Youth Conservation Corps Project

A Final Report to

The New Hampshire Department of Environmental Services

Submitted by

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Wendy Garland	Maine Department of Environmental Protection
Natalie Landry	New Hampshire Department of Environmental Services
Julia Peterson	UNH Cooperative Extension/Sea Grant
Jeffrey Schloss	UNH Cooperative Extension
Duane Snyder	Acton Shapleigh Youth Conservation Corps
Jared Teutsch	New Hampshire Lakes Association
Directors	New Hampshire Corporate Wetlands Restoration Project
Nancy Spencer Smith	Alden Young Trust
Gary Miller	Miller Ford of Sanford
	Springvale Nurseries

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Executive Summary

The Acton Wakefield Watersheds Alliance (AWWA) is a non-profit organization formed in 2004 to protect and improve water quality in the lakes and streams in the Acton, ME, Wakefield, NH border region and ultimately in the rivers, estuaries and bays into which they flow. The Alliance is registered with the State of New Hampshire and holds 501(C)3 status. The organization's mission is to protect the watersheds and preserve or restore the water quality of lakes and streams located primarily in, but not limited to, Wakefield, NH and Acton, ME.

The Acton Wakefield Watersheds Alliance (AWWA) Youth Conservation Corps (YCC) projects, through direct remediation efforts, protect the quality of the public waters for future generations and for fish and wildlife habitat. The AWWA YCC reached its desired outcome for the 2006-2007 YCC project with the stabilization of shorelines on the target waterbodies in the Acton/Wakefield watersheds. The project also benefited residents of the surrounding communities and the large numbers of visitors that use these public water bodies for recreation throughout the year. Over the course of this two year project, beginning in April of 2006 and concluding in December of 2007, the AWWA YCC installed Best Management Practices (BMP) to fix erosion or runoff problems at 30 private and public sites; provided technical assistance to an additional 60 landowners; provided recommendations to individuals, municipalities and other stakeholder to address NPS issues not able to be addressed by the YCC; and raised awareness of NPS pollution solutions through outreach and education programs.

The total cost of the AWWA YCC project, including in-kind match amounts was $175,547. The total cash cost was $96,371. In addition to the $66,041 provided by the NH DES Watershed Assistance grant, funds were provided by the towns of Acton, Maine ($7,000) and Wakefield, NH ($12,000); the NH State Conservation Committee ($4,998); the NH Corporate Wetlands Restoration Project ($5,000); the local lake associations ($4,150); individual donors ($598); and fundraising activities ($581). In-kind donations totaled $79,237 and included volunteer hours ($43,737); Project Host materials ($13,968); business contributions ($15,304); volunteer miles driven ($5,209); and volunteer in-kind donations ($1,019).

The AWWA Board of Directors is an enthusiastic and active group of 14 volunteers who give freely of their time and expertise. In the first two years of programming the board members collectively donated over 2,000 hours of time. These board members bring diverse backgrounds including volunteer management, environmental education, science education, civil and electrical engineering, physics, computer science, landscaping and construction, bookkeeping, as well vast resources within the communities. Members of the board continue to enhance their understanding of environmental issues and organization management with regular attendance at seminars, conferences, and workshops.

AWWA partners include representatives from ME Department of Environmental Services, NH Department of Environmental Services, UNH Cooperative Extension, York County Soil & Water Conservation District, UNH Center for Freshwater Biology, and the NH Lakes Association. The AWWA board freely seeks advice from its partners in its efforts to be an effective and proactive defender of the AWWA region's water resources.

The Acton Wakefield Watersheds Alliance (AWWA) Youth Conservation Corps (YCC) is staffed by a Technical Director, Crew Leader and four or five high-school aged crew members. YCC Technical Director provides advice, landscaping designs and selects the projects for the crew. The crew, led by the crew leader, provides the labor for the BMP installations at no cost to the property owner. The property owners are responsible for acquiring all plants and materials for the projects. Signs posted at all demonstration sites serve to raise awareness of NPS pollution and the project hosts serve as ambassadors

for the program to all interested neighbors and visitors.

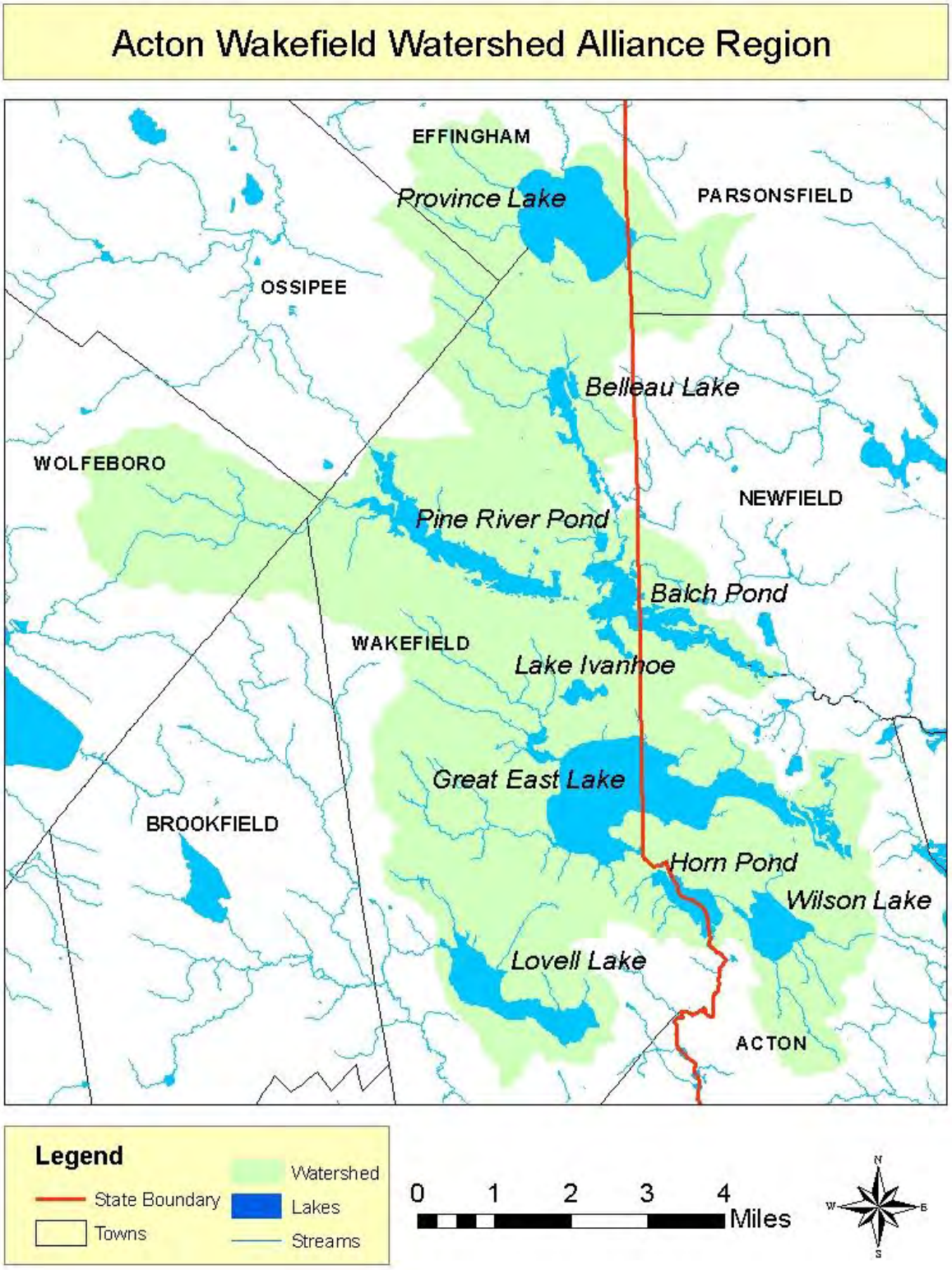
The performance targets for the AWWA YCC project were all met or exceeded within the two-year project period. The communities demonstrated their support for the YCC goals by providing funding and publicity on both the municipal and local association levels. The YCC staff performed all expected tasks with confidence and expertise and all necessary equipment was purchased or donated. Shorelines were stabilized or stormwater was controlled on 30 sites within the targeted watersheds resulting in an reduction of sediment loading of 37.28 tons per year. The recommended BMPs were installed on eight of the 2006 technical assistance sites as verified by site visits and conversations with the property owners. Verification of the 2007 technical assistance compliance will be made in 2008.

