Moose Pond

Watershed Survey Report

Cumberland County Soil & Water Conservation District

Prepared by Heather True
March 2011

Acknowledgments

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

Sponsors

Cumberland County Soil and Water Conservation District (CCSWCD)
Maine Department of Environmental Protection (MDEP)
Lakes Environmental Association (LEA)
Moose Pond Association (MPA)
US Environmental Protection Agency
Towns of Bridgton, Denmark, and Sweden

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Moose Pond Watershed Survey volunteers on May 8th, 2010.

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Watershed

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

A study of the entire Moose Pond Watershed was conducted over the summer of 2010 to identify sites contributing polluted runoff, particularly soil erosion, into the Pond. Volunteers and technical staff identified 208 erosion sites currently impacting or having the potential to impact the Pond's water quality. Of these 208 sites, 23 were rated as having a high impact to water quality, 75 as medium impact, and 110 as low impact (see Table 1 p. 5). Impacts predominantly consisted of the following land uses: residential (73 sites), town roads (34 sites), commercial (30 sites), driveways (24 sites), beach access (18 sites), and private roads (17 sites). Impacts were also identified at state roads (5 sites), trails or paths (3 sites), boat access (2 sites), construction site (1 site), and a picnic site (1 site).

All water quality impact sites identified were in the towns of Bridgton and Denmark (See map of watershed survey sites in Appendix B). Out of the 34 Town Road sites identified, 9 were in the Town of Bridgton and 25 were in the Town of Denmark.

Residential and driveway sites combined represented more than half of all the sites identified. Common issues included: surface erosion, lack of shoreline vegetation, shoreline erosion and/or undercutting, areas of bare soil / uncovered sand, roof runoff causing erosion, unstable water access, evidence of beach sand being brought in, shoulder erosion, clogged culverts, and unstable culvert inlets and outlets.

Next Steps

Moose Pond.

Cumberland County Soil and Water Conservation District, with the support of Moose Pond Association, Lakes Environmental Association, Oxford County Soil and Water Conservation District, and the towns of Bridgton, Denmark, and Sweden, plan to submit a grant to the Maine Department of Environmental Protection seeking funds to help address the biggest impact sites. This funding will provide free technical assistance and cost sharing for property owners of these impact sites. Given the size of this watershed and the number of sites observed, addressing these sites will likely occur in two phases. For more information about the grant process, please contact the Cumberland County Soil and Water Conservation District at (207) 892-4700.

Introduction

Moose Pond Watershed

Moose Pond, located in the towns of Bridgton, Denmark, and Sweden in both Oxford and Cumberland County, Maine, is currently listed on the Maine Department of Environmental Protection's (MDEP) *Nonpoint Source Priority Watershed* list. The Pond has a surface area of 1,617 acres and a volume of 30,722 acres/feet with a mean depth of 20 feet and a maximum depth of 80 feet. The Pond's watershed covers 11,170 acres and is part of the larger Saco River Watershed. Moose Pond has three distinct basins: upper, middle, and lower. The flushing rates for these basins are 4.97, 1.04, and 6.34 flushes per year, respectively. All three watershed towns (Bridgton, Denmark, and Sweden) have Comprehensive Plans approved by the State Planning Office.

NONPOINT SOURCE (NPS) PRIORITY WATERSHED

Waterbodies listed on MDEP's NPS priority watershed list are higher priorities for state resources . Visit MDEP's website: www.maine.gov/dep/blwq/docwatershed/nps_priority_list/index.htm for additional information.

Moose Pond is a highly valued waterbody for fishing, boating, and swimming. The Pond has two public boat launches located on Route 302 in Bridgton and one on Denmark Road in Denmark. It also has a scenic public picnic/rest area on Route 302 in Bridgton, a campground on Mountain Road in Denmark, and a public beach on Denmark Road in Denmark. Highly valued for its large and smallmouth bass fishery, Moose Pond is home to yearly bass tournaments. The Maine Department of Inland Fisheries and Wildlife used to stock Moose Pond with lake trout and currently stock the Pond with salmon.

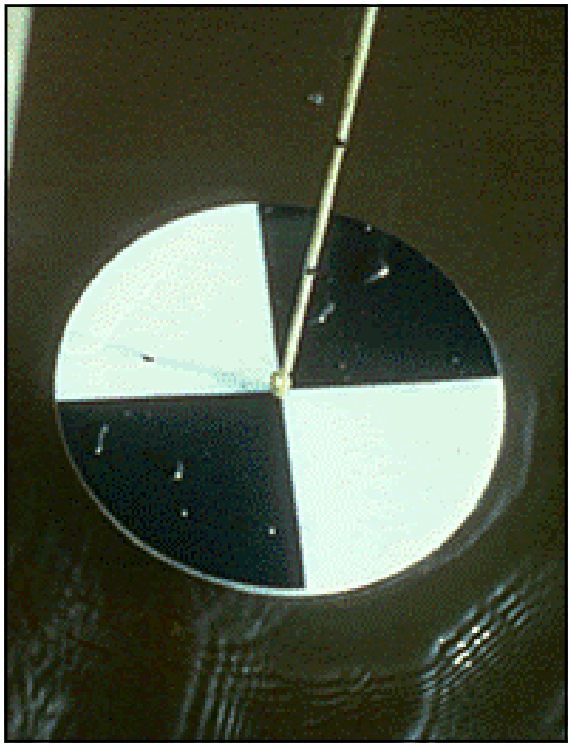
Since the mid 1970's, Lakes Environmental Association (LEA) has supported the Moose Pond community. In addition to working with volunteers to regularly monitor the water quality of the Pond, LEA maintains courtesy boat inspectors at launches and also assisted landowners in forming the Moose Pond Association. With support of the Alpine Village Association and the Town of Bridgton, LEA recently applied for and was granted Maine Department of Transportation's Surface Water Quality Protection Program funds to address sedimentation stemming from ditches along Route 302 in Bridgton. In addition, LEA designed and oversaw the installation of boat washing stations for both the southern and northern launches with funding from generous landowners and the Towns of Bridgton and Denmark.

Aerial view of Moose Pond.

The Moose Pond Association (MPA) is actively working to maintain and improve Moose Pond. They fund boat inspectors to prevent invasive aquatic plants from entering Moose Pond, conduct surveys to monitor for invasive aquatic plants and are currently working to reduce erosion along the Route 302 causeway caused by heavy recreational use. They also recently led an effort to preserve the scenic Caruso Island.

Moose Pond's Water Quality

Water quality data for Moose Pond has been collected since 1976. The Pond is divided into the three distinct basins. The upper basin (north of Route 302), is considered to have above average water quality based on measures of Secchi Disk Transparencies, total phosphorus, and Chlorophyll-a. This portion of the Pond, located in the least developed area of the watershed, is also considered to have a low potential for nuisance algal blooms. The middle basin (located near the Bridgton/Denmark line) and the lower basin (near Wood Island), however, both show moderate dissolved oxygen depletion in deep areas of the Pond, which is severely limiting habitat for the Pond's cold water fishery and increases the risk of internal loading of phosphorus. Due to low dissolved oxygen in deep waters of Moose Pond during the late summer and the associated impact on cold water fish species such as salmon, Lakes Environmental Association currently rates Moose Pond in a moderate to high degree of concern category.



Secchi disk being lowered into the water to determine water clarity.

Why is the Water Quality at Risk?

The biggest pollution culprit in Moose Pond and most other Maine lakes is **polluted runoff.** During and after storms and snowmelt, soil (and hitch-hiking nutrients like phosphorus and nitrogen) washes into the lake from the surrounding landscape through streams, ditches and overland flow.

POLLUTED RUNOFF

Also called:

- Surface Runoff
- Stormwater Runoff
- Overland Flow
- Nonpoint Source (NPS) Pollution

Raking removes the natural duff layer (pine needles, leaves, etc.), which results in increased runoff into the lake.

In an undeveloped, forested watershed, 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, stormwater does not always receive the treatment the forest once provided. It gathers with other runoff from impervious surfaces like rooftops, compacted soil, gravel camp roads, and pavement, speeds up, and becomes a destructive, erosive force. If the phosphorus supply to the lake is great enough, the resulting cycle of increased algae growth, death, and decomposition can lead to oxygen depletion in the bottom portion of the lake. When lake-bottom oxygen is gone, a chemical change occurs that allows phosphorus previously locked in the bottom sediments to be re-released into the lake waters. This "internal recycling" of phosphorus continues the downward spiral in lake quality.

There are many ways residents of Moose Pond can reduce the impacts of polluted runoff. This report outlines several of these options.

How Does Runoff Become A Problem?

The problem is not necessarily the water itself, it's the sediment and nutrients in the surface runoff that can be bad news. Large volumes of sediment can settle out in the lake, creating an ideal substrate for nuisance and invasive aquatic plants such as variable-leaved water milfoil. Phosphorus, a nutrient that is common in soils and dissolved in polluted runoff, is a primary food for all plants, including algae. In natural conditions, the scarcity of phosphorus in a lake limits algae growth. However, when a lake receives extra phosphorus from the watershed, algae growth increases dramatically. Sometimes this growth causes choking blooms, but more often it results in small, insidious changes in water quality that, over time, damage the ecology, aesthetics, and economy of lakes.

Photo credit: Maine VLMP

Excess **phosphorus** can "fertilize" a lake and lead to nuisance **algae blooms** like this one that occurred in 2002 on Pease Pond in Wilton, Maine.

Why should we protect Moose Pond from polluted runoff?

- The lake contains valuable habitat for fish, birds and other wildlife.
- Moose Pond provides recreational opportunities to watershed residents and to visitors. It is an important contributor to the local economy.
- Sedimentation of a lake creates the perfect silty habitat for invasive aquatic plants, such as variable milfoil, which has become a threat to all Maine lakes.
- A 1996 University of Maine study demonstrated that lake water quality affects property values. For every meter (3 ft) decline in water clarity, shorefront property values can decline as much as 10 to 20 percent! Declining property values affect individual landowners as well as the economics of the entire community.
- Once a lake has declined, it can be quite difficult to restore.

Moose Pond shoreline.

Moose Pond Association's mission is to help maintain and improve the quality of life on Moose Pond. To learn more about MPA, visit their website at www.moosepondassociation.org

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 Moose Pond Watershed.
- Raise public awareness of the connection between land use and water quality and the impact of polluted runoff.
- Help direct future plans for remediation and protection efforts.
- Make general recommendations for fixing erosion problems documented.

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. The results of this survey are intended to provide landowners and the Moose Pond Association the information needed to continue to protect Moose Pond from polluted runoff.

The Survey Method

Moose Pond Watershed Survey volunteers.

The survey was conducted by 22 volunteers with the help of experienced technical staff. Volunteers were trained on survey techniques and erosion identification during a two hour classroom workshop on May 8th, 2010. Following the classroom training, the volunteers and technical staff spent the remainder of the day in the field documenting erosion on the roads, shoreline, stream crossings, and foot trails in their assigned sectors by using cameras, GPS, and standardized forms. Sections that were not surveyed on May 5th were completed by volunteers and technical staff throughout the summer. Camp Winona, Camp Wyonegonic, and Shawnee Peak were evaluated during the Spring and Summer of 2010 by experienced technical leaders. In the fall of 2010, technical staff conducted pollutant loading estimates of all identified medium and high impact sites.

The data collected was entered into a database, and the documented erosion sites were plotted on maps. The sites were broken out into categories (driveways, roads, private residences, etc.) and rated based on their impact on the lake and the estimated cost of fixing the problem. The next section of this report gives a description of sites and associated ratings. Maps are located in Appendix B and a spreadsheet of the data collected is located in Appendix C.

