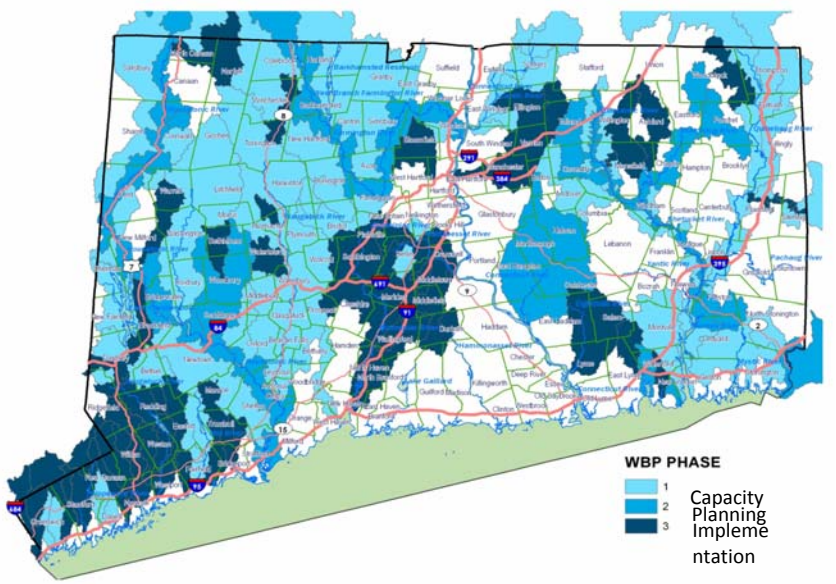
Nonpoint Source Management Program 2011 Annual Report



Connecticut Department of
ENERGY &
ENVIRONMENTAL
PROTECTION

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.

Table of Contents

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 strong partnerships with a wide range of public agencies, industry organizations, and private 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) (US EPA Nonpoint Source Management Programs), from which it receives yearly funds to support projects and program staff.

Nonpoint source pollution originates as runoff from roads, parking lots, driveways, roofs, lawns, recreation fields, broken septic systems, and….[please complete]. Sources include such things as:

- Bacteria from pet and waterfowl waste, broken septic systems, and animal operations such as horse or dairy farms
- Nutrients (phosphorus and nitrogen) from fertilizing lawns, golf courses, and athletic fields, and from farm operations
- Sediment from construction sites, soil erosion, and winter sanding
- Chloride (salts) from winter deicing
- Heavy metals (lead, zinc, cadmium) and other toxic fluids from motor vehicles and industrial operations

Nonpoint sources of pollution are typically not regulated by state or federal pollution permit programs.

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 organizations for planning and implementation of environmental programs and projects with the goal of improving water quality. 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 primarily targeted to watersheds identified by the agency as impaired (i.e., not meeting state water quality standards), and/or for which the development of Total Maximum Daily Load (TMDL) analyses are required.

The Connecticut Department of Energy and Environmental Protection awarded $1,074,176 to help fund twelve projects designed to reduce NPS pollution in lakes and streams. Nonpoint Source Pollution (NPS) grants contracted in 2011 were funded with 2010 federal fiscal year monies provided to Connecticut by the EPA under Section 319 of the Federal Clean Water Act.

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. The EPA Long Island Sound Study also provides significant support for NPS efforts throughout the state. Numerous other funding sources, from other federal and state agencies, and private foundations, are utilized when available.

II. PROGRAM HIGHLIGHTS

In 2011, DEEP completed fifteen NPS projects. In 2011, the NPS program focused efforts on the completion of successful EPA approved 9 Element Watershed Based Plans (WBP) with the goal of implementing best management practices in prioritized watersheds in CT. These WBPs holistically assessed these prioritized watersheds across the State of CT. Below are highlights of some of those WBPs and their long term accomplishments toward water quality improvements.

Project Applicant	Project Title	Total Project Award
CT Federation of Lakes	Lake Organization Small Grants Program	$31,450
University of CT/ NEMO	Eagleville Brook Watershed Based Plan	$200,000
Lake Lillinonah Authority	Lake Lillinonah Water Qualtiy Monitoring	$12,000
University of CT	NEMO Catalyzing Community Actions	$70,000
Northwest Conservation District	Morgan Brook Watershed Based Plan	$50,000
Kings Mark RC&D	Horse Environmental BMP & Technical Services Phase I	$32,000
Connecticut River Coastal Conservation District	Coginchaug Watershed Based Plan – Farm BMP	$75,000
City of Bridgeport	Pequonnock Watershed Based Plan	$89,500
Town of Westport	Sasco Brook Watershed Based Plan	$20,000
Eastern CT Conservation District	Mashamoquet Brook water quality improvement BMP	$36,000

Connecticut River Coastal Conservation District	Coginchaug Watershed Based Plan Coordinator	$22,000
Kings Mark RC&D	Horse Paddock Stormwater Management BMP	$32,000
Eastern CT RC&D	North Canaan Nutrient Removal Management Practice	$130,000
Town of Tolland	Crandall Pond Watershed Based Plan	$10,000
Eastern CT Conservation District	Niantic River Coordinator	$28,000

Crandall Pond Watershed Based Plan

In 2010, DEEP began coordinated efforts with the Town of Tolland to begin the WBP for Crandall Pond. Using extremely limited funding resources, the Town depended on strong local capacity to monitor the lake, identify impairments, causes, load reductions, and potential management measures for the watershed. In addition, the town investigated potential funding partners, worked on a strong outreach program to residents and based on the capacity and partners has developed an initial schedule for management measures for future water quality improvements.

- Waterbody Name: Crandall Pond
- Project Grantee: Town of Tolland
- 319 Grant Amount: $10,000

Sasco Brook Watershed Based Plan

DEEP supported the Town of Westport to complete an extensive capacity building and planning effort in the towns of Westport and Fairfield to complete the Sasco Brook WBP. DEEP staff spent significant amounts of dedicated time and resources to work closely with the towns to assist with developing capacity among new partners and further develop the understanding of holistic watershed based planning and the elements of a WBP.

- Waterbody Name: Sasco River
- Project Grantee: Town of Westport
- 319 Grant Amount: $20,000

Pequonnock Watershed Based Plan

DEEP contracted with the City of Bridgeport to complete a complex Watershed Based Plan for the Pequonnock River Watershed. Bridgeport coordinated a multi-year effort with the Towns of Trumbull and Monroe. The City formed a multi-town, multi-department workgroup to draft the WBP. The Plan tackled complicated topics like CSOs, residential septic systems and areas of impaired urban stormwater. The Plan outlined and designed watershed wide and site specific best management practices to improve water quality, including LID measures and outreach programs.

- Waterbody Name: Pequonnock River

- Project Grantee: City of Bridgeport
- 319 Grant Amount: $89,500

Eagleville Brook Watershed Based Plan

In 2011, DEEP finalized work under a contract with UConn/ NEMO Program. A Watershed Based Plan was developed to fully assess the impairments, potential sources and load reductions for Eagleville Brook. The WBP built upon the TMDL that was finalized in 2007. This WBP included implementation options on the UConn campus as well as education and technical assistance for the town of Mansfield, where the Eagleville Brook is located. One of the major successes from the WBP was a more fully developed capacity on the campus that encourages ongoing collaboration and coordinated funding and technical efforts for future implementation.

- Waterbody Name: Eagleville Brook
- Project Grantee: University of Connecticut
- 319 Grant Amount $200,000

III. WATERSHED MANAGEMENT PROGRAM

Watershed Management and Low Impact Development

The CT DEEP has been in a comprehensive, regional, 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:
South Central coastal basin:

- Quinnipiac River.

Thames River basin:

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

Housatonic River basin:

- Pomperaug River, and
- Steel Brook.

Southeast coastal basin:

- Fenger River, and
- Niantic River.

Southwest coastal basin:

- Norwalk River,
- Sasco River, and
- Saugatuck River.

Connecticut basin:

- Hockanum River,
- Scantic River,
- North Branch Park River,
- Mattabesset River, and
- Coginchaug River.

Photos above include several Implementation Practices in the Crandall Pond Watershed, including (counter clockwise from the top) rain gardens, boat launch entrance, pet waste management and pavilion maintenance.

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 (WM) 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 WM Section administers river and lake watershed management programs in cooperation with other CT DEEP programs, other state and federal agencies, and nongovernmental organizations. The WM Section includes coordinator positions for the five major river basins (Thames, Connecticut, Housatonic, Central Coastal, and Southwest Coastal Basins), and oversees and coordinates 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 Watershed Managers includes:

- 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;
- Providing education and outreach on watershed issues, including the CT DEEP web site, fact sheets, meetings, workshops, and conferences;
- Managing 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; and
- Assisting in the development of basin reports, watershed assessments, TMDLs, and watershed based plans.

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 2011, CT DEEP emphasis continued on completing progress on previously provided assistance grants.

Other watershed management initiatives during 2011 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 based plans, which cover 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. WBPs are a holistic assessment of regional watershed conditions. In addition to including the 9 elements such as impairments, potential sources of those impairments and load reductions, these plans also include assessments of healthy areas in the watershed and protection and preservation strategies for the future.

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 2011, 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 Development (LID) techniques for reducing storm water and nonpoint source pollution runoff. Watershed Managers incorporate LID training and technical assistance for partners at the municipal, state and federal levels to provide information and outreach materials and technical coordination in the application of LID techniques. Watershed Managers promote LID management practices as part of Watershed Based Planning with municipal land use agencies and public and private stakeholders in order to protect, conserve and restore water quality in Connecticut.

The role of Watershed Management when supporting water quality improvement and LID

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. Below is a photo taken by Ms. Pelletier of local volunteers planting a rain garden at Hartford's Classical Magnet School.

project implementation includes:

- 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 project implementation efforts.

- Providing assistance to municipalities for the incorporation of LID regulations and ordinances into local zoning, subdivision and wetlands codes. This included follow up with ten towns within the Farmington River Watershed. Through DEEP, grants were awarded to ten towns 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. Seven additional towns passed regulations that incorporated Low Impact Development into local regulations in 2011. http://www.ct.gov/dep/cwp/view.asp?a=2719&q=477274&depNav_GID=1654

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

- Finalizing the Low Impact Development Appendix to the Stormwater Guidance Manual: http://www.ct.gov/dep/lib/dep/water/nps/swgp/lid_stormwaterfinal.pdf

- Finalizing the Low Impact Development Appendix to the CT Guidelines for Soil Erosion and Sediment Control: http://www.ct.gov/dep/lib/dep/water/nps/swgp/lid_soilerosionfinal.pdf

- 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. http://www.ct.gov/dep/lib/dep/water/watershed_management/wm_plans/lid/what_is_a_vegetated_riparian_area.pdf

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

Some of the CT DEEP Low Impact Development accomplishments for 2011 included:

- Providing stakeholder capacity building through participation at Watershed Based Planning conferences, technical assistance workshops, local watershed management meetings and with statewide interagency workgroups.

- Incorporating LID education and outreach materials, including brochures on LID practices, 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 Supplemental Environmental Projects to revise local land use regulations to incorporate LID regulations and ordinances and implement LID.

