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Bureau of Water Management
Planning & Standards Division
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CONNECTICUT NONPOINT SOURCE MANAGEMENT PROGRAM 2004 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.

2004 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 Management (BWM) administers grants funded under the Clean Water Act (CWA) Section 319(h). From FY90-04, Section 319 grants totaling just over \$15 million have supported 344 projects and CT DEP NPS Program staff salaries. Of the 344 projects, 129 are still active, and CT DEP closed out 6 projects in 2004. 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 FY04, \$800,000 was awarded under the PPG, and \$1,413,715 was awarded under a separate "categorical" grant to support 32 projects. The categorical grant funds include \$911,410 for base or statewide programs, and \$502,305 for watershed projects. The project funds are generally targeted to watersheds identified by the state as impaired (i.e., not meeting state water quality standards), and for which the development of total maximum daily load (TMDL) analyses are required, and as "Category 1" by the state's Unified Watershed Assessment (UWA). The FY04 grant also included \$100,000 for the ninth 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 BWM, 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, and construction of municipal sewage treatment facilities; administers the state Clean Water Fund (SRF); and provides support functions for the other bureau divisions for necessary planning, program development, and technical and administrative assistance.

Permits and Enforcement Division (PED): Regulates, inspects, and monitors municipal and industrial wastewater discharge facilities; regulates storm water; and requires the abatement of point and nonpoint source pollution.

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.

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 BWM, 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.

There are also several other CT DEP units that perform NPS Program support activities. The CT DEP Office of Communication and Environmental Education (CEE) supports outreach and education on NPS issues to municipal agencies, the general public and teachers. The Environmental Geographic Information Center (EGIC) 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 2004, 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, New York, and New Jersey.

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 2004 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 Management, volunteer monitoring heading (<http://www.dep.state.ct.us/wtr/volunmon/volmonindex.htm>). 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 2004 over 200 individuals participated in this water quality-monitoring program. Participants have included watershed associations, college ecology classes, town conservation commissions, and sporting clubs. For additional information regarding this program, please contact Mike Beauchene (860) 424-4185.

Number of monitoring locations	54
Number of waterbodies monitored	43
Number of individual participants	232
Number of groups	20
Number of groups participating for the first time	10
Number of returning groups	10

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.

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 Environmental Education (CEE) 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 2004, Kellogg Environment Center staff, DEP staff and trained WET facilitators and volunteers conducted 7 workshops, 8 festivals, and 1 training program. Kellogg staff, WET facilitators and volunteers worked with 576 students and trained 63 educators to use Project WET materials. Project WET was selected as the principal curriculum for an EPA funded program called Project CLEAR (Candlewood Lake Environmental Awareness and Responsibility) for year two. CLEAR is designed to integrate the social, biological, environmental and historical information about Candlewood Lake into the high school and middle school curriculum of the five school districts within the watershed.

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 teachers who have adopted 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 2004, Project SEARCH continued to work with teachers and students from 75-80 public and private high schools across Connecticut to collect water quality data on rivers and streams within their communities. Schools sampled water chemistry and macroinvertebrate communities and assessed habitat quality, including potential NPS pollution sites, in the fall and spring at their monitoring sites. SEARCH staff conducted 116 site visits including 87 field sampling trips to provide technical support to teachers and collect replicate data for the project QAAP, 18 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 two, 3-day workshops (June and August) to train new teachers entering the program, and a 1-day workshop on bacteria testing for SEARCXH teachers. A total of 30 teachers participated in these SEARCH workshops. An estimated 90-100 teachers and 2,000-2,400 students in grades 9-12 participated in SEARCH activities.

Water quality data was collected from 100 sites on 78 rivers and streams. SEARCH staff collected replicate samples for the projects Quality Assurance/Quality Control (QA/QC) analysis, and prepared an annual report, *Project SEARCH: Water Quality Data Summary Report 2003*, that summarized the results of the stream surveys. SEARCH staff also completed a new chapter on NPS for the SEARCH Teachers curriculum manual and began planning for integration of a GIS land use/cover mapping component to the program to facilitate understanding of NPS issues with the schools.

Geographic Information

The NPS Program receives GIS support services from trained Bureau of Water Management (BWM) staff and from the Environmental and Geographic Information Center (EGIC). During the past several years, CT DEP has used Section 319 funds to supplement state funding for GIS staff to support the NPS Program. GIS services relevant to NPS management include providing new ways to access datalayers and information via the NPS Online website and the DEP GIS Data Download page, assisting NPS Program staff with on-going use of desk top GIS capabilities, producing updated maps of Aquifer Protection Areas and Ground Water Quality Classifications, and producing an Aquifer Potential Map.

Last year, a new Shellfish Area Classification data layer was established. Shellfish area classification is under the jurisdiction of the Connecticut Department of Agriculture (DOA). DOA is able to print shellfish area classification maps for the public and DEP is able to reference a digital version of the shellfish area classification when updating the water quality classifications. In FY 2004, a draft version of the detailed maps of Connecticut's coastal shellfish (lots) lease beds was completed and DEP continued to update the Shellfish Area Classification data layer as needed.

The NPS Online application was redesigned in the second quarter of 2004. It is a web-based GIS application tailored for NPS program needs, and provides a regional perspective, the ability to query information about entire towns or watersheds, and can present information in a form suitable for NPS work. The new version provides the ability to navigate by and to view towns, watersheds, aquifer protection areas, and other regions. The ability to do a spatial query on the database and return a map and tabular data for a specific region was an important feature built into the new NPS Online. It was made available on the DEP intranet in June 2004.

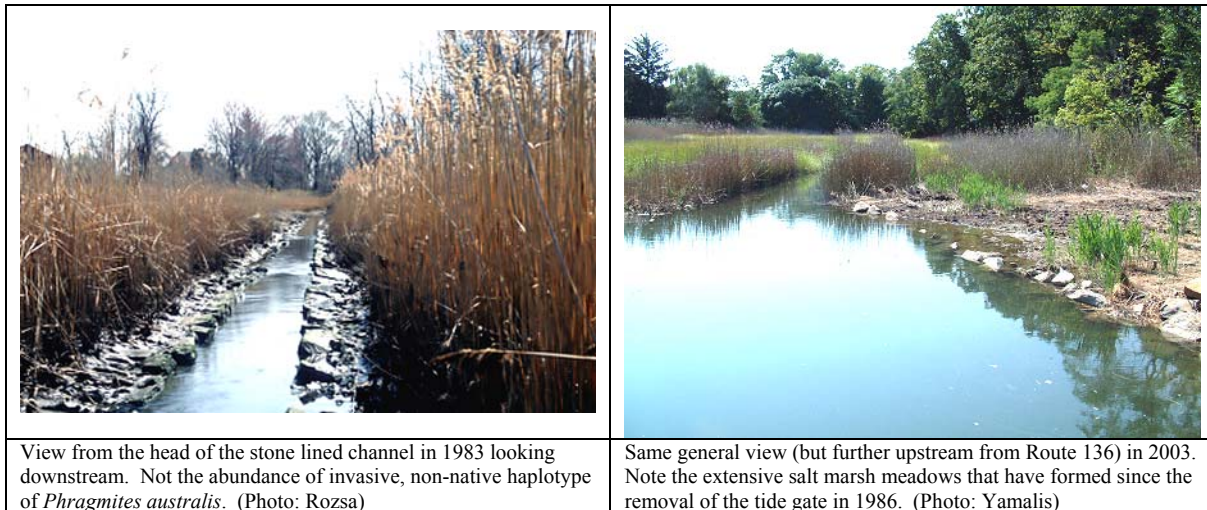
EGIC prepared a 2004 edition of *Environmental GIS Data for Connecticut*, which is an information product developed by EGIC (see: <http://www.dep.state.ct.us/gis/>). This product is comprised of seven CDs of natural resource and environmental GIS data for Connecticut plus Arc Explorer mapping software for viewing the information on a PC. These CDs are the means by which local officials, environmental consultants, teachers, and student's access GIS information from DEP, including BWM. Using the data and software on the CDs, the general public is able to create digital maps of Connecticut that include a combination of environmental information from DEP and other cooperating State and Federal agencies. Features include lakes, rivers, streams, roads, political boundaries, dams, aquifer protection areas, water quality classifications, drainage basin divides, DEP property, municipal open space, detailed soil types, wetland soils, bedrock geology, glacial geology, USGS topographic quadrangle maps, and aerial photos taken in 1990.

