Nonpoint Source Management Program 2010 Annual Report

Final Report

Nonpoint source pollution is diffuse in nature, both in terms of its origin and in the matter in which it enters surface and ground waters. It results from a variety of human activities that occur over a wide geographic area. Pollutants find their way into water in sudden surges and are associated with rainfall, thunderstorms, or snowmelt. Nonpoint source pollution results from land runoff, precipitation, atmospheric dry deposition, drainage, or seepage. Hydromodification is any physical disturbance to a water resource caused by human activity. Included in these activities are filling, draining, ditching, damming, or any other disturbance to wetlands and stream courses.

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I. INTRODUCTION

The Connecticut Department of Energy and Environmental Protection* (CT DEEP) Nonpoint Source (NPS) Program works to abate known water quality impairments and prevent significant threats to water quality from nonpoint source pollution. Nonpoint source pollution is caused by diffuse sources that are not regulated as point sources and are normally associated with precipitation and runoff from the land or percolation. A significant strength of the program is its networked approach to nonpoint source management. CT DEEP 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).

*The Connecticut Department of Environmental Protection was reorganized in 2011 into the Connecticut Department of Energy and Environmental Protection (DEEP).

Resources

The CT DEEP NPS Program is supported by both federal and state funds. The CT DEEP Bureau of Water Protection and Land Reuse (BWPLR) administers grants to applicants for planning and implementation of environmental programs and projects with the goal of improving water quality. CT DEEP closed out 15 nonpoint source projects under CWA Section 319 during this period. 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. The remaining allocation funded projects that are generally targeted to watersheds identified by the state as impaired (i.e., not meeting state water quality standards), and/or for which the development of total maximum daily load (TMDL) analyses are required.

CT DEEP 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 DEEP 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.

The Connecticut Department of Energy and Environmental Protection awarded $1,080,101 to help fund fourteen projects designed to reduce NPS pollution in lakes and streams. Nonpoint Source Pollution (NPS) grants will be funded with 2009 federal fiscal year monies provided to Connecticut by the EPA under Section 319 of the Federal Clean Water Act. Qualifications include the following:

1. The proposal should address impairment in a 303(d) listed water body. An example of an impairment is "does not support Primary Contact Recreation" as indicated by high indicator bacteria. Impairment is an identification of the causes and sources that will need to be controlled to achieve the load reductions estimated and to achieve any other watershed goals identified in the watershed-based plan.
2. In addition, the waterbody must have an EPA approved "Watershed-based Plan" which focuses on addressing that specific 303(d) impairment and addresses the following 9 elements **(impairment; load reduction; management measures; technical assistance & financial assistance; public information & education; management measures; performance and monitoring).** In cases where a final Watershed-based Plan has not been completed, applicants have the option of creating an interim Watershed-based Plan that partially addresses the water quality impairment, a portion of the watershed, or a specific management activity relevant to the water quality impairment. For example, an interim plan may use land use/cover information to identify cause and affect relationships with the intention of a more complete analysis leading to a final Watershed-base plan in the future.

FINAL WATERSHED-BASED PLANNING EFFORTS "PRESENTLY OR SOON TO BE" UNDERWAY	
Watershed	**Status**
Coginchaug	Completed
Niantic	Completed
Tankerhoosen	Completed
Broad Brook	Completed
Little River – Muddy Brook – Roseland Lake	Completed
Steel Brook	Completed
North Branch of the Park River	Completed
Spaulding Pond	Completed

II. CT DEEP NPS MANAGEMENT STRUCTURE

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

Planning and Standards Division (PSD)

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

Inland Water Resources Division (IWRD)

Regulates activities in the state's inland wetlands, watercourses, and flood plains, including oversight of municipal Inland Wetland Agencies; enforces the state's inland wetland and floodplain protection statutes; manages allocation of water resources through diversion permitting; and prevents or mitigates natural disasters through flood warning, emergency recovery efforts from flooding, and dam safety programs.

Office of Long Island Sound Program (OLISP)

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

Remediation/Sites Clean-up

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

There are also several other CT DEEP units that perform NPS Program support activities. The CT DEEP, Office of Communication and Publications, supports outreach and education on NPS issues to municipal agencies, the general public, and teachers. The Office of Information Management (OIM) houses the department's Geographic Information System (GIS) staff, whose members are responsible for collecting and digitizing all manner of data relevant to water resource management in the state. The GIS Office is responsible for coordinating GIS activities that involve CT DEEP 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 DEEP 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 DEEP Watershed Managers 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 2010, Section 319 funds in the PPG were used to support the following staff: NPS program coordinator, Water Bureau administrative assistant, two watershed managers, two subsurface staff, one full time cartographer and one position for data management (305[b]). These staff help integrate NPS Program goals and objectives into their own programmatic areas.

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

Monitoring and Data Management

Section 319 funds support two staff positions in the Bureau of Water Protection and Land Reuse (BWPLR), water quality monitoring and data management unit: the Volunteer Monitoring Coordinator and the 305(b) Assessment Database (ADB) Manager providing technical support to prepare the biennial Integrated Report.

The Volunteer Monitoring Coordinator

The Volunteer Monitoring Coordinator facilitates training in sampling procedures and data quality methods to volunteer monitoring organizations to assure results meet DEEP criteria for use in Integrated Report, and assists in evaluating and assessing Connecticut water bodies based on water quality monitoring data. 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 coordinator's major 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. DEEP and EPA must approve these plans. This program has lead to volunteer monitoring data being integrated with DEEP data to increase our knowledge of the conditions of Connecticut's waters.

The 2010 summary report for the Rapid Bioassessment in Wadeable Streams and Rivers by Volunteer Monitors (RVB) can be seen on the DEEP web page under the Bureau of Water Protection and Land Reuse, volunteer monitoring heading (http://www.ct.gov/dep/cwp/view.asp?a=2719&q=325606&depNav_GID=1654). This program enables citizen groups to collect useful data for DEEP by combining the utility of invertebrate indicators with a non-technical methodology. Prior to sampling, a three-hour training session was held, in which over 400 individuals participated in this water quality-monitoring program. Participants include watershed associations, college ecology classes, town conservation commissions, and sporting clubs.

Data collected according to the RBV protocol can be used as a screening tool to identify stream sections with either very high or very low water quality. The documentation of key indicator organisms in a section of a stream provides a record of the benthic community present for a collection date and time. Since the program inception in 1999, volunteer monitoring data has been used to assess more than 323 river miles as fully supporting Aquatic Life Use in the 305(b) water quality report to Congress.

The 305(b) Assessment Database (ADB) Manager

The 305(b) Assessment Database (ADB) Manager assures water quality assessments are entered into the ADB, and mapped using Arcview 10.x to provide a geographic representation of Connecticut's water quality assessments for all water-body types in support of the biennial submission of the Integrated Water Quality Report (IWQR) (formerly referred to as the "Water Quality Report to Congress" or 305(b) Report, as required under Section 305(b) of the federal Clean Water Act (CWA) and Connecticut Impaired Waters List, which is required by Section 303(d) of the CWA).

CT DEEP evaluates water quality based on results from data collections within CT DEEP, and results from data shared by the U.S. Geological Survey (USGS), volunteer, municipal, academic, and Project SEARCH monitoring. The resulting water quality assessments are stored by "segment identifiers" (segment ID), a unique identifier derived from a combination of the Connecticut basin code, and segment number in the ADB. This information is extracted into the IWQR biennially, and shared with EPA and the public.

Updating the Assessment Database (ADB) is an ongoing process, based upon monitoring results from all available field work. Water quality work performed during the 2010 calendar year will be evaluated to support the 2012 IWQR, comprised of a written report detailing Connecticut Water's assessed by segment ID, a copy of the Assessment Database (ADB), electronic copies of Connecticut's assessed waters for geographic display called "shape files", and the Impaired Waters list (303(d) list), which will be submitted on April 1st, 2012 to EPA and posted on the DEEP web page, which will be available to the public.

Rapid Bioassessment in Wadeable Streams/Rivers by Volunteer Monitors

Number of monitoring locations	106
Number of samples collected	119
Number of waterbodies monitored	76
Number of fall samples > or = 4 "Most Wanted" types	18
Number of individual participants	400+
Number of groups participating in 2010	22

Number of groups participating for the first time	6
Number of groups returning for another year	16

Outreach and Education

Project SEARCH is a collaborative program of the CT DEEP and The Children's Museum. The program provides equipment, training, and technical support to high school and middle school teachers who have incorporated a water quality monitoring program as part of their science curriculum. Funding for this program, which was initiated through a National Science Foundation grant, is now provided by CT DEEP General Funds and Section 319.

In 2010, Project SEARCH continued to work with teachers and students from over 35 public and private high schools and middle schools across Connecticut to collect water quality data on rivers and streams within their communities. Schools collected water chemistry data, assessed habitat quality (including potential NPS pollution), and surveyed benthic macroinvertebrate communities in the fall and spring at their monitoring sites.

Water quality data was collected from 46 sites on 36 rivers and streams. SEARCH staff collected 81 replicate samples for the project's Quality Assurance/Quality Control (QA/QC) analysis

Geographic Information

The NPS Program receives GIS support services from trained Bureau of Water Protection and Land Reuse (BWPLR) staff in addition to the Office of Information Management (OIM). GIS services relevant to NPS management include maintaining the NPS Online Viewer and the CT DEEP GIS Data Download websites, assisting NPS Program staff both with the use of desktop GIS and with materials and guidance for GIS projects, including updating data layers such as the Aquifer Protection Areas, Surface/Ground Water Quality Classifications, and creating maps representing Connecticut hydrology for presentations and for public use.

III. PROGRAM HIGHLIGHTS

In 2010, grantees completed fourteen nonpoint source projects. Below are a few of the completed projects and their accomplishments.
DEEP conducted limnological monitoring of 20 Connecticut lakes per year, for three years. Water quality assessments made from this probabilistic sample will be used for 305(b) reporting and will be extrapolated for all lakes in the State. Sampling will include nutrient and chlorophyll sediment cores and will establish current and historic trophic conditions for nutrient criteria development.

- Waterbody Name: 20 Lakes across the state
- Project Grantee: Connecticut College
- 319 Grant Amount: $90,200

- DEEP supported efforts to initiative a Farmington River Watershed Rain Barrel Program to encourage implementation of low impact development regulations being reviewed for adoption in the town. The town purchased rain barrels and distributed to the town residents. The response to the program was excellent.
- Waterbody Name: Farmington River
- Project Grantee: Town of Avon
- 319 Grant Amount: $3,000

Eastern CT Conservation District conducted an assessment within the Eagleville Brook. A TMDL assigned watershed for potential stormwater retrofits in consultation and coordination with the sites prioritized by the local municipalities. The district conducted field investigations and developed conceptual stormwater retrofit design strategies.

- Waterbody: Thames River Watershed
- Project Grantee: Eastern CT Conservation District
- 319 Grant Amount: $32,000

NRCS finalized an EPA Approved 9 Element Watershed Based Plan for the Broad Brook Watershed. The North Central Conservation District supported these planning efforts with projects and assistance in the watershed, including a regulatory review in the Broad Brook watershed.

- Waterbody Name: Broad Brook Watershed
- Project Grantees: North Central Conservation District and NRCS
- 319 Grant Amount: NRCS: $78,000 & NCCD: $38,500

A recent TMDL for Eagleville Brook cited problems associated with excess stormwater as the likely cause of the impairments in the Brook. The first phase of this project was to install and monitor a vegetated green roof on a portion Gant Plaza at the University of Connecticut. Green roofs have been shown to significantly reduce the volume of runoff leaving a roof. The second phase of the project evaluated in detail the Eagleville Brook watershed (above the point where the brook daylights on the south side of North Eagleville road), to determine suitable locations for disconnection of impervious areas and installation of bioretention.

- Waterbody Name: Eagleville Brook
- Project Grantee: University of Connecticut
- 319 Grant Amount: $50,000

The Southwest Conservation District conducted a goose management project to address nonpoint source pollution in the Norwalk River Watershed by focusing on one contributor, the non-migratory Canada goose, a source of E. coli bacteria. The Norwalk River Watershed Initiative will train volunteers and municipal staff to implement management activities, such as public education to inform residents that geese should not be fed, addling and/or oiling eggs with the aim of reducing the number of resident Canada geese in this watershed. The project's goals are: 1) to reduce the number of geese eggs hatching each year; 2) to control the prevalence of geese in the watershed; and 3) to improve water quality. Towns that are

members of the Watershed Initiative will be involved; towns in the Saugatuck River Watershed will also be encouraged to participate.

- Waterbody Name: Norwalk River
- Project Grantee: Southwest Conservation District
- 319 Grant Amount: $42,786

An EPA Approved Watershed Based Plan was finalized for the Byram River Watershed. The funding will be used to build the capacity, and create the plan. Goals will include specific best management practices designed to reduce bacteria loading into the Byram River. The purpose of the Byram Watershed Coalition forum is not only to create the watershed plan, but also to facilitate ongoing collaboration and implementation. The central goal of the forum is to address and mitigate water quality impairments in a consensus-driven interstate watershed based planning and implementation process.

- Waterbody Name: Byram River
- Project Grantee: Southwest Conservation District
- 319 Grant Amount: $30,000

IV. WATERSHED MANAGEMENT PROGRAM

Watershed Management and Low Impact Development

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

Consistent with this approach, CT DEEP offers competitive annual Section 319 grants to watershed initiatives for the priority watersheds, and to statewide NPS initiatives for transfer to local watershed management efforts.
Watershed basins that CT DEEP has targeted in the past include:

- Norwalk River,
- Quinnipiac River,
- Hockanum River,
- Mattabesset River,
- Pequabuck River,
- Scantic River,
- Sasco River, and
- Fenger River.

CT DEEP has new focused watershed management initiatives underway in the following river Basins:

Thames River basin:

- Eagleville River,
- Little River,
- Quinebaug River, and
- Shetucket Rivers.

Housatonic River basin:

- Pomperaug River, and
- Steel Brook.

Southeast coastal basin:

- Niantic River.

Southwest coastal basin:

- Saugatuck.

Connecticut basin:

- Coginchaug

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, habitats 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 and stream corridor assessments, the Consolidated Assessment and Listing Methodology (CALM) reporting and targeting NPS assessments. The primary purposes of the CALM data analyses are to determine the extent to which waters are attaining water quality standards, to identify waters that are impaired and need to be added to the 303(d) list, and to identify waters that can be removed from the list because they are attaining standards. The CT DEEP WMC Section administers river and lake watershed management programs in cooperation with other CT DEEP programs, other state and federal agencies, and nongovernmental organizations. The WMC Section includes coordinator positions for the five major river basins (Thames, Connecticut, Housatonic, Central Coastal, and Southwest Coastal Basins), and overseeing and coordinating watershed management activities in each basin. The watershed program addresses NPS-related water quality problems on a comprehensive basis throughout an entire watershed. The role of the WMC basin coordinators include:

- Coordinating CT DEEP base program activities in priority watersheds

- Serving as liaison between CT DEEP and other state and federal agencies, municipalities, citizen groups, watershed associations, and other partners

- Assisting in the development of basin reports, watershed assessments, TMDLs, and watershed management plans

- Providing education and outreach on watershed issues, including the CT DEEP web site, fact sheets, meetings, workshops, and conference

- Helping to 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 DEEP continues to encourage the growth of both new and previously existing non-governmental watershed organizations, partnerships and initiatives in priority watersheds. The CT DEEP directs funds to the Rivers Alliance of Connecticut to administer the Watershed Assistance Small Grants Program (WASGP). The WASGP was launched in 2002 through the Section 319 (FY '01) program to provide small grants to start-up, growing and established organizations, to aid them in their efforts to improve and protect the water resources of Connecticut. These small grants are particularly appealing to new and small groups that may not have ready access to some of the more traditional sources of funding enjoyed by larger and more well established groups. Since this program began, 38 watershed and other environmental organizations have received funding for 59 projects related to: education and outreach; organizational start-up and development; water quality monitoring; watershed assessment and planning; purchase of equipment; and other relevant activities. Overall, the WASGP has been well received and effective at improving watershed protection and reducing NPS pollution. During 2010, CT DEEP emphasis continued on completing progress on previously provided assistance grants.

Other watershed management initiatives during 2010 include:

- Continuing to evaluate and implement CT DEEP watershed management strategies to improve watershed management and strengthen the state's ability to control NPS pollution including coordination of DEEP programs that influence land use development, creating stronger municipal relationships, offering assistance to municipalities making land use decisions, and promoting low impact development tools.

- Examining a long-term approach to solving complicated water quality impairments in Connecticut's main stem tributaries.

- Working with the NPS Program to focus on 303(d)-listed impaired waters, causes and sources of impairments, and implementation projects to fix impairment.

- Developing watershed management plans, which covers all 9 elements of an EPA watershed-based plan, build out conditions, and other CT DEEP NPS and watershed management assessment, planning and implementation needs.

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

Districts partner with various public and private stakeholders to develop and implement watershed management plans and local initiatives focused on protecting and improving watershed health. Among others, partners include CT DEEP, NRCS, municipalities, regional planning entities, and natural resource and land preservation groups. Conservation Districts used their base section 319 funds to provide assistance to municipal leaders, commissions and staff, the development community, and residential, commercial and agricultural land users by:

- Providing technical information and assistance on natural resource problems by conducting site plan reviews and on-site inspections and providing recommendations for management of NPS pollution, erosion and sedimentation control and storm water management including stormwater retrofit opportunities; and conducting pollution source track down surveys to identify potential sources of water quality impairments and restoration opportunities.

- 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; erosion and sediment control, nutrient management, stormwater management; forestry best management practices; and integrated pest management.

- Providing on-call detailed information and recommendations to ensure protection of wetlands, streams, rivers, groundwater, watersheds and land from storm water run-off, and to address problems resulting from the lack of erosion and sedimentation controls.

Low Impact Development Program

In 2010, the CT DEEP Bureau of Water Protection and Land Reuse Planning and Standards Division continued to support the Watershed Management and Nonpoint Source Pollution Program in bringing the citizens of Connecticut an awareness of Low Impact

Low Impact Development (LID) is a land use planning and site design strategy for the management of storm water runoff that uses small scale controls integrated throughout a site to infiltrate, filter, store, detain, and evaporate storm water close to its source, replicating the pre-development hydrology of a site. LID techniques decrease surface runoff, erosion, and non-point source pollution and conserve natural site features to improve water quality and regulate water quantity.

Photo: Green Roof at the State Capitol Building funded in part by the CT Clean Water Fund.

Development (LID) techniques for reducing storm water and nonpoint source pollution runoff. The LID program works with partners at the municipal, state and federal levels to provide information and outreach materials and technical coordination in the application of LID techniques. The program promotes LID management practices with municipal land use agencies and public and private stakeholders in order to protect conserve and restore the water resources of Connecticut.

The role of the LID Program includes:

- Supporting the work of DEEP's Watershed Managers to protect and restore water quality by serving as a liaison between CT DEEP and other state and federal agencies, municipalities, citizen groups, watershed associations, and others through the coordination of LID recommendations for watershed-based plans and implementation efforts.

- Providing assistance to municipalities for the incorporation of LID regulations and ordinances into local zoning, subdivision and wetlands codes.