- The EPA, CTDEEP, and the Metropolitan District Commission continued the project coordination efforts to incorporate green infrastructure on the State Capitol Grounds. The Hartford Green Capitols Project highlights several stormwater retrofits: a green roof, rain gardens, rainwater harvesting (see photo of installation below) 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,andhomeowners.
  http://www.ct.gov/dep/lib/dep/water/watershed_management/wm_plans/lid/green_capitols_brochure.pdf

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 final CWA Section 319 watershed based plan ("WBP") was completed 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.

The watershed coalition met bimonthly with active participation of the Town of Greenwich Conservation, Environmental Health, Inland Wetlands and Planning and Zoning Departments, as well as the town of North Castle. Significant input was provided to guide revision and implementation of municipal policies, plans, and regulations including a Stormwater Manual to be published in 2012.

Watershed stakeholders include, but are not limited to the Town of Greenwich, Interstate Environmental Commission, Byram Watershed Coalition, Southwest Conservation District, Westchester County Planning/Conservation District, North Castle, 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 published a draft watershed-based plan in 2011 for nonpoint source pollution. The City of Stamford has continued to work with local park users to enhance the heavily used trail systems 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 SWRPA, the Mianus River Watershed Council, Greenwich, Stamford, Mianus River Greenway Alliance, SWRPA, Aquarion, North Castle, Westchester County Planning / Conservation District, and Mianus River Gorge Preserve. The final EPA approved Watershed Based Plan will be available in 2012.

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 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. A Draft Plan is expected in 2012. Watershed stakeholders include, but are not limited to Stamford, the Mill River Collaborative, and the US Army Corps of Engineers.

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 dredge impoundments and 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, and development of a draft watershed-based plan in 2011. Detailed ambient monitoring was completed by Harbor Watch / River Watch in 2011 and the additional funds for targeted monitoring are being sought. The watercourse can be treated-effluent dominated in late summer, but pathogen sources appear to be nonpoint sources and illicit discharges or leaks. A final Watershed Based Plan will be completed in 2012.

Watershed stakeholders include, but are not limited to SWRPA, 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 bacteria 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 to be funded by local municipalities despite the loss of State funding. Management of excess non-migratory Canada Geese has been identified as a

priority project and completed 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 has been 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 funded by CT DEEP.

The South West Regional Planning Agency has completed 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 SWRPA, 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. Fairfield County Hunt Club has been working with the Sasco Brook Water Pollution Abatement Committee and the Town of Westport to improve Best Management Practices for horse keeping and manure management at their facility. Nutrient and manure management activities continue to be emphasized at the local level. An extensive homeowner survey by high school students was completed, as part of the Watershed Based Plan creation, to gather information about and also educate citizens about their role in abating nonpoint source pollution.

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, private citizens, and the CT Department of Agriculture Aquaculture Division. The stakeholders finalized 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, potential flooding, lead and bacteria TMDLs, and riparian restoration.

The Mill River Wetland Committee continues to work on educational programs in schools. Trout Unlimited Nutmeg Chapter members have expressed interest in building capacity for watershed planning.

Watershed stakeholders include, but are not limited to Fairfield, RiverLab / Mill River Wetland Committee, Trout Unlimited Nutmeg Chapter, 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 Pequonnock River Watershed Based Plan was completed by the City of Bridgeport and the Pequonnock Watershed Partnership.

Watershed stakeholders include, but are not limited to Save the Sound, Bridgeport, Trumbull, Monroe, Greater Bridgeport Regional Council, Southwest Conservation District, 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. As part of this, CT DEEP is also working on a Statewide Phosphorus Reduction Strategy for Inland Non-Tidal Waters.

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 process for cleaning up 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 2011:

- As part of the Rest of River remediation process under the Housatonic GE PCB Consent Decree, EPA sponsored a series of mini workshops in April 2011 to provide information on PCBs and explore cleanup alternatives. This was followed by a public charrette in May 2011 to give the public an opportunity to better understand the decision-making process and share ideas with EPA. In a process separate from but related to the Consent Decree, EPA's New England regional office was required, in June 2011, to submit a pre-decisional document on remediation options to and attend a meeting of the EPA National Remedy Review Board which reviews large scale projects across the country for consistency and also provides feedback. Although this meeting was closed to the public, they were invited to

- GE submitted its 2010 PCB monitoring report for fish and aquatic insects for selected sections of the Housatonic River in Connecticut to CT DEEP. This voluntary monitoring report is a continuation of previous Cooperative Agreements between CT DEEP and GE. It pre-dates and is independent of the Consent Decree driven remediation process. The monitoring is intended to track PCB levels in aquatic biota in impaired sections of the Housatonic River in Connecticut per the migration of PCB contaminated sediments from GE's upstream facilities and other areas in Massachusetts. The sampling and analysis is conducted by the Academy of Natural Sciences of Philadelphia. The results of this monitoring are used to inform fish consumption advisories which are determined by the CT Department of Public Health. While PCB levels have generally declined and remained steady as compared to earlier monitoring years, levels still remain high enough to require stringent fish consumption advisories.

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 2011:

- The Town of Watertown continued to move forward on its 319-funded dam removal design project for Heminway Pond Dam by issuing a request for qualifications for consulting firms, interviewing five firms, and selecting Princeton Hydro to perform the work. Subsequently, the Town and Princeton Hydro worked on refining a detailed contract scope of services and negotiating a fee. Several issues relative to the project needed to be addressed before arrangements could be finalized but these were ultimately resolved. This project 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) entered into contract with CT DEEP for a 319 funded project to retrofit the two failed stormwater basins at Highwood Estates, an older subdivision in Thomaston, which drain to Northfield Brook Lake. Next, NCD moved forward to solicit bids for the construction work. This is a major 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.

- CT DEEP and the Town of Seymour continued to work on long-term plans for constructing a bypass channel for diadromous fish passage at Tingue Dam. This project is being supported by funding from CT DEEP Supplemental Environmental Penalty, American Resource and Recovery Act, and National Oceanic and Atmospheric Administration. During this time period, CT DEEP and the Town continued to work cooperatively on acquiring all the property rights needed to construct the bypass. In addition, a revised hydrologic and hydraulic analysis report by Milone and MacBroom, CT DEEP's consulting engineer, was submitted to the Connecticut Department of Transportation (CT DOT) for review and approval since a portion of the bypass will be constructed on their property. CT DOT concluded its review and approved the hydrologic and hydraulic analysis report in October. With this approval, CT DEEP has met all conditions required to construct the project on CT DOT property. Also during this period, CT DEEP legal staff continued their review of the Operations and Maintenance Agreement that will govern how the Town of Seymour and CT DEEP will manage the bypass and associated park. The proposed Operations and Maintenance Agreement was submitted to Seymour for review and comment. Seymour will focus on reviewing this agreement once all property rights are secured. CT DEEP anticipates going to bid on the project in 2012.

- The Naugatuck River Forum, a one day conference was held in Waterbury for stakeholders who have been or are interested in working to restore the river, create greenways and promote sustainable economic development in the municipalities bordering the river. This well attended and successful event was organized by Rivers Alliance of Connecticut and funded by the Connecticut Community Foundation. CT DEEP participated in Steering Committee meetings and provided input prior to the event.

Still Regional Basin

The Still River watershed comprises approximately 71 square miles in the towns of Danbury, Bethel, Brookfield, and New Milford near the New York state border. The river flows from south to north and enters the Housatonic River in New Milford just north of Lake Lillinonah. Located about an hour's drive north of New York City and bisected by several major highways,

much of the watershed is heavily to moderately developed.

Although water quality has improved significantly since the late 1960s, the Still River is still struggling to recover from its reputation as an extremely polluted river. During the Industrial Revolution, the City of Danbury was known as the "hatting capital of the world" because of its high concentration of hat manufacturers. Using great quantities of water in its manufacturing processes, these industries discharged wastewater laden with pollutants such as dyes and mercury. These industrial wastewater discharges ended in the late 1970s - early 1980s when the last hat manufacturer went out of business. In 1993, a significant step in improving water quality was made when Danbury completed a major upgrade to its sewage treatment plant.

With funding support from the CT DEEP Lakes Management Program, Danbury completed a "diagnostic-feasibility study" of Kenosia Lake, which is on the state's 303(d) list of impaired waters. The City of Danbury subsequently received Section 104(b)(3) grant funds from CT DEEP to map the stormwater drainage system in several subwatersheds of Lake Kenosia and analyze pollutant inflow to the lake from the drainage system.

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

Due to bacteria impairments, a TMDL for recreational uses of the Still River Basin was created and finalized in 2010.

In 2011:

- The City of Danbury and other stakeholders, including CT DEEP, participated in regular committee meetings to reconstitute and determine the future of the Still Rivers Alliance. During this time period, the primary focus of the Still River Alliance remained the Still River Greenway although there was discussion of expanding the purpose of the organization to include the entire watershed and water resource issues.

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. Unfortunately, *Didymosphenia gemintata* (aka Didymo), was identified in stretches of the Upper Farmington in early 2011. CT DEEP Inland Fisheries Division is tracking the issue and has developed information for the public in an effort to help prevent the spread of this invasive alga.

West Branch & Upper Farmington - The Farmington River Coordinating Committee (FRCC), the stakeholder group (consisting of the National Park Service, CT DEEP, 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 water resource related projects which FRCC helped to fund in 2011 included: water quality monitoring, vernal pool identification and mapping, and a Still River watershed study to identify water quality issues and potential solutions.

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

which have been identified for this area are: geology, water quality, biological diversity, cultural landscape, and recreation. Also serving on the Study Committee is CT DEEP, 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 provides an invaluable opportunity for Study area towns to come together, mobilize public participation, and create a locally-shaped vision for their communities to protect and preserve highly valuable water resources. Ultimately, the management plan will help guide the actions of a locally led coordinating committee which will oversee the plan's implementation (non-regulatory, advisory only - similar to the FRCC above), if and when Wild & Scenic designation is obtained.

In 2011, NPS-related projects throughout the Farmington Regional Basin included:

- Finalization of the "Lower Farmington River and Salmon Brook Wild and Scenic Management Plan" by the Study Committee.

- Finalization of the "Lower Farmington River and Salmon Brook Wild and Scenic Study – Study Report and Environmental Assessment" by the National Park Service.

- Completion of a 319-funded draft mini-watershed based plan and map for Morgan Brook, an impaired tributary of the West Branch of the Farmington, by the Northwest Conservation District. CT DEEP reviewed the materials and provided NCD with comments for improvement of the forthcoming final products.

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, was dedicated to the development of a Watershed-Based Plan (WBP) for the North Branch Park River Watershed for MDC's failure to correct CSOs. The final North Branch Park River Watershed Based Plan was finalized in July 2010. The watershed includes the towns of Bloomfield, Hartford and West Hartford. A sum of $72,500 is being committed to a watershed coordinator and implementation practices described in the WBP. In 2011, the North Central Conservation District supported local efforts through a coordinated strategy with Park Watershed, Inc. a non-profit organization dedicated to improving water quality in the Park River.

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.

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.

Tankerhoosen River Subregional Basin

The Friends of the Hockanum River Linear Park of Vernon received a Section 319 NPS Watershed Assistance Small Grant to review local planning & zoning regulations for reducing imperviousness, as well as 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 had been 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, intensive animal feeding operations, equestrian operations, natural sources, waterfowl, and other unknowns.