Summary of Watershed Survey Findings

Volunteers and technical staff identified 208 erosions sites in the Moose Pond Watershed that are currently impacting or have the potential to impact water quality.

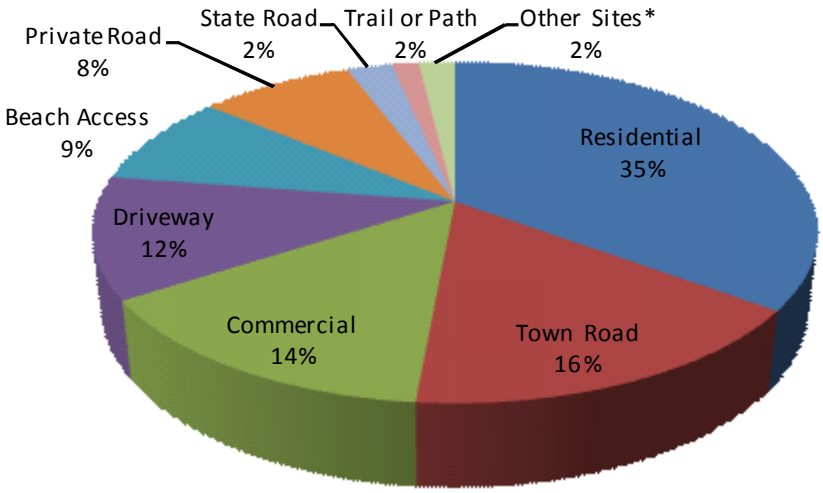
Table 1 represents the tally of sites in each category as well as their impact rating. Most sites were determined to have a low impact to the Pond (110 total), but it is important to remember that the cumulative impact of all sites is what can cause water quality to decline. The different levels of impact are defined in the following pages.

The pie chart in Figure 1 below depicts the percentage of erosion sites documented in each land use category. More than half of the sites identified were associated with residential properties and town roads. A map of all documented sites can be found in Appendix B.

Table 1. Summary of site categories and impacts

Land Use	High Impact	Medium Impact	Low Impact	Total
Beach Access	0	9	9	18
Boat Access	2	0	0	2
Commercial	8	12	10	30
Construction Site	0	1	0	1
Driveway	2	4	18	24
Picnic Site	0	0	1	1
Private Road	2	7	8	17
Residential	3	26	44	73
State Road	1	3	1	5
Town Road	5	11	18	34
Trail or Path	0	2	1	3
Total	23	75	110	208

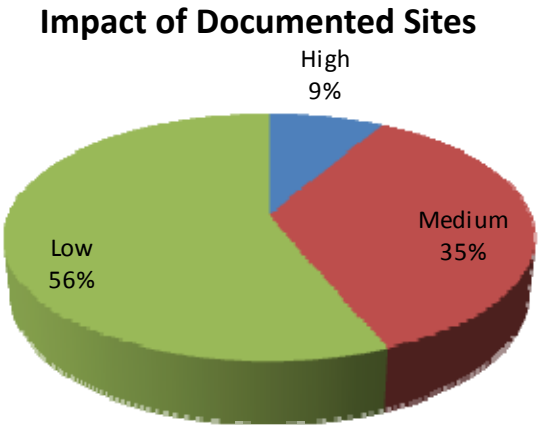
Figure 1. Percentages of Erosion Sites by Land Use



* Other sites include Boat Access (2 sites), Construction Site (1 site), and Picnic Site (1 site)

All of the documented sites were rated for their relative impact to water quality and the cost of materials and labor for the recommended fixes. Figures 3 and 4 depict these ratings.

Figure 3.

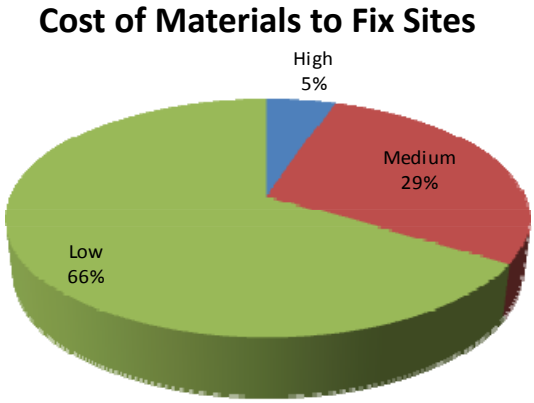


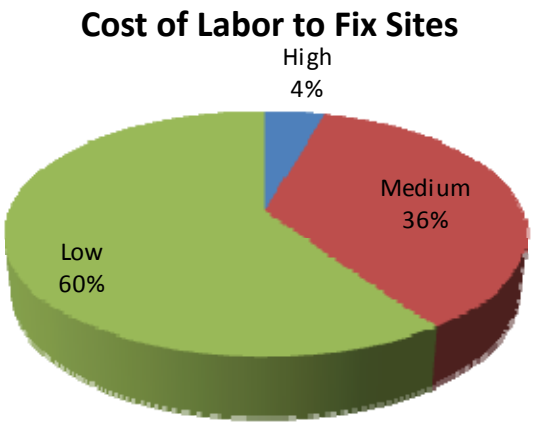
Impact was based on size of site, slope, amount of soil eroded and proximity to water.

- "Low" impact sites are those with limited soil transport off-site.
- At "medium" impact sites, sediment is transported off-site, but the erosion doesn't reach a high magnitude.
- "High" impact sites are large sites where there is significant erosion that flows directly into Moose Pond or a waterbody flowing into the lake.

More than half of all documented sites were ranked low impact. It is important to keep in mind that, when combined with many other similar sites throughout a watershed, even erosion from small sources can have a significant impact on lake water quality.

Figure 4.





Cost is an important factor in planning for restoration. It is useful to consider costs for materials and labor individually, so as to not miss any "hidden" costs.

- "Low" cost sites were estimated to cost less than $500 to fix.
- 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.

The majority of the sites identified had a low cost of materials and a low cost of labor.

Residential Areas

A total of 73 sites were identified in the survey as being associated with residential areas. Of these sites, 3 were rated as being high impact, 26 as medium impact, and 44 as low impact. The majority of the sites can be fixed with low cost of material and labor.

Common Problems Identified:

- Slight to moderate surface erosion
- Lack of shoreline vegetation
- Shoreline erosion and/or undercutting
- Areas of bare soil, uncovered sand
- Roof runoff causing erosion
- Unstable water access
- Evidence of beach sand being brought in

Typical Solutions to these Problems:

- Vegetate and mulch bare soil
- Establish or enhance shoreline vegetation
- Limit foot traffic in eroding areas
- Define recreational areas on property
- Create defined meandering footpaths
- Install dripline trench to catch roof runoff
- Educate about the impacts of beach sand to water quality

(Sector and site number blocked from photos for generalization purposes.)

The erosion problems associated with the property pictured at left were common on many other properties within the watershed.

Problems:

- Lack of shoreline vegetation.
- Bare soil with surface erosion.
- Direct flow of sediment to pond.
- Exposed tree roots.

Solutions:

- Plant native plants.
- Mulch bare areas.
- Infiltrate or redirect runoff above shoreline.
- Stop raking.
- Create defined foot paths.

Residential areas were the most common land use to impact Moose Pond representing 35% of all sites documented.

Town Roads

Of the 34 town road sites documented through the survey, 5 were high impact, 11 were medium impact, and 18 were low impact. Most of the problems identified appear to be fairly inexpensive to fix.

Common Problems Identified:

- Unstable culvert inlets and outlets
- Moderate shoulder erosion
- Unstable ditching / ditch erosion
- Clogged or rusted culverts
- Road surface erosion
- Sinkholes above culvert crossings
- Buildup of winter sand

Recommended Solutions:

- Clean out culverts and armor culvert inlets and outlets with riprap
- Vegetate or stabilize road shoulders
- Clean, reshape, and armor ditches with stone or vegetate with grass
- Replace clogged and rusted culverts
- Enlarge and lengthen culverts contributing to erosion
- Remove winter sand

The erosion problems associated with the town road pictured below were common on many other roads throughout the watershed.

(Sector and site number blocked from photos for generalization purposes.)

Problems:

- Unstable culvert inlet and outlet.
- Moderate road shoulder erosion.

Solutions:

- Armor culvert inlet and outlet with stone.
- Stabilize road shoulder with angular riprap.

Erosion sites on town roads were identified as the second most common land use impacting Moose Pond (16%). Many of these sites simply require improved road maintenance whereas others require improving road culvert crossings.

Commercial Sites

Of the 30 commercial sites documented through the survey, 8 were high impact, 12 were medium impact, and 10 were low impact. The majority of the sites are fairly inexpensive to fix with the cost of materials being slightly more expensive than labor/skills needed to fix these sites.

Common Problems Identified:

- Bare soil
- Moderate to severe surface erosion
- Moderate shoulder erosion
- Unstable ditching / ditch erosion
- Clogged or too small culverts
- Lack of shoreline vegetation
- Concentrated runoff causing scouring

Recommended Solutions:

- Cover bare soil with erosion control mulch
- Improve gravel roads with proper road material, grade and crown
- Reshape ditches and stabilize with vegetation or stone
- Replace clogged or small culverts
- Plant native trees and shrubs along shorelines
- Divert and infiltrate concentrated water flows

The erosion problems associated with the commercial site pictured below were common on many other sites throughout the watershed.

Problems:

- Erosion from high concentrated water flows.
- Bare soil, exposed roots.

Solutions:

- Divert and infiltrate stormwater uphill of erosion site using water diverters and native shrubs.
- Create defined walkways.
- Cover areas of bare soil with erosion control mulch.
- Use strategic plantings to divert water flow and define walking paths.

The three commercial sites in which soil erosion was observed included: Camp Winona, Camp Wyonegonic, and Shawnee Peak. MPA, LEA, and CCSWCD will be working with these businesses to address sites identified in the survey.

Driveways

Of the 24 driveways documented through the survey, 2 were high impact, 4 were medium impact, and 18 were low impact. Estimated costs to address these sites is fairly low.

Common Problems Identified:

- Moderate to severe surface erosion
- Moderate shoulder erosion
- Clogged culverts
- Unstable culvert inlet and outlet

Recommended Solutions:

- Add proper gravel material to driveways
- Crown and reshape to get water off road
- Install diverters such as waterbars, open top culverts, or rubber bars to get water off road
- Remove grader berms and winter sand to allow proper drainage
- Vegetate or armor driveway shoulders
- Unclog or replace severely clogged culverts
- Armor culvert inlets and outlets with riprap

The erosion problems associated with the driveway pictured below were common on many other driveways within the watershed. Runoff from this driveway is also contributing to road shoulder problems.

(Sector and site number blocked from photos for generalization purposes.)

Problems:

- Road surface erosion.
- Road shoulder and ditch erosion.
- Clogged/undersized culvert (stormwater by passing ditch).
- Unstable culvert inlet and outlet.
- Unstable ditching.

Solutions:

- Install runoff diverters.
- Enlarge/lengthen culvert.
- Armor culvert inlet and outlet with riprap.
- Stabilize road shoulder and ditching with stone.

Residential properties and driveways combined represented more than half of the impact sites documented. Landowner education and technical assistance will be key to improving and protecting the water quality of Moose Pond.

Beach Access

There were 18 impact sites identified related to beach access: none were rated as high impact, 9 as medium impact, and 9 were rated as low impact. Costs to remediate these sites is fairly low.

