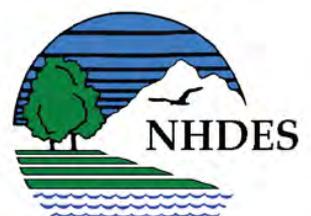


# Nonpoint Source Management 2014 Annual Report



New Hampshire  
Department of Environmental Services  
June 2015





# Nonpoint Source Management 2014 Annual Report

Prepared by  
Watershed Management Bureau  
New Hampshire Department of Environmental Services  
29 Hazen Drive  
Concord, NH 03302-0095

[www.des.nh.gov](http://www.des.nh.gov)

Thomas S. Burack  
Commissioner

Eugene J. Forbes, P.E.  
Director, Water Division

June 2015



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# New Hampshire's NPS Program At a Glance - 2014

## Projects Completed in FFY 2014

319 dollars invested: \$507,121

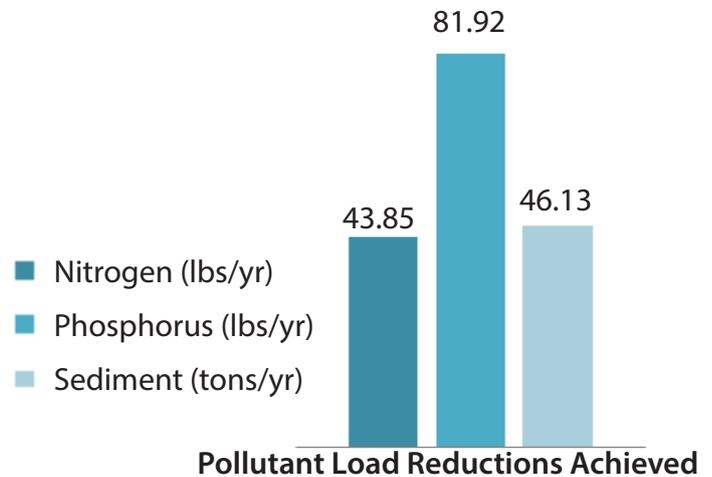
Total cost (including match): \$1,017,025

### Base Projects: 4

- 1 Coastal Watershed
- 2 Merrimack Watershed
- 1 Statewide Initiative

### Restoration Projects: 8

- 5 Coastal Watershed
- 1 Connecticut Watershed
- 2 Merrimack Watershed



## Projects Awarded in FFY 2014

319 dollars awarded: \$419,396

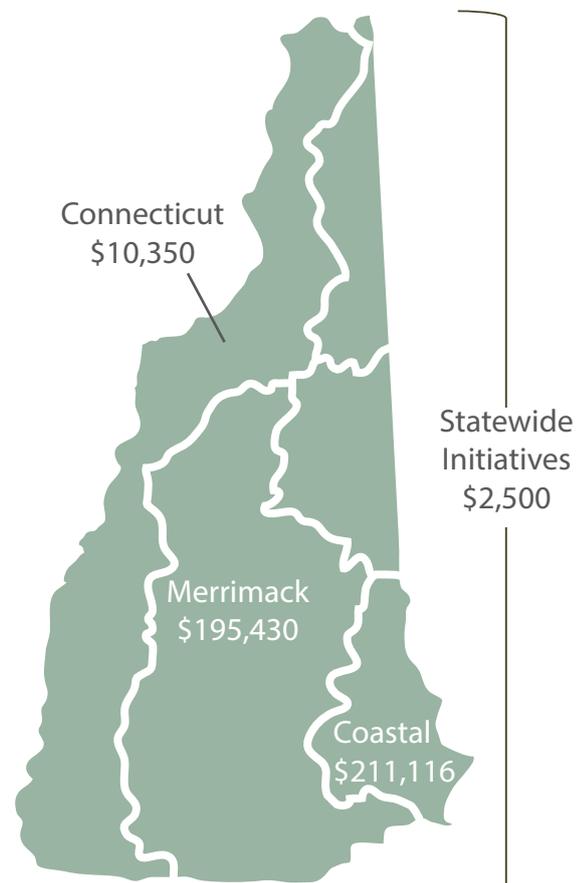
### Program/Planning Projects: 2

- 1 Merrimack Watershed
- 1 Statewide Initiative

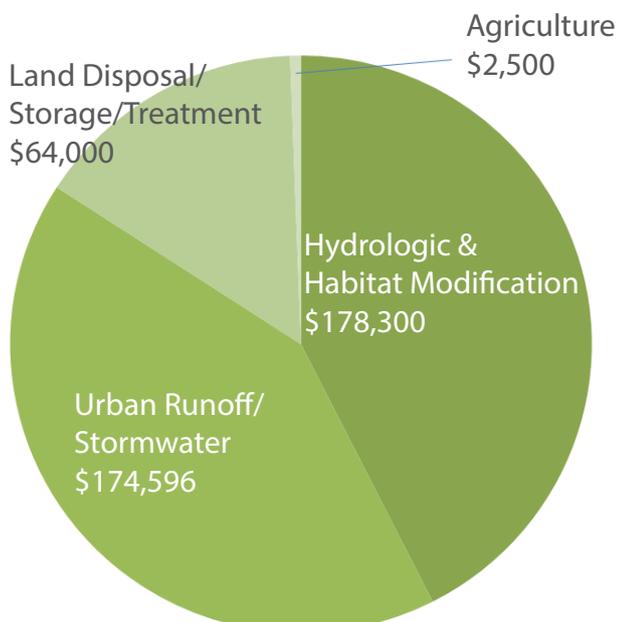
### Implementation Projects: 7

- 4 Coastal Watershed
- 2 Merrimack Watershed
- 1 Connecticut Watershed

### \$ By Watershed



### \$ By NPS Category



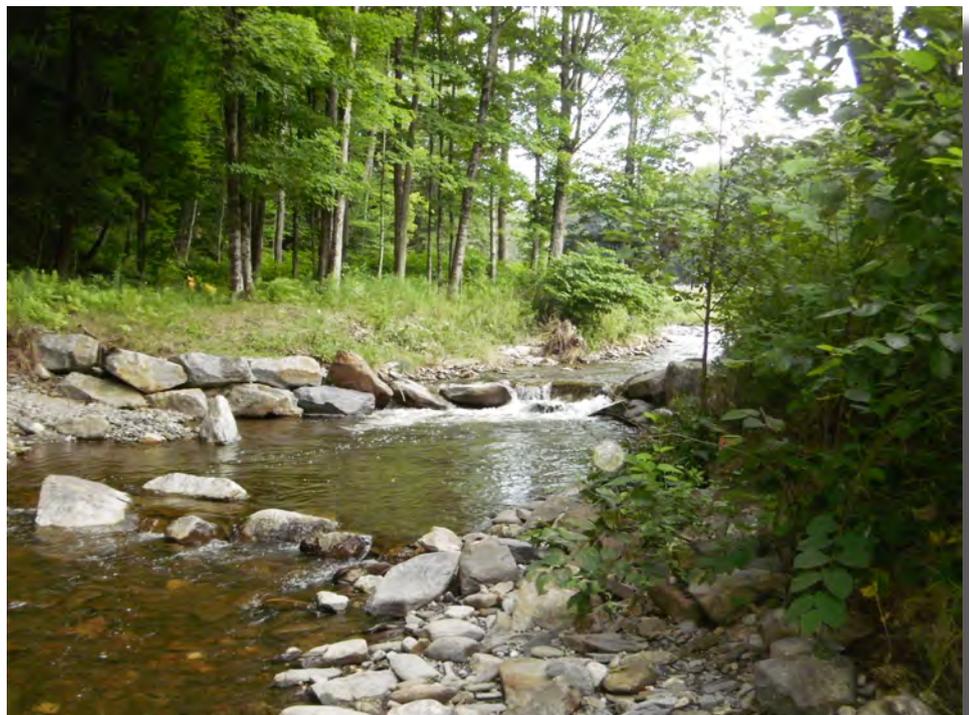
# Introduction

Reflecting in an annual report on a year of work with partners that number in the hundreds is always challenging. In 2014, the New Hampshire Nonpoint Source Program set the bar high, continued the launch of two major new programs, and made real progress addressing stormwater issues, particularly in the Great Bay watershed.

As required by the federal Clean Water Act, this report describes the activities and accomplishments achieved in New Hampshire to protect and restore waterbodies with funding appropriated under Section 319 of the Act during the time period October 1, 2013 thru September 30, 2014 (FFY 2014.) In FFY 2014, the New Hampshire Department of Environmental Services (NHDES) was awarded \$1,150,387 by the U.S. Environmental Protection Agency (EPA), a 2% increase over the prior year. Funding was distributed via our Performance Partnership Grant and a separate categorical grant.

During the year, nine grants totaling \$419,396 were awarded to watershed organizations and municipalities to develop and implement watershed-based plans. These partnerships are integral to the success of the New Hampshire Nonpoint Source Program.

The report also highlights the ten projects that were completed during FFY 2014 with the assistance of Section 319 funds awarded by NHDES to local organizations. Of special note are two projects in the Coastal Watershed: Phase 2 implementation of the Berry Brook Watershed Restoration Plan and Phase 2 implementation of the



*Warren Brook in-stream restoration, Alstead, NH*

Cocheco River Watershed Restoration Plan which demonstrate how urban retrofits can be done almost anywhere in the urbanized seacoast; and, that it is possible to achieve seemingly unreachable goals. In Berry Brook, the effective impervious cover exceeded 30% prior to the project, which is significantly higher than the 10% target, above which aquatic life use support begins to deteriorate. Completed in 2014, the project disconnected more than 21 acres of impervious area, bringing the effective impervious area in the watershed down to 18% and making significant progress toward the 10% goal.

Developing watershed-based plans can be quite costly for watershed organizations and funding for plan development has become more limited under changes to Section 319 guidance in 2013. In spite of this, plans were completed in the Mad River (Farmington), McQuesten Brook, and Rust Pond watersheds. To provide more resources for watershed-based plan development, NHDES made such work a top priority for funding in the Section 604(b) water quality planning grants program RFP issued in 2014. In 2012, this biennial RFP resulted in a soon-to-be-released plan for Pearly Pond in Rindge; and in 2014, 604(b) will fund

two additional plans – one for the Mad River in Campton, and one for Pleasant Lake in Deerfield.

NHDES is pleased to report that in 2014, New Hampshire’s updated Nonpoint Source Management Program Plan was approved by EPA. The Program Plan contains specific milestones over the next five years that cover six major NPS pollutant categories. Progress on these milestones will be reported to EPA as part of our NPS Management Annual Report.

There is a lot to digest in this year’s Annual Report, and much more is behind each and every highlight, particularly the contributions by watershed organizations, municipal officials and our state and federal agency partners. We cannot properly describe our gratitude to all of these people for the work they do on a daily basis, without which the progress described in this report could not have been made.

