Province Lake
Watershed Survey Report
2025

Acton Wakefield Watersheds Alliance

Province Lake Association

Acknowledgments

The following people and organizations were instrumental in the Province Lake Watershed Survey Project and deserve special recognition for their efforts:

Watershed Survey Volunteers

Sector 1: James Shimansky*, Mark Saraceno, Mary Saraceno, Ryan Ruel

Sector 2: Krystal Balanoff*, Mark Tellier, Jim Aiken, Maura Aiken

Sector 3: Gloria Norcross*, Dennis Badman, Jon Samuelson, Sara Willwerth

Sector 4: Jon Balanoff*, Larry Moody, Kate Kimball, Shea Kimball

Sector 5: Alex Wong*, Donna Luce, Jeff Lightizer, Russel Hawkins

Sector 6: Addie Halligan*, Debra Tully, Bob Tully, Tim Porosky

Sector 7: Amanda Pratt*, Marcia Fletcher, Mindy Schuman-Vye, Debbie Cunha

**Technical Leads*

Supporting Organizations

Acton Wakefield Watersheds Alliance (AWWA)

Province Lake Association (PLA)

New Hampshire Department of Environmental Service (NHDES)

Maine Department of Environmental Protection (ME DEP)

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Gloria Norcross – Town of Amherst

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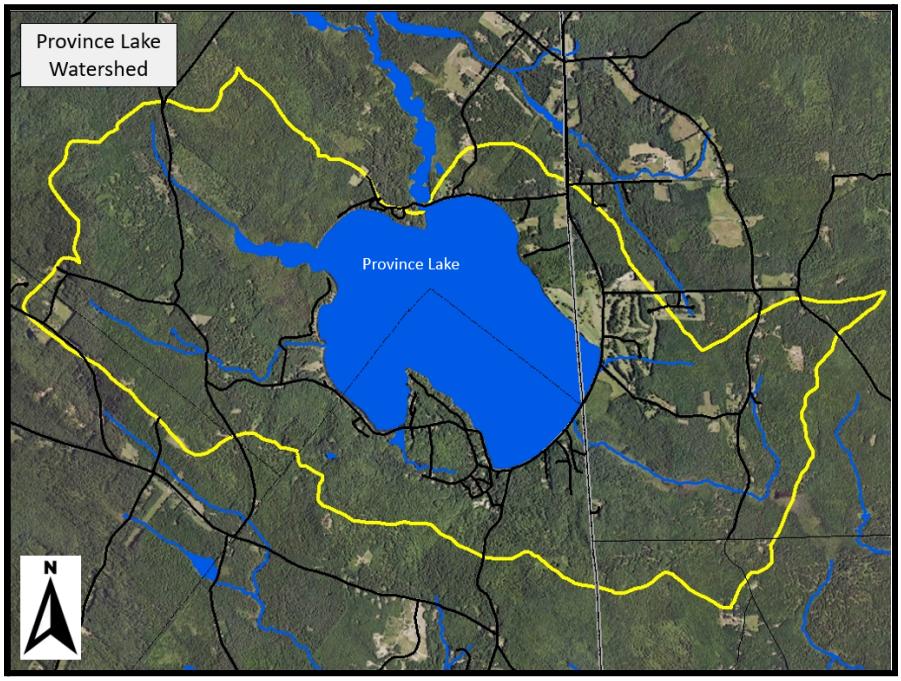
Introduction

This report serves to summarize and analyze the data collected during the Province Lake watershed survey conducted in the spring of 2025 and is intended to be a tool for residents, landowners, and resource managers to identify and prioritize water quality pollution sources and remediation opportunities within the Province Lake watershed.

Watershed surveys provide a snapshot of the condition of the watershed at the time the survey is conducted and document all observed evidence of sediment erosion. The information gathered during the Province Lake survey will be used by the Province Lake Association (PLA), the Acton Wakefield Watersheds Alliance (AWWA), and the surrounding municipalities to guide future efforts to preserve the lake's water quality for future generations to enjoy.

Province Lake Watershed



The area of Province Lake is approximately 1,014 acres while the area of the entire watershed is 4,672 acres This means there is an area of land four times the size of the lake that contributes stormwater and potential pollution into the lake itself. With an average depth of only ~9 feet, Province Lake experiences minimal seasonal turnover, and light regularly reaches the lake bottom. The lake is located in the towns of Wakefield and Effingham, NH, as well as Parsonsfield, ME and it is one of the many headwater lakes for the Saco River. The shoreline of Province Lake is highly developed; all precipitation that falls in the watershed drains into the lake through a network of streams, ditches, and overland flow.

The outlet at the Northern end of the lake is dam controlled and becomes the South River River which flows north until it connects with the Ossipee River. From there, it journeys to the Saco River and, ultimately, out into Saco Bay and the Atlantic Ocean.

What is a Watershed?

A watershed is defined as all of the land that drains or "sheds" into a given water body. A large watershed is made up of many smaller watersheds. For example, the watershed of Province Lake is part of the watershed of the Saco River River and the watershed of the Saco River is one of several in the Gulf of Maine Watershed. Activity in any part of the watershed can affect the quality of the water body as a result of the flow from rivers, streams, surface runoff, and groundwater, roads, ditches, pathways, and beaches. This is why protection of Province Lake must be addressed on a watershed level rather than simply focusing on shoreline activity.

Water Quality

Volunteers have been testing the water quality of Province Lake since 1991. The UNH Lay Lakes Monitoring Program (LLMP), and NHDES have collaborated with PLA volunteers to sample and evaluate water quality, track cyanobacteria blooms, and determine water quality trends.

Province Lake is considered impaired by the State of New Hampshire for Total Phosphorus and Chlorophyll-A. Province Lake is classified as an Mesotrophic lake meaning it supports moderate plant growth especially on shallow shorelines, and supports a biologically diverse aquatic ecosystem. Mesotrophic lakes fall in between Oligotrophic lakes which have minimal nutrients and don't support much life, and Eutrophic lakes which are nutrient-rich and allow for abundant plant growth and tend to lead to lower dissolved oxygen (DO) levels over time. Province Lake has been experiencing high levels of Phosphorus and cyanobacteria blooms as far back as the 1970s, so there is evidence that external nutrient loading has been an issue for quite some time, long before we understood the cause of cyanobacteria blooms.

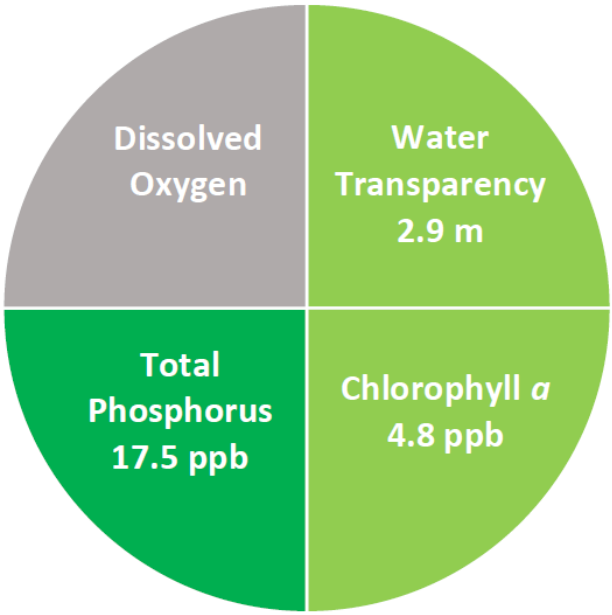


Figure 1. Province Lake Water Quality (2024)

Province Lake conducted their first watershed survey in 2014 and developed a watershed management plan in 2015. Since then, Cyanobacteria Blooms have been an annual problem, sometimes even occurring in the middle of winter. Province Lake residents, road associations, and the Province Lake Association have worked with groups like AWWA to reduce the amount of Phosphorus entering the lake by over 100 lbs/yr.

