Nonpoint Source Management Annual Report 2006

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NEW HAMPSHIRE DEPARTMENT OF Environmental Services

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Nonpoint Source Management Annual Report 2006

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Cover photo: Souhegan River, Amherst, N.H.

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Introduction

The Nonpoint Source Management Annual Report is required by Section 319 of the Clean Water Act to summarize progress made toward achieving Clean Water Act goals. Since the nonpoint source provisions were added to the Clean Water Act in 1987, the purpose of the annual report has been to describe progress made toward reducing pollution to navigable waters.

This report describes the results and outcomes achieved during federal fiscal year 2006, which ended on September 30, 2006. As we continually improve our ability to focus on water quality outcomes in watershed management, our watershed work shows that we also need to continually improve our capacity to work at the watershed level. As many of the project summaries in this report show, the success of watershed management, and therefore attaining cleaner water, depends on people and organizations working together toward common goals.

Extreme Makeover: The Watershed Assistance Grants Process Gets a Face Lift

In 2006, the Watershed Assistance Grants Program went through a dramatic transformation. After several years of using a traditional request for proposals (RFP) format, the Watershed Assistance Section (WAS) changed its project proposal, review, and evaluation process.

This change came about after an informal evaluation of projects from previous grant rounds. During this evaluation, the WAS noticed that the type and quality of projects funded through the Watershed Assistance Grant Program had reached a plateau, with very few new groups applying for funding each year. In addition, projects did not always meet their stated goals. It seemed that grant applicants were often so eager to develop and implement a full project scope, they would add tasks to the scope of work simply to "do" more things, without considering why they were including those tasks or if completing them would help meet their project objectives. This resulted in a completed scope of work, but left the projects falling short of achieving their goals.

In order to address these concerns, the WAS made two major changes to the RFP process. The first was to accommodate a pre-proposal submittal and review period. This encouraged new groups, previously intimidated by the traditional RFP format or with limited budgets or expertise, to simply get their project ideas on paper for consideration before needing to submit a detailed proposal. After the initial review, applicants of selected pre-proposals were invited to an interview. The interview provided an opportunity for the applicants, project partners, and WAS staff to discuss the projects in greater detail and to ask and answer questions to better understand the project scope and be confident that the project would be compatible with the water quality goals of the grant program. Following the outcome of the interviews, successful applicants were invited to submit full proposals.

The second change in the RFP process was an improved outcome-based full proposal form and project

development guidance. The intent of the outcome-based format, based on The Rensselaerville Institute's outcome framework, is to improve a project's success through thoughtful project planning. This includes defining a desired project outcome, establishing performance targets related to the outcome, and tasks to achieve the performance targets. The WAS staff provided assistance to applicants to develop their desired outcome, related performance targets, and tasks, and to decide on appropriate methods to verify project success.

Although this new process adds a number of steps and requires greater involvement of DES staff, it promises more thoughtful project development and more successful project outcomes. Project applicants agree:

> *…I can safely say that I and others I have heard from think the pre-proposal process is far and away a better approach than the standard "take your best shot" method. Being able to learn about the goals and needs of all parties from the beginning creates an educational opportunity that results in a better fit between the needs and capabilities of all the players…Speaking from years of experience preparing competitive proposals on limited information, if you are looking for partnership and collaboration to get a complex job done, the pre-proposal process is the way to go.*
>
> ~Boyd Smith, Executive Director of the Newfound Lake Region Association

For more information on the pre-proposal process or the outcome-based format, please visit the Watershed Assistance Grants website at www.des.nh.gov/WMB/was/grants.htm.

Education and Outreach

The Watershed Assistance grant program was supported through continuing outreach and education efforts in addition to several new initiatives.

GreenWorks, a monthly publication addressing water quality and the environment, was added to the DES e-newsletter distribution in addition to being e-mailed to DES staff, newspapers, and watershed organizations, and made available at local workshops and conferences. Follow-up evaluations of the new personalized e-mail approach indicated that *GreenWorks* had the highest percentage of opened e-mails coming from the DES distribution list. *GreenWorks* columns included: "Don't be a Butthead," "Releasing Too Much Gas: New Portable Gasoline Containers Will Help Improve Air and Water Quality," "Help Keep Boat Sewage Out of New Hampshire Waters," and "Spook the Phantom: Plugging Electrical Leaks in Your Home." Past publications can be found at www.des.nh.gov/gw-list.htm.

Working with New Hampshire communities required to meet federal Phase II stormwater regulations, outreach staff coordinated and co-hosted the *First Annual New Hampshire Statewide Regional Stormwater Meeting* on May 9. This was the first venue to provide an opportunity for the representatives from each of the regional stormwater coalitions (Nashua, Manchester and the Seacoast) to network and brainstorm on Phase II concerns relating to post construction requirements, stormwater ordinances, and illicit discharge detection and elimination. Fifty-one municipal public works staff and representatives from local boards and committees, consultants, and state and federal agency staff were updated on New Hampshire's progress with Phase II implementation. Also in FY 2006, utilizing funds passed through from the New Hampshire Estuaries Project, outreach staff assisted the Seacoast Stormwater Coalition with producing and promoting the *Guidelines and Standard Operating Procedures: Illicit Dis-*

charge Detection and Elimination and Pollution Prevention/Good Housekeeping for Stormwater Phase II Communities in New Hampshire.

The 319 Watershed Assistance grant program and the new pre-proposal process was promoted throughout the application process through the DES website, presentations, and a workshop "Designing Stronger Projects and Proposals for Water Resource Protection." The new pre-proposal process also provided an opportunity to provide hands-on grant writing assistance in planning outcome-based outreach and education components with sustainable behavior change objectives.

Participants brainstorm on grant project goals at the "Designing Stronger Projects & Proposals for Water Resource Protection" workshop.

Working with the New Hampshire Department of Transportation, EPA, and other DES staff, WAS outreach staff coordinated the first "Salt Reduction Workgroup" to start the process of meeting Section 303(d) of the Clean Water Act in relation to the I-93 corridor expansion and chloride impairments.

The department's Small Education and Outreach Grant Program for Watershed Organizations continued to provide project implementation financial assistance. The following is a summary of the projects that were completed in 2006.

Small Education and Outreach Grants		
Project Description	**Organization**	**Amount Paid**
Baker River Watershed Assn. Website Development	Baker River Watershed Assn.	$2,000
Contoocook River Education Project	Contoocook-North Branch Rivers Local Advisory Committee	$900
Lower Merrimack River Outreach	Lower Merrimack River Local Advisory Committee	$1,817
VLAP Participation and Education	NH Volunteer Lake Assessment Program	$2,000
Souhegan River Watershed Protection	Souhegan River Local Advisory Committee	$1,600

Watershed Assistance Grant Helps Local Group Improve Water Quality While Changing Lives

The Acton Wakefield Watersheds Alliance (AWWA), a group of community residents and lake association members, successfully completed the first season of its Youth Conservation Corps (YCC) in the summer of 2006. The successes of this program proved to be above and beyond expectations with a group of local high school students empowered to change water quality and their lives.

As the first YCC to work in New Hampshire watersheds, this success didn't come easy. A group of hardworking, passionate, and dedicated volunteers and their partners made it possible. It all started about three years ago when members of the Great East Lake Improvement Association heard about the YCC program on neighboring Mousam Lake in Maine. They were inspired by the Maine YCC model,

which provides local youth to help landowners fix erosion problems. In the fall of 2004, they convened representatives from the towns and lake associations that straddle the state border in Wakefield, New Hampshire and Acton, Maine. After incorporating with the State of New Hampshire and earning 501(c)(3) status with the IRS, the Acton Wakefield Watersheds Alliance was born.