The USDA Natural Resources Conservation Service (NRCS) completed a final Coginchaug River watershed-based plan in July 2008 with a Section 319 NPS grant. The plan can be found at: http://www.ct.gov/dep/cwp/view.asp?a=2719&q=379296&depNav_GID=1654 This project supports implementation of the Mattabesset TMDL for bacteria and the Long Island Sound TMDL for nitrogen. The WBP 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 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.

Salmon Regional Basin

Salmon River Conservation Strategic Action Plan

Project Manager Shelley Green of The Nature Conservancy (TNC) continued work on the Conservation Strategic Action Plan. She wound down early phase coordination of the Plan through the Salmon River Watershed Partnership and the Advisory Committee. An administration home and coordination transition will occur in 2012 as TNC Connecticut staff redeploy to other Connecticut resources priorities, including the broader Connecticut River watershed and Long Island Sound. Funding support from seven towns and staff resources from TNC continued to support the collaborative, science-based work of the Partnership.

The Partnership continued to act upon its 2007 Strategic Action Plan, focusing on overcoming the institutional and information barriers that often confront attempts to implement improved stormwater management/low impact development (LID), conservation of streamside forests, and management of municipal stormwater. The Partnership accomplished the following:

- Reconvened staff and commission members across all watershed towns to assess progress in implementing recommendations from the land use evaluation report, shared best practices, generated lessons learned, and looked for efficiencies to collaborate across towns. The Town of Colchester and the Town of East Hampton approved changes in their conservation subdivision and parking regulations. Land use commissions need to become comfortable to work with the new provisions allowing for alternative pavement materials and placements in (re)development projects.

Staff and Commission members meet to collaborate across watersheds in eastern CT. Meetings like these improve local responses to land use regulations and support education and outreach efforts by municipal staff and volunteers.

- Continued to tap into support from top-notch consulting land use planners and engineers, The Nature Conservancy, Connecticut DEEP, and University of Connecticut.
- Tapped into the education and outreach capacity of U.S. Fish & Wildlife Service, which has identified the Salmon River as a priority (not land acquisition highlight below).
- Hosted three open houses for the general public to increase awareness and support and to recruit volunteers.
- Continued to grow a regional pool of design engineers/developers with enhanced ability to incorporate LID practices.
- Continued the volunteer-based program to monitor water quality throughout the watershed, in coordination with the DEEP Water Monitoring program.

Local volunteers participate in a Rapid Bioassessment in Wadeable Streams and Rivers by Volunteer Monitors (RVB) in their local watershed.

- Formalized affiliation with Friends of Conte (National Wildlife) Refuge as a Friends group.
- With key watershed town planners, developed strategy to extend lessons learned from the 2010 land use evaluation project pilot towns to other towns in the watershed.

Gay City State Park LID Planning and Coordination

DEEP Watershed/NPS staff met with Gay City State Park staff in Hebron to develop consensus on installing common LID BMPs towards improving Recreation-impaired waters at the Park's swimming beach on the Blackledge River. A planning charrette map was used to illustrate hot spot NPS source areas and potential BMP locations. Park staff agreed to maximizing a naturally vegetated buffer between a vehicle parking area and a tributary, protective re-establishment of additional pond shoreline vegetation, installing pet waste boxes in popular areas of the Park, and continuing the effective No Feeding Waterfowl signage and related seasonal interpretive messaging at the beach. Parks management submitted an internal proposal to rip up the deteriorating bituminous pavement of a surplus parking area. This area discharges stormwater runoff down an eroding gully, picking up a suite of NPS pollutants through a core Park beach picnic area, located next to the river impoundment/swimming area. The project approval is expected in 2012 and 319(h) funds have been offered to offset material costs in regarding and top covering the parking lot for minimal surface runoff.

Land Acquisition in the Salmon Watershed

The Nature Conservancy transferred a 40 acre parcel to the U.S. Fish and Wildlife Service, Salmon River Focus Area of the Silvio O. Conte National Wildlife Refuge. This parcel is located in East Hampton and includes one half mile of Pine Brook, a direct tributary to the Salmon River. The Pine Brook Falls preserve is part of the exceptionally healthy Salmon River system. Though found in a rapidly developing region, it is part of an area that includes tidal marshes, forested riverbanks and streams teeming with trout. Targeted land and water resources acquisition is a critical element in effecting a Healthy Watershed approach to sustainable watershed protection in this river basin.

Eightmile Regional Basin

In 2011, the Eightmile River Wild and Scenic Coordinating Committee (ERWSCC) completed a study , entitled, "Stormwater Management Priorities: Road Map for Rural Towns Study," which was largely funded by a Long Island Sound Futures Fund grant, and developed in partnership with Eastern Resource Conservation and Development, Inc. and the towns of East Haddam, Lyme and Salem. The study provided enhanced mapping of stormwater outfalls including location relative to surface waters, infrastructure condition, outfall watershed impervious properties, and potential sources of nonpoint source pollution. Information gathered at each outlet was further used to develop a rating system to highlight particular areas of concern and offer suggested remedies that could be integrated into daily management of the stormwater system. Existing municipal stormwater management programs were reviewed for overall effectiveness along with short and long-term recommendations for future management decisions. The project consisted of several distinct phases and included the following:

- Stormwater Outfall Field Mapping and Field Data Collection;
- Development and Implementation of a Stormwater Outfall Priority Matrix;
- Review of Town Stormwater Management Practices;
- Stormwater Management Research, Recommendations and Report; and
- Development and Presentation of Training Workshops.

The study was undertaken to assess the existing stormwater outfalls as they relate to point and non-point source pollution and to assess the outfall properties and prioritize outfall improvements in as objective a method as possible for possible retrofits with and ultimate goal of meeting municipal safety requirements and improving water quality. Town staff and managers are now considering in-ground stormwater retrofit and related implementation projects for local capital improvement project lists and grant-based funding applications. The technical transfer opportunities are high, especially for clusters of communities within the Long Island Sound watershed that would benefit from a regional approach to this aspect of stormwater management. As part of this grant, a tabletop Enviroscape model was purchased and used at several public events. This 3-D interactive model demonstrates how both point source and non-point sources of pollution travel on the landscape and how various control methods can be applied to reduce water pollution.

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. In 2011, $50,000 was awarded to the Quinnipiac River Watershed Association for efforts to update the Quinnipiac Watershed Action Plan.

QRWA Outreach

The Quinnipiac River Watershed is a large and complex watershed. Because of changing capacity and multiple environmental programs, the leading nonprofit organization in the area, the Quinnipiac River Watershed Association (QRWA), has had the opportunity to work with multiple towns and local organizations to improve water quality in the watershed. In 2011, QRWA continued to work through several Section 319 NPS grants for outreach projects aimed at engaging the public and identifying NPS pollution through numerous streamwalks throughout the basin. Using a compiled database of volunteers' observations the group 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 throughout 2011 in an effort to gain ground for the update to the WBP that would be started in 2012. QRWA continues to partner with US EPA, CT DEEP, CT NRCS, the Community Foundation for Greater New Haven, and the QRWA Board of Directors, interns and members to ensure a complete assessment of the watershed is conducted.

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 was overseen by Save the Sound and completed in 2011. 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 in Killingworth 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 (Water Education for Teachers) 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 in the eastern third of Connecticut: 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, and more intensive residential and commercial development has occurred, primarily along major road transportation highways and some river corridors. 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 larger suburban expansion has occurred. Development and multiple expansion phases of two Tribal Nations casino resorts have created a decade-old and highly popular 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; preferential tax structure changes and realignment of the global corporation closed that facility in 2011, with discussions underway to sell the complex to the nearby Electric Boat Corporation. 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 redevelopment 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 NPS planning and management accomplishments in 2011 included the following:

French River Regional Basin

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 and pending 2012 Integrated Water Quality report.

A site visit was conducted at the former Belding-Corticelli Mill complex, a site with significant frontage along the French River, to consider long-stalled remediation projects and reuse planning strategies. Representatives from the Town of Thompson planning staff, a Licensed Environmental Professional, and a DEEP Watershed Manager all participated in the discussions. Subsequently, Town staff obtained a property owner agreement to formally access the site to fulfill an approved funding agreement by EPA and the CT Department of Economic and Community Development to hire engineers to perform a Phase 1 Environmental Site Assessment. The Town has obtained conceptual planning diagrams to initiate a community outreach and support campaign to outline land use options for the site. Watershed/NPS objectives include providing for limited safe public access and use, including waterfront access. This passive recreation access and riverside cleanup is consistent with recommendations from the 2005 French River Riparian Buffer Demonstration Project report; that report included a community planned and planted vegetated buffer upstream from this mill site, and a lower French River Streamwalk survey conducted by USDA NRCS staff that highlighted opportunities for cleanup and reuse of this river segment.

Quinebaug River Regional Basin

Eastern Connecticut Conservation District (ECCD)

In 2011, ECCD staff responded to over 100 inquiries from District residents, providing a wide variety of technical assistance on topics including land use regulations, low impact development, rain barrels, plant identification, installation of rain gardens, sediment and erosion control, forestry, storm water management, vernal pools, agricultural best practices, open space planning and management, NPS pollution controls, and riparian buffers and plantings. Staff also provided technical assistance to many Thames River basin towns, including assisting the Town of Ledyard with a successful grant application to install a riparian buffer

planting project on town land, assisting towns with development of MS4 stormwater management plans, low impact development education to land use commissions, and identification of potential stormwater BMPs at a public school.

Little River sub-regional watershed

Two agricultural projects addressed an ECCD core activity to work with farmers to help reduce nutrient loss in stormwater runoff. ECCD staff received a CWA Section 319(h) NPS grant to further implement a recommendation from the 2009 *Muddy Brook and Little River Watershed Plan*. Planning and multi-partner coordination began in 2011 at a dairy farm operation that will benefit from technical assistance by the USDA NRCS and the ECCD to address a silage leachate discharge that impacted aquatic life use support in the downstream North Running Brook. Another dairy farm operation will benefit from a separate CWA Section 319 (h) NPS award to ECCD for design and installation of a dairy barn roof gutter and drainage system, separating clean roof runoff from the adjacent and manure-laden heavy use cattle holding area. Key partners in that project also included the USDA NRCS and the farmer. Both agricultural BMP projects will be completed in 2012 and will include technical transfer workshops or site visits with area farmers and agriculture agency representatives.

Elsewhere in the town of Woodstock, ECCD staff began assessing potential stormwater retrofit sites and willing land owners for installation of high-visibility rain gardens and vegetated riparian buffers. These projects are based on recommendations from the Muddy Brook and Little River Watershed Plan and are planned to be compatible with recommendations in the 2004 Connecticut Storm Water Quality Manual. The latter project, with extended outreach included, should be completed in 2012.

Woodstock Nutrient Management Feasibility Study

The CT DEEP and Eastern Connecticut Resource Conservation and Development Area, Inc. (ECRCD) 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 than current operations. 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. The project somewhat stalled in 2011 due to mid-year loss of staff salary support with federal RC&D Area program budget rescissions. The Eastern CT RC&D Area board has committed to continuing this important project and began working with a transitioning set of subcontractor researchers, plant nursery cooperators, and manure suppliers in 2012-13.

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 piping ends back to an open channel river 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 initiated the TMDL project in 2010 with a 319(h) NPS grant with key stakeholders, including UConn's Center for Land Use Education and Research (CLEAR), the University of Connecticut and the Town of Mansfield. The project team consisted of the NEMO program 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(h) 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 led to development of a Summer 2011 workshop with 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 51" 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. If all 51 retrofit sites were completed, the estimated results would include a treatment area of 273 acres, costing approximately $6,220,000 and reducing effective watershed impervious cover percentage to 3.2%.