- Providing information on best management practices through outreach materials and technical coordination to municipalities, planners, watershed associations and contractors.

- Providing education and outreach on LID and nonpoint source pollution topics and funding opportunities through the CT DEEP web site, fact sheets, brochures, meetings, workshops, and conferences.

- Integrating LID alternatives into CT DEEP environmental site plan reviews.

Some of the CT DEEP Low Impact Development accomplishments for 2010 included:

- Supporting the work of the Watershed Managers and providing stakeholder capacity building through participation at conferences, workshops, watershed meetings and with interagency workgroups.

- Incorporating LID education and outreach materials, including brochures on LID practices, a municipal library of LID implementation in Connecticut, and other resource lists into the CT DEEP Watershed Management webpage online at: www.ct.gov/dep/watershed

- Conducting LID presentations for land use commissions, watershed organizations, DEEP Inland Wetlands Training, trade groups, and watershed based planning efforts

- Coordinating with DEEP's Permitting and Enforcement Division, stormwater permitting and enforcement program to support of Supplemental Environmental Projects to implement LID. This included awarding ten towns within the Farmington River Watershed DEEP grant funding to review current land use regulations and ordinances to identify barriers to LID, and to revise the applicable land use regulations and ordinances to remove barriers and incorporate LID into municipal regulations, zoning, and subdivision approvals. Plainville, the first town to successfully implement LID regulations through this grant program, passed their regulations in December 2010.

- The EPA, CTDEEP, and the Metropolitan District Commission began the partnership to implement wet weather management projects using green infrastructure approaches on the State Capitol Grounds. The Hartford Green Capitols Project highlights several stormwater retrofits: a green roof, rain gardens, rainwater harvesting, and porous surfaces. The intent for the Green Capitols project will be to serve as a statewide model for low impact development and green infrastructure solutions to be implemented by developers, municipalities, and homeowners.

  A green roof is located at ground level over a former generator room pad. Rain gardens one either side of the driveway entrance on Capital Avenue demonstrate a residential application while another rain garden along the driveway to the front of the Capitol building demonstrates a street retrofit for urban application. The rainwater harvesting demonstration consists of an underground cistern to capture the rainwater from the building's roof leaders and to utilize the rainwater for irrigation on capitol grounds. The cistern will be installed below ground on the side of the capitol building. Several porous surfaces are demonstrated at the capitol grounds by installation of pervious asphalt parking area, porous concrete sidewalks and pavers for walkways.

Southwestern Coastal Basin

Southwest Coast Basin

The Southwest Coast Basin consists of a series of mostly north to south flowing streams that discharge to Long Island Sound between Stratford, CT and Port Chester, NY. The Southwest Coast Basin encompasses approximately 448 square miles, 57 of which are in New York State, and is home to approximately 650,000 people. The basin can be further subdivided into five regional basins: Southwest Shoreline, Southwest Eastern Complex, Saugatuck, Norwalk, and Southwest Western Complex. The northern half of the basin watershed is relatively rural, characterized by small towns, farmland and forest, much of which surrounds public water

supply reservoirs. The southern half of the watershed tends to be more urbanized and commercial, dominated by the major transportation corridor surrounding I-95 and US 1.

Byram River

The Byram watershed is in the towns of Greenwich Connecticut and Port Chester/Bedford, New York. The major issues in this watershed are: a) flooding, especially in the Pemberwick area, water quality, b) sanitary sewer overflows (SSOs) and illicit discharges from Port Chester, NY into the estuary, c) sediment quality due to its industrial legacy, and d) contaminated sediments.

A draft CWA Section 319 watershed based plan ("WBP") was completed in 2010 with the final plan to be available in 2011. The Byram River Watershed Coalition has been organized with the following focuses: water quality, watershed-based plan development, public access and mitigation of flooding and erosion.

EPA Region 2 has issued an Administrative Order against Port Chester New York for noncompliance with their MS4 stormwater Phase 2 permit. Ambient monitoring continues to indicate significant dry-weather sewage discharges coming from the Port Chester stormwater systems. There have also been enforcement activities against the Town of Greenwich for intermittent problems related to infrastructure failures.

Watershed stakeholders include, but are not limited to the Town of Greenwich, Interstate Environmental Commission, Byram Watershed Coalition, Westchester County Health Department, Port Chester, Southwest Conservation District, Westchester County Planning/Conservation District, Bedford, Save our Shores, Save the Sound/Connecticut Fund for the Environment, Citizens Campaign for the Environment, Pace University, Columbia University, and SoundKeeper.

Mianus River

The Mianus River watershed is in the towns of Greenwich and Stamford, Connecticut. The major issues in this watershed are land preservation, riparian restoration, heavy use of parks, NPS pollution, and goose management.

South West Regional Planning Agency has been funded to develop a watershed-based plan for nonpoint source pollution. The City of Stamford has worked with local park users to enhance the trail system to lessen impacts to the river at Mianus River Park. Volunteer labor has been managed very successfully to implement trail and river corridor management projects. A hardened access point has been installed to lessen conflicts between user traffic and riparian restoration. In some areas, temporary deer fencing has been an effective tool in restoring vegetation by limiting human and animal traffic. River herring runs continue to improve dramatically in response to improved fish passage over existing dams.

Watershed stakeholders include, but are not limited to the Mianus River Watershed Council, Greenwich, Stamford, Mianus River Greenway Alliance, SWRPA, Aquarion, and Mianus River Gorge Preserve. The draft EPA approved Watershed Based Plan will be available in 2011.

Mill/Rippowam River

The Mill/Rippowam watershed is located in Stamford, Connecticut. The major issues in this watershed include the Mill River Restoration Project. The City of Stamford has essentially completed a major construction project to restore a more natural riparian condition and mitigate flooding in the lower end of the Mill River, in cooperation with the US Army Corps of Engineers. Bulkheads have been removed, two dams breached, and streambank slopes restored and managed for multiple uses. The City has also been working on a watershed plan to address water quality and stormwater and numerous other issues related to reconnecting the City's residents with the riverfront. Baseline data collection and analysis has been completed with funding from a STAG grant. Watershed stakeholders include, but are not limited to Stamford, the Mill River Collaborative, and the US Army Corps of Engineers. The Rippowam/Mill River Watershed Plan finalized an annual report in 2010.

Noroton River/ Holly Pond/Goodwives/Stoney/Tokeneke Rivers/Gorham's Pond

The Noroton River/ Holly Pond/ Darien River watersheds are located in Stamford, Connecticut. Goodwives/ Stoney/ Tokeneke Rivers/ Gorham's Pond watersheds are located in Darien, Connecticut. Major issues in these watersheds include flooding, sedimentation of impoundments, and NPS pollution.

Watershed stakeholders include, but are not limited to Stamford, Darien, SoundWaters, the Darien Land Trust, and the Friends of Goodwives River. The stakeholders continue efforts to improve water quality in the Goodwives River.

Five Mile River

The Five Mile River watershed is located in New Canaan, Norwalk and Darien, Connecticut. Major issues in the watersheds include flooding, erosion and sedimentation, water quality issues from point and nonpoint source pollution, treated effluent dominated in late summer, and development of a draft watershed-based plan in 2011.

Watershed stakeholders include, but are not limited to Norwalk, New Canaan, Darien, Friends of the Five Mile River, West Norwalk Association and Harbor Watch – River Watch.

Norwalk / Silvermine / Comstock Rivers

The Norwalk/Silvermine/Comstock River watersheds are located in the Connecticut towns of Norwalk, Wilton, New Canaan, Weston, Ridgefield, Redding and Lewisboro, New York. Major

issues in the watersheds include flooding, erosion and sedimentation, and water quality issues including nutrients from Publically Owned Treatment Works (POTWs) and pathogens from nonpoint source pollution.

The river's flow can be strongly influenced by treated wastewater effluent in late summer. There is an industrial legacy and zinc accumulation in sediments may have some effect upon aquatic life use support. Volunteer water quality monitoring has been active and has led to correction of many pollution sources. A bacterium Total Maximum Daily Load (TMDL) has been written and is being implemented with the assistance of the municipalities and the Norwalk River Watershed Initiative. CT DEEP has undertaken a stressor analysis study focusing on nutrients and dissolved oxygen, and the role of wastewater discharges and impoundments on water quality and aquatic life use support. Citizen's water quality monitoring and a part time NRWI Watershed Coordinator continue despite the loss of State funding. Management of excess non-migratory Canada Geese has been identified as a priority project and funded by CT 319 funding. The goals are twofold: egg oiling and educating people to not feed geese. Two dam removal projects are being planned on the Norwalk River. Engineering design and permitting will be completed by NRCS, under contract to CT DEEP, at Merwin Meadows Dam in Wilton. A similar design project at Flock Process Dam in Norwalk has been delayed due to funding problems.

The South West Regional Planning Agency has initiated a project to update the Norwalk River Watershed Initiative's Action Plan to comply with EPA's nine element format for watershed-based plans.

Watershed stakeholders include, but are not limited to the Norwalk River Watershed Initiative, Norwalk River Watershed Association, Harbor Watch/River Watch, Trout Unlimited, Norwalk Maritime Museum, Norwalk, Wilton, New Canaan, Ridgefield, Redding, Weston, Lewisboro, Southwest Conservation District, South Norwalk Water and Electric, and SoundKeeper.

Saugatuck / Aspetuck Rivers

The Saugatuck and Aspetuck River Watersheds are located in Westport, Weston, Easton, Redding, Newtown, Wilton, Fairfield, and Danbury, Connecticut. Major issues in the watersheds include land preservation, water quality, NPS, shellfish, water diversions and low flow, citizens monitoring, goose management, and The Nature Conservancy-Aquarion Low Flow Reservoir Management Model.

The Saugatuck River Watershed Partnership has had success with municipal support for its Conservation Compact. Several watershed workshops have been held focusing on stormwater and nonpoint source pollution. Citizen's water quality monitoring has been successfully implemented in both the Saugatuck and Aspetuck River watershed.
Watershed stakeholders include, but are not limited to the Saugatuck River Watershed Partnership, The Nature Conservancy, Harbor Watch/River Watch, Aquarion, Westport,

Fairfield, Weston, Newtown, Wilton, Fairfield, Ridgefield, Danbury, Easton, Trout Unlimited, Land Trust, USGS, Highstead Arboretum, SouthWest Conservation District, and Soundkeeper.

Sherwood Mill Pond

Sherwood Mill Pond is located in the town of Westport, Connecticut. The Town of Westport and Harbor Watch River Watch have been actively seeking out bacteria sources through Citizen's Water Quality Monitoring efforts to supplement efforts by the Westport-Weston Health District.

Watershed stakeholders include, but are not limited to Westport, Harbor Watch/River Watch, and the Westport-Weston Health District.

Sasco Brook

Sasco Brook watershed is located in the town of Westport, Connecticut. Major issues in the watersheds include water quality, citizens monitoring, NPS pollution, goose management, hobby farms/animals, watershed-based management plan, and the bacteria TMDL.

Nonpoint source management continues to be a primary concern. Education of horse owners to use best management practices for manure management has been successful. The identification of outfalls that serve areas where septic systems may fail continues. Watershed stakeholders include, but are not limited to Westport, Fairfield, Sasco Brook Water Pollution Abatement Committee, HarborWatch/Riverwatch, SouthWest Conservation District, Natural Resources Conservation District, and the CT Department of Agriculture Aquaculture Division. The stakeholders will finalize an EPA approved Watershed Based Plan in 2011.

Mill River

The Mill River watershed is located in the towns of Fairfield, Easton, Trumbull and Monroe, Connecticut. Major issues in the watersheds include water quality, water quantity, lead and bacteria TMDLs, and riparian restoration.

The Mill River Wetland Committee continues to work on educational programs in schools. Other organizations such as the League of Women Voters and the Fairfield garden clubs have taken an active role in public education and outreach, as well as riparian restoration and invasive species control at local parks and dedicated open spaces.

Watershed stakeholders include, but are not limited to Fairfield, RiverLab / Mill River Wetland Committee, Fairfield Garden Clubs, and the League of Women Voters.

Ash Creek / Rooster River

Ash Creek and Rooster River watersheds are located in the towns of Bridgeport and Fairfield, Connecticut. Major issues in the watersheds include water quality, CSOs, riparian restoration and preservation, and the bacteria TMDL. Watershed stakeholders include, but are not limited to the Ash Creek Conservation Association and the Connecticut Conservation Association.

Pequonnock River

The Pequonnock River watershed is located in the towns of Bridgeport, Trumbull and Monroe, Connecticut. Major issues in the watersheds include water quality from point and nonpoint sources, as well as combined sewer overflows, riparian and habitat restoration, flooding, and a watershed-based plan.

The collaborative effort among Trumbull, Monroe and Bridgeport continues as the three work to develop a watershed-based plan. Interest in organizing a Pequonnock River Watershed Partnership has been strong. A Citizen's Water Quality Monitoring program has been designed and implemented by Harbor Watch/River Watch.

Watershed stakeholders include, but are not limited Save the Sound, Bridgeport, Harbor Watch/River Watch Trout Unlimited, USDA/NRCS, and Beardsley Zoo.

Housatonic Major Basin -

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

Housatonic Mainstem Regional Basin

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

To date, the major issues affecting water quality of the Housatonic River in Connecticut have revolved around eutrophication, dissolved oxygen levels and PCBs. The first two issues are primarily associated with the three lower impoundments on the river – Lake Lillinonah, Lake Zoar and Lake Housatonic. It has been found that excessive amounts of phosphorus from upstream sources are causing serious algal blooms in these lakes. Reduction in phosphorus levels at upstream wastewater treatment plants, as well as the disappearance of some point sources, helped to lower nutrient levels and improve water quality for a period of time. However, eutrophication problems persist, particularly in Lake Lillinonah, and CT DEEP has been supporting studies, and working with communities and other stakeholders in an effort to better understand and address this issue.

The Housatonic PCB issue was first identified in the late 1970's and is primarily associated with releases from the General Electric Company (GE) facility in Pittsfield, MA. As a result of a Consent Decree, approved by the U.S. District Court in October 2000, involving GE, U.S. EPA and other federal entities, the State of Connecticut, Commonwealth of Massachusetts and City of Pittsfield, a collaborative clean-up of PCBs in the most heavily contaminated portions of the river (close to the GE facility) is underway. In-river remediation activities are being addressed in three distinct phases known as: the ½ mile (on the East Branch of the Housatonic, immediately adjacent to and downstream of the GE facility); the 1 ½ mile (on the East Branch of the Housatonic, commencing immediately below the ½ mile and ending at the confluence of the East and West Branches); and Rest of River (from the confluence of the East and West Branches which form the mainstem of the Housatonic, down through MA and CT to Long Island Sound). Remediation of the ½ mile and 1 ½ mile sections were completed in 2002 and 2007 respectively. Determination of whether clean-up in Rest of River will occur and to what extent is a multi-step process that is currently underway.

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

During 2010:

- As part of Rest of River Investigation under the Housatonic GE PCB Consent Decree Process, GE submitted a "Revised Corrective Measures Study Report" (Revised CMS) to EPA in October 2010. The Revised CMS includes two additional clean up alternatives, besides those previously submitted as part of the original CMS. Next, EPA will review

the proposed cleanup alternatives in the Revised CMS against nine criteria, and develop a preferred remedial alternative or set of alternatives, which will then be released for formal public comment.

Naugatuck Regional Basin

The Naugatuck River is the largest tributary of the Housatonic River, with a watershed of approximately 311 square miles incorporating 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 reputation as one of the most polluted in the state and country, it has been recovering as a result of restoration efforts by CT DEEP and other stakeholders initiated in the late 1960s. While initial efforts focused on eliminating or reducing gross point source pollution, more recent efforts have involved advanced wastewater treatment, NPS management, and fish habitat restoration. Based on a wasteload allocation analysis completed by CT DEEP in 1988, five of the six major municipal wastewater treatment facilities were upgraded to advanced treatment between 1992 and 2001, and the sixth was linked to the renovated Waterbury facility. In conjunction with the upgrade of the Waterbury wastewater treatment plant, 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 and water quality monitoring. In 1998-99, a fish ladder was constructed at the Kinneytown Dam, the southern-most dam on the river, as a condition to issuance of a federal hydropower license. In 1999, four dams on the Naugatuck were removed or breached (Freight Street, Platts Mill, Union City, and Anaconda). In 2004, the Chase Brass Dam on the Waterbury/Watertown section of the river was removed by the City of Waterbury. Plans are currently underway to construct fish passage around Tingue Dam in Seymour. This will leave just the Plume and Atwood Dam in Thomaston as the only remaining fish passage barrier on the Naugatuck below the Thomaston Flood Control Dam. If and when the Plume and Atwood Dam is eventually removed, over 30 miles of the lower Naugatuck River up to the Thomaston Flood Control Dam will be opened for anadromous fish passage.

Although much improved, water quality issues continue to plague the Naugatuck River from both point and nonpoint sources. In 2005, a TMDL was finalized for the Upper Naugatuck in the Thomaston area for water quality impacts linked to cumulative wastewater discharges from multiple industrial point sources affecting aquatic life. In 2008, a regional TMDL covering most of the Naugatuck River and several of its major tributaries was finalized for bacteria from both point and nonpoint sources, impacting recreational uses. In 2000, a TMDL was finalized for Steele Brook, a major tributary, for copper from point and nonpoint sources, impacting aquatic habitat. In June 2009, NRCS completed an EPA 9-element Watershed Based plan for Steele Brook for CT DEEP, focusing on iron precipitate and bacteria impairments below Heminway Pond Dam in Watertown.

Despite on-going challenges, water quality has none-the-less improved to a point where communities and recreationalists are turning back to and embracing river. After pursuing and obtaining official "State Greenway" designation for the Naugatuck River, regional planning organizations and many municipalities have created or are actively planning greenway trails. In recent years, a downriver canoe and kayak race between Waterbury and Beacon Falls has become a popular annual event. Meanwhile, CT DEEP Inland Fisheries has expanded its fish-stocking program of trout and broodstock salmon on certain sections of the river, and has designated two Naugatuck mainstem sections - from the confluence of the East and West Branches in Torrington to Route 118 in Harwinton and Litchfield; and from the Thomaston Dam to the Kinneytown Dam in Seymour - as a Trophy Trout Stream. The section in-between - from Route 118 to the Thomaston Dam - has been designated as a Trout Management Area.

In 2010:

- The Town of Watertown entered into contract with CT DEEP for a 319-funded dam removal design project for Heminway Pond Dam. This is the next step in implementing recommendations in the 2009 Steele Brook Watershed Based Plan. CT DEEP believes that increasing flows through this section of Steele Brook will address water quality impairments associated with iron precipitate that forms below the dam during periods of warm weather and low flows which impact aquatic life and habitat.

- The Northwest Conservation District (NCD) submitted final designs for retrofitting two failed stormwater basins associated with Highwood Estates, an older subdivision in Thomaston, which drain to Northfield Brook Lake. This 319 funded project is the "next step" in implementing recommendations in the mini-watershed based plan which NCD completed for Northfield Brook in 2009. Northfield Brook Lake, and the dam associated with it, are part of an U.S. Army Corps of Engineers (ACOE) flood control project and recreational area. This water body is impaired for recreation due to high bacteria levels, and ACOE has been forced to close the swimming area at Northfield Brook Lake frequently in recent years. The subdivision is located in close proximity to the lake and has been identified as a probable source of bacteria. By retrofitting the stormwater basins so that they will function properly, it is anticipated that the bacteria loading to the lake will be greatly reduced.