In 2006, the AWWA applied for and received a DES Watershed Assistance Grant to establish a Youth Conservation Corps for the border-region lakes. Six lake associations and the towns of Acton and Wakefield also provided funding. Several local businesses helped out, including Miller Ford of Sanford, Maine that provided a truck for the summer. Technical assistance was provided by DES, Maine Department of Environmental Protection, and UNH Sea Grant and Cooperative Extension.

Members of the Acton Wakefield Watershed Alliance crew – Chris Stanton, Nigel St. Pierre, Craig Hill, Sam Wilson, and Anthony Stanton – work to improve shoreland protection. (photo courtesy: Alix Marcoux, AWWA)

With funding and support in place, AWWA members got immediately to work hiring a technical director, who then hired a crew leader and five crew members from local high schools. Over the course of their eight-week season, which started in June, the crew leader and crew members completed ten projects in their service area. Projects included several rain gardens, vegetated buffers, rubber razors, and infiltration trenches to control runoff and prevent soil from reaching the lakes and tributaries. The crew leader estimated that these projects will keep over 15 tons of sediment out of the lakes each year. In addition to the construction projects, project staff also provided technical assistance to 37 landowners on eight different lakes.

The YCC students also generated significant public interest and support for the AWWA and YCC, resulting in additional funding for the program next year from the Town of Wakefield. After a presentation before the Board of Selectmen, AWWA President Linda Schier acknowledged that all of the students "got it." One student explained how he learned about the effect runoff has on the lakes; another noted that he learned the most from the people they dealt with.

In addition to water quality benefits, raising environmental awareness, and energizing communities, YCC projects also appear to encourage local youth to become environmental leaders. From one student moving on to an ecology program at St. Paul's School in Concord, to another speaking in Washington DC for "Jobs for America's Graduates," students have shown evidence of being inspired from the YCC program. One student noted that while residents may be used to seeing the kids hanging around downtown, the YCC work is a positive change.

AWWA will start up the second year of the YCC program in the spring of 2007 with most of the crew members returning for another year of hard work hauling rocks and dirt to improve water quality in Acton and Wakefield's lakes. Schier noted that she was most impressed that the students both began and ended the summer with such enthusiasm and energy. At one time, "while driving three students back after a full day of moving a massive amount of stone for a wall, they told me how their friends

would love this job and that they're the luckiest kids around."

For more information about the AWWA YCC program, contact Barbara McMillan at (603) 271-7889 or Natalie Landry at (603) 559-1507.

Nonpoint Source Pollution Investigations

DES began implementing pollution source investigations in the coastal watershed in 1996. At that time, the top priority water quality issue in the watershed was related to bacterial sources, which were frequently causing the closure of shellfish beds. Ten years later DES continues to find and investigate not only old and forgotten illicit discharges but new sources that are discovered every year either by incorrect plumbing, infrastructure failure or intentional discharging. In 2002 DES expanded the illicit discharge detection and elimination (IDDE) program to the Merrimack River watershed. The IDDE program is a collaborative program between DES and local municipalities. WAS staff help train local municipal employees on identification and detection techniques such as smoke and dye testing of storm drains. Once a specific source has been identified, then DES also assists municipalities in disconnecting these causes of bacterial pollution.

In the Coastal watershed, investigations in 2006 helped locate 11 sources linked to sewer discharges in eight different towns and cities. Eight of these sources were disconnected and three are currently under investigation. In the Merrimack River watershed approximately 50 outfalls were under active investigation or remediation at the end of 2006. Two illicit outfalls in Franklin that discharged into the Pemigewasset River were corrected in 2006 as well as one outfall in New Boston that discharged into the Piscataquog River.

Summary of 2006 IDDE Field Investigations

Watershed and Town/City	Samples Collected	Samples E.coli >406cts/100ml	Sources Identified	Sources under Investigation or Scheduled for Disconnect	Sources Eliminated	Est. Remaining Illicit Sources
Merrimack River						
Allenstown	1	0	0	1	0	Unknown
Bedford	2	1	0	2	0	Unknown
Bristol	2	0	0	2	0	Unknown
Concord	5	0	0	0	0	0
Franklin	9	9	3	0	3	0
Goffstown	17	8	1	1	1	0 - 1
Greenville	7	6	0	1	0	1
Hooksett	2	2	0	2	0	2
Manchester	15	10	0	10	0	10
New Boston	6	5	1	0	1	0
Weare	2	0	0	1	0	1
Coastal						
Dover	42	28	0	4	0	3 - 6
Durham	3	1	1	0	1	0
Epping	6	2	1	1	0	0 - 1
Exeter	9	0	0	0	0	0
Hampton	5	0	0	0	0	0
Keene	4	0	0	0	0	0
New Castle	1	0	0	0	0	0
Newmarket	8	6	2	1	2	1
Portsmouth	24	14	1	3	0	2 - 4
Rollinsford	23	11	0	0	0	0
Rye	2	0	1	0	1	0
Seabrook	2	0	1	0	1	0
Somersworth	31	10	3	2	2	1 - 3
TOTALS	**228**	**113**	**15**	**31**	**12**	**21 - 30**

Agricultural Management Grant Program

2006 marked the fifth year of the New Hampshire Department of Agriculture's Nutrient Management Grant Program. The department awarded $54,819 to implement BMPs at local farms and to produce an educational workshop for horse owners. These projects are made possible through annual DES funding from 319 base funds. See Appendix E for a list of projects funded during state fiscal year 2006.

Manure storage area funded through the N.H. Agricultural Nutrient Management Grant Program. (photo courtesy: NH Department of Agriculture, Markets and Food)

Highlights and Overview of Completed Projects

The following provides highlights, by watershed, of projects completed during the fiscal year.

Coastal Watershed

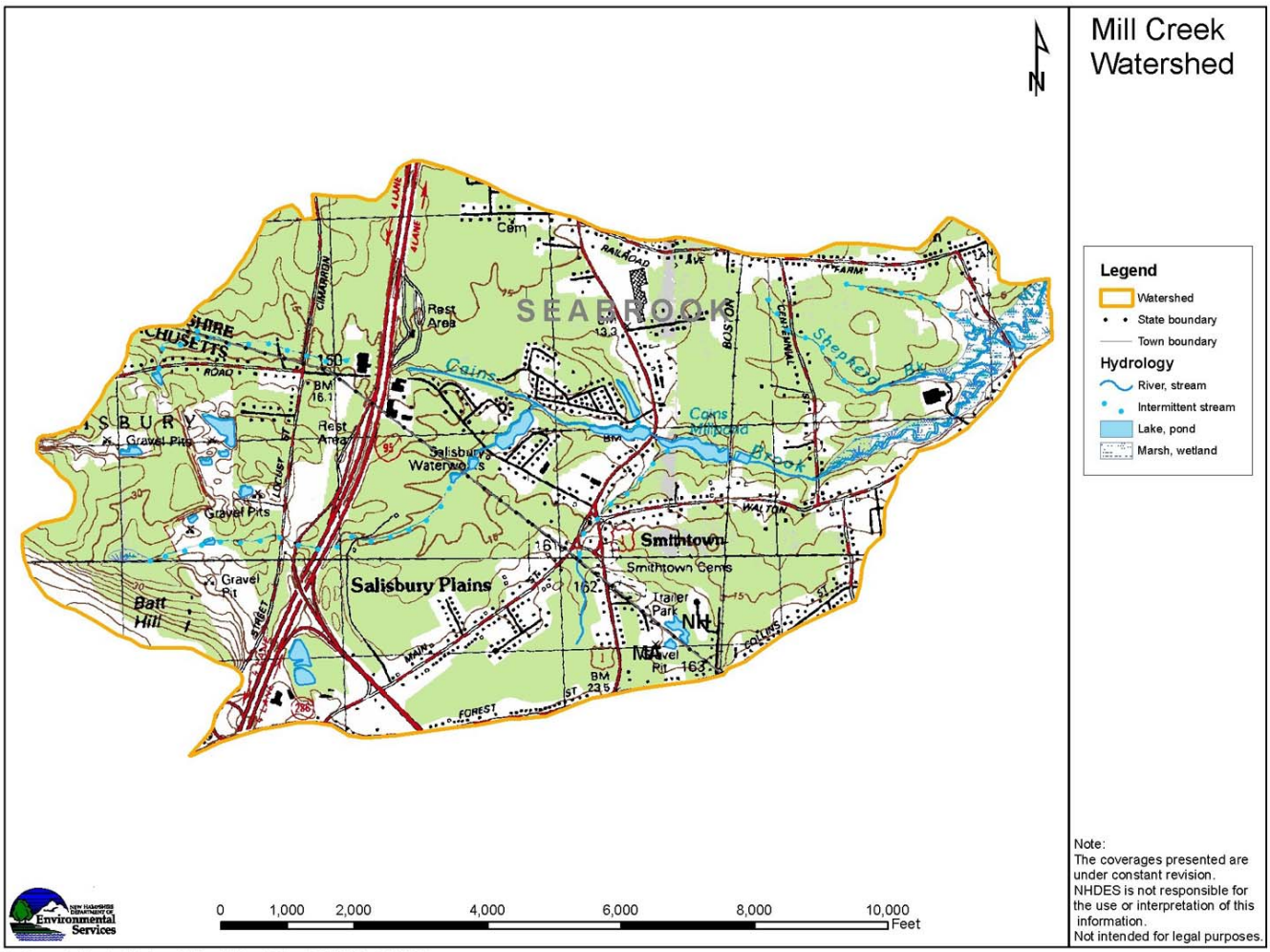
Determining Sources of Fecal Borne Bacteria in Mill Creek and Cains Brook, University of New Hampshire (2003 Restoration)
Grant Amount: $35,000 Local Match: $23,333