Common Problems Identified:

- Bare soil
- Moderate surface erosion
- Lack of shoreline vegetation
- Shoreline erosion
- Sand added to beach
- Unstable water access

Recommended Solutions:

- Cover areas of bare soil with groundcover or erosion control mulch
- Plant shoreline with native trees, shrubs and perennials
- Stabilize heavily eroded areas of the shoreline with riprap
- Define walking paths and recreation areas
- Educate landowners about the impact of added beach sand to water quality
- Stabilize areas of water access with timbers and infiltration steps

The erosion problems associated with the beach access site pictured below were common on many other shorelines within the watershed.

(Sector and site number blocked from photos for generalization purposes.)

Problems:

- Moderate to severe surface erosion.
- Lack of shoreline vegetation.
- Unstable beach access.
- Direct flow of runoff to Pond.

Solutions:

- Cover areas of bare soil and exposed roots with erosion control mulch.
- Create a defined, meandering walkway to beach.
- Vegetate shoreline.
- Use native plants, trees, and shrubs to direct foot traffic and absorb runoff.

Sediment is the biggest source of pollution to Maine lakes.

Private Roads

Of the 17 private road sites documented through the survey, 2 were high impact, 7 were medium impact, and 8 were low impact. These problems vary in technical expertise and cost to fix.

Common Problems Identified:

- Moderate to severe road surface erosion
- Unstable culvert inlet and outlet
- Clogged, rusted culverts
- Ditch erosion, ditch bank failure
- Moderate road shoulder erosion
- Winter sand
- Plow or grader berms

Recommended Solutions:

- Crown and reshape to get water off road
- Armor culvert inlets and outlets with riprap
- Replace, lengthen, or unclog culverts
- Clean, reshape, and armor ditches with stone or vegetate with grass
- Vegetate / stabilize road shoulders
- Remove grader berms and winter sand to allow proper drainage

The erosion problems associated with the private road pictured below were common on many other roads within the watershed.

(Sector and site number blocked from photos for generalization purposes.)

Problems:

- Road shoulder erosion.
- Road surface erosion.
- Poor surface material.
- Direct flow of road material to stream (Road material evident in stream).

Solutions:

- Add new / proper road surface material.
- Reshape and crown road.
- Install runoff diverters or turnouts to direct water to areas where it will infiltrate.
- Stabilize road shoulder with riprap.

Maine DEP's "Gravel Road Maintenance Manual – A Guide for Landowners" discusses ways to maintain and prevent erosion on private gravel roads. A copy can be downloaded at www.maine.gov/dep/blwq/docwatershed/camp/roads/maintenance.htm

State Roads

Of the 5 state road sites documented through the survey, 1 was rated as high impact, 3 as medium impact, and 1 as low impact. Due to the extent and conditions of these sites, a few of these sites may be fairly costly to fix.

Common Problems Identified:

- Extensive shoulder erosion
- Unstable culvert inlet and outlet
- Severe surface erosion
- Excess winter sand

Recommended Solutions:

- Armor culvert inlets and outlets with riprap
- Stabilize road shoulders with riprap or vegetation
- Crown and reshape to get water off road
- Add proper road material, possibly pave in chronically eroding areas
- Remove winter sand every spring

The erosion problems associated with the state road pictured below were common on many other roads within the watershed.

(Sector and site number blocked from photos for generalization purposes.)

Problems:

- Severe road shoulder and stream bank erosion.
- Poor road surface material.
- Direct flow of road material to stream.

Solutions:

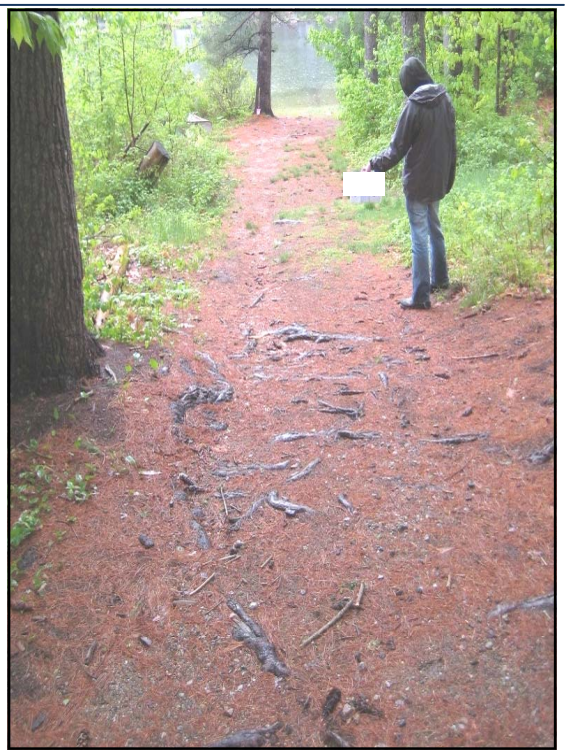
- Stabilize road shoulder with vegetation or stone.
- Add new / proper surface material.
- Reshape and crown road.
- Install runoff diverters or turnouts to direct water off the road prior to stream crossing.

For more information on construction Best Management Practices (BMPs), visit www.cumberlandswcd.org to download Maine DEP's "Maine Erosion and Sediment Control BMPs" manual.

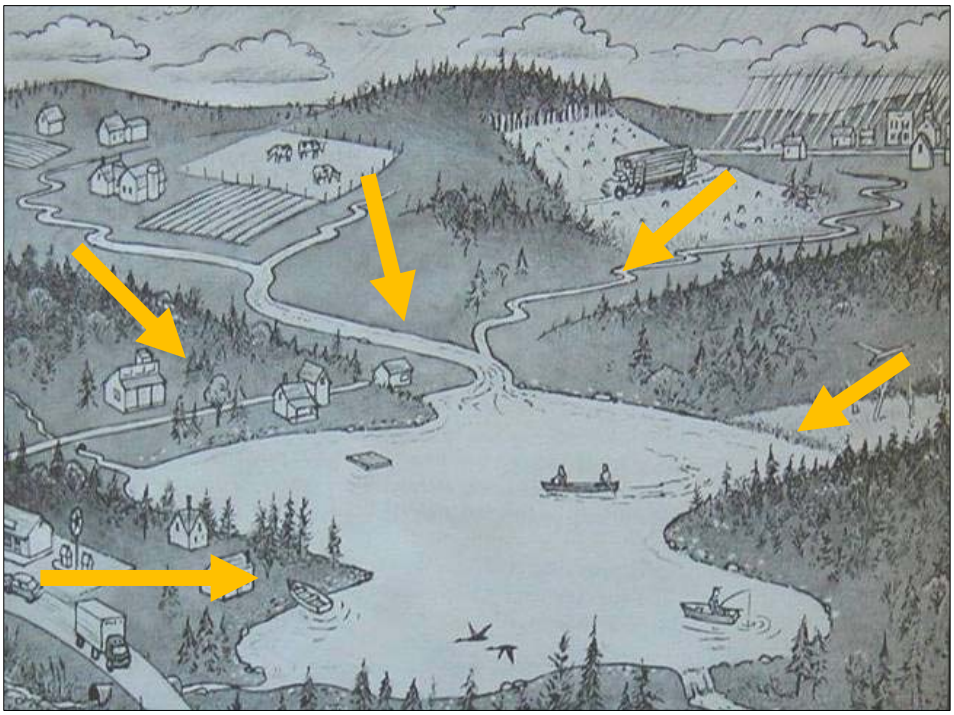
Trails or Paths

Three of the water quality impact sites identified were labeled as being either trails or paths. Two of these sites were rated as medium impact to water quality and one was labeled as low impact. Recommendations for these sites included armoring culvert inlets and outlets, reshaping and armoring ditches with riprap, defining walking paths, and stabilizing bare soil with erosion control mulch.

Eroding trails or paths can be improved by reducing path width, using native plants, creating a meandering path, and covering the path with erosion control mulch. Steeper paths may need timber tiers and crushed stone to hold soil in place.



The photo above shows a wide path leading to Moose Pond. Exposed roots are signs of erosion that has likely occurred over time.



This drawing depicts the flow of stormwater runoff throughout a watershed washing into the same waterbody.

Other Impacts

Two high impact boat access sites, one medium impact construction site, and one low impact picnic site were also identified in this survey.

Also, erosion problems on one property may be the result of runoff from an adjacent property. Improving lake water quality involves addressing problems throughout the entire watershed.

Remember, it is the cumulative impact of many sites that causes water quality to decline.

Next Steps ~ Where Do We Go From Here?

Fixing the sites identified in this survey will require efforts by the Moose Pond Association, the towns of Bridgton, Denmark, and Sweden, watershed residents, and road associations. Below are suggestions for next steps.

Moose Pond Association

- Work with the towns to create an action plan for addressing town road sites to protect Moose Pond's water quality. (Spring/Summer 2011)
- Work with Cumberland County Soil and Water Conservation District (CCSWCD) and Lakes Environmental Association (LEA) to apply for grant funding to address the highest water quality impact sites. (Spring 2011)
- Look into education and outreach opportunities to watershed residents on the impacts to water quality and basic conservation practices that can be implemented. (Ongoing)
- Maintain list of watershed erosion sites by adding new sites as they are found and removing sites as they get fixed. (Ongoing)

Towns

- Conduct regular maintenance on town roads in the watershed, and fix town road problems identified in this survey. (Ongoing)
- Properly remove excess winter sand from roadways promptly. (Spring/Yearly)
- Promote training for road crews, boards, commissions, and other decision-makers. (Ongoing)
- Continue strong enforcement of Shoreland Zoning Ordinances and the Erosion and Sediment Control Law to ensure protection of Moose Pond. (Ongoing)

Individual Citizens

- Prevent polluted runoff from washing into the lake. Collect runoff in depressions or divert flow to vegetated areas for infiltration. Call CCSWCD, LEA or Maine DEP for free advice.
- Minimize the amount of cleared land and road surfaces on your property.
- Stop mowing and raking, and let lawns and raked areas revert back to native plants.
- Avoid exposing bare soil. Vegetate and mulch bare areas.
- Don't ever add sand to shorelines and don't rebuild beaches without permits and technical assistance.
- Call the Code Enforcement Officer before cutting vegetation within 250 feet of the shore.
- Maintain septic systems properly. Pump septic tanks (every 2-3 years for year round residences; 4-5 years if seasonal), and upgrade marginal systems.
- Join the Moose Pond Association and Lakes Environmental Association.