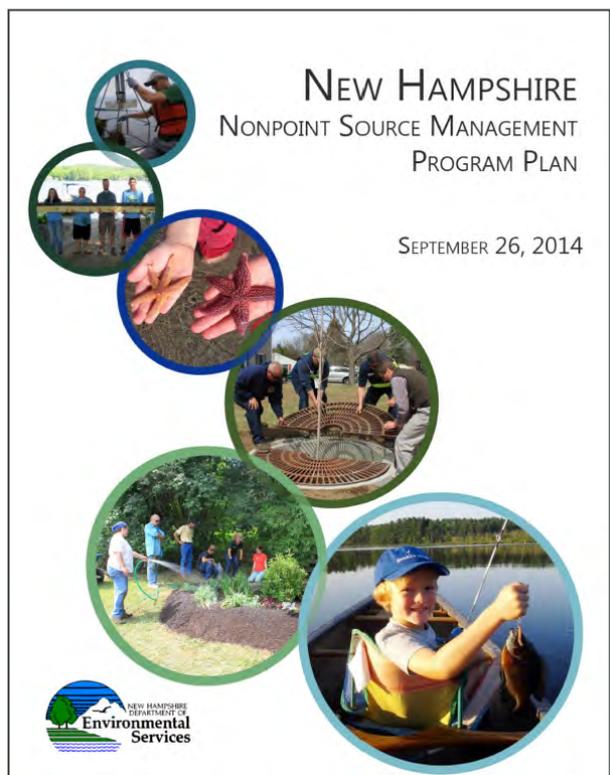
**New Hampshire Nonpoint Source Section 319 Grant Expenditures thru 09/30/14\***

Grant	Award Amount	Project Period	Expenditures	319 Project Obligations
C9-98132411-FY10	\$754,295	3/1/10 – 9/30/15	\$446,972	\$302,041
C9-98132412-FY11	\$752,940	8/22/11 – 9/30/16	\$474,451	\$238,299
C9-98132413-FY12	\$449,356 <sup>1</sup>	7/1/12 – 9/30/17	\$331,563	\$107,031
C9-98132414-FY13	\$531,049	3/1/13 – 9/30/18	\$122,663	\$287,819
C9-98132415-FY14	\$575,194	10/1/13 –9/30/18	\$ 3,340	\$496,363

<sup>1</sup>Reduction in outside projects in 319 grant was offset by increase in PPG funded projects

\*Source NHDES Ledger System

## Nonpoint Source Management Program Plan Approval



On September 30, 2014, EPA approved the New Hampshire Nonpoint Source Management Program Plan dated September 26, 2014. The updated plan reflects the input of over 450 stakeholders and serves as the Program’s road map for communication, outreach, planning and implementation projects during years 2015 through 2019. The Program Plan establishes a schedule to complete specific, short-term objectives with measurable milestones that help in attaining long-term goals for protecting and restoring New Hampshire’s waters and watersheds from NPS pollution. Progress on implementing these objectives will be reported annually.

New Hampshire’s 2014 Nonpoint Source Management Program Plan can be viewed on the NHDES website at <http://des.nh.gov/organization/divisions/water/wmb/was/nps-plan.htm>.

## Soak Up the Rain

The Soak Up the Rain (SOAK) program completed a successful field season in 2014. True to its name, the program and its partners literally soaked up nearly 115,000 gallons of stormwater, preventing an estimated 11,000 pounds of sediment, 3 pounds of phosphorus, and 6 pounds of nitrogen from washing into the state's lakes, streams and coastal waters.

The SOAK program partnered with the Great Bay Stewards, Silver Lake Land Trust, Green Mountain Conservation Group, Massabesic Audubon and the Towns of Washington and Hampton to complete five projects, including the installation of water bars, infiltration trenches, dry wells and rain gardens. In addition, dozens of site visits were conducted in the Great Bay watershed and around the Silver Lake shoreline in Harrisville and Nelson to determine candidate sites for future projects.

In the spring, the [SOAK program website](#) and [Soak NH Facebook page](#) were launched. The website serves as a central location for program information and resources. As projects are completed, the website is updated with stories and photos. A rain barrel on the home page fills up as projects are installed and begin to soak up stormwater. A map shows the locations of installations. Since the launch in May, the website has had over 1,000 users and over 8,300 page views.



*Campers at Camp Robin Hood on Lake Ossipee receive instructions from Jillian McCarthy and Lisa Loosigian, SOAK program staff before beginning installation of water bars and infiltration steps to address erosion problems.*

In the summer, NHDES was awarded a Project of Special Merit grant from the National Oceanic and Atmospheric Administration (NOAA) to enhance the SOAK program in New Hampshire's coastal zone communities. The grant includes working with the Great Bay Stewards to develop a sustainability plan for their local program to help build organizational capacity, evaluate program barriers and successes, and develop strategies to solicit future program participation, partners and funding. The plan can serve as a resource for other communities and organizations considering starting a Soak Up the Rain program. The grant also includes working with UNH Cooperative Extension to develop a Soak Up the Rain training program for professional landscapers to learn how to incorporate water quality practices, such as rain garden and dry wells, into their landscaping services.

## New Hampshire Launches First-in-the-Nation Commercial Salt Applicator Certification Program



*DES hopes to reduce excess salt application, as in the photo above, through the “Green SnowPro” training and the Certified Applicator program.*

The need for NHDES to look more closely at commercial contributions to road salt from winter parking lot applications at stores, businesses and schools arose from four impaired watersheds in the southern part of the state, along the Interstate 93 corridor, where salt reduction in the range of 25% to 45% is needed to meet water quality standards. Road salt, or sodium chloride, is toxic to aquatic life in fresh water when concentrations average 230 mg/l over a four-day period or 860 mg/l over a one-hour period. After a detailed study, NHDES found that as much as 50% of salt loading in impaired urban watersheds comes from commercial parking lots and driveways.

It is also known that chloride impairments are not limited to the I-93 corridor. Currently, there are 47 documented chloride impairments in New Hampshire. Since there is not sufficient chloride data to determine the impairment status of all waters, NHDES performed a statistical analysis of impaired watersheds to determine thresholds above which waters are likely to be impaired. Based on the analysis, a salt loading rate of 200 tons/square mile/year will likely cause violations of water quality standards at some time during the year. Analysis of land cover data showed that this threshold was likely to be met in watersheds where greater than 15% of the land cover is impervious. From this, it can be inferred that there are chloride impairments in New Hampshire

that have not yet been documented with water quality data, and that these impairments are most likely in the southeastern portion of the state which is more highly urbanized. In less urbanized areas, chloride impairments are more likely to be found in the watersheds of smaller streams with limited dilution capacity and a high proportion of roads, driveways and parking lots.

Working with the New Hampshire Department of Transportation (NHDOT), EPA, and the Federal Highway Administration, the NHDES Nonpoint Source Program established the I-93 Salt Reduction Working Group in 2006. The work group included representatives from the towns of Derry, Londonderry, Salem, and Windham; two regional planning commissions; environmental groups; and private sector salt applicators. One of the first issues raised by both public and private sector winter maintenance professionals was the need to address liability concerns for commercial salt applicators. For many years, municipal public works departments and NHDOT have trained their employees on proper salt application, have adopted winter maintenance policies and been exempt from liability under state law if they follow those policies. However, this same level of protection did not exist for those operators who maintain commercial and institutional parking lots and driveways. Stakeholders felt that commercial applicators were induced to use more salt, rather than less, due to concerns over liability for slip and fall claims. NHDES heard this message and conveyed the details to the Legislature. This resulted in the passage of a commercial salt applicator certification program with limited liability protection for claims arising from winter conditions.

This first law of its kind in the nation became effective for the 2013/2014 winter, during which 230 commercial salt applicators became certified by NHDES. Certification requirements entail completing a full day “Green SnowPro” salt applicator training and passing an exam. The training is provided by the University of New Hampshire Technology Transfer Center. The goal of the training is to teach salt applicators how to maintain safe surfaces while using salt efficiently to avoid excess applications that can run off and pollute nearby water bodies. The course focuses on the chemical properties of salt, application rates and techniques, environmental impacts, and the proper calibration of equipment. Certified applicators are required to keep event-based records of salt use, which are kept for their own benefit in case of damage claims, and must report annually on salt use and pavement treated. Over time, NPS Program staff will use this data to measure the effectiveness of the program. In addition to protecting salt applicators, the new law also provides limited liability protection to property owners who hire certified salt applicators to maintain their parking lots. To date, 384 salt applicators have been certified through Green SnowPro.

In addition, the NHDES NPS Program identified Chlorides and Road Maintenance as a distinct chapter in the 2014 Nonpoint Source Management Program Plan. This chapter includes specific milestones associated with the new certification program and the development of watershed based plans in priority watersheds with known chloride impairments.

## Education and Outreach

In 2014, NHDES was involved in numerous efforts with partners to educate others on nonpoint source pollution causes and impacts and to promote the Watershed Assistance Grants program.

### BMPalooza Tour

In October, NHDES, and its Nonpoint Source project partners from four different watersheds, hosted representatives from EPA in the biennial BMPalooza Tour. Attendees were provided with an opportunity to inspect installed Best Management Practices (BMPs), discuss future implementation projects and, most importantly, meet our valued project partners who provided tours at the following project sites:



**Cobbetts Pond, Cobbetts Pond Improvement Association** – attendees were provided with an overview of residential scale stormwater BMPs in the Cobbetts Pond watershed. Attendees inspect the Cobbetts Pond shoreline.

**Furnace Brook Watershed,  
Town of New Ipswich and FB  
Environmental**

*attendees were shown several BMP installations in the Furnace Brook Watershed. Whitney Baker from FB Environmental describes a BMP that was installed along Appleton Road.*



**Warren Brook Watershed,  
Town of Alstead, Cold River  
Local Advisory Committee and  
Headwaters Hydrology**

*Post-flooding restoration work for Warren Brook that included a newly created floodplain, floodplain culvert and creative in-stream restoration features. Sean Sweeney from Headwaters Hydrology describes the work completed along a restored section of Warren Brook.*



**Holt, Bowers and Harris Ponds,  
Pennichuck Corporation and  
Comprehensive Environmental,  
Inc. (CEI)**

*A tour of BMP practices that are helping protect the drinking water supply for the Nashua area. CEI Engineer, Ben Lundsted, points out the improvements surrounding the water supply ponds on Pennichuck Brook.*



In addition to informing state and EPA staff on the details of highlighted projects, this biennial event provided recognition to project partners for all of the significant work they do. The attendees came away from the tour feeling energized, rejuvenated and highly encouraged by the tremendous successes achieved in New Hampshire watersheds through the strong partnerships forged with the Section 319 Watershed Assistance Grants program.

## Natural Resources Outreach Coalition 2.0

In 2014, NHDES continued working with the Natural Resource Outreach Coalition (NROC), a collaboration of natural resource and planning professionals which assists coastal communities with protecting natural resources while accommodating growth. NROC's current approach provides tools for adapting to climate change and addressing the Great Bay nitrogen impairment. New efforts included using existing resources to provide hands-on responses to community requests for assistance. NHDES assisted with the general coordination of NROC efforts as well as provided assistance with special programs. This included the development of and presentation at a workshop for Newmarket town staff, boards and residents. NHDES presented on what it means to be a new MS4 municipality and how to prepare for the new permit requirements. NHDES and UNH Cooperative Extension staff also provided assistance to the Newington Conservation Commission to help them develop a proposal to apply for future Section 319 funding to reduce nitrogen impacts to Great Bay from septic systems.

## MS4 Stormwater Coalitions

NHDES supported the MS4 Regional Stormwater Coalitions in Manchester, Nashua, and the Seacoast regions as they prepared for the release of the new MS4 permit. Scheduled meetings in all three regions provided an excellent opportunity to convey valuable stormwater and Section 319 grant-related information to a broad municipal audience. NHDES addressed numerous topics including the state revolving loan and grant funds, draft Nonpoint Source Management Plan, Soak up the Rain program, Green SnowPro program and voluntary salt application certification, Coastal Resilience Technical Assistance Grant, and the new law regarding nitrogen and phosphorus content in fertilizer.