Pomperaug Regional Basin

The Pomperaug River drains a 90 square mile area, located primarily within the towns of Bethlehem, Woodbury and Southbury, and flow into the Housatonic River at the upper end of Lake Zoar. The northern part of the watershed has remained 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 contains a sizeable stratified drift aquifer, portions of which are used for public water supply by three different water

companies. 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. In response to these concerns, the Pomperaug River Watershed Coalition (PRWC) engaged the USGS to develop a precipitation runoff model to characterize groundwater recharge and streamflow throughout the basin. PRWC is using this model, as well as other information, to encourage and assist watershed municipalities in making scientifically based land uses decisions.

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. Transylvania Brook, a tributary to the Pomperaug, is impaired by contamination caused by discharges from the state-operated Southbury Training School wastewater treatment plant. In 2001, CT DEEP established and EPA approved a TMDL for phosphorous, ammonia, chlorine, copper, and zinc, and CT DEEP reissued a discharge permit with more stringent limits for these pollutants to help meet water quality standards in Transylvania brook. CT DEEP has been working with the Town of Southbury on plans, and is now moving forward to construct a pipeline to redirect the wastewater flow from the Southbury Training School to the Heritage Village wastewater treatment plant on the Pomperaug mainstem which has the capacity and is better equipped to treat the discharge.

CT DEEP Inland Fisheries has designated the entire Pomperaug River in Woodbury and Southbury as a Trophy Trout Stream.

In 2010:

- With assistance from the 319-funded Watershed Assistance Small Grant Program, the Pomperaug River Watershed Coalition expanded its website to include a “Protect Your Watershed” resource center, disseminated an educational brochure on septic system function and maintenance for watershed residents, and held a series of watershed workshops on topics ranging from watershed basics to buffers, rain gardens and other water-friendly landscaping practices.

Connecticut Major Basin

Farmington Regional Basin

The Farmington Regional Watershed covers 607 square miles in two states, including sixteen Connecticut towns (Avon, Barkhamsted, Bloomfield, Bristol, Burlington, Canton, Colebrook, East Granby, Farmington, Granby, Hartland, New Hartford, Simsbury, West Hartford, Windsor, and Windsor Locks). Beginning in the rural Berkshire Mountains in Massachusetts, flowing through the Connecticut highland region and Farmington Valley, then out to the Connecticut River in

Windsor; it provides 100% of the drinking water for over 600,000 people living in the Greater Hartford area and the Farmington Valley. The main stem of the Farmington River and the West Branch flows for 81 miles, and overall receives over 35 million gallons per day of treated wastewater from 9 publicly owned sewage treatment plants. The watershed is two-thirds forested, with equal amounts of agriculture and development, and supports abundant recreational opportunities; unique fish, wildlife, and plant habitats; hydropower generation; and was the first River in Connecticut to have a section federally designated as Wild & Scenic. This Wild & Scenic designation applies to a portion of the West Branch and the Upper Farmington mainstem. A separate Wild & Scenic designation is currently being sought for eligible sections of the Lower Farmington mainstem. (More information on these existing and proposed designations below.) The Farmington River is considered one of the premiere trout-fishing streams in the East.

West Branch & Upper Farmington - The Farmington River Coordinating Committee (FRCC), the stakeholder group (consisting of the National Park Service, CTDEP, Metropolitan District Commission (MDC), Farmington River Watershed Association (FRWA), the towns of Hartland, Barkhamsted, New Hartford, Canton and Colebrook, and the Farmington River Anglers Association) oversees the implementation of the Upper Farmington River Management Plan for the Wild & Scenic section which is non-regulatory and advisory only. With funding from the National Park Service, FRCC helps support projects within the Upper Farmington river corridor and watershed, aimed at conserving and enhancing natural and cultural resources – including improving water quality in the Farmington River and its tributaries. On-going FRCC water resource related projects in 2010 include: water quality monitoring, vernal pool identification and mapping, and development of plans for the Greenwood Anglers Trail to redirect foot traffic away from eroding banks along the Farmington River, on a MDC property popular among anglers.

Lower Farmington - The Lower Farmington River and Salmon Brook Wild & Scenic Study Committee was approved by Congress in late 2006 to determine the eligibility of these waterbodies for possible federal Wild & Scenic designation by the National Park Service (this study area is a continuation from the existing federally designated 14-mile segment of the Farmington River, downstream to the Rainbow Dam and includes both branches of Salmon Brook). Wild & Scenic designation will provide the ten communities (Avon, Bloomfield, Burlington, Canton, East Granby, Farmington, Granby, Hartland, Simsbury, and Windsor) with the knowledge, tools and resources to ensure that growth is approached in a way that is compatible with preserving the region's outstanding resource values. The valuable attributes currently being considered are geology, water quality, biological diversity, cultural landscape, and recreation. Also serving on the Study Committee is CT DEP, the Farmington River Watershed Association, and Stanley Black & Decker.

As part of the Wild & Scenic designation process, a locally supported management plan must be developed to provide for the long-term protection of these valuable attributes. This will provide an invaluable opportunity for the lower Farmington River and Salmon Brook watershed towns to come together, mobilize public participation, and fulfill a locally-shaped vision for

their communities to protect and preserve these highly valuable water resources. The management plan would guide the actions of a locally led coordinating committee which would oversee the plan's implementation (non-regulatory, advisory only), similar to the FRCC above. Work on the management plan, determination of the upper and lower Wild & Scenic boundaries, as well as public education and outreach was ongoing throughout 2010.

In 2010, nps-related projects throughout the Farmington Regional Basin included:

- As part of a 319-funded project to develop a mini-watershed based plan for Morgan Brook, an impaired tributary of the West Branch of the Farmington, the Northwest Conservation District completed a field survey to identify potential sources of bacterial pollution.

- FRWA received assistance from the 319-funded Watershed Assistance Small Grant Program to develop an outreach program to recruit landowners and others in certain portions of the Farmington River watershed to reduce fertilizer and pesticide use. By the end of grant period, twenty-four landowners had pledged to reduce fertilizer and pesticide use on their properties. FRWA will continue to promote this program.

- FRWA also received assistance from the 319-funded Watershed Assistance Small Grant Program to sponsor four full day Land Use Leadership Alliance (LULA) workshops for the ten towns participating in the Lower Farmington River and Salmon Brook Wild & Scenic Study Committee. The purpose of the workshops was to address the need for better coordination and planning on a regional scale with regard to nps pollution management and other land use issues. Input from workshop participants was to be incorporated into the management plan being developed by the Lower Farmington and Salmon Brook Wild & Scenic Study Committee.

- In addition to the on-going water resource related projects described previously, FRCC provided funding to FRWA to support an assessment of the watershed of the Still River, an impaired tributary of the West Branch of the Farmington, to identify likely causes of pollution and potential implementation projects. FRCC also provided funding to the Town of Barkhamsted to work with the Northwest Conservation District on a retrofit design with BMP/LID features to replace a failed stormwater detention basin at Miner Lane.

Pequabuck River Subregional Basin

The Pequabuck River watershed lies in the Central Connecticut Valley and collects drainage from both the Poland River and Coppermine Brook Subregional Basins, eventually discharging to the Farmington River. The Pequabuck River watershed alone is 29 square miles, but combined with the Poland and Coppermine watersheds totals nearly 58 square miles. This larger area covers six towns (Bristol, Burlington, Farmington, Harwinton, Plainville and

Plymouth) and has three Water Pollution Control Facilities (WPCF) discharging their effluent into the Pequabuck River. Although there has been a drastic reduction in bacteria and nutrients since the late 1980s, much work still needs to be done to improve the water quality of the river. E-coli bacteria levels still exceed the permissible limit for non-contact recreation and nitrogen is present in a significant amount. The Pequabuck River serves as a water source for various industrial and recreational purposes, as well.

The Central Connecticut Regional Planning Agency and the Pequabuck River Watershed Association rolled out to the general public the Pequabuck River Watershed Management Plan (including the Poland River and Coppermine Brook) which was written with a Section 319 NPS grant.

Park Regional Basin

The Park River's 77 square mile watershed covers the Greater Hartford Area (major towns include Bloomfield, East Hartford, Hartford, Newington, Rocky Hill, West Hartford, Wethersfield and Windsor; also portions of East Granby, Farmington, Glastonbury, Manchester, South Windsor and Windsor Locks). This highly urbanized, largely impoverished and minority community is plagued by Combined Sewer Overflows, Sanitary Sewer Overflows, as well as having its river and stream systems channelized and otherwise altered to convey stormwater, sewer overflows, and flood waters.

The Metropolitan District Commission (MDC) has developed a Long-Term Control Plan to reduce the impact of Combined Sewer Overflow discharges into the Connecticut River from the Park River and Wethersfield Cove. The fundamental purpose of the LTCP is to improve water quality by updating aged sewer infrastructure. Proposed activities include system-wide sewer cleaning assessment, capacity improvements and repairs; 80 miles of sewer separation, new drains and larger sewers; a 2 mile storage tunnel; a 2.5 mile microtunnel; treatment plant improvements to increase capacity and remove nitrogen; and relining and building new pipes to eliminate local overflows.

CT DEEP's Municipal Facilities section is using Supplemental Environmental Project (SEP) funds to address public education and outreach related to combined sewer overflows. These are exacerbated by illicit connections which violate local sewer ordinances; however, in some communities the municipal officials may condone the connections in areas were separate storm sewers do not exist or are not accessible. Educational efforts are needed to find ways to communicate with the public and other officials that these connections are harmful to public health and the environment and to identify the means or enticements to eliminate the illicit connections and prevent future connections from being made. The targeted audience for education may include, but is not limited to, homeowners, building officials, and plumbers.

The Eastern Connecticut Resource Conservation and Development Program (RC&D) has partnered with the USDA Natural Resources Conservation Service, the City of Hartford, Hartford Housing Authority, and Capitol Region Council of Governments (CROG) to design and construct

the Park River Greenway, a 1.8 mile multi-use trail, along the South Branch Park River. This is a component of a $500,000 grant from CT DEEP.

The City of Hartford is sponsoring a bike committee to assess potential bike paths that would connect the Park River Greenway, the East Coast Greenway, and other city routes. The East Coast Greenway is the nation's first long-distance urban trail system; a city-to-city transportation corridor for cyclists, hikers, and other non-motorized users. By connecting existing and planned trails, a continuous, safe, green route 3,000 miles long is being formed linking Calais, Maine at the Canadian border with Key West, Florida. It incorporates waterfront esplanades, park paths, abandoned railroad corridors, canal towpaths, and highway corridors, and in many areas it temporarily follows streets and roads to link these completed trail sections together.

North Branch Park River Subregional Basin

The MDC recently initiated its Clean Water Project to address Combined Sewer Overflows, Sanitary Sewer Overflows, and nitrogen removal. A Supplemental Environmental Project (SEP) in the amount of $140,000 from a civil penalty of $425,000 from a Consent Order between EPA and the MDC, has been reserved for the development of a Watershed-Based Plan (WBP) for the North Branch Park River Watershed for MDC's failure to correct CSOs. The proposed project will primarily take place in the towns of Bloomfield, Hartford and West Hartford. A sum of $72,500 is being held in reserve for yet-to-be-identified project implementation upon completion of the WBP.

The North Branch Park River WBP follows the EPA-approved Clean Water Act Section 319 required Nine Element planning points. The Plan complements the effort to control point sources of pollution by addressing, at a watershed scale, nonpoint source pollution, land use policies and practices, stormwater and river restoration and protection, education and outreach, and implementation to further advance water quality improvements and quality of life. It serves as a potential model for other urban watershed plans and to address the unique challenges and needs of urban rivers and waterways, their value as a natural resource, and their role in improving livability in an urban environment.

The WBP assesses current conditions, identifies threats and opportunities for improvements, fosters stewardship by the community, and serves as a model for other urbanized watersheds. The plan characterizes water and land resource conditions and nonpoint source pollution sources within the watershed. Based on this assessment, the plan estimates the pollution load reductions and improved conditions that can be expected once the plan's management measures are implemented to achieve water quality standards. Besides the measurable water quality improvements, the plan will revitalize an urban river by maintaining and restoring natural systems within an urban environment, and improve public recreation and use. The plan also provides for public education and outreach to inform businesses and residents about nonpoint source pollution, thereby promoting a constituency for sustainable development and

demonstrating the value of collaboratively and cooperatively working on ways to better manage land and water resources.

The Farmington River Watershed Association (FRWA) has "adopted" under its stewardship the contiguous North Branch Park River Watershed and, together with the Park River Watershed Revitalization Initiative, assisted in the development of the WBP.

Hockanum Regional Basin

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

Hockanum River Subregional Basin

The North Central Conservation District (NCCD) received Section 319 NPS and River Restoration grants to construct improvements of stormwater outfalls, bank stabilization, fish habitat enhancement, and river access on the Hockanum River in the Rockville section of Vernon. The project was completed.

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

Tankerhoosen River Subregional Basin

The Friends of the Hockanum River Linear Park of Vernon also received a Section 319 NPS Watershed Assistance Small Grant to review local planning & zoning regulations for reducing imperviousness, as well as a previously receiving a Long Island Sound Futures Fund grant with the Hockanum River Watershed Association to collect and evaluate chemical and biological water quality monitoring data in the Tankerhoosen River Watershed.

They additionally received a LISFF grant to develop a watershed management plan for the Tankerhoosen. This watershed management plan was completed in March, 2009 and can be

found at: http://www.ct.gov/dep/cwp/view.asp?a=2719&q=379296&depNav_GID=1654. In 2010, the plan continued to be a reference for DEEP and municipal staff.

Mattabesset Regional Basin

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

The Mattabesset River Regional Basin has a Total Maximum Daily Load (TMDL) analysis based on indicator bacteria. Achievement of the TMDL is directly linked to incorporation of the provisions of the General Permit for the Discharge of Stormwater from Small Municipal Separate Storm Sewer Systems (MS4) by municipalities, as well as the implementation of other BMPs to address nonpoint sources. Nonpoint sources of E. coli bacteria in the basin include failed collection systems, urban runoff and storm sewers, waterfowl, agriculture, and failed or inadequate septic systems. BMPs for the management of NPS sources include nuisance wildlife control plans, pet waste ordinances, septic system testing and maintenance, and farm animal waste management systems.

The Connecticut River Coastal Conservation District (CRCCD) has been systematically gathering and compiling water quality monitoring data, conducting education and outreach efforts, evaluating watersheds with Stream Walks and Track Down Surveys, designing and implementing stormwater retrofits, providing technical NPS assistance to municipalities, and preparing mini watershed-based plans throughout the Mattabesset Watershed. In addition to numerous Section 319 NPS grants, they received a Long Island Sound Futures Fund Grant to conduct a Comparative Subwatershed Analysis (CSA) of the Mattabesset Watershed as the first step towards developing small watershed restoration plans to address known water quality impairments. Information from the CSA was used to help prioritize subsequent stream corridor assessment and restoration planning efforts. In 2008-2009, Track Down Surveys and mini watershed-based plans were completed in Miner and Swamp Brooks in Middletown as part of these efforts, with nine completed now in total.

Miner and Swamp Brook Local Basins (Middletown)

CRCCD continued their work in Miner Brook. The District identified, eleven high priority restoration areas; and began finding solutions to reducing pollution by encouraging practices to include more frequent street sweeping and catch basin cleanout, storm drainage and road

culvert repair, and watershed-wide landowner education. In Swamp Brook, the district encouraged municipalities to address seven high priority restoration areas that were previously identified. Recommended management measures included stormwater quality retrofits, culvert replacement and maintenance, bank and channel stabilization, channel protection retrofit, stream buffer planting, livestock exclusion, and watershed-wide landowner education and street sweeping and catch basin cleanout.

Coginchaug River Subregional Basin

The Coginchaug River watershed has a drainage area of 28 square miles (predominantly in Middlefield, Durham, Middletown, and Guilford), which is about half undeveloped and the rest equally divided between agriculture and development. The Coginchaug River, a major tributary of the Mattabesset River, begins in N. Guilford and flows northerly to its confluence with the Mattabesset in Middletown, just west of the Connecticut River. Indicator bacteria is the major impairment with suspected sources being agriculture, crop-related sources, intensive animal feeding operations, natural sources, waterfowl, and other unknowns.

The USDA Natural Resources Conservation Service (NRCS) received a Section 319 NPS grant to develop a Coginchaug River watershed-based plan (WBP) to address the Mattabesset TMDL for bacteria and the Long Island Sound TMDL for nitrogen. The WBP was finalized in July 2008 and provides guidance on how to manage, at a watershed scale, nonpoint source pollution, land use policies and practices, stormwater and river protection, education and outreach, and implementation efforts to further advance water quality improvements. The NRCS has assessed current conditions; identifying threats and opportunities for improvements while fostering stewardship by the community.

The WBP characterizes water and land resource conditions and nonpoint source pollution sources within the watershed. Landscape features and characteristics were examined using GIS-based maps to assess the spatial relationships between impairments and land use/land cover types. This analysis then determined the potential for pollutant load reductions related to the impairment, load reduction goals, and other features and benefits essential to sound watershed management and healthy biological conditions in the stream network. The plan describes both “place-based” (site specific) and regional BMPs that will be needed to achieve the load reductions, as well as provide an estimate of the technical and financial assistance funds needed to implement the plan. The plan can be found at:
http://www.ct.gov/dep/cwp/view.asp?a=2719&q=379296&depNav_GID=1654

The Connecticut River Coastal Conservation District (CRCCD) also received a Section 319 NPS grant to work with NRCS and assist with the collection and compilation of data, and community education and outreach efforts associated with development of the WBP. The plan will provide for public education and outreach to inform businesses and residents about nonpoint source pollution, thereby promoting a constituency for sustainable development and demonstrating the value of collaboratively and cooperatively working on ways to better manage land and water resources. The plan satisfies Section 319 NPS guidance while providing broader benefits

to federal and state watershed management efforts in Connecticut and the NRCS Watershed Planning Process.

Salmon Regional Basin

Salmon River Watershed Partnership/Conservation Action Plan and Implementation

In 2010, Project Manager Shelley Green of The Nature Conservancy (TNC) continued coordination through the Salmon River Watershed Partnership and the Advisory Committee. Funding support from seven towns and staff resources from TNC resulted in $217,700 in three years to support the collaborative, science-based work of the Partnership.

The Partnership held three regional Low Impact Development workshops for professionals who design, review or approve land use projects or manage municipal pollution prevention/good housekeeping structures and practices. Participants were selected by town staff based on who most often represents applicants for development projects in each town. Staff from nine towns also participated. Participants visited examples of local subdivisions and were led by consultants and professionals from TNC and University of Connecticut. Links to workshop resources were distributed to the broader Partnership and targeted stakeholders.

The Partnership also provided staff and commissions from two pilot communities with in-depth support from consultants and TNC to advance recommendations from the 2010 *Salmon River Watershed Municipal Land Use Evaluation* report. The town of East Hampton was provided draft revisions to their standards for roads, conservation subdivisions, and parking, with a goal to "level the playing field" between conventional and innovate design from the perspective of permitting requirements and to provide incentives for more environmentally friendly design. The town of Colchester received peer review of a comprehensive land use policy revision (the first in 30 years).