Retrofit projects identified included: bioretention, rainwater harvesting, permeable pavement, green roofs, rooftop disconnection to cisterns or turf, wetland creation/restoration, tree plantings, floodplain reconnection, soil amendments in compacted lawn areas, and stormwater planters. Each of these opportunities was evaluated using professional judgment as well as technical factors of impervious area treated, pollutant removal capability, runoff reduction estimates, cost, and maintenance requirements. Additional non-technical factor were then used to refine a "Top Ten" list, each linked with field notes and follow up 25 percent design conceptual drawings. If the Top Ten retrofit sites were completed, the estimated results would include a treatment of 74 acres, costing approximately $1,250,000 and reducing the effective watershed impervious coverage percentage to 11.1%.

Implementation installation practices through UConn operations 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 and 2011. UConn reported to DEEP on the calibration of the rating curve, and then daily stream flow values in electronic record formats.

In 2011, the final TMDL Implementation project report by CLEAR staff includes:

- A summary of stream flow monitoring program and findings/recommendations related to continuation of the nearly two year monitoring window.
- A completed watershed-based plan that was approved by all partners and serves as guidance and reference for future implementation.
- Real-time stream monitoring information is being shared with interested planners, engineers and other land use decision makers on an updated and dynamic website at http://clear.uconn.edu/projects/TMDL/index.htm.

- CLEAR staff also customized LID site review guidance for various University of Connecticut departments, as well as for the Town of Mansfield.
- A fact sheet about this TMDL implementation project was developed and distributed to Mansfield land use commissions, boards and broader citizenry. The guidance document and the fact sheet are aimed at assisting Mansfield's commissions and staff involved with a concurrent revision to zoning and subdivision regulations and practices, slated for public hearings and adoptions in 2013.
- CLEAR staff also completed a guidance booklet, *Responding to an Impervious Cover-Based TMDL: A Brief Step-by-Step Guide*, and posted it on the project website. Project partners will be tracking interest to see if this is of practical use since the IC-TMDL approach has not yet been duplicated in other watersheds within Connecticut. CLEAR project staff strongly recommends that CT DEEP expand the IC-TMDL approach to other appropriate Connecticut watersheds.

For 2012, a watershed plan advisory committee will be formed with CT DEEP 319(h) NPS grant assistance, and coordinated by CLEAR staff. A significant stormwater retrofit project is expected to be completed with another 319(h) NPS grant to UConn CLEAR, as well as other projects will be advanced as opportunities present themselves within the continual development and redevelopment of the UConn Storrs (main) campus. Project partners continue to seek support for expanding the water quality and quantity monitoring at the downstream weir station, in order to better quantify the effects of incremental retrofit practices on the core university campus.

Willimantic River Alliance (WRA)

The Alliance was founded in 1996 and has a mission "to protect and preserve the Willimantic River through cooperative and educational activities that promote regional awareness, stewardship and enjoyment of the river and its watershed". It is a coalition of citizens, officials and local agencies that supports development of the 2003-designated Willimantic River state Greenway (a 25 mile corridor from Stafford Springs to Willimantic) along nine riverside towns. In 2011, WRA continued to advocate for the river and its watershed by:

- Sponsoring a Water Supply Forum to promote information sharing among interested parties and a regional approach to water supply issues.
- Opposition to a legislative bill that would sidetrack the Connecticut General Assembly's approval of the proposed statewide stream flow regulations.
- Support for Rapid Bioassessment for Volunteers water quality tests in the river and in Cedar Swamp Brook by trained volunteers and high school students.
- Representation on Town of Mansfield's Four Corners Sewer and Water Advisory Committee to address regional potable water and wastewater planning needs.
- Updated the WRA website (www.willimanticriver.org) to enhance the Conservation page that includes recent water quality reports and latest information on innovative planning

and implementation projects to improve area water quality – such as in the Eagleville Brook tributary.

WRA also continued to promote recreation and education by:

- Development of an application to the National Park Service requesting a National Recreation Trail designation for the Willimantic River's Water Trail. WRA collaborated with several town and DEEP officials to create mini management plans for nine designated water access launch sites.
- Submitting suggestions to DEEP to enhance appropriate public access to the river as part of the Route 74 bridge crossing project next to Nye-Holman State Forest in Tolland.
- Sponsored or cosponsored events including the annual Spring Paddle on the upper river and annual Family Paddle on the middle river segment, as well as three regionally-promoted Walktober walking tours and paddle fall events.

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Windham Region Council of Governments (WINCOG)

In 2011 the regional organization unanimously supported a town member-raised resolution in support of watershed based planning. Such regional action was heartily supported based on recommendations contained in the regional Land Use Plan, WINCOG support for three area State Greenway designations, and provided support for regional conservation compacts in two area watersheds. It was anticipated that this regional recognition of this planning process will provide needed future support for new watershed planning in the Willimantic River basin as well as the Natchaug, Shetucket and Salmon River basins.

Town of Tolland
Crandall Pond Water Quality investigation and watershed based plan

Crandall Pond with Crandall Park in Tolland (within the Skungamaug River sub-regional basin) provides the sole Town-owned swimming recreational use for residents. A small beach is operated for swimming during the summer. However, due to elevated bacterial counts, the 2.6 acre Crandall Pond was placed on the Connecticut Integrated Water Quality Assessment report in 2008 as an impaired water body for the non supporting designated use of Recreation, based on indicator fecal *E.coli* bacteria exceedences as reported by the regional Eastern Highlands Health District. The sparse emergent vegetation in the pond does not attract significant waterfowl. However, the contributing watershed for the pond is developed with an actively diverse recreational park setting, along with widespread mixtures of rural residential and institutional land use (schools, public works and municipal offices complex), and a small commercial strip development complex, crisscrossed with onsite septic systems, public sewer lines, paved parking areas and road networks, each being possible contributors. Additionally, dog-walking is prevalent in Crandall Park, particularly the area surrounding the pond. These uses and the lack of waterfowl habitat agree with the timing of the elevated counts: high bacteria levels occur following precipitation events, suggesting a watershed source to the pond

rather than internal processes. The Town of Tolland received a 319(h) NPS grant to conduct a water quality investigation and watershed plan to address the unknown bacteria load sources and impacts to the swimming area. In turn, the Town contracted with the University of Connecticut Civil and Environmental Engineering Department to examine potential sources of elevated bacterial counts in Crandall Pond and to assess potential mitigation measures to alleviate the loading to the pond. By the end of 2011 the Town had completed the water quality sampling and submitted a spreadsheet for DEEP review. A project team with Town Recreation, the Health District, UConn researchers and DEEP was established and met during the year to develop and discuss interim study and outreach efforts during the year. Abundant woodland mammal wildlife is regularly observed on park grounds. Upper watershed contributions of nutrients and bacteria may be the result of improperly installed and/or managed onsite septic systems and will require technical review and guidance from the town sanitarian, health district and public works personnel. Extensive public outreach was conducted with various Park and Recreation program audiences and a project signage campaign throughout the Park. Additional outreach project examples with focus on human and pet activities likely contributing to excess indicator fecal bacteria loadings were reviewed. Early drafting of a watershed plan was initiated. The project was not completed by the initial grant agreement deadline of December, 2011. Uncompleted project tasks will be incorporated into a new agreement expected to occur in 2012-13.

The Last Green Valley (TLGV)

TLGV is really two things: 1) it is a federally-designated National Heritage Corridor comprised of 35 communities that are situated across northeastern Connecticut and south-central Massachusetts; and 2) it is a member-supported nonprofit stewardship organization working locally to celebrate the heritage, conserve the natural resources, and respect the working lands of the region. The Quinebaug and Shetucket Rivers Valley National Heritage Corridor encompasses about 695,000 acres,. stretching from Norwich, Connecticut north to Charlton, Massachusetts and from Coventry, Connecticut east to the Rhode Island border. More than half the size of Grand Canyon National Park and ten times the area of Acadia National Park, its 35 towns with numerous villages have a total population of about 300,000.

In 2011 TGLV Board of Directors took 2 major strategic steps forward with development of sustainability plans - the *Vision 2020 Plan* and the *Green and Growing: A Call to Action Plan*. The *Vision 2020 Plan* revolves around on 6 visions, with accompanying strategies. Four of the visions are most relevant to the CT DEEP NPS management program – Land Use, Recreation, Water, and Wildlife. Amongst the many strategies are the following:

- Reduce and eliminate point and non-point source pollution to preserve and enhance the quality of the region's surface and ground waters."
- Engage community volunteers in water quality monitoring and assessment activities in the region and work to ensure the information is accessible and usable by local officials and the general public.

- Educate all generations on the value of outdoor, nature-based recreation and encourage a conservation ethic that leads to promotion and protection of these resources.
- Educate communities about land use planning, design, and controls such as zoning that promote sustainable development compatible with the region's natural and cultural resources.

The Green and Growing Plan is a rural sustainability call to action. Sub-titled "A comprehensive regional plan to sustain and expand food, fiber, and forest production and related agricultural economies in The Last Green Valley", a central theme of water resources is highlighted, with an expanded vision that includes best management practices being fully incorporated into all activities to protect the quality and sufficiency of water. The Plan calls for the following joint efforts required to achieve that vision:

1. Promote continuing education and communication to farmers of Best Management Practices (BMPs) for water quality, quantity, and stormwater management.
2. Encourage sound nutrient management practices that take into consideration time of year, timing of precipitation, potential for stormwater runoff and location of surface water bodies.
3. Encourage sustainable irrigation practices which consider timing, water availability, interactions between surface and ground water resources, demands from other users and fish and wildlife habitat requirements.
4. Identify crops best suited for water availability in The Last Green Valley given potential climate change.
5. Assist producers with implementation of BMPs for protection of water quality and supply throughout The Last Green Valley.
6. Expand the successful TLGV Water Quality Monitoring Program so that the entire region is included in the data.
7. Develop a regional watershed organization to conserve water resources, monitor water quality and quantity, communicate conservation issues to agricultural businesses and the public, and facilitate appropriate recreational access.

Several policy revisions and action priorities were subsequently made by the Board, staff and TLGV membership. One action item focused on an increased flexibility in forging partnerships, aiding in the goal to be the first sustainable National Heritage Area in the country, by 2015. The Source to Sea Expedition in 2009 highlighted the need for a watershed organization to provide outreach and advocacy on a regular basis. Present programs include water trail development and water quality monitoring, work that affects the entire watershed. A policy was revised to extend the service area for The Last Green Valley over time to include the entire Thames River Watershed Basin, of which the majority is in the Quinebaug and Shetucket Watershed.

A CT DEEP Watershed Manager is an active member of TGLV Board of Directors and will continue to provide NPS management program guidance and assistance with the TLGV region.

2011 was a busy year for TLGV's Water Quality Monitoring Program. A small army of volunteers collected data at 109 different locations using a variety of monitoring techniques. Quality Assurance Project Plans were approved by the U.S. Environmental Protection Agency for use in both Connecticut and Massachusetts that assures that all data are being obtained using uniform quality standards. Data collected by our volunteers that participated in the Rapid Bioassessment program were included in the *Rapid Bioassessment in Wadeable Streams & Rivers by Volunteer Monitors Annual Summary Report* prepared by the CT DEEP.