*NHDES staff instructs Goffstown employees and interns on how to use water quality monitoring equipment*

In addition to providing information at the regional meetings, NHDES piloted a confirmation water quality monitoring approach for impaired waters in the town of Goffstown. The Volunteer Lake Assessment Program (VLAP) then provided instructions, recommendations and hands-on training in Goffstown, Derry, Amherst, Plaistow and Bedford. NHDES plans to conduct annual confirmation monitoring throughout the state, rotating through the HUC 12s over the next ten years.

## General Events, Project Assistance, and Outreach Efforts

In addition to the above activities, DES provided general outreach assistance to grantees and participated in several events to educate the public on nonpoint source pollution and to promote Watershed Assistance Grants. These included:

- Speaking at the 2014 NH Water and Watershed Conference: Sustainability of New Hampshire's Water Resources, Plymouth State University;
- Providing a display at Discover Wild NH Day sponsored by NH Fish and Game;
- Hands-on activity with the Enviroscope watershed model at the Drinking Water Festival, Manchester Water Works, Milford Conservation Commission, and the Newmarket schools;
- Presentation on "Working with Government on Natural Resource Protection" and facilitating "The Watershed Game" at UNH Cooperative Extension and Great Bay Community College;
- Promoting the Soak up the Rain program at Science Café, Portsmouth Brewery; and
- Giving an hour long interview on Portsmouth Community Radio explaining how DES addresses stormwater through outreach and education.



*UNH Cooperative Extension and NHDES facilitate the Watershed Game with Natural Resource Stewards class.*



*DES staff, Lisa Loosigian, describes the concept of stormwater runoff to children at Discover Wild NH day.*

## 604(b) Water Quality Planning

The biennial RFP for Clean Water Act Section 604(b) projects was revamped in 2012 to better align with the Clean Water Act language, which requires funds to be allocated to regional planning entities for water quality planning activities including:

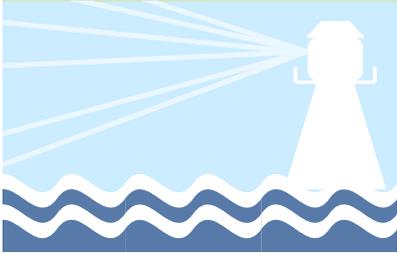
1. Identifying the most cost effective and locally acceptable facility and nonpoint source measures to meet and maintain water quality standards;
2. Developing an implementation plan to obtain State and local financial and regulatory commitments to implement water quality plans;
3. Determining the nature, extent and causes of water quality problems in the state; and
4. Determining those publicly owned treatment works which should be constructed, taking into account the relative degree of effluent reduction attained and the consideration of alternatives to such construction.

With the change in Section 319 guidelines limiting funding available for the development of watershed-based plans, NHDES prioritized number 2 above to better align our programs and support the development of watershed-based plans.

The biennial RFP for Clean Water Act Section 604(b) water quality planning projects was released in 2014. Two of the five projects selected will result in the development of watershed-based plans, while the other three funded projects will further water quality planning in the Great Bay watershed. See table below for a list of the specific projects and funding amounts.

**Clean Water Act Section 604(b) water quality planning projects**

<b>Organization</b>	<b>Project Name</b>	<b>604(b) Funding Amount</b>
Southern NH Planning Commission	Pleasant Lake Watershed Restoration Plan	\$50,000
Rockingham Planning Commission	Regional Stormwater Tracking and Accounting Tool for Municipal AOC and MS4 Programs	\$12,000
North Country Council	Mad River Fluvial Geomorphic Assessment and Restoration Plan	\$30,000
Rockingham Planning Commission	Implementation of WQ Improvement Tasks in the Lamprey and Piscassic River Watersheds	\$7,500
Strafford Regional Planning Commission	Septic System Database for Durham	\$43,183
Total FY14 and FY15		\$141,883



## Highlights and Overview of Completed Projects

### Berry Brook Watershed Restoration, Phase 2 - Low Impact Development Retrofits in an Urban Environment

Coastal Watershed

Berry Brook Watershed Restoration, Phase 2 - Low Impact Development retrofits in an Urban Environment

City of Dover

2007/2008/2010/2011 Restoration

Grant Amount: \$172,315

Local Match: \$235,440

Sediment Reduction: 6.82 tons/yr

Phosphorus Reduction: 49.7 lbs/yr

Nitrogen Reduction: 332.5 lbs/yr

**Project Background:** For many years, Berry Brook, a tributary to the Cocheco River, located in the City of Dover, was neglected. Historically, portions of its headwaters were piped underground and in its lower reaches, stormwater runoff resulted in flooding and habitat loss. Committed to addressing these problems, the City of Dover completed the Berry Brook Watershed Management Plan in 2008. Restoration goals include stream continuity and habitat improvements, treatment of stormwater runoff to remove pollutants, and reduction of stormwater volume discharged to the brook. This project is the second phase of a multi-year effort to implement the Berry Brook Watershed Management Plan. Previously, in Phase 1, five stormwater BMP installations were implemented, leading to a reduction in 0.5 acres of impervious cover (IC). In addition to the City, project partners include the Cocheco River Watershed Coalition (CRWC), UNH Stormwater Center, NH Fish and Game and American Rivers.



*Construction crews build a gravel wetland to treat nine acres of impervious cover in the Berry Brook headwaters.*

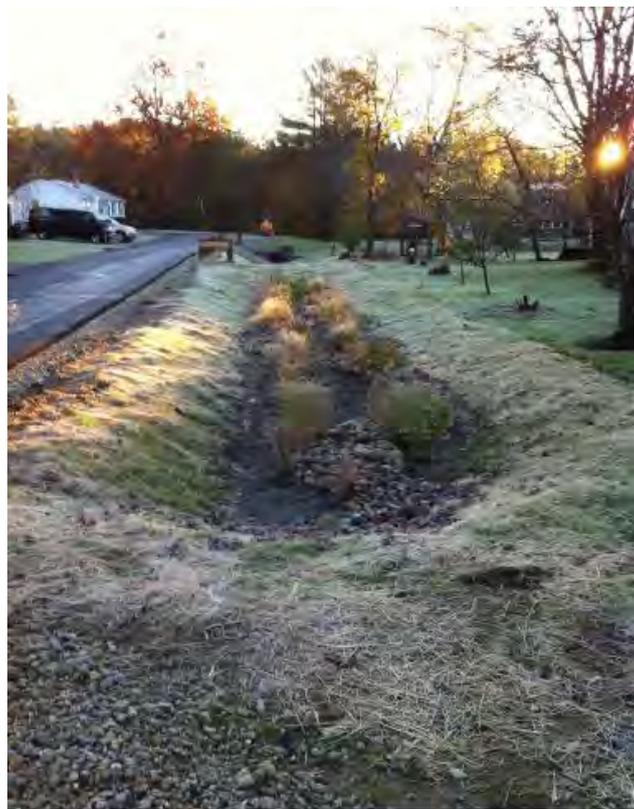
**Problem:** The Berry Brook watershed is nearly built-out with 29.7% impervious cover. Berry Brook is listed on the state's 303(d) List as impaired for Aquatic Life Use and Primary Contact Recreation as a result of urbanization and stormwater runoff.

**Project Objectives:** In setting a restoration goal and measuring progress on the plan, the IC approach is being applied. Under this approach, IC disconnection goals are used as a surrogate for specific pollutant load-reduction targets. Disconnection of IC refers to the practice of directing runoff from IC such that it does not flow directly into the stormwater system, but instead is diverted to stormwater treatment practices where the runoff is filtered and infiltrated into the native soils. This management approach will decrease pollutant loads and stormwater volumes being discharged to the brook. The goal under the Berry Brook Watershed Management Plan is to reduce the overall IC to 10% or 18.6 acres. To achieve this, approximately 66% or 36.6 acres of the existing IC needs to be disconnected.

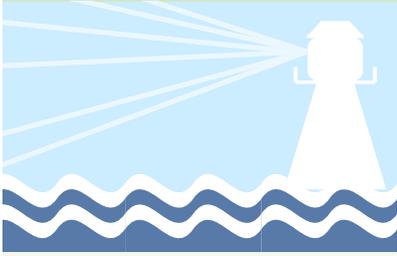
For Phase 2, project objectives included construction of Low Impact Development (LID) stormwater management strategies at several locations spanning almost the entire upper watershed. In addition to calculation of disconnected IC, verification of success will include pre- and post-BMP installation water quality monitoring for load reduction.

**Project Outcomes:** Seven BMPs were constructed: five bioretention or bioswale systems, a subsurface gravel wetland, and a swale connecting to a surface wetland detention area. Combined, these installations effectively resulted in an IC reduction of 21.4 acres and reduced annual pollutant loading of sediment by 6.82 tons, phosphorous by 49.7 pounds and total nitrogen by 332.5 pounds. The project also involved significant outreach through volunteer planting days, brook cleanups, school programs and working with the Department of Public Works staff to illustrate the importance of LID in controlling water quality and quantity. Additionally, with funding from the NH Aquatic Resource Mitigation Fund, over one thousand feet of Berry Brook's headwaters were day-lighted, with stream flows released to a constructed, natural design stream channel.

**Next Steps:** The overall watershed IC is now 33.2 acres (17.8%). In order to reach the 10% IC goal, it is estimated that a further reduction of 14.7 acres is needed. Phase 3 of the project is currently underway with Section 319 FFY 2013 funds. It is anticipated that following the completion of Phase 3, the IC reduction target will be met and Berry Brook will be able to meet water quality standards, resulting in another Section 319 Nonpoint Source Success Story.



*This bioretention unit uses natural processes to filter pollutants and infiltrate stormwater from road runoff.*



## Cocheco River Watershed Restoration, Phase 2 - Rochester LID

Coastal Watershed

Cocheco River  
Watershed  
Restoration, Phase  
2 - Rochester LID

Cocheco River  
Watershed Coalition

2011 Restoration

Grant Amount:  
\$51,500

Local Match:  
\$35,240

Sediment Reduction:  
0.07 tons/year

Phosphorus  
Reduction:  
0.6 pounds/year

Nitrogen Reduction:  
5.3 pounds/year

**Project Background:** The Cocheco River - Willow Brook restoration work conducted through this project emerged from goals set in the 2006 Cocheco River Watershed Restoration & Implementation Plan that include:

- Restore Willow Brook to its natural stream functions;
- Reduce volume of stormwater discharge;
- Improve treatment of stormwater discharge to remove pollutants;
- Promote Low Impact Development (LID); and
- Education and assistance to encourage civic engagement to meet these goals.

Restoration of the impaired brook to meet New Hampshire water quality standards is the long-term goal for the Cocheco River - Willow Brook initiative. This was the second phase in a multi-phase project to achieve the goal. For this phase of the project, the Cocheco River Watershed Coalition (CRWC) partnered with the City of Rochester Department of Public Works (DPW) and the University of New Hampshire Stormwater Center (UNHSC) to identify and implement stormwater solutions to attain project goals.

**Problem:** The Cocheco River, part of the Piscataqua watershed, flows from northwest to southeast, diagonally across the City of Rochester. Willow Brook drains approximately one third of Rochester's land area and joins the Cocheco River downstream of the city. The 2,515 acre watershed of Willow Brook is densely developed with pockets of undeveloped wetland.