Mill Creek begins as the freshwater Cains Brook originating west of Interstate 95 in Seabrook, flowing eastward it becomes tidally dominated and empties into the Hampton/Seabrook Harbor. The watershed lies in both Seabrook, N.H. and Salisbury, Mass. Previous studies have documented elevated levels of fecal coliform bacteria in both Cains Brook and Mill Creek. This bacteria loading has resulted in closures to the clams flats in the harbor, limiting the time the public is allowed to dig for soft shell clams.

The Hampton/Seabrook Harbor bacteria TMDL showed that Mill Creek contributed the greatest bacteria loading to the harbor when compared with the other tributary sources. The TMDL implementation plan called for a characterization of the bacteria sources in the Mill Creek and Cains Brook subwatershed. A local management plan is being created to address the specific sources identified in the subwatershed based on the results of the completed study described below.

In 2004 DES, in cooperation with the University of New Hampshire, conducted a study to identify the sources of the bacteria in the Cains Brook and Mill Creek watershed. This study used a relatively new technique in determining microbial pollution sources called ribotyping. Ribotyping determines the source species of bacteria found in surface waters by using the DNA fingerprint found in the bacteria. The DNA fingerprints were compared to those in an established library of bacteria fingerprints from various species such as domestic dogs, humans, coyotes and geese. When the fingerprint from the bacteria in the water matched a library fingerprint with a high degree of certainty, the bacteria from the water was identified as the source species it matched. This information gave DES a list of species that contributed to the bacterial pollution found in the watershed.

Of the bacteria isolates identified through ribotyping, the species categories found in Mill Creek and Cains Brook were wild animals (28 percent), livestock (19 percent), chickens (17 percent), humans (15 percent), pets (12 percent), and birds (9 percent). The predominance of wild animals is not surprising



because of the prevalence of wooded areas and extensive salt marsh along Mill Creek. The most common wild animal sources were raccoon, deer and coyote. Livestock, including chickens, were also expected to be present because of known sites with chickens and horses that are housed within the watershed. Pets and birds were a less significant source for this watershed, similar to observations made in most other studies in New Hampshire.

Human sources were relatively significant and found in all watercourses of the watershed. The majority of the buildings in the town of Seabrook are serviced by municipal sewer. Human-borne pollution could come from leaky sewer pipes located in close proximity to the Creek and its tributaries. Roughly, 40 percent of the watershed lies in the town of Salisbury, Mass. A portion of Salisbury is serviced by a municipal sewer service; however, the part of town that lies in the Cains Brook watershed is not served by the town's wastewater treatment facility. The homes and businesses rely instead on on-site subsurface disposal systems for treating sanitary wastewater. If improperly sited or failing, these systems could be causing bacteria pollution to enter the watershed.

The final report for this study provides several recommendations organized by source type such as human and pet. These recommendations include regular inspection of sewer pipes, manholes and storm drains in Seabrook for signs of leaks or illicit discharges; education of homeowners on proper septic system maintenance in Salisbury and evaluation by the town as to the feasibility of extending sewer service to the Cains Brook watershed area; and, outreach to pet owners and hobby farmers to raise

awareness on the impacts of pet and livestock waste to surface waters and to provide guidance on best management practices.

Managing pollution sources in this watershed is a challenging and multi-faceted effort that needs to be addressed by both Seabrook and Salisbury to improve the quality of the surface water and protect recreational uses. Local entities, ideally the municipal governments, are encouraged to implement the recommendations where they fit with capital improvement plans and other outreach efforts for raising environmental awareness. They are also encouraged to partner with local organizations such as horse, garden and hobby fowl clubs to accomplish many of the recommended outreach activities.

For more information about this study contact Natalie Landry, Coastal Watershed Supervisor at (603) 559-1507 or nlandry@des.state.nh.us. For more information about ribotyping contact Dr. Stephen H. Jones, Research Associate Professor at (603) 862-2175 or shj@unh.edu.

Connecticut River Watershed

Fluvial Geomorphic Assessment of Northern Connecticut River Tributaries, Connecticut River Joint Commission (2004 Restoration)

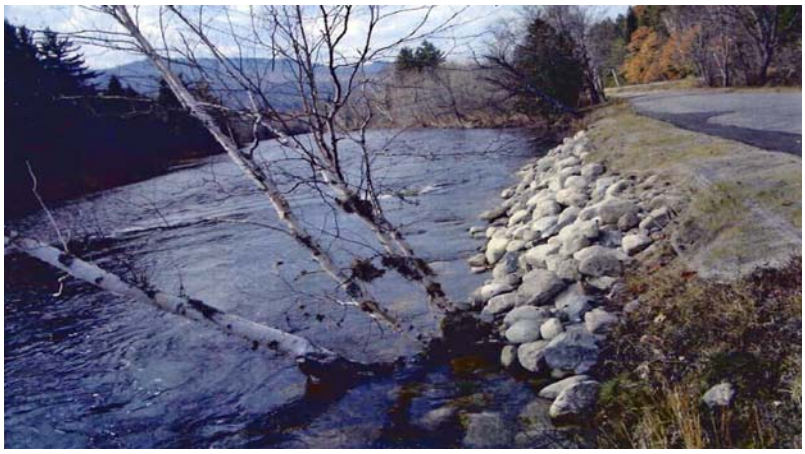
Grant Amount: $34,408 Local Match: $33,230

The Connecticut River Joint Commission (CRJC) was awarded this watershed restoration grant to continue work following completion of a contract with Field Geology Services, a geomorphology consultant that produced a 2004 study titled *Fluvial Geomorphology Assessment of the Northern Connecticut River, Vermont and New Hampshire* (Field, 2004). This project and the 2004 study are part of an on-going assessment which began in 1989, of erosion and excessive sediment transport and deposition within the Connecticut River corridor. The 2004 study looked at 85 miles of the northern Connecticut River and was designed to accomplish five major goals:

1. Subdivide the river into distinct reaches.
2. Characterize the existing channel morphology.
3. Identify the natural conditions and human land uses causing erosion and channel instability.
4. Develop strategies for erosion control that address the identified causes of erosion.
5. Design a project for bank stabilization at one high priority site that employs one or more of the developed erosion control strategies.