The program is also in the process of developing an interactive watershed map where collected data can be electronically accessed on the internet. Next season new equipment will be added to the program, including HOBO temperature data loggers and Van Dorn samplers. This equipment will be supplied by the US EPA Region 1 office under their Equipment Loan Program. HOBO temperature loggers will provide critical information on cold water fish habitat. The Van Dorn samplers are a way to collect water samples below the surface of a lake or pond for laboratory analysis.

Since The Last Green Valley comprises most of the Thames River watershed, TLGV has been an active TRBP partner for many years and is currently on the TRBP Steering Committee. In addition, TLGV stepped up its participation in 2011 to fill a gap in resources and provided grant funds for the TRBP Coordinator to continue that role.

Within TLGV Water Trails Program, relevant accomplishments included the following**:**

- The Trails Program finished the third year of technical assistance from John Monroe of the National Park Service Rivers, Trails, and Conservation Assistance Program and is looking forward to the fourth year. With John Monroe's assistance, the Water Trails Steering Committee has been meeting monthly and has completed Access Site Assessments for the Willimantic and Quinebaug Rivers and most of the Five Mile and French Rivers.

- Led four organized paddles, introducing more than 50 people to the Quinebaug and Shetucket Rivers, and assisted multiple partner organizations with their paddles.

- Continued to publish and expand *Currents from Source to Sea*, TLGV's periodic e-newsletter designed to keep members up-to-date on paddles and river events, water trail development, issues of concern, and success stories throughout the watershed.

- TLGV used the grant funds to purchase stream gauges (similar to yardsticks) that will be installed at six put-in and take-out locations on the Quinebaug River. The gauges will assist paddlers in determining whether water levels are too high or too low for a safe and enjoyable paddling adventure.

- Worked with the National Park Service and the Willimantic River Alliance to produce a new Paddle Guide to the Willimantic River Water Trail, and made substantial progress

on a new Paddle Guide to the Quinebaug River Water Trail. Helped publicize new Paddle Guides for Poquetanuck Cove in Preston and Ledyard, CT, the French River in Oxford, MA, and the Quinebaug River in E.Brimfield, MA, and Fabyan, CT.

- Supported the U.S. Army Corps of Engineers' application for a new segment of National Recreation Trail, and celebrated with them when the Fabyan to W. Thompson Lake, CT, stretch of the Quinebaug Water Trail received the national designation.

- Worked with many partners to submit a National Recreation Trail application for the designation of four segments of the Quinebaug River totaling 35 miles, and three segments of the Willimantic River totaling 21 miles.

Green Valley Institute (GVI)

TLGV continued 10+ year long partnership with the University of Connecticut and University of Massachusetts Cooperative Extension Services. In 2011, the following accomplishments for the Green Valley Institute were documented:

Eight workshops were presented on a variety of topics, including Development Alternatives, Fiscal Benefit of Agriculture, Map Reading, Invasive Plant Control and Dark Skies Model Regulations. Work was completed and guidelines published: *Green Valley Connections: A Guide to Linking Greenways, Blueways & Wildlife Corridors.*

GVI assisted in the development of interactive map technology for the TLGV websites.

GVI assisted in ongoing negotiations between the French River Connection and a utility company for recreational easements.

GVI assisted with efforts to preserve a 350+ acre farm along the Quinebaug River in Dudley.

GVI worked with the Town of Brimfield to update its vision for future growth and development.

Unfortunately, TLGV was unable to make a contractual commitment to GVI beyond March 4, 2011 because of the lack of a federal budget and the formal program was terminated. However, TLGV continues to provide land use education programming on a project by- project basis as funding is available and is reassessing and reenergizing its land use education programs.

In August, thirty amazing volunteers pulled an incredible number of tires - 239 - from the Quinebaug River. The tires were removed from a short stretch of river on the Brooklyn/Plainfield line. Volunteers from all over Connecticut and Massachusetts participated in the cleanup. The tires were most likely illegally dumped further upstream and settled in this slow-moving, low-water area. In contrast, TLGV volunteers found a much cleaner stretch of

Quinebaug River in Killingly along the Quinebaug River Trail in August. While the dozen volunteers pulled about 300 pounds of trash and some interesting items from the river (shopping cart, car bumper, kiddie pool), it was clear that the people who walk and bike the Quinebaug River trail every day help keep it clean. The Town of Killingly also deserves credit for maintaining this stretch of river trail and for helping to coordinate the river cleanup.

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. Several of the Partnership's NPS-related activities are listed below:

TRBP hosted its 11th annual Thames River Floating Workshop, *Conservation Efforts in the French River Watershed and The Last Green Valley Water Quality Monitoring Program* in Webster Lake/French River Basin, with 32 participants and several resource planners and managers providing on-land and on-water presentations. The French River is one of the nine regional river systems that are part of the greater Thames River watershed. The river once powered numerous mills associated with the Samuel Slater and the American Industrial Revolution. Today, many volunteer efforts are in place to change the perception of the river as a plethora of recreational opportunities in the watershed to everyone who lives in the watershed. The workshop included boarding power boats supplied by the Webster Lake Association and others for a tour of the lake and a demonstration of various water quality monitoring techniques used by trained citizen science volunteers.

Three quarterly Partnership meetings were held in 2011, each with a topical presentation, a roundtable presentation of partner actions related to the TRBP Plan of Work, and notices of upcoming events and projects. The Spring presentation was given by Jen Pagach of the CT DEP Long Island Sound Program**.** Jen presented a series of workshops focused on Climate Change involving local, state and federal stakeholders in Groton. The Connecticut Climate Network demonstrates how Connecticut municipalities are or should be adapting in anticipation of changing climate conditions. The Town of Groton included adaptive strategies to address a 6" sea level rise in their Plan of Conservation and Development. OLISP's current focus is to seek new communities interested in Low Impact Development strategies. Discussion was held on ideas to incorporate these strategies into watershed and conservation plans.

Municipal leaders of all eight towns within the Natchaug River watershed signed the Natchaug River Basin Conservation Compact. A special signing ceremony took place at Diana's Pool in Chaplin, CT. The compact was one of the outcomes of a Natchaug River system Conservation Action Plan process. John Meyer, a member of the Natchaug CAP team, created a video to provide education and attention to the Natchaug River Basin and the signed Conservation Compact.

In partnership with the Avalonia Land Conservancy and the Thames River Basin Partnership, the US Fish and Wildlife Service installed an information kiosk along Poquetanuck Cove at the Royal Oaks Drive boat launch in Ledyard. They also funded a canoe/kayak guide for Poquetanuck Cove based on the prototype developed for a previous TRBP Floating Workshop. This local collaborative effort further broadened local capacity towards active participation in an upcoming series of workshops for a Poquetanuck Cove Conservation Plan, slated for 2012.

The Thames Valley Chapter of Trout Unlimited (TU) volunteers conducted a roadway culvert survey in nine eastern Connecticut towns. Culvert size and design can impact in-stream fish migration patterns and other ecological and hydrologic connectivity needs of the Thames River basin. In addition, twenty schools participated in TU's Trout in the Classroom Program. Permits were obtained to release the juvenile trout into local streams. This is a high value education and experiential project to reach out to the next generation of conservation leaders and community decision makers.

Professor Mike Whitney of University of Connecticut's Marine Science Program recently published an article on hypoxia in Norwich Harbor in *Estuarine, Coastal and Shelf Science*, an international journal focused on salt water environments. This builds upon the scientific knowledge base that CT DEEP and many Thames watershed stakeholders and partners have worked over for over 20 years.

The Eastern Connecticut Conservation District (ECCD) completed and submitted a watershed based plan to CT DEP for Spaulding Pond, located in Mohegan Park in Norwich, CT. ECCD staff also completed two trackdown surveys and associated watershed based plans for Baker Cove in Groton, and for the Mashamoquet Brook watershed, located mostly in Pomfret.

The Last Green Valley Volunteer (TLGV) Water Quality Monitoring Program prepared two separate Quality Assurance Projects Plans for approval by CT DEP, MA DEP and Region 1 EPA. Approval was awarded in late March. These "umbrella QAPPs" for using an In-situ Troll 9500 multi-parameter monitoring unit and a LaMotte Smart2 Colorimeter will serve for all volunteer monitoring groups using the equipment as part of the program.

The Last Green Valley received a funding commitment from Connecticut Light and Power to sponsor several projects, including an expansion of the Volunteer Water quality monitoring program, water trail activities and a conference on the status of water quality and quantity in the region. The target audience for this conference will be volunteers rather than agency staff. The projected time frame of this conference is early 2012.

The Last Green Valley Water Trails project moved forward in 2011. National Recreational Trail applications were prepared for segments on the Quinebaug River, the Willimantic River and the Shetucket River, with assistance from the National Parks Service, Rivers and Trails Technical Assistance Program. The project has built additional regional capacity for community-based resource conservation and management in the Thames River basin.

The Summer meeting of the Thames River Basin Partnership included a presentation on hypoxia in the Thames River given by Dr. Michael Whitney of University of Connecticut's Marine Science Department, and Mickey Weiss of Project Oceanology in Groton. Dr. Whitney's study of the currents in the Thames River demonstrated that tidal currents carry nutrients from downstream locations upstream to Norwich Harbor in addition to the nutrient sources from upstream locations.

The Town of Thompson worked with several partners to construct a new community services facility. This new facility will be built to LEED standards, including low impact development design in the parking area. This site will be used by TRBP partners in LID outreach efforts.

The USDA Natural Resource Conservation Service sponsored a series of Healthy Soils Workshops to promote use of cover crops to improve soil health. Topics included row crops and livestock, perennial crops (orchard, vineyard, Christmas trees) and greenhouse growers, and small scale farming, the residential landscape, and permaculture. These workshops were held in November with full attendance numbers. Additional Soil Health workshops are being discussed for 2012. TRBP will have a Soil Health presentation in a future quarterly member meeting.

The U.S. Geological Survey National Water Quality Assessment program (NAWQA) regional study of nutrient concentrations and loads in rivers of the northeastern United States was completed in 2011. This study includes the Connecticut, Housatonic, and Thames River basins, and showed the nutrient trends and loads in these rivers in a regional context.

The Eastern Connecticut Conservation District completed their analysis and developed Watershed Based Plans for Mashamoquet Brook in Pomfret and Baker Cove in Groton. Both watersheds experience bacteria concentrations in excess of the allowable water quality standards by CT DEEP. ECCD has approached town staff in each community to discuss short term Plan implementation opportunities.

The National Fish and Wildlife Foundation announced the Long Island Sound Futures Fund projects that will receive funding this grant cycle. ECCD was awarded funds to work with the Towns of Ledyard and Preston and other partners to develop a Conservation Action Plan for Poquetanuck Cove. The Conservation Action Plan model was developed by The Nature Conservancy and recently was successfully implemented in the Natchaug River Watershed.

The Windham Region Council of Governments (WINCOG) unanimously endorsed a resolution in favor of the value of regional/watershed-based planning. This resolution was being sponsored by the Town of Chaplin, a strong participant in the Natchaug River Conservation Plan.

