# Mousam Lake Watershed Survey Report

Mousam Lake Region Association Acton Shapleigh Youth Conservation Corps Maine Department of Environmental Protection Volunteer Lakes Monitoring Program September 2017



Mousam Lake Region Association Mission Statement

The Mousam Lake Region Association is organized for the purpose of preserving and protecting the natural character of Mousam Lake, Goose Pond and its surroundings.

We are particularly focused on monitoring and enhancing water quality and educating people about the responsible use of the lake as a public recreational facility for today and for future generations.

### Acknowledgments

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

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#### **Sponsors**

Mousam Lake Region Association and Acton Shapleigh Youth Conservation Corps with support from

Maine Department of Environmental Protection (DEP) Volunteer Lakes Monitoring Program

Some background information in this report was obtained from the 1997 Mousam Lake Watershed Survey, the 2003 Phosphorus Control Action Plan and the 2008 EPA Nonpoint Source Success Story. Cover photo - Foot of the Lake courtesy Betty Smith

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When combined with many other similar sites throughout a watershed, even erosion from small sources such as this can have a significant impact on lake water quality.

### Introduction

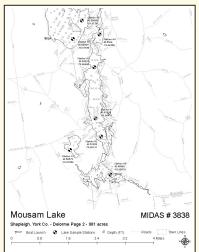
This report is specifically designed for citizens living in the Mousam Lake Watershed. It

provides the results and analysis of a soil erosion survey conducted in the Mousam Lake Watershed in 2017. The survey was conducted in response to concerns about Mousam Lake's water quality and a desire to preserve the lake's **special value** for future generations to enjoy.

#### Mousam Lake

Mousam Lake is a 926-acre lake located in the Towns of Acton and Shapleigh. Mousam Lake has a total combined **watershed** area of 21 square miles, inclusive of the associated Goose and Loon pond watersheds. For the purpose of this report only the direct watershed of Mousam Lake and Goose Pond were surveyed. Mousam Lake's shoreline is heavily developed with over 950 residences, and there are nearly 1,650 parcels in the watershed. The lake has been monitored by the MDEP and volunteers since 1974 and is considered to be stable based on measures of secchi disk transparency, total phosphorus and chlorophyll a.





Mousam Lake is listed as a Maine DEP NPS Priority Watershed. More specifically, it is listed as threatened with the reason as "Watch List." The Mousam Lake Region Association (MLRA), York County Soil & Water Conservation District (YCSWCD), and Towns of Acton and Shapleigh started lake protection efforts in 1997 when they conducted a 319-funded survey in a few areas of the watershed that identified 115 erosion problems. YCSWCD conducted a BMP Demonstration Project from 1999-2001 and installed conservation practices at six erosion sites around the watershed.

In 2001, a Mousam Lake Shoreline Survey was also completed and found that 65% of shoreline properties had inadequate buffers. During 2001 through 2007, EPA,

MDEP and Maine Department of Agriculture funded additional erosion control projects. In total, over 65 sites were addressed, the Mousam Lake YCC was established, several hundred technical assistance visits were completed and numerous workshops, and Septic and Road Socials were conducted. As a result of these efforts, Mousam Lake's water clarity stabilized and the lake was removed from the State of Maine 303 (d) Impaired Watershed's list in 2006.

### Mousam Lake's Water Quality

Volunteers and Maine DEP have tested water quality in Mousam Lake since 1974. Despite past efforts and stabilized water quality, Mousam Lake continues to be included on the State of Maine's NPS Priority Watershed "Threatened Lakes" List.

#### POLLUTED RUNOFF

Also called nonpoint source pollution or NPS. Soil, fertilizers, septic waste, pet waste and other pollutants from diffuse sources across the landscape that are carried into the pond by rainfall.

There is a moderate to low potential for algal blooms with some dissolved oxygen depletion in the late summer months and a moderate to high potential for internal recycling. Water quality is considered to be average compared to similar class coastal lakes and ponds.

Runoff erodes sediment and carries it into Mousam Lake.

### Why is the Water Quality at Risk?

The biggest pollution culprit in Mousam Lake and other Maine lakes is **polluted runoff** or nonpoint source (NPS) pollution. Storm water runoff from rain and snowmelt picks up soil, nutrients and other pollutants as it flows across the land, and washes into the lake.

