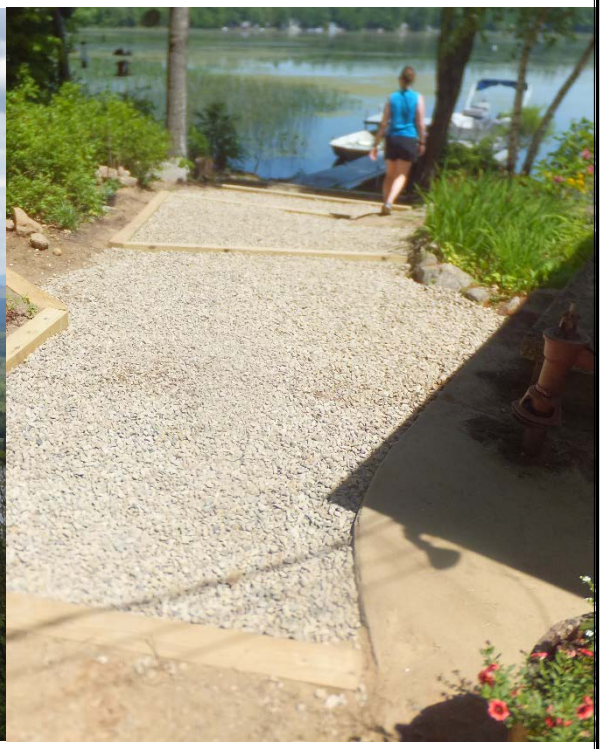

Province Lake Watershed Management Plan Implementation Phase 1: Addressing High Priority Actions and Building Local Capacity

RI-15-S-08

December 31, 2017

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

Town of Wakefield New Hampshire

UNIVERSITY OF NEW HAMPSHIRE STORMWATER CENTER

A Final Report to
The New Hampshire Department of Environmental Services

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Town of Effingham, New Hampshire
Town of Wakefield, New Hampshire
Province Lake Association
Local businesses
Generous individual donors

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Executive Summary

Addressing High Priority Actions and Building Local Capacity

In July, 2014 the Province Lake Association, in cooperation with FB Environmental, the Acton Wakefield Watersheds Alliance and the New Hampshire Department of Environmental Services, presented the Province Lake Watershed Management Plan. The Plan provides a road map for reducing nonpoint source nutrient loading in the effort to reach the desired outcome that Province Lake attains designated use status for Primary Contact Recreation as a result of fewer occurrences of cyanobacteria blooms and meets water quality criteria for Aquatic Life Use.

This project phase intended to reduce phosphorus loading by at least 26 lbs./yr. which was estimated to achieve in-lake phosphorus concentrations of at least ~14.0 ppb TP which is 10% percent of the water quality goal attainment as described in the Province Lake Watershed Plan. The activities of this project phase resulted in a phosphorus load reduction of 33.32 lbs/year as estimated by the Region 5 and Simple Method Models and the average in-lake phosphorus concentration in 2016 was 14.9 ppb. While this met the stated goal it is not clear that it is sole determining factor controlling the frequency and intensity of cyanobacteria blooms. Further study is recommended to determine the role of the benthic sediments in the cyanobacteria cycle.

The project began on May 27, 2015, was amended on August 23, 2016 and was completed on December 31, 2017. The total project cost was $203,021.02 which included the $98,100 grant award and $104,921.02 non-federal match. Match was provided by AWWA, its volunteers and the following generous supporters:

Towle Farm Community Corporation	In-kind labor, equipment & materials
Town of Wakefield, NH	in-kind labor & equipment
Province Lake Golf Club	in-kind function space
Province Lake residents	In-kind labor, materials

In addition to the excellent support from the NH Department of Environmental Services Watershed Assistance Section and particularly Project Manager Sally Soule, PLA's project partners included:

Jones & Beach Engineers, Inc	JBE
Maine Department of Environmental Protection	MDEP
Maine Department of Transportation	MDOT
NH Department of Transportation	NHDOT
Princeton Hydro, LLC	PH
Province Lake Golf Club	PLGC
Towle Farm Community Corporation	TFCC
Town of Wakefield Department of Public Works	WDPW
UNH Center for Freshwater Biology	UNH CFB

UNH Lakes Lay Monitoring Program	UNH LLMP
UNH Stormwater Center	UNH SC

All 10 of the Project Objectives were met over the course of the project period with varying degrees of success:

- The AWWA Youth Conservation Corps installed 21 erosion control features on 9 Province Lake properties reducing the phosphorus load by an estimated 21.3 lbs/year.