The results revealed that human channelization and straightening of the river, sediment inputs from tributary watersheds, and sediment inputs from high, eroding banks were the three major causes of erosion and channel instability. The study also documented that more that 30 percent of the river's length was straightened by humans prior to 1925. The absence of a riparian buffer along 20 percent of the river's length was also noted. The most alarming finding to come out of the 2004 study was that 66 percent of the river's banks are either eroding, have been protected from erosion, or are susceptible to further erosion.

Building upon the 2004 findings, this 319 Watershed Restoration project targeted the assessment of sediment inputs from two tributary watersheds, the Mohawk River and the Upper Ammonoosuc River, which were causing direct or indirect bank erosion along the main channel of the Connecticut



View looking downstream on the Upper Ammonoosuc at the Mill Brook confluence with evidence of past erosion control practices along North Side Road.

River. The fluvial geomorphic assessment of the Mohawk River and Upper Ammonoosuc River revealed the major natural and human factors controlling sediment inputs to the Connecticut River from these two tributaries.

On the Mohawk River, the naturally constricted valley, artificial channel straightening, road constructions, berming, and channel armoring, all serve to increase the stream's effectiveness in transporting sediment to the river's mouth. While only 10 percent of the banks are eroding, a large dam break flood in 1929 destabilized high banks of glacial outwash deposits that continue to be a source of sediment to this day. One of the principal recommendations in the final report is to encourage meander formation in unsettled areas. This prevents flood damage by reducing the risk of meanders forming near man-made infrastructures in response to large floods. The sediment stored in the meanders will also improve bank stability on the Connecticut River by reducing the total volume of sediment reaching the mainstem. Reestablishing meanders on the lower Mohawk River by returning flow to abandoned side channels was identified as the highest priority restoration project in the Mohawk River watershed. This is because its proximity to the Connecticut River will ensure greater and faster improvement to mainstem channel stability while reducing flood risks and improving aquatic habitat on the Mohawk.

In contrast to the Mohawk River, natural and human factors on the Upper Ammonoosuc River tend to reduce the river's ability to transport sediment to the Connecticut River. While 33 percent of the river has been artificially straightened, the lower Upper Ammonoosuc River remains naturally meandering, with large point bars storing considerable volumes of sediment. In addition, large volumes of sediment are stored in the impoundments behind three dams in Groveton, and only reach the Connecticut River during large floods. Ideally, a full river restoration project for the Upper Ammonoosuc River would include the removal of the artificial impoundments that disrupt the natural flow of the river.

Streams and rivers continually strive to achieve a state of equilibrium where energy, sediment transport, and deposition are in balance. Dams, artificial channels, and straightening of the natural course of the Upper Ammonoosuc River have eliminated that equilibrium. Since the presence of these major river impoundments limits the opportunities for achieving balance on the Upper Ammonoosuc's main stem, the project partners decided to focus efforts on contributing subwatersheds and tributaries. Work completed on these tributary watersheds will ensure that erosion and sediment transport are in balance and will not negatively impact the river system if and when the Upper Ammonoosuc impoundments are removed.

The Mill Brook confluence with the Upper Ammonoosuc River in Stark was chosen as the highest priority site for this type of restoration. This selection was made because public support is high for river management techniques that will reduce erosion on the North Side Road caused by sediment inputs from Mill Brook. Restoring flow to abandoned side channels on Mill Brook will encourage the forma-

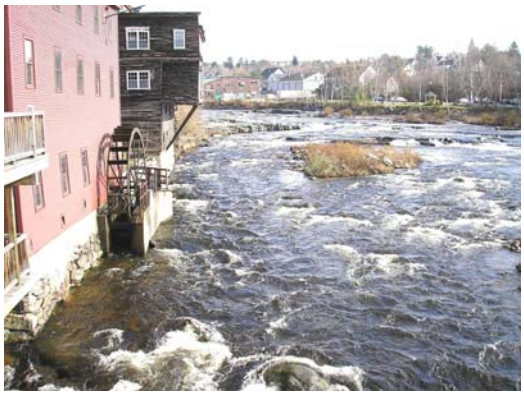
tion of gravel bars on the Mill Brook alluvial fan, decrease sediment delivery to the Upper Ammonoosuc, ease erosive pressures on North Side Road, and create aquatic habitat and wetlands. Although reductions in sediment inputs from Mill Brook will have only a minimal impact on the Connecticut River, the restoration techniques modeled might be applied later on to Nash Stream and lower on the Upper Ammonoosuc when public support grows for such management strategies. While the purpose of this project was to understand and limit sediment inputs to the Connecticut River, the resulting GIS mapping and assessment data provided information that will prove useful in the future for understanding and managing river stability issues on the Mohawk and Upper Ammonoosuc Rivers themselves.

In addition, the geomorphic assessment data collected through the 2004 restoration project on the Upper Ammonoosuc and Mohawk Rivers successfully identified pollution sources (excessive sediment supplies) as well as areas of extensive hydromodification, and generated a prioritized approach for selecting restoration alternatives and best management practices that will address the specific causes of degradation within these river reaches. The data collected through this phase of the project has identified the human factors that lead to or are currently causing surface water quality impairments on the Mohawk and Upper Ammonoosuc Rivers. The data and information submitted to DES through this project will lead to impairment decisions for Mill Brook (a tributary to the Upper Ammonoosuc River), and the Mohawk River at the confluence with the Connecticut River. Once these impairments have been officially documented, specific restoration projects will be designed and implemented at these locations to correct the impairments according to the guidance provided in the fluvial geomorphic assessments for these particular river reaches.

It is anticipated that the CRJC will be applying for future Watershed Restoration Grant funds to implement identified priority restoration projects at the Mill Brook confluence with the Upper Ammonoosuc River and at the Mohawk River confluence with the Connecticut River. Work on these two areas will strive to reduce the total volume of sediment reaching the mainstem of the Connecticut River and ensure greater and faster improvements to channel stability while reducing flood risks and improving aquatic habitat.

Drainage System Mapping and Modeling, Town of Littleton (2002 Base)

Grant Amount: $23,640 ***Local Match: $22,054***



Ammonoosuc River in Littleton. (photo courtesy: Ammonoosuc River Corridor Study Advisory Committee)

To protect the water quality of the Ammonoosuc River, the town of Littleton worked with PeopleGIS, geographic information system (GIS) consultant for the town, and local high school students, to identify and map the town's stormwater drainage system. The final storm water system model, including manholes, catch basins, and outlets was added as a GIS layer to the town's GIS program. The project also evaluated the impact of sand and salt applications at selected sites in the study area. In the late winter and spring of 2003, samples were taken from the Ammonoosuc River and two culverts that discharge to the river to be tested for chloride and total suspended solids. Although the test results showed elevated chloride levels, particularly in March at the culvert

locations, the samples collected from the river itself were within acceptable levels for sustaining freshwater life. Finally, a River Days weekend was held in September, 2003 to educate the public on the results of the study as well as the importance and cultural heritage of the Ammonoosuc River.

In addition to providing the students with hands on experience in sampling and using GIS tools, the project educated the local community and resulted in a valuable tool that municipal employees can use to plan for emergencies as well as future maintenance and upgrades of their stormwater system.

Lake Sunapee Pilot Watershed Approach - Scoping and Outreach, Lake Sunapee Protective Association (2005 Base)

Grant Amount: $3,560 Local Match: $2,375

Lake Sunapee, through the Lake Sunapee Protective Association, was selected to be one of two watersheds to participate in the Watershed Management Bureau's Watershed Approach Pilot Program. This grant was used as seed money to establish the Sunapee Area Watershed Coalition (SAWC), which will be the organization responsible for the development of a comprehensive watershed management plan. A newsletter describing the pilot project was developed and distributed to approximately 7,000 landowners in the watershed.