In an undeveloped, forested watershed, storm water runoff is slowed and filtered by tree and shrub roots, grasses, leaves, and other natural debris on the forest floor. It then soaks into the uneven forest floor and filters through the soil.

In a developed watershed, however, storm water does not always receive the filtering treatment the forest once provided. Rain water picks up speed as it flows across impervious surfaces like rooftops, compacted soil, gravel camp roads and pavement, and it becomes a destructive erosive force. In this way,

runoff from the developed areas in the watershed often washes directly into the lake or its feeder streams.

### Why is Runoff a Problem?

The problem is not necessarily the water itself. It's the sediment and nutrients in the runoff that can be bad news for Maine lakes. Studies have shown that runoff from developed areas has 5 to 10 times the amount of **phosphorus** compared to runoff from forested areas.

The nutrient, phosphorus, is food for algae and other plants and is found in soils, septic waste, pet waste and fertilizers. In natural conditions, the scarcity of phosphorus in a lake limits algae growth. However, 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.



Excess **phosphorus** can "fertilize" a lake and lead to nuisance **algal blooms**.

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

#### Mousam Lake Watershed

Mousam Lake is a dual basin, 926 acre waterbody in the towns of Acton and Shapleigh in York County, southwestern Maine. The watershed also includes the Goose and Loon Pond watersheds The lake has a maximum depth of 95 feet and a mean depth of 17 feet. The larger, upper basin, of Mousam Lake has a relatively slow, near average flushing rate of 1.3 times per year. The smaller and shallower lower basin of Mousam Lake has a much faster flushing rate of nearly 18 times per year. A total drainage area, inclusive of Goose and Loon Pond watersheds is 13,354 acres or 21 square miles.

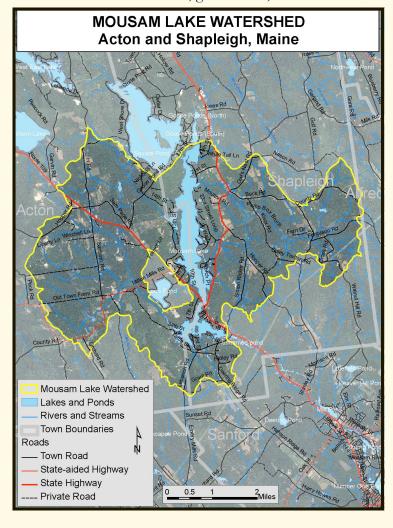
All of the land within the unshaded area (see below) drains directly into the lake through a network of streams, ditches and overland flow. Pump Box Brook, is one major stream that flows into the lake and Goose Pond is also a major source flowing into the lake.

Both upper and lower Mousam Lake basins are highly developed along the shoreline. There are approximately 950 shoreline lots and a total of 1,650 lots watershed wide. The majority of the people who live in Acton and Shapleigh live within the Mousam Lake watershed and the seasonal population increases to over 12,000 people. In 2001, it was reported that only four small farms remain active in the watershed and the largest of these is an apple orchard located on Hubbard Ridge in Acton. Other land uses include commercial boat marinas, gas stations, stores and

restaurants and the Acton Fairgrounds in the lower basin.

#### WATERSHED

All the land that surrounds a lake that drains or sheds its water into the lake through streams, ditches, over the land or through groundwater.



### Why should we protect Mousam Lake from polluted runoff?

- Once a lake has declined, it can be difficult or impossible to restore. Prevention is the key.
- ◆ The lake contains valuable habitat for fish, birds and other wildlife. Mousam Lake has a mixed warm water and coldwater fishery including American eel, golden shiner, fallfish, white sucker, brown bullhead, chain pickerel, banded killifish, pumpkinseed, redbreast sunfish and yellow perch to comprise the native species; The six stocked-managed species include sea-run alewife, landlocked rainbow smelt and atlantic salmon, brook, lake and brown trout. The principal warmwater fishery include smallmouth and largemouth bass, chain pickerel and black crappie.
- Mousam Lake provides excellent recreational opportunities to local residents and to visitors. It is an important contributor to the local economy.
- A 1996 University of Maine study found that lake water quality affects property values. For every 3-foot decline in water clarity, shorefront property values can decline as much as 10 to 20%! Declining property values affect individual landowners as well as the entire community.
- Sediment deposited into the lake from erosion creates the ideal environment for invasive aquatic plants to thrive.