  As a result of the RFQ process Jones & Beach Engineers, Inc. was chosen to develop the designs for the stormwater management projects at 121 and 141 Bonnyman Road. These sites were identified through the Province Lake Watershed Survey as the highest impact pollutant load sites due to landward erosion. Recommended BMPs were installed at 141 Bonnyman Road including an infiltration system, native vegetation and replacement of a failed retaining wall. Erosion control BMPs at 141 Bonnyman Rd resulted in an estimate phosphorus load reduction of 9.3 lbs/year. BMPs will be installed at 121 Bonnyman Road in Phase 2.

- Seven residential septic systems were inspected by Jones & Beach Engineers with two identified as in need of an upgrade. In addition, JBE determined that all the homes within two neighborhoods were likely to need upgrades due to the high water table. Cost-sharing opportunities will be offered to those identified as "in need" in Phase 2. As a result of this determination it was decided the seven inspections were sufficient.

- The Road Management Plan for Bonnyman Road and designs for two sites, one in Effingham and one in Wakefield, identified for stormwater management BMP installations were presented to the town boards of selectmen. The UNH Stormwater Center produced the engineered design sets and recommendations were installed at the Wakefield Bonnyman Road site. The estimated phosphorus load reductions for the Wakefield site is 0.37 lbs/year. The Effingham Bonnyman Road site BMPs will be installed in Phase 2.

  AWWA, NHDES, PLA, UNHSC and the Maine and New Hampshire Departments of Transportation met to discuss options for the stabilization of Route 153 along the shore of Province Lake. The UNHSC drafted a stormwater management design that was presented to NH & NH DOTs, PLA, AWWA, NHDES and MaineDEP on August 3, 2016. Consensus for construction approval was not forthcoming and will be revisited.

- 29 engaged citizens attended the "Your Land, Clean Water, Your Legacy" workshop on April 20, 2016. Of those, nine were landowners of parcels greater than 10 acres within the Province Lake watershed. The attendees participated in discussions about conservation easement, forest management plans, and the effects of land management on water quality. While no known formal forest management plans resulted from the workshop the lively discussion, myriad of questions and later follow-up discussions indicate an increased knowledge of the connections between land management and water quality.

- The suite of outreach tools successfully engaged the Province Lake community with safe boating brochures, updated and engaging website content, an online erosion quiz and yearly beach clean-ups.

- Pollutant Controlled reports for the Youth Conservation Corp, residential stormwater

management and road projects were delivered to NHDES in a timely manner.

- Dedicated volunteer Steve Craig and staff from the UNH Lakes Lay Monitoring program collected regular water quality samples at the deep hole and multiple tributaries. The data was analyzed by the UNH LLMP and reports were delivered to the PLA and the town planning boards. The LLMP updated its highlight report format in 2016 to a more user-friendly style by request from the Wakefield Planning Board.
- The Towle Farm Community Association, AWWA and the UNH Stormwater Center collaborated on the installation of the recommendations in Towle Farm Road Maintenance Plan produced by the UNHSC. While significant social challenges were encountered during installation the end result was successful. The Operations & Maintenance agreement was delivered and explained and the TFCC is well prepared to follow through with its implementation. Estimated phosphorus load reductions for the TFCC project is 2.35 lbs/year.
- The project steering committee included representatives from AWWA, PLA, and NHDES. Project communication was frequent and minutes were produced from four meetings.
- All required reports were completed and submitted in a timely manner.

The following project deliverables are on file at NHDES:

- Road Management Plan for Bonnyman Road
- Route 153 design set
- Dinger/Pongratz design set
- TF Road Maintenance Plan
- 2015 YCC Season Report
- 2016 YCC Season Report
- 141 Bonnyman Road Project Report
- Site designs for Bonnyman Road
- Bonnyman Road Site Report
- Towle Farm Road Site Report

On file at AWWA and provided upon request:

- WQ Reports
- Septic inspections
- Miscellaneous Outreach Materials

Introduction

Within the White Mountain Region of north-central New Hampshire, and southwestern Maine, the Province Lake watershed is located in the towns of Effingham (45%), Wakefield (17%), and Ossipee (4%) in Carroll County, New Hampshire, and Parsonsfield (30%) and Newfield (4%) in York County, Maine. Province Lake flows north into the South River, which flows north to the Ossipee River, a tributary of the Saco River. The HUC# is 010600020902.