Road Associations (or private roads without associations)

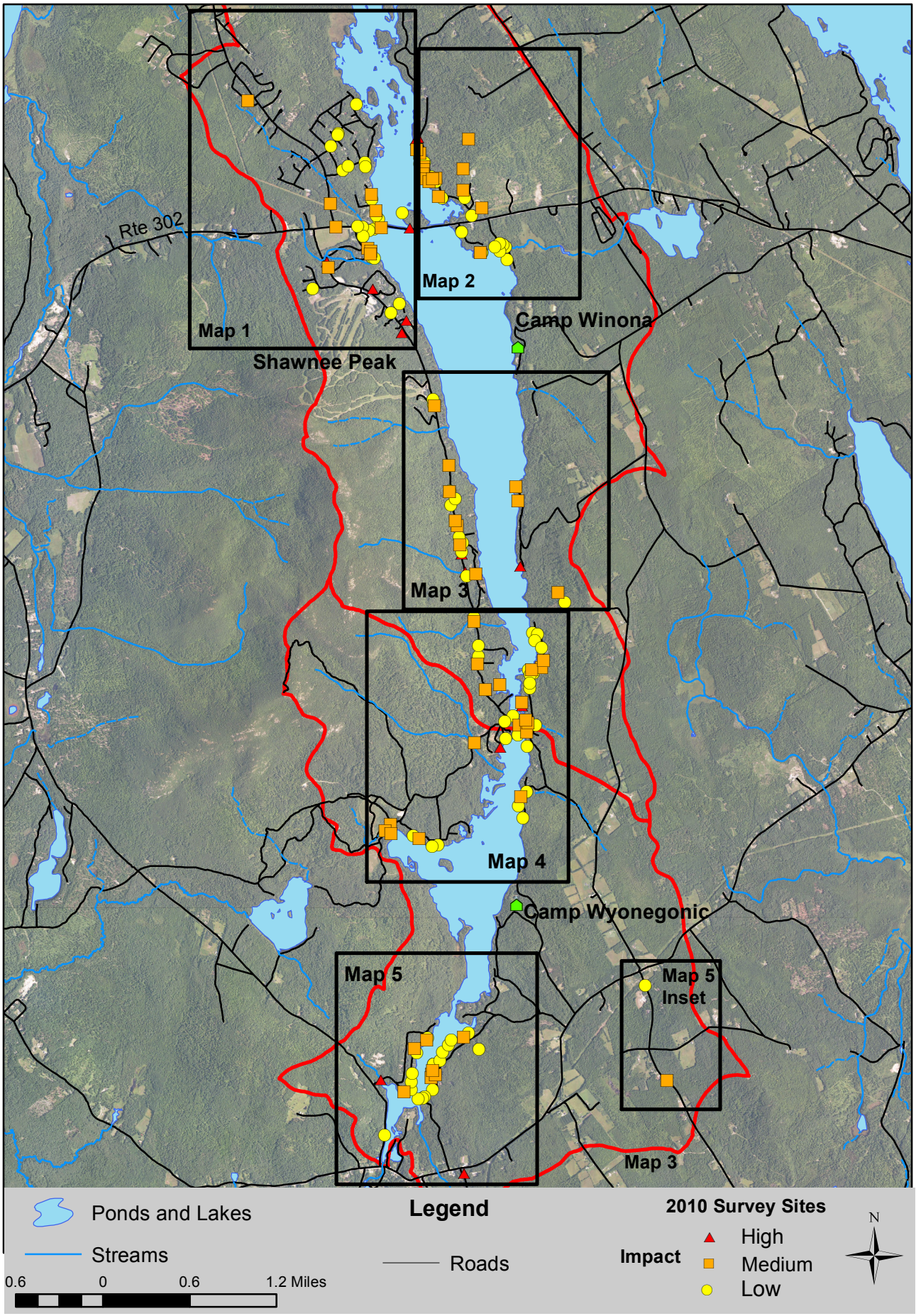
- Minimize road runoff by doing regular, comprehensive maintenance. Consider organizing "work parties" with neighbors to ensure regular maintenance is done.
- Form a road association if one does not already exist. Information on forming road associations and obtaining a guide book can be found at www.maine.gov/dep/blwq/docwatershed/camp/roads/association.htm
- Obtain a copy of *Gravel Road Maintenance Manual – A Guide for Landowners* and share it with contractors working on and/or plowing the road. This reference is a "must-have" for anyone managing a gravel road. Copies can be downloaded at www.maine.gov/dep/blwq/docwatershed/camp/roads/maintenance.htm
- Contact the CCSWCD, LEA or Maine DEP to get help for extensive problems.

Appendix A: Moose Pond Watershed Survey Surveyors

Sector 1	Steve Lord, Technical Leader Dave Croteau Phil Blaney Diana Fallon
Sector 2	Kristin Feindel, Technical Leader Brian Thomas Meredith Thomas
Sector 3	Wendy Garland, Technical Leader Karen King Mark Patterson
Sector 4	Betty Williams, Technical Leader Gabriel Shubert Joe Shubert
Sector 5	Jeff Stern, Technical Leader BJ Cavicchi Steve Cavicchi
Sector 6	Michelle Windsor, Technical Leader Steve Cavicchi David Ehrman Daniel Shubert
Sector 7	Cynthia Montanez, Technical Leader Carolyn Ehrman David Ehrman Alice Gold
Sector 8	Bridie McGreavey, Technical Leader Dorothy Dexter Marilyn Harrington Cindy Normand
Sector 9	Heather True, Technical Leader Sally Chapell Leigh Hayes
Sector 10	Jami Fitch, Technical Leader Connie Paterno Michael Paterno

Moose Pond 2010 Watershed Survey

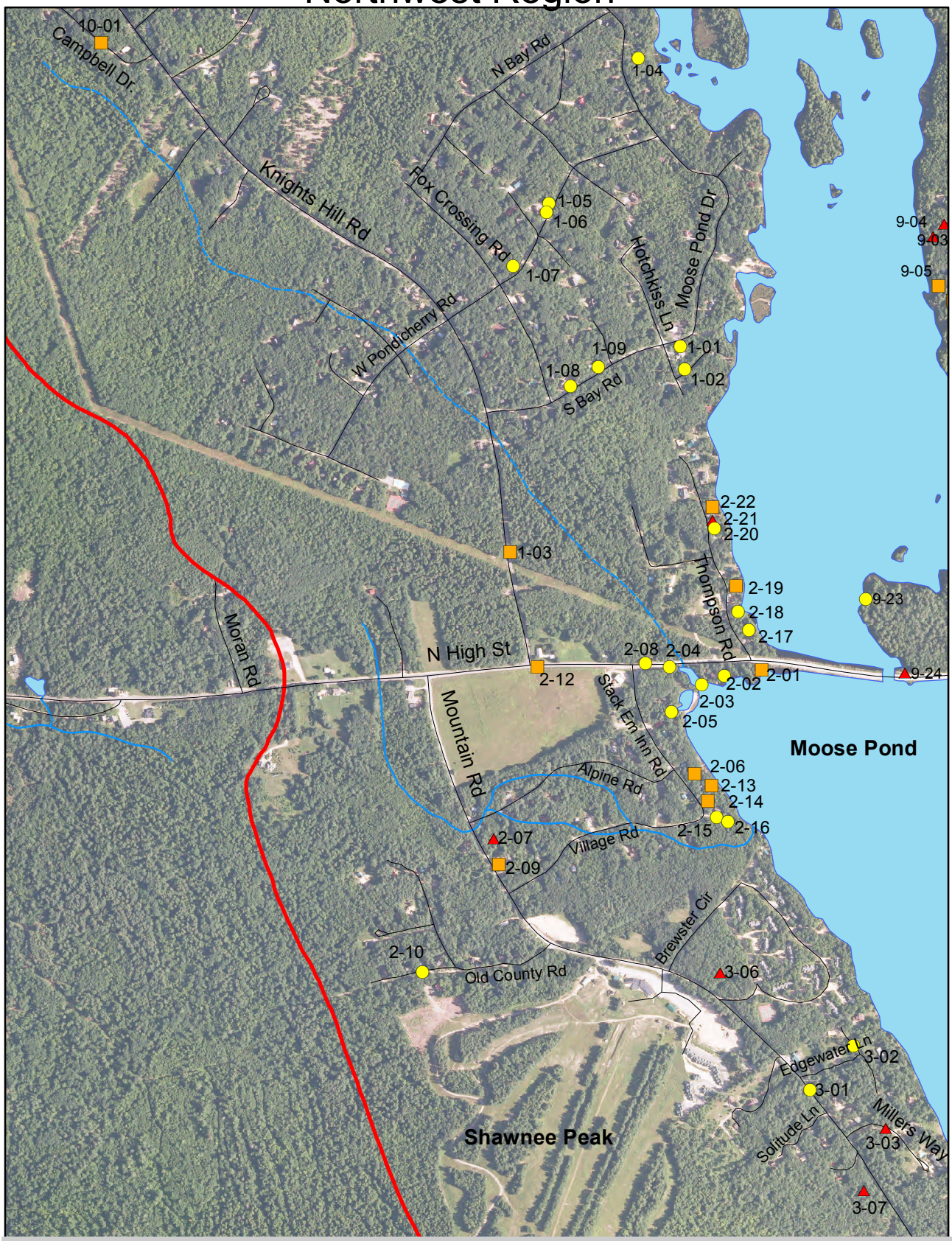
Map Key



Maps created by Susan Pienta, Maine Conservation Corps/AmeriCorps/Maine Department of Environmental Protection

Map 1

Moose Pond 2010 Watershed Survey
Northwest Region



Legend

Ponds and Lakes

Streams

Roads

Moose Pond Watershed

0.1 0 0.1 0.2 Miles

2010 Survey Sites

Impact

High

Medium

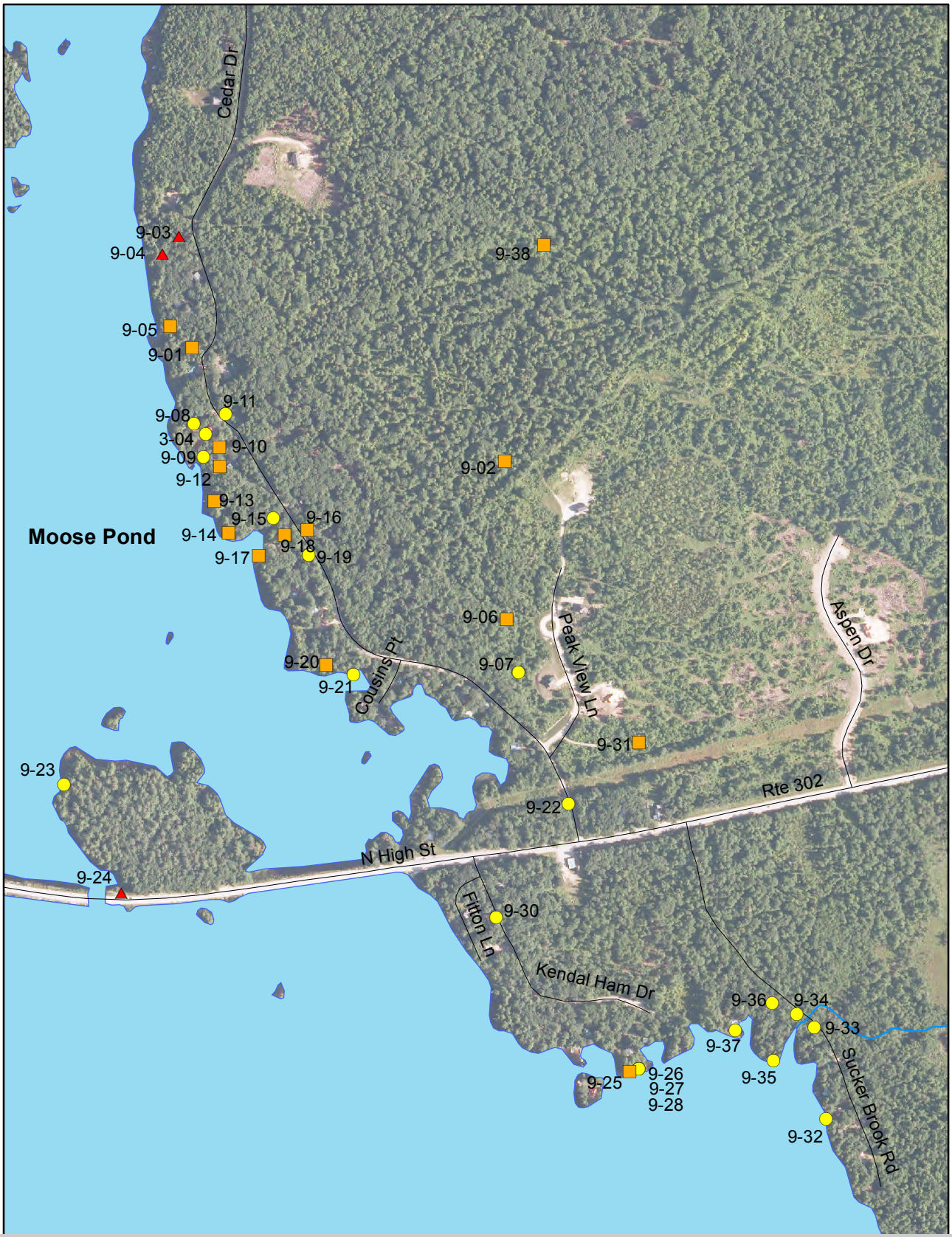
Low

N

Maps created by Susan Pienta, Maine Conservation Corps/AmeriCorps/Maine Department of Environmental Protection