Rochester grew dramatically during the nineteenth century when manufacturing and textile mills lined the Cocheco River. As a result of an increasing population, densely developed residential neighborhoods grew around the mills. Along with the development, drainage systems were installed to carry away stormwater. The older systems used the "pipe it straight into the stream" approach, carrying with it polluted runoff. Since that time, the public has learned about the adverse impacts of stormwater runoff and Rochester city officials have realized that there are better ways to approach stormwater management that will reduce runoff and improve water quality.

Willow Brook is on the New Hampshire State 303(d) list as impaired for Aquatic Life Use (low dissolved oxygen) and Primary and Secondary Contact Recreation (bacteria). Its direct receiving water, the Cocheco River, is impaired for Aquatic Life Use and Primary Contact Recreation. Sources are listed as unknown, but are likely to be nonpoint source pollutants from stormwater runoff as a result of being a highly impervious urban watershed.

**Project Objectives:** The main project objectives include stormwater management through construction of innovative practices, public education, and progress toward city-wide adoption of LID stormwater management.

This project uses the IC method to address water quality impairments. The IC method uses impervious cover reduction as a surrogate for pollutant load reductions. The IC method is helpful in addressing stormwater impact in impaired streams where no specific pollutant can be identified as the cause of the impairment. The Willow Brook watershed encompasses 2,515 acres of mixed land use including residential, commercial and institutional. Impervious surfaces cover approximately 16% of the watershed or 402 acres. The overall restoration goal for Willow Brook is to reduce the watershed IC to 10% or 252 acres. To reach this goal, a reduction of 150 acres of IC is needed.

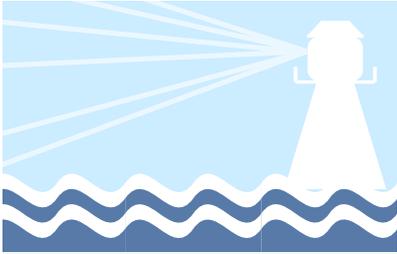


*Lori Chase (on left), CRWC, and volunteers install plantings for the Congress Street bioretention area.*

**Project Outcomes:** The results of this project built on successes achieved during Phase 1. The following three LID stormwater best management practices were installed on residential, municipal and institutional properties. Construction design and oversight was provided by the UNHSC.

- **Residential:** In order to demonstrate stormwater management in an urban residential setting, two bioretention systems were installed to treat runoff at a duplex residence on a small lot built by Southeast NH Habitat for Humanity, two city blocks from Willow Brook. The UNHSC developed the plans and provided construction oversight. The new homeowners chose the plantings and volunteers helped build and plant the BMPs.
- **Municipal:** The City DPW retrofitted an old municipal parking lot located two hundred yards from the Cocheco River at the intersection of Charles, Congress and Portland Streets to drain into a bioretention system. The site is highly visible as this broad intersection borders an urban residential neighborhood and the central business district.
- **Institutional:** An additional opportunity arose to demonstrate LID in an institutional setting. Two 550-gallon cisterns were installed at the Monarch School of New England, a private school for significantly disabled children, on Eastern Avenue that had recently installed other BMPs to protect Willow Brook. The school provided new rain gutters and diverters. Existing gardens, greenhouse and drip irrigation connect readily to the systems.

Education events were held, including a residential rain garden workshop at a local garden center and a presentation of the Piscataqua Region Estuaries Project, 2013 State of Our Estuaries report. To encourage commitment to ongoing and future implementation of LID BMPs, the project partners prepared and distributed an attractive LID technical memo. The purpose and opportunities of the stormwater initiative were presented in a 4-page graphic brochure with clear understandable language for residents at all levels of community decision-making. There have been many individual tours of the site by key community members, the crowning of which being local resident and U.S Congresswoman, Carol Shea Porter. This project resulted in the disconnection of an additional 0.30 acres of IC, bringing the total to date to 1.1 acres, with 148.9 acres remaining.



Coastal Watershed

Exeter River -  
Evaluating the  
Impacts of Dam  
Removal for the  
Great Dam

Town of Exeter

2008/2010  
Restoration

Grant Amount:  
\$69,500

Local Match:  
\$82,956

## Exeter River - Evaluating the Impacts of Dam Removal for the Great Dam

**Project Background:** The lower Exeter River from the Great Dam and upstream 7.5 miles has been listed on the state's 303(d) list since 2006 as impaired for Aquatic Life Use due to low dissolved oxygen levels. A previous Section 319 project, 2009 Exeter River Geomorphic Assessment and Watershed-Based Plan, identified the Great Dam as a potential contributor to water quality impairments upstream of the dam. A recommendation was made to evaluate dam removal as a way to improve water quality as well as fish passage. In addition to concerns related to the water quality impairment, the Great Dam does not meet state dam safety standards. As a result of these issues, the Town of Exeter, which owns and operates the dam, received this grant, along with funding from the Gulf of Maine Council on the Marine Environment through NOAA, to evaluate the impacts of dam removal and alternative actions.

**Problem:** The Lower Exeter River is impaired for Aquatic Life Use due to low dissolved oxygen and dam safety issues.

**Project Objectives:** To evaluate the potential impacts of dam removal, and other alternatives, to water quality, safety, fish passage, historic resources, recreation, sediment transport, adjacent infrastructure and other related issues.

**Project Outcomes:** This project included significant public participation from many local stakeholders including municipal officials, local volunteers, representatives from state and federal agencies, consulting engineers and natural resource professionals, local businesses, and residents. The project resulted in the creation of the Exeter River Great Dam Removal Feasibility and Impact Study (Feasibility Study). In addition to complete dam removal,

the Feasibility Study looked at eight alternatives. The results demonstrated that full dam removal would result in improved flushing rates and lower residence times in the river which would likely improve dissolved oxygen levels upstream of the dam. The study also found that removal of the dam would benefit migratory fish populations by allowing unimpeded passage of fish going upstream to spawn. The town of Exeter will take the results of this study and work with the project partners to develop and implement a process for making a decision about the dam's future.



*Great Dam in Exeter.*

## Mad River Restoration, Phase I - Implementation of Preliminary Assessment and Conceptual Restoration Plan

**Project Background:** A 2009 evaluation by the Cocheco River Watershed Coalition and Headwaters Hydrology titled "Preliminary Assessment and Conceptual River Restoration Plans for the Mad River between NH Route 11 and Tappan Street" (the Assessment) documented that the Mad River at this location is experiencing severe geomorphic instability due to hydromodification. This instability in the river corridor is resulting in mass bank failures, high powered erosive river flows, property damage and destruction of aquatic habitat. According to the assessment, the river has experienced direct and indirect human impacts including channel dredging and straightening, removal of riparian vegetation, construction of riverbank revetments, flow constrictions and impediments to aquatic organism passage (the last two issues are the result of an abandoned water main across the river). The Town of Farmington is partnering with the Cocheco River Watershed Coalition and local landowners to address issues identified in the assessment. This project implements the first phase, Design and Permitting, of the assessment's recommendations. Another Section 319 grant funded project to complete Phase 2 construction is underway.



*Bank erosion at the Mad River Restoration Site in the vicinity of  
St. Peter Church, Farmington*

**Problem:** The project site is located just west of the Tappan Street Bridge in the vicinity of St. Peter Church where there is significant erosion along 250 feet of riverbank. The erosion causes sediment loading to the river during high flows and bank loss at the site threatens safety and private property.



Coastal Watershed

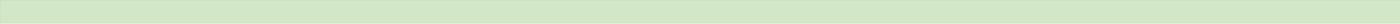
Mad River  
Restoration, Phase  
I - Implementation  
of Preliminary  
Assessment  
and Conceptual  
Restoration Plan

Town of Farmington

2012/2013  
Restoration

Grant Amount:  
\$22,280

Local Match: \$0  
\*total required match  
will be obtained  
from over-match  
of other projects



Stormwater runoff from the church parking lot exacerbates the bank erosion as it flows unmanaged over the paved surfaces and down the unstable embankment.

Additionally, aquatic organism passage and river flow are compromised at this site as a result of an abandoned municipal water main. The water main is exposed on the riverbed and is encased in concrete. The pipe and concrete control the riverbed elevation and have created an artificial pool with backwater extending about 150 feet upstream during low flow conditions. The low flow water level drops approximately 22 inches from the pool above the water main to a scour pool immediately below the water main. The height of this drop likely prevents the passage of most Eastern Brook Trout, especially the smaller size classes. Further, backwater created by the water main may be contributing to bedload deposition along the right bank above the crossing where a gravel point bar has formed.

**Project Objectives:** The goal of the project is to restore and stabilize approximately 250 feet of severely eroding river bank and remove a fish passage and river flow barrier from the river (an abandoned water main). Two phases are planned: This project implements Phase 1 - design and permitting. Phase 2 will implement restoration construction at the site including stabilization of the riverbank at St. Peter Church, stormwater management for the church parking lot, and removal of the abandoned water main.

**Project Outcomes:** The project outcomes for Phase 1 have been met which include the development of construction ready designs, approval of NHDES Wetlands permit, landowner permissions and selection of a consulting and engineer team of Headwaters Hydrology, LLC and Pathways Consulting, LLC.

## Middle Exeter River Watershed Management Plan Implementation, Phase I - Rowell Road West

**Project Background:** The Brentwood Conservation Commission and the Rockingham County Conservation District teamed up to partner on a water quality improvement project along the Exeter River. This project targeted two site specific restoration actions that were identified in the Exeter River Geomorphic Assessment and Watershed-Based Plan: Middle Exeter River (2010) to address stormwater runoff.

**Problem:** Rowell Road-West runs along the Exeter River. The unpaved, public road had become over-widened due to road management practices, recreational access, and public parking patterns. Impacts to the river from the road and unmanaged foot traffic to the river, included bank erosion and damage, sediment inputs from erosion and concentrated stormwater runoff at opposite ends of the unpaved road.

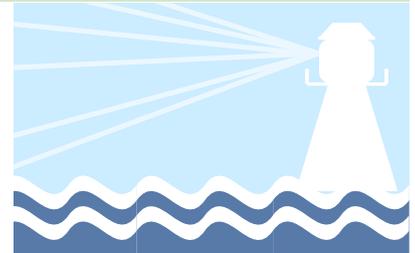
**Project Objectives:** The main goal of this project was to reduce sediment loads to the river, thereby improving the aquatic habitat and water quality for this reach of the Exeter River that is popular with anglers and other recreationalists.

To achieve this goal, the project focused on the following objectives:

- Reduce stormwater runoff from the road;
- Prevent riverbank erosion by providing focused river access;
- Stabilize severely eroding riverbank; and
- Conduct outreach to landowners.



*Volunteers install 300 plantings to stabilize 75 feet of the eroding riverbank.*



Coastal Watershed

Middle Exeter  
River Watershed  
Management Plan  
Implementat, Phase  
I - Rowell Road West

Town of Brentwood

2008/2009/2010  
Restoration

Grant Amount:  
\$49,152

Local Match:  
\$48,481

Phosphorus  
Reduction:  
11.2 pounds/year

Nitrogen Reduction:  
45.62 pounds/year

Sediment Reduction:  
8.67 tons/year

**Project Outcomes:** With labor from the Brentwood Department of Public Works as well as volunteers, the following accomplishments were achieved:

- Installation of vegetated treatment swales, a stormwater treatment wetland and improved stormwater collection including two catch basins;
- Installation of a grassed filter strip and buffer plantings along approximately 700 feet of the shoulder of Rowell Road;
- Repairs and stabilization to damaged portions of the riverbank;
- Repairs to culverts;
- Construction of a canoe launch with infiltration stairs for foot traffic; and
- Distribution of approximately 1,500 educational brochures. The brochures, titled Help Our River: Save Our Bay, provided practical measures for residents to reduce nutrient loads in stormwater runoff.