Threats to Province Lake

The largest threat to lakes in New England, including Province Lake, is polluted runoff or nonpoint source (NPS) pollution. Stormwater runoff from rain and snowmelt picks up soil, nutrients, and other pollutants as it flows across the land, and flushes into the lake.

In an undeveloped, forested watershed, stormwater runoff moves more slowly due to uneven terrain, tree and shrub roots, ground cover plants, leaves, and other natural debris on the forest floor. These features give runoff time to infiltrate into the ground, soaking into the uneven forest floor and filtering through the soil. The soil and mineral substrate below ground is the most effective form of filtration for stormwater runoff. In a developed watershed, stormwater does not have the opportunity to infiltrate and does not receive the filtration provided by the forest floor. Rainwater picks up speed as it flows across impervious surfaces like rooftops, compacted soil, gravel camp roads, and pavement, and becomes a formidable, erosive force.

Although much of Province Lake's watershed is still forested, most of the shoreline is developed with seasonal and year-round residences, as well as an extensive network of town and camp roads adjacent to the lake. While these residential lots and roads convey most of the runoff to the lake, public access points such as beaches and boat launches have been found to contribute as well. Camp roads are subject to frequent wash-outs during periods of heavy precipitation and spring thaws. Wash-outs can transport significant quantities of sediment and gravel into the lake increasing the nutrient levels and reducing clarity.

A number of the camps that surround the lake are many decades old and some may have ineffective septic systems. Leaching of these systems can release excess nutrients and potentially dangerous bacteria into the lake.

Why is Storm Water Runoff a Problem?

Though stormwater by itself can cause environmental issues when it gets into the lake, the primary issue with stormwater is the pollutants that it picks up and carries with it. The sediment and nutrients in the runoff can be bad news for freshwater lakes.

The nutrient known as phosphorus is food for algae and other plants and is found in soil, septic waste, pet waste and fertilizers. Algae in the lake react to additional phosphorus the same way that plants in the home and garden react when phosphorus fertilizers are fed to the plant—they grow. In natural conditions, the scarcity of phosphorus in a lake limits algae growth. Consequently, when a lake receives extra phosphorus, algae growth increases dramatically. Sometimes this growth causes choking blooms, but more often it results in small changes in water quality that, over time, damage the ecology, aesthetics, and economy of lakes.

Soil/sediment is the biggest source of phosphorus to Maine and New Hampshire lakes. As every gardener knows, phosphorus and other nutrients are naturally present in the soil. So, runoff is essentially "fertilizing" Province Lake with the soil that erodes from our driveways, roads, ditches, pathways, and beaches.

Reasons to Reduce Runoff

In addition to being a precious natural resource and source of joy for the community, Province Lake is also a valuable asset to the community for multiple reasons; economic, recreational, ecological, and cultural.

- Sediment deposited into the lake from erosion creates the ideal environment for invasive aquatic plants, algae, and **cyanobacteria** to thrive.

- Sediment clogs fish gills and algae blooms can lead to **fish die-offs** which reduce biodiversity and recreational fishing opportunities.

- Declines in water quality are directly correlated with **declining waterfront property value**. A large portion of tax revenue is derived from waterfront property taxes, which are based upon property value.

- A clean lake with clear water is perceived as being a **community asset**. Healthy lakes are regarded as being more valuable and desirable. The lake becomes a source of community pride and fosters a sense of stewardship.

- The lake attracts anglers and boaters from across the region, **boosting the local economy** from restaurants and gas stations to boat repair and storage.

- Bald eagles and other large birds of prey utilize the lake habitat for hunting, nesting, and breeding. **Loons** are a frequent sight and have become a symbol of the region.

- Prevention is the key. Once a lake has declined, it is difficult to restore.

Purpose of the Province Lake Watershed Survey

The purpose of this survey was to gain an in-depth understanding of the current conditions of the watershed in terms of surface sediment erosion through direct observation.

The results of the watershed survey are used for the following purposes:

- Identify and prioritize existing sources of polluted runoff, particularly soil erosion sites in the Province Lake watershed.

- To raise public awareness about the connection between land use and water quality and the impact of soil erosion on Province Lake, and to inspire people to become active watershed stewards.

- Provide a basis to obtain grant funding to assist in remediation of identified erosion sites.

- Make general recommendations to landowners to remediate erosion problems on their properties.

- Identify sites for future Youth Conservation Corps/grant projects.

- To update the Province Lake Watershed Management Plan, which uses the information gathered as one component of a long-term lake protection strategy.

Note: The purpose of the survey is *NOT* to blame landowners for erosion or seek enforcement action against landowners not in compliance with ordinances. This is an education, outreach, and science-based tool intended to help the Province Lake community work together with landowners and community partners to solve erosion problems on their properties through technical assistance, stormwater control projects, and funding opportunities.

Local citizen participation was essential in completing the watershed survey and will be even more important in years to come. With the leadership of PLA and AWWA and others concerned with lake water quality, the opportunities for stewardship are limitless.

Survey Method

The survey was conducted by PLA volunteers with the help of trained technical staff from NHDES, ME DEP and AWWA using the Maine DEP Lake Watershed Survey Protocol. Twenty-one volunteers were trained in survey techniques during a two-hour virtual training session on April 24th, 2025. On a rainy Saturday, April 26th, the volunteers met at Nutter Farm, organized into seven groups, and spent the day documenting erosion on the roads, properties, driveways, and shorelines in their assigned sectors using a tailored digital data collection app called Survey123. The volunteers completed the survey in a single day.

The survey was conducted in the spring, when stormwater erosion is most apparent. Each group had one technical leader, a resident of that sector, and 2-3 additional volunteers. The Technical Leader was responsible for entering data into the app and providing quality control for each entry. Volunteers were responsible for efficiently navigating their sector, numbering site photos, and engaging with homeowners. The entire group was responsible for seeking and identifying erosion sources.

When erosion was identified on a site, it was categorized in several ways:

- Degree of impact on lake water quality
- Estimated remediation cost
- Technical level required to remediate the erosion issue

Impact on Lake Water Quality: Each site was rated for its potential impact on lake water quality. The impact was based on slope, amount of soil loss, proximity to water, and the presence and size of a vegetated buffer.

- “Low” impact sites were those with limited soil transport off-site and little or no visible gullies.
- “Medium” impact sites had some sediment transport off-site with noticeable rills in the ground.
- “High” impact sites exhibited a large amount of sediment transported off-site with significant gullies eroded into the ground.

Estimated Remediation Cost: Recommendations were made for remediating erosion at each site and the associated cost of labor and materials was estimated for the homeowner.

