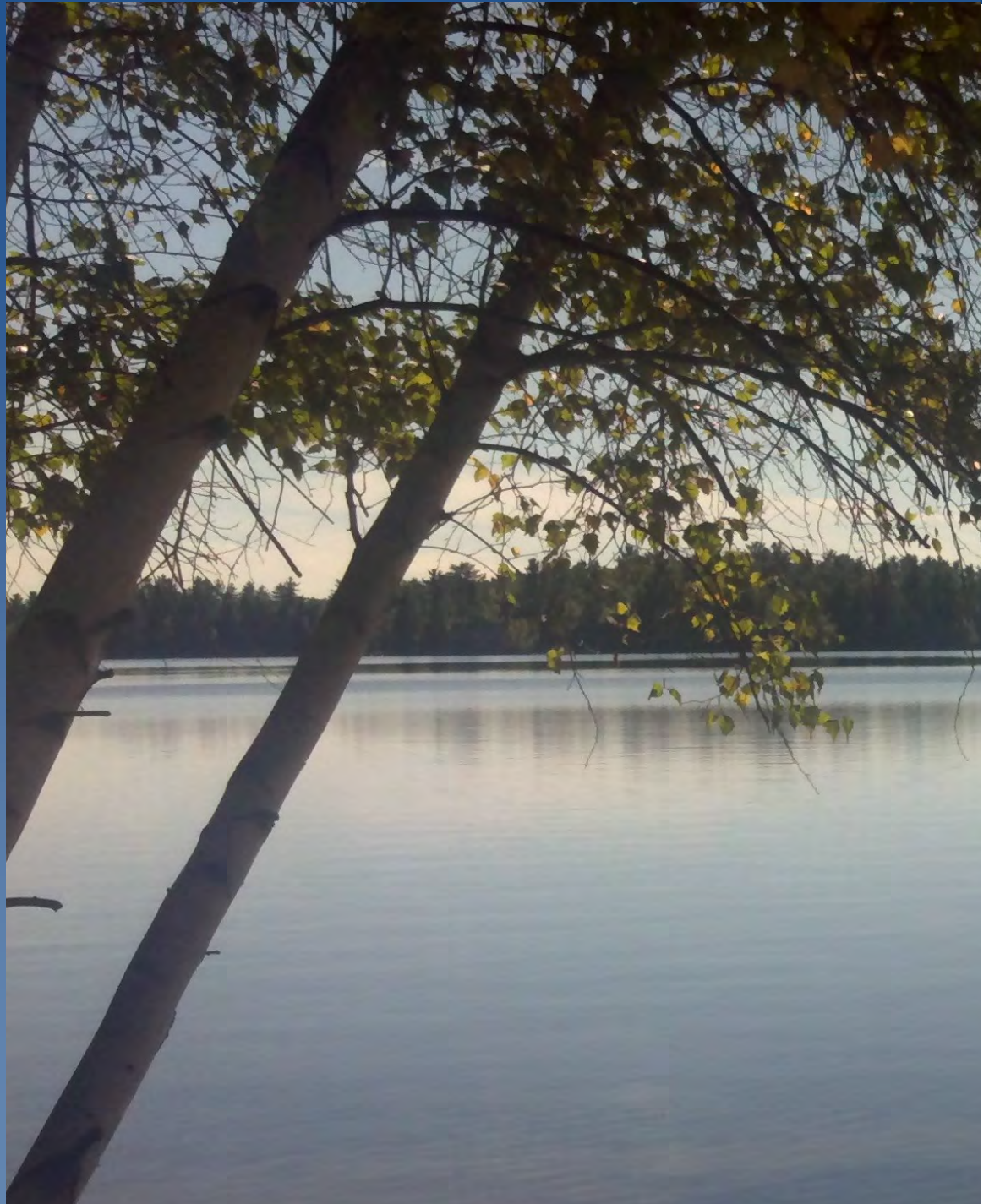


# WATERSHED PROTECTION PLAN

# FOREST LAKE



Cumberland County Soil & Water Conservation District

Prepared by CCSWCD for the  
Forest Lake Association  
January 2018

EOE



# 1. Watershed Background Information

## A. Document Purpose and Scope

The purpose of this watershed-based plan, hereafter referred to as the “Plan,” is to lay out a strategy and schedule for non-point source (NPS) pollution<sup>1</sup> mitigation and water quality protection efforts over the next five years (2018 to 2023). Cumberland County Soil and Water Conservation District (CCSWCD) has prepared this Plan on behalf of the Forest Lake Association (FLA) with support from the Maine Department of Environmental Protection (DEP).

This Plan was developed to satisfy national watershed planning guidelines provided by the U.S. Environmental Protection Agency (EPA). EPA and DEP require nine-element plans for impaired watersheds but allow alternative plans that meet minimum planning elements for Maine’s unimpaired lakes threatened by NPS pollution, provided they have recent watershed survey data and reference a geographically-appropriate scale. The Forest Lake watershed currently meets these requirements.

## B. Watershed Information

The Forest Lake watershed is located in the Towns of Gray, Cumberland, and Windham in Cumberland County, Maine (**Figure 1**). The Lake has a surface area of 210 acres, a maximum depth of 38 feet, an average depth of 12 feet, and a flushing rate of 1.4 flushes per year<sup>2</sup>. The Lake’s immediate watershed covers three square miles and serves as the headwaters for the Piscataqua River, which then flows into the Presumpscot River and Casco Bay. Development within the watershed has been mostly residential with nearly 180 lakefront properties. Most recent development has been occurring along the western shore of the Lake.