Lake Sunapee.

Merrimack River Watershed

Baboosic Lake Community Septic System – Phase 1, Town of Amherst (2000/2001 Restoration)

Grant Amount: $159,933 Local Match: $142,171

At the request of the Baboosic Lake Association, which had concerns over increasing frequency of algal blooms, a decrease in clarity, and a concern over the water quality impacts of septic systems, the DES Clean Lakes Program completed a diagnostic feasibility study in 1999. During the diagnostic study, lake and watershed management activities were identified, monitored, and evaluated to make recommendations to improve lake water quality.

Installation of community septic system near Washer Cove, Baboosic Lake, Amherst.

It was determined that more than 40 percent of the 200-plus waterfront homes had individual sewage disposal systems that exceeded their designed life span. As some sewage disposal systems become compromised with age, or even fail, they contribute phosphorus loading to the lake, causing a decline in water quality. The maximum phosphorus loading from septic systems has been estimated at approximately 277 Kg per year, which is more than 60 percent of the total annual phosphorus load to the lake. Phospho-

rus, a nutrient associated with increased algal growth, contributes to lake aging known as eutrophication. This has been apparent in Baboosic Lake, which has had several potentially toxic cyanobacterial algal blooms in recent years.

One area of the lake identified during the diagnostic study as having a high density of compromised septic systems was near Washer Cove on the west side of the lake in the town of Amherst. To address this issue, the town applied for and was awarded a Watershed Restoration grant in 2002. The purpose of the grant was to study the feasibility of establishing a community septic system on a 1.5 acre vacant lot owned by the town to service this area of homes. CLD Consulting Engineers Inc. submitted a final report, which included a design for a community sewage disposal system that could potentially service up to 48 homes.

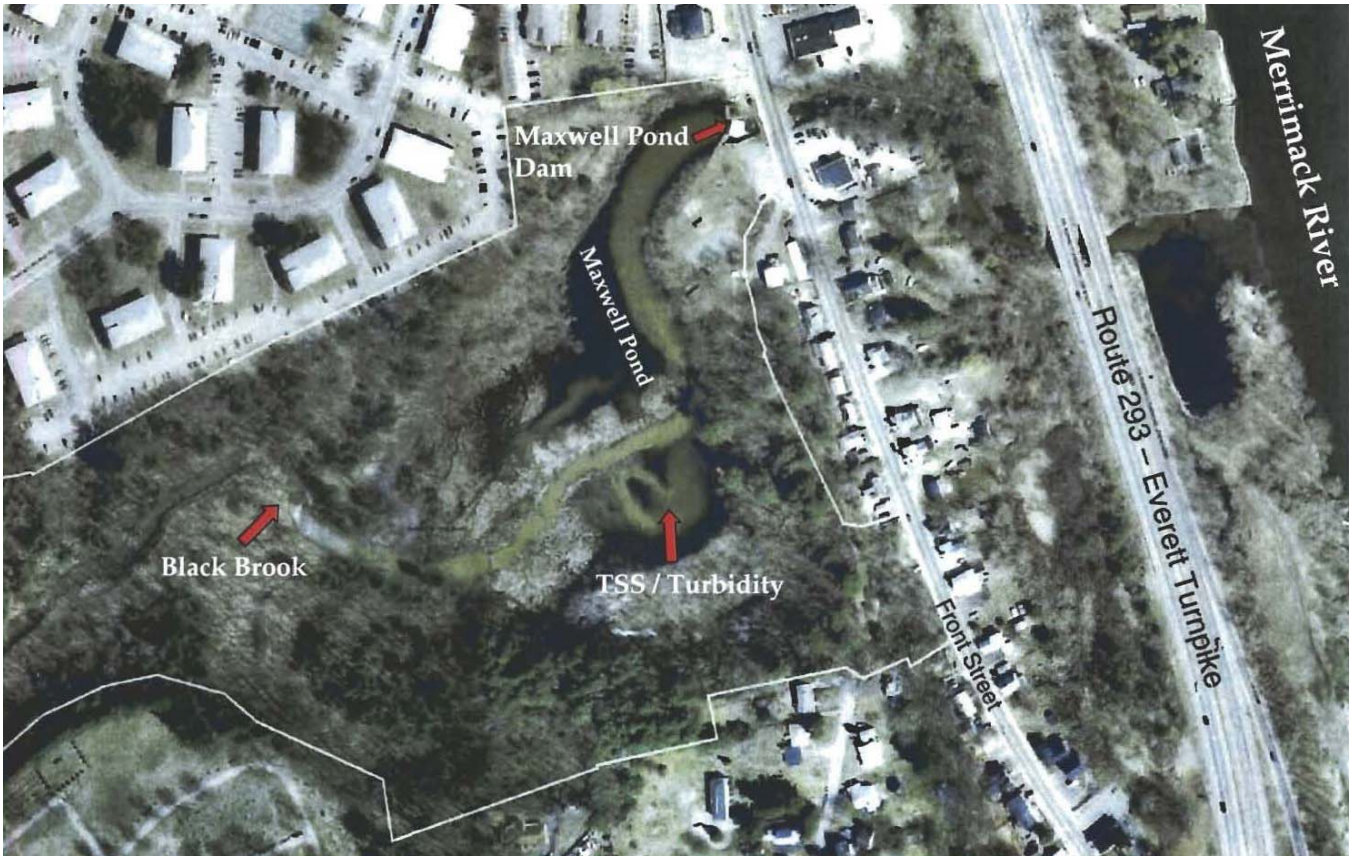
This 319 Watershed Restoration Grant, in addition to a Wastewater State Aid Grant (SAG), helped pay for the installation of phase I of the community septic system, which allowed 12 homes to hook up to the community septic system that was installed approximately 400 feet from the lake. Five of the homes that moved off private septic systems were less than 200 feet from the lake. It is estimated that approximately 13 Kg less phosphorous is discharging to the lake annually as a result of disconnecting these sites from private septic disposal. While this only amounts to roughly 3 percent of the total phosphorus load to the lake, even small phosphorus load reductions have the potential to significantly increase the lake's water quality since phosphorus is considered a limiting nutrient for algal growth. Removing these outdated septic systems is helping to address the 303(d) listed impairments of cyanobacteria and chlorophyll-A.

This phase of the project also established the fundamentals for a comprehensive management system through its public works department. The management system provides for continual monitoring and maintenance of the system and allowed town personnel to complete operational certification through DES.

Community feedback and town support for this project have been positive, in particular, because the project benefited the lake while providing a cost-effective method for providing sewage disposal to area homes. As a result the town, in cooperation with DES, will be studying additional community septic designs and site locations in the coming years.

Black Brook Survey and Corridor Restoration Design, Trout Unlimited (2001 Restoration)
Grant Amount: $13,850 Local Match: $10,000

Rivers and streams don't like fast change. For over 100 years, the Black Brook corridor in Manchester has been reacting to rapid changes instigated by man. In the 1800s, hundreds of acres of land along the stream corridor were converted from forest to orchards. In 1900, the Maxwell Ice Company constructed the Black Brook Dam upstream of Front Street to create Maxwell Pond. In the 1950s, the orchards upstream of Maxwell Pond were converted to a sand and gravel operation. Much of Black Brook in the vicinity of the sand and gravel operation was channeled, bermed, and diverted to accommodate the footprint and operational needs of the commercial operation. Throughout this time, several stream crossings were constructed over Black Brook that resulted in sections of the brook being conveyed through improperly sized culverts and bridges that eliminated access to floodplains and created additional disconnections in hydrology and habitat along the corridor.