- "Low" cost sites were estimated to cost less than $1,000
- "Medium" cost sites were estimated to cost between $1,000 and $3,000
- "High" cost sites were estimated to cost in excess of $3,000

Technical Requirements: In addition to cost, surveyors also determined what level of technical expertise would be required in order to correct an erosion issue. This often correlates with cost, but not always.

- "Low" tech recommendations can easily be installed by homeowners using hand tools and do not require landscape design knowledge or engineering.
- "Medium" tech recommendations require a site-specific landscape design using specific stormwater best management practices and could be completed by a landscape design company or by AWWA's Youth Conservation Corps Program.
- "High" tech recommendations will require large, complex installations and will likely require an engineered design.

All site information was submitted through the Survey123 App and downloaded into an MS Excel spreadsheet for analysis. Estimates of soil loss into the lake and the associated phosphorus loading estimates were made using the EPA Region 5 Model. This model is the standard for estimating soil loss. This data was standardized, validated, and organized to allow relationships and rankings to be determined. The sites identified by volunteers were prioritized for remediation based on rankings of their impact on the lake, required technical expertise, and estimated cost of remediation. The documented erosion sites were then marked on the Province Lake watershed map.

A description of sites and associated rankings are discussed in the next section of this report. Maps of the erosion sites are located in Appendix A, and a spreadsheet with data from the documented sites is located in Appendix B.

Contact PLA or AWWA for additional site information or to find out if a site number corresponds with your property (contact info found on Page 25).

Summary of Watershed Survey Findings

Water Quality Impact
In total, survey teams identified 83 erosion sites that were directly impacting Province Lake.

- 3 low impact to the lake
- 51 were medium impact
- 29 were deemed high impact

All three of these categories had a range of costs and technical complexity associated with remediating erosion (Figure 1).

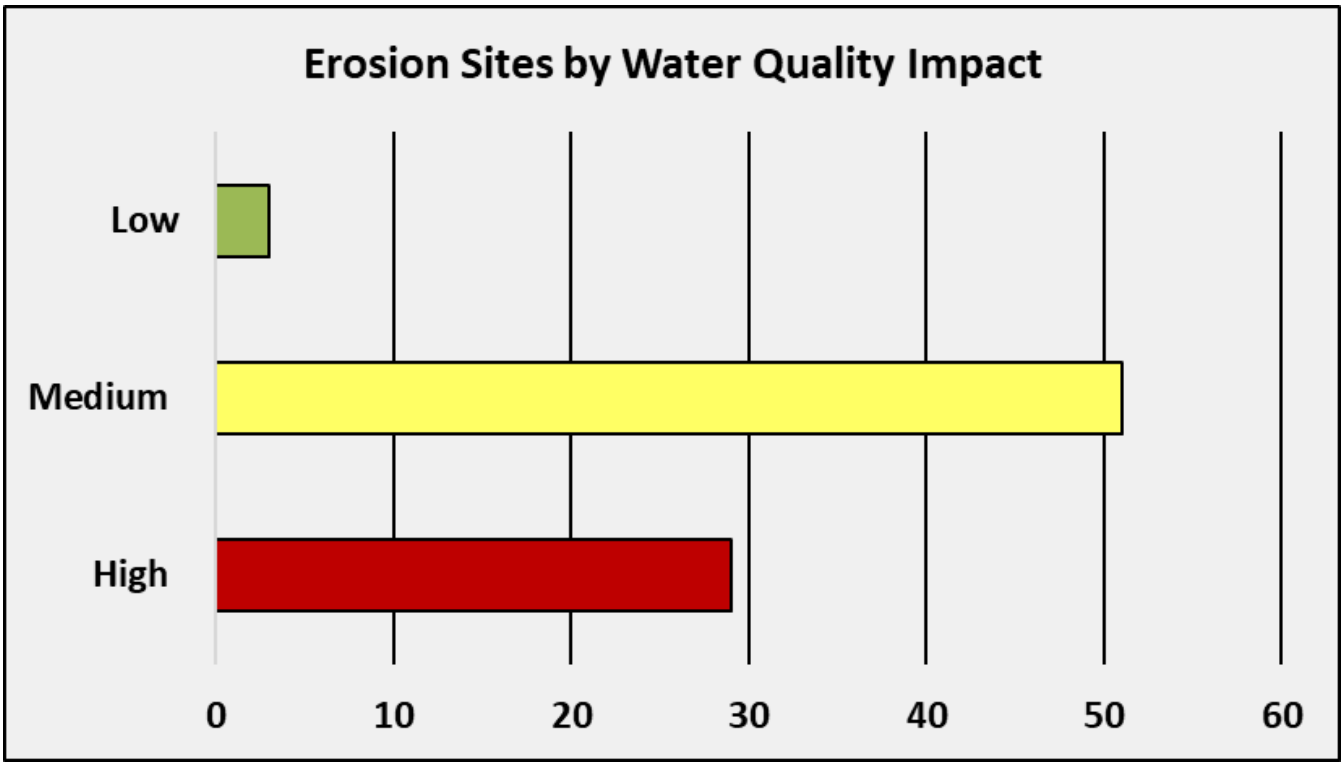


Figure 1. Identified Erosion sites based on estimated water quality impact.

Land Use

In addition to being categorized by water quality impact, erosion sites were also identified by land use type. The majority of erosion sites were identified on residential properties, followed by both private roads and town roads (Figure 2).

