provide additional guidance (June 1, 2005);
- continued to work with the municipalities in the program to begin implementation of the program, providing extensive outreach and meeting with individual municipalities to assist with delineation of APAs and establishing local regulations;
- added individual town maps showing the APAs to the web site, making the mapping more accessible to the public;
- completed adoption of amendments to the Level A Mapping regulations, which became effective September 1, 2005;
- provided technical assistance to numerous towns in response to inquiries and requests for assistance with aquifer protection issues;
- began work with the water utilities to develop a Municipal Assistance Program;
- continued to collect and review data, including point and non-point pollution sources, land use/land cover, and water quality data;
- continued to update the Water Quality Classifications and Leachate & Wastewater Discharge coverage for the Thames River major basin; and
- continued work on a mapping project with the Connecticut Geological Survey to derive an "Aquifer Potential Map" for the state that will be made available in GIS format (the project utilizes federal section 319 funding).

## **Long Island Sound**

Long Island Sound (LIS) is one of Connecticut's most important natural and economic resources, serving as habitat to numerous fish and wildlife populations, a commercial and recreational resource to the citizens of CT and NY, and contributing an estimated \$5.5 billion annually to the regional economy. Improving water quality in LIS is a major goal to ensure healthy habitats and safe productive use by people living around LIS. Studies in the late 1980s identified hypoxia (low dissolved oxygen) occurring in the bottom waters of the western Sound as a result of excess nitrogen enrichment to LIS waters. CT and NY have implemented management actions including upgrading of sewage treatment plants (STPs) to remove more nitrogen from STP discharges entering LIS, thus alleviating the spread and intensity of hypoxia. Another challenge facing LIS are pressures for increased recreation and public access of the Sound, and commercial interests for energy and commerce. Habitat restoration projects are being carried out through a number of programs with the goal of preserving 2000 acres of coastal and near shore habitat and 100 river miles of migratory fish passage in CT and NY by 2008. In addition, citizens, their elected officials, and agencies are working to implement a Long Island Sound Stewardship initiative to identify areas of ecological and recreational value to preserve and protect for future generations.

CT DEP's Long Island Sound management efforts revolve around two major programs: the Long Island Sound Study (LISS), which is administered by the Bureau of Water Protection and Land Reuse Planning and Standards Division (BWPLR PSD) in cooperation with DEPs Office of Long Island Sound Programs (OLISP), and the Coastal Management Program, which is administered by the OLISP.

#### Long Island Sound Study

The Comprehensive Conservation and Management Plan (CCMP) for Long Island Sound, completed and approved by EPA and the states in 1994, identified low dissolved oxygen (hypoxia) as the primary water quality problem for the Sound and excess nitrogen loads as the primary cause of the problem. The CCMP also cites additional problems, including bacteria and pathogens, toxic contamination, floatable debris, and loss of fish and wildlife habitat. Management efforts over the past several years have focused on reducing nitrogen loads to improve dissolved oxygen conditions and restoring degraded coastal habitats.

Nitrogen management efforts include installing advanced wastewater treatment equipment in new and existing municipal sewage treatment plants, eliminating raw sewage discharges through combined sewer overflows (CSOs), and controlling NPS pollution. In 2001, EPA approved the CT DEP and the New York State Department of Environmental Conservation (NYS DEC) TMDL for nitrogen loads to Long Island Sound. The TMDL calls for an approximately 64 percent reduction in nitrogen loads from point sources and a 10 percent reduction in nitrogen loads from nonpoint sources from urban and agricultural land.

In 2002, the nitrogen credit trading program and a statewide general permit with nitrogen limits for 79 sewage treatment plans were initiated. Four annual credit exchange cycles have now been completed with oversight by CT DEP and a nitrogen credit advisory board. It is anticipated that the trading program and general permit will enable the state to meet the nitrogen load reduction required by the TMDL more cost-effectively.

The LISS is developing a nonpoint source nitrogen-tracking program that will rely on watershed modeling. Discussions have begun on fine-tuning and implementation of the approach. It is anticipated that the program will allow managers to determine progress towards the 10% load allocation reduction in CT and NY specified in the TMDL.

The LISS and CTDEP have also been investing time and funding in habitat restoration activities that are relevant to NPS pollution abatement. In 2005, the LISS finalized a "Stewardship" strategy for LIS that will help protect sensitive habitats but also ensure protection of land conditions that are amenable to pollutant removal. LISS is also involved in CTDEP eelgrass protection evaluations, with a goal of establishing appropriate nitrogen loading criteria to protect eelgrass beds in eastern CT that have been in decline in recent years.

With funding from the Long Island Sound Study (LISS), CT DEP has also conducted extensive monitoring of Long Island Sound. The program is used to track changes in low dissolved oxygen levels as well as nutrient and other parameters relevant to an extensive hypoxia impairment that affects the western half of Long Island Sound's bottom

waters. In combination with upland monitoring described above, CT DEP and the LISS use these data to chart management progress, particularly for control of nitrogen, the primary pollutant leading to hypoxia.