The Last Green Valley Water Quality Monitoring Program trained an additional 15 volunteers to complete Rapid Bioassessments of wadeable streams in eastern Connecticut. This year's training was held at the Ashford Town Hall. A special focus on the Natchaug River watershed is underway in cooperation with the recent Natchaug River Basin Conservation Compact signed

by the 8 watershed towns. Several teachers are incorporating this monitoring into their science curriculum.

The Last Green Valley Water Trails Steering Committee is continuing to focus on close to home recreational opportunities. More than 50 miles of river segments in the upper Thames watershed are proposed for designation as National Recreational Trails in the Quinebaug and Willimantic Rivers. The committee is continuing to expand the list of public access sites, working with the river communities and property owners to prepare an application for this honorary designation.

The Center for Landuse Education and Research (CLEAR) has completed a watershed based plan for Eagleville Brook, located in the Town of Mansfield including the UCONN main campus. Eagleville Brook is a tributary to the Willimantic River. This plan includes a seven step process to address water quality in stormwater runoff, and incorporates recommendations for land use regulatory changes. Eagleville Brook is the first waterbody in the nation to be listed as impaired due to the amount of impervious cover in the watershed

CLEAR initiated the Community and Natural Resource Planning (CNP) Program to its family of partners. This new organization evolved out of the Green Valley Institute (GVI) which conducted land use education and outreach in the 35 towns of The Last Green Valley National Heritage Corridor since 1999. CNP will expand GVI's mission - improving the knowledge base from which land use and natural resources are made - to reach a larger audience. The new format and collaborations will address community and natural resource planning issues throughout the entire state of Connecticut. In partnership with the Connecticut Environmental Review Team and the Eastern Connecticut Resource Conservation and Development Area, CNP will conduct a series of land use workshops over the next year. The agreement includes "GVI-type" workshops in two new regions of the state in the fall of 2011 and in the spring of 2012. Other CLEAR partner organizations, including CT NEMO, will provide expertise in the workshop series as well.

The fall CNP workshop series were planned in conjunction with regional planning agencies. Each RPA conducted a brief online survey to assess the educational needs of the land use decision-makers in their region. As a result, the workshop series was created to address the following issues:

- Development Alternatives
- Economics of Land Use
- Growth and Community Character
- Building Sustainable Communities
- Low Impact Development

Two new river segments were designated State Greenways by the Connecticut Greenways Council in 2011, and are supported by the TRBP Plan of Work:

- **Shetucket River Greenway** - The Shetucket River is recognized by federal, state, local and private agencies as a valuable wildlife habitat for a rich diversity of aquatic and terrestrial plants and animals. The natural, historic and recreational resources enjoyed by communities are dependent upon the continued conservation along the river. This designation will facilitate natural resource protection on both sides of the Shetucket River as well as increasing public recreational opportunities. The participating communities in the Shetucket River Greenway will work to preserve the waters quality as well as the habitats within the greenway through community education and promotion of the natural, historic and recreation resources of the river corridor.
- **Canterbury's Quinebaug River Corridor** – This greenway is a continuance of CT's previously designated "Quinebaug River Multipurpose Trail" in Brooklyn/Killingly and the Trolley Trail in Plainfield. Designation of Canterbury's section of this greenway is felt to be the Town's next natural step in promoting stewardship, conservation and education of Canterbury's best natural resource.

Eastern Connecticut Resource Conservation and Development Area, Inc. (RC&D)

The regional RC&D continued a very productive operation, in spite of the loss of federal funding during mid year budget cuts to the RC&D Coordinator position. Amongst the myriad activities conducted across eastern CT and sometimes statewide, the following actions are linked to NPS planning and management activities:

- Provided sponsorship for the Thames River Basin Partnership's 11th Annual Floating Workshop (described elsewhere in this report).
- Partnered with the Eightmile River Wild and Scenic Coordinating Committee to receive and administer a $38,000 grant from the National Fish and Wildlife Foundation to improve water quality in that watershed (described elsewhere in this report). Project is transferable to greater Thames River basin communities.
- In partnership with The Last Green Valley, USDA Natural Resources Conservation Service, USDA Farm Services Agency, University of Connecticut, CT Department of Agriculture and others, completed Phase II of the "Agvocate" program in eastern CT with funding provided by a $49,000 grant from the Connecticut Department of Agriculture Viability Grant program.
- Received $40,000 from CWA Section 319(h) NPS funds to undertake a Shoreline Protection Best Practices Guide to be made available to inland lakeshore property owners across Connecticut.
- Received $70,000 from CWA Section 319(h) NPS funds to undertake a study to determine the viability of using dairy manure fiber, a byproduct of anaerobic digestion, in growing media for commercial plant production.
- Provided funding, through a grant from the New England Association of RC&D Area, to the Town of Lebanon for technical assistance in establishing a Community-Supported Agriculture Operation (in support of locally produced food and direct grower-consumer connections to land and water based resources).

- Provided project support to Connecticut Agriculture in the Classroom, the Town of Eastford, and Working Lands Alliance.
- Purchased, through a Contribution Agreement from USDA NRCS, three Trimble GPS units to be made available to citizen conservationists to map trails and preserved lands. Several Thames River basin stakeholders have utilized this new equipment for local support to watershed programs.
- Partnered with the Celebrating Agriculture event in Woodstock to showcase the benefits agriculture provides to the region as well as the challenges that farms face today. This event included participation from several greater Thames River watershed partners.
- Continued ongoing program administration of the Connecticut Environmental Review Team.

Southeast Coastal Major Basin

Southeast Coastal Watershed - Western Complex

Niantic River Watershed Protection Plan (NRWPP)

In 2005 CT DEEP awarded a U.S. NOAA-Office of Coastal Resource Management coastal NPS management grant to develop a watershed protection plan for NPS-impaired Niantic River and its watershed (31 square miles within towns of East Lyme, Montville, Salem and Waterford). A twelve-month planning process was completed in 2006 with the publication of the *Niantic River Watershed Protection Plan: Watershed-wide Strategies to Prevent Nonpoint Source Pollution*.

The Plan recommended a Niantic River Coordinator be created to move the Plan forward and implement the Plan NPS abatement recommendations. ECCD received a CWA Section 319(h) NPS grant to create the Coordinator position in 2009, and received two additional 319 NPS grant awards through 2011. Agreement tasks included creation of the Niantic River Watershed Advisory Committee and providing staff support to that group, as well as assistance to the watershed towns of East Lyme, Montville, Salem and Waterford, Connecticut. The Coordinator was responsible for assisting municipalities with land-use regulation review and NPS implementation, investigating existing water quality monitoring information, organizing and conducting targeted outreach and education programs, developing a social marketing strategy for homeowners, and upgrading and maintaining the Niantic River watershed website (www.nianticriverwatershed.org).

Multiple outreach and education programs were conducted in 2010-11, reaching a widespread audience.
The following are examples:

- Education and outreach to marina owners regarding the Clean Marina Program and the Clean Vessel Act, particularly keeping marina owners updated on changes in these programs and acting as liaisons for the programs.

- Distribution of magnets and stickers displaying contact information for the Niantic River Pumpout boat, for marinas and boat owners.
- Watershed Management Plan Implementation/Riparian Buffer workshops were conducted for each of the watershed municipal land-use boards as well as watershed residents.
- Low Impact Development workshop was conducted for municipal land-use boards.
- Outreach at municipal events, including Celebrate East Lyme Day. Formal presentations were given to watershed high school and college students.
- Creation of Water Quality Teacher Loan Kits, in response to needs stated in a questionnaire sent out to watershed teachers.

The Coordinator continued to represent the watershed and support efforts for sustainability into the future.

- Developed a social marketing strategy (Landscaping for Local Water Quality) for homeowners and local landscaping businesses to provide incentives for retrofitting home landscapes.
- Represented Committee at local and regional events.
- Began to compile existing water quality monitoring information. This led to working with the Water Monitoring Subcommittee in development of a RFP for a consultant to consolidate, analyze, and report on the existing data.
- Actively sought funding for the RFP implementation. Funding has not yet been secured, but will be a priority in 2012.
- Organized and led monthly meetings of the Niantic River Watershed Committee, which included separate meetings for the Board Development Subcommittee, the Education and Outreach Subcommittee and the Monitoring Subcommittee. The Board Development Subcommittee successfully laid the groundwork necessary for the creation of a Board of Directors for the Watershed Committee. As part of its work, the subcommittee approved a mission statement, logo, draft by-laws, a watershed compact and initial Plan of Work based on the implementation priorities identified in the 2005 Plan. A status report on implementation of the Plan's recommendations was issued and distributed to the four watershed communities, showing a wide range of activities completed or in process. This report provides support to town leaders to showcase local accomplishments to date, as well as leveraging local resources and commitments towards restoration of their regional watershed resources. The experience of the first three years of watershed plan implementation clearly demonstrated that the Coordinator position is critical to supporting the Niantic River Watershed Committee and moving the recommendations of the watershed management plan forward.

A State of the Watershed Forum was held in September and well attended by representatives of all four watershed communities and local media. It is anticipated to continue the venue on a regular basis, advancing the science, adaptive management actions taken to date, and further develop an educated watershed citizenry on effective ways to control NPS loadings.

In support of the Plan's recommendations, the town of East Lyme and the Eastern Connecticut Conservation District (ECCD) applied for and received a CWA Section 319(h) NPS award towards a stormwater retrofit project along a residential section of the Latimer Brook corridor. Project development commenced in 2011 with stormwater tree filter installations planned for mid 2012. Increased awareness and interest by watershed town staff and land use commissioners during the planning and early coordination phase has led to similar projects slated in 2012 by East Lyme and the Town of Waterford in two lower Niantic River locations.

Also in support of the Plan's recommendations, the Coordinator worked with the Town of East Lyme to install a vegetated riparian buffer on a highly visible Town-owned recreation parcel, in partnership with the Friends of Oswegatchie Hills Preserve, Inc.

Save The River-Save The Hills, Inc. (STR-STH)

This is a local organization dedicated to preserving the health of the Niantic River Estuary, its watershed and the natural beauty of the adjacent Oswegatchie Hills (the latter contains the largest area of undeveloped, and largely unprotected, shoreline anywhere along the CT coastline of Long Island Sound.) In 2011, STR-STH continued its strong advocacy and legal campaign to address large scale development plans for the largest portion of the Oswegatchie Hills. The current development proposals would likely create direct and indirect stormwater runoff, coastal forest and shoreline habitat degradation, and reduced public access to the Niantic River estuary. A popularly-attended kayak regatta was held in August that combined recreational fun with Niantic River issues-raising talks by several local municipal and state/federal government representatives. Other education and outreach events included support at native plant awareness events at a local retail plant nursery, and use of the hands-on Enviroscape watershed model in several schools, youth and civic organization events. STR-STH ran its 9th consecutive year of the pump out boat program from Memorial Day through Labor Day. Collected data will be reported on number of participating boats and volume of sanitary wastewater collection that was diverted from the Niantic River Estuary and discharged to the local municipal wastewater treatment facility. STR-STH members also started an indicator bacteria sampling program in the very popular recreational areas along the Niantic River estuary with cooperation from the regional Ledge Light Health District. Several results of samples collected following significant rain events had high enough bacteria levels that would have closed a designated swimming beach, regulated by the federal Clean Beach Act. The testing program will continue in 2012, with STR-STH in discussions with local towns, state agencies and others to raise awareness of the largely unregulated public health focus of this regionally significant recreational waterbody. STR-STH representatives continued active participation in the regional Niantic River Advisory Committee and provided an important link with municipal leadership and land use/harbor commission members.