All watershed towns received the draft standards for their own consideration and use. This Partnership work was presented at the 2010 *Connecticut Conference on Natural Resources*. A revised glossy brochure was produced that highlights three land use strategies – LID, minimizing impervious surfaces, and conserving streamside forests. This recent work builds upon an earlier phase 10-town regional conservation compact signing ceremony with full town leader representation.

The Partnership had successfully applied for LISS Futures Fund grant funding to develop the Municipal Land Use Evaluation (MLUE) project to provide information to the participating towns on tools and practices to accomplish several recommendations (especially being proactive watershed health and cool- and cold-water stream habitats) contained in the 2007 Conservation Action Plan, and targeted land acquisition negotiations with DEEP, TNC, local land trusts, and the Salmon watershed towns. A RFQ was issued, and the primary deliverables were a report that provides a detailed audit of municipal plans, policies, and practices related to conserving the integrity of watershed resources (e.g. stormwater management, impervious

cover, forest cover, wetland regulation upland review areas.) It also included a set of specific recommendations to each of the watershed municipalities. The Advisory Committee provided consensus towards strategic actions from the 2007 Conservation Action Plan, now updated to reflect progress to date and to articulate a series of next steps.

Lastly, the Partnership recruited 60 volunteers from a wide range of interest groups to sample water quality in watershed streams on a single day in September. DEEP and Connecticut River Coastal Conservation District provided training and coaching in the field.

Eightmile Regional Basin

Eightmile River Wild and Scenic Coordinating Committee In 2010, the Eightmile River Wild and Scenic Coordinating Committee (ERWSCC) continued with Program Director Pat Young providing part-time coordinating assistance to implement the watershed management plan through Committee and four subcommittee work plans. Accomplishments included securing federal funding with the regional Partnership Rivers program in a particularly challenging federal fund appropriations year.

Under the management goal of land conservation and open space, the Committee continued to identify key parcels for conservation and worked successfully with Haddam Land Trust that resulted in a DEEP Open Space grant for the 284 acre Dean property and the 116 acre Harris property, both in East Haddam, and a 40 acre Sterling Hill Road property with Lyme Land Trust in Lyme.

The Protection and Management subcommittee contacted all three watershed town community leaders to remind them of the federal Wild and Scenic designation, the approval and local responsibilities of implementing the Watershed Management Plan, and a briefing of the upcoming Stormwater Management Priorities project that will support local town DPWs. The subcommittee was awarded a Long Island Sound Futures Fund grant to initiate the watershed-wide Stormwater Management Priorities project (no watershed town currently regulated under the Phase 2 MS4 General Permit but could be in next permit cycle). The subcommittee also sponsored a Stream Crossing Guidance workshop, led by a DEEP Inland Fisheries biologist, for area town staff and commissioners to learn about the new Connecticut guidance and integration with the existing Massachusetts guidance (recommended for use in the Watershed Management Plan).

The Science and Monitoring subcommittee initiated a bacteria monitoring investigation of a recently impaired section of the Eightmile River, including consulting with DEEP Water staff on QAPP guidance and monitoring plan details in support of an eventual bacteria TMDL. They also collaborated with US Fish and Wildlife Service and The Nature Conservancy to initiate a local Invasive Species Management Area. The subcommittee received and reviewed a long awaited report on eight years of volunteer-based stream benthic invertebrate surveys conducted throughout the watershed.

The Education and Outreach subcommittee sponsored a riparian buffer demonstration planting on a well-worn riverside section of Devils Hopyard State Park, assisted the Lyme Consolidated School with a watershed study unit and collaborative art project, as ran a strongly attended Eightmile RiverFest event with educational displays and outreach programs.

The Site Plan Review subcommittee did meet with representatives of CT Department of Transportation to review and comment on the proposed Route 82/85 roundabout project with potential stormwater impacts to the nearby Harris Brook, a federally designated Wild and Scenic river segment.

South Central Coast Major Basin

Quinnipiac Regional Basin

The Quinnipiac Regional Watershed covers an area of 165 square miles, located in 12 towns (Bristol, Cheshire, East Haven, Farmington, Hamden, Meriden, New Britain, New Haven, North Haven, Plainville, Southington, and Wallingford). The Quinnipiac River flows 38 miles southward from the Plainville—New Britain border and enters Long Island Sound from New Haven Harbor. The watershed is heavily urbanized and faces several problems including stormwater discharges, contaminated sediments, habitat degradation, low flows during summer months, and flooding. Nonpoint source pollution in the watershed caused by stormwater runoff has led to the listing of the Quinnipiac main stem and several tributaries on the DEEP's *List of Connecticut Waterbodies Not Meeting Water Quality Standards.* In June 2008, a Total Maximum Daily Load Analysis was developed for the entire basin to address excessive levels of indicator bacteria.

QRWA Business Outreach Program

The Quinnipiac River Watershed Association (QRWA) has received several Section 319 NPS grants for outreach projects aimed at engaging the public and identifying NPS pollution through numerous streamwalks throughout the basin. As a result of their multi-year efforts, they have compiled a database of volunteers' observations and have provided recommendations to the towns for stream restoration. In an effort to educate river-side residents and municipalities about managing their land in ways that would help the Quinnipiac improve as a community resource, QRWA completed a §319 Grant funded outreach campaign in 2008, focused on municipalities and landowners. QRWA continued to build capacity in 2010 in an effort to gain ground for a larger initiative in the near future.

In 2009, QRWA utilized §319 NPS funds to conduct a business outreach project in the Quinnipiac Basin. The campaign included the distribution of Best Management Practices (BMP) materials to businesses, recruitment of business pledges to follow BMP's, and general information about the project to QRWA volunteers and members, the media and the community. Project partners included US EPA, CT DEEP, CT NRCS, The Community Foundation for Greater New Haven, and the QRWA Board of Directors, interns and members.

Consider the Quinnipiac Travelling Photography Exhibit

Sponsored by funding from the Quinnipiac River Fund, the *Consider the Quinnipiac* exhibit features 150 photographs that showcased both the beauty and the pollution problems on the Quinnipiac River. The exhibit was intended to inspire people to appreciate the river and its beauty, while moving them to take action to help protect it—including alleviating nonpoint source pollution. In 2009-10, the exhibit travelled to New Haven, North Haven, Wallingford, Meriden, and the State Capital Building.

Quinnipiac River Subregional Basin

Wallace Dam

Wallace Dam is the first dam from Long Island Sound along the Quinnipiac River. A second breached dam in Wallingford is passable by anadromous fish and a fish ladder has been constructed at a third dam in Meriden. After these three impoundments, the river is open to fish passage up to the Town of Southington. In 1999, The Quinnipiac River Watershed Association (QRWA) received a Section 319 NPS Grant to arrange for a transfer of land to allow a fish ladder to be built at the dam and to contract an engineering service to document existing conditions and provide a final design and specifications for the fish ladder. After several years of extensive negotiations, the landowner transferred their portion of ownership of the dam to the town of Wallingford, giving the town 100% ownership of the dam. The town is supportive of the project. Complete removal of the dam is not feasible due to third party water rights. A contractor completed design and specifications for the fish ladder. With guidance from CT DEEP Fisheries, construction drawings and project costs for a number of design variations were developed. CT DEEP submitted the project for American Reinvestment and Recovery Act (ARRA) funding in May 2009. Save the Sound submitted an application for a General Dam Repair Permit from DEEP's Inland Water Resources Division in Spring 2010. Construction will be overseen by Save the Sound and it is anticipated that the project will be put out for bid in Winter 2010 with construction planned for Spring 2011. After completion of the project, the Town of Wallingford will retain ownership of the fish ladder but daily operation and maintenance will be overseen by QRWA and DEEP Inland Fisheries Division.

Wharton Brook Subregional Basin

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

Chatfield Hollow Brook Subregional Basin

The Connecticut River Coastal Conservation District (CRCCD) received a Section 319 NPS grant to develop and implement a pet waste education and clean-up campaign at Chatfield Hollow State Park to reduce excessive bacteria. Five pet waste stations were installed, along with signage and distribution of various educational materials specifically designed for this purpose. The final report indicated that the project was successful in changing the behavior of some park visitors and in raising awareness of why dog waste is a nonpoint source pollutant. In particular, a critical aspect contributing to the success of this project was the personal interactions between CRCCD staff and park users. Printed educational materials were of great value but personal interactions proved most effective in educating park users about the link between uncollected dog waste and environmental health. The TMDL only requires a 5% reduction in bacterial loadings, therefore compliance by only a small number of visitors could make a large difference. The CT DEEP plans to continue efforts to reduce dog waste as a nonpoint source pollutant in this park.

West River Subregional Basin

West River List Serve

Yale School of Forestry and Environmental Studies is facilitating local stakeholder interests in improving the water quality of the urbanized sections of the West River in New Haven/West Haven. Long lists of notable individuals and experienced entities have participated, leading to the creation of a West River list serve for communication among stakeholders.

West River Watershed Youth Council

The West River Watershed Youth Council (WRWYC) was formed in 2009 with a mission to educate and promote water conservation and the importance of community awareness and involvement in stewardship for protection of the West River. In 2009, WRWYC participated in Project WET certification. The group also offers paid and volunteer opportunities to assist teens in becoming informed stewards of their local community through mentoring, hands-on learning, restoration and stream monitoring.

Thames River Major Basin

The Thames Major Drainage Basin comprises nine regional drainage basins: Thames Main Stem, French, Five Mile, Moosup, Pachaug, Quinebaug, Shetucket, Natchaug, Willimantic and Yantic. The upper reaches of the Quinebaug River and the French River are located in south-central Massachusetts, and smaller percentages of the French, Fivemile, Moosup and Pachaug basins originate in neighboring Rhode Island. The northern half of the basin is relatively rural, characterized by small towns, farmland and forest. However, a variety of pressures have caused the disappearance or further segmentation of many farms and privately-owned forest lands. In 1994 Congress designated the Quinebaug and Shetucket Rivers Valley National

Heritage Corridor, whose mission is to preserve the significant natural and cultural resources of the 35-town region while encouraging compatible economic development. The southern half of the basin trends to more urbanized and industrial land uses where urban re-development and suburban expansion has occurred. Recent development and multiple expansion phases of two Tribal Nations casino resorts have created a national tourism destination area and a new force as regional employers. An international pharmaceutical corporation developed its global research and development headquarters and transferred thousands of employees new to the region. The greater Thames River watershed includes one of Connecticut's leading tourism destination areas – the Mystic River with Mystic Seaport and Mystic Aquarium as anchors – attracting hundreds of thousands of people throughout the region and East Coast every year. The basin's proximity to urban areas of Hartford, Springfield, Worcester and Providence has increased residential and commercial development pressures not seen in several decades. A few regional distribution centers (food and home improvement stores) have been constructed or expanded within the basin in recent years. A large-scale re-development proposal for the former Norwich State Hospital property in Preston and Norwich, associated road/rail/ferry transportation improvement proposals in Norwich and New London, and regional water supply planning and distribution systems in southeastern Connecticut are recent additions to the myriad regional development pressures not seen in decades.
Significant accomplishments in 2010 included the following:

French River Regional Basin

In 2010, The Town of Thompson Together coalition, along with the Massachusetts-based French River Connection and other watershed stakeholders, continue action strategy development for water quality and watershed issues along the French River, and across State boundaries. Existing state and federal agency water monitoring data continues to be shared. CT DEEP provided Section 319 NPS funds to the Quinebaug-Shetucket Heritage Corridor Water Subcommittee Coordinator to fund necessary water quality equipment for a citizen monitoring project in Thompson, CT, while the Coordinator also obtained funding support for the Commonwealth of Massachusetts to obtain water quality monitoring equipment for citizen monitoring work in the Dudley, Oxford and Webster, MA communities within the French River watershed. Data collected within Thompson was provided to CT DEEP Water Monitoring program for integration in the Connecticut 2010 Integrated Water Quality Assessment report.

Quinebaug River Regional Basin

Town of Putnam:

The Town received a CT Recreation Trail Grant award and a grant from The Last Green Valley, Inc. to execute a conservation and access easement agreement that will include trail improvements for a mile-long, privately owned segment of the Airline Trail. Interpretive signage and trail drainage/regarding of the abandoned rail bed will improve local drainages to

the Quinebaug River and provide a vital recreational link in the regional Air Line Trail and the East Coast Greenway, leading in and out of Putnam.
The Town also secured a CT Small Town Economic Assistance Program (STEAP) grant. Part of the grant provided for improvement of a cartop boat launch at Simonzi Park on the Quinebaug River. An additional STEAP grant award portion was dedicated to assessing shoreline erosion due to recent flooding events, as well as stormwater runoff degradation from the popular Simonzi (town) Park and River Trail along the Quinebaug River. The Eastern CT Conservation District and a regional engineering consulting firm were contracted to develop a hazard mitigation plan and possible water quality restoration project. In 2011 the town will likely enter into development of a regional hazard mitigation plan to access technical and financial assistance from FEMA and other agencies to address these problems. There may be roles for the Watershed/NPS program, as well as the Stormwater Permitting and Enforcement program, to offer to town leaders.

Cargill Falls Mill, Putnam

DEEP programs completed a Stage I Site Review of the above referenced project. Given that the project involves redevelopment of a brownfield site in an urban area, it is expected that a properly prepared plan would not be inimical to the planning program objectives of DEEP. Revised study plans for hydroelectric power generation on-site have been submitted by the applicant outlining the parameters to be assessed in studies of these issues.

The Department reviewed these study plans submitted additional comments in 2010. Overall, it is anticipated that any environmental resource issues associated with development of a hydropower project at this site will be resolved in the FERC license exemption process. Among the issues DEEP identified requiring further study were: minimum flow release, downstream fish passage, upstream eel passage, recreational amenities and various project design elements including turbine type, tailrace design and trash rack design.

Overall site redevelopment plans were encouraged to incorporate appropriate analysis of the water quality assessment, site design elements and best management practices to minimize urban stormwater quality and quantity impacts to the receiving Quinebaug River, following the *2004 Connecticut Stormwater Quality Manual.* In order to reduce the impact of development and address stormwater quality issues, the Department strongly encouraged the appropriate uses of Low Impact Development (LID) measures on this site.

The water supply issue must be resolved and the plan must also insure that remediation will be accomplished in accordance with regulations as well as provide appropriate recreational amenities and proper mitigation for potential stormwater impacts. DEEP's Inland Water Resources Division is working with the Putnam Water Pollution Control Authority to revise a Consent Order that will resolve the unauthorized diversion from the nearby Little River and could lead to supporting additional water service to this redevelopment project. Confirmation of the acceptability of the plan can be accomplished during CEPA review, if a document is prepared for this project, or during the Stage II Plan Review. The Department also encouraged

the expansion of the Putnam River Mills Heritage Trail to be included in Phase I. The Department's former River Management Program had provided technical support for development of another trail, the 1.3 mile Putnam River Trail, back in the mid 1990s.

A new pedestrian linkage from the Cargill Falls Mill complex would complement the existing Heritage Trail and River Trail system. DEEP further recommended site redevelopment planning should also provide for linkage to the nearby Little River State Greenway, designated by the Governor's Greenway Council in 2006. The Council's designation announcement highlighted the potential to link to other trails such as the River Trail in Putnam. The Quinebaug River floodplain resource area should be conserved for effective long term flood management objectives, while appropriate public access from land should be considered to introduce mill complex visitors and others to the Little River Greenway, at a minimum through an information kiosk, and possibly an extension of the proposed trail. Future plans by the Town of Putnam and partnering organizations may be able to develop appropriate public linkages to the upper components of the Little River Greenway.

Eastern Connecticut Conservation District (ECCD)

The Eastern CT Conservation District continued to cooperate with DEEP's Wildlife Division to monitor management efforts with the Phragmites control areas in Roseland Lake, Woodstock, tied to a completed water quality management plan for the broader Muddy Brook watershed. The project has promoted significant landowner and general public re-connections to the lake.

In 2010, DEEP staff developed two funding agreements with local partners to augment the *Muddy Brook et al* watershed report . A dairy farm operation will benefit from technical assistance by the USDA NRCS and the Eastern Connecticut Conservation District to address a silage leachate discharge that impacted aquatic life use support in the downstream North Running Brook. Elsewhere in the town of Woodstock, the Conservation District will pursue rain garden and vegetated riparian buffer installations in high visibility locations with an associated outreach campaign.

Quinebaug/Shetucket/Thames/Niantic River Watershed Integrated Pest Management (IPM) and Nutrient Loading Demonstration Project

Partially supported with a Section 319 NPS grant, University of Connecticut Department of Plant Sciences and Cooperative Extension Service continued in 2010 to recruit IPM project cooperators in several agricultural commodity areas. The primary goal of this project was to reduce the use of pesticides and nutrients within the Quinebaug and Shetucket River watersheds that may pose a critical threat to aquifers and surface waters. This was accomplished by in-depth educational training programs for agricultural producers and green industry professionals.

Training was implemented in the Quinebaug and Shetucket River watersheds in the following commodity areas: vegetable crops, fruit crops, nursery crops, greenhouse crops, field corn and

turf grass. Depending on the commodity or clientele group, IPM education consisted of on-site demonstration projects, individual and group training sessions, twilight meetings, season-long consultations and meeting presentations. The programs provided recommendations for best management practices, particularly to reduce high-environmental-risk pesticides (e.g. those with high leaching potential) and excess nitrogen applications.

The Nutrient Management component included the use of the Presidedress Soil Nitrate Test (PSNT). The soil testing was conducted by staff of the Eastern Connecticut Conservation District. Nitrate analysis and nutrient recommendations were provided by Dr. Tom Morris (University of Connecticut Extension Soil Specialist), and the University of Connecticut Soil Testing Laboratory. Post-season surveys of program participants were used to determine changes in pesticide and nutrient practices as a result of the program.

A total of 10 in-field IPM training sessions were conducted with cooperators during this quarter in the targeted watersheds (lower Thames, Niantic and Coginchaug). The sessions included final visits and seasonal reviews of IPM practices for vegetable, fruit and nursery growers. One farmers was also visited by IPM staff for a Case Study of the Scott's deep zone tillage experiences over the last three years. The case study was published in the Connecticut Crop Talk newsletter and is posted on the UConn IPM website Post-program surveys and reviews of pesticide records were conducted with the targeted growers who participated in the IPM programs during the 2010 growing season. Surveys were designed to determine changes in pesticide loading at participating farms and green industry businesses located in our targeted watersheds. A total of 9 IPM/ICM oral presentations, attended by 232 people, were made at various meetings during this reporting period. IPM displays were presented at three different statewide events attended by 10,200 people. All of these occurred within the Thames Basin.

Woodstock Nutrient Management Feasibility Study

The CT DEEP and Eastern Connecticut Resource Conservation and Development Area, Inc. (ECRCD) coordinated and used Section 319 NPS funding for a feasibility study to evaluate composting or the anaerobic digestion of dairy manure at a regional facility in the Woodstock area, tributary to the Quinebaug River. This area was identified as having surplus dairy manure in excess of what is needed for crop production on the farms that generate the manure. The second project phase included the development of a marketing study and business plan for the Woodstock area.