Map 2

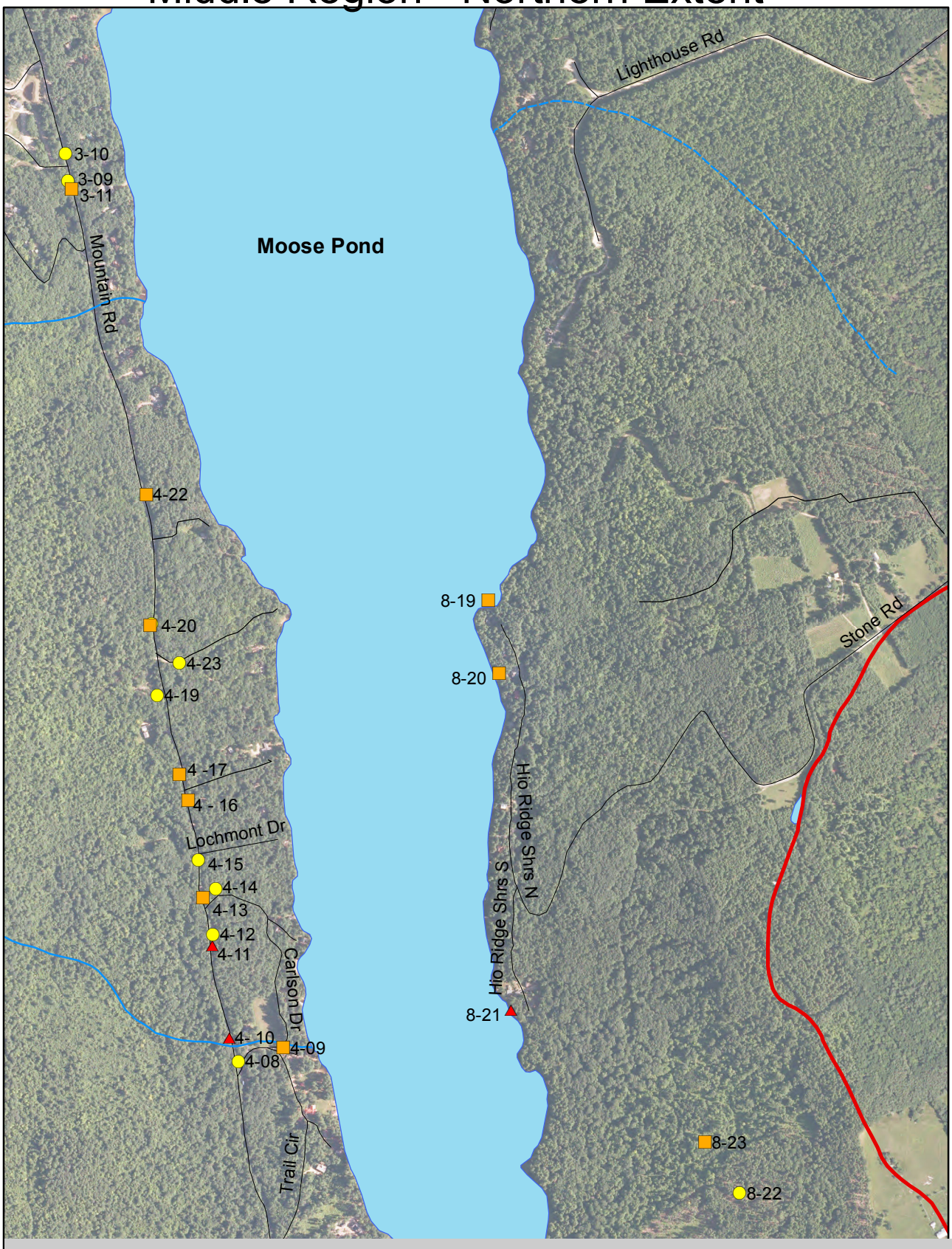
Moose Pond 2010 Watershed Survey
Northeast Region



Maps created by Susan Pienta, Maine Conservation Corps/AmeriCorps/Maine Department of Environmental Protection

Map 3

Moose Pond 2010 Watershed Survey
Middle Region - Northern Extent



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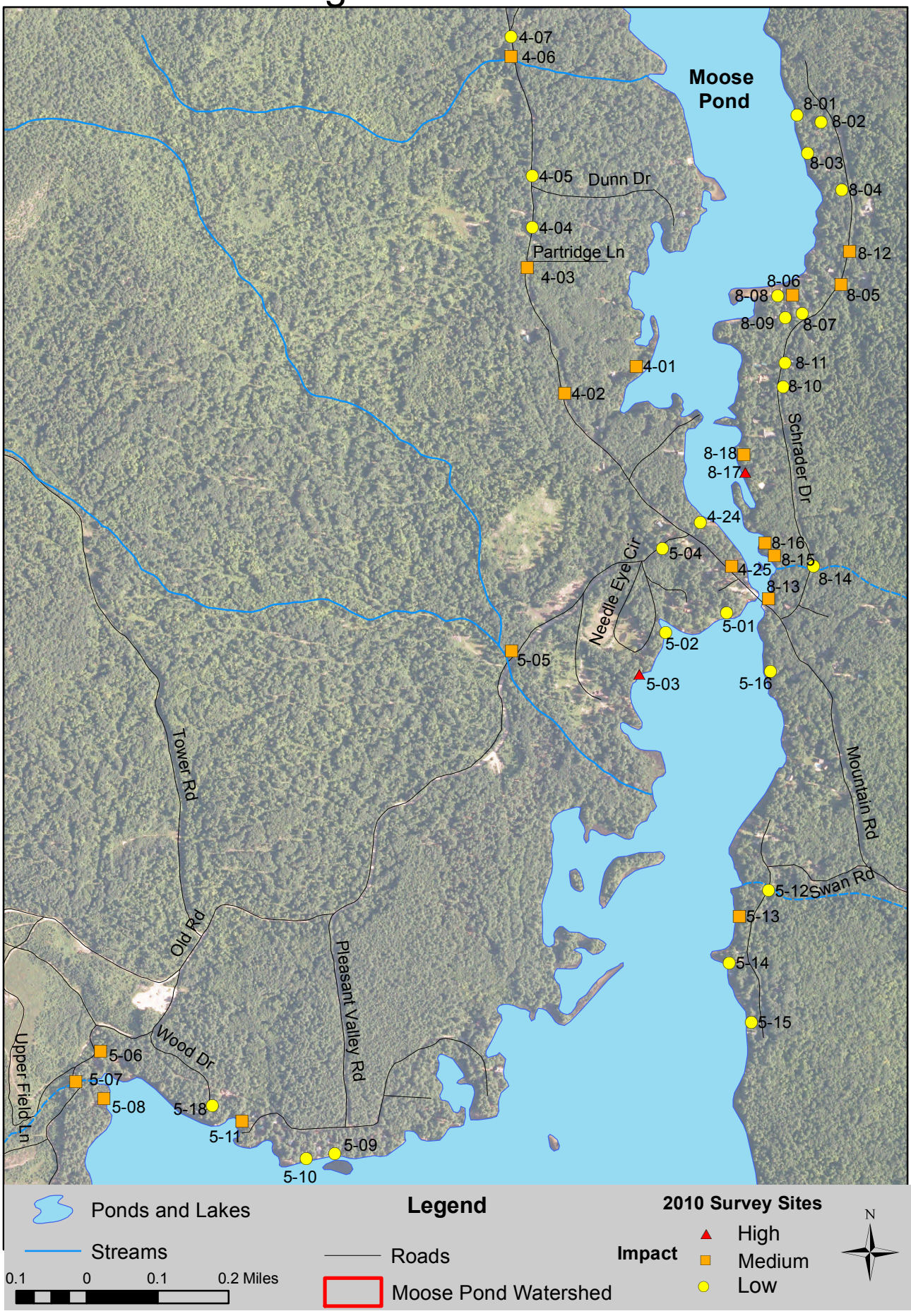
Moose Pond 2010 Watershed Survey
Middle Region - Southern Extent

Map 4



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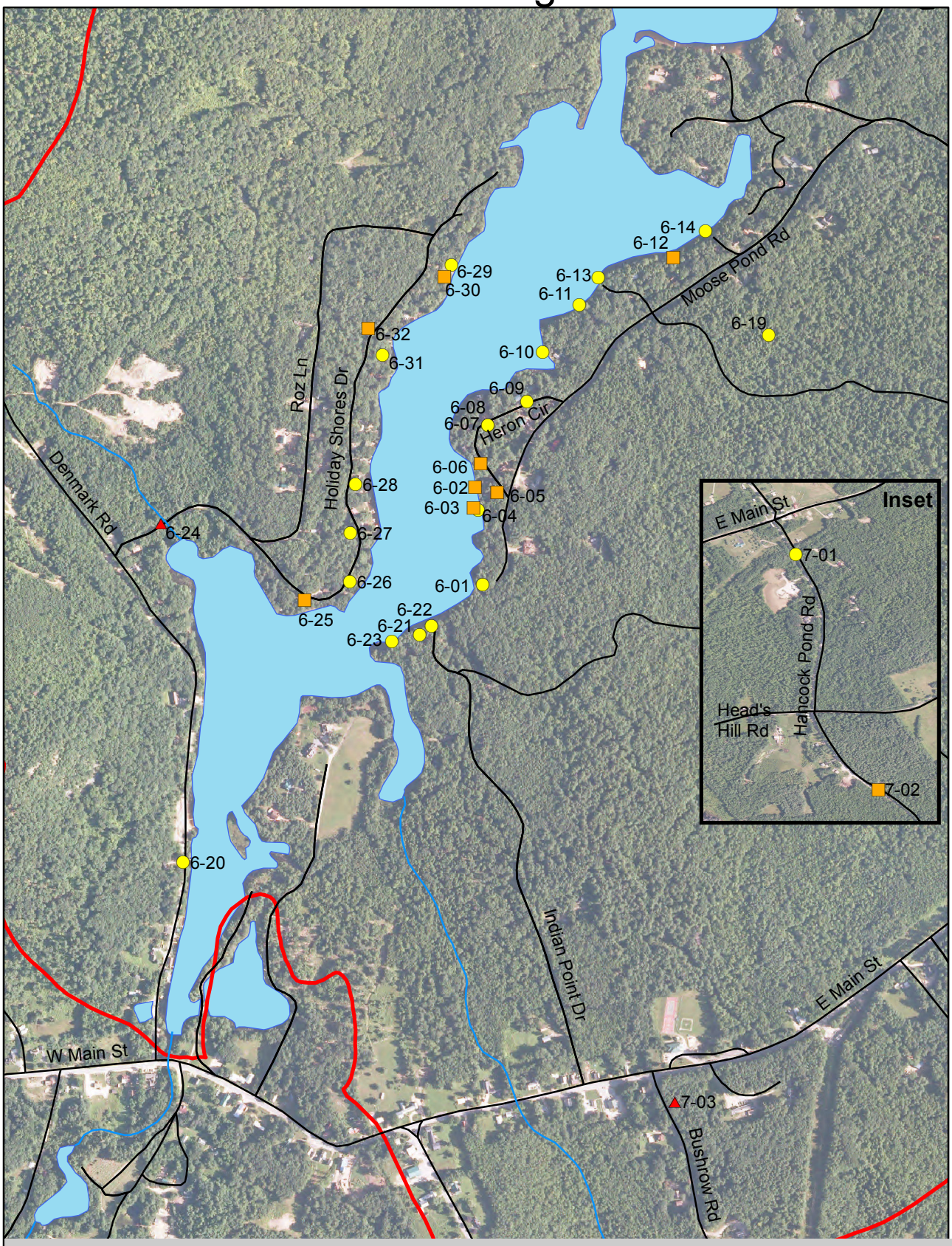
Moose Pond 2010 Watershed Survey
Southern Region