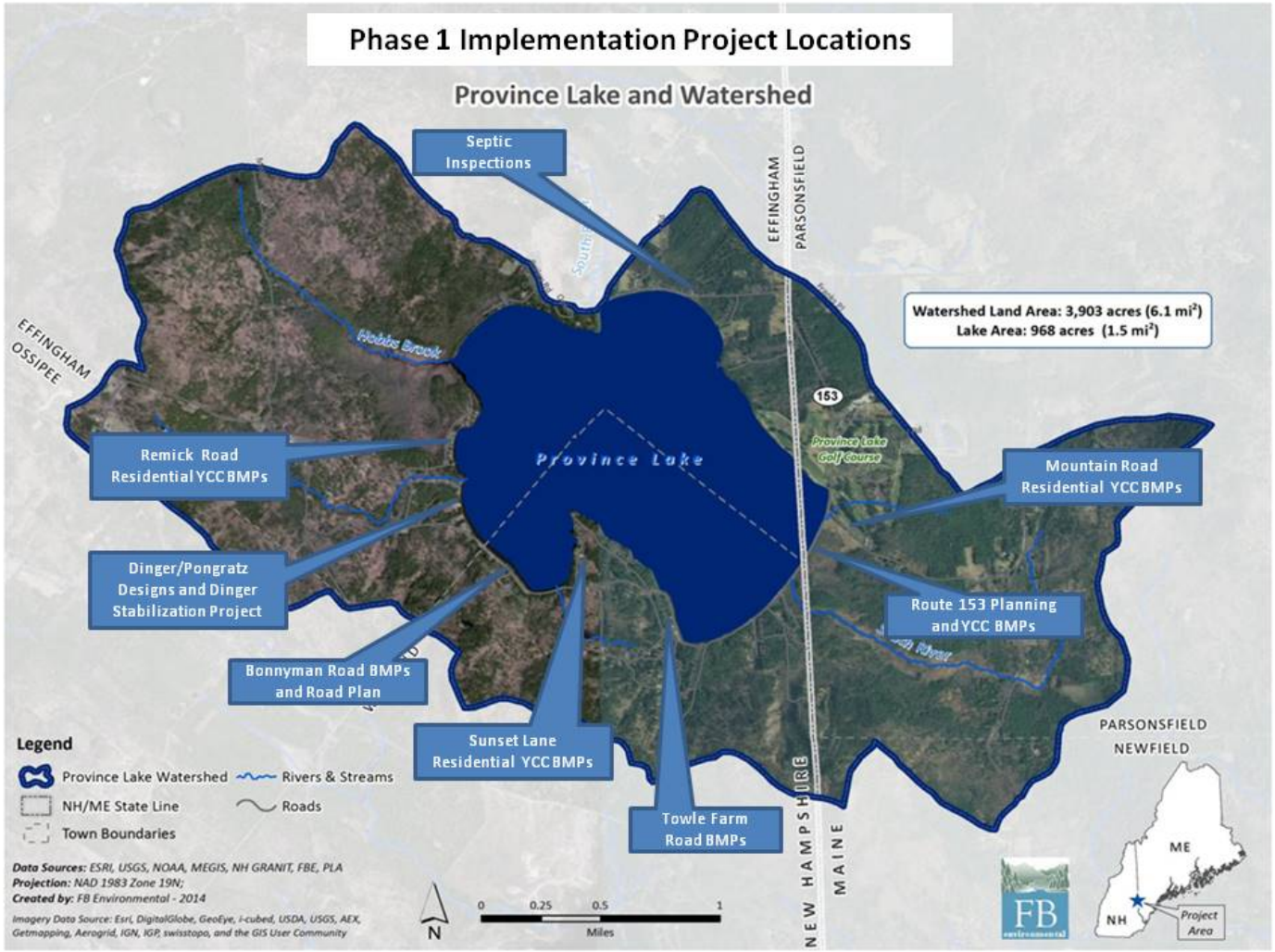
Province Lake's watershed (3,903 acres) is small relative to the size of the lake (968 acres). The watershed contains a large percentage of forestland (84%), as well as developed land (12%) (including shoreline development, a golf course, and several private campgrounds), wetlands (3%), and agriculture (1%). Province Lake is listed on the New Hampshire Department of Environmental Services (NH DES) 2010 and 2012 303(d) lists as impaired for Aquatic Life Use due to low pH, high levels of chlorophyll-a and total phosphorus, and is impaired for fish consumption due to mercury. It is also on the 2012 303(d) list as impaired for Primary Contact Recreation (swimming) due to reoccurring cyanobacteria blooms.