In 2009, Phase 2 was completed with submission of the Woodstock Anaerobic Digester Business Center Plan (ADBC). The solution was a better fit for the farm business and operations, and has a better opportunity to be implemented and sustained by the farm. In 2010, Eastern RC&D received funding under a Section 319 NPS grant to convert dairy manure fiber into plant growing media as a nutrient removal strategy. The project builds on the findings of the aforementioned Plan. Building on existing research, trials using digestive fiber based potting mixes to grow annuals, perennials and woody plants will be conducted at commercial greenhouse and nursery sites under supervision of the University of Connecticut. There

continues to be an identified need for funding sources to help offset the capital costs of engineering, building, training and start-up of the digester operation.

Fivemile River Regional Basin

Town of Thompson

Quaddick Lake Association was awarded $4,580 from The Last Green Valley, Inc. Partnership grant program to develop water quality educational packets to be delivered by volunteers to all households along Quaddick Lake. The packets address common water quality problems such as runoff from lawn care and car washing, flushing medications, controlling nuisance waterfowl and the spread of invasive species. The packets also included discount coupons from local businesses to help residents with improvement projects such as rain gardens, low flow showers/faucets, and septic system maintenance. The QLA also continued with aquatic nuisance vegetation control with a limnological consulting firm.

Town of Killingly

The town Conservation Commission recently developed an active Water Access Subcommittee as part of a town-wide visioning and growth management workshop. This subcommittee sponsored a successful river cleanup in 2010 within the borough of Danielson , filling up 35 trash bags and other debris totaling more than a ton of trash from the river and its banks. In addition, a series of commission-sponsored family river paddles and a competition river race provided community reconnections for dozens of people back down to their local rivers. The Town continued public outreach and related projects (including a public car top boat launch re-dedication and informational kiosk installation on the Quinebaug River) in 2010. The Town was instrumental in a successful nomination for Connecticut State Greenway designation for the Fivemile River in 2010.

The town planning department conducted local catch basin stenciling in the urban Main and Water Streets section of Danielson following a streetscaping and drainage improvement project. Initial plans to install a street-side stormwater treatment train were temporarily shelved in favor for needed sanitary sewer system improvements in this urbanized village center, which will provide more substantial water quality improvements to the Fivemile River and downstream Quinebaug River. Town staff continues to look for opportunities to incorporate stormwater tree filter installations and other enhanced stormwater management activities in support of improved water quality for these watercourses.

Moosup River Regional Basin

The Borderlands Project, initiated by The Nature Conservancy (TNC) in 2001, focuses on the Pawcatuck Borderlands forests and has since expanded by the Rhode Island Economic Policy Council and basin communities to include 20 towns on the Rhode Island and Connecticut border, and includes the Moosup River basin in Connecticut and Rhode Island.

A research project to identify priorities for ecologically-based land conservation was completed in 2005 with support from a new landscape target initiative of TNC. High priority parcel mapping in this watershed revealed that aquatic habitat ranks strongly in several alternative conservation strategies. The greatest threats to overall health of the area include future development, interruption of free-flowing streams, sewer discharges, roads and associated road runoff. Several headwaters and aquatic buffer areas which are most valuable to protect given these threats, were identified and acquisition methods and agencies were provided. Formation of a bi-state watershed council is encouraged to address these watershed-scale conservation planning priorities.

TNC continued their planning focus in 2007 with a Conservation Area Planning (CAP) exercise for the Thames River basin, highlighting conservation strategies for priority aquatic targets that include the Moosup River. One CAP outcome was the proposal by TNC staff to access settlement funds from the US Fish and Wildlife Service (USFWS) to initiate the removal of the first fish passage barrier on the Moosup at Water Street. In 2009, USFWS approved settlement funding for this project, and entered into an agreement with the Town of Plainfield to remove the pipe, which was successfully removed in late summer of 2010. DEEP had provided technical guidance to the Town in early permitting and approval reviews and site plan design work.

A series of fish passage barriers have been identified along the mid Moosup River in Plainfield that effectively limit some anadromous fish species migration, as well as resident fish movement to varied river corridor habitats. The river corridor is identified by CT DEEP as one of the highest quality cold water fisheries of the Quinebaug River watershed. A preliminary assessment began in 2001-03 as part of a Supplemental Environmental Project proposal by Kaman Aerospace in Moosup. That proposal was revisited in 2006 and 2007 by CT DEEP Watershed Management and Inland Fisheries Division staffs in preparation for a competitive application to the Millennium Power/Quinebaug River Mitigation Management Team Phase 2 program. Seven barriers, including an abandoned water/steam distribution main pipe and several dams of varying construction styles used for water impoundment and/or hydropower generation needs, have been visited, photographed and reviewed for initial design and construction cost estimates to breach or remove the barriers. Tours of this river corridor segment were provided to several other agencies and potential stakeholders. DEEP submitted a formal project proposal for funding assistance (approximately $1.5 million for an 8-10 year project timeline) to the Millennium Project Management in the winter of 2010. In mid-2010, The Millennium Management Team approved the DEEP proposal, allocating $1.5 million for a 10-year project timeline that could remove 6 or more fish passage barriers in this river segment. DEEP Inland Fisheries Division has taken the lead in developing agreements with USDA NRCS and American Rivers, Inc. in pursuit of the multiple barrier removal project. The approval conditions include a requirement for a project evaluation plan and a list of project milestones.

Natchaug River Regional Basin

Several years ago the Naubesatuck Watershed Council completed a Section 319-funded project to develop a river Plan of Conservation (phase 1 data collection). Preliminary data was collected and augmented with late summer streamwalk assessments. A part-time coordinator reviewed action plan options including town-by-town resource plans to address more watershed-based planning and management opportunities. Several multi-town conversations were held to determine priority directions to take and likely partners to include. That process led to a proposal coordinated by the Nature Conservancy–CT Chapter staff, Naubesatuck Watershed Council, Windham Region Council of Governments and CT DEEP to initiate a Natchaug Conservation Area Planning (CAP) in late 2008. This process was based on a successful application within the Salmon River watershed and other locations in Connecticut. It developed a set of focal conservation targets that represent the Natchaug Basin biodiversity, key ecological attributes and measureable indicators, and determination of current and desired status. The process first acquired the support from each of the watershed town's governing bodies. Nonpoint source pollution topical areas included a review of CT DOT and local highway department road operations and management of infrastructure with real and potential degrading impacts to generally high quality water resources in this watershed.

The Green Valley Institute coordinated development of a watershed-wide Natural Resources Inventory, linked to a co-occurring resource analysis tool to identify key parcels in this watershed from the perspective of water quality protection and connectivity on the landscape. In 2008 the CAP process was used to coordinate the initial stakeholder workshops – a kickoff meeting for municipal CEOs, town representatives, local conservation organizations, state and local agencies and the University of Connecticut in June. The workshop yielded an enthusiastic response to illustrate continued need for strong partnerships to help balance growth and conservation in the watershed while minimizing challenges to quality and quantity of the basin's waters; a first workshop in to identity conservation targets, key ecological attributes and indicators of ecological viability (9 identified/7 retained). In 2009, the second and third CAP workshops were conducted. 22 separate threats were identified across the 7 priority targets, or key ecological attributes (KEAs).
The highest ranked threats impacting the greatest number of targets were:

1. residential and commercial development,
2. road construction and maintenance,
3. groundwater withdrawal, and
4. dams.

Key strategies and actions for conservation of Natchaug Basin ecological targets were determined, with the highest strategies including the identification and convening of a steering committee to build leadership and local capacity (to elicit endorsement of and support for the Natchaug CAP Plan); implementing a watershed-wide mechanism for balancing conservation and economic growth in ecologically appropriate basin segments; and development of a so-called "dashboard manual" for town public works staff and ConnDOT outlining environmentally friendly road maintenance practices (using a $6,500 grant from the CT Environmental Review Team for manual design and production), and inventory of storm water infrastructure and needs in each basin town. In addition, a municipal land use evaluation of each watershed town was conducted.

A summary for major threats to water quality, general recommendations for regulatory changes where basin town regulations were deemed deficient, and specific regulatory suggestions unique to each town were made in a report distributed to the Natchaug River watershed Steering Committee and watershed towns. In 2010, the Committee met with government leaders and land use commissions in each watershed community towards endorsement of the CAP document and a consensus in support of a regional Conservation Compact tool to further implement the CAP document. The Town of Chaplin land use commissions in late 2010 began proposing a Natchaug River overlay protection zone, as a top priority recommendation of their recently approved Plan of Conservation and Development, as well as in support of the Natchaug CAP document.

Quinebaug Highlands - Natchaug River Watershed Project

In 2010, the Nature Conservancy-CT chapter completed a successful watershed resources protection North American Wetland Conservation Act (NAWCA) grant application. Project partners will have permanently protected 1,103 acres of significant habitat over 11 different tracts through fee and conservation restriction acquisitions. The project area is part of The Last Green Valley, the federally designated Quinebaug-Shetucket Rivers Valley National Heritage Corridor recognized for its important ecological condition and intact natural habitats. Completion of this project will protect key wetland ecosystems for waterfowl and other migratory birds, fish and wildlife. These habitat areas provide critical inland stop-over habitats for migration, diversity of food, cover and nesting habitat. The permanently protected land will provide recreation, educational and ecosystem service benefits to the public including bird watching, nature study, hiking, and winter pedestrian recreation, hunting, fishing and water resource conservation. This project will contribute to the achievement of the Atlantic Coast Joint Venture waterfowl goals in the Thames River Basin and the Long Island Sound. Much of the focus is on highly functional wetland systems that support base flow and excellent water quality in the targeted watersheds. Public benefits of the permanently protected lands will provide for water resource conservation, as well as for recreational and ecosystem services. CT DEEP land acquisition matches are an integral part of a protection oriented strategic approach in this regional watershed, and meets the protection-oriented watershed strategies for the Natchaug River basin as well as some headwaters of the Quinebaug River basin.

Based on Natchaug River Basin CAP recommendations, watershed stakeholders suggested several fundable projects that could be eligible for a Connecticut Healthy Watersheds Initiative Pilot. DEEP incorporated that information into a two-phase funding grant application to USEPA's Healthy Watershed Initiative. Watershed partners have a successful history (see above NAWCA project) and are well poised to effectively act on funds available for targeted land and water resource protection. Design and implementation of a watershed-wide education program for municipal land use decision makers would focus on consideration of regional impacts to water quality and quantity in this river basin.

Another suggestion is an assessment of storm water infrastructure, road crossing and culverts in a pilot town. The watershed partner Green Valley Institute conducted a GIS analysis in the river basin of highest priority forested parcels for the protection of water resources with a US Forest Service grant, with work completed in 2010. These data will be useful to inform model regulations and land protection by municipalities, and information is available at http://www.greenvalleyinstitute.org/NCAPLandUse.htm .

Leadmine Brook Fish Passage and Habitat Restoration Project

DEEP's Inland Fisheries Division received a $50,000 funding award from the National Fish Habitat Action Partnership in 2009 for critical work in the town of Ashford. Town public works staff repaired road and stream culvert damage caused by the October, 2005 flooding event that severely impacted much of northeastern Connecticut. The repair work created perched culvert conditions and a skewed culvert alignment, which redirected flows into the southern streambank, initiating streamside erosion. Native brook trout and other in-stream aquatic species were effectively blocked from in-stream migration, and more than 125 feet of downstream channel was straightened and channelized by the initial repair work. The project is now targeted for installation work in 2011, and will restore upstream fish passage and in-stream habitats for the wild trout population at this road crossing and provide access to nearly 3 miles of upstream brook trout habitat. Effective partnership will include the Town of Ashford, the Yale School of Forestry (which owns the surrounding 7,800 acres Yale-Myers Forest), and technical guidance from CT DEEP Fisheries staff. The local Trout Unlimited chapter will assist with the construction and installation of in-stream fish habitat treatments, and strengthen their watershed stewardship presence in this basin.

Shetucket River Regional Basin

The CT DEEP Diadromous Fish Restoration program continued monitoring of newly installed or revamped fish passage facilities at hydroelectric power generating facilities in the Taftville section of Norwich, and for Norwich Department of Public Utilities hydropower generation facility at the upstream Occum Dam. Diadromous fish species were reported as passing both facilities in their upriver migration each year from 2006-20010. Migratory river herring can now travel up the Thames River watershed to the base of the Scotland Dam in Scotland, which will incorporate fish passage plans as part of anticipated Federal Energy Regulatory Commission (FERC) hydropower license reissuance by 2012 (see entry below). DEEP Inland Fisheries Division distributed its Thames Basin Diadromous Fish Restoration Plan to regional stakeholders in 2010.

Scotland Dam Hydroelectric Project

The current FERC license (FERC # 2662) was subject by its owners to the beginning of a long relicensing process in 2006. By mid-2007 a rather unique scenario unwound in the integrated

relicensing process, as two applicants submitted notices of intent and preliminary resource assessment documents for the same facility – FirstLight Power and the Norwich Department of Public Utilities. Both applicants announced run-of-river flow conditions through this facility, which will have significant benefit potential for water quality and aquatic life habitat needs in the river. CT DEEP submitted review comments from 2007 through 2010 with respect to water quality and flow regimes in this segment of the Shetucket River, reminding applicants to review their plans in light of the current impaired waters listing for Recreation, due to bacterial exceedance. DEEP and other regulatory agencies requested site specific investigations. Studies included water quality monitoring, Vegetation, Fish Passage, Freshwater Mussel Survey, Wetlands/Riparian/Littoral Habitat Inventory, Recreation, and Archaeological/Historic. Studies were completed by the end of 20010. Water quality study elements produced baseline conditions and provided sufficient information to enable DEEP and FERC staff to understand the current water quality conditions at the Project. The freshwater mussel inventory above the dam yielded a surprising diversity of species including some not previously recorded in eastern Connecticut. FirstLight Power is the current licensee for this project working toward Preliminary Licensing Proposal (PLP) to relicense the existing 2000W project in 2012. Norwich DPU h as filed a similar PLP. DEEP will continue as an active regulatory stakeholder in this relicensing process in 2011 and beyond. It is anticipated that the chosen applicant will have installed new power generating equipment/facilities, new fish passage facilities and conducted additional water monitoring by 2015, effectively providing diadromous fish movement between Long Island Sound/Thames River estuary up to the upper Shetucket River headwaters in Willimantic for the first time in over 100 years.

Town of Sprague

The town in recent years has placed significant priority to reconnecting residents to their main river through their River Park project (which abuts the Shetucket River in the village of Baltic). Many of the trees that have been planted are donations from a local grower that previously supplied the town with trees. Additionally, the Last Green Valley, Inc. grant assistance purchased trees which were leveraged by a local grower who donated many flowering perennials. This project has been furthered by CT DEEP Urban Forestry grants that the town applied for over and received over the past 3 years. In 2009 the town received funds to plant 150 white pines (and 1,500 seedlings) at the Baltic Reservoir to control leaf litter blowing into the reservoir, which discharges into the Shetucket River. In 2008 and 2009 the Town utilized Urban Tree grant funds to conduct an adjacent streetscaping project.

In 2010, the Town partnered with regional entities in development of a DEEP Open Space and Watershed Lands Acquisition Grant program application for substantial acreage of a key Shetucket River parcel near the now-protected Mukluk property, which the Town and region have prioritized for long term resource protection. The State awarded a grant for the land acquisition, which is anticipated to close in 2011. The Town has also created a river overlay protection for both the Shetucket and the Little Rivers. A special permitting process within the zoning regulations to provide further natural resource protection elements to these river corridors.

Willimantic River Regional Basin

Eagleville Brook TMDL Implementation Project

Eagleville Brook is an impaired stream for aquatic life use and for recreation use. The watercourse flows through a highly urbanized area of the University of Connecticut (UConn) Campus and down into the rural Town of Mansfield where it meets the Willimantic River. The brook is piped under the most developed section of campus and daylights off-campus further downstream. In 2007 DEEP issued an impervious cover (IC) Total Maximum Daily Load (TMDL) for the Eagleville Brook watershed. This innovative TMDL is not based on a specific pollutant but rather on an indicator of the impacts of urban development. DEEP set a target watershed impervious cover of 11% for streams, with a 50 square mile drainage area or smaller. The 2.4 square mile Brook watershed, which is 18.9% impervious, exceeds the target by 97 acres, primarily in the highly urbanized section of the UConn campus. The objective of this project is to meet the TMDL requirements by reducing the amount of effective IC in the watershed by either removing IC or by disconnecting it through LID practices to treat runoff volume and water quality.

DEEP developed the TMDL with key stakeholders, including UConn's Center for Land Use Education and Research (CLEAR). The TMDL implementation will be managed by local stakeholders and partners. UConn's CLEAR and the Town of Mansfield initiated the Eagleville Brook impervious cover TMDL project in 2010 through a 319 grant. The project team consists of UConn/CLEAR, Center for Watershed Protection, and the Horsley Witten Group, Inc. Other watershed stakeholders taking an active interest in implementing this TMDL include the local Willimantic River Alliance, The Last Green Valley, Inc, and the Thames River Basin Partnership. Implementing this IC TMDL involves a four-step adaptive management strategy: reducing IC where practical, disconnecting IC from Eagleville Brook, minimizing additional disturbances, and installing engineered best management practices to reduce the quantity and improve the quality of stormwater runoff. For Phase 1 of this project, CLEAR staff initiated education and technical assistance for the Town of Mansfield by meeting with the Town Planner and the Public Works Director. A detailed land use board outreach program began in the fall of 2010.

The project team also shared a project overview presentation at the NEWIPCC meeting of 319 NPS and TMDL coordinators in New England. In late 2010 the Soil and Water Conservation Society/ Southern New England Chapter, held its winter meeting on the UConn Storrs campus and featured a workshop on this IC TMDL Implementation project. The presentation was well received and plans are underway for a Summer 2011 workshop to include more presentations and a campus-wide tour of completed and planned implementation practices. In addition, all data collected and mapping was placed on the project interactive map site at http://clear2.uconn.edu/TMDL/ The TMDL website metadata includes: streets, land cover (wetlands, land cover, impervious surfaces), watersheds (original and project revised), hydrography, CAD files, stormwater drainage, parcels and zoning, NRCS soils, topography, imagery, and coordinate system information. Technical meetings on TMDL and watershed-

based plan implementation options were held mid-year. Results from the mid-summer field work led the Project Team to settle on a "Top 50" list of campus stormwater disconnections opportunities, which were verified with UConn's Office of Environmental Policy for logistical and timing considerations. A briefing was then held with DEEP technical staff.

Retrofit projects identified included: bioretention, rainwater harvesting, permeable pavement, green roofs, rooftop disconnection to cisterns or turf, wetland creation/restoration, and soil amendments in compacted lawn areas. A refined "Top 10" list, each linked with field notes and follow up 20 percent design drawings, were generated in 2010. The Project Team was in communication several times during the year to establish current elements of the final document.

Some interim efforts were underway through UConn operations that included a porous surface maintenance manual, a retrofit project with design done/installation forthcoming, and a parallel campus-wide plan that can support the TMDL implementation work) as well as projected next steps. During this phase, project team members discussed the need for baseline stream flow data associated with this watershed. The project scope was amended to fund acquisition and installation of new monitoring equipment at an inactive sampling station on Eagleville Brook, just south of main campus. Stream gage calibration was completed and volumetric measurements began in late 2009 and continued through 2010. UConn reported to DEEP on the calibration of the rating curve, and then daily stream flow values in electronic formats.