### What is being done to protect Mousam Lake?

The Mousam Lake Region Association was formed in 1956 "to preserve, enhance, and protect the quality" of the Lake. Early action of its members lifted it from "impaired" in 2006 in collaboration with the Towns of Acton and Shapleigh and the York County Soil & Water Conservation District.

Recent and renewed concern for its protection have spurred association members and the Acton Shapleigh Youth Conservation Corps to sponsor workshops, as well as perform this watershed survey.

The Acton Shapleigh Youth Conservation Corps continues to work throughout the watershed to address smaller erosion problems and has completed over 360 projects since 2001 and provided more than 650 landowners with technical assistance.

The MLRA plans to also collaborate with the Towns of Acton & Shapleigh, the Acton Shapleigh Youth Conservation Corps and the York County Soil and Water Conservation District to apply for a "Section 319" grant through the Maine DEP to help fix some of the higher priority sites identified in the 2017 survey.

### The Purpose of the Watershed Survey

The primary purpose of the watershed survey was to:

- Identify and prioritize existing sources of polluted runoff, particularly soil erosion sites, in the Mousam Lake Watershed.
- Raise public awareness about the connection between land use and water quality, and the impact of soil on Mousam Lake. Inspire people to become active watershed stewards.
- Provide the basis to obtain additional funds to assist in fixing identified erosion sites.
- Use the information gathered as one component of a long term lake protection strategy.
- Make general recommendations to landowners for fixing erosion problems on their properties.

The purpose of the survey was NOT to point fingers at landowners with problem spots, nor was it to seek enforcement action against landowners not in compliance with ordinances. It is the hope that through future projects, the MLRA can work together with landowners to solve erosion problems on their property, or help them learn how best to accomplish solutions on their own.

Local citizen participation was essential in completing the watershed survey and will be even more important in upcoming years. With the leadership of the MLRA and assistance from agencies concerned with lake water quality, the opportunities for stewardship are limitless.

The MLRA hopes that you will think about your own property as you read this report, and then try some of the recommended conservation measures. Everyone has a role to play in lake protection!

### The Survey Method

The survey was conducted by volunteers with the help of trained technical staff from the DEP, ASYCC, Fiddlehead Consulting, Ecological Instincts, CCSWDC and YCSWCD. Thirteen volunteers were trained in survey techniques during a two hour classroom workshop in May 2017. Following the classroom training, the volunteers and technical staff spent the remainder of that day documenting erosion on the roads, properties, driveways, and trails in their assigned sectors using cameras and standardized forms. The teams worked together throughout the summer months to complete any unfinished sectors. Technical staff conducted follow-up examinations of sites to verify data accuracy. The survey included Goose Pond watershed but not Loon Pond watershed since it was surveyed in 2011.

The collected data were entered into a computer database to create a spreadsheet and the documented erosion sites were plotted on maps. The sites were broken out into land use categories (such as driveways, roads, private residences) and ranked based on their impact on the lake, the technical ability needed to fix the problem, and the estimated cost of fixing the problem.

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 MLRA or ASYCC for additional site information.

### Summary of Watershed Survey Findings

Volunteers and technical staff identified 189 sites in the Mousam Lake Watershed that are impacting or have the potential to impact water quality. Some key conclusions include:

- 110 of the identified sites (60%) were found on residential areas. These sites tend to have less severe erosion and can be fixed easily with low cost. Individual landowners can play a big role in helping address these problems.
- A significant percentage of the remaining erosion sites (28%) were associated with roads (private roads and driveways). These sites tend to be larger erosion problems with a greater lake impacts.
- Most sites can be fixed with low to moderate labor and materials cost. In fact, only 15 of the 186 sites were rated with a high cost of materials and labor (over \$2500).
- Erosion sites were identified all around the watershed and on eleven different types of land uses. Only the top eight land use categories are shown below as the remaining categories have less that 5 sites altogether. As such, everyone has a role to play in lake protection. The Towns of Acton and Shapleigh, shorefront property owners, business owners, road associations, lakefront landowners and even people living far from the lake can all take measures to reduce lake pollution.

