

NH Department of Environmental Services
**Nonpoint Source Management
Annual Report
2009**

April 2010

Nonpoint Source Management Annual Report 2009

Prepared by
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*Cover Photo: Rainbow over Pemigewasset River Restoration Site. Photo
by Barbara McMillan, DES Watershed Management Bureau.*

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Introduction

Through our improved water quality monitoring and assessment program we continue to assess more and more water bodies each year. The data makes clear our priorities for Section 319 and other watershed management programs – stormwater. Stormwater causes or contributes to 83 percent of New Hampshire’s water quality impairments.

This report describes several programmatic and policy efforts to improve stormwater management. Stormwater is also a common thread in the Section 319 projects completed in 2009 and described in the report.

Several projects addressing stormwater and hydrologic modification were highlighted during a project tour for EPA officials in October 2009. Getting a first-hand look at completed work and discussing the water quality problems addressed by grantees provided a valuable experience for program managers. We learned from Hancock Road Agent Kurt Grasset how his village center drainage project had to consider the aesthetics of a picturesque New England village, the practicality of winter road maintenance requirements, and budgetary constraints while protecting water quality in Norway Pond. In Peterborough, Public Works Director Rodney Bartlett showed how stormwater retrofits could be installed with little room to work in the heart of downtown. The rain garden installed adjacent to Town Hall showed how a stormwater project can also improve site aesthetics.



Steve Landry, DES, describes the Black Brook restoration project to EPA and DES staff during the fall project tour day.

To further communication and technology transfer about watershed management, DES held its first Watershed Roundtable to grantees. The half-day session included a roundtable discussion on watershed project management followed by short presentations from project managers. Event surveys showed that this kind of dialogue and information exchange is highly valued by watershed practitioners.

In 2009, DES streamlined its quality assurance program requirements by completing a program quality assurance project plan (QAPP) that allows grantees to reference the program QAPP while preparing much shorter site specific project plans to insure proper data collection and analysis.

We are also pleased to report that two more watershed restoration success stories were posted on EPA's website www.epa.gov/owow/nps/Success319/ in 2009: Crystal Lake in Manchester and Middle Brook Canal in Moultonborough. Through work funded partially with Section 319 funds, these waters were restored to water quality standards. We congratulate the city of Manchester and the Balmoral Improvement Association for their hard work on these projects.

Investigations

Since 1996 DES has been investigating and identifying illicit discharges of pollution caused by incorrect plumbing, infrastructure failure and even intentional releases. More recently DES has been providing technical assistance and informational support to municipalities and other local groups to help them implement and sustain their own watershed pollution source investigations program. This is done through on-site training and in the field investigations. In 2009, DES helped locate sources linked to sewer discharge and/or infrastructure failure in six different cities and towns. Eight of these sources were disconnected along with eight sources identified and scheduled for disconnect in 2010. In addition, DES staff assisted municipalities in identifying further sources through smoke and dye testing of storm drains. A summary of the results of summary of the 2009 field investigations is provided below.

Summary of Illicit Discharge Investigations and Detection 2009

Town/City	Samples Collected	Samples E.coli >406cts/100ml	Sources Identified	Sources under Investigation or Scheduled for Disconnect	Sources Eliminated	Est. Remaining Illicit Sources
Dover	20	12	2	2	3	3
Durham	3	0	0	0	0	0
Epping	14	4	0	1	1	1
Exeter	9	2	1	1	0	1
Hampton	6	5	1	0	1	0
Keene	1	0	0	0	1	0
Newcastle	4	2	1	1	0	1
Portsmouth	32	11	1	1	1	2
Rochester	1	0	1	0	1	0
Somersworth	10	4	0	2	0	2
Total	100	40	7	8	8	10±

Managing Stormwater

Data from the 2008 305(b)/303(d) Surface Water Quality Report show us that 83 percent of the surface water quality impairments in New Hampshire are due, at least in part, to stormwater and non-point source pollution. The affect of stormwater on New Hampshire's surface waters has been increasingly evident in recent years. The occurrence of toxic algae blooms in our lakes, the decline of eelgrass in Great Bay, the closure of shellfish beds after certain rainfall events, and the major flooding events of 2005, 2006 and 2007 are real examples of the threat stormwater poses to our water resources and our state and local economies.

These examples, along with others, have helped raise the general public's awareness of stormwater and

have also helped to make stormwater management a high priority at DES. The following recent initiatives undertaken by DES and other agencies and organizations around the state demonstrate the recent efforts to better manage stormwater and its impacts.

Stormwater Utility Feasibility Study Grants

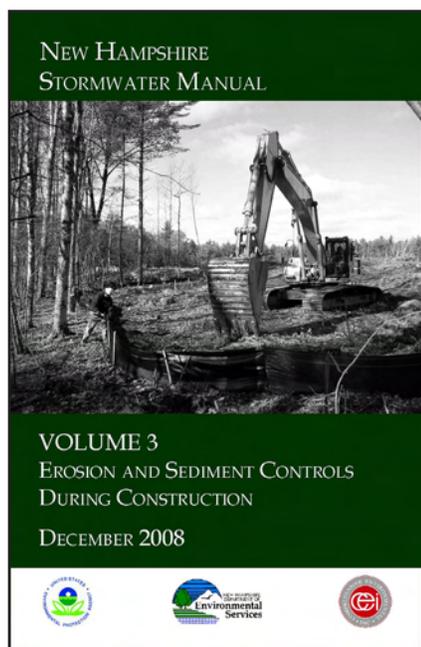
In 2008, New Hampshire municipalities were given legal authority to form stormwater utilities under RSA 149-I. A stormwater utility is a funding mechanism to provide a predictable revenue source that is dedicated to implementing stormwater management. Under the statute, stormwater utilities must address flood and erosion control, water quality management, ecological preservation and annual pollutant load contained in stormwater discharge.

To assist municipalities in evaluating whether or not a stormwater utility is right for their community, DES issued a Stormwater Utility Feasibility Study grant RFP in March 2009 using Section 319 funds. Based on the likelihood of stormwater utility implementation and the anticipated environmental benefits, grants were awarded to four communities, Dover, Portsmouth, Nashua and Manchester. The feasibility studies will provide all the key aspects of utility development and will give each municipality adequate information to bring a stormwater utility to a local vote.

Revisions to the Alteration of Terrain Program Rules [Env-Wq 1500]

The Alteration of Terrain (AoT) Program is New Hampshire's permitting program for land alteration activities that disturb 100,000 sq. ft. or 50,000 sq. ft. if a portion of the project is within the protected shoreland. The program requires erosion and sediment control as well as post-construction best management practices to address both water quality and water quantity issues associated with these activities. The AoT Program rules were revised in late 2008 (effective January 1, 2009) to better protect the quality of New Hampshire's surface waters. Requirements include capturing and treating the first one-inch of runoff from a rainfall event to avoid excess runoff and to remove the majority of stormwater pollutants; reducing the amount of water diverted off-site through groundwater recharge volume requirements;

and channel protection requirements that limit the total amount of time that a receiving stream exceeds an erosion-causing threshold based on pre-development conditions.