Maps created by Susan Pienta, Maine Conservation Corps/AmeriCorps/Maine Department of Environmental Protection

Appendix C: Sites Documented through the Moose Pond Watershed Survey

Site*	Easting	Northing	Primary Land Use / Activity	Description	Recommendations	Impact	Cost of Materials	Cost of Labor
1-01	354674	4881452	residential	roof runoff erosion	infiltration trench	**low**	low	low
1-02	354684	4881402	driveway	slight road shoulder erosion	reshape (crown)	**low**	low	low
1-03	354292	4880992	state road	unstable inlet and outlet, moderate road shoulder erosion	armor inlet/outlet, remove clog and enlarge culvert	**medium**	high	high
1-04	354580	4882099	residential	moderate ditch erosion, roof runoff erosion, shoreline erosion	install check dams	**low**	low	low
1-05	354379	4881774	town road	culvert - rusty water	vegetate ditch	**low**	low	low
1-06	354373	4881754	driveway	clogged culvert	rip rap	**low**	low	low
1-07	354298	4881633	town road	unstable and clogged culvert inlet	armor inlet/outlet, remove clog	**low**	low	low
1-08	354427	4881363	residential	bare soil, winter sand	armor inlet/outlet, remove clog, enlarge culvert, mulch/erosion control mix	**low**	low	medium
1-09	354490	4881407	driveway	clogged culvert, winter sand	armor inlet and outlet, install check dams	**low**	low	low
2-01	354856	4880726	residential	moderate surface erosion, roof runoff erosion	define foot path, infiltration trench, install runoff diverter	**medium**	low	low
2-02	354772	4880713	residential	Surface erosion, bare soil	mulch/erosion control mix, plants	**low**	low	low
2-03	354722	4880694	residential	slight surface erosion, bare soil, roof runoff erosion	infiltration trench, mulch/erosion control mix	**low**	low	low
2-04	354650	4880733	beach access	slight surface erosion, roof runoff erosion (from site 2-6), scouring caused by drainage	create rain garden, add new surface material, install runoff diverters, infiltration trench	**low**	medium	medium
2-05	354654	4880632	residential	slight surface erosion, bare soil	mulch/erosion control mix	**low**	low	low
2-06	354706	4880494	beach access	severe surface erosion, bare soil	define foot path, install runoff diverter, mulch/erosion control mix and/or gravel, infiltration steps	**medium**	medium	medium
2-07	354255	4880347	town road	unstable inlet and outlet, winter sand, sink hole	armor inlet and outlet	**high**	medium	medium
2-08	354596	4880741	state road	slight shoulder erosion, winter sand,	stabilize top of shoulder	**low**	low	low
2-09	354267	4880289	town road	moderate ditch erosion, rusted out culvert with adjacent sinkhole	armor ditch with stone	**medium**	medium	medium
2-10	354095	4880048	private road	unstable culvert in/outlet	armor culvert in/outlet	**low**	low	low
2-12	354353	4880734	state road	unstable culvert in/outlet, moderate shoulder erosion	armor in/outlet, stabilize shoulder	**medium**	low	low
2-13	354744	4880467	residential	bare soil, lack of shoreline vegetation	install runoff diverter at top of driveway	**medium**	low	low
2-14	354735	4880432	residential	Pipe from under house, culvert?, moderate ditch erosion, roof runoff erosion	install runoff diverter, mulch/erosion control mix, seed and hay	**medium**	medium	medium
2-15	354756	4880395	driveway	exposed cross culvert, unstable culvert in/outlet, bare spot on driveway	add soil or gravel over bare spot	**low**	low	low

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Appendix C: Sites Documented through the Moose Pond Watershed Survey

Site*	Easting	Northing	Primary Land Use / Activity	Description	Recommendations	Impact	Cost of Materials	Cost of Labor
2-16	354781	4880387	residential	moderate surface erosion, bare soil, roof runoff erosion (both sides)	install runoff diverters, mulch/erosion control mix	**low**	low	low
2-17	354828	4880816	residential	moderate surface erosion, bare soil, lack of shoreline vegetation, shoreline erosion	add new gravel to driveway, establish vegetation	**low**	medium	low
2-18	354803	4880857	residential	moderate surface erosion, bare soil, inadequate shoreline vegetation, shoreline erosion	add new gravel to driveway, install runoff diverters, establish vegetation	**low**	low	low
2-19	354799	4880916	residential	moderate surface erosion, bare soil, lack of shoreline vegetation, shoreline erosion	install runoff diverter	**medium**	low	low
2-20	354750	4881045	residential	moderate surface erosion	install runoff diverter	**low**	low	low
2-21	354746	4881062	residential	moderate surface erosion, bare soil, lack of shoreline vegetation, shoreline erosion	add new gravel to and grade driveway, install runoff diverters, mulch/erosion control, establish vegetation	**high**	medium	medium
2-22	354746	4881093	residential	severe surface erosion, bare soil, inadequate shoreline vegetation, shoreline erosion	mulch/erosion control mix, establish vegetation	**medium**	medium	medium
3-01	354965	4879783	town road	slight ditch erosion, slight surface erosion, winter sand, undercut shoreline, lack of shoreline vegetation	armor in/outlet, vegetate and armor ditch, armor shoulder	**low**	low	low
3-02	355062	4879883	driveway	Unstable inlet/outlet -undersized - moderate erosion- bare under construction .Silt fence improperly installed. Rubber diverter @top of new driveway.	properly install silt fence	**low**	low	low
3-03	355134	4879698	private road	Ditch slight erosion. Surface erosion moderate. Winter sand & fine	Install ditch. Install cross culvert under road into vegetation . Add new surface material. Recycled asphalt. Install catch basin	**high**	medium	medium
3-04	355289	4881439	beach access	Slight surface erosion, Bare soil. Unstable access to shoreline Recent material added to beach gravel	Install turnouts to ditch. Veg establish grass pavers.	**low**	low	low
3-06	354763	4880047	town road	Culvert/unstable inlet /outlets. Mod to severe ditch erosion. Mod to severe road shoulder erosion	Culvert - Armor Inlet/Outlet. Ditch/Armor with stone. Riprap farther up ditch sides. Cut back ditching to prevent erosion.	**high**	high	high
3-07	355086	4879558	town road	Unstable outlet. Ditch-severe erosion. Slight Shoulder erosion	Ditch - Armor with stone, reshape, install check dams and install sediment pools	**high**	medium	medium

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Appendix C: Sites Documented through the Moose Pond Watershed Survey

Site*	Easting	Northing	Primary Land Use / Activity	Description	Recommendations	Impact	Cost of Materials	Cost of Labor
3-09	355438	4878763	town road	Slight erosion to ditch. Mod shoulder erosion	Ditch -Vegetate Road-Riprap shoulder	**low**	low	low
3-10	355433	4878821	town road	Slight erosion to ditch. Mod shoulder erosion	Ditch/vegetate. Road riprap shoulder	**low**	low	low
3-11	355446	4878745	town road	Severe erosion to ditch and bank. Slight erosion to road	Ditch-armor with stone and reshape . Road- reshape shoulder	**medium**	medium	medium
4 - 16	356173	4875651	town road	Ditch severe erosion and bank failure	Install Sed. Basin in ditch prior to culvert inlet. Possibly install check dams if ditch cannot be reshaped	**medium**	medium	medium
4 - 18	356011	4875590	town road	unstable culvert inlet, bare soil	Vegetate ditch	**low**	low	low
4- 10	355926	4875876	town road	Unstable culvert Inlet/Outlet. Bank failure. Moderate road shoulder erosion.	Culvert- armor inlet/outlet. Stabilize steep bank W. TRM	**high**	high	high
4 -17	355937	4875966	town road	Culvert Unstable Inlet / Outlet, Bank Failure, Moderate @ Outlet	Stabilize Culvert outlet shoulder with riprap.	**medium**	medium	medium
4-01	355937	4876083	residential	Lack of shoreline vegetation/erosion	Waterbar and establish vegetation	**medium**	low	low
4-02	355889	4876354	town road	Unsuitable inlet & outlet on culvert. Shoulder erosion moderate	Culvert/armor inlet/outlet, replace sleeve, lengthen	**medium**	medium	medium
4-03	355889	4876399	town road	Moderate road shoulder erosion. 24 inch culvert	Culvert/armor inlet/outlet, replace sleeve, lengthen	**medium**	medium	medium
4-04	355808	4876850	town road	Culvert unstable Inlet/outlet. Moderate road shoulder erosion	Culvert/armor inlet/outlet. Stabilize steep ditch bank, road shoulder, & culvert outlet w/slash riprap	**low**	low	low
4-05	355906	4876880	town road	Slight road shoulder erosion	Stabilize road shoulder w/ riprap	**low**	low	low
4-06	355789	4876901	town road	.Culvert unstable inlet/outlet. Road shoulder moderate erosion, sink hole at top of culvert outlet	Replace with open bottom culvert or repair	**medium**	high	high
4-07	355752	4877101	town road	Road shoulder erosion slight	Stabilize road shoulder w/ riprap and install plunge pool @ culvert outlet	**low**	low	low
4-08	355753	4877126	town road	Bank failure	Install TRM on steep ditch bank	**low**	medium	low
4-09	355731	4877205	residential	Moderate erosion. On driveway	remove portion of paved road near lake and plant. Driveway / waterbar, rain garden	**medium**	medium	low
4-11	355759	4877225	town road	Unstable outlet. Road shoulder at culvert outlet severe.	Stabilize culvert outlet & road shoulder with riprap.	**high**	low	low
4-12	355721	4877288	town road	Unstable culvert outlet. Slight erosion on ditch. Mod shoulder erosion	Stabilize culvert outlet & road shoulder with riprap.	**low**	low	low
4-13	355699	4877417	town road	Unstable culvert outlet. Mod erosion on ditch. Mod at culvert outlet.	Ditch.. …armor with stone & reshape. Stabilize road shoulder @ culvert outlet with riprap	**medium**	low	low
4-14	355680	4877474	driveway	Culvert unstable Inlet/outlet. Moderate road shoulder erosion	Armor Inlet/Outlet Culvert	**low**	low	low

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Appendix C: Sites Documented through the Moose Pond Watershed Survey