Introduction

In the fall of 2004, a group of citizens, concerned about the potential adverse effects of erosion caused by stormwater runoff met with the director of the Mousam Lake Youth Conservation Corps explore the possibility of forming a region-wide YCC for the local watersheds. What became the Acton Wakefield Watersheds Alliance region includes the Salmon Falls and Ossipee River watersheds within the towns of Acton, Maine and Wakefield, New Hampshire. Within these watersheds are 10 lakes and ponds – Balch Lake, Belleau Lake, Horn Pond, Great East Lake, Lake Ivanhoe, Lovell Lake, Pine River Pond, Province Lake, Wilson Lake, and Woodman Lake. The region is included in hydrologic units 01060002 and 01060003. During 2005 the group worked through a visioning process with the help of Julia Peterson of UNH Cooperative Extension and developed its mission, adopted by-laws and received 501(C)3 status. The group decided to focus its initial efforts on creating a YCC to implement erosion control measures while educating the public about the importance of healthy water resources.

The NH Department of Environmental Services Non-Point Source (NPS) management plan lists erosion as the number one priority NPS pollutant. Storm water, carrying sediment and nutrients into the water bodies, destabilizes the shoreline by eroding fragile soils. Erosion results in shallow areas that promote weed growth and nutrients accelerate the eutrophication process. In undisturbed areas the nutrients and water are retained and recycled within the system but as land development changes the natural landscape other methods of preventing increased flow into the waterbodies must be employed. Vegetated buffers, shoreline stabilization, infiltration systems, rain gardens, water-bar diverters, and other Best Management Practices (BMP) can control storm water runoff and minimize soil erosion. It is far more cost effective and ecologically beneficial to prevent pollution of our surface waters now than to remediate impaired waters later. Development projections from the State of NH suggest a 36% population growth in Wakefield by 2025 with a corresponding loss of 5.4% forested lands. The sandy soils in the region are particularly susceptible to erosion. Acton is showing similar trends. It is imperative that the communities adopt land use practices that are designed to protect the high quality waters of the region before those pressures have a significant degrading effect.

Watershed Map



Project Performance Targets and Milestones

- **Performance Target 1:** Residents have interest and enthusiasm for the YCC goals of improving and protecting water quality such that the town governments and partners believe it is worthy to invest time and money into the program.

    - Milestone 1A: The general public develops awareness of YCC mission.
    - Milestone 1B: Town Officials in Acton, ME and Wakefield, NH offer letters of support and Towns approve funding.
    - Milestone 1C: Partner organizations pledge technical, financial and/or advisory support.
    - Milestone 1D: Interested landowners contact YCC for further information

- **Performance Target 2:** The infrastructure of the YCC is established including staff employment and training and administrative protocols.

    - Milestone 2A: The YCC staff has been hired and trained
    - Milestone 2B: NHLA or other partner organization has accepted employment administrative responsibilities.
    - Milestone 2C: All necessary tools and equipment have been procured.
    - Milestone 2D: All required reports are submitted, funding options are investigated insurance policy is contracted and administrative duties are complete.

- **Performance Target 3:** Shorelines are stable and stormwater is controlled on 30 sites along the targeted waterbodies.

    - Milestone 3A: Landowners agree to host projects and bear the cost of materials.
    - Milestone 3B: BMPs are installed on project sites.

- **Performance Target 4:** Landowners implement recommended BMPs on a minimum of 10% of the 60 additional Technical Assistance visit sites.

    - Milestone 4A: Landowners understand need for changing their landscape and 60 invite Technical Director for a site visit.
    - Milestone 4B: Landowners sign Pledge Cards and install the recommended BMPs.

Project Performance Target Verification

The efforts of AWWA to engage community members in the campaign to improve and protect the water quality of the region waters have been rewarded in a number of ways. To raise awareness of the YCC mission, AWWA volunteers and staff distributed articles about the YCC project as well as relevant informational pieces to the local newspapers and lake association newsletters. Examples of these articles may be found in **Appendix A**. AWWA volunteers and staff manned booths at local community events with activities to demonstrate the principles of NPS pollution and informational displays. Two AWWA volunteers delivered a series of three watershed education lessons to 75 of the Paul School 7th graders. A landscaping at the water's edge workshop, led by Jeffrey Schloss of UNH Cooperative Extension, was held during the summer of 2006 and was attended by approximately 20 people.

The town officials of both Wakefield and Acton have been extremely supportive of the AWWA YCC efforts resulting in an increase in funding of $2000 from each town in 2006 to $10,000 and $5,000 respectively in 2007. Wakefield has approved $12,000 in funding for 2008. The AWWA board and YCC staff delivered presentations highlighting the YCC activities at the end of each season which was well received.

AWWA gratefully accepted the assistance of highly qualified partners. Pat Baldwin and Duane Snyder of the Acton Shapleigh YCC (formerly Mousam Lake YCC) generously shared their expertise in developing and implementing a YCC and shared in training efforts. Wendy Garland of the Maine DEP shared her vast knowledge of watershed protection practices and regulations and YCC implementation as well as provided training and support for the YCC directors. Julia Peterson of UNH Cooperative Extension shared outreach and education assistance and guided the AWWA board through two visioning processes. Jeffrey Schloss of UNH Cooperative Extension helped get the YCC up and running and offered his expertise in water quality data and shoreline landscaping techniques. Jared Teutsch of the NH Lakes Association provided administrative support by providing payroll services and funding advice. Nancy Spencer Smith, trustee of the Alden Young Trust, provided office space and legal expertise. Gary Miller, of Miller Ford of Sanford, provided the free use of a pickup truck for each YCC season. Natalie Landry, project manager for the NH DES provided invaluable support throughout every phase of the YCC project.

The infrastructure of the YCC project was established prior to the beginning of the 2006 season. All necessary administrative contracts were completed, insurance procured and funds requested. Staff was hired and trained for each YCC season and functioned at or above the expected level. Alix Marcoux left the technical director position after the 2006 season and was replaced by Adam Shoukimas who had held the position of Crew Leader under Alix' leadership. Both Alix and Adam were trained in BMP installation and YCC organization by Wendy Garland of the ME DEP and successfully completed CPR and First Aid training. The crew was trained each season by the technical director and crew leader. All required reports and documentation were submitted in a timely manner.

During the 2006 YCC season 10 YCC projects were completed resulting in a sediment load reduction of 15.88 tons per year. An additional 35 technical assistance designs were provided and of that 23% of the clients installed the recommended BMPs. Verification of the installations was determined by the technical director performing site visits. During the 2007 season 20 YCC projects were completed resulting in a sediment load reduction of 21.4 tons per year. An additional 25 technical assistance designs were provided. Verification of the installations of the recommended BMPs will be conducted in 2008. Photographic documentation and descriptions of each of the YCC projects is included in the section **Photographic Documentation.** A list of the technical assistance visits is included in the **List of Tables** section.

Project Outcomes and Measurable Results

The desired outcome for the AWWA YCC is the stabilization of shorelines on the target waterbodies in the Acton/Wakefield watersheds. The success of the projects was measured by using the Region 5 Load Estimation Model for Gully Stabilization to estimate sediment load reductions by ton per year.

Measurements were taken wherever feasible by the AWWA technical director and crew leader consistent with the procedure outlined in the Acton Wakefield Watersheds Alliance Abbreviated Quality Assurance Project Plan submitted on July 20, 2006. Where the gully erosion existed, the technical director measured the dimensions of the gully. The technical director also evaluated the soil texture, the technical director was then able to estimate the soil loss at these sites due to erosion, according to the procedures of the Region 5 method. This method was also used to calculate the amount of phosphorus deposited into the respective waterbody annually. Whenever possible, either the crew leader, a YCC crew member, the landowner or an AWWA volunteer was recruited to assist the technical director with measurements and data collection.