New Hampshire Stormwater Manual

In conjunction with the adoption of the revised AoT Program Rules, DES developed the *New Hampshire Stormwater Manual*. A revision of the manual is expected in late 2010, after the Antidegradation Rules Workgroup recommendations have been finalized (see below).

The manual is presented in three volumes. *Volume 1: Stormwater and Antidegradation* presents an overview of New Hampshire's stormwater program including the state's antidegradation provision and related federal program requirements. *Volume 2: Post-Construction Best Management Practices Selection and Design* presents a detailed description of the structural BMPs applicable for use in New Hampshire

for the prevention, control and treatment of stormwater. *Volume 3: Erosion and Sediment Controls During Construction* presents a selection of practices applicable during the construction of projects to prevent adverse impacts to water resources as a result of land-disturbance activities.

The volumes are available for download or purchase at http://des.nh.gov/organization/commissioner/pip/publications/bmps_guides.htm.

Antidegradation Rules Workgroup

When the revision to the Alteration of Terrain (AoT) Program Rules were originally drafted, the Watershed Management Bureau worked with the AoT Program to include a new section that would incorporate the antidegradation provisions [Env-Wq 1708] of the New Hampshire Surface Water Quality Regulations into the AoT Permit. After a comment period and workshop on the proposed rule changes, the public expressed concern with this approach. Many were unfamiliar with antidegradation and they wanted a greater opportunity to participate in development of the rule language.

As a result, an Antidegradation Rules Workgroup was formed to develop antidegradation language to include in the AoT Program rules and to develop a methodology for applicant preparation and submittal, and for DES review of proposed activities. Recent proposed legislation, including the adoption of antidegradation into state law, has postponed the workgroup. DES is actively participating in these legislative activities, which will provide a basis, in statute, for much of what the workgroup has been discussing. When the outcome of the legislation is known, DES will reconvene a workgroup to amend the AoT Rules to include antidegradation.

Legislative Stormwater Commission

In the 2008 legislative session, House Bill 1295 established a commission to study the diverse issues relating to stormwater. The legislation specified membership to represent 20 stakeholder groups and outlined the following topics for the commission to study:

- a. The effects of stormwater and stormwater management on water quality, water supply and quantity, terrestrial and aquatic habitat, flooding, and drought hazards.
- b. The relationship between land use change and stormwater.
- c. The relationships among and adequacy of federal, state and local regulations and practices that pertain to stormwater management.
- d. State and municipal infrastructure construction and maintenance practices.
- e. The role of design, construction, and maintenance practices by residential, commercial, and industrial property owners.
- f. The effects of climate change on stormwater and stormwater management.



The commission has met monthly since September 2008. The first year focused on information gathering. The commission has divided its work into three sub-committees. The Stormwater Needs Subcommittee is tasked with identifying the areas for improvement necessary to reduce the impact of stormwater on state resources. The Funding Subcommittee is working to identify potential funding sources for implementing the areas for improvement, and the Regulatory Authority Subcommittee is researching existing laws and regulations to determine if current legislation sufficiently authorizes municipalities to manage stormwater. After the commission makes its recommendations (by November 1, 2011), the Regulatory Authority Subcommittee will draft any necessary legislation to implement the recommendations.

An overview of progress to date, including presentations made to the commission, agendas and meetings minutes are available at www.nh.gov/oep/legislation/2008/hb1295/index.htm.

Southeast Watershed Alliance

The Southeast Watershed Alliance (SWA) was established by RSA 485-E in the 2009 legislative session. It sets up an organizational framework for the 42 coastal watershed communities to learn about and address water quality issues. New Hampshire's coastal waters are subject to intense and increasing pressures due to accelerated population growth and development including increased pollutant loads from nonpoint sources, such as stormwater runoff, septic systems, lawn fertilizers and agriculture, as well as point sources, such as wastewater treatment facilities.

The Southeast Watershed Alliance will provide a way for communities to learn and work together on sustainable and cost-effective solutions to both nonpoint and point source water quality issues, such as the nitrogen impairment in Great Bay and the bacteria impairment in the Hampton-Seabrook Harbor. The Alliance will also assist the communities in addressing potential increased regulatory requirements. Eligible communities are Barrington, Brentwood, Brookfield, Candia, Chester, Danville, Deerfield, Dover, Durham, East Kingston, Epping, Exeter, Farmington, Fremont, Greenland, Hampton, Hampton Falls, Kensington, Kingston, Lee, Madbury, Middleton, Milton, New Castle, New Durham, Newfields, Newington, Newmarket, Nottingham, North Hampton, Northwood, Portsmouth, Raymond, Rochester, Rollinsford, Rye, Sandown, Seabrook, Somersworth, Strafford, Stratham and Wakefield.

Quality Assurance

In the last few years, the quality assurance and quality control documentation requirements for Section 319 grant-funded projects have expanded beyond environmental monitoring to include projects conducting surveying, modeling, and the use of secondary data. To reduce the burden on our project partners, the DES Watershed Assistance Section developed the *New Hampshire Section 319 Nonpoint Source Grant Program Quality Assurance Project Plan*, also called "Program QAPP."

The purpose of the Program QAPP is twofold. First, it describes the process used to manage the New Hampshire Section 319 Watershed Assistance Grants Program. And second, it serves as an overall quality assurance project plan (QAPP) that covers all NPS projects receiving funding under the Watershed Assistance Grants Program with the exception of projects that include environmental monitoring. Projects conducting environmental monitoring still require an individual QAPP to be developed in accordance with the New Hampshire Quality Management Plan and EPA requirements.

The Program QAPP addresses NPS watershed projects that are common to the grant program including:

- **Watershed Surveying Projects** that identify problem sites and gather data to quantify the problem and provide essential information for watershed planning and watershed implementation projects to allow for targeted remediation efforts to control or prevent pollution throughout a watershed.
- **Watershed Management Planning Projects** that develop and promote the use of a locally-supported plan to guide pollution control and prevention activities, as well as to formally recognize the roles of participating project sponsors and stakeholders.
- **Watershed Implementation Projects** that include selection, design and installation of best management practices to achieve significant reductions of NPS pollution to receiving waterbodies.