Forest Lake’s water quality is threatened by NPS pollution, which washes into the Lake from its surrounding watershed. Phosphorus and eroding soil, in particular, pose the greatest NPS threats to the Lake. As a result, Forest Lake is currently listed by DEP as an *NPS Priority Watershed* and a lake *Most at Risk from New Development* under Maine Stormwater Law in Chapter 502.

## C. Summary of Prior NPS Watershed Work

FLA, CCSWCD, and DEP have been working collaboratively to address soil erosion throughout the watershed since 2002, starting with a watershed survey

that identified 112 NPS pollution sites and indicated that at least 17% of septic systems in the watershed were more than 20-30 years old. A follow-up watershed management plan was created in 2003, listing methods to address the NPS sites identified. Two phases of conservation projects were implemented between 2004 and 2009. An updated NPS watershed survey was completed in the summer of 2017. Below is a list of all NPS-related projects to date<sup>3</sup>:

- 2002 Forest Lake Watershed Survey
- 2003 Forest Lake Watershed Management Plan
- 2004-2006 Forest Lake Conservation Project, Phase I
- 2007-2009 Forest Lake Conservation Project, Phase II
- 2017 Forest Lake Watershed Survey

A total of 46 NPS priority sites were addressed through the Phase I and Phase II conservation projects. These improvements prevented more than ~77 tons of sediment from entering Forest Lake each year.

This Plan serves to guide future actions and is based on the 2017 watershed survey. Of the 77 NPS pollution sites identified in the 2017 survey, 57% were determined to have a high or medium impact on Forest Lake’s water quality. Based on these findings, CCSWCD will work with FLA to seek grant funds in 2018 to help address the highest priority sites.

# 2. Identification of the Causes or Sources of NPS Threats

## A. Water Quality Summary

Water quality monitoring has occurred on Forest Lake at three sample stations since 1974. Water quality is considered above average based on Secchi Disk Transparencies (SDT), Total Phosphorus (TP), and Chlorophyll-a (Chla). Forest Lake is a non-colored lake with an average SDT of 5.2 m (17.1ft). The range for TP in the water column is 6-12 parts per billion (ppb) with an average of 8 ppb. Chla ranges from 1.4-8.5 ppb with an average of 3.4 ppb. Dissolved Oxygen readings for the lake average 6.1 parts per million (ppm) which is below the 7.2 ppm average of Maine’s lakes<sup>2</sup>.

<sup>1</sup>NPS pollution is caused by rain or melted snow moving over the land. As the water moves, it picks up and carries away natural and man-made pollutants, finally depositing them into lakes, rivers, streams, and other bodies of water.

<sup>2</sup> [www.lakesofmaine.org](http://www.lakesofmaine.org)

<sup>3</sup> All projects, with the exception of the 2017 Forest Lake Watershed Survey, were funded in part by the Maine Department of Environmental Protection under the U.S. Environmental Protection Agency’s Section 319 of the Clean Water Act.





# Forest Lake Watershed



**Figure 1:** Forest Lake Watershed

## B. Threatened Status

The Forest Lake watershed is currently on DEP's list of *Nonpoint Source Priority Watersheds* as an unimpaired yet threatened waterbody. It is listed primarily due to being considered sensitive to additional inputs of phosphorous<sup>4</sup>.

In addition to being listed as a *Nonpoint Source Priority Watershed*, Forest Lake is also on the State of Maine's Chapter 502 Stormwater Management Law's list of *Lakes Most at Risk from New Development*<sup>5</sup>. Criteria for being on this list include at least one of the following conditions:

- i. "A public water supply; or,
- ii. Identified by the Department as being in violation of class GPA water quality standards or as particularly sensitive to eutrophication based on:
  - a. Current water quality;
  - b. Potential for internal recycling of phosphorus;
  - c. Potential as a cold water fishery;
  - d. Volume and flushing rate; or,
  - e. Projected growth rate in the watershed."

Forest Lake watershed was added to this list due to rapidly increasing development in the watershed and existing water quality data indicate that it is sensitive to pollution.

## C. Watershed NPS Threats

The biggest water quality threat to Forest Lake is NPS pollution (i.e., polluted runoff), particularly soil erosion. Soil particles themselves can cause pollution by decreasing water clarity, covering fish beds, and clogging fish gills. However, it is the ability of soil particles to easily bind to other pollutants, particularly phosphorus, that can significantly affect lake water quality. Phosphorus is a nutrient that, in excess, can cause algal blooms. When algae die off, the water becomes depleted of oxygen through decomposition, and more advanced aquatic organisms such as fish are unable to survive. Algae itself can turn a lake green, making it undesirable and potentially unusable for fishing, boating, swimming, and wildlife.