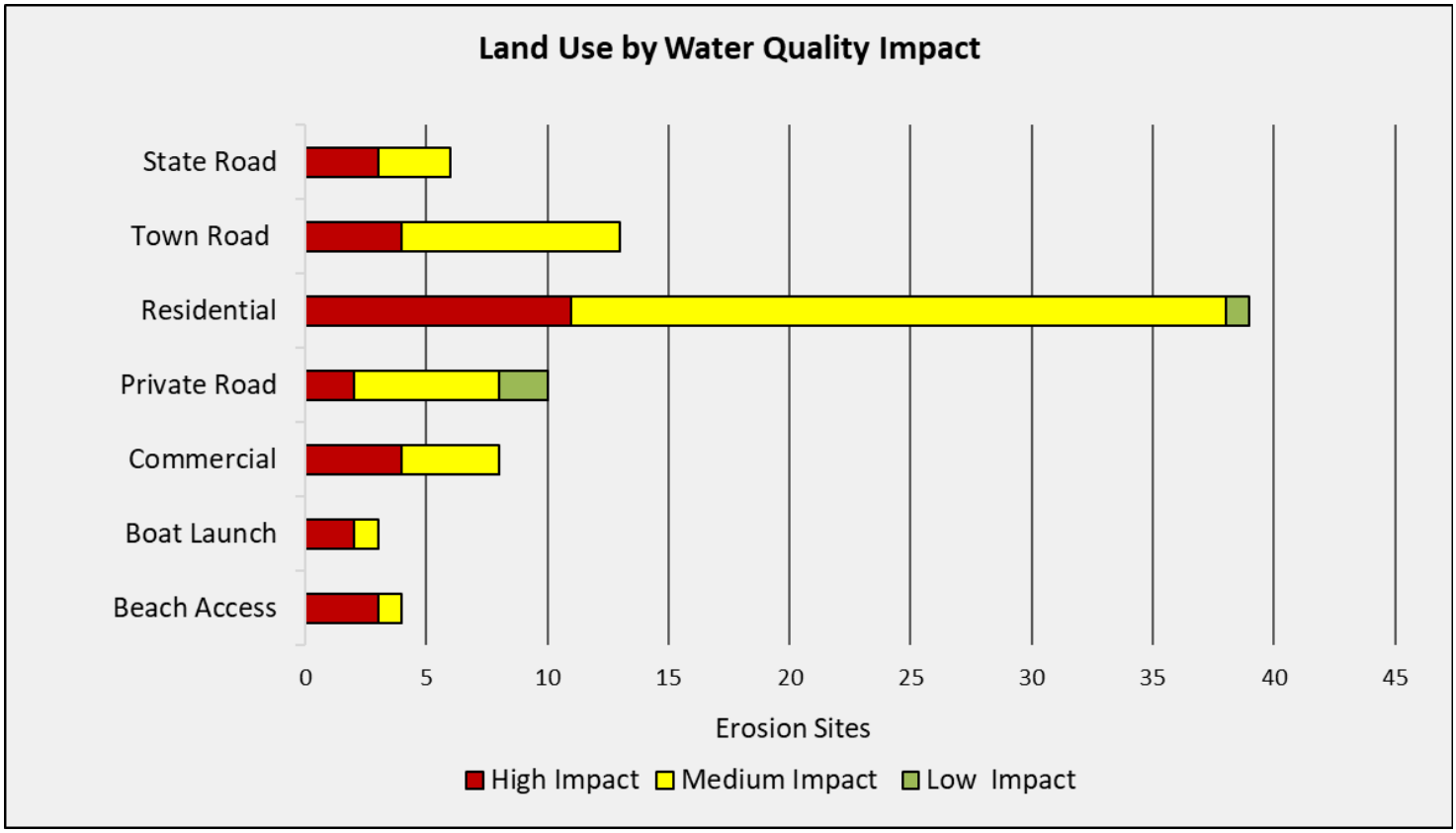


Figure 2. Impact to water quality separated by land-use type.

Estimated Cost & Complexity

Volunteers estimated the cost and technical requirements to remediate each erosion site. These are important considerations when prioritizing erosion control efforts given that inexpensive, simple projects can be completed in greater abundance and in less time, maximizing the benefit to water quality. Figures 3 and 4 breakdown each individual site by the estimated repair cost and technical requirements of each site. *Notice that the graphs are similar but not identical.* There were a handful of sites where cost estimates and technical level to repair differed. Reasons for this may include projects that can be done by homeowners but require a larger quantity of materials. Or conversely, there may be a smaller size project that still requires a higher degree of expertise of physical labor.

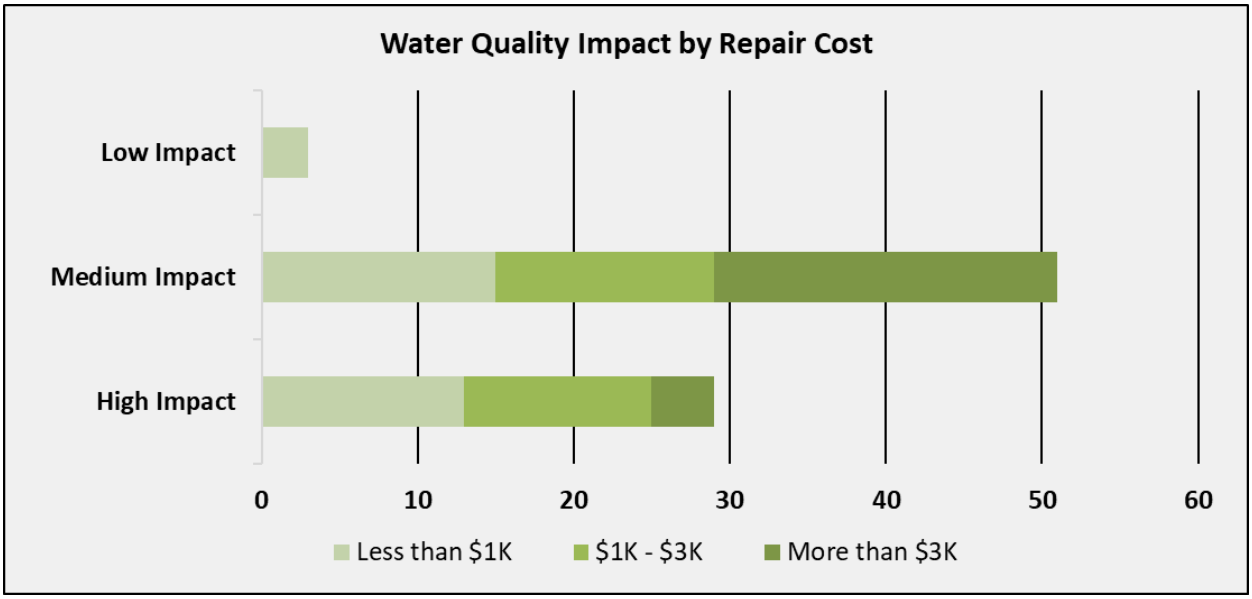


Figure 3. Water quality impact of erosion is separated by repair cost.

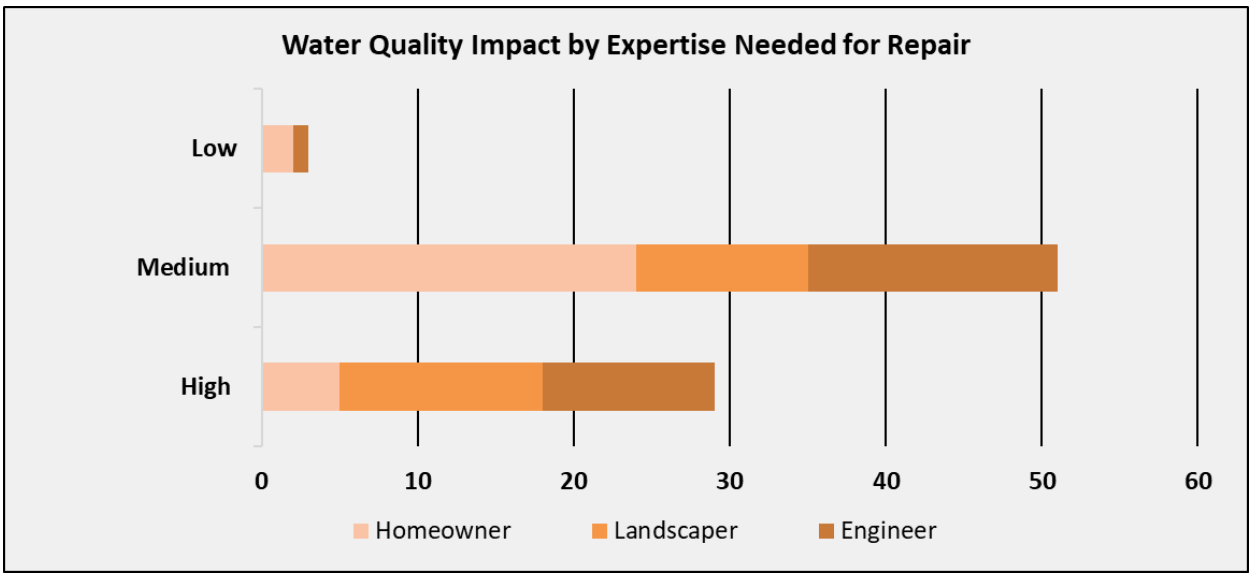


Figure 4. Water quality impact of erosion separated by complexity of repair.