Since the fall of 2010, there has been an increasing prevalence of documented cyanobacteria blooms in localized areas within Province Lake which motivated the Province Lake Association to request assistance in the development of the "Province Lake Watershed Management Plan." PLA partnered with AWWA to develop the proposal and guide the project. The Plan was published in October 2014 with specific a Specific Measurable Attainable Relevant & Timebound Action Plan. The PLA partnered again with AWWA to request grant funds to implement recommendations from the plan with AWWA taking the lead role in this round.

The stated desired outcome for the project is that "Province Lake attains designated use status for Primary Contact Recreation as a result of fewer occurrences of cyanobacteria blooms due to nutrient load reductions achieved through Plan implementation activities. It is also anticipated that the lake will meet water quality criteria for Aquatic Life Use.

This project phase intends to reduce phosphorus loading by at least 26 lbs./yr. which is estimated to achieve in-lake phosphorus concentrations of at least ~14.0 ppb TP which is 10% percent of the water quality goal attainment as described in the "Province Lake Watershed Plan." While the pollutant load reductions were met, the in-lake TP concentrations still average >14 ppb. Successful pollutant load reductions were achieved through YCC projects, residential stormwater management systems and road repairs.

Figure 1. Watershed Map with Phase 1 Project Locations



Project Objectives & Verification

Objective 1: By December 2017, all project management tasks will have been completed in a timely and accurate manner.

- Measures of Success: All required reports are submitted in a timely manner, match documentation is detailed and verified, funding is secured to meet project demands.

All project management tasks were completed and submitted in a timely manner, match documentation was verified and sufficient funding was secured meeting project demands.

Objective 2: The project Steering Committee, including stakeholders representing the varied interests in the Province Lake watershed, will have been actively engaged in the project and the Project Management Team will have communicated regularly and efficiently to ensure project success.

- Measures of Success: Steering committee represents all stakeholder interests and communication leads to successful project completion.

The project Steering Committee held four formal meetings with minutes but also kept up regular email, phone and personal communications throughout the project period. The successful partnership between AWWA, NHDES and PLA ensured that all project partners, stakeholders and community members were well informed about the progress of the project activities.

Objective 3: By December 2017, the phosphorus loading to Province Lake from shoreland runoff will be reduced by approximately 21 pounds per year.

- Measures of Success: The AWWA Program Manager will have performed at least 20 technical assistance visits, the YCC will have installed BMPs on at least 8 shoreland sites and 50' of riparian buffer at the golf course, and 2 high priority residential sites will be corrected with cost-sharing.
- Action Plan 5.2.2 p. 61.

Figure 1: YCC crew at Province Lake beach

AWWA Program Managers Sam Wilson, and then Amy Arsenault, provided technical assistance to 5 and 13 Province Lake residents in 2015 and 2016 respectively. Under their guidance the YCC installed 21 recommended BMPs at 2 sites in 2015 and 7 sites in 2016. BMPs included a rain garden, infiltration steps, water bars, ditch stabilization, native vegetation, erosion control mulch, dry well and rubber razor. These installations resulted in an estimated phosphorus reduction of 21.3 lbs/year. The AWWA YCC season reports are on file at NHDES.

Figure 3: 141 Bonnyman Rd erosion

121 and 141 Bonnyman Road were identified in the Province Lake Watershed Survey as the highest priority residential sites for pollutant loading due to erosion issues from expansive lawns and unstable beaches. Both landowners, Chris Pongratz and Peter Dinger agreed to participate in a cost-share program to modify their landscapes to reduce the pollutant loading. Jones & Beach Engineers, Inc. was chosen to develop the landscape designs as a result of an RFQ process. JBE partnered with Ironwood Design for the landscape design aspect. JBE designed the stormwater mitigation systems. There were several snags in the process including permitting delays, weather and equipment complications but the installation at the Dinger property at 141 Bonnyman was successfully installed in this phase. The structures, including a stone retaining wall, infiltration trench, are working as designed and all the plants have taken hold and are thriving. Erosion control BMPs at 141 Bonnyman Rd resulted in an estimate phosphorus load reduction of 9.3 lbs/year. The completion of the Pongratz project at 121 Bonnyman will be included in Phase 2. Details of the 141 Bonnyman Road project are on file at NHDES.