In 2002, the entire watershed was surveyed for sources of NPS pollution / polluted runoff into Forest Lake. A

<sup>4</sup> [www.maine.gov/dep/land/watershed/nps-management-plan-2015-2019.pdf](http://www.maine.gov/dep/land/watershed/nps-management-plan-2015-2019.pdf)

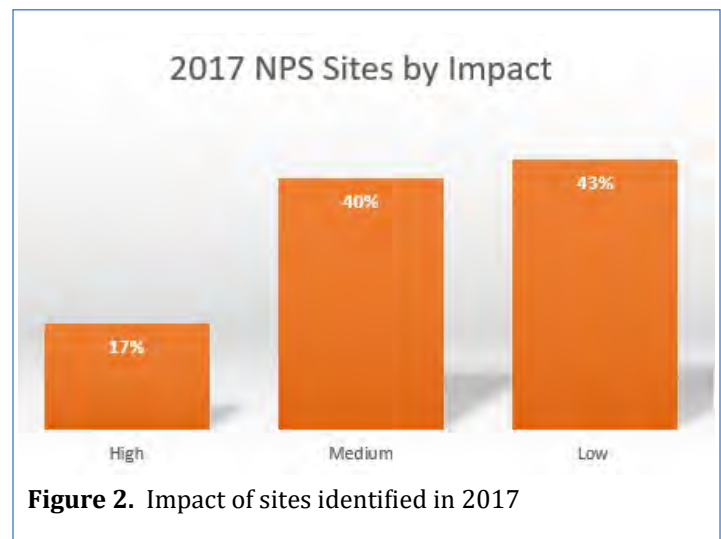
<sup>5</sup> [www.maine.gov/dep/land/stormwater/storm.html](http://www.maine.gov/dep/land/stormwater/storm.html)

total of 112 NPS sites were identified. The greatest number of sites were identified on residential properties (61), which accounted for about 55% of sites documented. The next most documented land uses were private road sites (25 sites, 22%) and driveways (19 sites, 17%). The remaining sites were associated with beach (6) and boat (1) access locations.

NPS sites identified in these surveys were ranked as having a low, medium, or high impact to water quality, based on size of disturbed area, slope, soil type, amount of soil eroding, proximity to water, and size of buffer. Low impact sites are those with limited transport of NPS/soil off-site. Medium impact sites have sediment transported off-site but do not reach a high magnitude, and high impact sites consist of significant erosion that flows directly into a stream, lake, or ditch. Out of the 112 sites identified, 75 were ranked as having a low impact to water quality, 26 as medium impact, and 11 as high impact. The majority of high impact sites were related to private roads and residential properties.

The watershed was surveyed again in 2017, and a total of 77 NPS sites were identified. Many of these sites may have been identified in the original survey. Out of these problem sites, 33 (43%) were ranked as having a low impact to water quality, 31 (40%) as medium, and 13 (17%) as high (**Figure 2**).

Residential properties (43%), private roads (33%), and driveways (13%) accounted for most of the sites in the 2017 survey (**Figure 3**). This breakdown of sites by land use was surprisingly similar to the results of the 2002 survey, especially in regards to sites associated with private roads. The greatest changes from the 2002 survey are the decrease in number of sites associated with residential properties, which decreased by 28, and driveways, which decreased by 9. The 25 private road





### 2017 NPS Sites by Land Use



**Figure 3.** 2017 impact sites per residential land uses

sites identified in 2017 was consistent with the number identified in 2002.

The 2017 survey indicated that the majority of high and medium impact NPS sites were located on private roads. Driveways and residential properties were primarily ranked as low impact sites (**Table 1**).

**Table 1.** Summary of 2017 survey sites by land use and their impact on water quality.

Land Use	High	Medium	Low	Total	%
Residential	2	9	22	33	43%
Private Road	10	10	5	25	33%
Driveway	1	3	6	10	13%
Boat Access		2		2	3%
Trail/Path		2		2	3%
State Road		1		1	1%
Town Road		1		1	1%
Beach					
Access		1		1	1%
Construction		1		1	1%
Other		1		1	1%
TOTALS	13	31	33	77	100%

## 3. Watershed Plan Goals and Objectives

The overall goal of this Plan is to maintain Class A water quality standards in Forest Lake by reducing phosphorus and sediment loading to the Lake by approximately 50 tons of sediment per year. This goal will be achieved through partnership efforts (See **Section 6**) through the following actions over the next five years (2018-2023):

- **Reduce current sources of phosphorus loading** by addressing 25 of the highest water quality impact sites identified in 2017 NPS watershed

survey. These sites will be addressed by providing targeted outreach, technical assistance, and cost-sharing assistance to install conservation practices at NPS sites.

- **Prevent new sources of phosphorus loading** by facilitating improved land use practices and ongoing maintenance activities. This objective will be met by conducting outreach and providing technical assistance to residents, road associations, and municipal officials.
- **Build local capacity** for watershed stewardship by strengthening the FLA-led outreach to the local community to recruit new members and membership donations; establishing a Forest Lake NPS committee with residents, FLA, road associations, town representatives, Maine Department of Transportation, and Maine Turnpike Authority; and supporting Lake protection education programs.
- **Conduct ongoing assessment of Lake and watershed conditions** by monitoring Forest Lake's water quality and creating/maintaining the NPS Site Tracker, data included in 2017 Forest Lake Watershed Survey Report, **Appendix A**.

## 4. Proposed Schedule and Milestones

Actions to meet this Plan's goal and objectives are listed in **Table 2**. This table includes a description of milestones, schedule, approximate cost estimates, potential funding sources and an organization responsible for the application of each specific action item. This Plan is designed to be implemented over the next five years and will be carried out with a combination of local, state, and federal resources. An overview of the implementation schedule is given in **Table 3** below.