The AWWA YCC uses the conservation BMP practices detailed on fact sheets developed by the ME Department of Environmental Services and the Portland Water District. These fact sheets can be found at http://www.pwd.org/news/publications.php#Brochures. These instructions were used by the YCC and distributed to the technical assistance clients. The following table details the number of each BMP that was installed during the 2006-2007 YCC seasons:

Table 1: Installed BMPs

BMP	Number installed
Rain Garden	7
Infiltration Steps	7
Dripline Trench	8
Vegetated Buffer	9
Rubber Razor	5
Erosion Control Mix	12
Plunge Pool	11
Meandering Path	7
Water Bar	12
Infiltration Trench	10
Planting Vegetation	5
Stabilization	4
Open Top Culvert	2
Turnout	2
Total	**101**

Map of Distribution of 2006 AWWA YCC Project Sites:

Map of Distribution of 2007 AWWA YCC Project Sites:

NPS Projects - Pollutants Controlled Report

New Hampshire Department of Environmental Services, Watershed Assistance Section

DES Project Number: ___B-06-C-02_____ **Annual Report for the year:** ___2006_____

Project Title: _Youth Conservation Corps_____

Grantee: __Acton Wakefield Watersheds Alliance_____

Table 1. Pollutant Load Reduction Estimates for NPS Sites Treated with BMPs

Waterbody Name	Sediment tons per year	Phosphorus pounds per year	Nitrogen pounds per year
Lovell Lake	6.22	5.302	N/A
Great East Lake	8.73	7.424	N/A
Balch Lake	0.93	0.787	N/A
Totals	15.88	13.513	N/A

Table 2. Wetlands, Streambanks, Shoreline Protected / Restored During This Project

Resource	Planned acres	Actual acres	Planned linear feet	Actual linear feet
Wetlands restored			not applicable	not applicable
Wetlands created			not applicable	not applicable
Streambank /shoreline protected	not applicable	not applicable		
Stream channel stabilized	not applicable	not applicable		

The estimations in this report were determined using the appropriate estimation model(s) and applied according to the procedures prescribed for the model. To the best of my knowledge these are reasonable estimates using appropriate methods. Documentation is kept on file by the grantee and is available for review by DES / EPA.

Submitted by (for Grantee): _____ _____ on ___/___/___
Signature Printed Name

Reviewed by (for DES): _____ _____ on ___/___/___
Signature Printed Name

NPS Projects - Pollutants Controlled Report

New Hampshire Department of Environmental Services, Watershed Assistance Section

DES Project Number: B-06-C-02 Annual Report for the year: 2006

Table 3. List of NPS Sites and Methods Used

Site ID (name or # from site list)	Brief Description NPS Site	Estimation Method / Sub-Method Used	**Tons of Sediment This Year**	Pounds of Phosphorus This Year	Pounds of Nitrogen This Year
Jones Road	**EXAMPLE**……. Stabilize 500 feet of road drainage ditch	Region 5 / CEE	12.7	1.4	N/A
Binette Property	Rubber Razor, Rain Garden, Pathway and Infiltration Steps, Vegetative Buffer	Region 5/GEE	0.13	0.126	N/A
Schlenker Property	3 Rubber Razors to stabilize 150ft driveway	Region 5/GEE	5.89	5.003	N/A
Desroches Property	Waterbars, Erosion Control Mulch (ECM) slope	Region 5/GEE	0.20	0.173	N/A
Smith Property	Vegetative Buffer, Dripline Trench	Region 5/GEE	0.03	0.027	N/A
Morgan/Cook Property	ECM slope, Vegetative Buffer, Dripline Trench, Install Pathway and Infiltration Steps	Region 5/GEE	8.68	7.379	N/A
Morgan/Cook Property	Stabilize tree root system on shoreline slope	Region 5/CEE	0.02	.018	N/A
Kattman Property	Rain Garden, Dripline Trench, Vegetative Buffer	Region 5/GEE	0.53	0.452	N/A
Hacker Property	ECM slope, Dripline Trench, Vegetative Buffer	Region 5/GEE	0.39	0.335	N/A
		Totals for the Year:	15.87	13.513	

Pollutant Load Reduction Estimation Methods

1. Region 5 Model Refer to EPA website http://it.tetratech-ffx.com/stepl/default.htm Go to the Region 5 Load Estimation Users Manual, "Michigan Method".

Descriptors to use for Region 5 Model sub-methods:

Region 5 / GEE	Gulley Stabilization - uses Gulley Erosion Equation
Region 5 / CEE	Streambank / Ditchbank and Roadbank Stabilization - uses Channel Erosion Equation
Region 5 / Fields	Agricultural Fields - uses Revised Universal Soil Loss Equation (RUSLE), sediment delivery ratio and contributing drainage area.
Region 5 / Filter	Filter Strips - uses relative gross filter strip effectiveness
Region 5 / Feedlot	Feedlot Pollution Reduction - uses a 12 step method

2. WEPP Model. Refer to USFS website http://forest.moscowfsl.wsu.edu/fswepp/ Water Erosion Prediction Project (WEPP) computer model

NPS Projects - Pollutants Controlled Report

New Hampshire Department of Environmental Services, Watershed Assistance Section

DES Project Number: ___B-06-C-02_____ **Annual Report for the year:** _2007_____

Project Title: _Youth Conservation Corps_____

Grantee: __Acton Wakefield Watersheds Alliance_____

Table 1. Pollutant Load Reduction Estimates for NPS Sites Treated with BMPs

Waterbody Name	Sediment tons per year	Phosphorus pounds per year	Nitrogen pounds per year
Lovell Lake	9.2	7.8	N/A
Great East Lake	3.2	2.7	N/A
Balch Pond	2.3	1.8	N/A
Province Lake	3.4	2.9	N/A
Branch River	1.6	1.4	N/A
Great East Lake Canal	0.6	0.5	N/A
Belleau Lake	0.8	0.7	N/A
Wilson Lake	0.7	0.6	N/A
Totals	21.4	18.0	N/A

Table 2. Wetlands, Streambanks, Shoreline Protected / Restored During This Project

Resource	Planned acres	Actual acres	Planned linear feet	Actual linear feet
Wetlands restored			not applicable	not applicable
Wetlands created			not applicable	not applicable
Streambank /shoreline protected	not applicable	not applicable		
Stream channel stabilized	not applicable	not applicable		

The estimations in this report were determined using the appropriate estimation model(s) and applied according to the procedures prescribed for the model. To the best of my knowledge these are reasonable estimates using appropriate methods. Documentation is kept on file by the grantee and is available for review by DES / EPA.

Submitted by (for Grantee): _____ _____ on ___/___/___
Signature Printed Name

Reviewed by (for DES): _____ _____ on ___/___/___
Signature Printed Name

NPS Projects - Pollutants Controlled Report

New Hampshire Department of Environmental Services, Watershed Assistance Section

DES Project Number: B-06-C-02 Annual Report for the year: ____2007_____

Table 3. List of NPS Sites and Methods Used

Site ID (name or # from site list)	Brief Description NPS Site	Estimation Method / Sub-Method Used	Tons of Sediment This Year	Pounds of Phosphorus This Year	Pounds of Nitrogen This Year
Jones Road	**EXAMPLE**……. Stabilize 500 feet of road drainage ditch	Region 5 / CEE	12.7	1.4	N/A
Province Lake Property	Waterbars, Drywells, Pathway, Infiltration Trench, Native Vegetative	Region 5/GEE	3.4	2.9	N/A
St. Anthony's Church Property	Rain Gardens, 120' Infiltration Trench	Region 5/GEE	1.2	1.0	N/A
Lovell Boat Ramp Property	Waterbars, Erosion Control Mix, Rain Garden, Native Vegetation	Region 5/GEE	0.4	0.4	N/A
White Mtn Highway Property	Riprap Stabilization	Region 5/GEE	0.4	0.4	N/A
Sundgaard Property	50' Infiltration Trench, Drywell	Region 5/GEE	0.7	0.6	N/A
Arnone Property	Open-top Culverts, Drywells, Infiltration Trench, Dripline Trench	Region 5/GEE	0.8	0.7	N/A
Gregorio Property	Open-top Culverts, Infiltration Trench, Drywells	Region 5/GEE	2.3	1.8	N/A
Golden Property	Waterbars, Drywells, Erosion Control Mix, Native Vegetation	Region 5/GEE	7.0	5.9	N/A
Shannon Property	Waterbars, Retaining Wall, Rain Garden, Erosion Control Mix	Region 5/GEE	2.3	2.0	N/A
McKinley Property	Rubber Razors, Infiltration Trench, Waterbar	Region 5/GEE	0.9	0.7	N/A
Heacock Property	Rubber Razors	Region 5/GEE	1.3	1.1	N/A
Darling Property	Waterbars, Infiltration Steps, Turnouts, Rain Garden	Region 5/GEE	0.5	0.4	N/A
Robinson Road Property	Infiltration Trench, Drywell	Region 5/GEE	0.6	0.5	N/A
		Totals for the Year:	21.8	18.4	N/A

Conclusions and Recommendations

The desired outcome for the AWWA YCC is the stabilization of shorelines on the target waterbodies in the Acton/Wakefield watersheds. In its first two-year project cycle the AWWA YCC succeeded at meeting its desired project outcome of stabilizing shorelines or controlling stormwater runoff at 30 project sites and eight technical assistance sites remedied by the landowner. AWWA is particularly gratified by the increasing support from the communities in both financial commitment and stakeholder interest. Requests for assistance continue to come in and municipal officials and conservation organizations refer watershed concerns to the AWWA office. There is a list of interested stakeholders waiting for assistance in the next YCC season.