Site*	Easting	Northing	Primary Land Use / Activity	Description	Recommendations	Impact	Cost of Materials	Cost of Labor
4-15	4402209	7048079	town road	Steep ditch bank and old gravel vel road washing into ditching.	Stabilizer Road Shoulder @ Culvert & Outlet, Plant old gravel road or add diverters	**low**	low	low
4-19	355632	4877645	town road	slight ditch erosion, slight shoulder erosion at culvert outlet	Armor ditch with stone, install sediment pool prior to culvert inlet, pave road shoulder above culvert inlet	**low**	low	low
4-20	355616	4877797	town road	Unstable culvert inlet/outlet, severe to moderate road shoulder erosion	Armor culvert inlet/outlet, enlarge culvert and lengthen	**medium**	medium	medium
4-21	355619	4877800	town road	Unstable culvert inlet/outlet, severe to moderate road shoulder erosion, small stream flows into forested vegetation	Armor culvert inlet/outlet, enlarge culvert, lengthen and install plunge pool	**low**	medium	medium
4-22	355608	4878081	town road	unstable culvert inlet/outlet, severe road shoulder erosion	Armor culvert inlet/outlet, replace culvert & lengthen, remove sediment pile from nearby parking area	**medium**	high	medium
4-23	355680	4877715	private road	Moderate to severe surface erosion	Build up road with new surface material, reshape crown, install broad-based dip runoff converters	**low**	medium	medium
4-24	356319	4875297	residential	Moderate surface erosion, lack of shoreline vegetation, exposed roots	mulch/erosion control mix. establish vegetation	**low**	medium	low
4-25	356389	4875197	residential	moderate surface erosion, bare soil, unstable water access	Infiltration steps, mulch/erosion control mix, establish vegetation, no raking	**medium**	low	low
5-01	356378	4875091	residential	undercut, lack of vegetation	establish buffer	**low**	low	low
5-02	356240	4875047	residential	bare soil (on bank)	buffer or grass	**low**	low	low
5-03	356180	4874952	boat access	surface erosion, severe - site at boat launch on property	add new surface material, - gravel, reshape	**high**	low	low
5-04	356232	4875237	private road	unstable in/outlet at culvert, plow/grader berm	armor in/outlet at culvert, armor ditch with stone, remove berm	**low**	medium	medium
5-05	355890	4875005	private road	moderate erosion, bare ditch with back slope	armor with stone, erosion control mix on back slope	**medium**	medium	medium
5-06	354957	4874096	driveway	partially clogged culvert, severe surface erosion, delta (silt) in stream	remove clog, build up driveway and reshape	**medium**	high	medium
5-07	354900	4874027	private road	moderate surface erosion	reshape (crown) road	**medium**	low	medium
5-08	354964	4873989	residential	moderate surface erosion, shoreline undercut and erosion, exposed roots	mulch/erosion control mix, plantings	**medium**	medium	medium
5-09	355488	4873864	residential	moderate surface erosion, bare soil	mulch/erosion control mix, steps to lake, ground cover	**low**	low	low
5-10	355424	4873853	residential	slight surface erosion, bare soil	define foot path, mulch/erosion control mix, ground cover	**low**	low	low
5-11	355278	4873938	residential	moderate Surface erosion, bare soil	define footpath, mulch/erosion control mix, ground cover	**medium**	low	low

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Appendix C: Sites Documented through the Moose Pond Watershed Survey

Site*	Easting	Northing	Primary Land Use / Activity	Description	Recommendations	Impact	Cost of Materials	Cost of Labor
5-12	356473	4874461	trail or path	unstable in/outlet, slight ditch erosion, slight surface erosion, bare soil	armor in/outlet at culvert, remover grader berm, mulch/erosion control mix	**low**	low	low
5-13	356407	4874402	beach access	moderate surface erosion, bare soil, shoreline erosion and unstable access	rip rap at shoreline, build up with gravel or mulch	**medium**	low	low
5-14	356384	4874297	residential	slight surface erosion, bare soil, lack of shorefront vegetation with erosion	mulch/erosion control mix, ground cover	**low**	low	low
5-15	356434	4874161	residential	slight surface erosion, bare bank along stream	mulch/erosion control mix and vegetation on bank	**low**	low	low
5-16	356478	4874958	residential	slight surface erosion, bare soil, , shoreline erosion	crushed stone	**low**	low	low
5-17	365225	5222393	beach access	bare soil, shoreline erosion	install runoff diverters, define foot path, mulch/erosion control mix, ground cover	**medium**	low	low
5-18	355210	4873973	residential	bare soil	define foot path, install runoff diverter, mulch/erosion control mx	**low**	low	low
6-01	355430	4871146	residential	Surface Erosion, bare soil, shoreline erosion	mulch/erosion control mix	**low**	low	low
6-02	355416	4871320	residential	moderate surface erosion, bare soil, lack of shoreline vegetation is causing erosion of artificial beach	Install runoff diverters: broad-based dip, open top culvert, rubber razor. Residential: define foot path. Vegetation: establish	**medium**	low	low
6-03	355414	4871284	residential	slight surface erosion, bare soil, lack of shoreline vegetation and erosion	infiltration trench, berm, vegetation along water	**medium**	low	low
6-04	355422	4871280	driveway	moderate surface erosion	add gravel, install runoff diverters	**low**	medium	low
6-05	355456	4871311	residential	Ditch bank failure, slight surface erosion, small stream: inadequate vegetation and erosion	ditch (natural brook) armor with stone. Residential: mulch/erosion control mix	**medium**	medium	low
6-06	355426	4871363	trail or path	moderate surface erosion, inadequate shoreline veg and erosion	define footpath, mulch.	**medium**	low	low
6-07	355439	4871432	residential	moderate surface erosion, bare soil, lack of shoreline vegetation and erosion	define foot path, mulch	**low**	low	low
6-08	355439	4871432	driveway	moderate surface erosion	gravel, install runoff diverters. Enhance veg at end of driveway	**low**	medium	low
6-09	355509	4871474	residential	moderate surface erosion, bare soil, inadequate shoreline vegetation and erosion	define footpath, install runoff diverters at end of paved driveway , enhance rain garden	**low**	low	low
6-10	355537	4871563	residential	slight surface erosion, bare soil, lack of shoreline vegetation and erosion	define beach sitting area, mulch/erosion mix, establish vegetation	**low**	low	low

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Appendix C: Sites Documented through the Moose Pond Watershed Survey

Site*	Easting	Northing	Primary Land Use / Activity	Description	Recommendations	Impact	Cost of Materials	Cost of Labor
6-11	355603	4871647	residential	slight surface erosion, bare soil, lack of shoreline vegetation and erosion	define foot path/sitting area, mulch/erosion mix	**low**	low	medium
6-12	355772	4871732	residential	ditch: moderate erosion, moderate surface erosion, bare soil, inadequate shoreline vegetation and erosion	Ditch: armor with stone. Install runoff diverters, mulch/erosion mix, improve steps and add vegetation	**medium**	low	low
6-13	355637	4871696	residential	bare soil, inadequate shoreline veg plus erosion	define footpath, mulch, enhance ground cover	**low**	low	low
6-14	355829	4871779	residential	moderate surface erosion, bare soil, delta in stream/lake, shoreline: undercut, inadequate shoreline vegetation, erosion, unstable access	Residential: define footpath, mulch/erosion control mix, infiltration steps	**low**	low	low
6-15	348787	4538652	residential	moderate soil erosion, bare soil,	mulch/erosion control mix	**low**	low	low
6-16	348623	4538814	residential	bare soil	mulch/erosion control mix	**low**	low	low
6-17	348648	4538969	residential	shoreline undercut due to boat wash	rock barrier along beach	**low**	low	low
6-18	355943	4538467	residential	shoreline undercut	rock barrier along beach	**low**	low	low
6-19	355943	4871594	residential	bare soil, shoreline: lack of shoreline vegetation, unstable access	establish vegetation	**low**	low	low
6-20	354893	4870648	town road	slight road shoulder erosion, slight surface erosion, bare soil	vegetate shoulder	**low**	low	low
6-21	355338	4871072	beach access	bare soil	mulch/erosion control mix	**low**	low	low
6-22	355317	4871056	residential	slight surface erosion, bare soil	erosion control mix	**low**	low	low
6-23	355267	4871044	residential	bare soil, shoreline: lack of shoreline vegetation, erosion, unstable access	Stop raking around house, define footpath, mulch/erosion control mix, establish vegetation	**low**	low	low
6-24	354853	4871255	private road	culvert not functioning-moderate road erosion	replace/armor culvert; crown road	**high**	medium	medium
6-25	355111	4871118	residential	bare soil. Diagonal trench across driveway ineffective	install effective run off diverter. Erosion control mix at beach	**medium**	low	medium
6-26	355192	4871151	residential	shoreline undercut	stones to shore up undercut erosion	**low**	low	low
6-27	355193	4871238	residential	Driveway & roof runoff	install runoff diverter and rain garden	**low**	low	low
6-28	355202	4871325	driveway	culvert clogged	install catch basin for culvert & runoff diverter for driveway	**low**	medium	medium
6-29	355374	4871719	residential	bare soil & erosion	erosion control mix	**low**	low	low
6-30	355361	4871698	beach access	moderate surface erosion & bare soil. Shoreline erosion	install runoff diverter	**medium**	low	low
6-31	355250	4871557	residential	bare soil	erosion control mix	**low**	low	low
6-32	355225	4871605	beach access	moderate surface erosion & bare soil	infiltration trench, runoff diverter, erosion control mix	**medium**	low	medium
7-01		4872304	driveway	Driveway turnout too close to stream	vegetate shoulder	**low**	low	low
7-02	358031	4871244	state road	road shoulder erosion - logging road adjacent to crossing - soil bare	culvert under logging road, armor inlet/outlet	**medium**	low	low
7-03	355774	4870219	state road	Severe road shoulder erosion	pave road, riprap over culvert	**high**	high	high

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Appendix C: Sites Documented through the Moose Pond Watershed Survey

Site*	Easting	Northing	Primary Land Use / Activity	Description	Recommendations	Impact	Cost of Materials	Cost of Labor
8-01	356538	4876222	private road	moderate surface erosion	Install runoff diverter/mulch/erosion control mix	**low**	low	low
8-02	356593	4876205	driveway	surface erosion	Add gravel, install runoff diverters	**low**	medium	medium
8-03	356562	4876136	beach access	surface erosion	Install runoff diverter, enhance with plants	**low**	low	medium
8-04	356640	4876053	driveway	surface erosion	Add gravel, reshape (crown)	**low**	low	medium
8-05	356638	4875837	private road	Ditch severe erosion, bank failure	Cut back ditch to reshape	**medium**	medium	high
8-06	356528	4875813	residential	surface erosion, bare trail to water, shoreline undercut, lack of shoreline, shoreline erosion, approx 2 cu yd of beach sand brought in	Educate about beach sand, define footpath, infiltration trench, install runoff diverter, mulch/erosion control mix, establish plants	**medium**	low	medium
8-07	356549	4875771	driveway	surface erosion	enhance with plants, no raking	**low**	low	low
8-08	356494	4875811	residential	Shoreline undercut, lack of shoreline vegetation, erosion	establish plants, water retention swales	**low**	low	low
8-09	356511	4875762	driveway	surface erosion	add gravel	**low**	low	medium
8-10	356506	4875604	driveway	road shoulder and surface erosion	add gravel	**low**	low	medium
8-11	356510	4875659	driveway	road shoulder erosion, on 11/9 road had been graded	install sediment pools in ditch, grade road	**low**	low	medium
8-12	356657	4875912	trail or path	unstable culvert inlet and outlet, severe bank erosion, bank failure, some wash/erosion down trail	armor culvert inlet/outlet, armor ditch with stone and reshape ditch	**medium**	medium	medium
8-13	356473	4875123	beach access	Bare soil. Inadequate shoreline vegetation, erosion, beach and lake access north of beach, (canoe launch?)	riprap along shore where there is runoff, vegetation and ECM berm along the beach	**medium**	low	medium
8-14	356575	4875198	private road	road shoulder erosion, surface erosion, winter sand in stream	lower road where culvert or build up berm to prevent runoff to stream	**low**	medium	medium
8-15	356487	4875221	residential	surface erosion, bare soil, roof runoff erosion, shoreline undercut and erosion	define footpath, infiltration trench, mulch/erosion control mix, rain garden, dripline trench	**medium**	low	medium
8-16	356465	4875250	residential	surface erosion, bare soil, roof runoff erosion, shoreline undercut, erosion, and	add gravel, install runoff diverters, define footpath, infiltration trench, mulch, erosion control mix, riprap shoreline and under roof line	**medium**	medium	medium
8-17	356420	4875410	driveway	bare soil, roof runoff erosion, shoreline undercut, erosion, unstable access	install runoff diverters (rubber razor, waterbar) define footpath, infiltration trench, mulch, mulch/erosion control mix, rain garden, riprap, no raking	**high**	medium	medium
8-18	356417	4875451	residential	surface erosion, bare soil, roof runoff erosion, shoreline undercut, erosion, unstable access (exposed roots)	define footpath, infiltration trench, install runoff diverter, mulch/erosion control mix, rain garden, riprap shoreline and under roof line	**medium**	medium	medium