Aerial view of the Black Brook watershed.

Today, Black Brook is disconnected from the Merrimack River by the Black Brook/Maxwell Pond Dam, and the pond itself is on the 303(d) list of impaired waters for dissolved oxygen. Approximately ten feet of sand and sediment have accumulated in Maxwell Pond over the years and the many improperly designed and installed stream crossing structures have created serious hydromodification issues that impair physical habitat, destroy habitat connectivity, and have limited the biological diversity within the corridor.

This grant was awarded to Trout Unlimited to initiate the Black Brook Topographic Survey and Corridor Restoration Design Project. This project forms the foundation of a larger, multi-year effort to restore and improve fish and aquatic habitat in the Black Brook watershed that will eventually restore

Maxwell Pond Dam.

Digitally-altered photo depicting Black Brook post-dam removal.

nearly eight miles of interconnected perennial stream habitat upstream of the confluence of Black Brook and the Merrimack River. The focus of this project was to generate extremely accurate, one foot contour maps for the project area along the Black Brook corridor. In April 2002, the aerial topographic survey was flown and the results of this survey were compiled as computer assisted drafting (CAD) topographic maps showing Maxwell Pond and the Black Brook corridor up to Dunbarton Road. Results from a sediment bathymetry study on Maxwell Pond were also compiled into CAD files, and integrated with the aerial topographic map data to create a seamless, surficial and benthic contour map for the project corridor.

In addition to the aerial survey work and the bathymetric surveys completed by the project partners, several visual renderings and cost estimates for various restoration scenarios were produced. The data generated on the CAD files were used to develop accurate cost estimates for dredging options within Maxwell Pond since the bathymetric data allowed for volumetric calculations to be derived. The CAD maps were also instrumental in developing channel restoration options for Black Brook if the Maxwell Pond Dam was removed. Visual renderings of Black Brook channel morphology following the proposed Maxwell Pond Dam removal were completed in May of 2003. These renderings illustrate present day conditions with the dam in place compared to a digitally altered image with post-dam removal conditions on Black Brook. This information was presented to the public-at-large at two informational meetings and to the City of Manchester Land and Buildings Committee.

The sediment bathymetry data and visual renderings of the dam have provided project partners with the necessary tools for developing dam removal cost estimates and comparison cost estimates for dredging the pond, and repair of the existing dam at Maxwell Pond. The information compiled from this project will help decision makers when planning future restoration efforts in the Black Brook watershed.

Souhegan River Watershed Management Plan, Nashua Regional Planning Commission (2002 Restoration)

Grant Amount: $21,000 Local Match: $21,824

The Souhegan River Watershed is comprised of 140,621 acres and includes land in 17 communities in New Hampshire and two in Massachusetts. A portion of the river is protected for its outstanding resource value under the New Hampshire Rivers Management and Protection Act. This project provided an opportunity to update the 1995 Souhegan River Watershed Study, satisfying the requirements of the Rivers Management and Protection Act while at the same time identifying sources of pollution causing impairments in the watershed. The Souhegan River Watershed Plan was also to include BMPs and other pollution control measures with estimated pollutant load reductions that would address these sources of impairments.

Milton Road crossing Souhegan River, Milford.

Unfortunately, due to changes in staffing and additional resource constraints, specific actions

necessary to address impairments listed in the 2004 305(b) Surface Water Quality Report and estimated pollutant load reductions that would be achieved through implementation were not included in the final plan.

The development of the plan did engage the local stakeholders, including the Souhegan River Local Advisory Commission, the Southwest Regional Planning Commission, and residents of local communities, in particular the corridor towns of Merrimack, Amherst, Milford, Wilton, New Ipswich, and Greenville who all became more aware of the values of the resources within the watershed and of the current threats to these resources. The plan included two 30" x 40" GIS maps. One, a watershed conditions map, identifies the major features of the watershed, including land cover and recreational and landmark sites. The second, a watershed assessment map, identifies the impaired and threatened waters, monitoring sites, and current land uses.

The goal is to have the plan incorporated into each town's master plan. The Nashua Regional Planning Commission recommends that the plan be followed up with an additional technical study and analysis to identify the pollutant sources and generate pollutant load calculations as well as a list of potential BMPs and their estimated pollutant load reductions that will reduce or eliminate NPS pollutants and restore surface waters to meet their designated uses.

Winnipesaukee Watershed Tributary Monitoring, Lake Winnipesaukee Association (2003 Base)

Grant Amount: $18,106 Local Match: $44,853

Lake Winnipesaukee has been monitored for over 20 years as a participant in the Lakes Lay Monitoring Program (LLMP) through the University of New Hampshire. Long-term trends show indications of water quality decline in Meredith Bay, Center Harbor and inner Moultonborough Bay. This project supported a volunteer monitoring effort that focused on selected tributaries in the Lake Winnipesaukee Watershed to better determine the potential impacts of "up watershed" activities on the lake. Twelve tributaries were monitored in the spring/summer of 2004 and 2005 for total phosphorus, nitrate nitrogen, *E. coli*, turbidity, conductivity, pH, temperature, dissolved oxygen and stream flow.

The project helped train and set procedures in place for a future expanded monitoring program that will include tributaries to the lake. The results of the data show that certain tributaries warrant expanded monitoring and investigation to address potential pollution problems that may be impacting lake water quality.

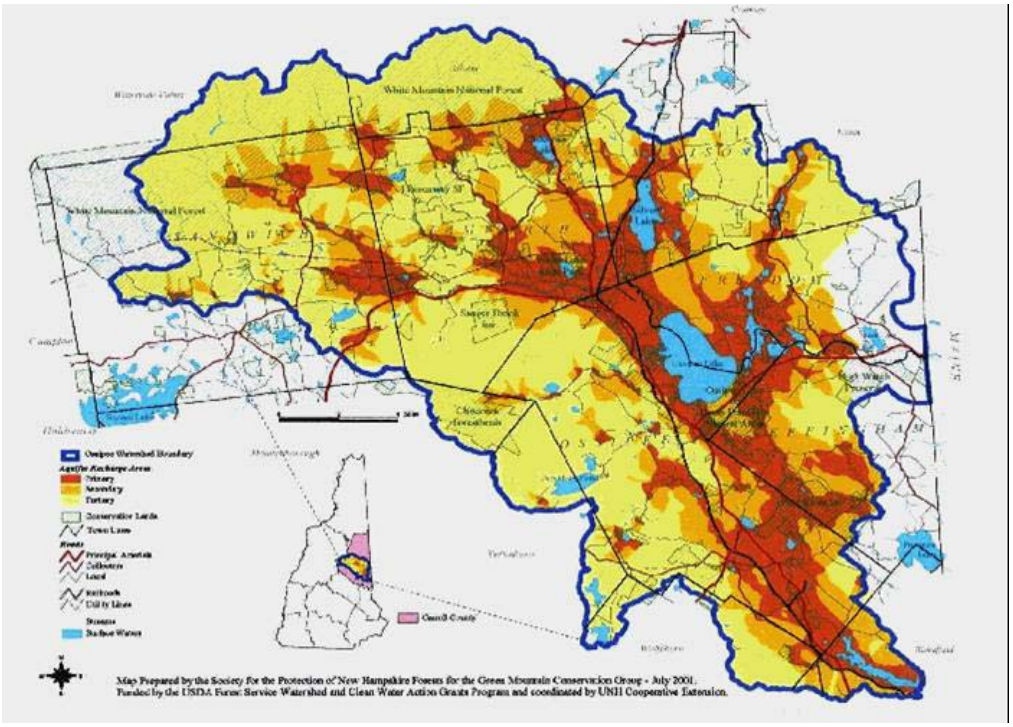
Saco River Watershed

Ossipee Watershed Environmental Planning, Green Mountain Conservation Group (2004 Base)

Grant Amount: $30,000 Local Match: $101,692

The Ossipee Watershed in central Carroll County, is located atop New Hampshire's largest stratified drift aquifer. The aquifer covers 47 square miles and receives drainage from a 330 square mile area. This is a critically important statewide resource for existing and future drinking water supplies. Carroll County is in the fastest growing region of the fastest growing state in New England, with an

expected 50 percent population increase by 2020. It is an area that is ripe for new approaches to the problem of landscape change.