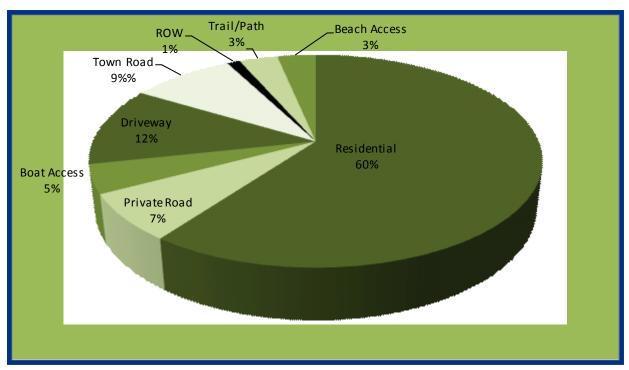


Figure 1. Erosion Sites by Land Use

Figure 2. Mousam Lake Watershed Sectors

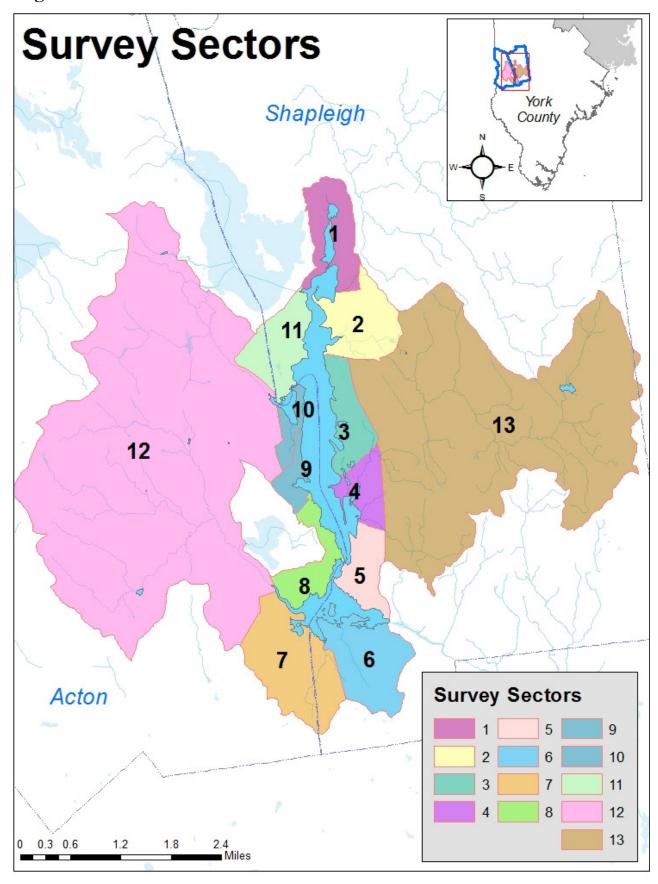
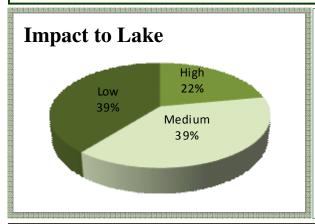


Table 1. Breakdown of site by land use categories and impact to lake.

| Land Use     |      |        |     |       |
|--------------|------|--------|-----|-------|
|              | High | Medium | Low | Total |
| Residential  | 17   | 36     | 58  | 111   |
| Private Road | 4    | 9      | 2   | 15    |
| Boat Access  | 5    | 2      | 1   | 8     |
| Driveway     | 5    | 15     | 2   | 22    |
| Town Road    | 5    | 8      | 3   | 16    |
| State Road   | 0    | 1      | 0   | 1     |
| ROW          | 1    | 1      | 0   | 2     |
| Trail/Path   | 2    | 2      | 2   | 6     |
| Construction | 0    | 0      | 1   | 1     |
| Commercial   | 1    | 0      | 0   | 1     |
| Beach Access | 1    | 4      | 1   | 6     |
| Totals       | 42   | 77     | 70  | 189   |

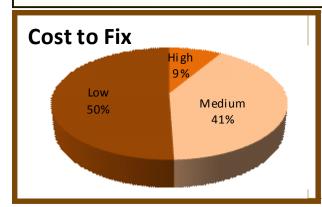
**Impact to Lake**—Each site was rated for its potential impact to the lake. Only 22% (41 of 189 sites) were deemed to have a high impact.



**Impact** was based on slope, soil type, amount of soil eroding, proximity to water or buffer, and buffer size.

- "Low" impact sites are those with significant buffer or filtering.
- At "medium" impact sites, some buffer or filtering but visible signs of concentrated flow or sediment movement through buffer into lake
- "High" impact sites have no filtering or buffering, all channelized direct flow into lake or stream

Cost of Materials to Fix Sites—Recommendations were made for fixing each site and the associated cost of labor and materials were estimated. Only 9% (or 17 of 189 sites) entail a high cost. As shown below, most sites can be fixed inexpensively with low-cost materials like mulch and stone.