The final TMDL Implementation project report includes a summary of stream flow monitoring program and findings/recommendations related to continuation of the nearly two year monitoring window. The Eagleville Brook TMDL Implementation project, with a pending watershed-based plan and real-time stream monitoring information, is being shared with interested planners, engineers and other land use decision makers on a dynamic website at http://clear.uconn.edu/projects/TMDL/index.htm .

University of Connecticut Grant Plaza Green Roof Demonstration Project (UConn Green Roof)

The DEEP issuance of the Eagleville Brook TMDL (2007) identified aquatic life use impacts associated with excess stormwater as the likely cause of the stream impairments. UConn initiated this green roof demonstration project in 2009 through a Clean Water Act Section 319 grant to install and monitor a green roof on a portion of UConn's Gant Plaza. A second project phase will evaluate the uppermost Eagleville Brook watershed to determine suitable locations for disconnections of impervious areas and installation of bioretention or green roofs. The site design was performed by the Landscape Architecture department at UConn. The design includes 356 Green Grid TM units (measuring 2 feet by 4 feet each). The resulting watershed best management practice covered a treatment area of 2,672 square feet. The units were installed with assistance from a number of UConn classes and clubs at a public ceremony in September (see photo).

Flow monitoring equipment was installed in drainage pipes from two section of the Plaza, along with a v-notch weir insert and a precipitation gauge. A paired watershed design study involved flow data collection in both a control and a treatment (the green roof modules) watershed to more accurately quantify any flow reduction from the green roof. Precipitation and runoff monitoring (including a suite of nutrient and metals constituents) began before the module installations to calibrate the two studied watersheds, and continued for one full year of treatment period through mid 2010.

Green roof maintenance is being overseen by the Landscape Architecture program and included a training program for UConn maintenance personnel. Initial statistical analysis of the runoff data was shared at the March 2010 *Connecticut Conference on Natural Resources*, and later reported to DEEP. Building on the knowledge of the water quality results of this research-based green roof, and in accordance with the University's Sustainable Design and Construction Policy adopted in 2007, UConn planners have designed a larger footprint vegetated green roof on at least one new academic building to be built in 2011.

University of Connecticut / Willimantic River Well field Study

Based on the findings and recommendations of the University's Water and Wastewater Master Plan (2007), University administration initiated an instream flow study to assess aquifer pumping on the Willimantic River along the mid Mansfield/Coventry town boundary. Modeled sustained yields at this wellfield are 1,400 gpm (2.016 mgd), whereas the total authorized diversion amount is 1,600 gpm (2.3007 mgd). The firm of Milone and Macbroom were able to accomplish the bulk of required field work during 2008, but they were unable to get low flows. They still collected most of the data needed for the PHABSIM modeling, and were able to get in one short aquifer test to use for re-calibrating the groundwater model. Although they still want to collect data at low flow, which is unlikely to occur until next summer.

The key preliminary finding was that wellfield withdrawals did exert an influence on the streamflow in the vicinity of the University's wellfield. Some interim recommendations on wellfield management were made in late 20008 that assume all the water pumped from the well field is coming from the river. The interim recommendations would be in place in the event that next summer is a low-flow year. They plan to complete the field work in 2009 and subsequently make final recommendations. The report will assist the University in its current strategy planning for the University water system. NPS pollutants do include altered stream flow, and thus this project is being followed by the NPS and Watershed Management program. The U.S. Geological Survey will, maintain an existing full water quality/flow stream gauge at the wellfield site, as well as install a full stream gage station at a preferred upstream location at the Merrow Bridge, running the 2 gauges concurrently through the completion of the project.

In 2009, with low flow data finally collected, a draft final report was circulated to the Technical Advisory Group, where comments were returned that recommended additional modeling analyses that could modify drought management plan stream flow thresholds that could cause water supply/drought advisories and warnings. The report included supply management as well

as demand-based conservation. Some water infrastructure and campus improvement projects are already incorporating draft report recommendations. A final report was issued by the University in 2010. University administrators will now develop a coordinated well field management plan that integrates the study findings and recommendations of both the Willimantic and the Fenton Rivers well fields.

The University continues to develop an on-campus water reuse project capable of producing up to 500,000 gallons per day. DEEP is encouraging UConn to ensure that a portion of demand freed up by this reclaimed project, once operational, be set aside for in-stream flow, with the remainder tagged for future potable water demands, and at an allocation ratio of 1 to 1. DEEP also encourages UConn to explore the draft recommendation of augmentation by managed upstream water releases during drought conditions, as well as to explore further discussions with Windham Water Works as a possible source of supply. Meanwhile, the University continues to work with the Town of Mansfield and private land owners/developers with requests for connections to the UConn water system. With the summer 2010 backdrop of a seasonal water drought that triggered water conservation measures in the UConn water system, and the drafting of a revised Water Supply Plan, UConn and Mansfield may soon formalize a joint water supply Environmental Impact Evaluation (EIE) application to regulatory agencies.

Thames River Main Stem/Basinwide
The Last Green Valley Inc (TLGV)
Water Quality Subcommittee

The Last Green Valley (TLGV) Volunteer Water Quality Monitoring Program completed its 5th season. Several separate teams collected water quality information on a monthly basis using an In-situ Troll 9500 multi parameter sonde and hand held microprocessor in the French, Quinebaug and Five Mile River watersheds at more than 60 unique locations. For 2010, a second Troll system was made available and the program expanded further into Connecticut waters. Streamwalk survey training focused on “train the trainers”, resulting in surveys being held in several upper Thames River basin tributaries, including Quaddick Lake tributaries (Thompson), Mashamoquet Brook (Pomfret), Little River (Woodstock/Putnam), Poquetanuck Brook (Preston/Ledyard), Eagleville Brook (Mansfield), Mount Hope River (Ashford), and Little River (Canterbury). DEEP-developed Rapid Bioassessment for Volunteers stream invertebrate sampling was conducted in 15 Connecticut towns throughout the Thames River basin with 19 voucher specimens sent to DEEP for identification and incorporation in upcoming water quality assessments. Special RBV training was provided to a number of members of the local chapter of Trout Unlimited. New water monitoring pilot projects will begin for indicator bacteria monitoring in the impaired Mashamoquet Brook watershed (which included the chronically impacted Mashamoquet Brook State Park swimming pond). The Committee was awarded an equipment loan of 2 Secchi disks from USEPA to be used to measure lake water transparency and productivity levels. The Water Monitoring Coordinator began development of two technology-based QAPPS for eventual approval by CTDEEP and MADEP, to meet a program goal of obtaining qualified data for state water management agency use.

Source to Sea Expedition Project

TLGV Board of Directors and staff enthusiastically committed several months of planning, design and execution of a large scale Thames River Watershed outreach and education campaign in 2009 and continued efforts in 2010. With a history of working as a regional catalyst with partnerships, TGLV created the Source to Sea Expedition. This was a nine week project focused on three goals: connecting people to their place in the watershed; connecting individual behavior and water quality; and highlighting recreational opportunities and attracting new river stewards. The paddling events provided structure to the overall project, with over 500 paddlers traversing collectively along 160+ river miles. Approximately 95 partners and sponsors supported 90 events, with over 30 events containing an "on water" component.

This project produced first known Thames River Basin watershed map depicting town boundaries, major water bodies and roads within CT, MA and RI; see at http://www.tlgv.org/uploads/NRA/Source%20to%20Sea/StoS%20map4smallfinal.pdf. Project highlights included the dedication of three new Quinebaug River Water Trail segments (with paddling guides and information kiosks in the 30 mile route), production and distribution of several public educational materials to 8,000-10,000 people (see children's brochure at http://www.tlgv.org/uploads/NRA/Source%20to%20Sea/ConnectDrops3-final%20kids%20activity%20guide.pdf), construction of interactive traveling exhibits (including Flo the water drop), and a social marketing component that resulted in over 700 individual "Making Sound Choices for Clean Water" pledge cards being returned. Over 50 event participants indicated interest in water quality monitoring volunteer work, excellent media cover and participation was recorded throughout, and the project recorded over 558,000 hits on TGLV website during a 6 month period.

Watershed education was advanced in 2010 with a 2-day program for 25 students from the New London Youth Affairs program. A *Rivers of the Last Green Valley* slide show presentation was developed and shown to several audiences. TLGV partnered with Center for Watershed Protection and three consulting firms to successfully receive a grant to bring storm water management workshops to municipal officials in the northern portion of the Valley – workshops will be held in 2011. Water Trails became a very hot topic with broad civic pride and participation following the 2009 Expedition. A subcommittee was formed, meeting regularly to track projects and share information about upcoming paddle events and issues, highlighted in a seasonal e-newsletter, *Currents from Source to Sea*.

Green Valley Institute (GVI)

GVI was created to help document, plan for and protect natural and related cultural resources as the 35-town Last Green Valley region grows. The stated goals are to improve the knowledge base from which land use and natural resource decisions are made; and to build local capacity to protect and manage natural resources as the region grows.

GVI is a formal outreach partnership among The Last Green Valley (TLGV) a National Heritage Corridor, the University of Connecticut's College of Agriculture and Natural Resources, the University of Massachusetts Extension, and The Nature Conservancy Connecticut Chapter. Its programs are made possible through active partnerships with many other organizations, and the active involvement of the TLGV's Natural Resources and Agriculture (NRA) Committee. GVI programming is based on the premise that land use and natural resource planning and management are primarily *local* activities. As a result, their programs specifically target three local audiences: private landowners, municipal leaders and land use commissioners, and contractors, realtors and others who convert open space to other uses.

GVI worked to ensure these groups have the knowledge and resources they need to make good decisions as they plan for the future. Since GVI geographically covers a substantial portion of the upper Thames River basin *and* targets its services to land use decision makers, a number of early 2010 accomplishments within Connecticut and related to nonpoint source pollution prevention and abatement were realized. Forty short courses, workshops and training session as were taught to 1,027 community leaders, landowners and others. Family Land Protection workshops were held with over 64 participants representing more than 800 acres of land. These efforts contributed to at least 124 acres of land in the process of, or permanently protected, bringing the total since 2001 to at least 9, 583 acres within The Last Green Valley. An educational retreat for conservation volunteers was held in a three day workshop entitled A New Introduction to the Natural World", with 29 participants committed to providing at least one year of service in a voluntary position in the Valley. However, grave uncertainty related to continued Congressional funding through the Heritage Corridor Area program culminated in mid 2010 with the rescission of the contractual agreement between The Last Green Valley, Inc. and the University of Connecticut, effectively de-staffing the Green Valley Institute.

The remaining core staff funded by the University re-purposed their mission into a statewide land use planning program, which will still benefit the upper Thames River basin communities but with less local focus and availability. Strategy planning and funding partnerships will be discussed in 2011 in attempts to fill the community needs left by the dismantling of this program.

Thames River Basin Partnership (TRBP)

The mission describes this Partnership as a voluntary, cooperative effort to share organizational resources and to develop a regional approach to natural resource protection. Priority areas of concern in the basin are to:

- Protect the region's agricultural and natural resources being threatened by land use changes

- Protect the ground and surface water quantity and quality being threatened and degraded by contamination

- Protect the region's biodiversity

- Improve the coastal zone resource conditions

A Steering Committee continued to develop and implement an Annual Plan, following three consecutive years of a part-time Coordinator funded with Section 319 NPS funds to the Eastern Connecticut Conservation District. That grant-funded Year 3 Coordinator position was completed by the June Floating Workshop event. The District continued Coordinator support by providing almost 2 hour per week of staff time to the Partnership in2010, with the focus on Partnership meeting coordination, quarterly Partners in Action reports, and maintaining the Partnership website. The following 2010 accomplishments not previously mentioned in this report are highlighted NPS management accomplishments on the Partnership website at www.thamesriverbasinpartnership.org .

- DEEP Wildlife completed the third season of *Phragmites* herbicide treatment and mulching in Poquetanuck Cove, a priority project of TRBP, Avalonia Land Conservancy, DEEP Wildlife, and the US Fish and Wildlife Service.
- TRBP hosted a site visit at DEEP' Salt Rock Campground on the Shetucket River in Sprague to learn about a recently completed in-stream habitat enhancement project between DEEP and USDA NRCS and US Fish and Wildlife Service. In-stream features include three constructed log jams and three floating log covers placed along the river's east side adjacent to DEEP property. This provides overhead cover and velocity refugia for aquatic life previously absent in this river segment. DEEP staff used the opportunity to discuss potential issues with multi users of this river segment (e.g. fishermen, boaters, conservation restoration teams) and to encourage other riverside property owners that may be interested in working with this project team on riverine habitat enhancement work.
- TRBP hosted its tenth annual Thames River Floating Workshop, *The Natural and Cultural Significance of Poquetanuck Cove*, with over 50 participants and several resource planners and managers providing on-land and on-water presentations. One event outcome was the interest from US Fish and Wildlife Service staff to assist TRBP and local town and organizational representatives to publish an on-water kayak trail brochure and to discuss opportunities to include the diversity-rich ecosystem into the regional Fish and Wildlife Refuge system. TRBP will work with stakeholders to reapply to the Long Island Sound Futures Fund in 2011 for a watershed conservation action plan process for the Cove and its contributing tributaries.

Southeast Coastal Major Basin

Southeast Coastal Watershed - Western Complex

Niantic River Watershed Protection Plan (NRWPP)

In 2005 CT DEEP awarded a NOAA-OCRM coastal NPS management grant to develop a watershed protection plan for NPS-impaired Niantic River and its watershed (within towns of East Lyme, Montville, Salem and Waterford). A twelve-month planning process was completed in September 2006 with the publication of the *Niantic River Watershed Protection Plan: Watershed-wide Strategies to Prevent Nonpoint Source Pollution*. The Plan includes an integration of nine key watershed plan elements required by DEEP and U.S. EPA for support of implementation recommendations that are eligible for Section 319 NPS funds. Key findings in the areas of data assembly and results, zoning, environmental and monitoring include:

- 15+ stormwater outfalls discharge directly into the Niantic River.
- 5 local basin drainages are currently covered by over 10% impervious surfaces, and current local regulations can allow for 10 local basins to be covered by 10% or more impervious over, with one basin projected to be over 30% impervious cover.
- Stormwater modeling showed increased loading to the Niantic River from existing development. Any areas considered developable pose a risk for direct discharge to the lower river by increasing pollutant loading through its tributaries.
- Undeveloped areas upstream of the lower, more developed portion of the bigger watershed pose a great risk to increasing loads to town water supply reservoirs.
- Tracked development in the watershed since 1985 recorded over a thousand acres of forest conversion to either developed, barren or grassed lands.
- For zoning, a more effective approach to protect community water resources may be to match wetland protection requirements for a consistent watershed wide approach to protecting water quality.
- Eelgrass populations plummeted in 1999 but rebounded in 2003-04. The future of eelgrass in the coastal river is unclear and requires regular protection and monitoring.
- Measurement of water quality throughout the watershed is not currently a standard practice. To evaluate improvements through use of BMPs and planning changes, practical measurement techniques will be needed.

- Monitoring and inspection programs are already underway in towns of East Lyme and Waterford, but the potential for future development is the greatest in the upper reaches of the watershed.

The DEEP Watershed Management program posted the document on its website at http://www.ct.gov/dep/cwp/view.asp?a=2719&q=379296&depNav_GID=1654 . DEP programs continued to meet with local stakeholders in 2007 towards formation of a standing committee to gain local adoption of the Plan. A delay ensued with the local election results bringing in new town chief officials. DEEP contracted with Eastern CT Conservation District, utilizing Section 319 funds, to fund a part-time position with existing District staff to provide a local coordinating role. The early results are promising, with new energy displayed by town staff and land use/shellfish commissions, local conservation and watershed organizations. There is a preliminary plan for a town CEO forum in early 2008 to garner political support to move the Plan document towards a useable community plan and basis for development of action strategies. Additional Plan priority recommendations that include water quality monitoring and community education/outreach were being pursued by DEEP and local watershed stakeholders in future DEEP contract agreements. An additional Plan recommendation is being addressed through the Connecticut Clean Marina Certification program, where DEEP is working with at least one Niantic basin marina toward possible certification in 2008.

In 2008, the Niantic River Basin Coordinator position was partially funded with a CT DEEP 319 grant to the Eastern Connecticut Conservation District for a part-time staff dedicated to assist in the implementation the 2006 Niantic River Watershed Protection Plan. The Coordinator worked 8-10 hours per week and accomplished many tasks in this first Coordinator year. Plan presentations were given to watershed town boards and commissions. Based on town land use committee and government leader feedback, a Plan Refinement Group was formed and met monthly through 2008 toward a draft Guided Summary Plan document, with updated Land Cover Maps, modified Impervious Surface Coverage maps, and a more user-friendly interface of the Plan. The Guided Summary will be distributed in early 2009.

A summary report of outreach activities by this Coordinator and other relevant efforts in the watershed was developed and distributed to the watershed towns, for inclusion in three town's Stormwater MS4 General Permit reporting requirements. In addition, a summary of the Plan's recommendations, relative to each of the four basin towns, was collected for a document to share with basin towns and a future Advisory Committee or Watershed Board. Two grant funding applications were submitted in 2008 to further implement the Plan's recommendations; one to Rivers Alliance of Connecticut for assistance in establishing a Watershed Board, and the second to DEEP for a Year 2 Section 319 grant to continue the Coordinator role for the watershed towns and other watershed partners. A project website was created at www.nianticriverwatershed.org.

In 2009, the Niantic River Watershed Advisory Committee (NRWAC) began the transition from the Plan Refinement Group to a legally established watershed board or commission. A mission

statement and three working subcommittees were established – Board Development, Monitoring, and Education and Outreach. Board Development explored options for a non-profit commission framework and a supportive role within the communities. Members also researched mechanisms for sustainable funding, and maintained communications with watershed stakeholders. The Monitoring working group was charged with assembling all available water monitoring source and data relevant to the Niantic River watershed, and then synthesizing in agreed-upon format(s) to facilitate interpretation and ongoing input. They were also tasked to identify long-term monitoring needs.

The working group developed a Request for Proposals in 2010 for a qualified consultant to consolidate, analyze and report on existing data (a priority NRWPP recommendation), submitting for quotes and applying for funding assistance. The Committee was populated with interested community and agency representatives with full support from the four watershed town CEOs. The Niantic Coordinator staff position, funded with a Section 319 grant, utilizing Conservation District staff continued to provide coordination services for this Committee's affairs, organizing meetings and presentations and involving all watershed towns and other watershed stakeholders in the process. The Summary was produced after many meeting with local officials and other watershed stakeholders, for the purpose of providing a shortened account of the highlights of the full NRWPP. It has been organized in a format that describes the watershed management concerns, and then outlines the goals, objectives and recommendations. References to sections in the full plan are found throughout the document, so readers can conduct further research into an area of interest. The purpose was to offer a concise description of the water quality impairments affecting the watershed and to provide a focused directory of recommendations aimed at reducing those impairments. With this condensed tool, stakeholders now have a better understanding of the relevant issues, be able to determine their role in the decision-making process and take appropriate actions.