### Coastal Zone Management

Pursuant to section 6217 of the Coastal Zone Act Reauthorization Amendments (CZARA) of 1990, the CT DEP has developed and administered the state's Coastal Nonpoint Pollution Control Program (CNPCP), which received full approval from EPA and NOAA in November 2003. Progress during 2005 includes:

Because Connecticut's program is a networked program based on existing authorities, several implementation activities have been undertaken by OLISP staff in the administration of their core programs. For example, coastal nonpoint source pollution control concepts, especially as they relate to stormwater management, were incorporated into review comments provided by OLISP staff to coastal municipalities. Where warranted, conditions continue to be included in permits issued pursuant to OLISP's coastal regulatory programs for structures, dredging, and filling seaward of the high tide line in the tidal, coastal, and navigable waters of the State of Connecticut and in tidal wetlands, to incorporate coastal nonpoint source pollution control concepts. Most permits contain a standard condition requiring the permittee to not cause or allow pollution of wetlands or watercourses, including pollution resulting from sedimentation and erosion. Connecticut's efforts to restore degraded tidal wetlands and other coastal habitats continued during 2005 as well. Many of these core programmatic activities have been undertaken in consultation with the coastal nonpoint source program coordinator to ensure consistent application of coastal nonpoint source management measures.

OLISP continues to provide technical assistance to coastal municipalities to help them meet the nonpoint source-related goals and objectives of the CCMP, TMDL, section 6217, and Connecticut Coastal Management Act, and in complying with PA 91-170 (which requires that zoning regulations in coastal municipalities consider impacts on Long Island Sound water quality and habitat). In 2005, OLISP staff conducted coastal nonpoint source pollution control regional workshops for non-coastal municipalities in the Trumbull and Weston regions of Connecticut. With the completion of these two regional workshops, each municipality within the coastal nonpoint source control program management area has been invited to attend a workshop about the program.

The coastal nonpoint source program coordinator also continued to work with the DEP's Bureau of Water Protection and Land Reuse (BWPLR) on several initiatives. For example, workshops for the Connecticut 2004 Stormwater Quality Manual were conducted during 2005, coordinated by BWPLR staff, the University of Connecticut's Nonpoint Education for Municipal Officials (NEMO) Program staff, and the DEP's consultant. In addition, several training sessions for DEP staff were also conducted during 2005.

OLISP met with BWPLR staff and staff from the Natural Resources Conservation Service (NRCS) to discuss the NRCS's soil survey interpretation to evaluate the suitability of soils for various stormwater runoff best management practices. The purpose of this newly developed interpretation is to better use soil survey information for successful selection and implementation of best management practices for stormwater runoff. The interpretation will be used to link appropriate soils to the practices contained in the state's 2004 Stormwater Manual.

In addition, OLISP worked with Section 319 staff, the District Manager of the North Central Conservation District, and representatives from the City of Hartford to develop a project to investigate the feasibility of re-vegetating the southern edge of Bushnell Park, just across the street from the entrance to the DEP building. This portion of the park has experienced erosion due to high foot traffic from patrons of food vendor trucks parked along the southern edge of the park—many of those patrons are DEP employees. The project will be funded through reprogrammed Section 319 funds from another project that the conservation district was unable to implement.

OLISP staff continues to work with the Town of Westbrook's sanitarian, recently appointed as the acting Director of Health for the town, on development of the town's comprehensive Onsite Wastewater Management Plan, funded in part through OLISP's Municipal Grants initiative. The Town of Westbrook's work on the Onsite Wastewater Management Plan had been continued in 2005 with a subsequent Municipal Grant to develop supporting documentation such as ordinances and inspection reporting forms. The coastal nonpoint source coordinator attended several meetings to discuss the draft ordinance and inspection reporting form, the latter of which is being developed with Carmody software and will be web-based to allow for easy and consistent data input. We anticipate continued

work with the town as they finalize the ordinance, inspection forms, outreach materials, and ultimately adopt the onsite wastewater management plan. The plan will include criteria for property inspections; identification of management program components (e.g., regularly scheduled system inspections and tank pump-outs, phase-out of cesspools, phase-in of system upgrades, etc.); identification of methods for inspection data collection and analysis, including the use of GIS; and development of an outreach and education program regarding the importance and methods of proper system use and maintenance.

### Clean Marina Program

OLISP continues to implement the Clean Marina Program. By 2005, 27 marinas had taken a Clean Marina Pledge, and five marinas have been certified as “Clean Marinas.” The Clean Marina Program has also began the process of awarding another Cost-Share Assistance Grant for the purchase of a dustless vacuum sander, bring the total number of funded projects to 8. The Clean Marina Cost-Share Assistance Grants are funded by a Clean Water Act Section 319 grant.