Education and Outreach

GreenWorks Expands

GreenWorks, the DES Watershed Assistance Section's environmental news column of ideas for a cleaner environment, has been so successful over past years that it has morphed into a DES-wide outreach partnership project. The expansion has enabled more input and buy-in from other program outreach staff and opens-up the distribution to a much wider audience. Water quality and nonpoint source topics are still included as part of the focus in article topics. 2009 articles included: "Get Your Butts off the Beach," "Wetlands and What They Can Do for You," "My Friend, a Change We Can All Make is 'Blowing in the Wind' (National Hanging Out Day)," "Beware, the 'Idles of March' are Upon Us – Time to Turn Your Engines Off," "Keeping Our Roads Safe on a Low Salt Diet," and "Is the Plumber Invited to Your Thanksgiving Dinner?" Copies can be found at <http://des.nh.gov/organization/commissioner/pip/news-letters/greenworks/index.htm>

Continuing Outreach Efforts with Natural Resource Outreach Coalition and MS4 Regional Stormwater Coalitions

With assistance from DES staff, the Natural Resource Outreach Coalition (NROC) worked with the town of Hampton and the city of Dover to address the problem of stormwater in their communities to decrease impacts to water quality from development.

Hampton formed the *Innovative Land Use Group* and acquired a grant from the New Hampshire Estuaries Project to hire a consultant to identify necessary changes in the town's stormwater regulations. The group then spearheaded an outreach effort to bring local decision makers up to speed on state regulations and options for proposed changes to local stormwater regulations. The result was the adoption of revised stormwater regulations by the planning board including: reductions in peak runoff rate and volume of discharges; requiring a stormwater management operations and maintenance plan that incorporates low impact development practices and conforms with the *New Hampshire Stormwater Manual*; increasing capacity requirements in structured stormwater management systems; and additional phased inspection requirements.



NHDOT demonstrates new stormwater model at Manchester Stormwater Coalition meeting.

In Dover a *Stormwater Outreach Group* was created to incorporate LID into local regulations and explore creating a stormwater utility. At Dover’s request, a Watershed Assistance Section intern worked on a “Does it Make Sense?” study for a stormwater utility in Dover. The study was presented at a stormwater workshop and brainstorming session for city decision makers. As a result, the city enthusiastically agreed to apply for, and later received, a DES grant to do a comprehensive stormwater utility feasibility study.

Watershed Assistance Section staff continued to work with the three New Hampshire Regional MS4 Stormwater Coalitions

in the Seacoast, Manchester and Nashua areas. Efforts included coordinating communication around EPA’s draft MS4 stormwater permit language and assistance with meeting agenda topics. In addition, staff presented the accomplishments and needs of the MS4 regulated communities to the Legislative Commission to Study Issues Relating to Stormwater.

Clean Watersheds Needs Survey

EPA’s Clean Watersheds Needs Survey is a comprehensive assessment completed every four years of the capital resources needed to meet the water quality goals set forth in the Clean Water Act. This was the first time that New Hampshire had participated in this extensive data collection and documentation effort specifically for stormwater. Watershed Assistance Section staff completed the gathering and documentation of this data. The availability of American Recovery and Reinvestment Act funds provided a much needed stimulus for municipalities to provide documentation of future stormwater needs. However, since New Hampshire has not funded stormwater projects under the State Revolving Loan Fund Program in the past, municipalities were not prepared with breakdowns or documentation of their stormwater needs and the resulting figures most likely represent only a small fraction of actual needs.

From the information received, the total stormwater needs documented was **\$64,624,463** with the following category breakdown:

- **Traditional Stormwater Conveyance Infrastructure \$50,721,233**
Plan, design, purchase, etc. of pipes, inlets, road side ditches, etc.
- **Traditional Stormwater Treatment Systems \$10,286,146**
Wet ponds, dry ponds, manufactured devices, etc.
- **Green Infrastructure/Low Impact Development (LID) Stormwater Treatment \$1,664,616**
Bioretention, permeable pavement, rain gardens, vegetated swales, etc.
- **General Stormwater Management \$1,952,468**
Street sweepers, GIS, vacuum trucks, etc.

Highlights and Overview of Completed Projects

Coastal Watershed

Pawtuckaway Lake Watershed Improvement, Town of Nottingham (2005 Restoration)

Grant Amount: \$30,000 Local Match: \$30,980

Phosphorus Load Reduction: 1.5 lbs./year



Pre- and post-construction for the Tuckaway Shores Beach area stormwater improvements.

As a result of phosphorus loading from tributaries and direct runoff, algal blooms and more specifically cyanobacteria blooms have become increasingly more frequent in recent years on Pawtuckaway Lake. This has led to Pawtuckaway Lake being listed as impaired for primary contact recreation and for not meeting state water quality standards.

To reduce algal blooms and eliminate cyanobacteria blooms, phosphorus loading as a result of watershed runoff must be prioritized and addressed. In 2006, the town of Nottingham, with support of the Pawtuckaway Advisory Committee and Pawtuckaway Lake Improvement Association received Section 319 funding to assist with this process. A watershed-based plan was developed that provided estimates of phosphorous loads to the lake and recommended goals for improvement. In addition, the report identified 12 specific problem sites and provided recommended BMP designs along with estimated pollutant load reductions for each.

In 2008, two sites were selected for stormwater improvements, Barderry Lane at Fernald's Creek crossing and Tuckaway Shores beach area. Construction was completed in October 2008 and included road shoulder and ditchline stabilization, bioretention, and level spreaders for stormwater energy dissipation. The annual phosphorus load reduction to the lake from these improvements is estimated at 4.0 kg per year.

In addition to the watershed based plan and BMP design and implementation the town will lead an education campaign targeting landowners within the watershed about their individual impact on the watershed, stormwater runoff and the lake. Education will be accomplished through the distribution of a waterfront and watershed property owner's lake protection brochure that was developed with funding from this project.

Pet Waste Outreach and Education (2005, Restoration):

- ***Blue Ocean Society for Marine Cons. (Grant Amount: \$2,802; Match: \$3,483)***
- ***Town of Exeter (Grant Amount: \$3,784; Match: \$7,917)***
- ***Town of Greenland (Grant Amount: \$4,770; Match: \$4,968)***
- ***City of Somersworth (Grant Amount: \$4,169; Match: \$5,000)***
- ***Town of Seabrook (Payment Pending)***

The 2007 Nonpoint Source Management Annual report highlighted a comprehensive pet waste outreach and education project “Scoop the Poop: Implementing Science-based Decision-making and Social Marketing at the Local Level.” As part of this initiative and as a follow-up to a successful pilot held in Dover, a request for proposals to coastal organizations to address dog waste as a water quality contaminant was issued. Grants were awarded to five municipalities and organizations to conduct their own pet waste outreach campaigns. Completed during fiscal year 2009, all of the grant projects incorporated community based social marketing techniques and measurable results into their outreach programs. Highlights included:

- **Greenland** – The Greenland Town Administrator managed the project and included a pre and post survey of existing attitudes and behaviors, a town-wide message of “Doo be a responsible pet owner,” and a recognition program for picking up pet waste were part of the program. Information was distributed through flyers, a mascot (dog costume), interactive displays and coloring books at town events, press releases, and by a very enthusiastic town hall staff for dog registrations. The town is committed to continuing its outreach efforts.