III. PROGRAM HIGHLIGHTS

FY 04 Completed Projects

In 2004, grantees completed six nonpoint source projects.

- The U. S. Geological Survey (USGS) completed a study to refine regression equations for estimating flood discharges on streams in Connecticut. The project was a multi-year effort which produced the following studies: **Peak Flow Frequency Estimates for U.S. Geological Survey Streamflow-Gaging Stations in Connecticut, Peak Discharges for Streams in Connecticut for Selected Recurrence, and Regression Equations for Estimating Flood Flows for the 2-, 10-, 25-, 50-, 100-, and 500-Year Recurrence Intervals in Connecticut.**
- DEP’s Permitting Enforcement Division (PED) with assistance from the Office of Long Island Sound Projects (OLISP) and Bureau of Water Management (BWM) updated and expanded the 1982 guidance document on seepage and pollutant renovation analysis for land treatment. The new document, “**Guidance and Standards for Large-Scale On-Site Wastewater Renovations Systems,**” was developed with the intent to emphasize the use of basic scientific and engineering principles and sound engineering judgement rather, than just using prescribed standards in designing on-site wastewater renovations systems.
- DEP held workshops in 2004 to introduce the 2002 **CT Guidelines for Erosion & Sediment Control Manual** to the professional community in the State.
- In 2004, **CT Federation of Lakes (CFL)** completed a NPS-funded project to assist individuals, steering committees, and established lake associations with needed guidance, advice, and support. The CFL also used the funding to promote a partnership amongst the many lake and pond organizations to improved advocacy for their priority issues.
- In 2004, the City of Norwalk, in concert with a set of partners that included DEP’s Office of Long Island Sound Programs, DEP Wildlife Division, DEP Division Services, NOAA Northeast Restoration Center, Save The Sound, EPA Long Island Sound Study, Preserve the Wetlands (Norwalk) and Wilson Point homeowners, completed the **Wilson Cove Salt Marsh Restoration** project. The project replaced the dike/culvert at the mouth of the cove with an open channel and the installation of a new culvert under Route 136 to improve drainage so as to remove excess freshwater. This water had been diluting the salt water from tidal flooding of the marsh, which was allowing *Phragmites* to displace native vegetation.



- The Town of Brooklyn completed the first phase of their **Quinebaug River Stormwater Quality Control Management Project**, designed to replace inadequate stormwater drainage facilities and to improve water quality that discharges to the Quinebaug River. The Town intends to accomplish this on a watershed wide basis by implementing both structural and non-structural BMPs. In this phase, the town developed detailed hydraulic calculations, topo maps, wetland delineation's, water quality sampling, preliminary design plans, construction estimates, evaluating funding options, maintenance plan, education outreach, and update town ordinances and regulations.

IV. WATERSHED MANAGEMENT PROGRAM

Watershed Management

The CT DEP has been in transition from a traditional, program-driven approach to water resources management to 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 based on impaired water quality conditions, and to statewide NPS initiatives for transfer to watershed management initiatives. Targeted basins in the past included the Norwalk, Quinnipiac, Hockanum, Mattabeset, Pequabuck, Scantic, Sasco, and Fenger River watersheds. New focused watershed management initiatives are underway for the Quinebaug and Shetucket rivers in the Thames River basin, the Pomperaug River in the Housatonic River 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 soon-to-be integrated, biennial 303(d) list of impaired waters and 305b water quality assessments, and targeted NPS assessments. 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 five major basin coordinator positions to oversee and coordinate watershed management activities in each of the state’s five major river basins: Thames, Connecticut, Housatonic, Central Coastal, and Southwest Coastal. 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 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 2004 CT DEP emphasis has been on completing progress on previously provided assistance grants. 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 is 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 2004 include:

- re-evaluating the CT DEP watershed management strategy to improve watershed management and strengthen the state's ability to control NPS pollution;
- 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;
- developing various watershed management plan model, which covers all 9 elements of an EPA watershed-based plan, and other CT DEP NPS 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 2004, 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

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), and NRCS. 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, the Maritime Aquarium at Norwalk, and the seven watershed municipalities.

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.

Section 319 funds have supported implementation of high priority action plan recommendations. NRWI accomplishments in 2004 include:

- EarthPlace's Harbor Watch / River Watch program has completed seven years of citizen water quality monitoring. 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.
- NRCS and the City of Norwalk, with assistance from CT DEP, have developed plans to restore a section of eroded streambank on the Silvermine River, near Silvermine School in Norwalk. The project incorporates 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. Construction will be completed between July and September of 2005.
- CT DEP, NRCS, and the South West Conservation District completed a riparian buffer planting project on the Silvermine River in New Canaan. This project replaced manicured turfgrass with naturalized buffers and serves as a demonstration project for other private property owners showing that naturalized landscaping can be aesthetically pleasing while providing water quality renovation and wildlife functions.
- NRCS, CT DEP, and the Mianus Chapter of Trout Unlimited have led efforts to restore over 7,000 linear feet of stream channel and riparian buffers to protect water quality and improve coldwater fish habitat. Restoration at Merwin Meadows Park and Schenck's Island has been completed. A fisheries bypass channel will be constructed around the dam at Cannondale in late summer 2005.
- EPA, CT DEP, the Fairfield County Community Foundation, and the City of Norwalk are working with the Soundkeeper to install 275 catch basin retrofits as well as providing public education and outreach.
- The Maritime Museum at Norwalk displayed a permanent exhibit focusing on the problem of nonpoint source pollution in the Norwalk River watershed. The exhibit includes a sixteen-minute video detailing the problem and suggesting what watershed residents can do to help reduce NPS pollution. Copies of the video will be made available for distribution in the coming year.
- Plans have advanced toward removal of the Strong Pond dam at Merwin Meadows Park. Two phases of sediment sampling and analysis have been completed, as well as a detailed analysis of sediment dewatering and disposal options. Total costs are estimated to be 1 million dollars, subject to sediment removal and disposal costs. Final design will be prepared in the coming year.
- DEP has begun preliminary design work for removal of the Flock Process Dam in Norwalk. A detailed topographic survey and hydraulic analysis have been completed by CT DOT as part of their Route 7 and 15-interchange reconstruction. DOT will fund NRCS to provide an engineering design, easements, and permits.

- The Wilton Conservation Land Trust, with support from CT DEP and the Town of Wilton, has converted a manicured lawn area to a naturalized wildflower meadow. This project demonstrates that there are less environmentally damaging alternatives to manicured turfgrass that provide aesthetic beauty as well as wildlife and water quality functions.