The Clean Marina Program is a voluntary, incentive-based education and outreach campaign to encourage environmental compliance and the use of BMPs at the state's 275 coastal and inland boating facilities. The program also includes an outreach campaign to educate the state's boaters about environmentally sensitive boating practices. OLISP, in cooperation with the CT DEP Boating Division, developed the program to address the potential threats to water quality from both inland and coastal marinas, particularly in the form of NPS pollution. In 2005:

- OLISP staff organized two, 2-day compliance courses in Jan and Feb of 2005. The classes included information on Hazardous Waste Regulations, Air Regulations, Stormwater Requirements for industry, chemical spill reporting requirements, EPCRA requirements, as well as Best Management Practices marina operators can take to minimize pollution at their facility. Participants received 5 binders with all the information presented during the classes as well as sample materials for pollution prevention plans and waste management checklists and logs.
- Two Clean Marina Cost-Share Assistance Grant projects, funded through a 319 Nonpoint Source Grant, were completed. The first project funded the purchase of two vacuum sanders and the purchase of a pressure wash wastewater treatment system. The second project funded the purchase of 20 dustless sanders to be awarded to marinas participating in the CT Clean Marina Program. The dustless sanders are used to collect particulates when marinas conduct boat bottom maintenance, preventing harmful anti-fouling paints from contaminating Connecticut's surface waters and ground. One previous recipient of a Cost-Share Grant for a dustless sander prevented over 850lbs of particulate bottom dust from entering the environment in a period of one year.
- Clean Marina staff conducted Outreach at the following events:
  - The Norwalk Boat Show
  - The Hartford Boat Show
  - The CT Marine Trades Association's Annual Marine Exposition
  - The CT Harbor Management Associations Annual Environmental Meeting
- DEP received 3 new CT Clean Marina Pledges
- All 5 Certified CT Clean Marinas were re-certified.
- Clean Marina staff conducted informal informational site visits to 5 CT marinas from Aug '05 – Dec '05
- 25 marinas renewed their pledges in 2005
- By the end of 2005, Connecticut had a total of 5 certified Clean Marinas and 28 marinas that had pledged to be certified within one year.

## Vessel Sewage Management

Sewage from recreational and commercial boating on Long Island Sound continues to be a potential source of pathogen contamination to shellfish beds and swimming areas. In poorly flushed areas with high boat concentrations this potential waste discharge may also contribute to nutrient enrichment. The CT DEP OLISP has primary responsibility for regulating marinas and related boating activities, including vessel sewage management.

Funding from the U.S. Fish and Wildlife Service through the Clean Vessel Act (CVA) grant program allowed DEP OLISP to build, operate, and maintain a total of 90 total pumpout facilities, including thirteen (13) pumpout boats, and 22 dump stations (including one floating rest room) available to boaters at 89 boating facilities along Connecticut's coastal waters. DEP will be constructing one additional stationary pumpout station in 2005.

EPA approved the designation of all Connecticut coastal waters in Fishers Island Sound from the limits of the previously approved No Discharge Area (NDA) in Stonington to Eastern Point, Groton, including Mystic Harbor, West Cove, Noank, Mumford Cove, the Poquonnock River and Pine Island Bay as NDA. An application requesting EPA approval of the designation of portions of Long Island Sound and its navigable tributaries from Guilford east to Eastern Point Groton as a NDA is under development for 2005. Further information on NDA proposals is available on the project website at: <http://www.ctnodischargeara.org/>

A directory of pumpout stations and boats can be found on the CTDEP website at: [http://www.ct.gov/dep/cwp/view.asp?a=2719&q=325524&depNav\\_GID=1642](http://www.ct.gov/dep/cwp/view.asp?a=2719&q=325524&depNav_GID=1642), along with a variety of information about Connecticut's Clean Vessel Act program.

## **Habitat Restoration**

Like many northeastern coastal states, Connecticut has lost much of its historic, natural tidal wetlands and other habitats to development and hydromodification (e.g., ditching, diking, draining, and filling). In reversing this trend, Connecticut has become nationally recognized for its leadership role in tidal wetland restoration, and has been an active participant on the LISS Habitat Restoration Team. In 1997, CT DEP established the Wetlands Habitat and Mosquito Management (WHAMM) Program, one of the first dedicated wetland habitat restoration programs in the country, with dedicated staff and specialized low ground pressure equipment. Connecticut also was the first state in the country to use funding from the federal Intermodal Surface Transportation Efficiency Act (ISTEA) for tidal wetland restoration where undersized culverts or tide gates associated with transportation routes have impacted the coastline. Since the early 1970s, CT DEP has used these programs and resources to restore over 1540 acres of tidal wetlands. In addition to restoring degraded habitat, OLISP also is involved in preventing degradation through improved management of exotic and nuisance species. In 1998, the LISS adopted a "Habitat Restoration Strategy" that sets a goal of restoring 2000 additional acres of coastal habitats such as tidal wetlands and coastal grasslands by 2008. In 2005:

- Restoration occurred at Indian Pond in East Lyme - 0.5 acres; Bluff Point tidal marshes, Groton 1.9 acres; Great Meadows marsh, parcels 2 & 3 in Stratford - 26.4 acres; and Lynde Point, Old Saybrook - 13.9 acres, for a grand total of 42.7 acres of tidal wetlands.
- In addition, WHAMM program performed Phragmites control at 32 sites in Connecticut totaling over 365 acres. These acres do not count toward DEP's restoration goal of 2000 acres.

Open marsh water management (OMWM) is a technique used on the salt and brackish marshes along the coast. OMWM can consist of creating ponds, new channels, or ponds with sill channels, and plugging old grid ditches. The idea behind OMWM is to provide habitat to sustain fish, which will eat mosquito larvae. In marsh restoration DEP uses this technique to increase flooding of phragmites and to restore fish and wildlife habitat through creation of surface water features that were eliminated by grid ditching, while at the same time not creating mosquito breeding areas. As far as updates for the eelgrass paragraph, another aerial survey of eastern LIS is scheduled for summer 2006, and it will be done using the same survey techniques as the 2002 survey.