- **Exeter** – The Exeter Department of Public Works stormwater contact administered this project, which included the formation of a pet waste committee of local stakeholders, and a town administered survey of Exeter licensed dog owners to identify local concerns and barriers to picking up pet waste. Outreach included information posted on the town’s website, press releases, stormwater drain stenciling, displays and dog bone handouts at the town hall and local events. Ten dog waste stations with waste disposal containers, bag dispensers and educational signs were placed around the town hot spots and dog walking loop to make it easier to pick up and dispose of pet waste. Due to their success, Exeter has requested more stations. The town also purchased small signs “Pick Up Pet Waste” to have on hand for residential areas that may request them as the program continues to grow.



Exeter pet waste disposal station.

- **Somersworth** – The city purchased an “Enviroscape” watershed model and presented education programs with a “scoop the poop” message to approximately 50 students. Information was also placed in town newsletters and at the town hall. Additionally, the city installed four dog waste dispensers in problem areas, and stenciled over 75 storm drains with the help of local students and residents.

- **Seabrook** – Markers were placed on over 100 storm drains with a “Do Not Dump Drains to Creek” message. “Scoop the Poop” pledges were distributed to dog owners at the town hall when they licensed their dogs and a “Scoop the Poop” brochure was developed and distributed to residents in an area where the town had received numerous complaints about dog waste.

- **Blue Ocean Society** – The *Beach Scoop: Tracking and Reducing Pet Waste on New Hampshire Coastal Beaches* project was developed by the Blue Ocean Society for Marine Conservation (BOS) in response to large amounts of pet waste observed during BOS’s monthly beach cleanups, especially during the winter months. BOS developed this campaign to monitor pet waste through data collection during beach cleanups. This project generated a baseline data set of dog waste along the New Hampshire coastline that was used to develop targeted outreach tools and to generate awareness. This data will be instrumental in assessing future initiatives. The other major aspect of this project was outreach, which included the creation of dog waste information flyers, media releases, newsletter articles, and signs for display at beaches. Volunteers also distributed dog biscuits and biodegradable waste bags.

Exeter River Subwatershed Management Plan Development, Rockingham Planning Commission (2003 Restoration) (2005 Base)

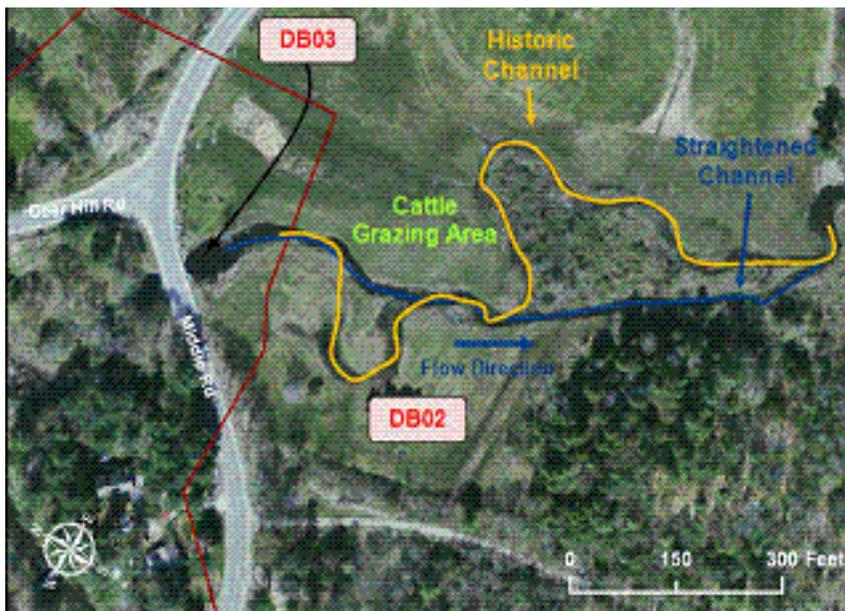
Grant Amount: \$7,100 Local Match: \$42,322 Outside Contract: \$48,000

Exeter River Geomorphic Assessment and Restoration Plan, Bear Creek Environmental, LLC (2003 Restoration)

Grant Amount: \$45,000 Local Match: \$37,823

The Exeter River watershed contains some of the fastest growing towns in New Hampshire resulting in increases in impervious cover, forest fragmentation, and ground water withdrawals. Further changes to the historic river channel design and high river flow events have increased concerns about flooding, erosion, and loss of infrastructure. In response to these concerns, the Exeter River Local Advisory Committee, the town of Exeter, NH Geological Survey (NHGS), and other project partners initiated a comprehensive watershed-wide geomorphic assessment and planning effort to gather scientific information about river functions and processes. DES was able to utilize FFY 2003 and 2005 319 funds to facilitate this effort. The project partners hired Bear Creek Environmental (BCE) and Fitzgerald Environmental Associates (FEA) to conduct the assessment and develop the plan.

The result of these two projects the *Exeter River Geomorphic Assessment and Watershed-based Plan* provides information to help watershed managers understand how the river responds to the land over which it



flows. The plan is based in the science of fluvial geomorphology, or the study of how rivers and landforms interact over time through different climatic conditions. This method provides a holistic, watershed-scale approach to understanding stressors on river health. The science also helps resource

Channel straightening can result in stream channel instability such as erosion, aggradation and scouring. This photo shows a reach on Dudley Brook where the stream channel was straightened to accommodate adjacent land uses.

mangers identify stable and unstable river reaches, and provides recommendations for avoiding damage caused by flooding, erosion or river channel adjustment.

The *Exeter River Geomorphic Assessment and Watershed-based Plan*: 1) provides information relative to fluvial geomorphic and biotic habitat conditions; 2) identifies projects that will protect or restore important river reaches; 3) offers recommendations to address and mitigate stressors leading to impairments; and 4) assists towns in the development of fluvial erosion hazard zones and planning tools.

The project team assessed 48 river and tributary miles to characterize the current physical condition of the river and identify stressors that impact river stability and water quality. The assessment was comprised of two phases. During the first phase NHGS conducted a desktop analysis to provide the geomorphic context for the plan. Topography, soils, surficial geology, land use patterns, and natural resource features were evaluated. During phase two, BCE and FEA conducted field evaluations of river features including: stream crossings: size/aquatic organism passage; channel width, depth, slope and type; substrate composition and instream habitat; and floodplain, river bank and riparian buffer conditions

The data were then used to develop recommendations to identify and guide local and watershed-wide protection and restoration projects. The types of projects identified in the final plan include river corridor protection, riparian buffer restoration, channel restoration, stream crossing improvements, aquatic organism barrier removal, and stormwater runoff mitigation. Recommendations were prioritized using a combination of factors including hazard mitigation potential, ecological benefits, costs, and local interest and priorities. Twenty-one high-priority projects were identified. Fluvial erosion hazard (FEH) zones were delineated and mapped for all assessed river reaches and a FEH model ordinance was developed to help communities minimize human/river conflicts. As a result, the town of Raymond is currently conducting outreach and public hearings in consideration of adopting a FEH ordinance for Fordway Brook and the Upper Exeter River subwatersheds.