Discussion

While discussing the impacts of the survey's findings, it is important to remember that polluted runoff is a nonpoint source pollution problem, meaning that *no single source has a major impact on water quality*. When added up, however, these small impacts have a significant accumulative effect on water quality. As seen in the figures above, the majority of erosion sites identified by volunteers do not have a high impact on water quality. These ratings (high, medium, and low), are relative and are primarily used as a way to prioritize which sites should be addressed by the community, but any erosion that can be addressed should be. For example, one high-impact site may represent 5% of the overall erosion in the lake and should be addressed right away. A site that represents only 1% of the lake's erosion is a lower priority to repair; however, if 10 of these low-priority sites are repaired, the effect will be 10% of erosion eliminated, twice as much as repairing the previously mentioned high-priority site. **Every erosion source that we eliminate contributes to an overall reduction of pollution getting into the lake.**

By prioritizing sites by impact, cost, and technical level, The Province Lake Association can focus their efforts on high-priority, complex sites, while encouraging homeowners to address the much larger category of inexpensive, low-impact sites. In Appendix B, the list of erosion sites is broken down by priority. The highest priority sites are those that have a high impact on the lake, but are inexpensive and easy to remediate. The lowest priority is low-impact sites which would be expensive and complicated. This prioritization ensures that we spend our limited financial resources efficiently while having the greatest impact on the lake. *If your own property is ranked higher on the priority list, this does not mean you have more responsibility to protect water quality than others.* Everyone is responsible for doing whatever they can to minimize their effect on water quality. This data will be a resource to the whole Province Lake community for accomplishing that goal.

See **Appendix B** for Watershed Survey Data and site prioritization.

Next Steps

Remediating the erosion issues identified in this survey will require efforts by PLA, AWWA, community members, road associations, and municipal officials.

PLA & AWWA

- Contact property owners, road associations, and town officials with identified erosion to offer technical assistance. Encourage improvements and provide resources.

- Make this report available to all residents of the Province Lake Watershed.

- Partner with NHDES, private funding sources, and towns to seek grant funding and implement grant-funded projects to protect lake water quality.

- Increase awareness; provide educational materials and guidance to members of the Province Lake watershed community.

- Organize volunteers to start remediating identified erosion problems and teach citizens how to repair similar problems on their own properties.

- Work with town officials to address erosion on public property to find solutions.

Individual Landowners

- Install stormwater landscaping where erosion is occurring. Contact PLA or AWWA for technical assistance, erosion best management practices, and funding options.

- Contact PLA to get involved with current water quality programs and efforts.

- *Encourage the growth of native vegetation and vegetated buffers on your property;* stop mowing and raking where possible and avoid exposing bare soil. Seed and mulch bare soil areas.

- Call your local Code Enforcement Officer (CEO) before doing any tree cutting or soil disturbance projects (see contact info on page 25).

- Maintain septic systems properly. Pump your tank every 1 to 3 years.

Municipal Officials

- Enforce shoreland zoning and other ordinances that protect Province Lake.

- Conduct regular maintenance on town roads in the watershed, and address town road issues identified in this survey where feasible.

Forming a Road Association

Proper maintenance of camp roads is crucial to the long-term health of Province Lake.

A road association is a way for landowners on a private camp road to share responsibility, make decisions, and split costs for road maintenance and repairs.

While small roads can make do with informal associations, it is becoming more common to establish road associations as 501(c)3 non-profit organizations. These associations are run through a straightforward, democratic process and have the ability to collect dues, receive legal protections, and may qualify for grant funding to remediate erosion issues.

Why form road associations on Province Lake?

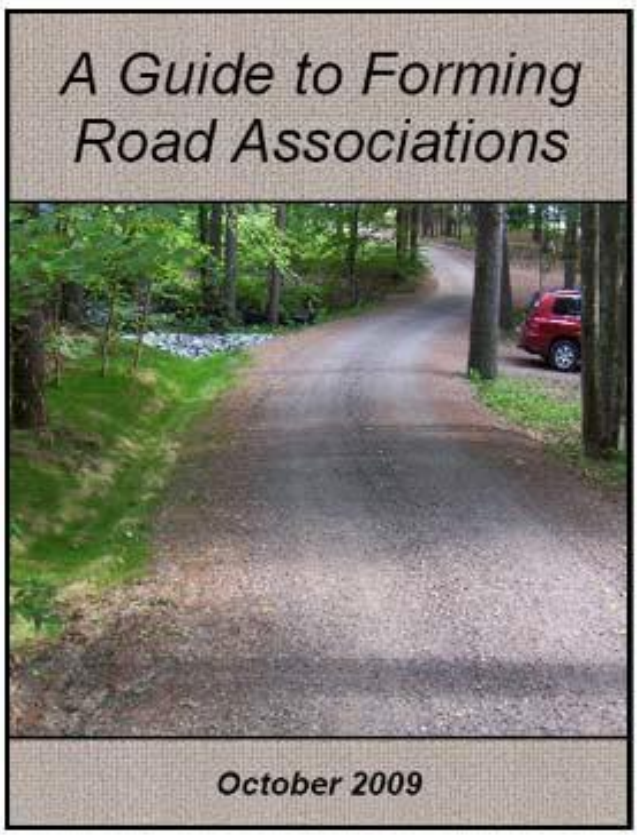
Ten impact sites identified during the watershed survey are on private roads. Maintaining roads helps protect Province Lake from the impacts of soil erosion.

A road association provides an avenue for private camp road users to formally manage roads in a fair, organized, and cost-effective manner.

Regular maintenance reduces road expenses over time. The Maine Camp Road Maintenance Manual estimates every $1 spent on routine maintenance saves $15 in repairs.

For information on forming road associations:

- New Hampshire Road Association Laws RSA 231:81-A
- NH Private Road Tax Payers Alliance
- How to form a Non-Profit
- NH Charitable Trusts Unit
- Maine DEP's 'Guide to Forming a Road Association -



Erosion Types and Best Management Practices for Homeowners

Stormwater Best Management Practices (BMPs) are landscaping and land maintenance installations that are designed to trap stormwater and allow it to infiltrate into the ground before it reaches the lake, while also operating as functional and aesthetic landscaping features on a property. Erosion can occur naturally, but when it is the result of human activity, stormwater runoff picks up soil and transports it into the lake. Some BMPs are useful for residential properties and some are specifically for use on private and town-owned roads. Residential BMPs are relatively simple to install and can be done by homeowners and landscapers. Road BMPs often require heavy machinery and in some cases require engineering (i.e. culvert installation).