In 2010, the group continued to assess goals outlined in the watershed and work to find funding to implement strategies to reduce nonpoint source pollution. To assist the Monitoring subcommittee development of nitrogen monitoring and modeling assessment needs, DEEP issued a NPDES wastewater permit to Dominion/Millstone power generating facility in Waterford that included a condition for establishment of a Nitrogen Work Group to facility the NRWAC and DEEP nutrient management needs in the Niantic River. Meeting group development began in late 2010 and participation includes NRWAC members and the Niantic Coordinator.

The town of East Lyme and the Conservation District successfully applied for a Section 319 grant towards a stormwater retrofit project along a residential section of the Latimer Brook corridor. Project development will commence in 2011 with stormwater tree filter installations planned for Spring 2012. Similar interest by the Town of Waterford may result in a parallel retrofit installation in a lower Niantic River location in 2012.

Southeast Coastal Watershed- Eastern Complex

Nitrogen Fertilizer Reduction in Coastal Lawns Project

The University of Connecticut Turf Management Program initiated this project through a training and education approach in 2008. The main objective is to establish demonstration stations showing alternative, lower input turf species and best management nitrogen fertilizer practices.

Five sites were initially chosen, though none in the Thames River or the Southeast Coastal basins. However, the Hole-in-Wall Beach in Niantic was the site of an innovative stormwater management project for a 93-parking space lot with high public visibility. UConn donated fescue seed to be planted in the area surrounding the various stormwater practices. UConn also established a 350 square foot demonstration site that utilized seven different lower input turf species. UConn staff conducted targeted training for municipal/turf industry professionals during the 2008 UConn Turf Field Day. Pre- and post-workshop surveys were conducted to ascertain the knowledge level and opportunities to modify turf management practices that reduce nutrient runoff potential to receiving waterbodies and Long Island Sound. Training was provided in web-based and in print media formats, aimed at changing fall fertilizer practices, broadening awareness of alternative inputs and use of slow-release fertilizers. The project has expanded through a Year 2 Section 319 funding assistance grant to UConn.

In 2009, the first phase was completed and report submitted to DEEP. Eight demonstration sites were established with fine and tall fescues. Approximately 20 landscape professionals and municipal workers were trained through a series of workshops over the two year period. Pre- and post surveys reveal the majority of the 20 individuals will change their nitrogen fertilization practices based on the workshop information. This should result in less nitrogen and phosphorus applications, decreasing threats to water quality. There are very good prospects for adoption of revised recommendations. In addition to web-based and print media formats, a video/DVD, instructional pamphlets and handouts were produced and distributed. Continuing education efforts are planned through UConn's Cooperative Extension System, Master Gardener Program and Residential Water Quality Group. A second Biennial Turfgrass Field Day was held at UConn Storrs campus in July 2010. The focus of the event was guided tours of current research studies.

Pawcatuck River Major Basin

Borderlands Project

In 2010, The Borderlands Project continued with municipal coordination and support and included part time staff support from the Green Valley Institute. For more Borderlands Project information, the website remained an active communication vehicle at www.borderlandsproject.org.

V. STATEWIDE MANAGEMENT PROGRAMS

Inland Wetlands and Watercourses

Inland Wetlands Management

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

In 2010 there were:

- 388 total participants, representing
- 114 municipal Inland Wetlands Agencies, of which
- 59 individuals attended all three segments and therefore received a 2010 certificate of program completion.

Erosion and Sediment Control

Since the publication of the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control (Guidelines), CT DEEP has provided detailed training, identified and corrected errors and then published a corrected electronic version on DEEP's webpage under Publications, Guidance Materials [http://www.ct.gov/dep/cwp/view.asp?a=2720&q=325660&depNav_GID=1654]. Future potential work on the Guidelines includes producing a fully bookmarked / linked version for availability on the web and on compact disk. In the past several years the DEEP has been working with the Connecticut Council on Soil and Water Conservation to develop visual training aids with the assistance of the Connecticut Conservation Districts with the goal of developing new training programs on soil erosion and sediment control.

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 Energy and Environmental Protection, Department of Public Health, Department of Public Utility, and the Office of Policy and Management. The Water Planning Council established three Committees to investigate issues identified in PA 01-177. The Council meets the first Monday of every month at the Department of Public Utility Control. Contact: Bruce Wittchen, CT OPM – Intergovernmental Policy Division, (860) 418-6323.

All Annual Reports, minutes of WPC meetings, the Water Allocation Policy Planning Model, and several other important committee reports related to WPC activities are available on the Department of Public Utility Control website:
http://www.dpuc.state.ct.us/DPUCINFO.nsf/ByWaterPlanning?OpenView&Start=1&ExpandView

Flood and Erosion Control Projects

The CT DEEP Flood and Erosion Control program as defined by CGS 25-69 thru 25-98 allows the DEEP to implement studies and capital repair projects to reduce or eliminate damage caused by flooding and erosion. The statute was changed in 1982 to allow DEEP to fund a portion of a dam repair as long as the dam was owned by a municipality.

The CT DEEP Flood and Erosion Control program implements studies and capital repair projects to reduce or eliminate damage caused by flooding and erosion. CT DEEP 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 DEEP also provides technical assistance in cooperation with private consultants or government agencies like the NRCS and Army Corps of Engineers (ACOE).

CT DEEP has started no new "Flood & Erosion Control" projects involving dams during the 2009 construction season. There have been many requests recently from municipalities asking DEEP through this program to fund repairs to municipally owned dams. One project in particular has been bid and the municipality is waiting for funding to be approved by the bond commission before they award the bid.

Late in 2006 the ACOE inspected all of the riverine and coastal levees that they constructed. Several levees were found to be in immediate need of study and repair. Of note was the levee in East Hartford along the Connecticut River. This levee had previously been rated good, but due to a fresh look at the design plans, an area previously not maintained as a part of the system was discovered. The lack of maintenance of this "impervious blanket" led to large trees being allowed to grow in this area, affecting the effectiveness of the blanket. This was repaired in 2008 with cost sharing in the amount of $4,000,000 from the State of CT DEEP through the

Flood and Erosion Control Board statutes. This repair was critical and therefore the repair was performed quickly. Due to ACOE questions raised during their initial inspection and file review and due to the fact that FEMA was re-mapping Hartford County, including East Hartford, additional studies were performed, leading to additional construction work being required in 2010. The DEP will aid the Town of East Hartford with additional funding for the future repairs, as well as provide technical expertise during the study and design portions of the levee review.

Other levees have required work. These levees are located in Hartford, Torrington and Waterbury/Watertown. The DEEP is responsible for maintenance for the Waterbury/Watertown levee, and we have completed our initial work to meet the minimum standards of the ACOE. However, some additional work needs to be performed at the levee, which the DEEP is working towards.

The Torrington Levee, owned and operated by the City of Torrington is the only levee which did not meet the ACOE standards by the deadline. Therefore, the City's levee has been deemed in-active by the ACOE, meaning that if the levee is damaged due to a storm event, the ACOE will not be allowed to fund repairs. Most of the problems with this levee have to do with many years of neglect, followed by environmental riverine enhancements which conflicted with the goals and design parameters of the original design. Torrington received $200,000 from DEEP to help clear debris and vegetation from the river channel to allow additional studies to take place. The City continues to move forward towards bringing this project into compliance with ACOE standards. The DEEP IWRD continues to participate in helping the city meet all of its engineering goals while allowing as much riverine enhancements to remain intact.

The DEEP entered into a three way agreement with The City of West Haven and the Lake Phipps Taxing District describing all of the monetary and long term obligations of each party. The dam reconstruction was started in the summer of 2008 and completed in the fall of 2009. DEEP is working with the Legislature to have the dam transferred from DEEP to the Lake Phipps Taxing District. It was always the intent of the DEEP that after the dam was fixed with a combination of state and local funds, that the dam would be turned back to the local taxing district.

The Flood events of 2007 have led to 2 Emergency Watershed Projects (EWP) being worked on in 2008 and 2009. The Natural Resource Conservation Service (NRCS) funds 75% of the project costs and DEEP funds the non-federal share of 25%. All of these projects protect infrastructure, but most of these projects protect the infrastructure by controlling the erosion that has created the threat.

Lakes

Lakes Management Program

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 DEEP 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, the Clean Lakes Program, CWA Section 314, provided funding for statewide baseline water quality assessments, and matching grants for diagnostic/feasibility studies and lake restoration projects. With the Clean Lakes Program being unfunded since 1994, Section 319 funds have been used in Connecticut to support a variety of nonpoint source pollution projects in lake watersheds.

Lakes Grant Program

Connecticut DEEP Lakes Grant Program funds lake restoration activities such as diagnostic water quality studies, land use planning, engineering feasibility studies, construction bid specifications development, storm water infrastructure improvements, dredging projects, and development of public education documents. The last year funding was available for the Lakes Grant Program was in 2001. In 2010, a phase of the ongoing stormwater improvement project at Highland Lake was completed. This project represents the fifth phase of a long-term project that has been funded with state and CWA Section 319 funds over many years.

Lake restoration projects are also conducted using bond funds authorized by the CT General Assembly and allocated by the State Bond Commission. In 2010, plans specifications were developed to implement the fourth dredging phase in of the Silver Lake Reclamation project. In 2010, dredging and stormwater improvements were constructed at Mead Pond in New Canaan.

CWA Section 319 Lake Projects

In 2006 and 2007, CWA Section 319 funds were used to develop the small grants program through the Connecticut Federation of Lakes. This program helps small and new lake groups become established and funds initial watershed assessments for lakes. In 2008, the Small Grants Program received more Section 319 funding to continue the program. In 2010, a small grants program projects was completed at Hitchcock Lake. Projects were also initiated at Amos Lake, West Hill Pond, Alexander Lake and Candlewood Lake. In 2010 monitoring of Lake Lillinonah continued with CWA Section 319 funds. Also

in 2010 Connecticut College collected, under contract with CT DEEP, completed analyses of data for sixty lakes.

Technical Assistance

In 2010 the Lakes Management Program continued to provide technical assistance to municipalities, lakes groups, private property owners and DEEP programs.

Invasive Aquatic Plants

In 2010 the Bureau of Water Protection and Land Reuse, in cooperation with the Division of Inland Fisheries, Wildlife Division, and the Pesticides Group of the Materials Management and Compliance Assure Bureau continued a to address infestations of non-native aquatic plants species that are new to Connecticut.

Groundwater

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

Preliminary APA mapping has been completed for all the state's major well fields (122) and provides a rough estimate of the contributing areas. Inventories of potentially regulated facilities and agricultural activities have been conducted. Final mapping is a further refinement and will define the APA, the area subject to land use regulation. To date, plans for data collection and analysis have been submitted for 115 well fields, all of which have been approved. Final Level A mapping has been submitted for 106 well fields and 101 have been approved. GIS mapping of the APAs has been partially supported with FY93 and FY95-98 Section 319 funds.

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

Municipalities are beginning program implementation, and the first step is to appoint a municipal aquifer protection agency (through adoption of a local ordinance). Thus far, 77 of the

78 towns have passed the required ordinance, and CT DEEP continues to work with the remaining municipality to implement this first step. Additionally, 62 towns have approved land use regulations in place, and have adopted APAs.

In 2010, CT DEEP:

- Continued to work with the municipalities to implement the program, providing extensive outreach and meeting with individual municipalities to assist with delineation of APAs and establishing local regulations;
- Held the annual municipal training program, a one-day workshop for Municipal Aquifer Protection Agencies, in June 2010. The workshop which focused on program implementation and best management practices for regulated facilities and a broad range of administrative and legal issues, was well attended and well received. Additional training for the municipalities is planned for June, 2010, and training is being developed for the industries affected by the program.
- Completed development of a training manual for the municipalities in the program, in part, using Section 319 funding for development and production of the manual. Printing of the manual and development of the on-line training modules are anticipated in August 2011
- Continued to keep the APA web site updated with new mapping as it becomes available, new guidance, examples and tracking tables; the Aquifer Protection Area Program web site is at www.ct.gov/deep/aquiferprotection
- Provided technical assistance to numerous towns in response to inquiries and requests for assistance with aquifer protection issues;
- Completed work with the water utilities to develop a Municipal Assistance Program;
- Continued to collect and review data, including point and nonpoint pollution sources, land use/land cover, and water quality data; and
- Continued to update the Water Quality Classifications, and Leachate & Wastewater Discharge coverage for the Thames River major basin, as well as evaluated and approved (if appropriate) requests for reclassification of groundwater; and

Long Island Sound

Long Island Sound (LIS) is one of Connecticut's most important natural and economic resources, serving as habitat to many aquatic marine invertebrates, fish, and wildlife populations, a commercial and recreational resource to the citizens of CT and NY, and contributing an estimated $8.5 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 in LIS waters. CT and NY have implemented management actions including upgrading of sewage treatment plants (STPs) to remove more nitrogen from STP discharges entering LIS, thus alleviating the spread and intensity of hypoxia. Another challenge facing LIS are pressures for increased recreation and

public access of the Sound, and commercial interests for energy and commerce. Habitat restoration projects are being carried out through a number of programs with the goal of preserving 1092acres of coastal and near shore habitat and 203 river miles of migratory fish passage in CT and NY by 2012. In addition, citizens, their elected officials, and agencies are working to implement the Long Island Sound Stewardship Initiative preserving 33 areas of ecological and recreational value and identifying additional areas to preserve and protect for future generations.

CT DEEP's Long Island Sound management efforts revolve around two major programs: the Long Island Sound Study (LISS) estuary program, coordinated through the Bureau of Water Protection and Land Reuse Planning and Standards Division (BWPLR PSD) in cooperation with DEEPs Coastal Management Program, which is administered by the Office of Long Island Sound Programs (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 toxic contamination, pathogens, floatable debris, loss of fish and wildlife habitat, and land use and development pressures. 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 DEEP and the New York State Department of Environmental Conservation (NYS DEC) TMDL for nitrogen loads to Long Island Sound. The TMDL calls for an approximately 64 percent reduction in nitrogen loads from point sources and a 10 percent reduction in nitrogen loads from nonpoint sources from urban and agricultural land. In 2008, CT DEEP in collaboration with EPA LISS and NYS DEC initiated revision of the 2001 TMDL. This was undertaken to address the change in the hypoxia model from LIS 3.0 to SWEM (System Wide Eutrophication Model), as well as work completed by the Connecticut River Workgroup (CTRW). The work completed by the CTRW provided a better estimate of nitrogen loading from both point and nonpoint sources from states upstream of Connecticut but included in the LIS watershed. This work also included a cost evaluation of best management practices and proposed target nitrogen reductions.

In 2002, the nitrogen credit trading program and a statewide general permit with nitrogen limits for 79 sewage treatment plants were initiated. Through 2010, nine annual credit exchange cycles have now been completed with oversight by CT DEEP and a nitrogen credit advisory board. It is anticipated that the trading program and general permit will continue to

enable the state to meet the nitrogen load reduction required by the TMDL more cost-effectively.

The LISS contracted with Manhattan College and HydroQual Inc. in developing a nonpoint source nutrient watershed modeling tool. A nitrogen-tracking program has been developed and the LISS Nonpoint Source and Watersheds Workgroup has begun fine-tuning and implementation of the approach. The program will allow managers to determine progress towards the 10% load allocation reduction in CT and NY specified in the TMDL. Work was completed on a Long Island Sound Riparian Buffer Toolbox that is posted on the LISS web site providing resources for local officials in drafting and implementing regulations to protect riparian areas. Riparian buffers can be a very effective means of reducing nonpoint source pollution to receiving waters in developed watersheds, similar to that of the Long Island Sound.

Identifying the causes of nonpoint source pollution and the relationship to human activities to the health of Long Island Sound is a priority area of concern for CT DEEP and the Long Island Sound Study estuary partnership. LISS and CT DEEP have contracted with the University of Connecticut's NEMO program and it's Center for Land Use Education and Research (CLEAR) on projects to map land use and land cover in the coastal areas of Connecticut and New York. (see http://clear.uconn.edu/) The Long Island Sound Regional Impervious Surface Study, the Coastal Riparian Buffer Analysis, and the Coastal Area Land Cover Analysis Project are important tools available to municipal and environmental managers in guiding future development needs while protecting watershed health. (http://clear.uconn.edu/research/index.htm) These projects utilized GIS technology to identify land cover and land cover change within LIS watersheds and riparian corridors of coastal Connecticut. (http://clear.uconn.edu/projects/riparian/interactive.htm) Riparian, or streamside, corridors are known to be environmentally important areas critical to stream stability, pollutant removal, and both aquatic and terrestrial wildlife habitat. Many of the threats posed to Long Island Sound are directly or indirectly the result of the urbanization of the watershed, particularly with the increase of impervious surfaces. Impacts related to the increase in impervious surfaces include: deterioration of water quality resulting in polluted surface waters, reduced ground water recharge resulting in a decrease in available sub-surface ground water, and an increase in runoff volume resulting in flood control problems.

The LISS and CTDEEP have also been investing time and funding in habitat restoration activities that are relevant to NPS pollution abatement. In 2006, the LISS adopted 33 Inaugural Coastal Stewardship Areas and in September 2006 Congress passed the Long Island Sound Stewardship Act of 2006, which was signed into law by President Bush (Public Law 109-359) in October. The bill authorizes up to $25 million per year for stewardship projects, including acquisitions of environmentally-sensitive lands for LIS that will help protect sensitive habitats but also ensure protection of land conditions that are amenable to pollutant removal. (http://longislandsoundstudy.net/issues-actions/stewardship/background/) LISS is also involved in CT DEEP 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.

Connecticut and New York have made commitments to have 50% of their respective sub-watershed areas in the LIS watershed developing or implementing watershed management initiatives in collaboration with locally based public and private entities by 2014. So far 38 percent of the CT and NY watershed areas have reached that goal.
(http://longislandsoundstudy.net/2010/07/watershed-management/)

With funding from the Long Island Sound Study (LISS), CT DEEP has also conducted extensive monitoring of Long Island Sound. The program is used to track changes in low dissolved oxygen levels as well as water temperature, nutrient levels 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 DEEP and the LISS use these data to chart management progress, particularly for control of nitrogen, the primary pollutant leading to hypoxia.
(http://www.ct.gov/dep/cwp/view.asp?a=2719&q=325570&depNav_GID=1654)

Coastal Zone Management

Niantic River Watershed Plan implementation progress continued during this reporting period. A permanent watershed plan coordinator was hired through the Eastern Connecticut Conservation District, using Clean Water Act Section 319 funding. OLISP and other DEEP staff worked with the new coordinator to help oversee several Implementation Committee working sub-groups on monitoring, education and outreach, and board development. The project website http://www.nianticriverwatershed.org/ is now fully functioning. During this reporting period, the DEEP's Low Impact Development (LID) Coordinator conducted an LID workshop in Waterford for land use staff that also included a site visit to Oswegatchie School to observe several LID practices installed on the school grounds. We anticipate continued coordination with the Niantic River watershed plan coordinator as plan implementation continues into future reporting periods.
During this reporting period, OLISP staff participated in the annual nonpoint source pollution conference in Plymouth, Massachusetts, sponsored by NEIWPCC. The annual conference is an opportunity for regional information-sharing in New England and New York regarding various nonpoint source pollution issues and projects. Conference attendees from state, federal, and municipal governments, private sector, academia, and watershed organizations participated in sessions addressing climate change in New England and its potential impacts on water quality; climate change adaptation planning for water quality management; case studies and in Low Impact Development (LID) and examples of LID ordinances; social marketing; and an update on the Eagleville Brook Impervious Cover Total Maximum Daily Load (TMDL) in Mansfield, CT, the nation's first impervious cover-based TMDL. In addition, representatives from the University of New Hampshire's Stormwater Center presented the results of their current research on the efficiency of cutting edge stormwater best management practices. These topics comprise key components of Connecticut's coastal nonpoint source pollution control program (CNP), and information from conference presentations will provide additional support for implementation

of the wide range of programs contained in the CNP, resulting in improved environmental quality and better stewardship of Connecticut's coastal resources.