Information about the watershed and the initiative is available at the following web site:
<http://www.norwalkriverwatershed.org/>

Sasco Brook

Sasco Brook is located in the Southwest Eastern Regional drainage complex and flows south directly into 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.

The Town of Fairfield is committed to improving water quality in Sasco Brook. They have installed two more swirl concentrator devices, and retrofitted and maintained numerous catch basins in drainage systems discharging to Sasco Brook. They completed a riparian buffer planting project and also continue with active education and outreach to local citizens. In the coming year they will install three additional swirl concentrators, two in the Mill River watershed, as well as additional catch basin retrofits.

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 Brook, 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 possible 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 two major drainage outflows in Port Chester New York, serving Westchester Avenue and Purdy Avenue, where illegal connections and sanitary sewage overflows 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.

Darien Coastal Watersheds (Goodwives, Noroton, and Tokeneke Rivers)

These small coastal watersheds are unique because they are very densely developed and are connected directly to the Darien River and Holly Pond. 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. The watershed lies almost entirely within the towns of Darien and New Canaan. 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 have hired a consulting firm to conduct a watershed study focusing on addressing the sedimentation problem and improving stormwater quality. To date, two small ponds have been dredged and restored.

Mianus River Watershed

The Mianus River Watershed Council plans to produce a Watershed Management Plan in the coming year. Several issues that are likely to be addressed include water diversions, impact by the growth of intensive lawn care 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.

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. Although a variety of pressures have caused the disappearance of many farms, an active agricultural community persists in this region. The southern half of the Housatonic watershed tends to be more urbanized and industrial.

Over the past several years, several initiatives led by non-profit organizations have emerged, each with goals relating to conservation and protection of natural resources, primarily located in the northern portion of the Housatonic watershed.

- **The Highlands Coalition has been working with the U.S. Forest Service toward designating a swath of land through northwestern Connecticut as part of the Highlands landscape. The Highlands is a relatively undeveloped area that stretches along the Appalachian Mountain ridge through four states - Pennsylvania, New Jersey, New York and Connecticut - which has been identified as having important natural resources attributes in a region that is becoming increasingly urbanized.**

- **The Nature Conservancy (TNC) is moving forward with its Northwest Highlands Landscape Program unrelated to the Highlands project described above) which encompasses a portion of northwestern Connecticut and adjoining areas in Massachusetts and New York. Through this program, TNC is working to identify conservation targets (including certain types of water resources), threats to conservation targets and strategies to abate these threats.**

The Housatonic River and the lands within its watershed also 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 two catch-and-release Trout Management Areas, two Smallmouth Bass Management Areas and seasonal Class I-IV whitewater boating opportunities. On the southern portion of the river, Lake Lillinah, Lake Zoar and Lake Housatonic - major impoundments created by three hydropower dams – are popular areas for boating, fishing and swimming. Candlewood Lake, a hydroelectric pump storage reservoir associated with the Housatonic, is also a popular recreational area. 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.

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 Lillinah, Lake Zoar and Lake Housatonic. Starting in the 1970’s, a series of studies determined that excessive amounts of phosphorus from upstream sources were 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

During 2004:

- A draft Diagnostic Feasibility Study for Lake Lillinonah was submitted by Lake Lillinonah Authority to CT DEP for review. 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.
- CT DEP participated in discussions with the Lake Lillinonah Authority, City of Danbury and citizen groups regarding the potential development of a TMDL for Lake Lillinonah to address phosphorus contributions from upstream watershed sources and associated eutrophication issues.

Hollenbeck River

The 43 square mile watershed of the Hollenbeck River encompasses most of the Town of Canaan (Falls Village) and parts of North Canaan, Norfolk, Cornwall and Goshen. The river flows south to north and passes through Robbins Swamp, an ecologically significant calcareous wetland, before entering the Housatonic River. The watershed area is primarily rural and includes active agricultural lands as well as a considerable amount of State Forest and privately-preserved open space.

The Northwest Conservation District (NCD) has been working with the USDA Natural Resource Conservation Service (NRCS) on a first phase CWA Sec. 319 funded project to address severe gullying, erosion, and flooding problems in a Falls Village neighborhood caused by agricultural drainage diversions in fields at the top of Beebe Hill, and highly erodible soils on its slopes. NRCS developed a plan to address the erosion problems. Phase 2 funds will assist in implementing the most appropriate BMPs to control the problem.

Naugatuck River

The Naugatuck River is the largest tributary of the Housatonic River, with a watershed of approximately 311 square miles in parts of 27 municipalities. The mainstem of the Naugatuck River forms in Torrington and flows south for 40 miles to Derby, where it enters the Housatonic River only 11 miles from Long Island Sound. The Naugatuck River watershed has the potential for excellent cold-water fish habitat and has historically supported anadromous fish runs. The existence of these runs ceased during the industrial revolution due to the construction of numerous dams and poor water quality. Although the river has a long history and was once one of the most polluted in the state and country, it has been recovering as a result of restoration efforts by CT DEP and other stakeholders initiated in the late 1960s. The primary objectives of the restoration efforts are to restore water quality and anadromous fish passage. Secondary goals include providing passage for recreational boating, reducing sediment deposition in impoundments, removing safety hazards, reducing flood levels, and establishing greenways.

In conjunction with the upgrade of the Waterbury wastewater treatment plant (WWTP), a mitigation plan was developed that included dam removals or construction of fish passage facilities at seven dams in the watershed, tributary habitat enhancements, river corridor revegetation, water quality monitoring, and assignment of a full-time CT DEP field inspector to the watershed. In 1999, four dams on the Naugatuck were removed or breached (Freight Street, Platts Mill, Union City, and Anaconda). Plans are underway to construct fish and canoe/kayak passage around Tingue Dam in Seymour. In 1998-99, a fish ladder was constructed at the Kinneytown Dam, the southernmost dam on the river, as a condition to issuance of a federal hydropower license. Once all of this work is complete, over 30 miles of the lower Naugatuck River up to the Thomaston Flood Control Dam will be opened for anadromous fish passage. As water quality in the river has improved over the years, CT DEP Fisheries has expanded its fish-stocking program of trout and broodstock salmon on certain sections of the river, and has designated the Naugatuck Mainstem - from the confluence of the East and West Branches in Torrington to the Kinneytown Dam in Seymour - as a Trophy Trout Stream.

In 2004:

As part of its CWA 604(b) funded project to assess the need and potential for creating a greenway on the upper Naugatuck, the Litchfield Hills Council of Elected Officials (LHCEO) completed a final inventory, assessment and preliminary plan for stabilizing erosion locations and stormwater outlets as well as a final report with a conceptual plan for improving public access, enjoyment and passive recreational use of the Torrington section of the Naugatuck River.

The City of Torrington was selected by UCONN CES Nonpoint Education for Municipal Officials (NEMO) to participate in their “Municipal Initiative” program, which is funded by CWA Sec. 319 to help communities to address nonpoint source issues.

- The City of Waterbury removed the Chase Brass dam as part of the conditions of the mitigation plan associated with the upgrade of the City’s WWTP.