The town was also able to secure a conservation easement under a separate grant to ensure connectivity of the riparian buffer as well as to protect the project improvements.

## Hodgson Brook Watershed Restoration, Phase 2 - Pease Tradeport Retrofit Survey and BMPs

**Project Background:** This project is the second phase of implementation for a multi-year restoration approach to reduce impervious cover (IC) in the Hodgson Brook watershed. Because of the highly urbanized nature of the watershed and the number of impairments, IC reduction is being used as a surrogate for individual pollutant load reduction goals. During Phase 1, IC was delineated and quantified and an IC reduction goal was set at ten percent for the lower portion of the watershed. It is anticipated that once the IC goal is met, the brook will meet water quality standards. IC reduction in the Upper Hodgson Brook watershed will be looked at in future phases of the project.

Phase 2 builds on highly successful first round implementation efforts where local partnerships were established and multiple BMPs were installed to disconnect IC in the Coakley Road area. For this project, IC reduction efforts targeted the Pannaway Manor section of the lower watershed. Additionally, because the brook is also impaired for chloride, efforts were made to identify and implement local approaches for achieving chloride reductions.

**Problem:** Hodgson Brook is a seven-mile stream that flows through the heart of Portsmouth. Impervious surfaces cover 32% of the total watershed area. Stormwater flows across these surfaces, picking up sediment and pollutants, which then discharge directly into Hodgson Brook. This has led to high levels of pollutants and sediments and increased streamflows in the



*Volunteers install a residential rain garden to treat roof and driveway runoff in the Pannaway Manor neighborhood in Portsmouth*



Coastal Watershed

Hodgson Brook Watershed Restoration, Phase 2 - Pease Tradeport Retrofit Survey and BMPs

Blue Ocean Society for Marine Conservation

2009/2010 Restoration

Grant Amount: \$104,574

Local Match: \$87,826

Phosphorus Reduction: 3.44 pounds/year

Nitrogen Reduction: 28.85 pounds/year

Sediment Reduction: 1.7 tons/year

brook. As a result, the brook was listed on the NHDES 2008 305(b)/303(d) Surface Water Quality Assessment as failing to meet the Aquatic Life Designated Use (benthic macroinvertebrates and dissolved oxygen), Secondary Contact Recreation (pathogens—E.coli) and chloride.

**Project Objectives:** The main project objective is to manage stormwater and reduce effective IC by promoting understanding and capacity building and implementing best management practices to reduce stormwater flows and contaminated runoff to Hodgson Brook.

Impervious Cover (IC) Target (acres)	
Hodgson Brook - Lower Watershed	649.9
Impervious Cover Beginning	183.4
10% IC Target	65.0
Total IC to be Reduced	118.4

**Project Outcomes:**

- Installation of three bioretention units to treat road and parking lot runoff. Provided training in residential rain garden design and construction. Installed five residential rain gardens in the Pannaway Manor neighborhood and distributed 74 rain barrels. As a result of these activities, IC was reduced by 2.09 acres;
- Trained over 35 winter maintenance professionals in salt application BMP methods through the Green SnoPro program;
- Conducted outreach through radio interviews, newspaper articles and press events;
- Held eight Hodgson Brook Advisory Board meetings to develop strategies for future projects;
- Held two trash day cleanups in and around the brook;
- Developed a stormwater flow approach to promote better understanding of existing stormwater management and identified locations for future BMP installations;
- Continued Volunteer River Assessment Monitoring to measure in-stream conditions;
- Used tracking spreadsheet to quantify IC and pollutant load reductions; and
- Communicated project results to stakeholders including the City of Portsmouth, Pease Development Authority and University of New Hampshire.

## Lower Warren Brook Restoration, Phase 2 - Design, Permitting, and Bidding

**Project Background:** On October 9, 2005, heavy rain caused water and mobile debris carried within Warren Brook to build up behind culverts under Route 123 until it washed away Cooper Hill Road, sending a destructive wall of water downstream into Alstead and the Cold River. Seven people died in the flooding and several homes and other buildings were swept into the raging waters. The emergency repairs and stabilization of Warren Brook in 2006 under the NRCS Emergency Watershed Protection Program only included the reshaping of the channel and lining the banks with riprap. The stabilization work completed by NRCS did not reduce the degree of channel incision, nor did it reconnect Warren Brook with its floodplains as recommended in the 2007 Restoration Master Plan for the Cold River, Warren Brook, and Bowers Brook (Restoration Plan.) In 2010, an approximately 900-foot section of Warren Brook was restored using natural channel design techniques recommended in the Restoration Plan. Phase 2 is to continue with restoration efforts in the watershed.

**Problem:** The Lower Warren Brook project reach has experienced significant bank erosion, channel incision, and a nearly complete disconnection from floodplain habitat, resulting in significant threats to property, stream quality and the biota that exist within the brook. Warren Brook fails to support the Aquatic Life Designated Use due to hydromodification changes that occurred as a result of the 2005 flooding and the emergency repair methods that were constructed. Another negative impact to Warren Brook, resulting from the catastrophic flooding in 2005, was the rapid incision and straightening of the channel that effectively shortened the

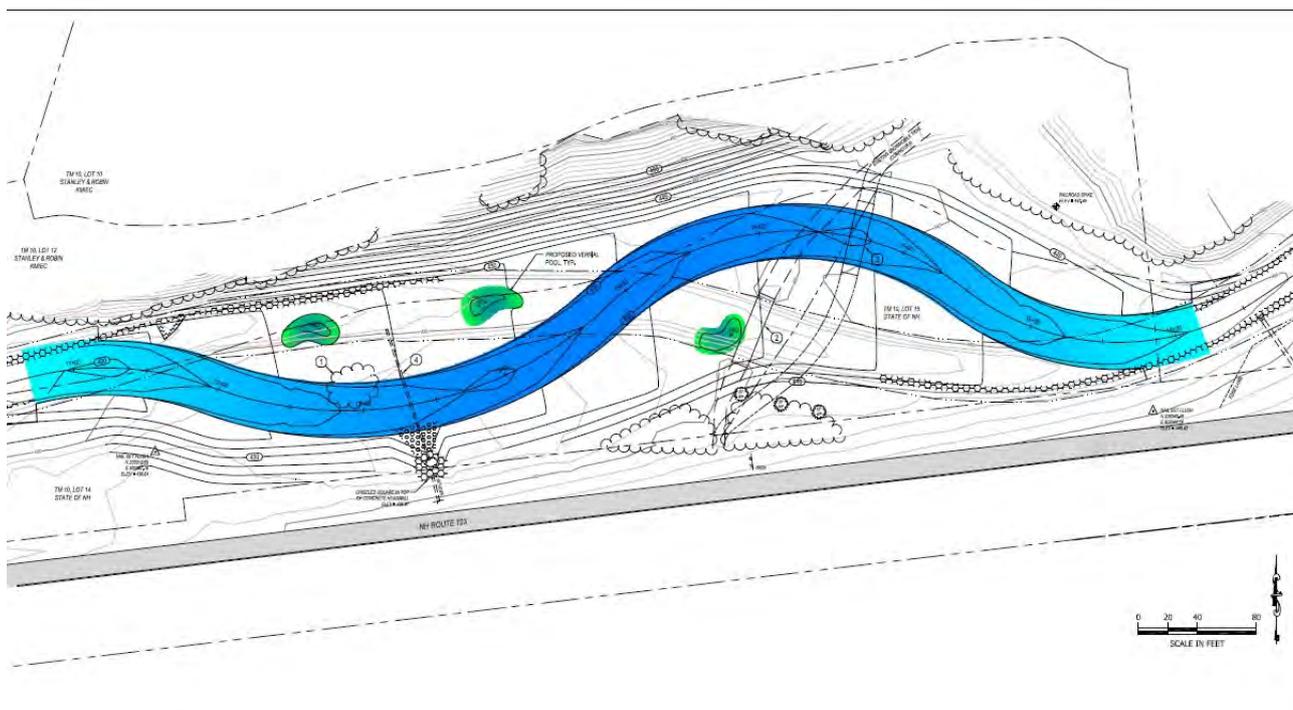
Connecticut River  
Watershed

Lower Warren Brook  
Restoration, Phase 2  
- Design, Permitting,  
and Bidding

Town of Alstead  
2008 Restoration

Grant Amount:  
\$20,000 (original  
award \$87,400)

Local Match:  
\$20,970



*Lower Warren Brook Restoration Project Design illustrating the former, straightened channel overlaid with the proposed, longer, and more meandering stream channel (blue) with floodplain and vernal pools (green).*

length of Warren Brook and increased its slope. This has caused the channel of Warren Brook to carry more sediment, trigger bank erosion from what were once stable and well vegetated stream banks, and has eliminated the ability of the brook to deposit sediment upon its floodplains due to the lack of meanders or bends.

**Project Objectives:** The ultimate goal in implementing the Restoration Plan is to restore form and function to Warren Brook with access to floodplain. The continuing erosion, channel widening and encroachment through private properties threatens safety and the structural integrity of adjacent businesses and homes. The objectives and associated tasks for this project entailed design and permitting (data review, landowner coordination, wetland delineation, hydraulic modeling and construction design), bidding, construction, oversight and reporting for the Lower Warren Brook reach identified in the Restoration Plan.

**Project Outcomes:** After approval of this project in 2012, a significant rainfall event occurred in June of the following year. Approximately six inches of rain fell in five hours which resulted in flash flooding and damage to the previously restored section of the brook. The flooding in 2013 triggered channel incision and floodplain scour and revealed a buried concrete structure (old dam) within the project area that the Restoration Plan had not taken into account. The discovery of this structure resulted in elevated construction bids that were beyond the available budget secured by project partners. As a result, this project needed to be redesigned to incorporate removal of the buried dam remnants.

Headwaters Hydrology, professional land and water resources consultant, was selected by the Town of Alstead to manage the project. The tasks of existing data review, landowner coordination, wetland delineation, field survey, base map creation, hydraulic modeling, final designs and construction plan preparations, permitting, bidding and drafting of contract documents have all been completed to date. Permission letters from the two private land owners within the project area have also been secured and the New Hampshire legislature passed Senate Bill 57 in the 2013 session which specifically approves the project on the state-owned properties in the project area.

Although this project was closed, prior to completion, the \$20,000 expended under this phase funded all of the project tasks, except for actual construction. The unspent balance will be applied toward a future Section 319 grant that will restore long-term stability and high quality aquatic and riparian habitats by realigning 810 linear feet of the brook to a meandering channel, constructing terraces bordering the brook, installing rock and wood in-stream structures, removing riprap and planting willow and dogwood live stakes. The floodplain habitat will also be diversified through the creation of vernal pools where the former channel existed. Project partners expect that within five to ten years after construction has been completed, visitors to this restored reach of Warren Brook will not be able to distinguish this restored reach from an undisturbed stream habitat in New Hampshire. The NHDES Watershed Assistance Section looks forward to the construction phase of this project and our continued partnership with the Town of Alstead, the Local River Advisory Committee and Headwaters Hydrology.