The Exeter River Local Advisory Committee and DES will use the plan to guide future efforts to restore and protect the river. The plan will also be used to educate watershed communities and residents about the importance and benefits of maintaining and restoring stable river channels.

Mendums Pond Watershed Assessment, Al Wood Drive Road Association, (2002/2003 Restoration)

Grant Amount: \$35,480 Local Match: \$48,067

The Mendums Pond watershed is located in the towns of Barrington and Nottingham and is facing increasing development pressures which affect the overall water quality of the Pond. The Al Wood Drive Road Association, in conjunction with the University of New Hampshire Center for Freshwater Biology and the UNH Cooperative Extension Water Resource Program, undertook this 18-month study in order to identify phosphorus inputs, create an annual total phosphorus budget and provide recommendations to reduce current and minimize future water quality impacts resulting from changes to the landscape. The project deliverable, a *Nutrient and Water Budget: Mendums Pond Watershed Assessment* final report provides scientific-based natural resource management strategies for each of the pond's major subwatersheds and outlet tributaries. The recommendations in this report can be incorporated into local master plans, regulations and growth management strategies.

The results of the study showed that the primary source of external phosphorus entering Mendums Pond was through channelized stream flow from non-point sources (65.1%). Contributing NPS factors



Stable banks and good riparian buffers adjacent to a tributary to Mendums Pond.

were diffuse runoff from shore lands, septic system inflow, atmospheric and groundwater components. The Perkins Brook subwatershed was the leading contributor of phosphorus (45.1%) followed by McDaniel Brook (32.9%) and Wood Road Brook (7.9%). The maximum phosphorus inflow occurred during spring followed by heavy phosphorus loadings in fall. Not surprisingly, further examination of the seasonal loading pattern revealed that shoreline septic systems have their greatest influence during the summer.

The Assessment also showed that although overall phosphorus loading to Mendums Pond was low, there was still generalized and site specific concerns related to the landscape. The Mendums Pond watershed is comprised of steep sloped areas that allow water to accelerate as it travels overland carrying with it phosphorus and sediment particles. The results also indicated an imbalance between the amount of phosphorus entering the pond and the amount of phosphorus leaving the pond. As a result, phosphorus is trapped over time in the bottom sediments. Because of this topography, clearing of steep slopes should be carefully managed. The study also illustrated that development will alter natural hydrology and increase discharge velocities of streams. Future land-use planning efforts should minimize impervious surfaces such as roads and outbuildings that could concentrate and accelerate overland water flow and, thus increase the potential for erosion. In addition specific efforts to foster maintenance of riparian vegetation and minimize channelized water flows towards the pond and its tributaries should be pursued to help protect and preserve water quality.

Connecticut River Watershed

Lake Sunapee Pilot Watershed Approach, Lake Sunapee Protective Association (2005 Base)
Grant Amount: \$47,100 Local Match: \$41,078

In general the overall water quality of Lake Sunapee is good; however threats exist as demonstrated by degrading trends in water quality monitoring results and recent occurrences of cyanobacteria blooms. With development over the past two decades averaging 24 percent and in lake phosphorous concentrations increasing by greater than 50 percent over the past 18 years a group of volunteers formed the Sunapee Area Watershed Coalition to raise community awareness, build stewardship and formulate guidelines around the important issues concerning the Lake Sunapee watershed and surrounding areas. Section 319 funding for this project helped with the development of *The Management Plan for the Lake Sunapee Watershed* found at http://des.nh.gov/organization/divisions/water/wmb/was/documents/lake_sunapee_wbp.pdf.

The plan included a detailed analysis of phosphorus loading under current conditions and projected for full build-out. Next steps will involve the Sunapee Area Watershed Coalition working

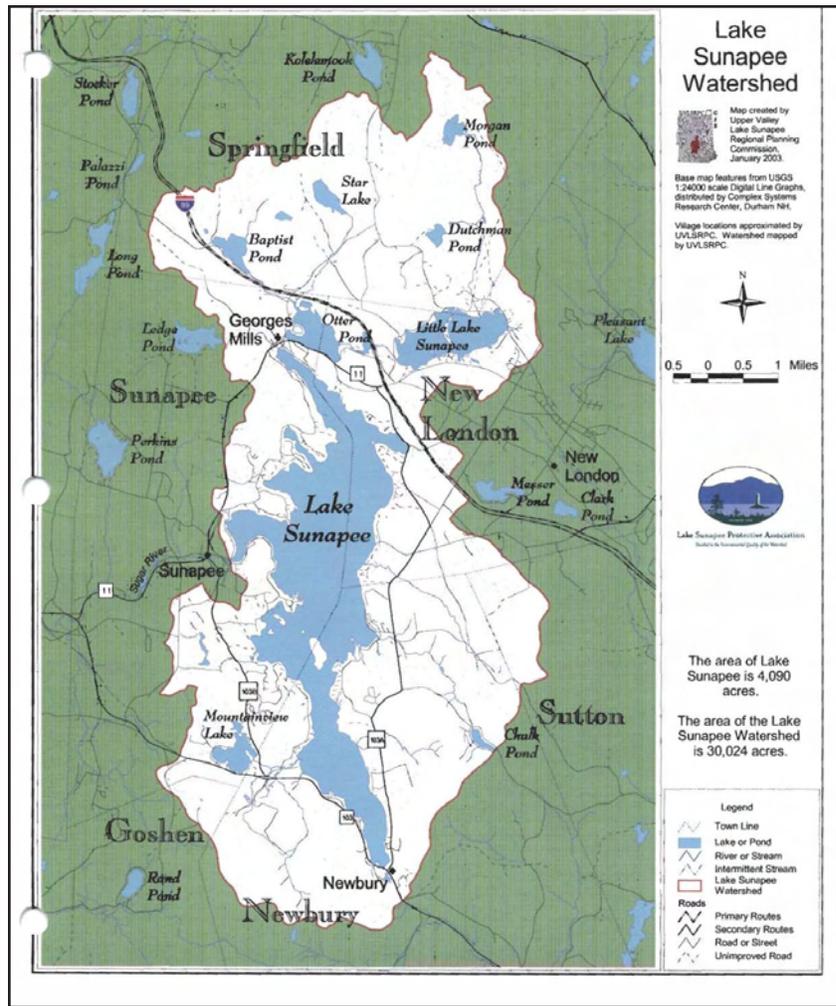
with the five watershed towns reduce phosphorus loading from new development with the goal of keeping in-lake phosphorus below 8 ug/l at full buildout.