Pomperaug River

The Pomperaug River drains a 90 square mile area, most of which is located within the towns of Bethlehem, Woodbury and Southbury, and enters the Housatonic River at the northern end of Lake Zoar in Southbury. The northern part of the watershed remains relatively rural in character, with a significant amount of active agricultural land. Over the last 30-40 years, the southern part of the watershed, which includes a section of I-84, has become increasingly developed in terms of residential and commercial growth. The Pomperaug River valley also contains a sizeable stratified drift aquifer, portions of which are used for public water supply. Some of this water is transferred out of the Pomperaug basin to satisfy increasing water demands in neighboring communities. Internal and external pressures on the water supply have caused watershed residents to become concerned about over-allocation of water resources and river flow issues. Contamination of the aquifer is also a matter of concern, especially in Woodbury, which has had incidents involving TCE and MTBE. NPS nutrient loads originating from the Pomperaug River watershed contribute to eutrophication problems in Lake Zoar, and residents near the mouth of the river are concerned about sedimentation.

During 2004:

- As part of a CWA Sec. 319 project, the Northwest Conservation District worked with a contractor to produce preliminary construction plans for stabilizing a severely eroded site on the Pomperaug River in Woodbury.
- The Abbey of Regina Laudis in Bethlehem began implementation of a CT DEP River Restoration grant designated for livestock bridge crossings and exclusionary fencing to protect wetland and watercourse areas impacted by the Abbey’s agricultural operations.
- The Abbey of Regina Laudis was awarded a USDA Natural Resources Conservation Service Environmental Quality Incentive Program (EQIP) grant to implement additional agricultural best management practices beyond those being funded by the CT DEP River Restoration program.

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, 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. In 2002, with assistance from the CWA Sec. 319 supported Watershed Assistance Small Grants Program, the Bantam River Watershed Association (BRWA) incorporated as a non-profit organization to raise citizen awareness and work on water resource issues within the Bantam watershed, a subregional basin which comprises a part of the Shepaug Regional Basin.

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 2004:

- With assistance from the CWA Sec. 319-supported Watershed Assistance Small Grants Program, the Goshen Land Trust established a permanent office for its operations. The Land Trust was selected to receive funding because one of its primary goals is to acquire and protect land along headwater tributaries of the Bantam River.
- With support from the Bantam River Watershed Association and Goshen Land Trust, the “Bantam River Historical and Conservation Greenway”, a stretch along the Bantam River in Goshen, received official State greenway designation.

Still River

The Still River watershed comprises approximately 71 square miles in the towns of Danbury, Bethel, Brookfield, and New Milford near the New York state border. The river flows north and enters the Housatonic River in New Milford just north of Lake Lillinonah. Located about an hour's drive north of New York City and bisected by several major highways, much of the watershed is heavily to moderately developed. The river itself has a reputation as being extremely polluted due to Danbury's role in the Industrial Revolution as the “hatting capital of the world” because of its high concentration of hat manufacturers, and dyes and mercury in the wastewater.

The (former) Fairfield County SWCD received 604(b) grant funds to work with the City of Danbury and other partners to inventory land use activities that relate to nonpoint source pollution and identify undeveloped open space for a potential greenway within a 1000-foot corridor of the Still River in the city. Subsequently, the City of Danbury has been working through the Still River Alliance on the Still River Restoration Project, funded, in part, by CT DEP River Restoration and DEP Recreational Trails grants. Accomplishments of this project include installing stormwater retention basins in the floodplain using bioengineering techniques, stabilizing eroded stream banks, establishing a greenway and hiking trail, and conducting outreach and education. Complementing these efforts, local economic development and tourism interests have sought to establish a canoe trail on the Still and Housatonic Rivers from Danbury to the Stevenson Dam on Lake Zoar and have installed several new canoe put-ins.

In 2004:

- U.S. EPA approved a TMDL for Kenosia Lake aimed at reducing nitrogen and phosphorus loading to Lake Kenosia from stormwater and nonpoint sources in the lake's watershed.

Tenmile River

The Tenmile River watershed encompasses approximately 206 square miles in New York and Connecticut, with the vast portion of the watershed lying in New York State. The Tenmile flows into the Housatonic River just south of

the “Bull’s Bridge” hydropower dam on the town border between Kent and New Milford. The Connecticut portion of the watershed constitutes approximately 36 square miles or 22,899 acres and is relatively rural, characterized by small towns, farms, and forest. Of these 22,899 acres, approximately 6,066 acres are farmland. Numerous studies have determined that the primary water quality problem in the Tenmile watershed is nutrient enrichment, and that agricultural NPS runoff is an important contributing factor. Phosphorous contributes to eutrophication in Lakes Lillinonah, Zoar and Housatonic, the three large impoundments on the lower Housatonic River.

In 2000, the Northwest Conservation District completed a federal CWA Sec. 319 (FY '00) funded project geared toward initiating an Agricultural Environmental Management (AEM) program in the Connecticut portion of the Tenmile River watershed. Focusing on NPS, it helps farmers identify environmental problems and implement BMPs and other solutions. Of the 16 areas of concern assessed at each farm, LCSWCD identified the top five as milk room wastewater, barnyard conditions, petroleum storage areas, manure storage and spreading practices, and silage storage areas. Since most of the Tenmile basin lies within New York State but drains to Connecticut, there is need for greater interstate cooperation between the States on watershed management issues.

In 2004:

- With funding provided, in part, by the CWA Sec. 319-supported Watershed Assistance Small Grants Program, the Housatonic Valley Association completed a report on a portion of the Tenmile watershed in New York State (ie. - Webatuck and Wassaic Creeks) that identified water resource issues and stakeholder groups.

South Central Coastal Basin

Quinnipiac River Watershed

The Quinnipiac River is located in south central Connecticut, flowing southward from the border of New Britain and entering Long Island Sound in New Haven. 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) received a Section 319 grant for public education and outreach to riparian landowners and is continuing their work on completing previously funded streamwalks and providing quarterly updates in accordance with the requirements of a Section 319 grant for administration and grant tracking. The QRWA also coordinated the removal of a derelict cat walk with the assistance from the Town of Wallingford from across the Quinnipiac River as a show of good faith to the property owner involved in the on-going negotiations with QRWA for obtaining land rights to construct the Wallace Dam fishway.

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.

Mattabeset River

The Mattabeset River is a major tributary of the Connecticut River that flows for 18 miles in a southeasterly direction before entering the Connecticut River just north of Middletown. The 45,000-acre watershed encompasses parts of seven towns - New Britain, Berlin, Cromwell, Southington, Newington, Rocky Hill, and Middletown. Land use in the watershed is predominately 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 Connecticut River Coastal Conservation District (CRCCD) established the Connecticut River Watch Program (CRWP), a volunteer river monitoring, protection and improvement program for the Connecticut River designed to build awareness about river resources and water quality, and to collect scientifically credible data that can be used to identify and address water quality problems. CRWP accomplishments in the Mattabeset in 2004 include:

- Conducted several meetings under Section 319 grant with Cromwell Hills Condo Association on restoration of a pond and Willow Brook that will complement past education and outreach on NPS BMPs.
- Contracted consultant under Section 319 grant to design stormwater retrofit for discharges to Railroad Pond in Berlin.

Under a 319 grant, the Town of Berlin obtained permits and contracted the design and construction for a stormwater retrofit of a discharge at Chestnut Lane to the Mattabeset River.