Presentations to community stakeholders were well received, much due to the participation of the youth crew members. Each YCC crew member demonstrated his/her commitment to water quality protection and increased knowledge about water resources and processes in a charismatic manner during season end tours and PowerPoint presentations. The increased stewardship of the youth is a powerful tool to engage the community and an essential component of sustainable water resource protection efforts.

The initial efforts of the AWWA YCC were successful at bringing the issue of pollution caused by erosion from stormwater runoff to the forefront of the community dialogue and generating an interest in and effort at mitigating the causes. That said, there is much work still to be done. Throughout this initial phase the AWWA staff and volunteers spent much time planning for future efforts and determining the capacity needed to continue the process. The group completed a second visioning process in the fall of 2007 and determined that increased staff and funding are needed to strengthen the program. The time required by the volunteers was far greater than had been anticipated and there was not time for detailed evaluation tools to be completed. A comprehensive evaluation plan, including a project host interview, a technical assistance client survey, and YCC crew observation tools have been developed and, given time and funding, will be implemented during the next YCC season.

While stakeholder interest has driven the project to date, the group determined that comprehensive watershed surveys should be performed to guide the programming in a more targeted manner. AWWA has applied for, and been awarded, a NH DES High Quality Waters grant to develop a watershed-based management plan for the watersheds within the region that drain into the Salmon Falls River. Future efforts will be made to do the same for the watersheds that drain into the Ossipee River. The watershed-based management plan proposal includes GIS computer-based modeling, performing watershed surveys and developing a region-wide water monitoring program. The data acquired through this process should assist the communities in planning future efforts at watershed protection and NPS pollution prevention.

In order to have the capacity to carry out all its desired projects AWWA has decided to hire a part-time executive director to assist with the administrative duties, coordinate the watershed planning efforts and supplement the duties of the YCC technical director in evaluation and implementation of the YCC project. The AWWA Board of Directors is hopeful that with increased capacity AWWA will be able to continue its effective Youth Conservation Corps program while taking advantage of the momentum it has created to promote land-use planning and enhanced outreach and education programs.

List of Tables

Table 2: 2006 Technical Assistance Clients

LAST NAME	WATERBODY	ADDRESS	TOWN	VERIFIED
Clark	Great East Lake	17 Field Rd	Acton	yes
Frackleton	Balch Pond	330 Whitehorse Rd	W. Newfield	yes
Hall	Balch Pond	15 Green Bay Rd	W Newfield	yes
Harris	Great East Lake	275 Hams Camp Rd	Acton	yes
MacDonald	Balch Pond	131 Au Bord Du Lac Rd	E Wakefield	yes
Maguire	Lovell Lake	52 N Roberts Cove Rd	Sanbornville	yes
Maloney	Great East Lake	1725 H Rd	Acton	yes
Robert Shores Association	Lovell Lake	North Roberts Cove Rd	Sanbornville	yes
Achille	Wilson Lake	94 Peacock Rd	Acton	YCC
Binette	Lovell Lake	46 North Roberts Cove Rd	Sanbornville	YCC
Cummings	Great East Lake	85 North Shore Dr	E Wakefield	YCC
Desroches	Lovell Lake	29 Chase Lane	Sanbornville	YCC
Kimball	Balch Pond	90 Balch Hill Rd	E Wakefield	YCC
Schlenker	Lovell Lake	21 Chase Lane	Sanbornville	YCC
Awiszus	Belleau Lake	516 Belleau Blvd	Wakefield	no
Bernier	Great East Lake	229 Veazey Point Rd	Sanbornville	no
Boucher	Lovell Lake	716 Brackett Rd	Sanbornville	no
Boucher	Lovell Lake	726 Brackett Rd	Sanbornville	no
Camerato	Lovell Lake	87 South Roberts Cove Rd	Sanbornville	no
Davis	Lovell Lake	102 Pond Road	Sanbornville	no
Grant	Belleau Lake	182 Fisher Rd	E Wakefield	no
Henrichon	Great East Lake	377 North Shore Rd	E Wakefield	no
Hurley	Belleau Lake	31 Lexington Drive	E Wakefield	no
Jeffrey	Pine River Pond	295 Sparhawk Ter	E Wakefield	no
Lundgren	Pine River Pond	140 Clearwater Lane	Wakefield	no
Nadeau	Wilson Lake	252 Hawk Road	Acton	no
Paquette	Horn Pond	42 West Street	Acton	no
Rowe	Province	131 Bonnyman Rd	Wakefield	no
Tinkham	Lovell Lake	740 Brackett Rd	Sanbornville	no
Carlson	Great East Lake	8 Knapp Lane	Acton	?
Kosinski	Great East Lake	138 Red Gate Lane	Acton	?
Pidgeon	Belleau Lake	35 Moose Point CBU #40	E Wakefield	?
Rausch	Great East Lake	94 Beechwood Park Road	Acton	?
Williams	Belleau Lake	435 North Desmond Rd	E Wakefield	?

Table 3: 2007 Technical Assistance Clients

LAST NAME	WATERBODY	ADDRESS	TOWN	VERIFIED *will be verified in 2008*
Shannon	Great East Lake	291 Veazey Point Rd	Sanbornville	
Kasprzak	Great East Lake	74 Chipmunk Run	Acton	
Carrington	Great East Lake	1239 Canal Rd	Sanbornville	
Smith	Great East Lake	378 Langley Shores Dr	Acton	
Murray	Great East Lake	389 Langley Shores Dr	Acton	
Langley Shores Rd Assn	Great East Lake	Langley Shores Dr	Acton	
Nolan	Great East Lake	1511 H Road	Acton	
Blanner	Balch Lake	99 Thoreau Trail	E Wakefield	
Kelley	Balch Lake	122 Racoon Rd	Acton	
Gasbarro	Belleau Lake	85 Lexington Dr	E Wakefield	
McPherson	Belleau Lake	150 Fisher Rd	E Wakefield	
Adcock	Belleau Lake	150 Lexington Dr	E Wakefield	
Doughty	Belleau Lake	430 Beverly Hills Dr	E Wakefield	
O'Brien	Belleau Lake	137 Lexington Dr	E Wakefield	
Jeffery	Pine River Pond	295 Sparhawk Terr	E Wakefield	
Cobb	Pine River Pond	71 Heron Rd	Sanbornville	
Chiostri	Pine River Pond	100 Camp Rd	Sanbornville	
Kochan	Pine River Pond	119 Chandler La	E Wakefield	
Stier	Pine River Pond	1 Windy Pt Rd. South	E Wakefield	
Stewart	Pine River Pond	131 Olde Pine Rd	E Wakefield	
Dan Paquette	Horn Pond	42 West St	Acton	
Prisco	Wilson Lake	99 Hummingbird Rd	Acton	
Collyns	Woodman Pond	288 Bonnyman Rd	E Wakefield	
Newfound Lake YCC	Newfound Lake		Bristol	
Drew	Private Pond	172 Walsh Rd	Sanbornville	

Photographic Documentation
2006 Season:

1. Linda Schier **Great East Lake Sanbornville, New Hampshire**

The homeowner was experiencing a significant amount of sheet erosion toward the lake on both sides of the house. To alleviate this problem a rain garden and rock retaining wall were erected on one side of the house. On the other side of the house, erosion control mulch (ECM) was spread over the entire slope. The owner opted for this over installing a path, due to wanting to be able to rake the area and maneuver the area with a wheelbarrow and other wheeled devices. As a final buffer to sediment entering the lake, we enhanced the existing vegetative buffers on both sides of the dock. A space was left on one side of the dock for boat access.

Schier Property Before YCC Work

Schier Rain Garden After YCC Work

Days to Complete Project: 3.5
Labor Provided: Crew leader x 3.5 days
5 crew members x 3.5 days

BMPs Installed:

- Rain Garden
- Vegetative Buffer
- ECM on slope

Sediment Loss Estimate: Due to the amount of sheet erosion this area could not be measured.

Cost to Homeowner: **$1,161.37**

2. Georgie Cook & Lee Morgan **Great East Lake Acton, Maine**

The homeowner was experiencing a significant amount of erosion in the driveway. Gullies were created that ran under the house and towards the lake. There was also a great deal of roof run-off creating an eroded slope on the lakeside of the house. The slope was eroded so much that it was hard for the homeowner to walk from the house, down the sandy slope to the lake. A large tree near the house was eroded to the point that a large amount of the root system was showing. Also, a large tree on the bank was undercut with a large hole under the root system.