**Cost** is an important factor in planning for restoration. The cost of labor and materials to fix each site was rated as follows.

- "Low" cost sites were estimated to cost less than \$500.
- An estimate of \$500 to \$2,500 was rated "medium".
- If the estimated cost to fix a site exceeded \$2,500, a "high" rating was assigned.

### **Residential Areas**

Of the 111 sites associated with residential areas, 58 were low impact, 36 were medium impact, and 17 were high impact. 70 of the 111 sites can be fixed with low cost. Some of the most common problems and recommended conservation practices are pictured below.



**Mulch**—Place mulch such as J.A. Simpson's "Soil Conservation Mix" on bare soil.



Before-Loose, bare soil washed down hill directly into lake.





**After -** A winding path was created and covered with crushed stone. Sides of the path were covered with bark mulch and planted with attractive shrubs and flowers.



Waterbars—Place timbers or log "speed bumps" across paths to slow runoff and trap soil.



**Roof Runoff**—Install stonefilled trenches along the roof dripline to help infiltrate runoff.



Example:
Buffers—Plant trees and shrubs along the shoreline or let them grow back naturally.

Residential areas were associated with over half (60%) of the identified sources of polluted runoff. These problems pose a significant threat to lake water quality. Fortunately, most of these sites can be corrected with easy, low cost fixes.

In addition, the ASYCC Erosion Control Crew can provide free labor to install erosion controls and technical assistance is also available for a very low cost.

### Private Roads and Driveways

15 private road sites with 4 high impact, 9 medium impact and 2 low impact sites. 22 driveways had documented erosion problems. 5 of these had a high impact, 15 had medium impact and 2 had low impact. 22 of the 37 sites can be fixed at a medium cost (\$500-\$2500) or low cost (under \$500). Some of the most common problems and recommended conservation practices are pictured below.





Photo above - Private gravel road with shoulder erosion, left over plow and grader berms. Recommend defining ditch or drainage swale and removing berms.

Photo left-water channelizing in this driveway creating a gully.

### Examples



**Ponding Areas**—Create small ponding areas to trap sediment and infiltrate driveway runoff.



Road Material—Add hardpacking, cohesive surface material to the driveway.



**Crown**—Grade the road so water runs off the sides. Remove sand and grader berms from road edges.

Preserve water quality and save time, money and wear on your vehicle by having a lake-friendly camp road. Use adequate surface material, establish a crown, and add diversions to direct runoff into buffers.

### Next Steps ~ Where Do We Go From Here?

Fixing the sites identified in this survey will require efforts by individuals, the Mousam Lake Region Association, road associations and municipal officials.

### Mousam Lake Region Association

- Distribute copies of the survey report or summary survey report to property owners, road associations and towns with identified erosion problems and encourage them to make improvements.
- Will collaborate with ASYCC, YCSWCD, and municipalities to apply for DEP and other grants to help fix erosion problems identified in the survey.
- Continue to increase and empower the association's membership, and provide educational materials and guidance to members of the Mousam Lake watershed community.
- Continue to partner with the Town of Acton & Shapleigh, ASYCC, York County SWCD, Maine DEP, and others to seek funding and implement projects to protect lake water quality.
- Organize workshops and volunteer "work parties" to start fixing identified erosion problems and teach citizens how to fix similar problems on their own properties.
- Educate municipal officials about lake issues and work cooperatively to find solutions.

#### **Individual Landowners**

- Look in the report or contact the MLRA to see if you have a identified erosion problem. If so, try to start fixing it. Call the ASYCC or DEP for free advice about how to get started.
- Stop mowing and raking your shoreline and parts of your property. Let lawn and raked areas revert back to natural plants. Deep shrub and tree roots help hold the soil.
- Avoid exposing bare soil. Seed and mulch bare areas.
- Read "Permitting ABCs" on page 13 and call the Town Code Enforcement Officer and DEP before starting doing any cutting or soil disturbance projects.
- Maintain septic systems properly. Pump septic tanks (every 2 to 3 years for year round residences; 4-5 years if seasonal) and upgrade marginal systems.
- Join the Mousam Lake Region Association and get involved with their activities.