Additional information on Stormwater Runoff and Erosion BMPs include:

- ME DEP Stormwater BMP Manuals
- Maine Gravel Road Manual
- NH Homeowner's Guide to Stormwater Management
- AWWA Conservation Practices for Homeowners

Common Erosion Issues

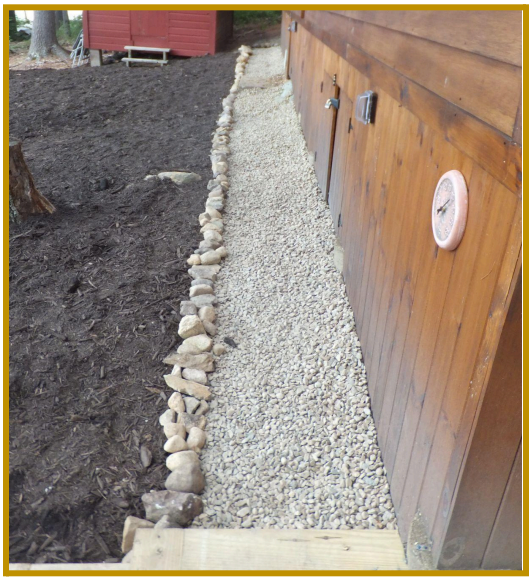
Gully Erosion
Forms when fast moving water forms a channel on bare soil and begins to pick up and transport sediment downhill to the lake. The most visually obvious form of erosion. Smaller gullies are referred to as rills.

Sheet Erosion
Less apparent than a gully. Occurs when soil erodes in equal amounts across the landscape and the soil level lowers. Exposed roots are evidence of this. Roots naturally grow underground, so the amount of soil loss equals at least the height of the exposed roots. Sheet erosion often goes unnoticed and can lead to significant soil loss.

Shoreline Erosion
Shorelines can erode both from stormwater runoff and intense wind and wave action. The root systems of plants on the shoreline work to stabilize soil on the slope and protect it from eroding. In the absence of permanent, woody vegetation, the bank soils have no structure and can easily erode into the lake.

Best Management Practices: *Infiltration*

Infiltration Path - a trench filled with crushed stone that traps stormwater. Can replace dirt paths susceptible to runoff.



Dripline Trench - Traps roof runoff and directs it into the ground. An alternative to gutters.

Infiltration Steps - Crushed stone steps that trap stormwater instead of allowing it to flow downhill.

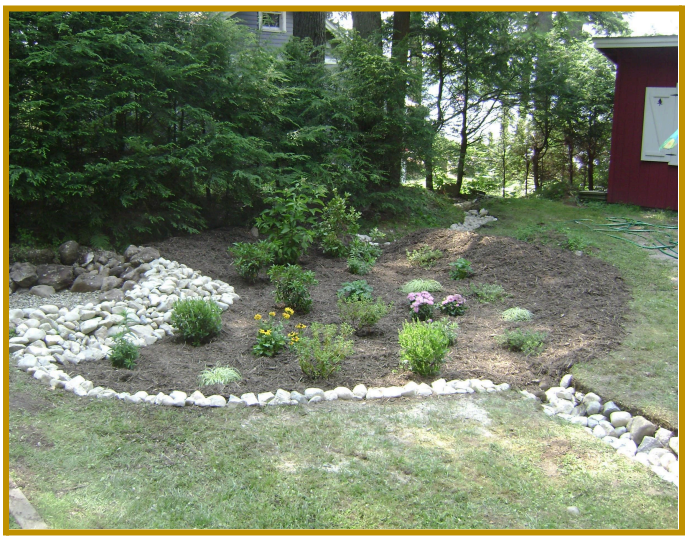
Best Management Practices: *Diversion*

Rubber Razor - strips of hard rubber are partially buried in the driveway, placed on an angle to divert stormwater into an adjacent trench or natural area.

Water Bars - 6”x 6” lumber is installed on a slope with crushed stone on the uphill side to trap and divert stormwater. Water bars are left slightly raised to slow water down and can be used as seen here, or placed in a pathway in shorter lengths to function as steps.

Firehose Diverter - In paved driveways, burying rubber and wood are not an option. Old firehose, or other durable material, can be filled with sand or stone and placed on an angle to divert stormwater. These have the added benefit of being movable.

Best Management Practices: *Retention*



Rain Garden - pervious detention basin designed to store stormwater during a rain event and allow it to infiltrate. Typically, a trench directs water into the rain garden. Water tolerant plants are put in to uptake additional water and absorb excess nutrients.

Vegetated Buffer - The shoreline is the last line of defense from stormwater. Dense, woody vegetation slows down stormwater and the root system binds sediment together and keeps it from eroding.

Erosion Control Mulch - This chunky mulch is made of tree and stump grindings of various sizes, this allows it to bind together and trap stormwater without washing away. This is the simplest way to protect bare soil and will last for many years before breaking down.

Best Management Practices: *Roads*

Hard Pack - This is an aggregate stone material that does not wash away as easily as sand and gravel. The lack of fine materials means less sediment erosion.

Crowning - A dirt road should be slightly pitched so water will run off of it instead of forming potholes and gullies. The high point can be in the middle to direct water in both directions, or on a single side to direct all water in one direction.

Roadside Ditching and Check Dams - Once water is directed off the road, it should flow into a pervious ditch to allow it to infiltrate. Ideally, trenches would have a native vegetation and/or rip to reduce water velocity, and have saddled stone walls known as check dams laid out perpendicular to the flow to allow water to pond on its way downhill.

Permitting and Regulations - New Hampshire

The Shoreland Water Quality Protection Act (SWQPA) establishes a "protected shoreland", located along public waters. Certain homeowner activities are regulated within the protected shoreland, which includes all lands within 250' of public waters:

- Lakes & ponds greater than 10 acres
- Year-round flowing waters (streams and rivers) fourth-order or higher
- Coastal waters

Waterfront Buffer Requirements

- Within 50' of the water's edge, ground cover and shrubs may not be removed.
- Exception is made for a max 6' wide footpath to the water or to structures in the waterfront buffer (may need shoreland permit).
- Ground cover and shrubs may be trimmed to a height of no less than 3'.
- Trees may also be pruned as long as the health of the tree is not endangered. Pruning only the bottom 1/3 of a tree is recommended to maintain property aesthetics and tree health.
- No pesticides can be applied within 25' of the water's edge
- No chemicals of any kind can be applied within 50' other than by an NH licensed professional.

Permitting Requirements

- A shoreland permit is not required for vegetation management provided it occurs in accordance with the SWQPA.

- Any dead, diseased or hazardous tree may be cut to ground level at any time.

- An NHDES shoreland permit is required for excavation, fill, or construction within 250' of the reference line. Examples include, but are not limited to removing stumps, constructing most walkways, patios, other structures, or grading. Any earthwork or construction on the bank, in the water, or on the bed of a waterbody is regulated by the NHDES Wetlands Bureau and is subject to the NHDES Wetlands Permitting Process.

- Areas cleared of ground cover, shrubs, or trees prior to July 1, 2008 may be maintained but not enlarged.

- Before removing trees, always check local ordinances as well. Many municipalities have standards that are stricter than the NH Shoreland Water Quality Protection Act.

- Low-impact activities that propose no greater than 1,500 SQFT of impact may qualify for a shoreland permit by notification, which is a simplified permit with a faster turnaround.