## 5. Proposed Management Measures

Efforts to address NPS pollution at the highest priority sites from the 2002 survey have been implemented through the two conservation projects listed in **Section 1.C**. Specific management measures to address currently known NPS sites are listed in the 2017 Forest Lake Watershed Survey Report included as **Appendix A**. Typical problems and management measures for the most common land uses identified in the survey are described in the sections below. Recommendations follow guidelines commonly used by Soil and Water Conservation Districts and found in DEP publications including the *Gravel Road Maintenance Manual*, *Conservation Practices for Homeowners Factsheet Series*, *Natural Resources Conservation Service (Field Office Technical Guide)*, and the *State of Maine Erosion and*

**Table 2.** Action items<sup>6</sup>

Activity	Management	Schedule	Cost Estimates	Potential Resources
<i>Reduce current sources of phosphorus loading</i>				
Determine sites eligible for 319 grant cost sharing: Comparison of 2017 sites to sites previously addressed through 319 program	Forest Lake Association (FLA)	Winter/ Spring 2018	\$500 in-kind	FLA
Apply for EPA 319 watershed implementation grant funds through MDEP to address 25 impact sites identified in the 2017 watershed survey (approximately 1/3 of sites identified)	Cumberland County Soil & Water Conservation District (CCSWCD)	Spring 2018	\$3,500 plus \$1,000 in-kind	CCSWCD1; Towns of Cumberland, Gray, and Windham; FLA
If funded, conduct 319 watershed implementation project targeting 25 high impact, primarily residential sites identified in the 2017 watershed survey	CCSWCD	January 2019 - December 2020	\$90,000 grant; \$60,000 in-kind/cost share	EPA and DEP 319 grant program and local match
Through potential 319 watershed implementation project, provide up to 50% cost share to address 25 of the highest priority sites identified in the 2017 watershed survey	CCSWCD	10 sites addressed in 2019, 15 sites addressed in 2020	\$60,000 grant, \$40,000 in-kind/cost share	EPA and DEP 319 grant program, non-federal match from towns and private road associations
Through potential 319 watershed implementation project, establish a yearly residential cost share program to provide landowners with up to \$300 matching grants to address erosion issues.	CCSWCD / FLA	2019-2023	\$30,000 grant, \$20,000 in-kind/cost share	EPA and DEP 319 grant program, non-federal match Watershed Towns and Landowners
<i>Prevent new sources of phosphorus loading</i>				
Write and distribute yearly newsletters promoting phosphorous reduction methods and distribute to watershed residents, towns and stakeholders	FLA	Yearly	\$2,500 (\$500/year)	FLA
Conduct presentations to Towns of Cumberland, Gray, and Windham, on lake water quality trends, opportunities, and recommendations to reduce impacts.	FLA and CCSWCD	Yearly starting in spring 2018	\$5,000 (\$1,000 per year)	EPA and DEP 319 grant program, FLA, and CCSWCD
Review local town ordinances of the three watershed municipalities to determine if updated language is needed to help reduce phosphorus loading into Forest Lake	FLA and CCSWCD	Yearly starting in spring 2018	\$18,000 (\$6,000 per town)	Towns of Cumberland, Gray, and Windham; FLA
Reach out to private road associations to promote road maintenance	FLA	Yearly starting in spring 2018	\$1,000 in-kind	FLA
Provide 5-year Private Road Operation and Maintenance Plans	CCSWCD	Yearly starting in 2019	\$10,000 (Approx. \$2,500 per road / up to four road plans)	EPA and DEP 319 grant program, private road associations, Towns of Cumberland, Gray, and Windham
Conduct presentations at FLA Annual Meetings to promote lake protection and residential BMPs; Highlight opportunities available through potential 319 watershed implementation grant	CCSWCD	Summer of 2019 and 2020	\$700 grant, \$500 matching funds	EPA and DEP 319 grant program and local match from watershed towns and

<sup>6</sup>With the exception of CCSWCD, resources may be able to provide monetary and/or in-kind support.

**Table 2.** Action items (continued)

Activity	Management	Schedule	Cost Estimates	Potential Resources
Promote lake protection and residential BMPs at FLA Annual Meetings	FLA	Summer 2021, 2022, and 2023	\$1,200 in-kind	FLA
Submit press releases to local papers to promote lake protection and highlight opportunities available through potential 319 watershed implementation grant	CCSWCD	Spring of 2019 and 2020	\$600 grant, \$500 matching funds	EPA and DEP 319 grant program and local match from watershed towns and FLA
Create summary of sites addressed through the potential implementation grant to be available by FLA to watershed stakeholders	CCSWCD	2020	\$900 grant, \$600 matching funds	EPA (319) and DEP grant program and local match from watershed towns and FLA
<i>Build local capacity</i>				
Campaign to grow FLA membership and participation: Newsletter encouraging participation based on recent NPS survey findings; Incentives to participate in 2018 Annual Meeting	FLA	Spring/Summer 2018	\$500 plus \$2,500 in-kind	FLA
Establish NPS committee to form steering committee for watershed implementation grants	FLA	3 meetings per year	\$2,000 in-kind	FLA
Devise incentives plan for new members to join FLA (e.g. plant/BMP material discounts, local business discounts, FLA support plaques, etc.)	FLA and CCSWCD	2019-2020	\$3,000 plus \$2,000 in-kind	EPA and DEP 319 grant program; FLA
Increase outreach efforts to encourage community participation and FLA membership (through newspaper notifications, community service workshops, guest speaker presentations, etc.)	FLA and CCSWCD	Spring/Summer 2019-2020	\$3,000 plus \$5,000 in-kind	EPA and DEP 319 grant program; FLA
Solicit local business support of FLA and its endeavors	FLA and CCSWCD	2019-2020	\$2,500 plus \$2,500 in-kind	EPA and DEP 319 grant program; FLA
Create and install water signage to unify community and encourage FLA membership	FLA and CCSWCD	2019-2020	\$2,000 plus \$2,000 in-kind	EPA and DEP 319 grant program; FLA
Continue to hold yearly FLA meetings to educate and recruit members	FLA	Yearly (Summer)	\$1,600 in-kind	FLA
<i>Conduct ongoing assessment of lake and watershed conditions</i>				
Continue yearly water quality monitoring through Maine's Volunteer Lake Water Quality Monitoring Program	FLA's Water Quality Volunteer Monitors	Yearly (Spring, Summer, and Fall)	\$8,000	FLA Volunteers
Create or update an NPS Site Tracker with sites identified in 2017, and sites previously addressed	FLA	Winter/Spring 2018	\$500 in-kind	FLA
Continue to update NPS Site Tracker as sites are addressed and as new sites become apparent	FLA and CCSWCD	Yearly	\$600 grant, \$1,900 in-kind	EPA and DEP 319 grant program; FLA