Figure 2: 141 Bonnyman Rd restored

Objective 4: By December 2016, 20 high risk septic systems within the Province Lake watershed will have been identified, 10 will be evaluated and 3 will agree to cost-share upgrades in the next grant round, a neighborhood pump out program will have been carried out resulting in a potential TP load reduction of 9-18 pounds per year and options for outhouse upgrades will have been determined.

- Measures of Success: Success will be indicated with the evaluations of 20 high risk septic systems, 10 landowners opting for septic evaluations, the participation of at least 20 landowners in neighborhood pump out programs and options for outhouse upgrades have been presented to the campgrounds.
- Action Plan 5.2.1 p. 60.

Using data collected through the Province Lake Septic Survey 20 residences were identified as "high risk" based on the age of the wastewater system and its proximity to the lake or stream. Offers of a free septic system evaluation were sent to each of the high risk candidates. Seven requested evaluations which were conducted by Jones & Beach Engineers as a result of an RFQ selection process. Through the evaluation process the engineer from JBE determined that all systems within the Lake Shore Drive and Remick Road neighborhoods would need upgrades due to the water table level in those areas. The project leaders decided that cost-share upgrades would be offered to the two families whose systems were deemed needing upgrades as well as the other property owners in the target neighborhoods. Three families applied for the cost-share program. These will be installed in Phase 2.

The Province Lake Association negotiated with a local septic hauler, Lakes Region Septic, to offer neighborhood discounts if three or more neighbors request pump outs at the same time. While Lakes Region Septic confirms this arrangement was made and neighbors did take advantage of the offer, no official records were kept.

The Jolly Roger Campground has 66 cabins that all have holding tank systems within the cabins. Those systems are emptied into "honey wagons" and transported to the communal septic system where the waste is transferred. The owner of the campground is interested in connecting the cabins to a community septic system. The owner investigated engineering opportunities and requested a cost-share process in the next grant round. The owner will contract the engineering and permitting and will partner with AWWA and NHDES for installation in Phase 2.

Objective 5: The Province Lake Road Management Plan for Bonnyman Rd and Route 153 resulted in implementation at two sites on Bonnyman Road and development of an accepted plan for Route 153 for Phase 2 implementation. The Bonnyman Rd sites have reduced the TP loading by ~10 pounds per year.

- Measures of Success: The Province Lake Road Mgmt Plan for Bonnyman Rd and Route 153 is published. Recommendations for Bonnyman Road are presented to the Wakefield & Effingham selectmen resulting in implementation of at least 2 of the recommendations. Recommendations for Route 153 are presented at a public forum that is attended by stakeholders resulting in an accepted implementation plan for Phase 2. Pollutant load calculations at 2 implementation sites on Bonnyman Road indicate a TP load reduction of 10 pounds per year.
- Action Plan 5.2.3 p.63.

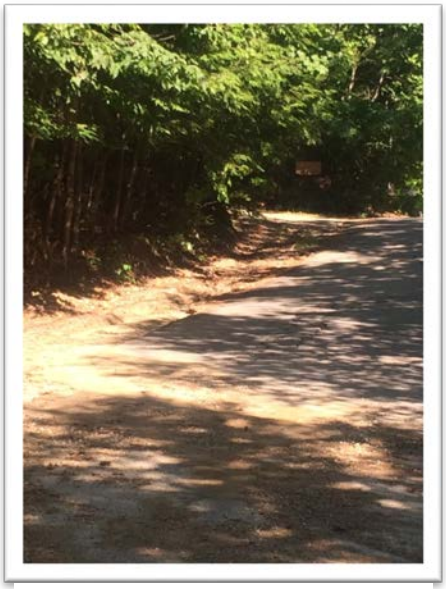


Figure 5: Bonnyman Rd Wakefield erosion

The Road Management Plan for Bonnyman Road and Route 153 plans were completed with a variety of challenges along the way. Princeton Hydro, LLC was chosen as the contractor for the Bonnyman Road plan through an RFQ process. Several months into the project AWWA and NHDES came to the conclusion that Princeton Hydro, LLC was unable or unwilling to provide the services agreed upon in the contract and the decision was made to sever ties. The draft of the Road Management Plan for Bonnyman Road was suitable as a basis for moving forward with a new contractor – the UNH Stormwater Center, the runner-up in the RFQ process. The UNHSC worked with the draft plan and developed site specific designs for two sites along Bonnyman Road. The Wakefield site was installed by the Wakefield DPW as part of this phase of the project and the Effingham site will be installed with the Town of Effingham's chosen contractor as part of Phase 2. The estimated phosphorus load reduction for the Wakefield site is 0.37 lbs/year. The Bonnyman Road site report is on file at NHDES.