Nitrogen Work Group

A Nitrogen Work Group was established in 2011, involving regulatory and scientific agencies, academic researchers, land and water manager and interested watershed stakeholders

(including the Niantic River Watershed Committee). The group is tasked with providing oversight for a Nitrogen Study of the Niantic River. The river estuary is impaired for Marine Aquatic Life support due to nutrient over enrichment and related issues. The study is a stipulation of a local power generating facility's NPDES permit issued by CT DEP in 2010. The facility's owner, Dominion Nuclear Connecticut, Inc. (DNC) was required to submit a Scope of Study designed to outline its role in the evaluation of nitrogen loading and management in Niantic River. The Scope of Study was approved by CTDEP in 2011. Work group progress was made to review all available data on nitrogen loading and eelgrass in Niantic River. The group identified data gaps and outlined several areas that require further study. Information regarding the potential studies was evaluated by the Work Group members and additional elements were incorporated into DNC's monitoring plan and schedule over the next 2-3 years. Nitrogen source identification and quantification of nitrogen loadings from human and natural sources will be an initial focus of the study, followed by studied impacts on the river estuary's critical eelgrass beds. The results will complement local Niantic River freshwater monitoring and assessment work underway by the Niantic River Watershed Committee. Eventual nutrient management strategy development will be well served by the Work Group findings.

Freshwater Tributary Water Quality Monitoring

U.S. Geological Survey (USGS) completed a third year of stream gage discharge and multi-parameter water quality monitoring at three gaging stations, one established on each of the three main freshwater tributaries to the Niantic River. CT DEEP provided CWA Section 319(h) NPS funds in a cooperative agreement with USGS for this three year study, a key recommendation of the 2005 watershed Plan. A 319 NPS final report indicated the largest tributary, Latimer Brook, accounted for nearly 3/4ths of the nitrogen and phosphorus loading to the Niantic River. Occasional indicator bacteria exceedences were recorded following significant precipitation events at all three tributary stations. A final report will be produced under a USGS Scientific Investigations series in 2012. Regional watershed researchers and stakeholders are advocating continued monitoring, at minimum, on the lower Latimer Brook tributary, and funding partnerships are being sought at this time. The stage and discharge readings at the Latimer Brook gauge assisted the Town of East Lyme during two very significant weather storm events in 2010 and 2011. The local watershed committee's Water Monitoring subgroup is making plans for a Latimer Brook corridor water quality sampling program in 2012, to further understand nitrogen fluxes in the full river corridor and seek potential sources for the nutrients.

Clean Marina Certification

The Connecticut DEP Clean Marina certification was presented to Port Niantic in the Niantic section of East Lyme. DEP's Clean Marina designation acknowledges the efforts of marinas and other boating facilities that go beyond regulatory compliance and participate in voluntary measures to keep Connecticut waters clean. With the addition of the Port Niantic facility, there are now 29 Clean Marinas in Connecticut.

Pawcatuck River Major Basin

Pawcatuck River Wild and Scenic Rivers Study Bill
The Wood Pawcatuck Watershed Association (WPWA) worked with RI State office of USDA NRCS and the RI Congressional designation to build support for raising a Pawcatuck River Wild and Scenic Rivers Study Bill in 2011. CT DEEP offered future technical support if and when the study bill is passed and funded, offering to draw on experiences with the Farmington River and also the Eightmile River federal designations.

Pawcatuck River Bacteria TMDL
CT DEEP assisted the Rhode Island Department of Environmental Management with strategic action planning to implement the RI bacteria/pathogen TMDL on the Pawcatuck River, approved in 2010. A well-attended stakeholder meeting was held in May, providing a suite of presentations involving RI and CT water quality monitoring, municipal stormwater management plans and actions, shellfish considerations, public outreach and education efforts and plans. Initial plans are to continue this bi-state, multi-partner update forum in 2012.

IV. CT DEEP NPS PROGRAM AND MANAGEMENT STRUCTURE

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 2011, Section 319 funds in the PPG were used to support the following staff: NPS program coordinator, Water Bureau administrative assistant, two watershed managers, three subsurface staff, one full time cartographer and one position for monitoring and assessment data management (305[b]). These staff help integrate NPS Program goals and objectives into their own programmatic areas.

Applications to CT DEEP for funding under the Nonpoint Source Program must meet the following qualifications:

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. The proposal should focus on prioritized watersheds that DEEP has drafted or finalized Watershed Based Plans for in 2011. 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 implementation 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 implementation WBP 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 Based Plan in the future. These prioritized Watershed Based Plans are listed in the table below:

Draft and Final Watershed-based planning efforts	
Watershed	**Status**
Baker Cove	Completed
Byram River	Completed
Coginchaug	Completed
Niantic	Completed
Tankerhoosen	Completed
Broad Brook	Completed

Little River – Muddy Brook – Roseland Lake	Completed
Steele Brook	Completed
North Branch of the Park River	Completed
Spaulding Pond	Completed
Norwalk River	Completed
Pequonnock River	Completed
Sasco River	Completed
Eagleville Brook	Completed
Mashamoquet Brook	Completed
Five Mile River	Draft
Saugatuck-Aspetuck River	Draft

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.

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 and NPS Programs including Watersheds and Lakes Management, Aquifer Protection Area and Long Island Sound Study 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) 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.

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 2011 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 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 and extracted into the IWQR biennially to share 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 2011 calendar year will be evaluated to support the 2014 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).

The 2014 IWQR will be submitted on April 1st, 2014 to EPA and once approved posted on the DEEP web page available to the public at:
http://www.ct.gov/dep/cwp/view.asp?a=2719&q=325610&depNav_GID=1654

Rapid Bioassessment in Wadeable Streams/Rivers by Volunteer Monitors

Number of monitoring locations	117
Number of samples collected	120
Number of waterbodies monitored	68
Number of fall samples > or = 4 "Most Wanted" types	24
Number of individual participants	400+
Number of groups participating in 2010	21
Number of groups participating for the first time	5
Number of groups returning for another year	16

Outreach and Education

In 2010, Project SEARCH, a collaborative program of the CT DEEP and The Children's Museum, was awarded a two year grant which provided equipment, training, and technical support to high school and middle school teachers who had incorporated a water quality monitoring program as part of their science curriculum. This program originated in 1994 with a National

Science Foundation grant and was then annually funded through 2010 through CT DEEP General Funds and Section 319. This $40,000 contract ended in November, 2011. It is the goal of the CWA Section 319 funding to encourage applicants like The Children's Museum to use their knowledge and experience learned during this project and continue and expand on this project with new partners.

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.

V. STATEWIDE MANAGEMENT PROGRAMS

Inland Wetlands and Watercourses

Inland Wetlands Management

The Inland 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 Inland 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.

One focus of the 2011 Municipal Inland Wetland Commissioners Training Program was storm water management. Storm water may result in significant pollution to surface water affecting aquatic life and recreational activities. An overview of the storm water topic including a review of different contaminants and their affect on wetlands and watercourses was presented.

The 2011 training program had:

- 283 total participants, representing
- 91 municipal Inland Wetlands Agencies, of which

- 34 individuals attended all three segments and therefore received a 2011 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.

A Low Impact Development Appendix to the Connecticut Guidelines for Soil Erosion and Sediment Control was finalized in August 2011. http://www.ct.gov/dep/lib/dep/water/nps/swgp/lid_soilerosionfinal.pdf

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 one new "Flood & Erosion Control" projects involving cost sharing in the funding of a dam repair during the 2011 construction season. The project was not completed during the 2011 construction season. There have been many requests recently from municipalities asking DEEP through this program to cost share in the funding of repairs to municipally owned dams.

FEMA published new maps for several counties in the state that included a new designation of "Provisionally Accredited Levee" or PAL, for areas protected by levees. This designation was temporary with the permanent designation slated to be "Accredited Levee". In order to qualify for the term Accredited Levee, the owners of the levees in the remapped counties needed to undertake evaluations and ultimately make modifications to demonstrate that their levee met the accredited levee requirements. Several levees needed repairs and upgrades to meet the requirements of FEMA. Some of these repairs/modifications were made during the year to allow the communities to keep their accredited levee status. Losing this accredited levee status would mean that the area behind the levee would considered floodplain and the residents within the floodplain would be required to purchase flood insurance. The State of CT DEEP through the Flood and Erosion Control Board statutes helped East Hartford pay for some of the engineering and levee modifications. The city of Hartford also used state money through a special act to make modifications to their levee to maintain their accredited levee status.

Other levees have required work. These levees are located in 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.

Lake restoration projects are also conducted using bond funds authorized by the CT General Assembly and allocated by the State Bond Commission. In 2011 the fourth dredging phase of the multi phase Silver Lake reclamation project was advertised for bidding. Unfortunately bids came in higher than anticipated so DEEP did not award a contract for this work. If DEEP had awarded a contract for the work as bided, there would have been insufficient funds to complete the fifth and final dredging phase as originally designed. As a result, DEEP began to redesign the fourth phase to encompass areas that would have been included in the fifth dredging phase.

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 additional Section 319 funding to continue the program. In 2011 the program concluded with the completion of projects for Amos Lake, West Hill Pond, Alexander Lake, and Candlewood Lake.

Also in 2011 DEEP completed a water quality monitoring project a Hatch Pond in Kent. During the monitoring period, a small dairy farm that was a major source of nutrient loading to Hatch Pond discontinued operations. Subsequently the property was purchased by a local private school. The monitoring indicated that since the farm ceased operating, water quality is beginning to improve. More monitoring is needed to assess whether or not water quality will continue to improve and to determine what if any restoration efforts will be needed.

In 2011 DEEP continued working on a shoreline management manual for lakes. The purpose of the manual is to help lakeside property owners and local commissions design shoreline areas to be more suitable for lakes environments. Working through the Eastern CT RC&D DEEP hired a consulting engineering firm to begin drafting the manual. Work was ongoing at the end of 2011.

Technical Assistance

In 2011 the Lakes Management Program continued to provide technical assistance to municipalities, lakes groups, private property owners and DEEP programs.

Invasive Aquatic Plants

In 2011 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 Assurance Bureau continued 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.

Aquifer Protection

One of the key components of the state's ground water 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 102 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, and CT DEEP continues to work with the remaining municipalities to get local regulations in place.

In 2011, the Aquifer Protection Area Program:

- 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 2011. 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. The manual is available online on the aquifer protection web page (see below).
- 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 program issues, including implementation, administration and enforcement

Ground Water Quality Standards and Classifications

- 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 as well as evaluated and approved (if appropriate) requests for reclassification of groundwater.

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, and which will be updated in the coming years, 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 convened a work group for revision of the 2001 TMDL. The revision will incorporate the upstream states of New Hampshire, Vermont and Massachusetts as well as New York and Connecticut. A big component of the preparation for the TMDL revision is developing a NPS tracking system to assess (quantitatively where possible, qualitatively elsewhere) the NPS reductions that have taken place since the original TMDL was developed. Each state is pulling together preliminary data on programs and efforts to reduce NPS pollution. We are also meeting with NRCS to integrate their efforts into the tracking system. In addition, the LISS has targeted $44,619 for an enhancement grant to begin phase I development of a “Stormwater & NPS Tracking Tool”. NEIWPCC will bring on a contractor through an RFP process to investigate model NPS tracking systems and recommend an approach to developing such a tool, including identifying the data needed, available sources of

information and estimate cost to develop a tracking system for the LISS (and its member states) to utilize.