## Lake Winnepesaukee Watershed Management Plan Phase I - Center Harbor

**Project Background:** The completion of a watershed management plan for the Center Harbor Bay subwatershed is an essential next step in the process of creating a public, web-based watershed management plan for Lake Winnepesaukee. Following the completion of the subwatershed management plan for Meredith, Paugus and Saunders Bays in the fall of 2010, Center Harbor was the next subwatershed targeted for development of a watershed management plan.

**Problem:** Center Harbor shares the declining trend in water quality as a result of in-lake phosphorus concentrations, similar to those in all of Lake Winnepesaukee, that have increased from a summer median value of 4.9 ppb to 6.0 ppb over the last 25 years. Specific nonpoint source pollutants of concern in the Center Harbor Bay subwatershed are associated with stormwater runoff and the sediments and nutrients transported with it. Sources for these pollutants have been identified by local officials and watershed stakeholders as local and state roads, commercial and residential properties, application of fertilizers, sand and salt during the winter months, and aging septic systems along First Neck and NH Route 25.

**Project Objectives:** As with all Watershed Assistance Grant projects, it takes a dedicated, organized and consistent grant recipient and/or

project team to develop and implement a watershed-based plan. At the time of entering into this agreement, the Lakes Region Planning Commission had committed to the project schedule and secured a commitment from the Lake Winnepesaukee Watershed Association for the technical support required for watershed modeling, water quality goal setting and assimilative capacity determinations. The following ten objectives, and 31 associated tasks, were committed to as part of this grant project:

1. Site Specific Project Plan development and approval;
2. Tier 2 high quality water criteria attainment determination for Center



Merrimack River  
Watershed

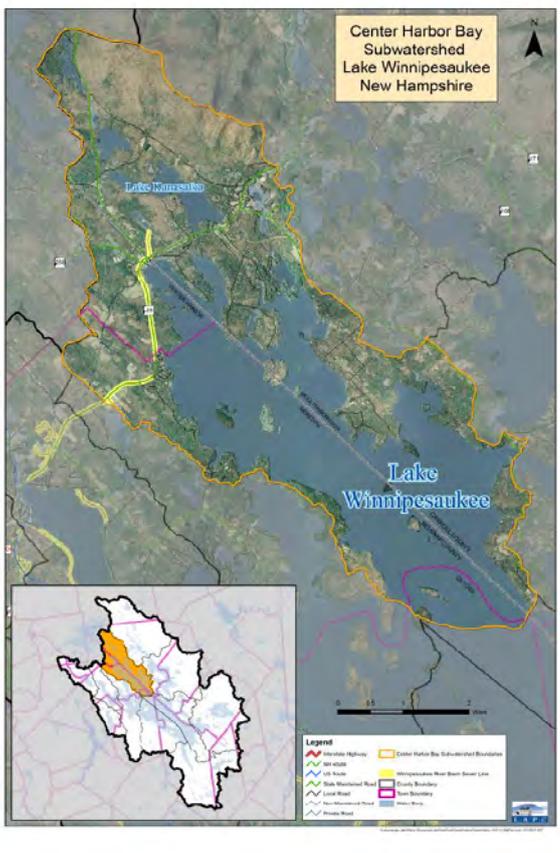
Lake Winnepesaukee  
Watershed  
Management  
Plan Phase I -  
Center Harbor

Lakes Region  
Planning  
Commission

2010 Restoration  
2011 PPG Base

Grant Amount:  
\$55,000  
(project incomplete  
- \$15,300 spent)

Local Match:  
\$18,891



Map of Center Harbor subwatershed.

Harbor;

3. Establish water quality goal for phosphorus within Center Harbor;
4. Identify current and future pollution sources;
5. Estimate pollution reductions needed to maintain the water quality goal under projected future build-out;
6. Determine actions needed to reduce pollution source loads in order to maintain the water quality goal;
7. Post Center Harbor Watershed Management Plan at [www.winnepesaukeegateway.org](http://www.winnepesaukeegateway.org);
8. Provide opportunities for participatory involvement for watershed residents as plan is developed;
9. Education and outreach of watershed stakeholders; and
10. Project administration and reporting.

**Project Outcomes:** Unfortunately, just under half of the 31 tasks were completed between 2011 and 2014. Significant and timely progress was made at the outset of the project once the Grant Agreement was approved and the following outcomes were achieved:

1. Approved Site Specific Project Plan;
2. Calculation of the current water quality criteria for phosphorus and Tier 2 confirmation;
3. A water quality goal for phosphorus was developed and approved by the water quality advisory and project steering committees;
4. STEPL modeling results and modeling report for Center Harbor Bay Subwatershed; and
5. Various outreach efforts including a riparian buffer workshop, expansion of the Wi-CAN network blog and integration of the residential runoff tool on [www.winnepesaukeegateway.org](http://www.winnepesaukeegateway.org).

However, the momentum achieved during the first year slowed over time due to personnel changes, resignations of key team members at critical junctures, and the eventual absence of a project manager.

In 2013, an extension of the project end date from December 31, 2013 to December 31, 2014 was granted in order to provide new staff time to get acquainted with the project and the scope of work yet to be completed. In February, 2014 and shortly after the STEPL modeling report was delivered by the Lake Winnepesaukee Watershed Association (LWWA), the new project manager at the LRPC resigned. One month later, a key technical project member resigned from the LWWA Board of Directors and the project team. With that resignation, the ability to conduct the on-the-ground survey work for BMP identification and prioritization was lost. Concurrent with this setback, the Director of the LRPC retired and, with that, support for completing remaining tasks dissolved. In April 2014, NHDES closed out the project with \$39,700 of the grant award unspent.

Although this project did not deliver the results anticipated, it did complete a large portion of the water quality criteria determination, goal setting and STEPL modeling required for the development of a watershed-based plan. Future efforts to develop a plan for Center Harbor will benefit greatly from these work products and NHDES looks forward to an opportunity to collaborate on this effort in the future.

## McQuesten Brook Watershed Restoration Phase 1, Geomorphic Assessment and Development of Restoration Plan

**Project Background:** The McQuesten Brook headwaters emerge from a culvert under South Main Street in Manchester. The waters then merge with the outlet of McQuesten Pond before flowing under Second Street, Eastman Ave, and Wathen Road in the Town of Bedford, eventually emptying into the Merrimack River. McQuesten Brook represents a unique water resource located within a highly-developed watershed. Despite more than a third of the 563-acre watershed being covered with impervious surfaces, the brook's base flow conditions and favorable in-stream temperatures have sustained a robust population of rare eastern native brook trout.

Recognizing the importance of this unique urban natural resource, the New Hampshire Rivers Council (NHRC) engaged partners and sought financial support to protect and restore the McQuesten Brook watershed. This project completed the first phase by conducting a geomorphic assessment of the brook and developing a Watershed Restoration Plan. The plan will serve as the guide for future protection and restoration efforts. In addition to a Section 319 grant, funding was provided by the New Hampshire Fish and Game Department, the New Hampshire Rivers Council and the Samuel P. Hunt Foundation.

**Problem:** McQuesten Brook is on the list of impaired waters for failing to meet the designated uses of aquatic life support due to low dissolved oxygen concentration and saturation, and elevated concentrations of Chlorides. McQuesten Pond, a dammed tributary to McQuesten Brook, has low dissolved oxygen levels, elevated concentrations of Chlorophyll-a and is listed as impaired for failure to meet the designated uses of Aquatic Life and Primary Contact Recreation.

McQuesten Brook and its eastern native brook trout population face several significant challenges including:

- Warm stormwater runoff and pollutants from the surrounding impervious surfaces that contribute to low dissolved oxygen levels in the brook;
- Multiple roadway crossings, undersized culverts and stream constrictions affecting aquatic species movement through the watershed; and
- Several dams that promote warm waters and serve as barriers to fish.



*McQuesten Brook, Manchester faces various threats to aquatic life, including undersized culverts and unregistered dams.*



Merrimack River  
Watershed

McQuesten  
Brook Watershed  
Restoration  
Phase I, Geomorphic  
Assessment and  
Development of  
Restoration Plan

New Hampshire  
Rivers Council

2011 Restoration

Grant  
Amount:  
\$17,000

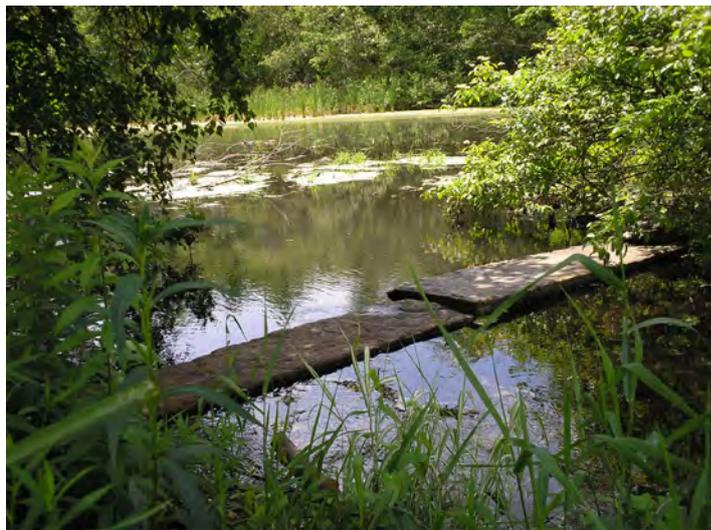
Local Match:  
\$46,031

**Project Objectives:** Restore the McQuesten Brook watershed to a healthy and fully-functioning system capable of supporting aquatic life, including the eastern native brook trout, while providing floodwater storage and recreational uses. Creating a geomorphic assessment and watershed restoration plan for McQuesten Brook is a major stepping stone for achieving that goal.

**Project Outcomes:** One of the first steps that NHRC took was to create a steering committee comprised of multiple interests in the watershed. Known as the “McTeam,” its initial members included the NHRC, NHDES, New Hampshire Fish and Game Department, Manchester Urban Ponds Restoration Program, City of Manchester, Town of Bedford, River Network, Trout Unlimited Merrimack Valley Chapter, Manchester Fly Fishers Association, business owners and private residents. Through the combination of efforts put forth by the project stakeholder team, along with the technical expertise provided by Comprehensive Environmental Inc. (CEI) and Headwaters Hydrology, the McQuesten Brook Geomorphic Assessment and Watershed Restoration Plan was published in October 2013. The plan can be viewed and downloaded here: <http://nhrivers.org/mcquesten-brook/>.

The completed “a-i” plan identifies the actions and resources needed to restore the brook and lays out a foundation for obtaining future grant funds to complete the work. Other phases of the project utilizing Section 319 funding are already underway, including culvert replacements (project number RI-14-M-06) and dam removals (project number RI-13-M-03). Subsequent phases of watershed restoration plan implementation will focus on reduction and/or disconnection of impervious cover, installation of stormwater BMPs and continued education and outreach.