Map of the Ossipee River Watershed showing extensive groundwater resources.

The purpose of this project was to establish a coalition to design and implement watershed planning across the Ossipee Watershed as a first step toward better growth management. In a region of rural communities with limited land regulation, including one town, Tamworth, that lacks a zoning ordinance, a tremendous amount of capacity building is needed to address land use change.

The Green Mountain Conservation Group (GMCG) hired a planning consultant, Jeff Taylor and Associates, who is familiar with planning issues in rural New Hampshire towns; formed the Watershed Coalition; and began an outreach program to continue building the base of natural resource knowledge that GMCG started a few years earlier by presenting natural resource inventory maps to each town.


A Tamworth landscape. (photo courtesy: GMCG)

Regional public meetings were held, vision statements adopted, and a general public survey was completed. Following these initial activities, GMCG met with each town's planning board and conservation commission to discuss master plans, land use regulations, and regional issues.

As a result of the project, municipal officials in each of the six towns engaged directly with GMCG and the planning consultant and worked on drafting some form of natural resource based plan in their town. This ranged widely from auditing the master plan to securing additional funding to conduct a wetland inventory.

The next steps for the Watershed Coalition are to hold groundwater conferences, develop water extraction ordinances, and create a natural resource planning guide for the region. Each of these steps is intended to further develop the capacity of the towns to protect natural resources through better land use management.

Statewide Projects

Development and Implementation of Nutrient Management Plans – Year 2, UNH Office of Sponsored Research (1998/2003 Base)

Grant Amount: $25,000 Local Match: $27,415

Nutrient management planning has become standard practice for many farms. In addition to the environmental incentive to prevent runoff to water bodies, farmers have an economic incentive to reduce fertilizer applications. The purpose of this project, lead by UNH Cooperative Extension, was to fine tune the nutrient management planning process by addressing phosphorus from a critical source area perspective, which includes both soil phosphorus content and soil phosphorus transportability.

By looking at critical source areas, UNH was able to reduce phosphorus loading by 28,800 pounds, saving $18,000 in fertilizer costs on ten demonstration farms, or $5.25/acre.

In addition to the development and implementation of nutrient management plans on the pilot farms, a "Phosphorus (P) Site Index" was developed for other New Hampshire farmers to use in developing their plans. This tool was accepted by N.H. Natural Resources Conservation Service (NRCS) as the official P Site Index tool and will be used in developing any nutrient management plan. This tool is based on the current science of phosphorus management and is supported by the results of the research conducted as part of this project. It is currently a required element of any NH NRCS nutrient management plan.

Mapping Forest Sensitivity to Acid Deposition, NHDES Air Resources Division (2004 Base)

Grant Amount: $20,000 Local Match: $14,172

This project was part of a regional effort to determine the sensitivity of forest ecosystems to the atmospheric deposition of sulfur and nitrogen in New England and Eastern Canada Provinces. Although sulfur emissions have decreased over the last two decades, sulfur and nitrogen compounds from atmospheric deposition continue to have an adverse impact on forest soils, tree health, and water quality.

The results of the study showed that a 50 percent reduction in nitrogen and sulfur deposition can remediate the nutrient depletion problem in 76 percent of the sensitive forest areas in New Hampshire, improving forest health and ultimately benefiting water quality.

2005 Exotic Species Prevention Lake Host Program, New Hampshire Lakes Association (2005 Base)

Grant Amount: $20,000 Local Match: $29,225

This project allowed the New Hampshire Lakes Association (NHLA) to expand its Lake Host Program to prevent the spread of non-native aquatic weeds in New Hampshire's waterbodies. Since 2002, the Lake Host Program has been educating boaters on the problem of exotic plants and how boaters can prevent them from spreading from one waterbody

A Lake Host volunteer inspects a boat for signs of exotic plants. (photo courtesy: NHLA)

to another. The Lake Host Program is run by volunteer and paid hosts who serve as the "first line of defense" at public boat ramps. With the funding from this grant, the Lake Host Program was expanded by adding volunteers so that the program could be implemented at 61 boat launch sites on 56 lakes and ponds during the 2005 season. The volunteers inspected 34,878 boats and prevented 54 contaminated vessels from entering the lakes. The exotics removed from the boats included variable milfoil, Eurasian milfoil, fanwort, and water chestnut seeds.

Looking Ahead

We hope to continue our focus on watershed-based plans in the coming years, both for restoring impaired waters and in working with local groups to protect high quality waters. As our financial resource base shrinks, it will be more important than ever to use our limited dollars wisely to achieve cleaner water. We will continue to support watershed-based projects with clear and measurable water quality goals. Conversely, we can no longer support projects that address single site issues and that do not make progress toward meeting these watershed based objectives. We also need to address the root causes of water quality problems to reduce the need for future restoration measures. This requires a focused effort to improve the number one issue relative to nonpoint source pollution: landscape change.

Appendices

A. Watershed Assistance NPS Local Initiative Grants Awarded in FFY 2006

Grantee	Project Name	Project Number	NPS Category	Watershed	Source of Funds (FFY)	Grant Award
NH Dept. of Agriculture	Agriculture Nutrient Management Grant Program	N/A	Agriculture	Statewide	2006	$30,000
Beaver Lake Improvement Association	Beaver Lake Watershed Management Plan	B-04-M-13	All sources	Merrimack	2004	$55,620
Acton Wakefield Watersheds Alliance	AWWA Youth Conservation Corps	B-06-C-02	Urban runoff, land development	Coastal	2006	$60,041
Town of Boscawen	Jamie Welch Park Canoe Launch	B-06-M-04	Stormwater, streambank stabil.	Merrimack	2006	$24,500
Green Mountain Conservation Group	Development of Natural Resource Planning Guide	B-06-S-01	All sources	Saco	2006	$35,000
Town of Chester	Wason Pond Remediation	B-06-C-05	Urban runoff, post-devel. erosion	Coastal	2006	$4,355
Town of Peterborough	Contoocook River Urban Stormwater Improve. & Demo. Project	B-06-M-03	Urban runoff	Merrimack	2006	$104,990
Millerworks	REPP Innovative Land Use Techniques Guide	B-04-SW-14	All sources	Statewide	2004	$4,240
Lake Sunapee Protective Association	Lake Sunapee Watershed Management Plan	B-05-CT-P-1	All sources	Connecticut	2005	$35,000
Town of Meredith	Lake Waukewan Assessments	B-05-M-P-2	All sources	Merrimack	2005	$50,000
			Total Awards			**$403,746**

B. Watershed Assistance Restoration Grants Awarded in FFY 2006

Grantee	Project Name	Project Number	NPS Category	Watershed	Source of Funds (FFY)	Grant Award
Town of Nottingham	Pawtuckaway Lake Watershed Improvement	R-05-C-03	Urban runoff	Coastal	2006 Base 2005 Restor.	$10,000 $20,000
Partridge Lake Owners Association	Partridge Lake Phosphorous Load Reduction	R-05-C-02	Agriculture	Connecticut	2006 Base 2005 Restor.	$10,000 $20,000
Town of Seabrook	Beach Area Catch Basin Replacement, Phase 2	R-03-C-08	Urban runoff	Coastal	2003	$7,000
Great Bay Coast Watch	Berry's Brook Storm Event Sampling	R-02-C-06	Urban runoff, land development	Coastal	2002	$3,780
University of New Hampshire	Berry's Brook Pollution Source Investigation	R-02-C-07	Urban runoff, land development	Coastal	2002/2003	$20,000
City of Manchester	Nutts Pond Watershed Improvement	R-05-M-01	Urban runoff	Merrimack	2005	$60,000
Trout Unlimited	Pemigewassett River Restoration	R-05-M-04	Hydromodification	Merrimack	2005	$315,000
					Subtotal	**$465,780**