**Table 3. Implementation timeline****2018**

- Compare 2017 sites identified to sites addressed in through Phase I and II 319 grant cost sharing
- Apply for Phase III EPA Section 319 Clean Water Act implementation grant through MDEP to address eligible sites
- Distribute FLA newsletter highlighting 2017 NPS survey results, promoting phosphorous reduction methods, and encouraging membership, volunteering, and funding for FLA
- Conduct presentations to Towns of Cumberland, Gray, and Windham on lake water quality trends, opportunities, and recommendations to reduce negative lake water quality impacts
- Review local town ordinances of the three watershed municipalities to reduce phosphorous loading
- Promote road maintenance to private road associations
- Establish NPS committee, meet up to three times per year
- Conduct annual lake association meeting to educate and recruit members; Devise incentive for attendance
- Conduct water quality monitoring
- Create NPS Site Tracker
- Update NPS Site Tracker as sites are addressed and new sites become apparent

**2019**

- Address up to 10 NPS abatement sites
- Establish yearly residential cost share program to address erosion issues
- Distribute FLA newsletter promoting phosphorous reduction methods and to recruit new members, volunteers, and funding for FLA
- Devise incentives plan for new members to join FLA and increase outreach efforts to encourage community participation and FLA membership
- Create and install water signage to unify community and encourage FLA membership
- Conduct presentations to Towns of Cumberland, Gray, and Windham on lake water quality trends, opportunities, and recommendations to reduce negative lake water quality impacts
- Review local town ordinances of the three watershed municipalities to reduce phosphorous loading
- Promote road maintenance to private road associations
- Provide 5-year Private Road Operation and Maintenance Plans
- Conduct up to three NPS committee meetings
- Conduct annual lake association meeting to educate and recruit members
- Conduct residential BMP presentation at yearly lake association meeting and highlight cost share opportunities
- Submit press releases to promote lake protection and highlight cost share opportunities
- Conduct water quality monitoring
- Update NPS Site Tracker as sites are addressed and new sites become apparent

**2020**

- Address up to 15 NPS abatement sites
- Conduct yearly residential cost share program to address erosion issues
- Distribute FLA newsletter promoting phosphorous reduction methods and to recruit new members, volunteers, and funding for FLA
- Devise incentives plan for new members to join FLA and increase outreach efforts to encourage community participation and FLA membership
- Create and install water signage to unify community and encourage FLA membership
- Conduct presentations to Towns of Cumberland, Gray, and Windham on lake water quality trends, opportunities, and recommendations to reduce negative lake water quality impacts
- Review local town ordinances of the three watershed municipalities to reduce phosphorous loading
- Promote road maintenance to private road associations
- Provide 5-year Private Road Operation and Maintenance Plans
- Conduct up to three NPS committee meetings
- Conduct annual lake association meeting to educate and recruit members
- Conduct residential BMP presentation at yearly lake association meeting and highlight cost share opportunities
- Submit press releases to promote lake protection and highlight cost share opportunities
- Conduct water quality monitoring
- Update NPS Site Tracker as sites are addressed and new sites become apparent
- Create summary of sites addressed through potential Phase III implementation grant project

*Table 3 continued on next page*

**Table 3.** Implementation timeline (continued)**2021**

- If funds allow, continue conducting yearly residential cost share program to address erosion issues
- Distribute FLA newsletter promoting phosphorous reduction methods and to recruit new members, volunteers, and funding for FLA
- Conduct presentations to Towns of Cumberland, Gray, and Windham on lake water quality trends, opportunities, and recommendations to reduce negative lake water quality impacts
- Review local town ordinances of the three watershed municipalities to reduce phosphorous loading
- Promote road maintenance to private road associations
- Provide 5-year Private Road Operation and Maintenance Plans
- Conduct up to three NPS committee meetings
- Conduct annual lake association meeting to educate and recruit members
- Conduct water quality monitoring
- Update NPS Site Tracker as sites are addressed and new sites become apparent

**2022**

- If funds allow, continue conducting yearly residential cost share program to address erosion issues
- Distribute FLA newsletter promoting phosphorous reduction methods and to recruit new members, volunteers, and funding for FLA
- Conduct presentations to Towns of Cumberland, Gray, and Windham on lake water quality trends, opportunities, and recommendations to reduce negative lake water quality impacts
- Review local town ordinances of the three watershed municipalities to reduce phosphorous loading
- Promote road maintenance to private road associations
- Provide 5-year Private Road Operation and Maintenance Plans
- Conduct up to three NPS committee meetings
- Conduct annual lake association meeting to educate and recruit members
- Conduct water quality monitoring
- Update NPS Site Tracker as sites are addressed and new sites become apparent
- Pursue updating this watershed protection plan for the next 5-years

*Sediment Control Manual.* The recommended best management practices (BMPs) or conservation practices accomplish this Plan's goal of reducing phosphorus and sediment loading to the Lake by stabilizing bare soil; mitigating erosion; and diverting, infiltrating, or filtering polluted runoff before it reaches the Lake and its tributaries.