Success to date has been a result of the partnership’s approach of beginning implementation while in the planning process. Annual watershed cleanup days have created visibility and public awareness, which have begun to foster a sense of community. Since its inception, the McTeam has expanded to include Anheuser-Busch and Ducks Unlimited. Working in a hidden urban watershed area can be challenging. Many people were not aware of the Brook’s existence or did not perceive its value. NHRC has worked to build awareness and will continue to do so through social media, e-newsletters, meetings, door-to-door campaigns, cleanup days and other public events. The McTeam believes that when the stream barriers are removed and the culverts project is completed, there will be more physical evidence of progress in the area and that future phases of the plan’s implementation will begin with more citizen and business support ultimately generating another Nonpoint Source Success Story.



*McQuesten Pond and one of the three unregistered dams slated for removal and subsequent stream restoration.*



*Volunteers show off the results of their efforts following the annual McQuesten Brook Cleanup Day.*

## Rust Pond, North Inlet and Route 28 Boat Launch, Phase I - Watershed Management Plan and Stormwater BMPs

**Project Background:** Rust Pond is a 210-acre waterbody located in Wolfeboro. The pond's 1,651-acre watershed is situated in portions of Wolfeboro and New Durham. The Rust Pond Association has been an active participant in the New Hampshire Volunteer Lake Assessment Program (VLAP) for many years. Sediment loads from the North Inlet subwatershed have reduced water depths at the north end of the pond to the point where recreational use of some docks has become either impossible or significantly impaired. In 2007, NHDES completed the Rust Pond and Watershed Diagnostic Study (Study) to assess in-lake conditions and watershed characteristics influencing water quality trends within the pond.

**Problem:** The Study identified two locations, the North Inlet and the Route 28 boat launch, as contributors of excess sediment to the pond. Sediment loads from North Inlet subwatershed have reduced water depths at the north end of the pond to the point where recreational use for navigation of surface waters has become impaired, which resulted in the placement of Rust Pond on the 2012 303(d) List. The Study determined that the primary factors causing the impairment were sediment loads from land uses, channel erosion and incision from upstream hydromodification, and associated streambank destabilization. The sediment delta at this location is estimated to contain 740 to 1,100 cubic yards of deposited material that has been transported into the pond from North Inlet. As a result of the bank instability and incision that is ongoing within North Inlet, the rate of deposition within Rust Pond in recent years is estimated to be two orders of magnitude greater than what would be expected under current land use conditions. In addition, runoff from Route 28 onto the unstabilized boat launch surface results in additional erosion and sediment to the pond.

**Project Objectives:** Provide subwatershed assessments for the North Inlet and the Route 28 boat launch. Outline necessary actions to reduce impacts of hydromodification including reducing sediment loading, and stormwater runoff rates and volumes to acceptable levels so that Rust Pond can be used for secondary contact recreation and is removed from the impaired waterbody list.

**Project Outcomes:** The subwatershed-based plan developed by Geosyntec, and titled North Inlet and Route 28 Boat Launch Subwatershed Assessment, included modeled sediment loading budgets under several watershed development scenarios. The model also estimated additional sediment loads due to erosion in portions of the North Inlet tributary streambank itself.

Based upon the modeling results, a water quality goal for North Inlet of Rust Pond was determined by the consulting team and the project stakeholders, including NHDES, the Rust Pond Association and the Town of Wolfeboro. The water quality goal established for sediment loading in North Inlet is to maintain the current loading estimate of 10.0 tons/year. This goal assumes



Merrimack River  
Watershed

Rust Pond, North  
Inlet and Route  
28 Boat Launch,  
Phase I - Watershed  
Management Plan  
and Stormwater  
BMPs

Rust Pond  
Association

2010 Restoration

Grant Amount:  
\$50,000

Local Match:  
\$37,995

TSS Reduction:  
0.43 tons/yr

that projected sediment loading increases due to future development will be prevented or offset via the implementation of recommended stormwater BMPs outlined in the subwatershed-based plan.

Conceptual designs and supporting hydrologic calculations were developed for selected BMP options in the North Inlet subwatershed. These BMPs were designed with sediment load reductions in mind and stormwater infiltration that would reduce the flashy nature of runoff directed into the North Inlet tributary. Property owner permission for construction of several stormwater management BMPs could not be obtained in time to allow for permitting and construction within the grant timeframe. As a result, the Town and NHDES agreed that final design, permitting and construction would focus on stabilization of the eroding portion of the North Inlet streambank and the removal of an abandoned beaver dam that had exacerbated lateral migration of the channel and accelerated erosion of the outside bank. Construction in this area was successfully completed in November, 2013 by the Town of Wolfeboro Department of Public Works. This is predicted to create equilibrium over time within the North Inlet tributary relative to sediment transport, stream flows and channel dimension.



*Beginning Construction at North Inlet tributary to Rust Pond.*

Public education and outreach activities associated with this project included the development of an educational brochure and a Field Guide to the Aquatic Plants of Rust Pond. In addition, a public workshop was held to present the watershed-based plan and information relative to siting, designing and installation of Low Impact Development techniques for residential properties.

The ultimate measure of success and long-term goal for Rust Pond and North Inlet will be verification that the sediment loading goal is being met, and that the North Inlet tributary is functioning in a manner appropriate to existing land use conditions within the

watershed as a result of the implementation of recommended BMPs. Once verified, project partners will seek additional funding to assist with the dredging of the sediment delta within North Inlet, and thus return the pond to conditions that fully support recreational boating.

## Lake Wentworth and Crescent Lake Watershed Management Plan

**Project Background:** The Lake Wentworth and Crescent Lake watershed is located in the towns of Wolfeboro (86.1%), Brookfield (11.3%), Ossipee (0.3%) and New Durham (2.3%). The watershed is over 35 square miles with fourteen streams draining directly into Lake Wentworth. These tributaries account for 76% of the water entering the lake, which means that land use and other factors impacting the health of the tributaries are critical to the overall water quality of Lake Wentworth and ultimately Crescent Lake. Yearly water quality monitoring by the Lakes Lay Monitoring Program, as well as private testing, have documented declining water quality trends for chlorophyll-a, increasing total phosphorus concentrations, and decreasing transparency.

The idea to develop a watershed based plan was initiated in 2009 by two members of the Lake Wentworth Foundation who saw the need to develop a scientifically-based plan to protect these lakes for future generations. Since then, many enthusiastic individuals and organizations have stepped up to support this effort through the formation of a steering committee and an active outreach campaign. Participants include the Town of Wolfeboro, Lake Wentworth Association, University of New Hampshire, and the Lake Wentworth Foundation (LWF).

**Problem:** Over the past several years, there has been an increase in the amount of algae in both Lake Wentworth and Crescent Lake, and low levels of oxygen at depths greater than 40 feet. Threats to water quality include excess sediment and nutrients from existing and future development, aging septic systems, and stormwater runoff from roads throughout the watershed, and general lack of environmental awareness.

**Project Objectives:** The primary goal of the project is to develop a comprehensive management plan for the watershed of Lake Wentworth and Crescent Lake. The final watershed plan explores the connection between identified threats in the watershed and signs of stress in the lakes. The plan includes:

- Quantified primary sources of phosphorus loading using existing data and a watershed and lake response model;
- Prioritized sources for further action;



*A door-to-door septic survey was conducted in 2011. (photo credit : FB Environmental)*



Merrimack River Watershed

Lake Wentworth and Crescent Lake Watershed Management Plan

Town of Wolfeboro

2009/2011 PPG Base

Grant Amount:  
\$67,800

Local Match:  
\$73,907

- An educational effort to make property owners and lake users aware of the sources and consequences of non-point source pollution;
- Preliminary BMP designs to address sources;
- Review of planning and zoning ordinances with an eye towards water quality protection; and,
- Methods for tracking progress during implementation of the plan recommendations.

**Project Outcomes:** A comprehensive watershed plan has been created with short and long-term goals for improving the water quality of Lake Wentworth and Crescent Lake over the next ten years (2013-2023). The long-term goal is to protect the water quality of Lake Wentworth and Crescent Lake through a 15% reduction in median in-lake total phosphorus (TP). The plan provides a roadmap for improving the water quality of Lake Wentworth and Crescent Lake, and provides a mechanism for acquiring grants and other funding to pay for the actions needed to achieve the water quality goal. In addition, it sets the stage for ongoing dialogue among key stakeholders in many facets of the community, and promotes coordinated municipal land use changes to address stormwater runoff. The success of this plan is dependent upon ongoing leadership, group commitment, and a concerted effort of volunteers.

## Looking Ahead

At the time of writing this report, the longtime supervisor of the Watershed Assistance Section, Eric Williams, has left New Hampshire to start a new journey with the State of Oregon Watershed Enhancement Board. After over 20 years managing New Hampshire's Nonpoint Source Program, Eric's guidance, ingenuity, and friendship will be greatly missed. We anticipate that 2015 will be a year of transition as the program settles in to new leadership; however, the 2014 Nonpoint Source Management Program Plan articulates well the specific actions, outcomes, and measurable results we will be working on over the next five years.

We look forward to a greatly expanded Soak Up the Rain program, with a presence in more watersheds and many more homeowners engaged in stormwater management as part of a broader recognition that sustainability begins at home. During the off-season, the SOAK program will be working on program and process improvements as well as designs for new project installations scheduled for the spring of 2015.

Pollutant tracking and accounting will take center stage in the Great Bay watershed as we work with communities to find common methods to measure change, both increases and decreases, to pollutant loading over time. With more attention on wastewater and stormwater discharge permits, there will continue to be a need to document and account for changes in pollutant loading from nonpoint sources as well.

New Hampshire's revised MS4 permit is likely to become effective in 2015, further incentivizing municipalities to invest in green infrastructure. The multiple benefits of pollutant load reduction, flood prevention and aesthetic improvement will become clearer. The Nonpoint Source Program will continue to provide leadership through assistance to municipal stormwater coalitions, implementing demonstration projects through the Great Bay Municipal Bioretention Program, aka "Biopalooza," and methodically implementing watershed-based plans, such as the one for Berry Brook in Dover.



*The NHDES Watershed Assistance Section staff pause for a photo during their last strategy meeting with Eric.*

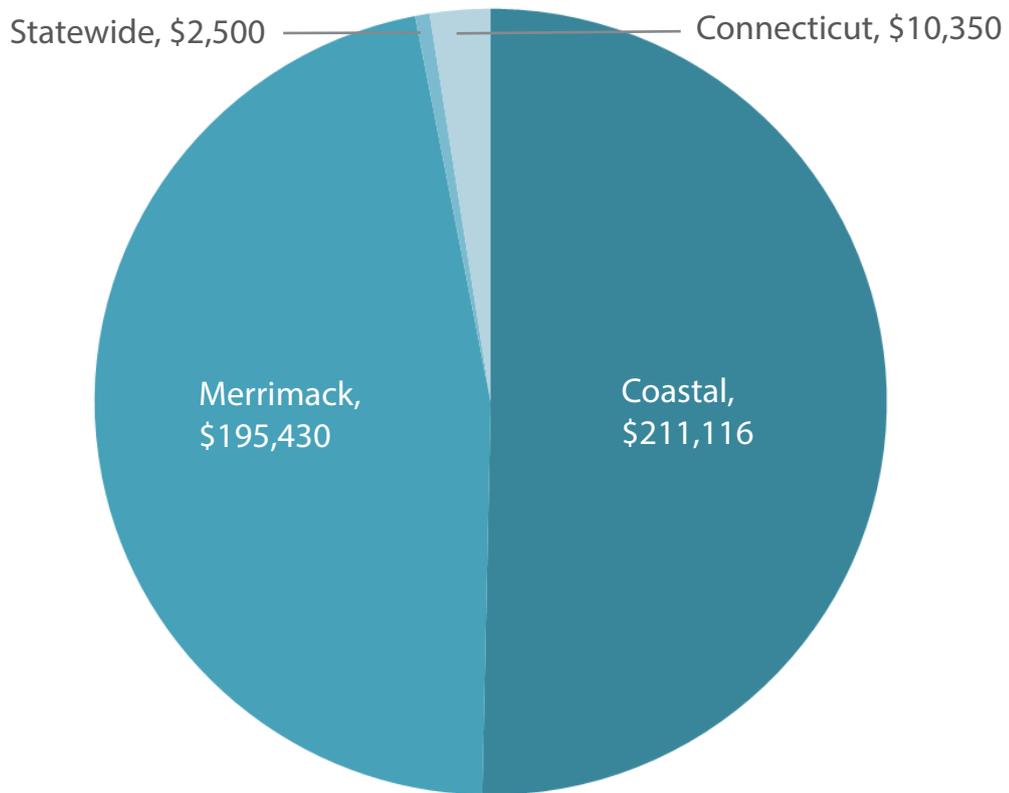
In 2015, it is expected that Berry Brook will have the distinction of being the first urban watershed in the state to reduce effective impervious cover from around 30% to below 10%. With further documentation of water quality improvement, we expect another New Hampshire watershed restoration success story. Similar progress in urban watershed restoration has been made and will continue in the Cobbetts Pond and Nutt Pond watersheds, both of which are showing water quality improvement as a result of sustained, long-term BMP implementation.