Scantic River

The Scantic River is a tributary of the Connecticut River that flows in a southwesterly direction from Massachusetts before entering the Connecticut River north of Hartford. The watershed encompasses parts of five towns - Somers, Ellington, Enfield, East Windsor, and South Windsor. 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 USGS National Ambient Water Quality Assessment (NAWQA) for the Connecticut River identified Broad Brook, one of the main tributary streams, as one of the most nutrient-enriched streams in the Connecticut River basin. However, the results of a four-year voluntary benthic monitoring program, completed in 1996, indicated that aquatic habitat is only slightly impaired.

CT DEP, NRCS, the North Central Conservation District (NCCD), and municipalities previously formed the "Scantic River Watershed Terrace Escarpment Work Group," which completed a DEP-funded geological mapping project to identify and define soil and surficial conditions and natural resources impacts associated with 75 erosion sites previously inventoried by NRCS. The NCCD continues this effort by administering a 319 grant to continue the mapping project on a statewide basis.

Through a section 604(b)-funded project during 2004, the NCCD took the results of the mapping project and worked with the Towns of East Windsor, Enfield, and South Windsor to develop a brochure for homeowners, a Power Point Presentation, and town-wide maps, explaining the value and limitations of owning land abutting terrace escarpments.

Hockanum River

The Hockanum River is the third major Connecticut River tributary to be targeted for NPS management. Most of the watershed lies within the following seven towns -- East Hartford, Manchester, Vernon, South Windsor, Bolton, Tolland, and Ellington -- with the river originating in Ellington and flowing westward to its confluence with the Connecticut River in East Hartford. The river is heavily impacted by urban development, with urban nonpoint runoff, stormwater, and habitat degradation the primary causes of water quality impairment. In addition to addressing these water quality problems, another goal of the watershed stakeholders is to link existing riverside parks into a contiguous urban green way and trail.

The North Central Conservation District has been receiving section 319 funding since 1996 to administer the "Hockanum River Watershed NPS Program." The watershed project is coordinated by the NCCD, with assistance from CT DEP, NRCS, the Hockanum River Watershed Association (HRWA), and the watershed communities, and is focused on the issues of stormwater management, fish habitat restoration, and public access.

- The NCCD has been constructing and demonstrating stormwater BMPs at their Tolland facility for public view and offering tours.

Farmington River

The Farmington River Watershed is a 607 square mile (388,00 acres) watershed, beginning in the rural Berkshire mountains in Massachusetts, flowing through the Connecticut highland region and Farmington Valley, and out to the Connecticut River in Windsor, CT. The watershed is approximately 70% forested, 15% agricultural and 15% developed. Thirty-three towns lie within the watershed and the main stem of the Farmington River (including the West Branch) flows for 81 miles. The impact of the river reaches far beyond its watershed boundaries as the river system serves drinking water to over 500,000 people outside the watershed.

CT DEP awarded a FY01 supplemental 319 grant to the Farmington River Watershed Association (FRWA) for streambank restoration and fisheries habitat improvements along the West Branch of the Farmington River, which was completed in 2002.

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 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.

Major accomplishments in 2004 included the following:

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 will connect to a new water access site in Fabyan section of town for car top boating and fishing in 2005, and includes marking trails, placing signs, stabilizing slopes and building boardwalks.

Quinebaug River Basin

Town of Brooklyn:

- The implementation phase of the Day Street-Westview Drive stormwater quality management project geared up in 2004 with a Section 319 NPS grant to the Town. A conservation and drainage easement agreement was pending with owners of one large parcel where portions of a stormwater treatment train will be installed. .

Eastern Connecticut Conservation District (ECCD):

- The Section 319 NSP-funded Standardized Farm Field Mapping Project was continued in 2004 by contacting over two dozen farmers in the Quinebaug and Shetucket River basins. This project 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 was continued in 2004 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 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.

The Green Valley Institute (GVI):

- A partnership of the Quinebaug-Shetucket Heritage Corridor, Inc. and the University of Connecticut Cooperative Extension Service, the GVI was created to document, plan for and protect the resources of The Last Green Valley. In 2004, an extensive number of workshops were conducted for targeted land use decision makers, including a smart growth/smart conservation series, a municipal commissioner training series, a regional land trust forum, a 5-day geospatial technologies training workshop, and a weekend training retreat for new land use and conservation volunteers.

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 recruited IPM project cooperators in several agricultural commodity areas in 2004 to reduce the use of pesticides and fertilizer.

Pachaug River Basin

In 2004, the Nature Conservancy worked with the North Stonington Citizen Land Alliance to acquire 123 acres of targeted conservation land along Ashwillet Brook, a Pachaug River tributary, and adjacent to Pachaug State Forest.

The Town of Griswold developed a river-side park with improved water access that included a walking trail along the Pachaug River at Ashland Pond.

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. Construction of the two fish passage facilities began in the fall of 2004 and they are expected to be operational and passing migratory fish in early 2005.
- CT DEP continued to stock Atlantic salmon surplus broodstock (937) in the Shetucket River in Fall 2004 to expand a popular recreational fishery between Occum and Scotland Dam.

Willimantic River Basin

Willimantic River Alliance (WRA):

- A new 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), and development of incorporation paperwork to become a formalized nonprofit conservation organization. Approved incorporation is expected in 2005 with the establishment of a diverse board of directors.

Willimantic Whitewater Partnership (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, NOAA, consulting firms and others.

Thames River Main Stem/Basinwide

Thames River Basin Partnership (TRBP):

- A FY2005 319 NPS grant is funding a part-time coordinator to assist in implementing the Partnership's Plan of Work and in expanding outreach capabilities. The TRBP 2004 Plan of Work is now available online at the expanded website: www.thamesriverbasinpartnership.org.

U.S. Geological Survey/CT District Office (USGS) continued several studies of water quality impairments in the French, Quinebaug and Shetucket Rivers.

One focus in 2004 was the development of a Thames River Basin Plan of Work (Science Plan). The objective is furthering 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 analysis indicate that total phosphorus in the Quinebaug River has decreased substantially since the 1970s and 1980s, with an increase in the late 1990s and early 2000s (see <http://pubs.usgs.gov/sir/2004/5094/>). 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.

- 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) continued successful implementation of their 2003-2004 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;
- Continuing support for the Environmental Review Team that assists towns' and developers' site plan reviews for major land use proposals.

Southeast Coastal Major Basin

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.

DEP Inland Fisheries Division contracted with Trout Unlimited, Thames Valley Chapter, to repair and enhance the fish passage facility on Latimer Brook above the I-95 highway crossing in East Lyme. By late 2004 this facility was operational and passing the targeted sea-run brown trout run.

DEP Inland Fisheries Division staff, as part of the Diadromous Fisheries Restoration program, stocked sea run brown trout parr from the Kensington State Fish Hatchery into Latimer Brook of the Niantic River Basin, as well as into Whitfords Brook of the Mystic River basin.

Pawcatuck River Major Basin

- A multi-year study (Shunock River System Environmental study) on Parke Pond continued in 2004 to complement the Nature Conservancy Pawcatuck Borderlands Project to install fish passage along the Shunock River.

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 Wetland Agencies in the state. This support includes training and education, review of local regulations for conformity (with state and federal laws), site review and assistance in project evaluation, and enforcement. Because most 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 wetland agencies of necessary changes to their regulations due to 2003 statutory changes, as well as a review of pending court cases. In 2004:

- 282 individuals attended at least one of the three program segments, with 453 total participants. Approximately 49 of these individuals attended all three segments and therefore received a 2004 certificate of program completion. 96 Municipal Inland Wetlands Agencies were represented.