In addition to structural BMP recommendations, public education and outreach efforts will be needed to promote responsible stewardship and ongoing maintenance activities. Many of these efforts will be led by the FLA.

## A. Residential Sites

A total of 33 (43%) residential sites were documented in the 2017 survey. Of these, 2 were rated as having a high impact to water quality, 9 as medium impact, and 22 as low impact.

Common problems identified included:

- Bare soil
- Inadequate vegetation along the shoreline
- Sheet erosion
- Roof runoff erosion
- Shoreline erosion

Recommended solutions include:

- Seed and mulch bare soil
- Establish or enhance shoreline buffer with native plants
- Limit foot traffic in eroding areas, place erosion control mulch or stone on heavily used paths
- Install runoff diverters, such as rubber razor blade water bars or "speed bump" water diverters
- Use dripline trenches to infiltrate roof runoff
- Stabilize shoreline with woody shrubs, root wads, and hand-placed armor, like riprap if appropriate (permitting required)

Maintenance for recommended solutions include:

- Reseeding/over-seeding and replenishing erosion control mulch every two years and when area has been scraped or damaged (often due to snow plowing and in areas of high foot traffic)
- Water plants frequently during first year following installation, water during summer months and times of drought; replace dead and dying buffer plants
- Replace decomposed erosion control mulch in walking paths (about every two years), clean out stone paths every two to five years to ensure proper infiltration

- Clean out accumulated debris from behind waterbars, re-establish diverters if damaged or no longer functioning as intended
- Clean out stone in dripline trenches every five years to ensure proper infiltration
- Repair shoreline stabilization following proper permitting requirements

*All maintenance recommendations will be the sole responsibility of the landowner to perform.*

This Plan aims to address residential sites in the following manner, based on the availability of federal, state, and local funding and resources:

- FLA will form an NPS committee to oversee residential outreach and assistance.
- FLA will notify landowners whose properties were identified in the 2017 NPS watershed survey of findings and basic corrective actions items they can implement.
- Through a potential Phase III 319 implementation grant/conservation project, free technical assistance can be provided by CCSWCD to residential landowners and up to \$300 matching grant funds to address erosion issues. CCSWCD will assist FLA in possibly continuing this project after the completion of a Phase III 319 implementation grant project, if funding is available from FLA or other resources.
- FLA will distribute yearly newsletters and hold a yearly annual lake association meeting to promote phosphorous reduction methods on residential sites.
- CCSWCD will provide presentations on residential BMPs at up to two yearly annual lake association meetings through funding provided by a potential Phase III 319 implementation grant project.

## B. Private Road Sites

Private road sites were the second most common land use associated with NPS pollution, with a total of 25 sites identified, totaling 33% of the sites identified. Of these, 10 were rated as having a high impact to water quality, 10 as medium impact, and 5 as low impact.

Common problems identified include:

- Road shoulder and surface erosion
- Severe ditch erosion
- Unstable culvert inlet and outlet
- Winter sand build-up
- Plow or grader berm

Recommended solutions include:

- Grade and reshape gravel roads to create a “crown” and install appropriate surface material

- Stabilize road shoulders with riprap or grass seed
- Clean, reshape, and armor ditches with stone or grass
- Armor culvert inlets and outlets
- Remove winter sand and built up grader berms
- Install plunge pools below culverts to hold runoff and catch sediment before it enters streams or the Lake
- Properly size and align culverts

Maintenance for recommended solutions include:

- Re-grade gravel roads twice a year to properly re-establish road crown
- Re-establish and repair ditches and road shoulders where needed each spring from snow plow damage; inspect ditches after storm events to ensure they are functioning as intended (no heavy sedimentation)
- Replace fallen riprap at culvert inlets and outlets
- Remove accumulated sediment from plunge pools and properly dispose of away from water resources
- Ensure existing culvert inlets and outlets are free of accumulated debris and sediment, check to make sure damage has not occurred to culvert itself
- Ensure future culverts are aligned and sized properly; consider using StreamSmart<sup>7</sup> principles in future culvert replacements

*All maintenance recommendations will be the sole responsibility of the road associations and landowners to perform.*

This Plan aims to address private road sites in the following manner, based on the availability of federal, state, and local funding and resources:

- FLA will form an NPS committee to oversee private road outreach and assistance.
- FLA will notify private road associations whose roads were identified in the 2017 NPS watershed survey and provide a summary of findings and action items to implement improvements on their road(s).
- Through a potential Phase III 319 implementation grant, technical and/or engineering assistance will be provided by CCSWCD to private roads/road associations and provide up to 50% matching funds to address the highest priority erosion issues.
- CCSWCD will provide at least four private road operation and maintenance plans through funding provided by a potential Phase III 319 implementation grant.