A particularly important coastal habitat type is submerged aquatic vegetation dominated by eelgrass (*Zostera marina*). Historically, eelgrass grew in shallow water throughout the Sound, providing important habitat for fish and shellfish. In the 1930s, there was a major decline of eelgrass throughout its range on the Atlantic coastline. By the 1950s, eelgrass had returned to eastern Long Island Sound, but not to central and western coastal areas. CT DEP suspects that the excessive nitrogen loads associated with developed areas promoted greater phytoplankton production, which reduced light penetration necessary to support plant growth. Remaining eelgrass beds occur east of the Connecticut River, and the total acreage measured in 1993-94 was less than 700 acres. In 2002, the acreage of eelgrass had increased to over 1380 acres. While some of this increase is likely due to differences in survey methodology (boat survey versus aerial photo analysis), much of this increase is due to natural 'recovery'. Most of the increase are associated with beds that in Long and Fishers Island Sounds. There is little change in the acreage of beds within coves, embayments and tidal rivers. Little Narragansett Bay continues to support no eelgrass beds and the beds in Clinton Harbor have disappeared. The only success story is the restoration of nearly 50 acres of eelgrass in Mumford Cove, the result of removing a sewage treatment plant discharge in 1987. Another aerial survey of eastern LIS is scheduled for summer 2006, and it will be done using the same survey techniques as the 2002 survey.

## **Atmospheric Deposition**

The CT DEP, through the New England Governors and Eastern Canadian Premiers (NEG/ECP) Environment Committee, has been actively participating in a regional effort to promote additional reductions in nitrogen oxide (NO<sub>x</sub>) emissions, which are believed to contribute significantly to nitrogen loading to the Sound through atmospheric deposition. CT DEP is a member of a New England Governors/Eastern Canadian Premiers committee charged with developing a northeastern Acid Rain Action Plan (ARAP). In the last few years, the Acid Rain Steering Committee has refocused and become the Acid Rain and Air Quality Steering Committee (ARAQSC) to take a more comprehensive look at issues related to both Acid Deposition and Ambient Air Quality. While the focus is on lake acidification and human health effects, attention is also being directed towards atmospheric nitrogen loads and their effect on estuaries as a logical extension of the problem. Over the last five years, the ARAQSC work groups have identified monitoring protocols and a network to track effects of atmospheric deposition that would lead to management recommendations for additional control of acid deposition. The final product defining acid deposition effects is forest sensitivity mapping throughout the region to determine critical loads that affect forest productivity. A section 319-funded project on critical loads mapping for forests in the State of Connecticut has been completed.

CTDEP will be participating in a new committee on Critical Loads for both land and water. The short-term goals of the Committee will be to gather scientific data and information to fill gaps in critical load development in the US. Eventually, the findings will help define management goals that could benefit both terrestrial and aquatic environments.

Air quality regulations set by CT DEP in December 2000 establishing a 20-30% reduction in NO<sub>x</sub> emissions by 2003 and a 50% reduction in SO<sub>2</sub> emissions by 2002, beyond current commitments have been implemented on schedule. The actions reduced NO<sub>x</sub> emissions by nearly 3,500 tons per year, a 26% reduction and SO<sub>2</sub> emissions by 8,900 tons per year, a 67% reduction, in concurrence with NEG/ECP goals. As required in the LIS TMDL for nitrogen, EPA's Clean Air Interstate Rule (CAIR) is being used to predict benefits of nitrogen emission control programs under federal law. Statewide efforts relevant to Connecticut include:

- New regulations and emphasis on state use of, and tax breaks for clean air vehicles.
- Adoption of a Connecticut climate action plan.
- Review five years of progress under the Action Rain Action Plan, and assessment of future actions.

## **Fish Habitat Restoration**

The CT DEP Inland Fisheries Division has an active fish habitat restoration program, involving removal of barriers to fish passage, construction of fish passage facilities, and physical restoration of in-stream and riparian habitat

features. CT DEP coordinates its restoration activities with many other federal, state, and town agencies and non-government organizations, including the U.S. Fish and Wildlife Service, NOAA, NRCS, EPA, State Water Conservation Districts, American Rivers, Trout Unlimited, the Connecticut River Watershed Council, and various other watershed groups and land trusts. Although Section 319 funds have only been used on a limited basis in the past, several fishway projects currently in the planning stage have received 319 funding and these types of projects will receive high priority in the future.

Restoring habitat for native *diadromous* fish is a high priority in Connecticut. Diadromous species include *anadromous* and *catadromous* species. *Anadromous* species, which spend most of their lives in salt water and migrate up rivers to spawn in fresh water, include Atlantic salmon, blueback herring, alewife, and American shad. *Catadromous* species, which spend most of their lives in fresh water and migrate down rivers to spawn in salt water, include only the American eel, which is under consideration for listing under the federal Endangered Species Act.