More progress toward addressing chloride impairments will be made through the Green SnowPro program by continuing efforts to boost the professional status of salt applicators through training, certifications, annual symposia and extended outreach to local Chambers of Commerce and businesses. Finally, we will continue to address hydromodification impairments through barrier removal projects as well as geomorphic restoration projects along New Hampshire's rivers.

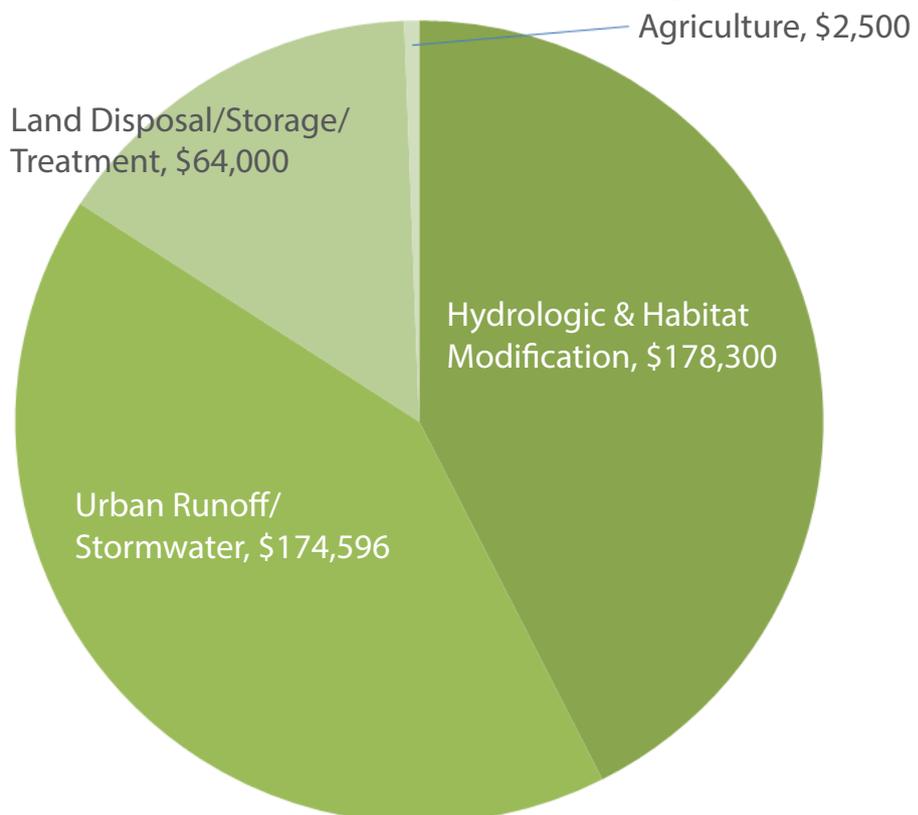
## Appendix A. DES Section 319 Watershed Assistance Grants Awarded in FFY 2014

DES Section 319 Watershed Assistance Grants Awarded in FFY 2014						
Grantee	Project Name	Project No.	NPS Category	Watershed	Source of Funds (FFY)	Grant Award
Town of Farmington	Mad River Restoration, Phase 2	HI-13-C-06	Hydro-modification	Coastal	2014 Sec. 319 Project Implementation	\$38,500
University of New Hampshire	Updating the Best Management Practices for Biosolids Applications	P-14-SW-12	Agriculture	Statewide	2014 Sec. 319 Program	\$2,500
Silver Lake Land Trust	Silver Lake Watershed Management Plan Implementation, Phase 2, Soak up the Rain Silver Lake	HI-14-CT-11	Urban Runoff/Stormwater	Connecticut	2014 Sec. 319 Program	\$10,350
Lake Winnepesaukee Watershed Association	Moultonborough Bay Inlet Watershed Restoration Plan Development and Phase 1 Implementation	RP-14-M-04	Urban Runoff/Stormwater	Merrimack	2014 Sec 319 Program/2010 Sec. 319 Restoration	\$55,630
Belknap County Conservation District	Gunstock Brook MPSB Watershed Management Plan Implementation, Phase 1, Geomorphology-based restoration at Route 11B	RI-14-M-08	Hydro-modification	Merrimack	2014 Sec. 319 Project Implementation	\$69,800
Rockingham Country Conservation District	Great Bay Watershed Management Plan Implementation, Phase 1, Permeable Reactive Barrier Demonstration Project	RI-14-C-09	On-Site Wastewater Treatment	Coastal	2014 Sec. 319 Project Implementation	\$64,000
UNH - Office of Sponsored Research	Great Bay Waterbody/ Watershed Nonpoint Source Study, Phase 1, UNH BMPs to Reduce Nitrogen	RI-14-C-05	Urban Runoff/Stormwater	Coastal	2014 Sec. 319 Project Implementation	\$93,616
New Hampshire Rivers Council	McQuesten Brook Geomorphic and Watershed Restoration Plan, Phase 3, Culvert Replacement and Removal.	RI-14-M-06	Hydro-modification	Merrimack	2010 Sec. 319 Restoration	\$70,000
Great Bay Stewards, Inc.	Soak up the Rain Great Bay	RI-14-C-10	Urban Runoff/Stormwater	Coastal	2014 Sec. 319 Project Implementation	\$15,000
Total Awarded:						\$419,396

## Appendix B. Distribution of Section 319 Grant Dollars Awarded in FFY 2014 by Watershed



## Appendix C. Distribution of Section 319 Grant Dollars Awarded in FFY 2014 by NPS Category



## Appendix D. DES Section 319 Projects Completed in FFY 2014

DES Section 319 Projects Completed in FFY 2014							
Grantee	Project Name	FFY Source of Funds	Grant #	Date Completed	Watershed	319 Funds	Total Cost Inc. Match
UNH Stormwater Center	On-Call Consulting Engineers for small-scale BMP designs	2010 Incremental	B-11-OC-01	7/24/2014	Statewide	\$25,000	\$25,000
Town of Wolfeboro	Rust Pond Watershed Mgt. Plan Implementation, Phase 1	2010 Incremental	R-10-M-07	7/9/2014	Merrimack	\$50,000	\$87,995
Town of Farmington	Mad River Restoration - Phase 1	2012/2013 Incremental	HI-13-C-05	7/2/2014	Coastal	\$22,280	\$22,280
Lakes Region Planning Commission	Lake Winnepesaukee Watershed Mgt. Plan - Center Harbor (project terminated before completion)	2010/2011 Incremental and Base	B-11-M-02	4/17/2014	Merrimack	\$15,300	\$34,191
NH Rivers Council	McQuesten Brook Watershed Restoration Plan, Phase 1	2011 Incremental	R-11-M-01	4/14/2014	Merrimack	\$17,000	\$63,031
Cocheco River Watershed Coalition	Cocheco River Watershed Restoration Plan Implementation - Phase 2	2011 Incremental	R-11-C-04	2/20/2014	Coastal	\$51,500	\$86,740
City of Dover	Berry Brook Watershed Restoration Plan Implementation - Phase 2	2007/2008/2010/2011 Incremental	R-11-C-02	2/14/2014	Coastal	\$172,315	\$407,755
Town of Brentwood	Middle Exeter River Watershed Mgt. Plan Implementation, Phase 1	2008/2009/2010 Incremental	B-11-C-04	1/28/2014	Coastal	\$49,152	\$97,633
Blue Ocean Society for Marine Conservation	Watershed Restoration Plan Implementation, Hodgson Brook, Phase 2	2009/2010 Incremental	R-11-C-05	1/6/2014	Coastal	\$104,574	\$192,400
Town of Alstead	Lower Warren Brook Restoration (project terminated before completion)	2008 Incremental	R-08-CT-05	12/9/2013	Connecticut	\$20,000	\$40,970
Town of Wolfeboro	Lake Wentworth and Crescent Lake Watershed Management Plan	2009/2011 Base	B-11-M-03	12/9/2013	Merrimack	\$67,800	\$141,707
Town of Exeter	Exeter River Restoration-Great Dam Removal Evaluation	2008/2009 Incremental	R-06-C-09	11/14/2013	Coastal	\$69,500	\$152,456
Total						\$507,121	\$1,017,025

## Appendix E. 2014 Estimated Pollutant Load Reductions Achieved

2014 Estimated Pollutant Load Reductions Achieved									
Grantee	Project Name	FFY Source of Funds	319 Funds	Total Cost	N (lbs/yr)	P (lbs/yr)	Sediment (tons/yr)	Model/ Method	Notes
Acton Wakefield Watersheds Alliance	Salmon Falls Headwaters Watershed - Watershed Based Plan Implementation Project - Phase 2	2009, 2010, and 2012 Base	\$87,026	\$209,893	0	75.28	44.54	Region 5 Model and Simple Method	More reductions completed and reported last year
Blue Ocean Society for Marine Conservation	Watershed Restoration Plan for Hodgson Brook Phase 2 - Pease Tradeport Retrofit Survey and Pannaway Manor and Great Bay Community College Best Management Practices	2009 and 2010 Restoration	\$104,574	\$174,325	0.95	0.04	0.01	Simple Method	More reductions completed and reported last year
UNH Stormwater Center	Great Bay Municipal Bioretention Program	2012 Base	\$134,000	\$223,378	38	5.8	1.16	Simple Method	Project still in progress
Cocheco River Watershed Coalition	Cocheco River Watershed Restoration Plan Implementation, Phase 2 - Rochester LID Projects	2011 Restoration	\$51,500	\$86,740	4.9	0.8	0.07	Simple Method	
Town of Wolfeboro	Rust Pond, North Inlet and Route 28 Boat Launch Watershed Management Plan and Stormwater BMP Projects, Phase 1	2010 Restoration	\$50,000	\$87,994	0	0	0.35	Region 5 Model	
<b>Totals:</b>					<b>43.85</b>	<b>81.92</b>	<b>46.13</b>		