Erosion and Sediment Control

In January 2004 CT DEP completed the training program for the *2002 Connecticut Guidelines for Soil Erosion and Sediment Control (Guidelines)*, which training program was funded in part by a 319 grant and monies. The *Guidelines* are now out of print and plans are being made to produce them on compact disk and to make them available on the internet. Once produced on CD, it is anticipated a second round of training on the *Guidelines* will be offered using funds that remain from a supplemental environmental project received in 2002.

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 convened its first meeting on October 22, 2001 and established three Committees to investigate issues identified in PA 01-177.

The Water Planning Council submitted its annual report to the Legislature in January 2003, and proposed a set of initial action steps and policy changes for state agency implementation or legislative consideration. The Council's

findings include the need for a revised water allocation procedure, the securing of adequate, stable resources for water allocation management, and a reframing of the current management structure governing water policy. The Water Planning Council established an Advisory Group in 2003 comprised of a broad array of stakeholders to assist the Water Planning Council in accomplishing action items set out in their report. The Water Planning Council submitted its second Annual Report and Work Plan for 2004 to the General Assembly on January 26, 2004.

All Annual Reports, including the Annual Report submitted in 2005, 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.

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 for \$90,000, and the Salmon River Ice Control Project.

CT DEP in cooperation with NRCS, administers the “Emergency Watershed Protection” 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 2004, 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 which was completed in the fall.

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.

In 2004 funds from the Lakes Grant Program were used to complete lake management studies at Candlewood Lake, Lake Zoar, Lake Lillinonah, Pickerel Lake (Colchester), Crystal Lake (Ellington) and Black Pond (Woodstock). Additionally, studies began at Hatch Pond (Kent), Park Pond (Worcester), and Congamond Lakes (Suffield). Funds from the Lakes Grant Program were also used to complete a buffer garden manual for Candlewood Lake and to restore Keney Park Pond (Hartford) by dredging 8,500 cubic yards of accumulated sediment.

In 2004 CWA Section 319 funds were used to complete a multi year grant with the Connecticut Federation of Lakes. This grant helped the CFL fund an administrative position, increase membership, and develop outreach materials through a quarterly newsletter and a web page <http://www.ctlakes.org/>

CWA Section 319 funds were used by to develop the framework for a lakes probabilistic monitoring program. In 2004 DEP Bureau of Water Management entered into a contract with 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 Management, 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 water quality standards and classifications, water supply planning, discharge permitting, water diversion permitting, site remediation, land use regulation in certain areas, and a host of NPS control programs. One of the key components of this program is the Aquifer Protection Area (APA) Program, which provides comprehensive protection for major well fields in stratified drift aquifers. The APA Program requires mapping of the "areas of contribution" and "recharge areas" to major well fields and will soon regulate land use in those areas to minimize the potential for contamination of the water supply.

Mapping of the APAs is being done in two phases. A preliminary, or Level B, 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 been conducted within the Level B areas. Final, or Level A, mapping is a refinement of Level B and will define the APA, the area subject to land use regulation. Final Level A mapping has been submitted for 41 well fields and 20 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. CT DEP is preparing to release guidance documents and forms necessary for implementation of the APA program, including the Model Municipal Ordinance (which will be a template to assist municipalities in adopting local land use regulations for APAs), and guidance on materials management plans, stormwater management plans, site plan review, planning and zoning coordination, water utility assistance, and other local guidance.

Municipalities are working to begin program implementation, and the first step is to appoint a municipal aquifer protection agency (through adoption of a local ordinance). In 2004, 41 (of the 83 towns in the program) passed the required ordinance. CT DEP continues to work with the municipalities to implement this first step.

In 2004, CT DEP:

- Worked with internal and external work groups to develop the Model Municipal Ordinance, including an annotated version to provide additional guidance.
- Initiated contact with all the municipalities in the program and worked with them to begin implementation of the program.
- Provided extensive outreach on program implementation to municipalities, including 6 regional workshops.
- Provided technical assistance to numerous towns in response to inquiries and requests for assistance with AP issues.
- Initiated 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).
- The USGS bedrock well study (CT DEP participated in the review committee) was published by USGS: Simulation of Ground-Water Flow to Assess Geohydrologic Factors and their Effect on Source-Water Areas for Bedrock Wells in Connecticut. U.S. Geological Survey Scientific Investigations Report 2004-5132. Available online at <http://ct.water.usgs.gov/pubs/pubsindex.html>.

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 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 are being carried out through a number of programs. 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) is administered by the Bureau of Water Management Planning and Standards Division (BWM PSD) in cooperation with DEP’s Office of Long Island Sound Programs (OLISP), and the Coastal Management Program 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 states submitted the final TMDL in January 2001, and EPA approved it on April 6, 2001. 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 statewide general permit with nitrogen limits for 79 sewage treatment plants were initiated. Two 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 through an agreement with a consultant that will rely on watershed modeling. 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 (see below).

The LISS has begun evaluating water quality tracking programs and models to help quantify loads of nitrogen, phosphorus and sediments to receiving waters throughout the state. While such a program or model will help track the TMDL commitment of reducing NPS nitrogen loads by 10%, it will also assist the Section 319 program with quantifying pollutant reductions for GRTS reporting. LISS and CT hope to adopt a suitable system in 2005.

The LISS and CTDEP have also been investing time and funding in habitat restoration activities that are relevant to NPS pollution abatement. In 2003, the LISS approved a draft "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 nitrogen control, 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 the last year includes:

A ceremony to commemorate the November 2003 full approval of Connecticut's Coastal NPS Pollution Control Program was held in Connecticut at the Department's Hartford offices on March 18, 2004. EPA New England Regional Administrator Robert Varney, OCRM Director Eldon Hout, and DEP Commissioner Arthur J. Rocque, Jr. spoke of Connecticut's achievement in obtaining full federal approval and signed a certificate of approval of the state's Coastal Nonpoint Source Pollution Control Program. The event continued with a forum including DEP Deputy Commissioner Jane Stahl relaying an overview of the program and a panel of six experts discussing six specific components of the program including nitrogen reduction, the state's Clean Marina Program, onsite wastewater management efforts, agriculture issues, habitat restoration, and the state's stormwater best management practices manual.

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 2004, OLISP continued with its comprehensive outreach program utilizing the *Connecticut Coastal Management Manual* to train municipal planning and zoning officials and their staffs.

OLISP conducted several regional workshops targeting non-coastal municipalities located in the section 6217 coastal nonpoint source pollution management area, specifically in southwestern and southeastern Connecticut and the mid-section of the Naugatuck River watershed. The workshops and guidance materials were based on materials pertaining to stormwater management, watershed planning, and vegetated buffers that were developed for the coastal management workshops. Regional and individual workshops for non-coastal municipalities will continue to be conducted on an as-needed basis.

The Town of Westbrook continued to develop a comprehensive Onsite Wastewater Management Program (OWMP). This grant program has allowed Westbrook to develop the OWMP and supporting documentation such as ordinances, inspection reporting forms, and outreach materials. The completed OWMP will ultimately enable the Town of Westbrook to sustain an onsite wastewater management approach for the properties in the project planning area in an effort to protect surface and ground water and human health. An additional, equally important purpose of the project is to document the planning process undertaken in the development of an onsite wastewater management plan, which may serve as a model for other municipalities in developing OWMP's. 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; development of an outreach and education program regarding the importance and methods of proper system use and maintenance; and identification.