C. Watershed Assistance NPS Local Initiative Projects Completed in FFY 2006

Grantee	Project Name	Source of Funds	Grant #	319 Funds	Total Cost	Completed	Watershed
Town of Littleton	Drainage System Mapping & Modeling	2002	B-02-CT-08	$23,640	$45,694	7/13/2006	Connecticut
Lake Winnipesaukee Association	Tributary Monitoring in the Winnipesaukee Watershed	2003	B-03-M-02	$18,106	$62,959	8/2/2006	Merrimack
UNH Office of Sponsored Research	Development & Implementation of Nutrient Mgt. Plans - Year 2	2003 1998	B-03-SW-05	$25,000 $15,000	$67,415	11/15/2006	Statewide
Green Mountain Conservation Group	Ossipee Watershed Environmental Planning Initiative	2004	B-04-S-04	$30,000	$131,691	1/9/2006	Saco
NHDES Air Resources Division	Mapping NH Forest Sensitivity to Acid Deposit.	2004	B-04-SW-08	$20,000	$34,172	1/9/2006	Statewide
Lake Sunapee Protective Association	LSPA Pilot Watershed Approach	2005	B-05-CT-07	$3,560	$5,935	12/8/2005	Connecticut
NH Lakes Association	2005 Lake Host Program — Exotic Species Prevention	2005	B-05-SW-03	$20,000	$49,225	10/24/2005	Statewide

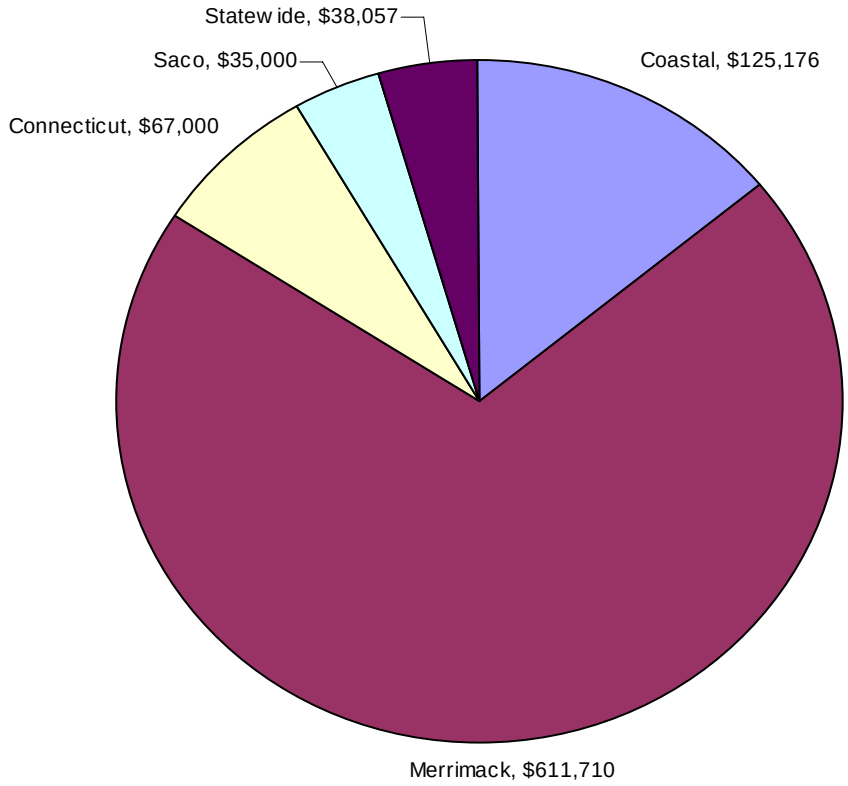
D. Watershed Assistance Restoration Projects Completed in FFY 2006

Grantee	Project Name	FFY Source of Funds	Grant #	319 Funds	Total Cost	Completed	Watershed
Town of Amherst	Baboosic Lake Community Septic System – Phase I Installation	2000 2001	R-00-M-10	$137,004 $22,929	$375,078	6/6/2006	Merrimack
Trout Unlimited	Black Brook survey and Corridor Restoration Design	2001	R-01-M-05	$13,850	$23,350	6/5/2006	Merrimack
Nashua Regional Planning Commission	Souhegan River Watershed Management Plan	2002	R-020M-07	$21,000	$42,824	12/31/2005	Merrimack
University of New Hampshire	Microbial Source Tracking in Mill Creek and Cains Brook	2003	R-03-C-01	$35,000	$58,332	12/5/2005	Coastal
Connecticut River Joint Commission	Fluvial Geomorphic Assessment of Northern CT River Tributaries	2004	R-04-CT-05	$34,408	$67,638	3/6/2006	Connecticut

E. Agricultural Nutrient Management Grants Awarded SFY 2006

Grant Award	Management Practice	Recipient	Operation Type	Town	Waterbody
$2,500	Drainage improvement	David Clark	Bison	Langdon	Crane Brook to Cold River
$2,500	Fencing	James Bibbo	Mixed livestock	Bradford	Hoyt Brook to Warner River
$2,500	Roof for manure and compost bunker	Roger Charbonneau	Cattle & greenhouse	Hooksett	Dube Pond, Massabesic Lake Watershed
$2,500	Barn gutter	Charles Cox	Horse	Durham	Oyster River
$2,390	Manure storage	Earl Cate	Dairy	Loudon	Bumfagon Brook to Soucook River
$2,500	Manure runoff control	Gary Grazziano	Dairy	Contoocook	Elm Brook
$2,500	Roof for manure storage	Sandwich Creamery	Dairy	North Sandwich	Unnamed Brook
$2,500	Manure/compst storage	Damon Burt	Mixed livestock	Strafford	Intermittent Stream
$2,500	Manure storage	Katherine Cooper	Horse	Epping	Hoar Pond Watershed
$1,425	Educational workshop	Hillsborough Cnty Cons Dis	Horse	Milford	Statewide
$2,500	Feed lot drainage improvements	Robert Drown	Dairy	Webster	Blackwater River
$2,500	Manure storage	Ethely Nye	Horse	Auburn	Cohas Brook
$2,500	Heavy use area	Richard Flint	Dairy	Milan	Tributary to Androscoggin River
$2,500	Heavy use area	Brian Farmer	Bison	Warner	Warner
$1,004	Fencing	Elizabeth McCann	Cattle	Lyme	Grant Brook
$2,500	Fencing	James Bibbo	Mixed livestock	Bradford	Hoyt Brook Tributary
$2,500	Fencing	David Clark	Bison	Langdon	Crane Brook to Cold River
$2,500	Fencing	Murray Hill Farm	Horse	Laconia	Unnamed Stream
$2,500	Barn gutters and stream crossing	Ross Cisneros	Dairy goats	Sanbornville	Unnamed Stream
$2,500	Manure storage and heavy use area	Marion Ingoldsby	Beef cattle	Alstead	Milliken Brook to Cold River
$2,500	Manure storage	Paul Buck	Horse	Holderness	Wetland
$2,500	Manure storage	Crotched Mountain Fnd.	Dairy	Peterborough	Bogle Brook
$2,500	Fencing	Karen Dodge	Horse	Pittsfield	Unnamed Stream
$54,819	**Total**				

F. Distribution of Section 319 Grant Dollars Awarded in 2006 by Watershed



G. Distribution of Section 319 Grant Dollars Awarded in 2006 by NPS Category