To apply for a Shoreland Permit, visit the NHDES Shoreland webpage

Note: The Town code enforcement officer may also require a permit for work done in the shoreland zone. Contact the Town Land Use Office for more information.

Contacts

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603-539-7770

Town of Effingham
Norman Hutchins
Deputy Code Enforcement Officer
207-608-2544
www.parsonsfield.org/code-enforcement

New Hampshire Department of Environmental Services (NHDES)

Watershed Assistance Section - Grants, outreach, water quality
Sally Soule Sally.Soule@des.nh.gov (603) 559-0032

Wetlands and Shoreland Protection - Permitting, enforcement, regulations
Wetlands Bureau (603) 271-2147

Publications

A citizen's guide to Volunteer Lake Watershed Surveys. Maine DEP. 2011. https://www.maine.gov/dep/land/watershed/materials/lakewsurveyguide.pdf

A Guide to Forming Road Associations. Maine DEP. 2020. 21 pgs. https://www.maine.gov/dep/land/watershed/road_assoc_guide_2020_edit.pdf

Gravel Road Maintenance Manual: A Guide for Landowners. Kennebec County SWCD and Maine DEP. 2016. www.maine.gov/dep/land/watershed/camp/road/gravel_road_manual.pdf

Conservation Practices for Homeowners. Maine DEP and Portland Water District. 2006. 20 fact sheets. https://www.maine.gov/dep/land/watershed/materials.html

NH Homeowner's Guide to Stormwater Management. NHDES. 2019. https://www.des.nh.gov/sites/g/files/ehbemt341/files/documents/2020-01/homeowner-guide-stormwater.pdf

NHDES - Vegetation Management for Water Quality. NHDES. 2020. 5 pgs. https://www.des.nh.gov/sites/g/files/ehbemt341/files/documents/2020-01/sp-5.pdf

NHDES - Lake Information Mapper. NHDES. 2022. Online Geodatabase. https://www.des.nh.gov/resource-center/data-and-mapping

Appendix A: Watershed Map

Appendix B: Watershed Survey Data

Site #	WQ Impact	Cost	Technical Level	Erosion Issue	Erosion Recommendations	Phosphorus Load (lbs/yr)
1-11	High	Low	Homeowner	Dripline, Bare soil/lawn	Erosion Control Mulch, Dripline Trench	0.6
1-13	High	Low	Homeowner	Walking path/trail, Bare soil/lawn	Erosion Control Mulch, Vegetated Buffer	3.4
4-01	High	Low	Landscaper	Bare soil/lawn	Erosion Control Mulch	0.6
1-01	High	Low	Engineering	Buried, Unstable	Install a Culvert	0.3
2-06	High	Medium	Homeowner	Bank Erosion, Undercutting, Inadequate Shoreline Vegetation, Unstable Access, Excessive Clearing	Establish Vegetated Buffer, Live Staking	4.1
2-07	High	Medium	Homeowner	Inadequate Shoreline Vegetation, Excessive Clearing	Establish Vegetated Buffer, Live Staking, Erosion Control Mulch	1.7
7-04	High	Medium	Homeowner	Bank Erosion, Inadequate Shoreline Vegetation	Establish Vegetated Buffer, Erosion Control Mulch, Native Seed, Live Staking	5.3
3-11	High	Medium	Landscaper	Walking path/trail	Infiltration Path, Vegetated Buffer, Water Bars, Rubber Razors, Seed Bare Soil, Dripline Trench, Erosion Control Mulch	12.8
4-14	High	Medium	Landscaper	Bare soil/lawn	Erosion Control Mulch, Vegetated Buffer	42.5
4-17	High	Medium	Landscaper	Bare soil/lawn	Erosion Control Mulch, Vegetated Buffer	1.3
4-18	High	Medium	Landscaper	Bare soil/lawn	Erosion Control Mulch, Vegetated Buffer	1.7
6-05	High	Medium	Landscaper	Undercutting, Inadequate Shoreline Vegetation	Live Staking	34.4
2-05	High	Medium	Landscaper	Bank Erosion, Inadequate Shoreline Vegetation, Unstable Access, Excessive Clearing	Establish Vegetated Buffer, Erosion Control Mulch, Live Staking	1.0
3-03	High	Medium	Landscaper	Bare soil/lawn	Erosion Control Mulch, Infiltration Path, Vegetated Buffer, Water Bars, Rubber Razors, Seed Bare Soil	10.5

Site #	WQ Impact	Cost	Technical Level	Erosion Issue	Erosion Recommendations	Phosphorus Load (lbs/yr)
3-05	High	Medium	Landscaper	Walking path/trail, Bare soil/lawn	Dripline Trench, Water Bars, Rubber Razors, Seed Bare Soil	7.4
4-13	High	Medium	Landscaper	Bare soil/lawn	Erosion Control Mulch, Vegetated Buffer	25.5
2-09	High	High	Landscaper	Driveway, Dripline, Bare soil/lawn, Walking path/trail, other	Erosion Control Mulch, Infiltration Path, Vegetated Buffer, Eliminate Raking	1.7
4-16	High	High	Landscaper	Bare soil/lawn	Erosion Control Mulch, Vegetated Buffer	2.1
6-06	High	High	Landscaper	No crown/grade, No Stormwater Controls Measures	Add Crown and Grade	76.5
2-08	High	High	Engineering	No Stormwater Controls Measures, No crown/grade	Pave	3.7
2-03	High	High	Engineering	No Stormwater Controls Measures, No crown/grade	Pave, Rubber Razor, Stormwater Ditching, Stormwater Detention Basin	2.7
4-08	High	High	Engineering	Buried	Replace	1.1
5-27	High	High	Engineering	Perched	Armoring, Install Plunge Pool	17.0
2-01	High	High	Engineering	No Stormwater Controls Measures	Turn Out, Check Dams, Catch Basin, Remove Plow Berms	1.2
4-03	High	High	Engineering	Undersized, Perched, Unstable	Replace, Install Plunge Pool	0.1
4-05	High	High	Engineering	No crown/grade, No Stormwater Controls Measures	Crown / Grade, Stormwater Ditching, Check Dams, Stormwater Detention Basin	8.5
5-16	High	High	Engineering	No Stormwater Controls Measures, No crown/grade	Rt 153 Shoulder fill slope is unstable.	17.0
5-17*	High	High	Engineering	**Province Lake Beach** No Stormwater Controls Measures	Vegetated Buffer, Catch Basins, Stormwater Ditching	68.7*
5-20	High	High	Engineering	Bank Erosion	Establish Vegetated Buffer, Live Staking, Native Seed	21.3
2-11	Medium	Low	Homeowner	No Stormwater Controls Measures		0.1
4-15	Medium	Low	Homeowner	Bare soil/lawn, Walking path/trail	Infiltration Path, Water Bars, Steps	1.7