Clean Marina Program

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 350 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 2004:

- OLISP staff organized four informational meetings for January and February 2004, and two meetings in December 2004 to introduce the Clean Marina Program to the state's marina industry, and to distribute Program materials.
- During 2004, four Clean Marina Cost-Share Assistance Grant projects, funded through a 319 Nonpoint Source Grant, were completed. The completed projects were: purchase of 1 high-volume, low-pressure spray gun for paint spraying, 2 used oil furnaces, and 3 vacuum sanders. The grant money continues to be available on a first-come, first-served basis for eligible projects.
- Starting in May, staff hired by the DEP's Boating Division distributed clean boating information to boaters at boat launch ramps and at marinas throughout Connecticut. The seasonal boating education assistants distributed "Clean Boater Packets" which include an oil absorbent spill pad to clean up small drips and spills of petroleum products, a Boaters' Waste Wheel which provides information about the proper disposal of certain wastes that may be generated when boating, a Clean Boater Tip card which provides basic information about clean boating practices, a pumpout map and other related materials. Boaters were also asked to take a pledge to be a Clean Boater. Over 1,500 boaters took a Clean Boater Pledge in the 2004 boating season.
- DEP certified three marinas as Clean Marinas in 2004.

By the end of 2004, Connecticut had a total of 5 certified Clean Marinas and 25 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. In FY04, OLISP received \$764,652 from the U.S. Fish and Wildlife Service through the Clean Vessel Act (CVA) grant program to build, operate, and maintain boat sewage pumpout and dump station facilities in the coastal area.

By the end of 2004, there were 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.

In September 2004, 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.

A directory of pumpout stations and boats can be found on the CTDEP website at: <http://dep.state.ct.us/olisp/cva/cva.htm>, 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 1500 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 acres of coastal habitats such as tidal wetlands and coastal grasslands by 2008. In 2004:

- Restoration occurred at Minore Marsh, Branford 4.7 acres; Castle Rock Marsh, Branford 2.1 acres and Mile Creek Marsh, Old Lyme 13 acres. All three project areas totaling 19.8 acres.
- In addition, WHAMM program performed *Phragmites* control at 52 sites in Connecticut totaling 165 acres. These acres do not count toward our restoration goal of 2000 acres.
- The WHAMM Program received permission from property owners at Little River Marsh in New Haven and North Haven to initiate a wetland habitat restoration project on their property. An area of 150 acres of *Phragmites* was mulched and herbicide was applied to the site. The site was monitored and it was estimated that 80 percent control was achieved in 2002. By 2004, only 17 acres of *Phragmites* needed to be treated.

OMWM is a technique we use 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 we use 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.

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.

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_x) 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). 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 ARAP 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. One ARAP work group has mapped forest sensitivity to acid deposition in Vermont, Massachusetts and New Foundland, a project that has been expanded into Connecticut and should be completed in 2005.

New air quality regulations set by CT DEP in December 2000 establishing a 20-30% reduction in NO_x emissions by 2003 and a 50% reduction in SO₂ emissions by 2002, beyond current commitments have been implemented on schedule. The actions reduced NO_x emissions by nearly 3,500 tons per year, a 26% reduction and SO₂ emissions by 8,900 tons per year, a 67% reduction, in concurrence with NEG/ECP goals. Though required in the LIS TMDL for nitrogen, EPA has made no progress towards developing a recommended atmospheric deposition control plan for nitrogen by 2003. 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 Acid 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 on January 9, 2004. Accomplishments include:

- Over 3,300 facilities, towns or activities were registered under the various stormwater discharge general permits by the end of 2004, most of which have annual monitoring requirements. There were 1,807 industrial operations, 1167 construction sites, and 251 commercial sites. DEP stormwater staff conducted 233 inspections and issued 62 Notices of Violations for stormwater related violations during 2004.
- On April 8, 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 January 9, 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 in 2004. Outreach and workshops 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 initiated the development of a new BMP technical guidance manual utilizing FY99 319 funds. In 2004, DEP issued the Connecticut Stormwater Quality Manual, which will be used to conduct outreach and education to municipal land use officials and public works personnel, as well as private developers and their design engineers. .

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. Operations that exceed a certain size threshold are subject to the National Pollutant Discharge Elimination System (NPDES) program. 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 2004 include:

- NRCS and UConn/CES assessed about 115 farms from FY96 through FY04 and wrote or revised about 50 agricultural waste management system plans (AWMPs) that CT DEP has approved.
- Through FY04, nutrient management plans are being implemented on 28 farms and about 13,502 acres (although the acreage changes each crop year as farmers add and or lose fields, which is a little greater than the projections made in December 1998 in the 319 proposal for nutrient management -- 25 farms and 12,500 acres).
- NRCS and UConn/CES completed the second year of a project to develop a user-friendly computerized record-keeping system to help farmers track nutrient use on their fields. 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 utilized 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 BWM 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 FY99-04 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 eleven 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 2004, the NEMO program published *Putting Communities in Charge*, a look at the impacts of NEMO's municipal education efforts. This booklet reviews the actions that Connecticut towns have taken as a consequence of NEMO education, focusing particularly on the Municipal Initiative towns that were the subject of FY 00-03 section 319 funds. Some of the towns and organizations included in the publication include:

Salem

With the help of the NEMO Team, the town adopted the resource inventory developed by the Conservation Commission. The inventory includes a comprehensive study of the natural features in Salem, and was designed to serve as a technical backdrop to future open space planning efforts. The Planning and Zoning Commission formed a separate Open Space Plan Committee to begin crafting elements of an open space plan.

In addition to open space preservation, the town was interested in maintaining its economic viability. A workshop on economic development was sponsored by the Economic Development Commission as a kickoff to the development of an economic development plan for the town. The plan is now complete, and the commission is working to expand the town's agricultural heritage through the encouragement of equestrian businesses. A separate "Horse Council" made up of leading business people and land owners are looking at ways to develop a system of trails that will become a part of the town's open space plan.

The Planning and Zoning Commission was interested in investigating a number of planning and regulatory issues. In their update to the town's Plan of Conservation and Development (POCD), the Commission focused on the need to protect water resources through the use of innovative site design and open space planning. For example, as part of this effort the Commission approved a change to their off-street parking requirements. The change allows for parking areas that are not paved, when the non-paved surface would "substantially enhance environmental quality." The POCD also sets goals for future road improvements and aquifer protection.

The Planning and Zoning Commission is now applying regulatory techniques that better match proposed development to the capacity of the land to accept development. After a workshop by the NEMO Team, the Commission adopted changes to their zoning regulations that incorporate the concept of "net buildable area." This regulation requires any new lot to have a total of 40,000 square-feet of land that does not contain wetlands, floodplains or steep slopes, and has soils that are suitable for on-site sewage disposal. This assures that any approved lot will meet the standards necessary for public health and the protection of water resources.

East Haddam

With recommendations from NEMO workshops, the Planning and Zoning Commission adopted new subdivision regulations using the “net buildable area” concept to better match the size of the lot to the capacity of the land to accept development. These regulations require an inventory of natural resources and a “yield plan” of the parcel in order to determine the number of lots allowed. In this way, both traditional and conservation subdivision designs better reflect the “carrying capacity” of the land.