#### **Municipal Officials**

- Enforce shoreland zoning and other ordinances to ensure the protection of Mousam Lake.
- Conduct regular maintenance on town roads in the watershed.
- Participate in and support long term watershed management projects and watershed protection grant applications.
- Promote training for road crews, boards, commissions, and other decision-makers.



### **Conservation Practices for Homeowners**

After reading this report you probably have a general idea about how to make your property more lake-friendly. However, making the leap from concept to construction may be a challenge.

The Maine DEP and Portland Water District's series of fact sheets answer many common how-to questions. The fact sheets profile 20 common conservation practices and include detailed instructions, diagrams and color photos about installation and maintenance. The series includes the following:

Construction Practices Dripline Trench Drywells Erosion Control Mix Infiltration Steps (2) Infiltration Trench Live Plant Staking Native Plant Lists (6) Open-Top Culverts Paths and Walkways Permitting Planting Vegetation

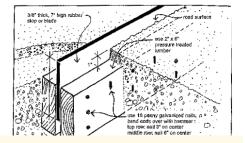
Rain Barrels Rain Gardens Rubber Razors Turnouts Waterbars

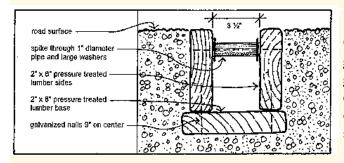


The series includes four native plant lists. Each one is tailored to different site conditions (e.g., full sun and dry soils). The lists include plant descriptions from the DEP's *Buffer Handbook* and small color photos of each plant to make plant selection easier.

Fact sheets are available to help you install conservation practices on your property. Download at http://www.maine.gov/dep/blwq/docwatershed/materials.htm.

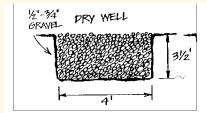
**Rubber Razor Blade:** Use this structure in a gravel driveway or camp road. It can be plowed over only if the plow operator is aware of its presence and lifts the plow blade slightly. Place it at a 30 degree angle to the road edge and direct the outlet toward a stable vegetated area.





**Open Top Culvert:** Use this structure in a gravel driveway or camp road that does not get plowed in the winter. Place it at a 30 degree angle to the road edge and point the outlet into stable vegetation. Remove leaves and debris as needed.

**Drywell:** Use a drywell to collect runoff from roof gutter downspouts. Drywells can be covered with sod, or left exposed for easy access and cleanout. Drywells and infiltration trenches work best in sandy or gravelly soils.



### Permitting ABC's

Protection of Maine's watersheds is ensured through the goodwill of lake residents and through laws and ordinances created and enforced by the State of Maine and local municipalities. The following laws and ordinances require permits for activities adjacent to wetlands and waterbodies.

Shoreland Zoning Law—Construction, clearing of vegetation and soil movement within 250 feet of lakes, ponds, and many wetlands, and within 75 feet of most streams, falls under the Shoreland Zoning Act, which is administered by the Town through the Code Enforcement Officer and the Planning Board.

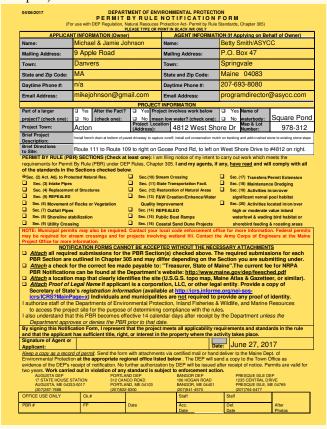
Natural Resources Protection Act (NRPA) - Soil disturbance & other activities within 75 feet of the lakeshore or stream also falls under the NRPA, which is administered by the DEP.

Contact the DEP and Town Code Enforcement Officer if you have any plans to construct, expand or relocate a structure, clear vegetation, create a new path or driveway, stabilize a shoreline or otherwise disturb the soil on your property. Even if projects are planned with the intent of enhancing the environment, contact the DEP and town to be sure.

#### How to apply for a Permit by Rule with DEP:

To ensure that permits for small projects are processed swiftly, the DEP has established a streamlined permit process called **Permit by Rule**. These one page forms (shown here) are simple to fill out and allow the DEP to quickly review the project.