Sunapee Hills Stormwater Management Ordinance, Town of Newbury (2005 Base)

Grant Amount: \$14,495

Local Match: \$15,155

This project involved the research and development of a stormwater management ordinance for the town of Newbury. The concerns were initiated here solve the ongoing erosion problems within the Sunapee Hills development surrounding Chalk Pond. The town realized that these problems were not just limited to this particular area, but were a concern across town due to its hilly terrain and potential impacts of sedimentation to Lake Sunapee and other local waterbodies.



In developing its ordinance, the town reviewed approaches used by other communities as well as documentation from regional, state and federal organizations. In order to achieve success, an effective education and outreach campaign was critical. This involved the development of a guidance manual with simple approaches to implementation of stormwater control BMPs. The proposed ordinance was made available to local officials and the general public. After final modifications and edits were made, the warrant article was posted and a public hearing held. The proposed ordinance was then put before the voters in March 2008 and passed with strong support.

Homestead Woolen Mill Dam Removal, DES Dam Bureau (2002 Restoration)

Grant Amount: \$19,614 Match: \$13,135

The Homestead Woolen Mill Dam has been under consideration for removal since 1998 when the dam owner, Homestead Woolen Mills Inc., received a Letter of Deficiency (LOD) from DES. A feasibility study was developed that outlined several alternatives that were pertinent to the overall goal of the project: 1) attain dam safety, whether through dam repair or removal; 2) provide fish passage whether through dam removal or installation of effective fish passage; and 3) ensure the stability of the Thompson Covered Bridge, regardless of the project outcome. In March 2006, the town of Swanzey voted

unanimously not to take over ownership of this dam. As a result, the dam owner moved forward with the dam removal option and in 2007 started the design, engineering and permitting process.

This 319 project provided partial funding to implement some of the tasks outlined in the Scope of Work; specifically alternatives for channel design and determination of the best alternative for channel stabilization that considered fish passage, stabilization of the river banks, as well as stabilization of the upstream Thompson Covered Bridge. Since 2007, the dam owner has worked closely with the town of Swanzey



Homestead Woolen Mill Dam, Summer 2009

and many project partners relative to the dam removal and bridge stabilization project. During the summer of 2009, the dam and bridge projects were advertised as a single project, but unfortunately, the cost for the individual projects came in well over the estimate. The town of Swanzey was able to secure funds to re-advertise the bridge project as a single project in January 2010. The dam owner has been actively seeking additional funds in order to complete the dam removal in conjunction with the bridge project. It is projected that sufficient funds will be secured in order to advertise and contract the project during 2010.

Merrimack River Watershed

Baboosic Lake Stormwater Management, Baboosic Lake Association (2002/2003 Restoration; 2005 Base)

Grant Amount: \$30,000 Match: \$22,840

Phosphorus Load Reduction: 0.7 lbs/year

As a result of excessive phosphorus loading through tributaries and direct runoff, more frequent cyanobacteria blooms have been occurring at Baboosic Lake, which has contributed to its impaired listing on the 2008 303(d) list. To address this problem the Baboosic Lake Association coordinated Phase I of this project to develop a watershed based plan identifying and prioritizing locations with excessive run-off to the lake; designed and implemented several stormwater BMPs; and, produced and distributed a watershed guide for property owners. Education and outreach is also continuing through a new website funded through this project.



Stormwater infiltration trench constructed at Baboosic Lake.

Baboosic Lake Community Wastewater System-Phase III, Town of Amherst (2007 Restoration)

Grant Amount: \$144,105 Local Match: \$478,922

Phosphorus Reduction: 66 lbs/year

The Baboosic Lake Community in Amherst is comprised of older year-round homes on small lots. The age and proximity to the water of on-site septic systems have been identified as a source of the water quality impairments of Baboosic Lake. In three previously funded projects DES utilized 319 dollars to fund the site design and construction of a community septic system. Phases I and II provided for septic effluent pre-treatment and disposal for 22 homes (see DES Nonpoint Source Management Annual Reports for 2006 and 2008). Phase III expands the system to serve 13 additional homes on Clark Avenue and Clark Avenue Extension. The total calculated phosphorus annual reduction to date is greater than 220 pounds per year.

Contoocook River Urban Stormwater Improvements and Low Impact Development (LID) Demonstration Project, Town of Peterborough (2006 Base)

Grant Amount: \$104,990 Local Match: \$97,038

Sediment Load Reduction: 1,088 lbs/year

Phosphorus Load Reduction: 0.68 lbs/year

Nitrogen Load Reduction: 4.8 lbs/year

The Contoocook River, an impaired water-body listed in the *New Hampshire 2008 Section 305(b)/303(d) Surface Water Quality Report*, flows for miles from Poole Pond in Rindge, north to the state capital, Concord, where it enters the Merrimack River. This project is located in downtown Peterborough, in an area that drains to the Contoocook River. Prior to the installation of these BMPs, the downtown area discharged untreated stormwater directly to the river.

To address the downtown stormwater runoff as well as downtown area flooding, this

project installed several low impact de-

velopment (LID) stormwater best management practices including: four, deep sump leaching catch basins along School and Depot streets; approximately 100 linear feet of infiltration trench with perforated drainage pipe; a rain garden in the Depot Square parking lot; a pervious infiltration divider strip in the Wall Street municipal parking lot; two rain gardens and infiltration beds (from roof leaders) at the municipal Town House, as well as replacing an impervious concrete sidewalk with pervious brick. In addition, the

This kiosk in downtown Peterborough describes the issues surrounding stormwater and water quality, while also serving as a convenient display of local events thereby increasing its usage.



Pervious walkway and rain garden installed next to the Town House in downtown Peterborough.



project included an outreach component to promote behavior change of downtown business owners to reduce stormwater impacts on water quality and to increase awareness of stormwater and nonpoint source pollution to residents and visitors of downtown Peterborough.

The results of this project demonstrate how different LID practices can improve water quality while having the additional benefit of improved municipal stormwater drainage, eliminating flooding and providing aesthetically pleasing demonstration sites to raise the awareness of local businesses, residents and visitors.

Jamie Welch Park Car Top Boat Access and Erosion Control, Town of Boscawen (2006 Base)

Grant Amount: \$23,228 Local Match: \$15,783

Sediment Load Reduction: 28.7 tons/year

Phosphorus Load Reduction: 28.7 lbs/year

Nitrogen Load Reduction: 15.7 lbs/year

The public boat launch located at Jamie Welch Park, Boscawen is a popular car top access point to the Merrimack River. Due to the steep path, the destruction of stabilizing vegetation and run-off from an adjacent parking lot, the site was experiencing significant erosion resulting in sediment and other contaminants being discharged to the river.