We installed a rubber razor across the driveway to divert water into a plunge pool we also installed. This helped

direct run-off away from the house and into the plunge pool. We installed a dripline trench to infiltrate all the run-off from the roof into the ground on the lakeside of the house. The slope was so sandy and eroded that we decided the best option was to cover the slope with ECM to stabilize the soil on the slope and cover the exposed roots from the large tree at the top of the slope. We also installed a set of infiltration steps from the top of the slope down to the lake. This made maneuvering down the slope to the lake much easier, which was demonstrated during our year end tour. Several elderly members were on the tour and were easily able to walk down the slope to the lake. One board member even commented on how he had come to look at the site before the crew began work and had not dared to walk down to the lake for fear of falling. He found it very easy to walk down the stairs to the lake. The stairs will also help divert water off the trail to the vegetation along the edge of the path. Finally, were able to stabilize the tree along the shore by inserting geotextile fabric and securing the hole with stones.

Cook/Morgan Property Before

Cook/Morgan Steps to the Lake After

Days to Complete Project: 6.5

Labor Provided:
Crew leader x 6.5 days
5 crew members x 3 days
4 crew members x 2.5 days
3 crew members x 1 day

BMPs Installed:

- Erosion Control Mulch over slope
- Infiltration Steps
- Vegetative Buffer
- Rubber Razor
- Plunge Pool
- Dripline Trench
- Meandering Path

Sediment Loss Estimate: 8.681 tons

Cost to Homeowner: $850.66

3. Dorothy Smith **Great East Lake Sanbornville, New Hampshire**

This homeowner was experiencing a significant amount of sheet run-off over a large grassy area down to the lake. Although the slope was not very large, the area and grass, which the water was able to flow over, was enough to contribute a significant amount of pollution into the lake. At the top of this slope, a large amount of roof run-off was also contributing to the problem.

We installed a dripline trench on the lakeside of the house to help infiltrate some of the water into the ground before it was able to flow over the grassy slope down to the lake. We also installed a large vegetative buffer along a new retaining wall on the shore of the lake to help filter the water that is running off of the slope towards the lake.

Smith Property Before

Smith Vegetative Buffer After

Days to Complete Project: 0.5 days
Labor Provided: Crew leader x 0.5 days
4 crew members x 0.5 days

BMPs Installed:

- Vegetative Buffer
- Dripline Trench

Sediment Loss Estimate: 0.035 tons

Cost to Homeowner: $784.22

4. Barbara & Gil Binette **Lovell Lake** **Sanbornville, New Hampshire**

The homeowner had a significant amount of driveway and roof run-off. Both were contributing to gullies that formed on the lakeside of the house. This was quite a large project and only the second one the crew worked on.

We decided that the best way to deal with the driveway runoff was to recommend that the homeowner work with the road association to have an engineer come in and deal with the road situation. We also constructed a rubber razor across the top of the bottom portion of the driveway. This diverted water into a plunge pool which drained into a trench down the slope and into a rain garden, all of which the YCC installed. At the bottom portion of the paved driveway, the YCC constructed a meandering path with infiltration steps down to the lake. This path helped to capture some of the roof run-off before it reached the lake. We recommended that the homeowner install, on their own time, a rain barrel to capture water from the gutters, which were on a portion of the house. Finally at the bottom of an old boat ramp, the YCC installed a vegetative buffer of blueberry bushes.

Binette Property Before

Binette Meandering Path After

Days to Complete Project: 6 (includes several trips back to correct system failures)
Labor Provided: Crew leader x 6 days
5 crew members x 5 days
4 crew members x 1 day

BMPs Installed:

- Rain Garden
- Meandering Path
- Rubber Razor
- Plunge Pool
- Trench to Rain Garden
- Vegetative Buffer
- Infiltration Steps

Sediment Loss Estimate: 0.133 tons (mostly sheet erosion that could not be measured)

Cost to Homeowner: $790.84

5. Dick Desroches **Lovell Lake** **Sanbornville, New Hampshire**

The homeowner had mild erosion on the side of the house down to the lake. An existing plunge pool needed to be enhanced to deal with the amount of storm water run-off that was coming from the road. To deal with the run-off coming down the slope towards the water, the YCC installed to waterbars to divert water away from the house and into existing vegetation. The homeowner also plans to enhance the existing vegetation next summer. Plunge pools were also installed at the end of the waterbars to capture excessive water from large rain events. Finally, ECM was spread over the majority of the slope to help absorb any remaining run-off.

Desroches Property Before

Desroches Waterbar After

Days to Complete Project: 2 days
Labor Provided: Crew leader x 2 days
5 crew members x 1 day
4 crew members x 1 day

BMPs Installed:

- Water Bar
- Spread ECM
- 2 Plunge Pools

Sediment Loss Estimate: 0.203 tons

Cost to Homeowner: $41.00

6. <u>Cheri Schlenker</u> <u>Lovell Lake</u> <u>Sanbornville, New Hampshire</u>

The homeowner had extremely large gullies the length of the long sloping driveway. These gullies made the

driveway barely passable. The lot was an irregularly shaped lot that narrowed as it approached Lovell Lake. The camp sits across Chase Lane and is not directly on Lovell Lake, however the gullies from the driveway diverted water directly into a brook that ran into Lovell Lake. The YCC installed 3 rubber razors across the driveway. The rubber razors diverted water into extensive existing vegetation. After the YCC installed the rubber razors, the homeowner had some fill brought in to fill in the gullies between the rubber razors.

Schlenker Property Before

Schlenker Rubber Razor Blades After

Days to Complete Project: 1.5 days
Labor Provided: Crew leader x 1.5 days
4 crew members x 1 day
3 crew members x 0.5 days
BMPs Installed:

- 3 Rubber Razors

Sediment Loss Estimate: 5.89 tons

Cost to Homeowner: $906.41

7. <u>Sue Hacker & Jim Farnan</u> <u>Balch Lake</u> <u>Acton, Maine</u>

The homeowner had a significant amount of sheet erosion, along with some gullies down to the lake on the lakeside of the house. This was contributed to, in part, due to roof run-off. The majority of the problem on the lakeside of the house was due to work they had completed on their well the previous fall. The large equipment that was needed to complete the wok on the well dug up a large portion of the slope going down to the lake and caused a large amount of soil to become unstable. To alleviate these problems, we installed a dripline trench on both sides of the house to infiltrate water from the roof into the ground. We also planted an area of conservation grass seed mix at the top of the slope to stabilize this flat area that had a large amount of exposed soil. The YCC installed a meandering path with infiltration steps/water bars to divert water off the path into existing vegetation. To stabilize the exposed soil on the slope the YCC spread ECM over the entire slope and planted 30 blueberry bushes.

Hacker Property Before

Hacker Meandering Path and Vegetation After

Days to Complete Project: 4.5 days
Labor Provided: Crew leader x 4.5 days
4 crew members x 4.5 days

BMPs Installed:

- Meandering Path
- Infiltration Steps
- Dripline Trench
- Plant Conservation Seed Mix
- Spread ECM
- Plant 30 blueberry bushes over slope

Sediment Loss Estimate: 4.95 tons

Cost to Homeowner: $1,384.30

8. <u>Michael Kattman</u> <u>Balch Lake</u> <u>East Wakefield, New Hampshire</u>

This property had a large amount of impervious surfaces near the house. There were many decks and patios contributing to run-off that was reaching Balch Lake. This property also had a significant amount of roof run-off that was contributed to by the installation of a paved "moat" around the house. The solution we came up with was to install an infiltration trench from the end of the paved moat to a rain garden that the YCC installed. In addition to the rain garden and trench, the YCC installed a dripline trench on the lakeside of the house and shed. We also installed a vegetative buffer along a portion of the shoreline. Finally, the YCC spread a large amount of ECM and planted vegetation along a slope that ran from the dirt road down to the grassy property. This helped to stabilize the exposed soil so it could not run towards the lake.

Kattman Dripline Trench

Kattman Rain Garden and Trench

Days to Complete Project: 3 days
Labor Provided: Crew leader x 3 days
4 crew members x 3 days

BMPs Installed:

- Trench to Rain Garden
- Rain Garden
- Dripline Trench
- Vegetative Buffer
- Spread ECM

Sediment Loss Estimate: 0.65 tons

Cost to Homeowner: $470.00

9. <u>Marge Kimball</u> <u>Balch Lake</u> <u>East Wakefield, New Hampshire</u>

This property experienced sheet run-off down an old boat ramp. The owner no longer wished to use the boat ramp, so we laid timber diverters along the boat ramp to divert water off the path and into existing vegetation. We spread ECM between the diverters. The YCC installed a vegetative buffer along the shoreline to filter any sediment from the water before it reaches the lake. We also extended an existing rock waterbar to help keep sediment from flowing down into the newly formed vegetative buffer. Finally, we enhanced a plunge pool that directed water from the grassy lawn area towards the lake.