## **Stormwater Management**

Stormwater permitting and compliance is conducted by the CT DEP Permitting and Enforcement Division (PED) under the authority of the CWA National Pollutant Discharge Elimination System (NPDES) storm water provisions and supporting state statutes and regulations. PED permits and enforcement staff are organized into three regional units: (1) Housatonic, Southwest Coastal, and Hudson major basins; (2) Thames, Southeast Coastal, Pawcatuck, and South Central Coastal major basins; and (3) Connecticut River Basin. At least one environmental inspector is assigned to conduct compliance inspections in each of these three regions, while a central, statewide enforcement program handles more significant violations. One stormwater staff person is assigned to each watershed and performs stormwater inspection and enforcement in their respective watersheds. A fourth stormwater staff member is assigned to program outreach and development for all stormwater permits with particular emphasis on the General Permit for the Discharge of Stormwater from Small Municipal Separate Storm Sewer Systems (MS4 permit). One of the four stormwater program staff is funded under Section 319 through the PPG.

CT DEP regulates stormwater discharges from many sources, including construction sites, industrial activities, large commercial sites and municipally owned facilities. During 2004, the CT DEP stormwater program staff continued to conduct compliance inspections in priority watersheds and issued the modified construction stormwater general permit to meet the requirements of the NPDES Stormwater Phase II Rule. The new municipal "MS4" stormwater permit was completed and issued in 2004. Accomplishments include:

- Over 3,000 facilities, towns or activities were registered under the various stormwater discharge general permits by the end of 2005, most of which have annual monitoring requirements. There were 1,344 industrial operations, 1242 construction sites, and 231 commercial sites. DEP stormwater staff conducted 218 inspections and issued 78 Notices of Violations for stormwater related violations during 2005.
- In 2004, DEP issued the modified construction general permit to take the threshold for permit coverage from 5 acres down to 1 acre. The modified permit states that for construction disturbance between 1 and 5 acres, the activity does not require registration under the general permit as long as it receives local municipal approval of its erosion and sedimentation control plan
- The largest part of the Phase II program is the MS4 (municipal separate storm sewer systems) general permit covering municipal storm sewers. This new permit was issued in 2004. 132 towns in the state are covered by this permit. These covered towns must develop a storm water management plan that addresses "six minimum control measures". These minimum measures are: public education and outreach, public participation, illicit discharge detection and elimination, construction storm water management, post-construction stormwater management, and pollution prevention/good housekeeping. DEP, in cooperation with the Connecticut Conference of Municipalities, conducted extensive outreach and workshops, which are on-going. DEP will also issue separate MS4 permits for DOT and "non-traditional" government-operated MS4s.

To support implementation of the Phase II stormwater permitting program and improve its technical assistance capabilities, the CT DEP development a new BMP technical guidance manual utilizing 319 funds. In 2004, DEP issued the Connecticut Stormwater Quality Manual, which is used to conduct outreach and education to municipal land use officials and public works personnel, as well as private developers and their design engineers.

In 2003, The General Permit for the Discharge of Stormwater Associated with Industrial Activity ("the industrial general permit") was modified to include a provision for the submission of a no-exposure certification for certain "light" industries. Submission of a no-exposure certification exempts such industries from registration requirements of the industrial general permit. Prior to this 2003 permit modification, the Department did not have a formal record of industries that were exempt from permitting requirements. In 2005, there were 80 certifications.

Accomplishments in 2005 include:

- The program developed a draft DOT MS4 permit with cooperation from DOT after several workgroup meetings. DOT prepared their Stormwater Management Plan for this permit in 2005 and they are following in advance of the permit being issued.
- DEP developed the first draft of the Institutional (formerly "non-traditional") MS4 permit.
- DEP conducted extensive outreach in conjunction with CCM as well as some regional planning agencies for the MS4 permit.
- DEP conducted industrial outreach to the CT Marine Trades Association, CBIA, and the CT Transportation Institute along with other organizations. The program also did outreach to several contractors' and developers' organizations on the construction permit.

## **Agricultural Nonpoint Source Management**

Agricultural nonpoint source pollution remains a problem in several areas of Connecticut, notably in Litchfield, Windham, and portions of Hartford, Tolland, and New London counties. Farmland runoff contaminated with sediments, organic matter, nutrients, pesticides, pathogens and other substances, and groundwater contaminated with nutrients, pesticides and other soluble substances remains a priority problem for CT DEP and its NPS Program partners, including the NRCS, Department of Agriculture, UConn/CES, and SWCDs.

The Connecticut Council on Soil and Water Conservation (CCSWC) has received Section 319 funding periodically to support some aspects of the program. The Connecticut Association of Conservation Districts (CACD) serves as the umbrella organization for the soil and water conservation districts (SWCDs), providing coordination between the districts and CCSWC, and overall guidance on statewide district programs. EPA and CT DEP annually award 319 funds to NRCS, UConn/CES, and the SWCDs to match other funding sources (e.g., EQIP) to provide technical assistance to agricultural producers on nutrient management, and integrated crop and pest management.

The NRCS also administers two new programs established under the 1996 and 2001 Farm Bills, the Environmental Quality Incentives Program (EQIP), which provides cost-share funds to farmers to implement a wide range of conservation practices, and the Wildlife Habitat Improvement Program (WHIP), which funds restoration of riparian buffers and other natural wildlife habitat.