This project, was a joint effort between the Upper Merrimack River Local Advisory Committee (UMR-LAC), the town of Boscawen (Conservation Commission, Historic Committee, Planning Board, and the Public Works Department and Committee), and DES. The project entailed the regrading of the parking area to direct run-off away from the path. The path was stabilized with porous pavers and the adjacent areas were re-vegetated to prevent further erosion. A kiosk, describing the project along with historical information about the area will help to educate the public about the Upper Merrimack River and instill a greater sense of stewardship toward this important resource.



Pre- and post-photos of the Jamie Welch Park Car Top Boat access path.

Nutt Pond Watershed Improvement, City of Manchester (2005 Restoration)

Grant Amount: \$60,000 Local Match: \$354,298

Sediment Load Reduction: 62.6 tons/year

Phosphorus Load Reduction: 37.1 lbs/year

Nutt Pond is impaired for primary contact recreation and for aquatic life due to chlorophyll-*a* levels and low dissolved oxygen. This project addressed the non-point sources of pollution entering the pond through the development of a watershed management plan and the implementation of two structural stormwater BMPs. Specifically sediment forebays and wetlands restoration were constructed at both the south and east inlets to the pond. These BMPs will reduce the storm water flow velocity and trap solids prior to reaching the pond. The management plan also identifies and ranks other BMPs that are recommended in order to meet pollutant reduction goals. Costs and removal efficiencies are provided to assist the city in planning future restoration projects.



View of constructed forebay at East Inlet, Nutt Pond, Manchester.

Androscoggin River Watershed

Flint Farm Manure Storage and Milkhouse Waste Management System, Flint Farm (2006 Base)

Grant Amount: \$57,650 Match: \$57,506



Flint Farm manure storage facility and catch basin.

Flint Farm in Milan is an 80-cow dairy farm. Historically, this site has had problems with barnyard and manure run-off to an adjacent stream within the Androscoggin River watershed. Funding from this project was used to design and construct a short-term manure storage facility to contain the manure until it can be beneficially used on site. In addition a catch basin and grass filter strip were installed to treat the milk-room waste.

Looking Ahead

In 2010 we will continue to work aggressively on the stormwater programs highlighted in this report. We are working closely with the legislature, with municipalities interested in adopting stormwater utilities, and with watershed organizations exploring the possibilities embodied in antidegradation to reduce stormwater pollutant loading.

Based on our success in 2009, we will strive to make the fall project tour and Watershed Roundtable an annual event that will be available to grantees as well as watershed practitioners.

Also in 2010, we hope to post at least two more success stories to EPA's web site: Black Brook, the first dam removal project using Section 319 funds, and the restoration of the Pemigewasset River in Woodstock, the location of our largest fluvial geomorphology restoration project to date.

The American Recovery and Reinvestment Act of 2009, also known as the "stimulus package," included six "green infrastructure" projects that address stormwater and natural hydrology regimes. We plan to report on the success of these projects in 2010, as well as the long-term implications of opening up our state revolving fund program to stormwater projects on a continuing basis.



The other side of the rainbow over the Pemigewasset River Restoration site. Photo by Barbara McMillan, DES.

Appendices

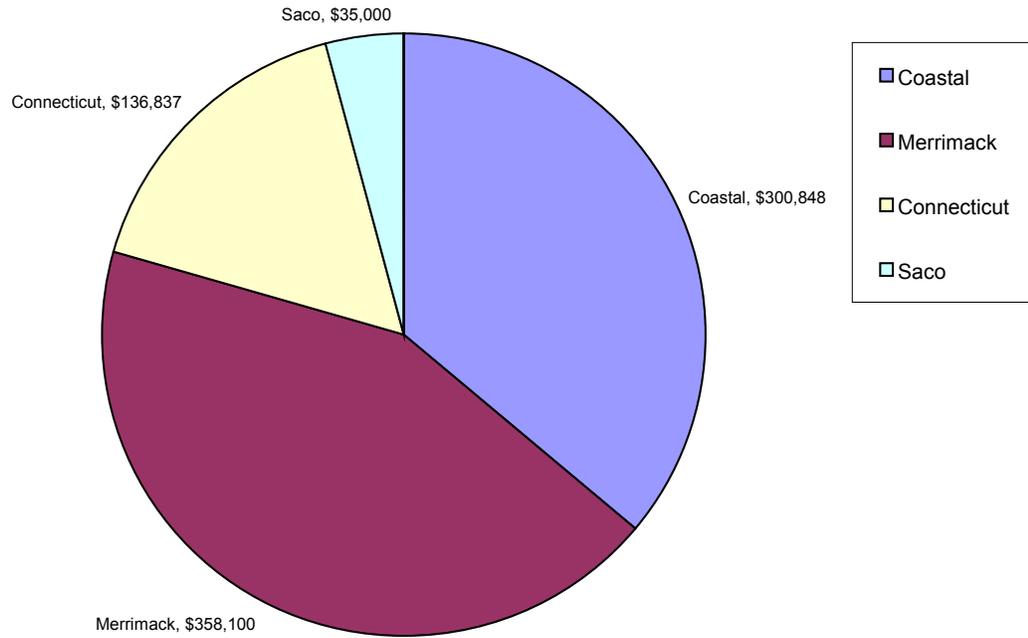
A. Section 319 NPS Local Initiative Grants Awarded in FFY 2009

Grantee	Project Name	Project Number	NPS Category	Watershed	Source of Funds (FFY)	Grant Award
Connecticut River Joint Commission	Ammonoosuc River and Floodplain Assessment - Phase 2	B-09-CT-02	Hydromodification	Connecticut	2009	\$124,137
City of Portsmouth	Portsmouth Stormwater Utility Feasibility Study	B-09-C-03	Urban Runoff/Stormwater	Coastal	2009	\$27,500
City of Dover	Dover Stormwater Utility Feasibility Study	B-09-C-04	Urban Runoff/Stormwater	Coastal	2009	\$27,500
Green Mountain Conservation Group	Ossipee Watershed Water Quality Initiative	B-09-S-01	All Sources	Saco	2009	\$35,000
New Hampshire Lakes Association	Lake Waukewan Watershed Water Quality Mitigation and Community Outreach	B-05--M-P2A	Urban Runoff/Stormwater	Merrimack	2005	\$21,920
			Total Awarded			\$236,057