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. Work was completed on a Long Island Sound Riparian Buffer Toolbox that is posted on the LISS web site (see http://longislandsoundstudy.net/research-monitoring/river-and-stream-bank-restoration-toolbox/) 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)

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.

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Coastal Zone Management

Office of Long Island Sound Programs (OLISP) staff continued to participate on the stakeholder group established to evaluate the incorporation of Low Impact Development (LID) principles into the state's Stormwater General Permits. Previously, the project partners developed a commitment statement to fine-tune the mission for the project: *Improve, maintain, and preserve the quality and quantity of Connecticut's water resources by incorporating LID practices into the stormwater management toolbox.* The project has also identified long-term goals for regulatory and non-regulatory approaches to meet this mission, including LID-related updates to the existing stormwater quality and soil erosion and sediment control manuals. A final meeting of the LID work group provided an opportunity for the project consultants to unveil appendices for the Soil Erosion and Sediment Control Guidelines and the Stormwater Quality Manual, which were subsequently released by DEEP.

Niantic River Watershed Plan implementation continues, and OLISP staff participates on the Nitrogen Work Group established to provide oversight for a nitrogen study of the Niantic River conducted by Dominion Nuclear Connecticut, LLC (the Millstone nuclear power station in Waterford, at the mouth of the Niantic River) as a stipulation of their permit. The Nitrogen Work Group met to discuss data gaps as the nitrogen study progresses. OLISP staff also assisted in preparing a Niantic River Watershed Protection Plan stakeholders meeting. The meeting was held to acknowledge the Chief Elected Officials of each watershed town and their official support of the plan's Conservation Compact; to welcome the new Board of Directors for the Niantic River Watershed Committee; and to roll-out the new Plan of Work. OLISP staff presented an overview of the history of the Niantic River Watershed planning project at the meeting.

OLISP staff participated in the annual nonpoint source pollution conference in Saratoga Springs, New York, 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 stormwater retrofitting, nitrogen reduction, onsite wastewater treatment technologies, LID case studies and examples of LID ordinances, social marketing, agriculture best management practices to abate nonpoint source pollution, and climate change adaptation planning for water quality management. 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 conducted a coastal management workshop for land use officials in the Town of Madison to re-energize municipal efforts and commitments to protect 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

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.

OLISP staff continued to provide technical assistance to coastal municipalities in the review of proposed amendments to zoning regulations and plans of conservation and development regarding nonpoint source pollution and LID. Recommendations routinely cover the four key tenets of LID (i.e., minimizing site disturbance and clear cutting; working with existing site elevation contours and hydrology; minimizing and disconnecting impervious surfaces; and applying small-scale water quality controls as close to the source of runoff as possible), as well as incorporating recognition of the State of Connecticut's Integrated Water Quality Report which includes a list of all water quality impairments in the state, the causes of the impairment, and the potential sources of those impairments.

OLISP's coastal nonpoint source pollution control program coordinator is a member of the Long Island Sound Study Nonpoint Source Work Group. The work group continues to fine-tune its work plan and establish specific deliverable, outputs, and outcomes for work plan tasks. Information about the LISS NPS Work Group can be found at http://longislandsoundstudy.net/about/committees/nonpoint-source-pollution-and-watersheds-work-group/
OLISP is the lead on a project with ICLEI- Local Governments for Sustainability that held past workshops using Groton, CT as a test case and model for coastal climate adaptation in the northeast. The Groton final report, which shares lessons learned for all levels of government, was released and will be especially useful for other communities who want to start or continue adaptation efforts. OLISP has also been developing with ICLEI an Adaptation Resource Toolkit (ART). ART is a web-based resource that will allow Connecticut towns and others interested in adaptation planning to have "one-stop shopping" for all relevant resources. OLISP and other DEEP staff also held a Connecticut Municipal Climate Network meeting allowing towns, academic institutions, and state and federal staff to share updates on their ongoing climate efforts, offer information on funding and other resources that may be available to jumpstart town efforts, and provide feedback on ART content.

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 seventy nine (79) stationary pumpout facilities, fifteen (15) pumpout boats, and fourteen (14) dump stations available to boaters at boating facilities along Connecticut's coastal waters.

In 2011, approximately 517,952 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 2011:

- Club Creek (West Haven) – 2.6 acres of tidal wetlands (TW) were restored
- Long Beach West (Stratford) – 0.35 acres of TW, 17.7 acres of dune habitat, and 0.3 acres of estuarine embayment habitat were restored.

- Little River (New Haven & North Haven) – 23 acres of TW were restored
- Harkness Memorial State Park (Waterford) – 2.8 acres of dune habitat were restored.
- Brides Brook/Rocky Neck State Park (East Lyme) – 0.5 acres dune habitat were restored.
- Frankel Dam (formerly Lilian Poses Dam) on the Aspetuck River in Westport was removed. Because there is still one non-passable fish barrier downstream of this site, no miles of riverine migratory corridor were reconnected to LIS for anadromous species of fish. The 0.7 miles from Frankel Dam to the next dam upstream will be added to the miles from the downstream barrier when passage around it is restored.
- **Grand total of 47.25 acres of coastal habitats were restored, and 0 miles of RMC were reconnected.**

- The weather throughout the majority of the eelgrass growing season was not conducive to aerial photo surveying, so this year's scheduled eelgrass survey in eastern LIS was postponed to 2012 (weather permitting).

Climate Change and Water Resources

CT DEEP has worked on many climate change initiatives involving water resources. Sentinel Monitoring for Climate Change in Long Island Sound is a bi-state and federal partnership including DEEP agency staff and scientists that look at monitoring, ecosystems, species, and other indicators of change to inform impacts and adaptation strategies. Change in precipitation (form and timing) is a Sentinel Monitoring core parameter. Increases in surface water runoff and associated issues have already been experienced in our region and are not projected to improve. The LISS has a Sentinel Monitoring website located at http://longislandsoundstudy.net/research-monitoring/sentinel-monitoring/ . In addition, DEEP coordinates with Cornell's Extreme Precipitation website which incorporates the last 60 years of data showing changes: http://precip.eas.cornell.edu/

The Office of Long Island Sound Programs (OLISP) coordinated a series of workshops in Groton with federal, state and local government and other stakeholders to pilot how a community coastal climate change planning process in a home rule state would work. Throughout 2010 many DEEP and other state agency staff attended and had input into the workshops, including the final report with recommendations for all communities, finalized in 2011. Both the workshops and the report highlighted the need to assess and improve water infrastructure and management, especially storm water, and to consider LID and other techniques to minimize negative impacts on ecosystems and the built environment from climate impacts. The report and all workshop videos and presentations are available online through the ctclimatechange.com website at the following link: http://ctclimatechange.com/index.php/learn/adaptation/
In 2010, the Connecticut Adaptation Subcommittees including Public Health, Agriculture, Infrastructure and Natural Resources subcommitees staffed with DEEP employees, finished their individual topic impacts evaluation and published a final report, as well as holding public hearings for input. Following the release of the 2010 Climate Impacts report, working groups of

subject matter experts including extensive CT DEEP staff looked at these anticipated changes to Connecticut's climate and proposed adaptation strategies.The workgroups recommended several overarching and specific adaptation strategies including water resource management and LID strategies in the draft "CT Climate Preparedness Plan". This 2011 report open for comment as well as the finalized Impacts Report are available online on the ctclimatechange.com website.
CT DEEP staff are involved in many climate change outreach initiatives too, including a Municipal Climate Change Network of towns and state staff who are moving forward with cutting edge climate efforts led by DEEP staff. OLISP staff leads a CT Climate Education Communication Committee which is a varied group of educators from the private, government and academic sector who meet virtually or in person every month to keep informed on best available science and educational practices including water resource impacts.

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. Construction began in September of 2011 using 319 funding (along with other funding) and was completed by the end of the year. Operation of the new fishway is anticipated on April 1, 2012.

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 (specific defined industrial activities are required to register; certain 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

- MS4 (Municipal separate storm sewer system) discharges (113 municipalities designated as Small MS4s and 1 municipality designated as a Medium MS4) .

Approximately 2450 facilities, towns or activities were registered under the various stormwater discharge general permits as of December, 2011. Sites/ Municipalities regulated by the industrial and MS4 permits are required to sample its stormwater discharges and submit the monitoring data to the Department. There were approximately 1560 industrial operations (approximately 160 of which have submitted No Exposure Certifications), 530 construction sites, 240 commercial sites, and 114 MS4 activities.

Accomplishments in 2011 include:

- The industrial stormwater general permit with modifications, issued on August 23, 2010, became effective on October 1, 2011. Existing permittees were required to reregister by June 1, 2011. The new permit has significant modifications including increased emphasis on impaired waters, more frequent sampling, increased inspection requirements, new pollutant 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".

- The Department issued a Notice of Tentative Determination (NOTD) to reissue the construction general permit with modifications on March 24, 2011 and held a public hearing on June 23, 2011. The construction general permit with modifications includes requirements for third party independent plan review and certification, public availability of registrations, retention of post construction stormwater runoff (1" for most sites), endangered species review, inspector qualifications, and turbidity monitoring of construction runoff. The Department is in the process of resolving issues put forth during the public comment period and hearing. To allow for the resolution of

these issues and to maintain permit coverage, the March 24, 2011 NOTD extended the term of the current construction general permit in "as-is" form to September 30, 2012.

- The Department continued SEP funded LID work throughout CT. This success has connected outreach and education about stormwater and LID implementation to help residents in towns understand water quality at a watershed scale.

The Nature Conservancy (TNC) worked with many volunteers at Toth Park in the Town of Easton to install a buffer between the upland area and the nearby stream in the Aspetuck watershed.

The buffer planting includes a filter strip and a rain garden. These plantings will discourage geese from entering the stream and will help to filter and absorb stormwater runoff from the upland area, including part of a playing field.

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 2011 include:

- NRCS and UConn/CES – DEEP continued to approve Comprehensive Nutrient Management Plans (CNMPs) under partnerships with NRCS and UCONN.
- Nutrient management plans are being implemented on farms throughout Connecticut in cooperation with DEEP 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 2012. (UConn/CES has continued a 319-funded IPM/ICM program continued to work with communities throughout CT, with a focus on outreach.

Technical Assistance Program/Demonstration Projects

Conservation Districts

DEEP has partnered with Conservation Districts to support statewide education and technical assistance to municipalities and local organizations to improve water quality. Conservation Districts provide outreach programs to municipalities and lead efforts to bridge the critical gap to keep local capacity strong between outreach of the final Watershed Based Plans and installation of the site specific and watershed wide BMPs to improve water quality. Conservation Districts provide assistance when designing and installing BMPs in both urban and agricultural projects across the state.

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).

Funded through CWA Section 319 NPS funding in 2009, NEMO began 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 Watershed Based Plan for the project was approved by DEEP. The project has already resulted in several implemented and planned practices. A pervious asphalt and a pervious concrete parking lot have been installed. Pervious parking stalls and rain gardens were installed at a campus residence complex. In 2011, the first new building constructed since the TMDL was implemented includes a green roof, bioswale, and pervious pavers.

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