Confined animal feeding operations (CAFOs), an important source of agricultural pollution, are now defined by EPA as point sources. CT DEP, which is authorized by EPA to administer its NPDES permitting program, will implement the CAFO permitting program with a statewide general permit. CT DEP has determined that there are approximately 10 CAFOs and at least 35 animal feeding operations (AFOs) statewide. The DEP Commissioner has the discretion to decide that certain AFOs be regulated as CAFOs.

Under the general permit, each farm will be required to develop a Comprehensive Nutrient Management Plan (CNMP). Connecticut is using phosphorous-based manure application criteria for CNMPs. Recommendations for

nutrient application rates will be based on the agronomic critical ranges required for crop production as established by the UConn Soil Test Lab, or UConn-recognized industry practice. Recommended rates are based on soil and post-mortem tissue tests, documented yield information, and management capabilities.

In addition, NRCS and UConn/CES evaluate the adequacy of a farm's land base with potential for fertilizer application for its capacity to utilize manure nutrients. NRCS will use the technical guidance for developing CNMP's along with Field Office Technical Guide Practice Standards to develop CNMP's. CT DEP is working on the General Permit criteria.

Agricultural NPS program accomplishments during calendar year 2005 include:

- NRCS and UConn/CES assessed about 120 farms from FY96 through FY05 and wrote or revised about 55 agricultural waste management system plans (AWMPs) that CT DEP has approved.
- Through FY05, nutrient management plans are being implemented on 21 farms and about 11,658 acres (although the acreage changes each crop year as farmers add and or lose fields, which is a little less than the projections made in December 1998 in the 319 proposal for nutrient management -- 25 farms and 12,500 acres).
- NRCS and UConn/CES continued to work with agricultural producers to develop a user-friendly computerized record-keeping system to help them track nutrient use on their fields. The record-keeping program is being tested and developed for uploading to UConn's Soil Testing Laboratory's web site for ease of access for farmers. UConn/CES has continued a 319-funded IPM/ICM program targeting coastal watersheds in Fairfield and New Haven counties, with a focus on outreach and education.

## **Technical Assistance/Demonstration Projects**

CT DEP also has used its section 319 funds to provide technical assistance to local land-use decision makers, to develop numerous guidance documents, and to conduct demonstration projects in support of its watershed management and other base programs. A number of targeted technical assistance programs are described in previous sections on watershed initiatives, erosion and sediment control, stormwater management, and agricultural NPS management. In addition to these targeted efforts, the CT DEP and EPA have utilized section 319 funds to support a statewide University of Connecticut Cooperative Extension System (UConn/CES) Nonpoint Education for Municipal Officials (NEMO) Project.

The goal of the NEMO Project is to provide local land use decision-makers with the tools necessary to understand the impacts of nonpoint source pollution and guide development in such a way as to minimize these impacts. Recognizing that NEMO's educational programs help achieve many of the goals of the CT DEP's NPS Program, the two state agencies have formed a partnership to deliver technical training to Connecticut municipalities over an extended period. Annual planning meetings between the NEMO Project team and CT DEP are held to ensure coordination between the Office of Long Island Sound Programs coastal zone management program, the BWPLR Watershed Management section, Aquifer Protection Program, stormwater permitting program (more intensely as the Phase 2 permitting program develops), and the TMDL program.

CT DEP and EPA have awarded FY99-05 section 319 funds to the NEMO Project to expand its program by adding research, watershed programming, Internet tools, and a targeted intensive municipal initiative to its educational effort. After fifteen years of the NEMO Project, there is concrete evidence that Connecticut municipalities are giving greater consideration to water quality in their land use planning and regulatory programs. In 2005, the NEMO program focused on three primary areas: developing a new workshop on urban stormwater management, conducting statewide workshops on the CT DEP Stormwater Quality Manual and coordinating and conducting the *Municipal Initiative* for selected towns. Some of the results of these activities are outlined below:

## **1. Managing Stormwater in Urban Areas**

A 100-slide presentation was prepared focusing on link between land use and water quality in urban areas (Appendix 1). The presentation is organized into five sections, starting with a description of the importance of water resources, giving an overview of *Connecticut's Changing Landscape* focusing on their municipality, a review of how developed landscapes affect water resources, strategies for reducing the impact of development and finally, how cities can get started to implement these strategies. Although the urban focus is new, linkage of land use to water quality reflects what NEMO has been teaching for over a decade. The relationship of impervious surface to water resource health is very well documented in urban areas. What is less well known is how to reduce the "ecological footprint" of urban areas, while retaining the economic viability that keeps an urban area vital. To bridge this information gap, NEMO relied on a number of studies, reports and the work of colleagues in other states. Key sections of the CT Stormwater Quality Manual were also referenced.

The strategy highlighted in this presentation is termed "restorative redevelopment." A key strategy is to reduce and disconnect impervious surfaces and to encourage multiple uses of green spaces for both aesthetic, recreational and stormwater renovation. Redevelopment and mixed uses are also encouraged to increase the efficiency of land use and provide a more vital urban setting.