Site #	WQ Impact	Cost	Technical Level	Erosion Issue	Erosion Recommendations	Phosphorus Load (lbs/yr)
5-26	Medium	Low	Homeowner	Bank Erosion, Inadequate Shoreline Vegetation, Unstable Access	Establish Vegetated Buffer, Live Staking, Native Seed, Erosion Control Mulch	6.4
7-02	Medium	Low	Homeowner	Bank Erosion, Inadequate Shoreline Vegetation, Unstable Access	Establish Vegetated Buffer, Biodegradable Erosion Blanket, Erosion Control Mulch, Native Seed	5.3
7-03	Medium	Low	Homeowner	Dripline, Bare soil/lawn	Seed Bare Soil, Erosion Control Mulch, Vegetated Buffer	6.6
7-06	Medium	Low	Homeowner	Bare soil/lawn	Erosion Control Mulch, Seed Bare Soil, Eliminate Raking	5.3
1-04	Medium	Low	Homeowner	Bare soil/lawn	Erosion Control Mulch, Water Bars, Dripline Trench	0.6
1-06	Medium	Low	Homeowner	Walking path/trail, Bare soil/lawn	Erosion Control Mulch, Vegetated Buffer, Water Bars, Rubber Razors	0.3
1-07	Medium	Low	Homeowner	No Stormwater Controls Measures, No crown/grade	Erosion Control Mulch, Drywell	0.1
1-08	Medium	Low	Homeowner	Inadequate Shoreline Vegetation	Establish Vegetated Buffer	0.4
1-09	Medium	Low	Homeowner	Bare soil/lawn, Walking path/trail	Erosion Control Mulch, Dripline Trench	0.2
1-12	Medium	Low	Homeowner	Bank Erosion, Inadequate Shoreline Vegetation	Establish Vegetated Buffer	0.1
2-02	Medium	Low	Homeowner	No Stormwater Controls Measures, No crown/grade	Rubber Razor	0.1
3-01	Medium	Low	Homeowner	Inadequate Shoreline Vegetation, Excessive Clearing	Establish Vegetated Buffer, Live Staking	1.5
4-02	Medium	Low	Homeowner	Walking path/trail	Erosion Control Mulch, Vegetated Buffer, Driveway repair	0.8
6-01	Medium	Low	Homeowner	Walking path/trail	Erosion Control Mulch	0.1
7-01	Medium	Low	Homeowner	Inadequate Shoreline Vegetation	Establish Vegetated Buffer, Erosion Control Mulch	0.1
1-03	Medium	Low	Homeowner	Bare soil/lawn	Erosion Control Mulch	1.1
1-05	Medium	Low	Homeowner	Walking path/trail, Bare soil/lawn	Erosion Control Mulch, Water Bars	1.3

Site #	WQ Impact	Cost	Technical Level	Erosion Issue	Erosion Recommendations	Phosphorus Load (lbs/yr)
3-02	Medium	Low	Homeowner	Walking path/trail	Erosion Control Mulch	1.3
4-06	Medium	Low	Homeowner	Walking path/trail	Erosion Control Mulch, Vegetated Buffer	4.3
4-10	Medium	Low	Landscaper	Bare soil/lawn, Walking path/trail	Vegetated Buffer	0.8
3-08	Medium	Medium	Homeowner	Walking path/trail, Bare soil/lawn	Erosion Control Mulch, Infiltration Path	2.8
3-09	Medium	Medium	Homeowner	Walking path/trail, Bare soil/lawn	Erosion Control Mulch, Infiltration Path, Vegetated Buffer, Water Bars, Seed Bare Soil	4.0
5-14	Medium	Medium	Homeowner	No crown/grade, No Stormwater Controls Measures	Crown / Grade, Stormwater Ditching, Pave	7.7
3-10	Medium	Medium	Landscaper	Driveway	Firehose diverter, decommission parking. Dry well or trench at edge of parking, stones	0.1
4-12	Medium	Medium	Landscaper	Walking path/trail	Erosion Control Mulch, Vegetated Buffer	5.1
6-02	Medium	Medium	Landscaper	No Stormwater Controls Measures, No crown/grade		12.2
6-03	Medium	Medium	Landscaper	Inadequate Shoreline Vegetation	Establish Vegetated Buffer, Live Staking	0.1
6-04	Medium	Medium	Landscaper	Undercutting	Live Staking, Establish Vegetated Buffer	10.2
3-04	Medium	Medium	Landscaper	Dripline, Walking path/trail, Bare soil/lawn	Dripline Trench, Infiltration Path, Seed Bare Soil, Erosion Control Mulch, Vegetated Buffer, Water Bars	2.0
5-12	Medium	Medium	Landscaper	No Stormwater Controls Measures, No crown/grade		102.0
5-18	Medium	Medium	Landscaper	Unstable	Armoring	1.1
5-39	Medium	Medium	Landscaper	Buried, Clogged, Unstable	Replace	1.1
5-39	Medium	Medium	Landscaper	Undersized, Buried, Clogged	Replace	0.3
4-04	Medium	Medium	Engineering	Bare soil/lawn	Erosion Control Mulch, Vegetated Buffer, Road repair	1.3

Site #	WQ Impact	Cost	Technical Level	Erosion Issue	Erosion Recommendations	Phosphorus Load (lbs/yr)
2-04	Medium	High	Engineering	No Stormwater Controls Measures	Crown / Grade, Stormwater Ditching, Check Dams, This is a tough site, engineering required	10.6
2-11	Medium	High	Engineering	Undersized, Perched	Install a Culvert	0.1
4-07	Medium	High	Engineering	No crown/grade, No Stormwater Controls Measures	Crown / Grade, Stormwater Ditching, Check Dams, Stormwater Detention Basin	3.2
4-09	Medium	High	Engineering	Driveway, Bare soil/lawn	Build proper boat launch	2.1
5-24	Medium	High	Engineering	Unstable	Armoring	2.1
5-28	Medium	High	Engineering	Perched	Install Plunge Pool	1.3
1-02	Medium	High	Engineering	Buried, Clogged	Remove Clog, Replace	0.1
3-07	Medium	High	Engineering	other	Less sand, perched beach	9.0
5-15	Medium	High	Engineering	Unstable	Armoring	34.0
5-19	Medium	High	Engineering	Clogged, Undersized	Remove Clog, Replace	0.1
5-21	Medium	High	Engineering	Clogged, Crushed, Undersized, Buried	Remove Clog, Armoring, Install Plunge Pool, Replace, Install a Culvert	0.1
5-22	Medium	High	Engineering	Clogged, Crushed	Armoring, Remove Clog	0.6
5-25	Medium	High	Engineering	Clogged, Perched	Remove Clog, Install a Culvert	0.1
5-25	Medium	High	Engineering	Clogged, Perched	Remove Clog, Replace	0.1
2-10	Medium	High	Engineering	No Stormwater Controls Measures	Tough location for addressing stormwater, very thin buffer and steep bank	4.0
3-06	Low	Low	Homeowner	Walking path/trail	Erosion Control Mulch, Infiltration Path, Water Bars, Seed Bare Soil	0.1
5-11	Low	Low	Homeowner	Undersized, Clogged	Replace, Armoring, Remove Clog	0.2
1-10	Low	Low	Engineering	Clogged, Perched	Remove Clog, Replace	0.1

*Province Lake Beach/Route 153 was documented in the 2013 Watershed Survey as having a Phosphorus load of 85 lbs/year. Since then, AWWA/PLA projects have resulted in a 16.3 lbs/yr reduction of Phosphorus. Hence the new calculation seen at site **5-17** of 68.7 lbs/yr. Citation: Province Lake Watershed Management Plan Page 47