Figure 4: Bonnyman Rd Wakefield Ditch & Check Dams

Figure 6: Boat launching from Rt 153 Beach

Finding a solution to the problems caused by the proximity of Route 153 to Province Lake has been an ongoing concern. The state highway borders the eastern edge of Province Lake traveling from NH into Maine heading north. There is only a narrow strip of privately owned beach between the road and the water's edge. Although the beach is privately owned it has been used as a de facto beach by the public for decades. The owner is eager to work with all these partners to find a solution to the misuse issues while still being open to the visiting public. While many people use the beach as it should be used there are many documented incidences of vehicular traffic driving on the beach and into the lake sending sediment into the water. Boat launching from the beach is a common occurrence thus avoiding the invasive plant inspections at the ramp open to the public. Annual beach clean-ups illustrate the significant amount of trash left behind by beach visitors. Stormwater washing directly across the highway into the lake carries all the pollutants from the road as well as washing the beach sediments into the lake.

AWWA first arranged a meeting with the Maine and NH Depts. of Transportation in 2012 along with NHDES, Maine DEP and the UNH Stormwater Center engineers at the state line on the highway. A subsequent meeting with the same partners except for Princeton Hydro engineers rather than the UNHSC yielded much of the same head scratching. Solutions to the problems were not an easy find with the many conflicting perspectives of stormwater management, human traffic control, winter snow management, and vehicular safety. Another meeting with the UNHSC back in the role of engineer yielded some compromises and a directive to develop a design using cabled guardrails. When the plans for this design were unveiled to the stakeholder agencies a new player at the table disagreed with the assessment of the impact of the road on the lake's water quality and approval to move forward was denied by Maine DOT. Options will continue to be explored in Phase 2.

Objective 6: At least one forest management plan has been developed for a parcel >10 acres in the Province Lake watershed.

- Measures of Success: At least 10 large parcel landowners within the Province Lake watershed attended a workshop "Your Land, Clean Water, Your Legacy" presented by AWWA and local land conservation organizations, to learn about forest management and land conservation opportunities. At least one forest management plan will be developed as a result of the workshop.
- Action Plan 5.2.4 p.65.

"Your Land, Clean Water, Your Legacy" was presented to 29 engaged stakeholders on April 9, 2016 at the Province Lake Golf Course. The program included Sally Soule of NHDES describing the current water quality status of Province Lake, Sam Wilson of AWWA illustrating the connections between land use practices and water quality, Wendy Scribner of UNH Cooperative Extension explaining the value of forest management plans, Patti Connaugton-Burns of Moose Mountains Regional Greenways discussing voluntary conservation easements, and Nels Liljedahl and Wayne Munroe of the Natural Resources Conservation Service (NRCS) outlining the available financial and technical assistance available to private landowners. The discussion was lively, the food delicious, and several of the large landowners made connections with the NRCS for follow up meetings. No formal forest management plans have been documented but the engagement in the evening's program was measureable.

Figure 7: Forest Mgmt Workshop Invite

Objective 7: A suite of outreach tools, developed to enhance the connections between land use and water quality, has been delivered resulting in increased interest in lake friendly activities and resources.

- Measures of Success: 20 people complete the shoreland landscape self-assessment quiz, lake friendly boating brochures have been distributed at the boat launch and by mail, 20 people attend the beach clean-up and the results of the BMP tracking tool are published on the PLA website which documents increased traffic.

Outreach materials were produced and distributed to the Province Lake community including a safe boating brochure to encourage safe boating practices that reduce the stirring up of sediments, a YCC brochure to encourage participation in the AWWA YCC erosion control program, and the online erosion quiz designed to engage homeowners in inspecting their properties for signs of erosion causing pollution to reach the lake. Regular email, website and Facebook posts kept the Province Lake community in touch with the project progress. Beach clean-ups in August of each year yielded significant trash reduction and community engagement with 20 volunteers in 2015 and 14 in 2016. The brochures and PDF of the online quiz are on file at NHDES.

Objective 8: Pollutant Load Reduction Estimates are submitted in a timely manner.

- Measures of Success: PCR reports are completed and delivered to NHDES by December 31 each year.

PCR reports for the pollutant load reductions from the YCC projects, residential stormwater management projects and road projects were submitted by December 31 each year.