Kimball Property Before

Kimball Mulched Path and Diverters

Days to Complete Project: 2.5 days
Labor Provided: Crew leader x 2.5 days
3 crew members x 2 days
4 crew member x 0.5 days

BMPs Installed:

- Vegetative Buffer
- Spread ECM
- Install Plunge Pool
- Install Rock Waterbar
- Install Timber Waterbars/diverters

Sediment Loss Estimate: No gullies to measure. Sheet run-off, difficult to measure.

Cost to Homeowner: $1,227.00

10. Anne Cranney **Belleau Lake** **East Wakefield, New Hampshire**

This property had a very wide path with terraced steps down to the lake. Quite a bit of material had eroded from the steps. There was also a significant amount of roof runoff. To remedy the problem of the rather wide steps, we laid timber diverters between the existing steps and back filled the timbers with crushed stone to help infiltrate the water into the ground. Because the path was so wide we narrowed it by planting a garden along the length of the path. This garden also helped to stabilize the hillside behind the path. Finally, we installed a dripline trench to help infiltrate water from the roof into the ground.

Cranney Property Before

Cranney Infiltration Steps After

Days to Complete Project: 2 days
Labor Provided: Crew leader x 2 days
4 crew member x 2 days

BMPs Installed:

- Retrofit Infiltration Steps
- Add more infiltration steps
- Make existing path more narrow
- Plant garden to help stabilize slope and make path narrow
- Dripline Trench

Sediment Loss Estimate: No gullies to measure. Sheet run-off, difficult to measure. Steps had washed out a few inches across the 14 foot span of the path.

Cost to Homeowner: $Waiting for details

2007 Season:

1. <u>Bonnyman Road Municipal Lot</u> **<u>Province Lake, East Wakefield, New Hampshire</u>**

Large pine trees have been removed from this site by the town and the site itself had been misused. A tremendous amount of sand and sediment was being eroded from the site and washed into the lake. There was no barrier preventing road runoff from flowing over the lot and carrying sediment into the lake. There was a wide open area covered in sand at the top of the site that needed to be stabilized. Also, there existed a lot of local vegetation adjacent to the property to where runoff could easily be diverted. The hill leading down to the lake had gullies from erosion and there was no good access to the lake that did not cross other peoples' properties. The gullies were packed and stabilized with riprap rock, preventing further erosion. A set of infiltration steps was constructed on the hill providing access to the lake. The large sandy area was covered with erosion control mix. Three timber waterbars were installed. Each diverted runoff to a drywell that would capture and slowly release water into the adjacent vegetation. At the edge of the property along the road, an infiltration trench was dug to capture water from the road, preventing fast moving water from slamming into the site. Native vegetation was planted along the road side of the property where local vegetation was especially sparse. The native plants also helped to define a

meandering path leading to the infiltration steps. This site offered a multitude of difficulties, many of which have yet to be resolved due to the crew's limitations and the relatively narrow breadth of the organization's jurisdiction. Future remediations are likely to be needed before this site is adequately resuscitated.

Bonnyman Road Property Before

Bonnyman Road Property After

Days to Complete Project: 3.5 days

Labor Provided: Crew leader x 3.5 days
4 crew member x 3.5 days

BMPs Installed:

- Infiltration Steps
- Timber Waterbars
- Erosion Control Mix
- Riprap Stabilization
- Paths & Walkways
- Infiltration Trench
- Drywells
- Native Vegetation

Sediment Loss Estimate: Sheet Erosion: could not measure

Gully Erosion: 3.4 tons/year

Cost to Town for all projects: $1,993.13

2. St. Anthony's Church **Branch River, Sanbornville, New Hampshire**

This property was surrounded by a short, steep drop leading directly to the Branch River. The church had a very large parking lot around it that was pitched toward the river. Surrounding the parking lot, right above the drop

to the river, was a small asphalt berm with breaks periodically cut into it where water could escape. The driveway thus created a large amount of runoff that was concentrated at these breaks where it could erode a considerable amount of sediment as well as carry away the sand that had been spread over the winter on the driveway itself. However, the breaks also focused the water into specific areas, making BMP placement a lot easier. At two of the breaks, where there was enough space before the drop and the river, rain gardens were installed to capture and filter the concentrated runoff from the parking lot. Along the front of the driveway, water was rushing down, carrying across a large sandy area, and diving into the river. Along the side of the sloped driveway, an infiltration trench was installed to capture the runoff pitched towards it. This helped to collect a significant amount of water before it reached the river.

St. Anthony's Church Before

St. Anthony's Church Rain Gardens After

Days to Complete Project: 2 days

Labor Provided: Crew leader x 2 days
4 crew member x 2 days

BMPs Installed:

- Rain Gardens
- Infiltration Trench

Sediment Loss Estimate: Sheet Erosion: could not measure

Gully Erosion: 1.2 tons/year

Cost to Landowner: $XXX.XX

3. Lovell Lake Boat Ramp **Lovell Lake, Sanbornville, New Hampshire**

This property was a thin strip of land with a moderate slope between Lovell Lake and Witchtrot Road. Cars often parked along the top of the property to use the boat ramp at the lower part of the lot. Water coming off of the road would cut across the top of the property and pick up sediment, washing it into the lake. The area where cars would park was well packed to almost impervious conditions and there was only bare soil exposed. The only vegetation on the site was grass on the lower part of the property. A timber waterbar was installed at the top of the site to divert as much water from the road as soon as possible to prevent it from spreading further down on the site. The waterbar led to a rain garden to collect the runoff before it could enter the lake. Along the road side of the property where cars had parked, erosion control mix was spread above a long line of timber waterbars. The erosion control mix served to stabilize the exposed soil and soak up water. Native vegetation was planted in the area as well to help absorb water and discourage parking in the area.

Lovell Lake Boat Ramp Before

Lovell Lake Boat Ramp After

Days to Complete Project: 2 days

Labor Provided: Crew leader x 2 days
4 crew member x 2 days

BMPs Installed:

- Timber Waterbars
- Erosion Control Mix
- Rain Garden
- Native Vegetation

Sediment Loss Estimate: Sheet Erosion: could not measure

Gully Erosion: 0.4 tons/year

4. White Mountain Highway at Mobil Station **Branch River, Sanbornville, New Hampshire**

This property was right along the White Mountain Highway behind the Mobil station. Runoff was coming from the highway, concentrating to a single channel, and eroding a deep gully down the property. The runoff was eroding sediment and carrying it into the Branch River below. Riprap rock was packed into the gully, stabilizing it and preventing further erosion. Considerable vegetation existed on the site to adequately control the runoff that now flowed over the site with less severity.

White Mtn Highway Before

White Mtn Highway Riprap After

Days to Complete Project: 0.5 days
Labor Provided: Crew leader x 0.5 days
4 crew member x 0.5 days

BMPs Installed:

- Riprap Stabilization

Sediment Loss Estimate: Gully Erosion: 0.4 tons/year

Residential Projects

3. Helen Cummings **Great East Lake Sanbornville, New Hampshire**

The roof of the landowner's camp sloped and drained very close to the shore of the land. A significant amount of runoff was cascading off of the roof, collecting of the ground, and washing into the lake along with a considerable amount of sediment. The sheet erosion here was able to be controlled though the installation of a dripline trench. The trench collects the roof runoff and prevents its immediate flow into the lake and stops any velocity that contributes to excess sediment erosion. The installation of the dripline trench was an effective solution to the

Cummings Property Before YCC Work

Cummings Rain Garden After YCC Work

Days to Complete Project: 1

Labor Provided: Crew leader x 1 day
4 crew members x 1 day

BMPs Installed:

- Dripline Trench

Sediment Loss Estimate: Sheet erosion: could not be measured.

Cost to Homeowner: **$70.00**

4. <u>Marion Sundgaard</u> **<u>Wilson Lake, Acton, Maine</u>**

The homeowner was experiencing a significant amount of erosion due to her neighbor's driveway. The neighbor had paved his portion of the street and driveway uphill of the property. During events of even light precipitation, a deluge of water would run down the paved area and make a direct like though the property towards the house. Fortunately, there was enough of the landowner's property to install a means of diverting the water away from the house and off into nearby vegetation. An infiltration trench was dug at the top of the property, originating where the water first enters the property. At this spot, the trench was made extra wide and deep to serve as a collection area where the water would first enter the trench and have the opportunity to be absorbed into the ground. The trench snaked through a vegetated area before terminating at another large bowl on the side of the house where runoff could slowly seep out into local vegetation. At one point the crew needed to return to the site to improve the design by relining the trench with an impervious material because water was being absorbed into the ground and seeping to the house foundation. After the remediation, the seeping stopped and the trench worked as designed.