OLISP staff is participating on a stakeholder group established to evaluate the incorporation of LID principles into the state's Stormwater General Permits. The Connecticut Department of Energy and Environmental Protection (DEEP) has initiated a project to explore opportunities to add LID concepts and planning into the construction, municipal separate storm sewer systems (MS4s), industrial, and commercial stormwater general permits. The project will also make recommendations for modifications of the *Soil Erosion and Sediment Control Guidelines* and the *Stormwater Quality Manual* to better incorporate LID principles. DEEP intends for this to be a partner-driven process and has established a stakeholder group to participate in the review of current DEEP policies and standards and offer strategies to incorporate LID into DEEP's programs. Using American Reinvestment and Recovery Act funding, DEEP entered into a contract with Fuss & O'Neill, an engineering consulting firm that was also retained by the DEEP to develop and update the *Stormwater Quality Manual*. The Fuss & O'Neill team will include Larry Coffman, who originated the LID method in Prince George's County, MD and authored *Low-Impact Development Design Strategies* (2000), which was the very first LID manual in the country. A series of five meetings will be held over the course of the eight-month project. The website for the project can be found at http://www.ct.gov/dep/cwp/view.asp?a=2719&q=459488&depNav_GID=1654

During this reporting period, OLISP staff participated in a meeting and site visit to the Jordan Cove low impact development (LID) subdivision in Waterford with representatives from EPA and the Town of Waterford in a fact-finding mission for EPA's new stormwater rule-making. EPA has initiated a national rulemaking to establish a program to reduce stormwater discharges from new development and redevelopment and make other regulatory improvements to strengthen its stormwater program. The Jordan Cove LID subdivision is an Urban Watershed National Monitoring Program Project funded, in part, through the Connecticut Department of Energy and Environmental Protection (DEEP) and the U.S. EPA's Section 319 National Monitoring Program. The project was a ten-year study designed to determine the water quantity and quality benefits of using pollution prevention best management practices (BMPs) in developing an urban residential subdivision. Stormwater runoff from three subdivision watersheds—a control watershed, an existing "traditional" watershed, and a BMP watershed—was monitored as part of the study. The runoff from the BMP and traditional subdivisions was compared to the control watershed to determine whether or not using BMPs would maintain pre-development hydrologic conditions during and after residential development. More information about the Jordan Cove subdivision project can be found at http://www.jordancove.uconn.edu/.

The CNPS Program Coordinator is also participating in the 2010 Groton Coastal Climate Adaptation Workshop series sponsored by Connecticut DEEP and the International Council for Local Environmental Initiatives (ICLEI), designed to help engage representatives from federal, state, and municipal governments in climate adaptation efforts and to begin defining strategies for maximizing resilience to coastal impacts throughout Connecticut and the Northeast.

Participation in this workshop series will enable the CNPS Program Coordinator to work with other coastal nonpoint source municipalities to consider adoption of climate change adaptation strategies discussed for the Town of Groton, including smart growth and LID techniques to, in part, decrease stormwater runoff volumes in light of the potential increase in precipitation resulting from global climate change.

The towns of Westbrook, Clinton, Essex, and Old Saybrook sponsor an on-going series of regional workshops to assist land use decision-makers in balancing growth and protecting natural resources. During this reporting period, the Coastal Nonpoint Source Program Coordinator and other OLISP staff conducted a coastal management workshop for this series to re-energize municipal efforts and commitments to protecting coastal resources and water-dependent uses. The workshop included an overview of the coastal site plan review process and highlighted the basics of coastal nonpoint source management measures, including low impact development (LID) techniques to discourage increases in total impervious cover and encourage the incorporation of vegetated resource buffers. The workshop also presented an updated section on planning for nonpoint source pollution controls, and incorporating climate change considerations into the local planning and zoning process. In addition, the CNPS Program Coordinator participated in another workshop in this series presented by the Town of Westbrook's engineering consultant addressing stormwater management through LID techniques. Potential opportunities to revise municipal zoning and subdivision regulations and Plans of Conservation of Development to incorporate LID techniques were discussed at length.

The coastal nonpoint source pollution control program coordinator is a member of the Long Island Sound Study Nonpoint Source Work Group. During this reporting period, the work group refined its work plan and established priorities for 2011, which include continued funding for the University of Connecticut's Center for Land Use and Research (CLEAR) to create a new 2010 Long Island Sound watershed dataset, updating the data for both New York and Connecticut; support for a new public perception survey to help target a social marketing campaign; continued educational outreach to various public audiences about fertilizer laws and stormwater runoff as a vector for nonpoint source pollution; and the need to better understand stormwater and other nonpoint source BMPs and how they work in the climate of the immediate LIS region. Please see the following updates LISS work group-related webpages:
LISS NPS Work Group
http://longislandsoundstudy.net/about/committees/nonpoint-source-pollution-and-watersheds-work-group/
LISS Watershed Management
http://longislandsoundstudy.net/issues-actions/watershed-management/
LISS River and Stream Bank (Riparian) Restoration Toolbox
http://longislandsoundstudy.net/research-monitoring/river-and-stream-bank-restoration-toolbox/
OLISP continues to implement the Clean Marina Program. By the end of this reporting period, twenty-seven facilities were certified as Clean Marinas. Twenty-six marinas were on the list of facilities pledged to become a Clean Marina. Two verification visits were conducted during this reporting period and are close to certification. Staff also used this reporting period to continue

to revise and streamline the certification process, including involving Connecticut Sea Grant with necessary updates to the Clean Marina Guidebook to more accurately reflect current regulatory requirements. Updates to the Compliance and Award checklists used to evaluate facilities are also continuing to be made to streamline the certification process. Forms are in the process of being posted to the DEEP website for ease of use by facilities and to allow for regular updating. Staff continues to work with a number of facilities who have submitted checklists for review and site confirmation visits in an effort to certify additional facilities within the next reporting period.
DEEP staff continues to be involved in Clean Marina issues on a regional and national basis. OLISP staff continues to participate in a regional Marina Work Group sponsored by NEWMOA and the EPA. Proper management of boat bottom pressure washing wastewater continues to be an issue that affects all New England marinas. In Connecticut the Clean Marina Program has been a partner in communicating the requirements for proper handling of this wastewater. OLISP staff worked with staff in the Department's Water Permitting and Enforcement Division to review and comment on proposed guidance for recreational vessel discharge best management practices in cooperation with the Connecticut Marine Trades association. A draft suite of BMPs developed by CMTA was compared with the draft BMPs and conditions on the EPA aborted Recreational Vessel General Permit that was made moot by the passage of the Clean Boating Act of 2008. Revisions to the CMTA proposal are currently under review. The BMPs will include routine winterization practices that have result in minor discharges of winterization fluid (Propylene Glycol) among other routine maintenance and operational practices conducted by boat owners and staff at marinas and boatyards.

Clean Marina Program

OLISP continues to implement the Clean Marina Program. By the end of 2010, 29 marinas had been certified as "Clean Marinas." The pledged facility list was not managed during this timeframe. All facilities that had previously pledged were maintained on the list. 20 facilities remain on the pledged list.

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 306 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 DEEP 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 2010:

- *Clean Marina staff conducted outreach at the following events:*
    - *The Hartford Boat Show*
    - *The CT Marine Trades Association's Annual Marine Exposition*
    - *The CT Harbor Management Association's Annual Environmental Meeting*

- *Clean Marina staff conducted informal informational site visits to several CT marinas as well as two targeted workshops in Old Lyme and Norwalk to encourage marina participation in the program.*

- *Clean Marina staff* conducted 3 verification visits resulting in 2 new certified facilities

Information on the Department's Clean Marina Program can be found at: www.ct.gov/dep/cleanmarina.

Vessel Sewage Management

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

Funding from the U.S. Fish and Wildlife Service through the Clean Vessel Act (CVA) grant program has allowed DEEP OLISP to fund the construction, operation, and maintenance of many marine sewage disposal facilities (MSDF) including 79 stationary pumpout facilities, fifteen (15) pumpout boats, and 14 dump stations available to boaters at boating facilities along Connecticut's coastal waters.

In 2010, approximately 619,735 gallons of sewage were properly collected and disposed of through CVA funded marine sewage disposal facilities.

EPA approved the application for designation of all Connecticut coastal waters in Long Island Sound and its navigable tributaries from the New York state boundary in the Byram River to Guilford as a No Discharge Area (NDA) on June 2007. All Connecticut coastal waters are now a designated NDA. The current website is: http://www.ct.gov/dep/cwp/view.asp?a=2705&q=323816&depNav_GID=1635.

A directory of pumpout stations and boats can be found on the CT DEEP 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 DEEP 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 DEEP has used these programs and resources to restore nearly 2300 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 2,000 additional acres of coastal habitats such as tidal wetlands and coastal grasslands by 2008. In September 2006, the LISS set a new goal to restore or protect an additional 300 acres of coastal habitat and open up an additional 50 miles of riverine migratory corridor to diadromous fish from January 1, 2006 to December 31, 2011, and ultimately restore 2,000 acres by 2020.

In 2010:

- Duck Pond and Duck River (Old Lyme) – 5.4 acres of tidal wetlands (TW) were restored and 0.3 miles of riverine migratory corridor were reconnected to LIS for diadromous species of fish.
- Tweed/New Haven Airport – 70.5 acres of TW were restored.
- Brides Brook / Rocky Neck State Park (East Lyme) – 82.4 acres of TW restored, and 5.1 miles of RMC reconnected.
- Burritt Cove (Westport) – 0.16 acres of TW restored.
- Continental Farm (Stonington) – 35.8 acres of TW restored.
- West Point Road Park (Branford) – 2.5 acres of TW restored.
- Wakeman Island (Fairfield) – 2 acres of TW restored.
- **Grand total of 198.76 acres of TW restored and 5.4 mile of RMC reconnected.**

- Another aerial survey of eelgrass in eastern LIS was completed during summer 2009, and it was done using the same techniques as the 2002 and 2006 surveys. Preliminary results of the 2009 survey are not ready yet.

Atmospheric Deposition

CT DEEP continues to participate in a Critical Loads Ad Hoc Committee sponsored by the National Atmospheric Deposition Program. The critical loads cover both land and water effects. The short-term goals of the Committee will be to gather scientific data and information to fill gaps in critical load development in the US. Eventually, the findings will help define management goals that could benefit both terrestrial and aquatic environments.

A regional Total Maximum Daily Load (TMDL) for mercury was coordinated through the New England Interstate Water Pollution Control Commission (NEIWPCC) and included the New England states and New York. The TMDL gained approval from EPA in 2007. A large portion of the mercury comes from out of state sources via atmospheric transport and deposition, becoming part of the stormwater and nonpoint source load. The states and NEIWPCC have decided to submit a Section 319(g) petition to EPA to request convening a management conference to address those out of state sources. The petition was submitted in October 2008, and EPA has begun planning for the first conference meeting tentatively targeted for late June, 2010.

In 2010, the upstream states of Massachusetts, Vermont, and New Hampshire joined Connecticut and New York in preparation of the revised Long Island Sound TMDL for nitrogen. The TMDL process involves allocating loads to watershed (WWTFs, regulated and non-regulated storm water, and agriculture) and atmospheric sources. The group plans to assign the air deposition of nitrogen using estimates of the new ozone standard once it is adopted. It is anticipated that a new CMAQ model run will follow adoption of the standard. In the meantime, an estimate from the 2020 Maximum Feasible Scenario will be used to develop a tentative allocation. Recently, it was determined that the draft TMDL document will be completed on a longer time frame (2013) in order to allow for additional analyses and an enhanced implementation of the 2000 TMDL.

Fish Habitat Restoration

The CT DEEP 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 DEEP 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, The Nature Conservancy, 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. Providing fish passage at the Wallace Dam (first barrier on the Quinnipiac River) in Wallingford has been a top priority for many years. Progress was achieved in 2007 when final designs for a Denil fishway at the Town-owned dam were completed. The project was delayed in 2010 due to the need to secure additional funding and permits. It is now expected that construction will begin by September of 2011 using 319 funding.

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.

Stormwater Management

Stormwater permitting and compliance is conducted by the CT DEEP Water Permitting and Enforcement Division (WPED) under the authority of the CWA National Pollutant Discharge Elimination System (NPDES) stormwater provisions and supporting state statutes and regulations.

CT DEEP regulates stormwater discharges from the following sources:

- Construction sites (sites 1-5 acres in size are not required to register with DEEP if municipal approval have been obtained; sites 5 acres or more must register with CT DEEP),
- Industrial activities (activities defined as "light" industries with no stormwater exposure submit a No Exposure Certification in lieu of a permit registration),
- Commercial sites with more than 5 acres of impervious area, and
- Municipal separate storm sewer system discharges.

Approximately 2200 facilities, towns or activities were registered under the various stormwater discharge general permits as of July, 2011, many of which have annual monitoring requirements. There were 1460 industrial operations, 380 construction sites, 229 commercial sites, and 113 MS4 activities. Additionally, approximately 100 No Exposure Certifications for the industrial general permit were approved as of July, 2011. DEEP stormwater staff conducted 64 inspections and issued 91 Notices of Violations for stormwater related violations.

Accomplishments in 2010 include:

- CT DEEP reissued its industrial stormwater general permit with modifications. The new permit was issued on August 23, 2010 and will become effective on October 1, 2011. Existing permittees must reregister by June 1, 2011. The new permit has significant modifications including increased emphasis on impaired waters and endangered species, more frequent sampling, increased inspection requirements, new benchmarks, the implementation of effluent limits for certain industries, provisions for public access and review of each registration and a new format that allows the permit to address specific activities beyond the basic permit requirements at facilities that fall into one of ten "sectors".
- CT DEEP reissued its construction general permit in "as-is" form to maintain permit coverage while the Department works to reissue the permits in modified form.

Stormwater staff began drafting a modified construction general permit to go to public notice in 2011.

- CT DEEP stormwater staff issued 12 consent orders, with penalties, to municipalities regulated by the MS4 permit for permit violations related to failure to submit annual reports and sampling data.

- CT DEEP stormwater staff referred 4 enforcement cases to the Attorney General for violations of stormwater general permits.

Agricultural Nonpoint Source Management

Concentrated animal feeding operations (CAFOs), an important source of agricultural pollution, are now defined by EPA as point sources. CT DEEP, which is authorized by EPA to administer its NPDES permitting program, will implement the CAFO permitting program with a statewide general permit. Of the thousands of animal feeding operations (AFOs) in Connecticut, CT DEEP has determined that there are approximately 10 large CAFOs by numbers and possibly 35 medium CAFOs statewide. The DEEP 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 are based on the agronomic critical ranges required for crop production as established by the UConn Soil Nutrient Analysis Laboratory, or UConn-recognized industry practice. Recommended rates are based on soil nutrient analyses and crop tissue tests, documented yield information, environmental risk 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 DEEP is slowly moving forward with development of the CAFO General Permit.

Agricultural NPS program accomplishments in 2010 include:

- NRCS and UConn/CES – DEP continued to approve Comprehensive Nutrient Management Plan (CNMP) under partnerships with NRCS and UCONN.

- Nutrient management plans are being implemented on farms throughout Connecticut in cooperation with DEP and farmers.

NRCS and UConn/CES continued to work with agricultural producers to provide a user-friendly computerized record-keeping system to help them track nutrient use on their fields. CT NRCS

has adopted the use of the nationally recognized Manure Management Planner (MMP) a windows-based computer program developed by Purdue University to develop CNMPs. MMP for CT should be up and running in the fall of 2011. (UConn/CES has continued a 319-funded IPM/ICM program continued to work with communities throughout CT, with a focus on outreach and education.

Technical Assistance Program/Demonstration Projects

NEMO

The NEMO (Nonpoint Education for Municipal Officials) program began in 1991, with the foundation that education – not regulation – is the most efficient and cost-effective, means of influencing land use decisions. Initial programming emphasized "linking town halls to land use and water quality" using build-out projections, remote sensing, impervious surface cover, and water quality ratings to show towns various scenarios for the future. CT DEEP and UConn/NEMO have had a long and productive partnership on projects that support the state's Nonpoint Source Program. Early partnership efforts focused on applied landscape research and statewide educational efforts, including a "Municipal Initiative", where NEMO staff worked intensively with towns. These programs have resulted in many changes to local plans, regulations and development designs as documented in the national award winning NEMO impact report, *Putting Communities in Charge* (Rozum and Arnold, 2004).

NEMO provided education on stormwater to numerous municipalities, groups, agencies and at conferences both in the state and regionally. During the project period, NEMO educators conducted 40 workshops or talks about LID and stormwater management to hundreds of local commissioners, professionals and the public. Education has been a key factor in preparing the state for the acceptance of LID and other practices. The partnership between UConn NEMO and the DEEP has made this education possible and has served as a model around the country. By 2009, over 30 states have adopted the NEMO education model and have been promoting the use of LID and other alternative stormwater approaches.

In 2009, NEMO took the lead in an innovative project to respond to the first impervious cover-based TMDL in the country, which CT DEEP promulgated for the Eagleville Brook watershed in Mansfield, CT. The project is a partnership between CT DEEP, the University of Connecticut, and the Town of Mansfield. The NEMO team and its partners assembled a geospatial database of the watershed, and updated the impervious coverage and storm drainage data layers using the latest high resolution imagery. A week of field work in July 2009 resulted in a list of 51 stormwater retrofit opportunities, and a "Top Ten" list of high priority retrofit sites for which detailed designs were developed. A Watershed Plan for the project has been submitted to CT DEEP, and is awaiting approval. Although still in progress, the project has already resulted in several implemented and planned practices. A pervious asphalt (the first in the state) and a pervious concrete parking lot have been installed. Pervious parking stalls and rain gardens were installed at a campus residence complex. Most recently, (summer of 2011), the first new building constructed since the TMDL was implemented includes a green roof, bioswale, and

pervious pavers. A Watershed-Based Plan has been developed for the watershed, and NEMO is working with both the Town and the University on changes to their regulations and procedures in support of the IC-TMDL.

NPS Program Contact List

CT DEEP Nonpoint Source Coordinator	(860) 424-3347
US EPA Nonpoint Source Coordinator	(617) 918-1687

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 and Enforcement	(860) 424-3018
NRCS Water Quality Coordination	(860) 977-1543
Inland Fisheries Division	(860) 424-3474
Marine Fisheries Division	(860) 434-6043
Office of Long Island Sound Programs	(860) 424-3034