- Fill out a notification form before starting any work. Forms are available from your town code enforcement officer, Maine DEP offices, or online at http://www.state.me.us/dep/blwq/docstand/nrpa/pbrform.pdf
- The permit will be reviewed by DEP within 14 days. If you do not hear from DEP in 14 days, you can assume your permit is approved and you can proceed with work on the project.
- Follow all standards required for the specific permitted activities to keep soil erosion to a minimum. It is important that you obtain a copy of the standards so you will be familiar with the law's requirements.



### Where Do I Get More Information?

#### Mousam Lake Region Association

P.O. Box 333 Springvale, Maine 04083 http://mousamlake.mylaketown.com/

### **Acton Shapleigh Youth Conservation Corps**

P.O. Box 47 Springvale, Maine 04083 207-693-8080 programdirector@asycc.com

#### York County Soil and Water Conservation District

21 Bradeen Street, Suite 104 Springvale, Maine 04083 info@yorkswcd.org 207-324-0888

Offers assistance with watershed planning and surveys, environmental education, engineering support, seminars and training sessions, and education on the use of conservation practices.

### Maine Department of Environmental Protection

312 Canco Road, Portland, Me 04103 (207) 822-6320 or 800-452-1942 www.maine.gov/dep

Provides permit applications and assistance, numerous reference materials, environmental education, funding opportunities, and stewardship activities for lakes.

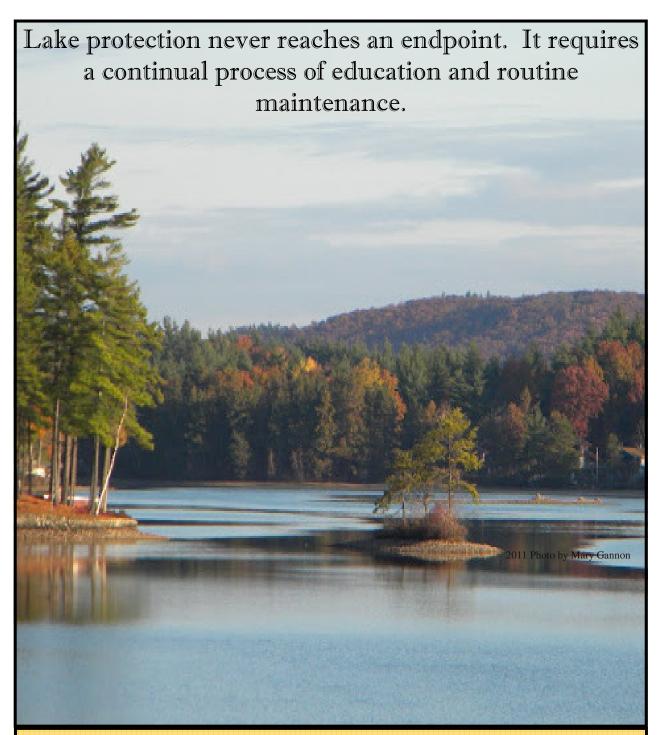
#### **Publications**

Camp Road Maintenance Manual: A Guide for Landowners. Kennebec County SWCD and Maine DEP. 2016. 106 pgs. <a href="www.maine.gov/dep/land/watershed/camp/road/gravel-road-manual.pdf">www.maine.gov/dep/land/watershed/camp/road/gravel-road-manual.pdf</a>

Conservation Practices for Homeowners. Maine DEP and Portland Water District. 2006. 20 fact sheets. <a href="www.maine.gov/dep/land/watershed/materials.htm">www.maine.gov/dep/land/watershed/materials.htm</a>

Maine Shoreland Zoning—A Handbook for Shoreland Owners. Maine DEP. 2008. 40 pgs. Www.maine.gov/dep/land/slz/citizensguide.pdf.

**A Guide to Forming Road Associations.** Maine DEP. 2014. 25 pgs. & appendices. www.maine.gov/dep/land/watershed/materials.htm



The purpose of this survey is to raise awareness, and to assist the MLRA and the ASYCC with prioritizing protection efforts in the Mousam Lake watershed. This comprehensive survey utilized volunteers to document known, existing issues and to identify new issues. Every attempt was made to ensure reporting accuracy. Information collected for this survey and provided in this report is intended for educational and watershed management purposes only and will not be used to seek any enforcement action against landowners. If you have any questions or wish to request a technical assistance visit, please contact the ASYCC Director

at ECCleader@asycc.com or betty@asycc.com.