Objective 9: Monitors have conducted lake monitoring with the UNH Lakes Lay Monitoring Program with the addition of color and nitrogen parameters. Tributary monitoring has been conducted on at least 4 inflowing sites for standard VRAP parameters plus TP and bacteria at hot spots.

- Measures of Success: Suitable volunteers have been recruited for monitoring teams, samples have been analyzed by UNH and NHDES, and reports have been generated. .
- Action Plan 5.2.6 p. 67

Water quality samples were taken and data delivered to the UNH LLMP in a consistent and timely fashion. Data was analyzed and the reports were delivered to the appropriate stakeholders. The Town of Wakefield's Planning voted to fund the development of user-friendly reports for all the Wakefield lakes supported by the UNH LLMP in 2016. Reports and more detailed data analysis is available on request.

Objective 10: Reduce stormwater runoff from Towle Farm Road.

- Measures of Success: Stormwater management practices have been designed and installed to reduce runoff and pollutant loading from Towle Farm Road. .
- Action Plan 5.2.3 p. 63.

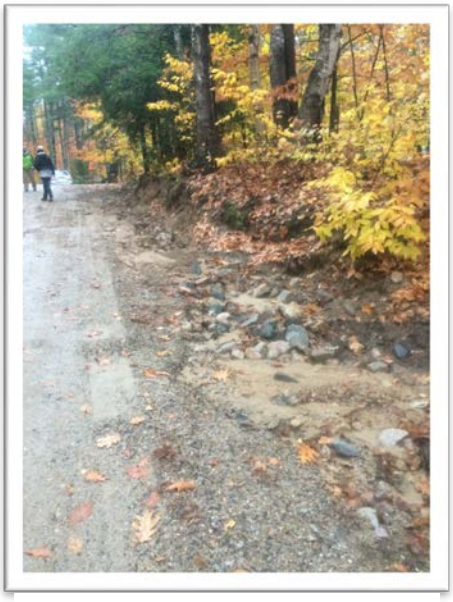


Figure 8: Towle Farm Road erosion

Implementation of the "Phase 1 Road Management Plan for Towle Farm Road Association, Wakefield, NH" was the most challenging aspect of this Phase 1 implementation project. Note that the plan was written for the Towle Farm Road Association which is actually the Towle Farm Community Corporation, known from here on as TFCC. During the watershed planning project the Town of Wakefield partnered with the UNHSC to install stormwater management BMPs at the intersection of the town-owned Bonnyman Road and the privately owned Towle Farm Road. It was quickly apparent that additional stormwater management measures needed to be installed uphill from the town installation. AWWA, NHDES and UNHSC met with representatives from TFCC and abutting landowners leading to the development of site specific designs by the UNHSC.

In the end, the stormwater management measures have been installed, the Operations & Maintenance plan has been delivered, phosphorus loading has been reduced by an estimated 2.35 lbs/year and the TFCC community has learned a lot about the relationship between private gravel roads and water quality. The process of getting to that point was very bumpy. The TFCC is made up of families who have been feuding for generations and this project seemed to serve as a catalyst for igniting those feuds. Disputes ranged from who would wear the captain's cap to property line boundaries to arm chair engineers disagreeing about the appropriate solutions. Each of these disputes needed hand-holding from the staff at AWWA and NHDES and occupied many more woman-hours than anticipated. When a rogue excavator operator decided to do his own engineering and created a wetlands violation extra time and money were required to restore the wetland and obtain an after-the-fact permit.

Figure 9: TFCC Road crew

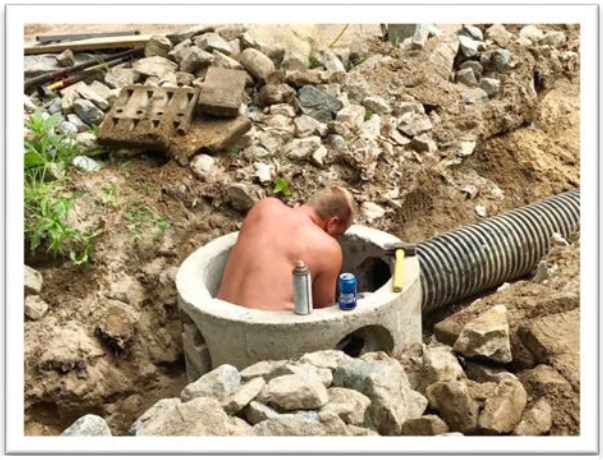


Figure 10: TFCC Road Crew at work

To reiterate, the project was successfully implemented. AWWA has the optimistic vision that the difficulties encountered during the project, the significant expense to TFCC and the lessons TFCC learned through the project will guarantee that the TFCC will stay committed to ensuring their gravel roads stay put and do not erode back into Province Lake. Photo documentation is on file at NHDES.