<sup>7</sup>[www.maine.gov/dacf/mfs/policy\\_management/water\\_resources/stream\\_smart\\_crossings.html](http://www.maine.gov/dacf/mfs/policy_management/water_resources/stream_smart_crossings.html)





## C. Driveway Sites

NPS sites associated with driveways totaled 13% (10 sites) of the water quality impact sites identified in 2017. Of these sites, 1 was rated as high impact, 3 as medium, and 6 as low.

Common problems identified include:

- Surface erosion
- Bare soil
- Damaged or clogged culverts
- Roof runoff erosion

Recommended solutions include:

- Install gravel or asphalt water bars or rubber razor blade water diverters to divert flow off road
- Seed and mulch bare soil
- Properly size and align culverts
- Install native plant buffers between driveways and the Lake to infiltrate and filter runoff

Maintenance for recommended solutions includes:

- Re-grade gravel driveways yearly to properly re-establish crown
- Remove accumulated sediment and debris from behind water diverters, re-establish diverters if damaged or no longer functioning as intended
- Inspect and maintain culverts before and after rain events to ensure they are able to properly convey water flow
- Water plants frequently during first year of installation, water during summer months and times of drought; Replace dead and dying buffer plants

*All maintenance recommendations will be the sole responsibility of the landowner to perform.*

This Plan aims to address driveway sites in the following manner, based on the availability of federal, state, and local funding and resources:

- FLA will notify landowners whose driveways were identified in the 2017 NPS watershed survey of findings and basic corrective actions.
- Through funding provided by an anticipated 319 implementation grant project, up to 50% cost sharing and technical and/or engineering assistance will be provided by CCSWCD for the highest impact driveway sites
- Less extensive driveway fixes will be considered for residential cost sharing programs and landowner outreach through FLA.

## D. Other Sites

The remaining 11% of water quality impact sites documented consisted of two boat access sites, two

trails, and one site at each of the following: beach access, Town road, State road, and construction site. All of these sites were listed as medium impact.

Common problems identified with the beach access sites, boat access sites, trail, and town and state roads include:

- Bare soil and surface erosion
- Shoreline erosion
- Minimal vegetated buffer along shoreline

Recommended solutions include:

- Establish or enhance buffer
- Seed and mulch bare soil
- Minimize bare areas
- Create defined pathways for foot traffic
- Stabilize shoreline with vegetation and riprap if appropriate (permitting required)

Maintenance for recommended solutions includes:

- Water plants frequently during first year following installation, water during summer months and times of drought; replace dead and dying buffer plants
- Reseeding/over-seeding and replenishing erosion control mulch every two years and when area has been scraped or damaged (often due to snow plowing and in areas of high foot traffic)
- Re-establishing paths if damaged, replace mulch every two years
- Repair shoreline stabilization if damaged
- Use appropriate ECM BMPs on construction sites

## 6. Plan Oversight and Partner Roles

FLA will lead implementation of this Plan according to schedule and update the action items as needed. Key partners assisting with the Plan's implementation are listed below with their general roles responsibilities. Specific action items that these partners will implement are listed in **Table 2**.

**Forest Lake Association (FLA)** will serve as the designated entity to oversee the implementation of this Plan and ensure it is updated as needed. FLA will both provide funding and help to seek additional funding to conduct landowner outreach, encourage FLA membership and volunteers, and establish an NPS committee to oversee remediation of NPS sites and keep the NPS Site Tracker up-to-date. FLA will also support efforts to notify property owners of identified BMP sites to provide basic recommendations for corrective actions and work with NPS committee to update this Plan in 5 years.

**Cumberland County Soil and Water Conservation District (CCSWCD)** will assist with the Plan's implementation by seeking federal, state, and local funding in order to provide technical resources. With adequate support, CCSWCD will apply for a Phase III implementation grant under Section 319 of the Clean Water Act, distributed by DEP's annual NPS Grants Program. CCSWCD will serve as the Project Coordinator, and participate on FLA's NPS committee, should the grant be awarded. Tasks through this project include managing and reporting activities, providing technical recommendations and engineering for high priority sites, and educating the community on the importance of water quality protection and recommended conservation practices.

**Maine Department of Environmental Protection (DEP)** will collaborate with Maine's Volunteer Lake Monitoring Program to conduct water quality monitoring and technical assistance and provide the opportunity for financial assistance through the NPS Grants Program. Should a Phase III implementation grant be funded, DEP will provide project guidance and participate on FLA's NPS committee.

**US Environmental Protection Agency (EPA)** may provide Clean Water Act Section 319 funds and guidance.

The **Towns of Cumberland, Gray, and Windham** may provide funding support for the Plan and their respective town-owned and maintained water quality impact sites. Based on guidance from FLA and CCSWCD, the Towns will work to address NPS problems and conduct regular maintenance of town road sites. They will also participate in the FLA's NPS committee.

**Private road associations, Maine Department of Transportation, Maine Turnpike Authority, and landowners** will address NPS issues on their properties and conduct ongoing maintenance of BMPs, as well as be invited to participate on FLA's NPS committee and potential grant-funded projects.

## 7. Water Quality Monitoring

Throughout the 5-year duration of this Plan, water quality testing will be performed by Volunteer Lake Monitors under the guidance and collaboration of Maine's Volunteer Lake Monitoring Program (VLMP) and DEP. Readings on water clarity and dissolved oxygen will be taken by FLA volunteers at two-week intervals through the spring, summer, and fall months.