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Appendix C: Sites Documented through the Moose Pond Watershed Survey

Site*	Easting	Northing	Primary Land Use / Activity	Description	Recommendations	Impact	Cost of Materials	Cost of Labor
8-19	356351	4877851	residential	surface erosion, bare soil, roof runoff erosion, shoreline undercut, erosion, unstable access	define footpath, infiltration trench, mulch/erosion control mix, riprap on shoreline and under roof line	**medium**	medium	medium
8-20	356375	4877692	residential	surface erosion, bare soil, shoreline undercut, lack of shoreline vegetation, erosion, unstable access	vegetation plantings	**medium**	low	medium
8-21	356400	4876961	residential	bare soil, shoreline undercut, lack of shoreline vegetation, erosion, unstable access	Establish vegetation and install riprap	**high**	low	medium
8-22	356897	4876564	residential	Surface erosion, bare soil, lack of shoreline vegetation, inadequate shoreline vegetation, erosion	mulch/erosion control mix for pathway, vegetation	**low**	low	low
8-23	356822	4876674	construction site	bare soil, lack of shoreline vegetation, erosion, new dock/patio built w no erosion control measures - left shoreline unstable	riprap exposed bank, vegetation, construction site mulch, silt fence/EC berm	**medium**	low	low
9-01	355286	4881555	residential	moderate surface erosion, bare soil, roof runoff erosion	infiltration trench	**medium**	low	low
9-02	355765	4881382	private road	unstable culvert inlet and outlet, sinkhole above culvert outlet	armor culvert inlet/outlet, lengthen culvert, install sediment pools in ditch, build up and add gravel to driveway	**medium**	medium	medium
9-03	355266	4881726	driveway	severe surface erosion, sand brought in for fill at parking lot. Ditching around eroding	Vegetate and armor ditch with stone, cover exposed areas (stormwater is somewhat filtered prior to flowing into lake)	**high**	medium	low
9-04	355241	4881699	residential	Severe surface erosion, bare soil, roof runoff erosion, part of roof runoff guttered directly toward lake, driveway gully leading into lake	install runoff diverters, rubber razor, waterbar for driveway/road, infiltration trench, erosion control mix, drywell, enhance with vegetation	**high**	medium	medium
9-05	355253	4881588	driveway	gully/false ditch originates from road down to pond	install runoff diverters, rubber razor	**medium**	low	medium
9-06	355768	4881140	private road	road shoulder erosion, severe surface erosion	Armor culvert inlet/outlet, reshape road (crown)	**medium**	medium	high
9-07	355786	4881058	residential	bare soil	erosion control mix	**low**	low	low
9-08	355307	4881424	driveway	moderate surface erosion, snow bank pushed towards ditch	vegetate shoulder between driveway and ditch	**low**	low	low
9-09	355304	4881388	residential	moderate surface erosion	establish strategic plantings	**low**	low	low
9-10	355328	4881403	driveway	moderate surface erosion, road ruts observed	install runoff diverters and rubber razor for driveway	**medium**	medium	low
9-11	355338	4881454	driveway	moderate surface erosion	stabilize parking lot with better material	**low**	low	medium

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Site*	Easting	Northing	Primary Land Use / Activity	Description	Recommendations	Impact	Cost of Materials	Cost of Labor
9-12	355329	4881373	residential	lack of shoreline vegetation, roof gutter not functioning properly	install runoff diverter, mulch/erosion control mix, establish vegetation	**medium**	low	low
9-13	355320	4881320	residential	lack of shoreline vegetation	establish a meandering path and enhance with vegetation	**medium**	low	medium
9-14	355342	4881272	residential	uncovered pile of sand within 75 ft of shoreline (approx one truck load), inadequate shoreline vegetation	erosion control mix, shrubs, no raking	**medium**	low	medium
9-15	355411	4881294	beach access	inadequate shoreline vegetation, some exposed soil	Across the street from the house on the water side install a waterbar, erosion control mix, establish vegetation	**low**	low	medium
9-16	355463	4881276	town road	Unstable culvert inlet/outlet, ditch bank failure, moderate road shoulder erosion. Culvert recently replaced. Ditch is also a running stream. Sediment in stream	Armor culvert inlet/outlet, armor ditch with stone	**medium**	medium	medium
9-17	355388	4881237	residential	Lack of shoreline vegetation, erosion	erosion control mix, shrubs	**medium**	low	medium
9-18	355428	4881268	driveway	severe road shoulder erosion, severe surface erosion, bare soil. (11/12/2010 note: construction in May photo now stabilized)	vegetate shoulder, install runoff diverters, waterbar, mulch/erosion control mix	**medium**	medium	medium
9-19	355465	4881238	town road	Clogged culvert	remove clog,	**low**	low	low
9-20	355492	4881070	beach access	lack of shoreline vegetation	erosion control mix, shrubs	**medium**	low	medium
9-21	355534	4881055	beach access	lack of shoreline vegetation, erosion	Waterbar, erosion control mix	**low**	medium	low
9-22	355863	4880857	town road	unstable inlet/outlet	Armor culvert inlet/outlet	**low**	low	low
9-23	355090	4880886	picnic site	unstable shoreline-mostly exposed roots & rocks at water's edge	install runoff diverter. Erosion control mix. Establish veg buffer	**low**	medium	medium
9-24	355178	4880720	boat access	severe surface erosion, bare soil, delta in lake	install water barriers between upright granite all along road. Add surface gravel and vegetate shoulder	**high**	high	medium
9-25	355956	4880447	beach access	lack of shoreline vegetation, Barrier is breaking down	erosion control mix, shrubs	**medium**	low	low
9-26	355971	4880451	town road	moderate shoulder erosion	ditch: armor with stone	**low**	medium	low
9-27	355971	4880451	residential	inadequate shoreline vegetation	install runoff diverter, erosion control mix, shrubs	**low**	low	low
9-28	355971	4880451	residential	inadequate shoreline vegetation & roof runoff erosion	continue erosion control down to lake. Add gutter & rain barrel	**low**	medium	medium
9-30	355752	4880683	residential	lack of shoreline vegetation plus erosion	install runoff diverter. Erosion control mix.	**low**	low	low
9-31	355971	4880951	beach access	bare soil, lack of shoreline vegetation,	erosion control mix, shrubs	**medium**	low	medium

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Site*	Easting	Northing	Primary Land Use / Activity	Description	Recommendations	Impact	Cost of Materials	Cost of Labor
9-32	356257	4880375	beach access	inadequate shoreline vegetation, erosion. Sand appeared to have ben added	erosion control mix, shrubs	**low**	low	medium
9-33	356239	4880514	private road	runoff both sides of bridge	armor with stone	**low**	medium	low
9-34	356212	4880535	private road	culverts unstable-runoff	lengthen culverts, armor inlet/outlet	**low**	medium	medium
9-35	356177	4880464	beach access	bare soil, inadequate shoreline vegetation	erosion control mix, shrubs	**low**	low	medium
9-36	356175	4880552	private road	culvert clogged	remove clog	**low**	low	low
9-37	356118	4880510	beach access	erosion at shoreline	mulch/erosion control mix	**low**	low	low
9-38	355825	4881712	private road	stream going under culvert. Culvert clogged. Severe erosion of ditch and bank. Moderate shoulder erosion	Culvert: armor inlet/outlet. Replace/enlarge.	**medium**	high	high
10-01	353374	4882134	private road	unstable culvert in/outlet, slight ditch erosion, slight road shoulder erosion,	armor culvert in/outlet, vegetate ditch, and armor with stone	**medium**	medium	low

In addition to the sites listed above, 30 commerical sites were identified by technical staff at Camp Winona, Camp Wyonegonic, and Shawnee Peak. Of these sites, 8 were rated as high impact, 12 as medium impact, and 10 as low impact. MPA, LEA, and CCSWCD will be working with these properties to develop improvement and ongoing maintenance plans.

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For More Information

Moose Pond Association (MPA)
David Ehrman, President
Email: dcehrman@roadrunner.com Website: www.moosepondassociation.org
MPA mission is to help maintain and improve the quality of life on Moose Pond allowing all to enjoy the lake for many generations to come. Their primary goal is to prevent non-native invasive aquatic plants from entering Moose Pond.

Town of Bridgton
3 Chase Street, Suite 1, Bridgton, Maine 04009
(207) 647-8786 Website: www.bridgtonmaine.org
Bridgton's Code Enforcement Office deals with land use and zoning issues, permits, and inspection. The town's Public Works Department maintains all town road and facilities. Bridgton also has a Planning Board that meets the first Tuesday of every month.

Town of Denmark
62 East Main Street, Denmark, Maine 04022
(207) 452-2163 Website: www.townofdenmark.org
Denmark's Code Enforcement Officer is charged with upholding the Denmark Zoning Ordinance, Building Codes, and Plumbing Codes. Denmark's Public Works Departments maintains the town's core services and is responsible for the maintenance of all town roads and facilities.

Lakes Environmental Association (LEA)
230 Main Street, Bridgton, Maine 04009
(207) 647-8580 Website: www.mainelakes.org
LEA is a non-profit organization whose mission is to preserve and restore the high water quality and traditional character of Maine's lakes, watersheds, and related natural resources. LEA provides water testing, milfoil control, education, and technical assistance services to landowners, contractors, and municipalities.

Cumberland County Soil and Water Conservation District (CCSWCD)
35 Main Street, Windham, ME 04062
(207) 892-4700 Website: www.cumberlandswcd.org
CCSWCD is a non-profit organization whose mission is to assist and educate the public to provide stewardship of soil and water resources. CCSWCD offers assistance with watershed planning and survey work, environmental education, engineering support, seminars and training sessions, and education on the use of conservation practices.

Oxford County Soil and Water Conservation District (OCSWCD)
17 Olson Road, Suite 3, South Paris, Maine 04281
(207) 743-5789 ext. 101 Website: www.oxfordswcd.net
OCSWCD is a non-profit organization with services that include survey work, implementing water quality improvements, and providing public education.

Maine Department of Environmental Protection (MDEP)
312 Canco Road, Portland, ME 04103
Toll Free (888) 769-1036 or (207) 822-6300 Website: www.mainedep.com
Provides permit applications and assistance, numerous reference materials, technical assistance, environmental education, project funding opportunities, and stewardship activities for lakes.

Remember, the long term health of the watershed depends on <u>you</u>!

Cumberland County Soil & Water Conservation District

35 Main Street, Suite 3

Windham, ME 04062

207.892.4700