Project Outcomes:

- 18 Province Lake landowners received site specific Technical Assistance designs from AWWA's Program Manager.
- The AWWA YCC installed 21 BMPs on 9 sites in the Province Lake watershed.
- The Town of Wakefield installed a ~650' of rip rap lined ditch with regularly placed check dams Bonnyman Road between the two outlets of Silver Hill Drive and a culvert under the road to outlet into a detention basin.
- 20 volunteers, representing all shores of Province Lake, participated in the PLA Beach Clean-up on August 29, 2015 and 14 volunteers participated on August 27, 2016.
- The Towle Farm Community Corporation installed:
    - a 10' x 20' infiltration basin that outlets to a weir wall to a 12" HDPE pipe under Towle Farm Road to outlet to an infiltration basin lined with 6" – 8" rip rap.
    - ~350' of 12" pipe along the western shoulder of lower Towle Farm Rd outletting to existing drainage system installed by the Town of Wakefield at the Towle Farm Rd./ Bonnyman Rd intersection.

Measureable Results:

- The AWWA YCC projects reduced pollutant loading to Province Lake by an estimated 21.3 pounds of phosphorus per year using the Region 5 Model.
- BMPs installed on Bonnyman Road reduced the phosphorus loading by 0.37 lbs/yr using the Modified SIMPLE method.
- BMPs installed on Towle Farm Road reduced the phosphorus loading by 2.35 lbs/year using the Modified SIMPLE method.
- The 2015 PLA Beach Clean-up yielded trash weighing 136 lbs and 2016 yielded 547 pounds.

Conclusions and Recommendations

The stated desired outcome for the project is that "Province Lake attains designated use status for Primary Contact Recreation as a result of fewer occurrences of cyanobacteria blooms due to nutrient load reductions achieved through Plan implementation activities. It is also anticipated that the lake will meet water quality criteria for Aquatic Life Use.

This project phase intends to reduce phosphorus loading by at least 26 lbs./yr. which is estimated to achieve in-lake phosphorus concentrations of at least ~14.0 ppb TP which is 10% percent of the water quality goal attainment as described in the Province Lake Watershed Plan."

While the pollutant load reductions were met, the in-lake TP concentrations still average >14 ppb. Successful pollutant load reductions were achieved through YCC projects, residential stormwater management systems and road repairs.

Recommendations for future actions encompass six key action categories: septic systems,

shoreline BMPs, roads, municipal ordinances and land conservation, recreation and boating, and monitoring and lake assessment.

Phase 2 of implementation will include the following:

- Additional site specific designs and YCC projects for shoreline landowners
- Road BMP installations at an Effingham Bonnyman Road site
- Installation of stormwater management systems at 121 Bonnyman Road
- Cost-share programs for septic system upgrades at 3 residential sites
- Installation of a community septic system for 12 – 18 cabins at Jolly Roger Village
- Continued water quality monitoring to include tributaries and lake parameters
- Continued outreach and education using the Province Lake Association website and social marketing tools as well as direct mail
- Partnership with the Province Lake Golf Course to increase knowledge about land use practices affecting water quality and to reduce polluted runoff from reaching Province Lake

The Province Lake Association will pursue additional scientific perspectives on the causes of reoccurring cyanobacteria blooms and will investigate alternative approaches to cyanobacteria bloom controls.

This project illustrated an important factor in watershed planning – it is about the people. While action items were clearly defined and solutions to on-the-ground issues easily identified the reality of successfully implementing them is entirely a social issue. Careful outreach efforts to ensure that stakeholders understand the relationship between the problem and water quality is essential. In addition, it behooves project managers to learn as much as possible about the neighborhood dynamics, historical relationship challenges, boundary disputes, etc. What appear to be simple implementation strategies can become very challenging when personalities clash.

It will require the continued commitment and cooperation of all the project partners to see that Province Lake meets its water quality goal and attains designated use status for Aquatic Life Use with phosphorus and chlorophyll-a concentrations that meet or surpass NH DES standards for mesotrophic water bodies, thus ridding itself of the description as a “lake on fire.”

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