Sundgaard Property Before

Sundgaard Infiltration Trench After

Days to Complete Project: 5

Labor Provided: Crew leader x 5 days

4 crew members x 5 days

BMPs Installed:

- Infiltration Trench

Sediment Loss Estimate: Sheet erosion: could not be measured

Cost to Homeowner: $XXX.XX

3. <u>Joseph Arnone</u> **<u>Belleau Lake, East Wakefield, New Hampshire</u>**

This homeowner was experiencing a significant amount of sheet run-off coming from the road and flowing over his driveway and eventually through his property and into the lake. The driveway is very long and wide and a significant amount of water from upland properties eventually finds its way to his property. The homeowner lives at the property year round so a diverter that would hinder plowing could not be installed in the driveway. Runoff from the roof of the garage was also causing some erosion. In order to capture the runoff on the driveway, an open-top culvert was installed across the vast expanse of the driveway's width. This carried water down to the side of the driveway to a vegetated area where a large drywell was installed to collect the runoff and slowly released it into the vegetation. A dripline trench was installed along the side of the garage. Further down the driveway, another open-top culvert was installed across a narrowed section. This culvert led to an infiltration trench running down the side of the driveway, terminating at a drywell where the runoff would finally be slowly released to water the lawn. The design worked rather well, although the open-top culverts will need to be cleaned often to remove the sediment that runoff washes into them.

Arnone Driveway Before

Arnone Open-top Culvert After

Days to Complete Project: 4 days

Labor Provided: Crew leader x 4 days
4 crew members x 4 days

BMPs Installed:

- Open-top Culverts
- Dripline Trench
- Infiltration Trench
- Drywells

Sediment Loss Estimate: Sheet erosion: could not be measured

Gully erosion: 0.8 tons/year

Cost to Homeowner: $525.00

4. Stephen Gregorio **Balch Pond, East Wakefield, New Hampshire**

The homeowner had a significant amount of driveway runoff. Very large and long gullies had formed along the length of the driveway leading down to the house. The lower part of the driveway was flanked by a retaining wall on one side and a hill on the other, making diverting of water difficult. Three open-top culverts were installed along the length of the driveway. Along the base of the retaining wall, an infiltration trench was installed to collect water from the driveway and transport it down to the lowest open-top culvert where it will be cast across the driveway into local vegetation. Leading from the house down to the lakefront beach was a long series of paved stairs. A considerable amount of runoff flowed down these stairs and carved a deep gully across the beach. This runoff carried an incredible amount of sand into the lake. An infiltration trench was installed along the bottom of the stairs to collect this runoff and transport it along the top of the beach to deposit the runoff into nearby vegetation where it will be absorbed. Because of the pitch of the driveway and the stairs, the open-top culverts and infiltration trenches should be cleaned of sediment regularly to ensure property drainage and flow of water.

Gregorio Property Before

Gregorio Infiltration Trench After

Days to Complete Project: 5

Labor Provided: Crew leader x 5 days
4 crew members x 3 days

	3 crew members x 2 day
BMPs Installed:	• Open-top Culverts • Infiltration Trenches
Sediment Loss Estimate:	Sheet erosion: could not be measured Gully erosion: 2.3 tons/year
Cost to Homeowner:	$550.00

5. Charlene Gottlieb **Great East Lake, Sanbornville, New Hampshire**

The homeowner had a very steep paved driveway where runoff from the road above ran incredibly fast down to the house with a large amount of sediment that eventually mounded up where the runoff finally slowed down as the property levels off by the lake. Fortunately, the driveway was not a straight-shot, and as the driveway turned, there was opportunity to dig a series of turnouts where water could escape into the vegetation along the driveway. Also, at the top of the driveway, there was a small piece of the property that the runoff flowed over before hitting the driveway and flying downhill. On this portion of property, a large drywell was installed to collect the initial road runoff and slowly releasing it so that not all of the water coming from the road would flow down the driveway. Also, the water that escaped and did go down the driveway would not do so at maximum velocity. Because the driveway was paved, we were presented with a challenge for diverting the water from the driveway surface to the side where the turnouts were dug. This problem was solved with the use of donated used fire hose filled with sand. The hoses were laid across the driveway and worked very well. In fact, the hoses and turnouts were so effective that the water that was diverted of the driveway found its way onto the neighbors' property, resulting in another project for the crew later in the season.

Gottlieb Property Before

Gottlieb Property After

Days to Complete Project: 2 days

Labor Provided: Crew leader x 2 days
4 crew members x 2 days

BMPs Installed:

- Drywell
- Turnouts
- Fire Hose Diverters

Sediment Loss Estimate: Sheet erosion: could not measure

Cost to Homeowner: $XXX.XX

6. Jeanne Achille **Wilson Lake, Acton, Maine**

The homeowner had moderate runoff coming from the roof and driveway, flowing down over the lawn and eventually going into the lake. The lakefront was the area most in need of remediation as most of the vegetation was gone and a considerable amount of bare soil remained. There was also poor access to the lake due to the slope of the terrain. Waterbars were installed to divert runoff from the driveway. A crushed stone path was created to provide access down to the lake. At the lakefront, infiltration steps were constructed and surrounded by buffer plantings and erosion control mix to prevent any runoff from making its way into the lake. This project proved to be one of the most significant transformations of the summer.

Achille Property Before

Achille Stabilized Shorefront After

Days to Complete Project: 5 days

Labor Provided: Crew leader x 5 days
4 crew members x 5 day

BMPs Installed:

- Waterbars
- Paths and Walkways
- Erosion Control Mix
- Infiltration Steps
- Buffer Vegetation

Sediment Loss Estimate: Sheet erosion: could not measure

Cost to Homeowner: $905.38

7. Patrick Golden **Lovell Lake, Sanbornville, New Hampshire**

The homeowner had a significant amount of gully erosion. The site was a beach lot situated tightly between Lovell Lake Road and Lovell Lake itself. Because of that, an incredible amount of runoff was coming off of the road and eroding deep gullies across the beach. Tremendous amounts of sand had been washed into the lake. A barrier between the road and the beach had to be created in order to prevent the beach from being eroded entirely into the lake. A long timber waterbar was installed that led to a vegetated area on the side of the property where a drywell was placed. Another timber waterbar was installed across the bottom of a parking area leading to another drywell in a vegetated area on the other side of the property. Between the two waterbars a stone-lined path was created to provide access to the dock. Erosion control mix was spread in front of the long waterbar and to the side of the beach behind the waterbar to stabilize the sand here that was not used as a beach. Also, beside the beach in the mulched area, plants were added to additionally stabilize the soil. Crushed stone was spread in front of the shorter waterbar to stabilize the parking area. Since the BMPs were installed, the gullies have not yet returned.

Golden Property Before

Golden Waterbar and Erosion Control Mix After

Days to Complete Project: 4 days

Labor Provided: Crew leader x 4 days
4 crew members x 4 days

BMPs Installed:

- Waterbars
- Drywells
- Erosion Control Mix
- Buffer Vegetation

Sediment Loss Estimate: Gully Erosion: 7.0 tons/year

Cost to Homeowner: $XXX.XX

8. <u>Gil Binette</u> **<u>Lovell Lake, Sanbornville, New Hampshire</u>**

This property had been a YCC project in 2006. Because of the road situation in the area, this property received an incredible amount of runoff coming across it even during minor precipitation events. Last year, the crew needed to return to the property a few times to improve the site designs that the runoff constantly strained. This year, the crew returned for a last time to make final improvements to the site by retrofitting an infiltration trench, adding filters to the drywell and infiltration trench to prevent clogging, and improving a path by replacing the pea stone with a heavier and coarser crushed stone. Aside from these necessary improvements, the rest of the design from the previous year worked very effectively, including the rain garden and rubber razor.