The Planning and Zoning Commission also addressed the road standards and stormwater management sections of the regulations. Road width requirements for local roads were reduced from 32 to 18 feet, and the use of curb-and-gutter drainage was discouraged. All proposed projects in town require a thorough stormwater management plan that addresses both water quantity and quality. The recommendations for dealing with stormwater mirror those found in the new Stormwater Quality Manual published by the CT DEP. East Haddam was the first town in Connecticut to refer to this manual as guidance for future development. In addition, the Inland Wetlands and Watercourse Commission increased the upland review area from 75 to 100 feet, providing further protection to the town’s water resources.

East Haddam is also implementing new parking regulations that allow for innovative stormwater management such as on-site bioretention and techniques to reduce overall parking requirements. These techniques include shared parking in commercial areas, and multi-functional landscaping that both renovates stormwater runoff and provides aesthetic benefits.

The Planning and Zoning Commission is working with NEMO partners to develop an interactive buildout analysis model using CommunityVIZ™ software (produced by The Orton Foundation). This model will determine the ability of a property to support housing units, using the recent regulation changes. From this information a watershed-based plan will be crafted, setting development goals for individual sub-regional watersheds in town.

Stonington

The NEMO Task Force was broadened to become the town Stormwater Management Study Group, comprised of members from the Planning and Zoning, Inland Wetland and Watercourse, Conservation and Shellfish Commissions as well as town staff, CT DEP’s Office of Long Island Sound and Stonington’s state representative. The Study Group identified a number of key issues with their existing regulations. They recommended a number of strategies that would reduce the amount of impervious surface created during new construction, and called for flexibility in determining requirements for parking, road standards, driveway widths and other impervious elements of the landscape.

The Study Group’s recommendations are being incorporated into the town’s POCD. It calls for development that both considers and respects the land’s natural capability to support the proposed new use. Two methods of accomplishing this goal are proposed: a “buildable land regulation” that excludes lands with severe limitations (steep slopes, wetlands or floodplains) from development, or “soil-based zoning,” which matches the amount of development to the capacity of soils on the site to accept that development. In addition to these stormwater and water quality strategies, the POCD calls for a number of new strategies to preserve open space: the establishment of a Stonington Land Trust, requiring “open space developments” in certain areas of town, and acquiring land to connect existing preserved areas and to provide coastal access.

The Stormwater Task Force, is now focusing its effort in three areas. First, thanks in part to a grant from CT DEP, the town is investigating the feasibility of creating a “stormwater utility” to assist the town in funding existing and future stormwater infrastructure improvements. (Stormwater utilities, which are used in a number of states nationwide, have not been used in Connecticut to date). Second, the Task Force will be working with town staff on a new Public Improvement Standards manual that will take a unified approach to major public infrastructure elements such as roads and stormwater management. The use of alternative storm-water design (such as water quality swales and rain gardens) will be encouraged. Third, the Task Force will be focusing on raising public awareness of stormwater issues through a public education program, with particular emphasis on school-aged children.

Candlewood Lake Authority (CLA)

The CLA Action Plan reviewed the plans and regulations in their five member towns and made specific recommendations on how to protect the lake. These recommendations included standards for storm-water management and impervious surface coverage in both zoning regulations and site design requirements.

The Action Plan specifically calls for a Lake Protection Zone (LPZ), an overlay zone for land uses immediately around the lake. (An overlay zone such as the LPZ does not supplant existing zoning; rather, it applies additional standards on top of the current zoning.) In order to protect water quality, the LPZ sets impervious surface limits, requires buffers around water resources and sets minimum lot area requirements. The LPZ also incorporates innovative standards that allow for flexibility in site design. For example, if the lot configuration or existing structures limit the amount of new impervious cover allowed, the owners can exceed the limits if they provide for other water quality management practices

Council of Governments for Central Naugatuck Valley (COGCNV)

To date the COGCNV has completed impervious surface buildout analyses for 8 of the 13 towns in the region, including all those within the Pomperaug River watershed. The analysis contrasts a map estimating current levels of impervious surfaces to a map of potential future levels, estimated using Center for Land Use Education and Research (CLEAR) land cover data, town zoning and lot coverage regulations.

As each analysis is completed, a report is created and a workshop is conducted for town land use decision makers. At the workshops, COGCNV staff describe the analysis and its results, and then NEMO staff discuss concrete steps that could be taken to reduce the impacts of stormwater runoff. The impervious surface analysis is used as a framework from which town decision makers can build an overall strategy that deals with both best stormwater management practices for existing problems, and planning and design approaches to prevent future impacts.

As a result of these analyses, several towns have implemented changes to their plans and regulations. The Pomperaug River Watershed Coalition (PRWC) has used the impervious surface and buildable lands analysis to help develop methods and criteria to determine “lands of critical value” in the watershed. These are lands that promote and protect the health of the watershed. PRWC and COGCNV develop strategies to place these valuable agricultural and forested areas under permanent protection, hence ensuring the long-term health of the Pomperaug River.

Visit NEMO’s website at: <http://nemo.uconn.edu/> for more details on NEMO educational program and the CT DEP supported Municipal Initiative, as well as for information on how this CT DEP-supported project has launched a national network of NEMO projects all working to protect water resources across the country.

In 2004, NEMO helped to create a major new web site on the **Connecticut’s Changing Landscape** project, a major new research effort of NEMO parent organization, the UConn Center for Land use Education and Research (CLEAR). By creating four dates of land cover spanning a 17-year period, the CCL project made it possible, for the first time, to quantify and view land cover change, particularly the growth of developed land. The change maps are eye-opening for many people, giving them a previously unattainable picture of the recent development history of their town or watershed.

Focus on the Coast is a multi-media education project designed to address the intersection of urban land uses and priority coastal habitat areas along Connecticut’s coast. The goal is to educate local land use decision makers about key coastal resources, put the resources in the context of other local information, and encourage natural resource based planning that incorporates these coastal resources. The Focus on the Coast website provides additional cutting-edge geospatial resources for the educational workshop, including a Coastal Resource Inventory tutorial and a Mapping Station with three ways for users to view and analyze GIS data.

Impervious surface coverage has been proven to be an important and useful indicator of the impacts of urbanization on water resources. NEMO and CLEAR have continued to focus on new tools and research for measuring and estimating impervious coverage, including the development of the Impervious Surface Analysis Tool (ISAT), a GIS “plug-in” tool designed to estimate the percent area of a watershed (or another user specified

geographic area) that is covered with impervious surfaces. A host of information including ISAT and other CLEAR tools and research, is contained on the new NEMO Impervious Surfaces website

Finally, FY04 section 319 funds are being utilized to promote the new CT DEP Stormwater Quality Manual. In 2004, the NEMO team began meeting with CT DEP and the members of the manual's advisory committee to begin planning for training workshops to be given in 2005. A number of key constituents will be targeted including municipal officials, town and consulting civil engineers, landscape architects, public works departments, state employees and others.

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/. 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 2004 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 almost 100 percent, with increased concentrations and loading of nitrate-nitrogen (NO₃-N).
 - Sediment export increased 90 percent and total phosphorus increased 89 percent, and loading of copper, lead and zinc 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. However, the concentrations of total suspended solids, total phosphorus, and total Kjeldahl nitrogen remain greater than during calibration. Exports have declined during post-construction, except for total phosphorus and total suspended solids 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 will continue for one more year to assess the overall differences in how these two types of development impact water quality.

NPS Program Contact List

CT DEP Nonpoint Source Coordinator	(860) 424-3730
US EPA Nonpoint Source Coordinator	(617) 918-1687

Other Nonpoint Source related programs:

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, Enforcement and Remediation	(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