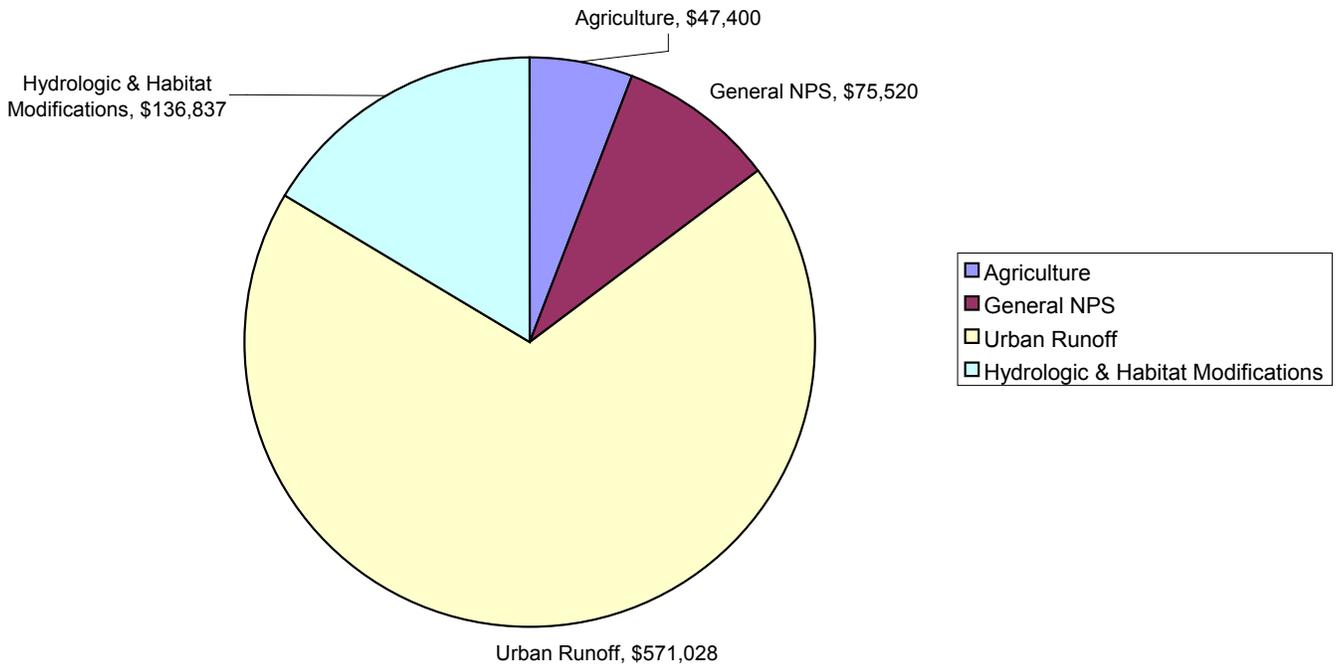
B. Section 319 Watershed Restoration Grants Awarded in FFY 2009

Grantee	Project Name	Project Number	NPS Category	Watershed	Source of Funds (FFY)	Grant Award
Baboosic Lake Association	Baboosic Lake Stormwater Mgt. BMP Implementation - Phase 2	R-09-M-02	Urban Runoff/Stormwater	Merrimack	2009	\$78,000
Bear Creek Environmental LLC	Middle Exeter River Geomorphic Assessment and Restoration Plan	R-06-C-08	All Sources	Coastal	2006	\$40,520
City of Concord	Horseshoe Pond Restoration	R-09-M-01	Agriculture/Urban Runoff/Stormwater	Merrimack	2009	\$47,400
Cocheco River Watershed Coalition	Willow Brook Watershed Low Impact Development	R-09-C-05	Urban Runoff/Stormwater	Coastal	2009	\$84,912
Pennichuck Water Works	Tinker Road BMPs	R-08-M-04	Urban Runoff/Stormwater	Merrimack	2008/2004	\$210,780
Blue Ocean Society for Marine Conservation	Lower Hodgson Brook Watershed Low Impact Development to Reduce Effective Impervious Cover	R-09-C-04	Urban Runoff/Stormwater	Coastal	2009	\$120,416
Town of Alstead	Warren Brook Restoration Plan	R-07-CT-05	Hydromodification	Connecticut	2007	\$12,700
			Total Awarded			\$594,728

C. Distribution of Section 319 Grant Dollars Awarded in 2009 by Watershed



D . Distribution of Section 319 Grant Dollars Awarded in 2009 by NPS Category



E . 2009 Estimated Pollutant Load Reductions Achieved

Grantee	Project Name	FFY Source of Funds	319 Funds	Total Cost	P(#/yr)	N(#/yr)	Sediment (tons/yr)	Other	Model/Method	Notes
Acton Wakefield Watersheds Alliance	Watershed Based Plans for High Quality Waters in the AWWA Region	2008 - Incremental	\$108,266	\$240,037	20.3	n/a	23.6	n/a	Region 5 Model	Project still in progress
Town of Tamworth	Chocoma village Bio Retention and Stormwater Treatment	2007 - Base	\$50,000	\$33,350	1.5	96.5	0.16	n/a	SIMPLE	
Town of Washington	East Washington Mill Pond Restoration	2007 - Incremental	\$48,546	\$80,940	36	90	8	n/a	Region 5 Model	Project still in progress
Piscataquog Land Conservancy	Lake Horace Marsh Restoration	2004 - Incremental	\$102,927	\$187,267	n/a	n/a	n/a	181 AC	Physical Measurement	Wetland enhancement, thru installation of water control structure
Trout Unlimited	Pemigewassett River Restoration Plan Implementation	2005 - Incremental	\$315,000	\$525,000	164	n/a	2,344	1,635 ft	Physical Measurement	Measure of linear feet of stabilized streambank & calculation of soil lost prior to restoration
City of Manchester	Maxwell Pond Dam Removal and black Brook Restoration	2003 - Incremental	\$105,000	\$187,567	n/a	n/a	n/a	one unit	Physical Measurement	Stream restoration (dam removal)
City of Manchester	Nuffs Pond Watershed Improvement Project	2005 - Incremental	\$60,000	\$354,297	37.14	n/a	63	n/a	Reknow, & Rational Method (for P)	Sediment load reduction was included in 2008 annual report
Trout Unlimited	Nash Stream Restoration	2004 - Incremental	\$78,100	\$197,600	n/a	n/a	n/a	0.5 mi	Physical Measurement	Level II geomorphic stream assessment completed
Connecticut River Joint Commissions	Stream Restoration at Lower Mohawk River and Colebrook Industrial Park	2003 & 2007 - Incremental	\$122,914	\$204,857	n/a	n/a	453	575 ft	Physical Measurement	Stream restoration (access restored to abandoned floodplain channel)
Partridge Lake Property Owners Association	Partridge Lake NPS Phosphorus Load Reduction Project	2005 - Incremental & 2006 Base	\$30,000	\$52,635	3.21	n/a	n/a	n/a	Calculated from Maine DEP values	BMP implemented; project not complete at this time.
Town of Seabrook	Cains Brook and Mill Creek Restoration Project	2006 - Incremental	\$68,240	\$113,800	1	0	0.34	n/a	Region 5 Model	BMP implemented; project not complete at this time.