To date, the program has been delivered to three cities in Connecticut: Derby, Torrington and Waterbury. The program is also being used in Minneapolis, MN and Long Island, New York. Sections of this program have also been incorporated into other workshops, such as the *Stormwater Quality Manual* presentation. As the focus of land use turns back to our urban areas in CT, the NEMO program feels this program will be in more demand.

## **2. Statewide Workshops on the CT DEP Stormwater Quality Manual**

NEMO, in collaboration with CT DEP and a private contractor, developed and organized statewide training workshops on a new DEP publication, the *2004 Stormwater Quality Manual*. NEMO team members had worked with DEP and a steering committee of state agency representatives and private professionals, in the development of the manual. The manual provides guidance to both land use decision makers and development professionals on stormwater practices to protect water quality. Prime among these practices are "low impact development" (LID), site-level practices that minimize the volume and maximize the quality of stormwater leaving the site.

NEMO team members conducted 20 workshops, reaching over a 1,000 local land use decision makers, design engineers, state agency personnel, and town staff. The result of these workshops is that many towns are incorporating the practices outlined in the manual into their regulations. The professionals in the development field have also begun to use the manual as a standard reference text. The upshot of both the publication and the subsequent training workshops is that both the decision makers and the development community have a single source on which to design and evaluate development proposals for water quality impact.

## **3. Conduct the Municipal Initiative in Three CT towns**

The "Municipal Initiative" is a unique program developed in collaboration with the CT Department of Environmental Protection, that allows the NEMO Team to focus more resources on a few municipalities, establishing relationships between the program and these towns from the initial educational workshop through implementation of on-the-ground changes. Because of the time commitment required for this program, the NEMO Team can only focus on a few towns per year, however, the chosen towns then serve as case studies and examples to other towns in Connecticut. Selected towns must designate a contact person for the initiative who will be responsible for facilitating communication both between the program and the town, and among various commissions within the town. In addition, a NEMO Task Force must be established whose membership includes, at a minimum, members of the following commissions or boards: planning, zoning, inland wetlands, conservation and the office of the chief elected official (town council; board of selectmen, mayor's office). Other groups, such as town departments, land trusts and economic development commissions are also encouraged to participate.

In 2005, NEMO worked with three communities under the Municipal Initiative. Below is the progress each town made under the initiative:

#### **A. Killingworth**

The Conservation Commission took the lead early in the process to begin to assemble a natural resource inventory of the town. The resource inventory is the first-step in natural resource-based planning as espoused by NEMO. As of this writing, the Killingworth resource inventory is in its final phase of development. The inventory contains all the statewide available data pertinent for land use planning, as well as some locally derived maps. The final inventory will also include detailed descriptions of the sources, dates and limitations of the various maps.

The resource inventory will form the basis for several planning exercises in town. An update to the open space plan and the Plan of Conservation and Development are planned to begin this year. Community interest in open space acquisition has continued to grow with the most recent purchase of a 140-acre parcel.

The Task Force was very interested in updating the stormwater regulations to reflect the new DEP Stormwater Quality Manual. NEMO staff provided a detailed review of their existing regulations and suggested ways that they could be strengthened to reflect new thinking in stormwater management.

#### **B. Killingly**

Killingly's first task was to update a 15-year-old Plan of Conservation and Development. As mentioned above, Killingly faces a diverse set of issues, from urban revitalization and affordable housing to open space planning and natural resource protection. The plan specifically targeted several water quality issues, focusing on the importance of "clustering" development to protect open lands and the use of low impact development techniques in both urbanized and rural settings. The plan is in the final stages of preparation and is scheduled to go to public hearing in 2006.

The Task Force has also undertaken an update to the subdivision regulations to implement some of the recommendations of the plan. Besides modernizing the 15-20 year old document, major changes have been made to include the use of "low impact development" techniques and the use of the CT DEP Stormwater Quality Manual for stormwater management. These new standards would apply to all new subdivisions. The Task Force is also considering an update to the cluster subdivision provision that would allow the planning commission, not the applicant, to decide where cluster development would best apply. This may include the ability to design a "hybrid" cluster, where both traditional and cluster components within a single development would be allowed.

After the plan and subdivision updates are complete, the task force will move on to a zoning regulation revision. Key among the topics to be addressed are a buildout analysis of the town to assess current zoning, parking standards and design, and impervious cover requirements. The task force hopes to begin this process in the fall of 2006.

#### **C. Torrington**

Of the three municipalities involved in the 2004-2006 Municipal Initiative, Torrington had the most ambitious goals. Given the number of full-time staff and the support of the elected officials, the hoped for changes, though far reaching, were not unreasonable. The Work Group decided that the area of most immediate attention were updates and revisions to both the engineering standards and the zoning and subdivision regulations.

The engineering department has developed the City of Torrington's Standards, Specifications, Rules and Regulations. These standards include all the engineering requirements necessary to complete a successful project in town, whether a private application or a city project. Changes were made to these standards to follow many of the principles presented both in the NEMO workshops and the CT Stormwater Quality Manual. The standards require the preparation of a stormwater management plan for both water quantity and quality for all projects that will disturb more than one acre of land. The engineering standards also include considerable detail on roads. Flexibility in road standards to allow a curbless design, that allows for sheet flow to roadside drainage swales, and the use of permeable materials in both road-ways and driveways provide a departure from past practice in the city.