Binette Drywell and Infiltration Trench Before

Binette Drywell and Trench with Filters

Days to Complete Project: 1 day

Labor Provided: Crew leader x 1 day
4 crew members x 1 day

BMPs Installed:

- Paths & Walkways
- Infiltration Trench

Sediment Loss Estimate: Sheet erosion: could not be measured

Cost to Homeowner: $XXX.XX

9. <u>Paul Shannon</u> **<u>Great East Lake, Sanbornville, New Hampshire</u>**

This property experienced gully runoff down an old boat ramp as well as sheet erosion occurring over a retaining wall and across the driveway. The owner no longer needed the boat ramp so we laid timber waterbars along the very top of the boat ramp to divert water from the road off the path and into existing vegetation. Below this, we constructed a retaining wall using concrete blocks from the landowner's replaced lakefront wall. This new wall was constructed in line with the existing railroad tie retaining wall. We spread ECM between the diverters and planted vegetation on top of the new wall. An additional tier was added on to the lowest level of the existing timber retaining wall. Above this wall was a natural basin where road runoff collected and eventually breached the wall to flow down towards the lake. A rain garden was planted here with native vegetation. Behind the rain garden, a small soil berm was created. The rain garden, soil berm, and additional tier on the retaining wall all combined to prevent the washing of runoff over the wall. They collectively manage the water effectively.

Shannon Property Before

Shannon Retaining Wall and Waterbars After

Days to Complete Project: 3.5 days

Labor Provided: Crew leader x 3.5 days
4 crew member x 3.5 days

BMPs Installed:

- Retaining Wall
- Erosion Control Mix
- Waterbars
- Rain Garden

Sediment Loss Estimate: Sheet Erosion: could not measure.
Gully Erosion: 2.3 tons/year

Cost to Homeowner: $769.00

10. Martha Ortiz **Lovell Lake, Sanbornville, New Hampshire**

This property was on a very long sloping hill leading to the lake. Due to the mature pine trees shading the property, there was little to no ground vegetation. Few barriers existed to stop or even slow runoff streaming down the hill from entering the lake. Much of the pine needles had washed away leaving bare soil exposed. Runoff from the roof was also contributing to the problem. It was decided that the best approach to this very broad problem was to cover as much of the property with strategically place timber waterbars and erosion control mix. The erosion control mix covered and stabilized the bare soil and the timber waterbars diverted runoff into nearby vegetation. Dripline trenches controlled roof runoff and prevented it from washing into the lake. Finally, a vegetated buffer strip was installed along the shore of the lake where, ordinarily, water running down the bare slope would directly enter the lake with its sediment load.

Ortiz Property Before

Oritz Waterbar and Erosion Control Mix After

Days to Complete Project: 2.5 days

Labor Provided: Crew leader x 2.5 days
4 crew member x 2.5 days

BMPs Installed:

- Erosion Control Mix
- Buffer Vegetation
- Waterbars
- Dripline Trenches

Sediment Loss Estimate: Sheet Erosion: could not measure

Cost to Homeowner: $1171.00

11. Lennie McKinley **Great East Lake, Sanbornville, New Hampshire**

This landowner had runoff coming onto her property due to a previous project the YCC had done earlier in the season. Water was rushing though the woods and coming onto the side of the driveway and eventually down to the lake. A long, multi-leveled timber waterbar was installed along the edge of the woods in order to keep the water in the vegetation and guide the runoff into a flat area where it could be properly absorbed and controlled. Water was along coming from the road and running down the considerably steep driveway, carving gullies and bringing sediment into the lake. Because the driveway was gravel and the house was used very little if at all in the winter, two rubber razors were installed across the driveway. Also, an infiltration trench was installed along the lower pitched side of the driveway. The rubber razors divert water into the infiltration trench where it is guided down to the end of the driveway where the infiltration trench terminates in a flat area of local vegetation where the runoff is managed and prevented from entering the lake.

McKinley Property Before

McKinley Rubber Razors and Trench After

Days to Complete Project: 3 days

Labor Provided: Crew leader x 3 days
4 crew member x 3 days

BMPs Installed:

- Timber Waterbars
- Rubber Razors
- Infiltration Trench

Sediment Loss Estimate: Gully Erosion: 0.9 tons/year

Cost to Homeowner: $XXX.XX

12. Alan Heacock **Lovell Lake, Sanbornville, New Hampshire**

This property had a long gravel driveway leading from a paved, well used road. A considerable amount of runoff was coming from the road and flowing down the driveway, carving deep gullies in the driveway surface. Sediment from the driveway was being washed into the lake. The landowner did not use the driveway in the winter and it would not be plowed. A series of rubber razors were installed to periodically divert water off the driveway into vegetation where it could be absorbed and controlled.

Heacock Upper Rubber Razors After

Heacock Lower Rubber Razors After

Days to Complete Project: 2 days

Labor Provided: Crew leader x 2 days
4 crew member x 2 days

BMPs Installed:

- Rubber Razors

Sediment Loss Estimate: Gully Erosion: 1.3 tons/year

Cost to Homeowner: $XXX.XX

13. Tom & Jillian Darling **Lovell Lake, Sanbornville, New Hampshire**

This property was experiencing a lot of runoff coming from the paved road and flowing down the driveway and over wooded area, all bringing sediment into the lake. Also, a series of impervious stairs led to the lake that runoff simply washed over. Turnouts along the side of the driveway were dug to allow water running over the driveway surface areas to escape into the lower lying vegetation where the water would be prevented from getting to the lake. Timber waterbars were installed in the wooded area below and to the side of the driveway in order to divert and slow the runoff in this area. Also, a waterbar was installed below the driveway where it could divert water into the woods. The two highest stairs leading to the lower lawn and the lake were retrofitted into infiltration steps by removing the impervious material of the step and backfilling it with crushed stone that will absorb the water flowing over it. Finally, at the base of the steps, a rain garden was installed to capture any remaining water that might make it into the lake.

Darling Impervious Steps

Darling Retrofit Infiltration Steps After

Days to Complete Project: 2 days

Labor Provided: Crew leader x 2 days
4 crew member x 2 days

BMPs Installed:

- Retrofit Infiltration Steps
- Timber Waterbars
- Turnouts
- Rain Garden

Sediment Loss Estimate: Gully Erosion: 0.5 tons/year

Cost to Homeowner: $420.00

Acton Municipal Sites

1. Canal Road Parking Area at Robinson Road Great East Lake Canal, Acton, Maine

This property had a lot of road runoff traveling across it, picking up sediment, and running down a steep slope into the canal. Without the capability of repitching the entire parking area, the crew had to prevent the water that was coming onto the site from reaching the canal. Also, the design could not be located anywhere that it would be in the way of plowing activities. Therefore, at rock waterbar was installed along the edge of the site, immediately above the slope leading to the canal. The waterbar diverted water to a drywell further down the slope to an area where it leveled off enough to allow the construction of a drywell.

Canal Road Before

Canal Road Waterbar and Drywell After

Days to Complete Project: 1 day

Labor Provided: Crew leader x 1 day
3 crew member x 1 day

BMPs Installed:

- Rock Waterbar
- Drywell

Sediment Loss Estimate: Sheet Erosion: could not measure

Cost to Town: $0.00

2. Robinson Road Great East Lake Canal, Acton, Maine

This property had a lot of runoff from Robinson Road. A trench on the side of the road terminated before leading water anywhere that it could be controlled. The water was spreading over the site and eventually flowing

down into the canal with enough velocity to carve a gully into the terrain, resulting in sediment being washed into the water. Extending the infiltration trench and leading it to a drywell controlled the runoff and prevented it from washing directly into the canal.

Robinson Road Before

Robinson Road Infiltration Trench After

Days to Complete Project: 2 days

Labor Provided: Crew leader x 2 days
4 crew member x 2 days

BMPs Installed:

- Infiltration Trench
- Drywell

Sediment Loss Estimate: Sheet Erosion: could not measure

Gully Erosion: 0.6 tons/year

Cost to Town: $0.00

3. <u>New Bridge Road Parking Area</u> **<u>Horn Pond, Acton, Maine</u>**

This property was situated between the road and the lake. Runoff from the road ran across the site, picked up sediment, and flowed into the lake. There was no significant vegetation to prevent any erosion or absorb any of the water. A rock waterbar was constructed across the property to act as a barrier, preventing the washing of water and sediment into the lake.

New Bridge Road Before

New Bridge Road Waterbar After

Days to Complete Project: 1 day

Labor Provided: Crew leader x 1 day
2 crew member x 1 day

BMPs Installed:

- Rock Waterbar

Sediment Loss Estimate: Sheet Erosion: could not measure

Cost to Town: $0.00

Appendix A – Brochure and Press Articles

AWWA Brochure *see attached*
NPS Times Fall 2006 *see attached*
NH DES Environmental News February 2007 *see attached*
Lakeside August 2006 *see attached*

Appendix B – Match Documentation *see attached*

Details of match documentation are available upon request