The planning department worked with the planning and zoning commission to make major changes to both the subdivision and zoning regulations. In zoning, the major change came with the recognition of different development

demands between the sewer and unsewered areas of the city. In the more rural sections, the commission appended the zoning regulations so that new development would need to meet the "net buildable area" requirements. These requirements assure that the carrying capacity of the land to accept on-site sewage disposal is met, ultimately determining the suitability of a lot for development. In the more urbanized sections of the city, the regulations now allow for higher density mixed-use development, encouraging retail on the ground floor, with residential uses on the 2nd and 3rd floors.

Both the zoning and subdivision regulations have embraced the use of low impact development and the standards of the Stormwater Quality Manual. Greater effort has been made to bring agreement between the standards of the engineering department and the requirements of the zoning and subdivision regulations, both for consistency and to ease the application process.

Finally, the Work Group was interested in conducting a buildout analysis to refine planning for both the sewer and unsewered areas of the city of Torrington. NEMO team members reviewed the city's available geospatial data and concluded that the existing information was inadequate to conduct the desired analysis. The city is working towards the development of a comprehensive GIS system.

## **VI. National Monitoring Program**

### Jordan Cove Urban Watershed Monitoring Project

The Jordan Cove Urban Watershed Monitoring Project is one of 24 projects in the nationwide section 319 National Monitoring Program (NMP). The purpose of the NMP is to scientifically evaluate the effectiveness of watershed technologies designed to control nonpoint source pollution, and improve our understanding of nonpoint source pollution.

The Jordan Cove project, located in southeastern Connecticut in the town of Waterford, is a ten-year study to document the difference in stormwater quality and quantity between traditional subdivision development and a subdivision with best management practices incorporated into the design and construction. The project is using a "paired-watershed" approach to demonstrate the water quality benefits of incorporating best management practices (BMPs) into subdivision development. The University of Connecticut (UConn) initiated baseline monitoring of the two subdivision sites, and a third "control" subdivision, in November 1995 and construction phase monitoring began in June 1997 when construction commenced in the "traditional" neighborhood. Construction phase monitoring of the "BMP" neighborhood was completed in September 2002. Construction monitoring of the traditional neighborhood, was completed in June 2003. Monitoring of the control subdivision will continue throughout the entire project period.

An important component of this project is outreach and education to municipal commissions, developers, and the public. Lessons learned from this project are already being shared with these target audiences through a variety of means, including presentations at workshops and conferences; articles in journals, newsletters, and newspapers; and web sites. For additional information see: [www.canr.uconn.edu/jordancove/](http://www.canr.uconn.edu/jordancove/). The Jordan Cove project is also used as a case study in the UConn/CES NEMO Project, and has its own web page in the NEMO web site: <http://www.nemo.uconn.edu>.

Project accomplishments in 2005 include:

- UConn continued educational efforts with the BMP neighborhood residents on "housekeeping" BMPs.
- Monitoring during the construction of the "traditional" neighborhood, where houses were built using generally accepted practices, has determined that:
- Erosion and sediment controls reduced sediment and associated pollutants in construction site runoff, but did not reduce the volume of runoff, and increased runoff volumes increase the mass export of pollutants.
- Weekly flow and peak discharge increased by two orders of magnitude, with increased concentrations.
- Sediment, nitrogen, phosphorus, copper, lead and zinc export also increased.

- Results from the construction period at the traditional site suggest that increased runoff, rather than erosion, was the cause of increased pollutant export from the site.
- Monitoring during post-construction in the Traditional neighborhood indicated that stormwater volume increased. Exports of N, P, and solids also increased during post-construction.
- Monitoring during the post-construction period in the BMP neighborhood indicated that the volume of stormwater runoff decreased. Peak discharge did not change from pre-development levels. However, the concentrations of total suspended solids, total phosphorus, and total k Kjeldahl nitrogen remain greater than during calibration. Exports have declined during post-construction, except for total phosphorus, which increased. Metals export declined following construction.
- The driveway study was completed. Stormwater runoff and mass export of solids, nutrients, and metals was greater from the asphalt than the pavers than the crushed stone driveways. Concentrations of solids, nutrients, and metals were lower in runoff from the paver driveways than the asphalt driveways.

Post-construction monitoring was completed June 30, 2005.

## NPS Program Contact List

CT DEP Nonpoint Source Coordinator	(860) 424-3730
US EPA Nonpoint Source Coordinator	(617) 918-1687
<b>Other Nonpoint Source related programs:</b>	
Aquifer Protection	(860) 424-3020
Council on Soil & Water Conservation	(860) 767-9594
Inland Water Resource Wetland Comm. Training	(860) 424-3706
Water Quality Monitoring	(860) 424-3020
Lakes Management	(860) 424-3020
Watershed Management & Coordination	(860) 424-3020
Stormwater Management	(860) 424-3018
Stormwater Data	(860) 424-3020
Permitting and Enforcement	(860) 424-3018
NRCS Water Quality Coordination	(860) 977-1543
Inland Fisheries Division	(860) 424-3474
Marine Fisheries Division	(860) 434-6043
Office of Long Island Sound Programs	(860) 424-3034