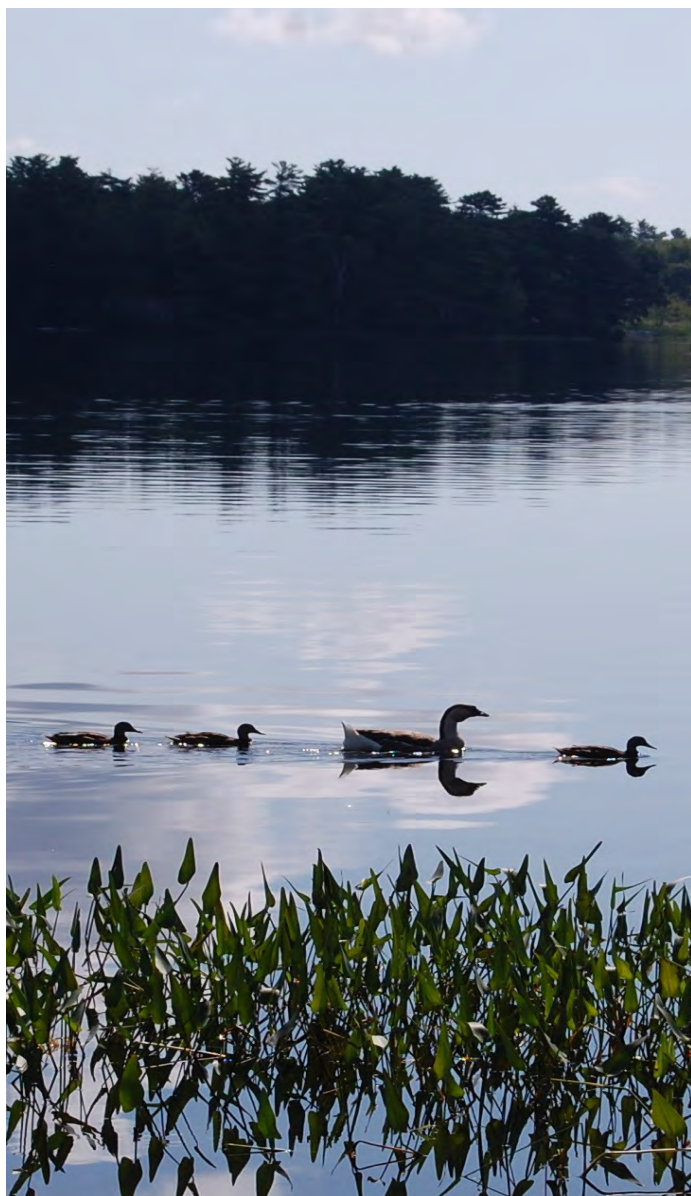
## 8. Pollutant Load Reductions

Pollutant load reductions will be estimated for all high priority sites addressed through EPA and DEP 319 watershed projects. These calculations will estimate sediment and phosphorus load reductions expected upon the installation of prescribed BMPs. Pollutant load reduction estimates will be completed using methods approved and recommended by DEP and EPA.

## 9. Watershed Survey Reports

Watershed survey reports for Forest Lake can be found in the following attached appendices:

- **Appendix A – 2017 Forest Lake Watershed Survey Report**
- **Appendix B – 2003 Forest Lake Watershed Survey Report**





Cumberland County Soil & Water Conservation District

35 Main Street, Suite 3  
Windham, ME 04062  
207.892.4700  
[www.cumberlandswcd.org](http://www.cumberlandswcd.org)



## **Appendix A: 2017 Forest Lake Watershed Survey Report**





*Forest Lake Maine*



# **2017 Forest Lake Watershed Survey**

## **September 2017 ~ Forest Lake Association**

Prepared by  
Debi Curry, Secretary  
Forest Lake Association  
2017 Watershed Survey Steering Committee





# Acknowledgements

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

## Watershed Survey Volunteers

Vanessa Blair-Glanz

Paula Curcio

Debi Curry

Jon Curry

Bill Devoe

Janene Gorham

John Gorham

Ted Ney

Greg Schulz

Don Scipione

Susan C.H. Siu

Glenn Sylvester

Barbara Tellefsen

Cathy Whorf



## Survey Leaders

Kristin Feindel, Maine DEP

Wendy Garland, Maine DEP

Betty Smith, Technical Consultant

Jeff Stern, Fiddlehead Environmental Consulting

Heather True, Cumberland County Soil & Water Conservation District

## Technical Support

Wendy Garland

John MacLaine, Environmental Specialist, DEP

Heather True, Cumberland County Soil & Water Conservation District

## Steering Committee

Debi Curry, Janene Gorham, & Greg Schulz – Forest Lake Association Trustees

Wendy Garland, Department of Environmental Protection

## Cover Photo

Photo by Tyler E. Dunlea

## Funding

Maine Volunteer Lake Monitoring Program  
Town of Windham, ME

Town of Gray, ME  
Forest Lake Association



## CONTENTS

Introduction .....	1
Forest Lake Watershed .....	1
Water Quality .....	3
Forest Lake Water Quality .....	3
NPS Priority Watersheds .....	3
Water Quality Monitors .....	5
Certified Water Quality Monitors .....	5
Certified Invasive Plant Patrollers .....	5
Threats to Lake Water Quality .....	5
Phosphorus 101 .....	5
Why Protect the Lake? .....	6
What Are We Doing Now? .....	6
Watershed Survey Overview .....	8
Purpose of the Watershed Survey .....	8
The Survey Method .....	8
Problem Sites .....	8
Survey Sectors .....	10
Sector Teams .....	10
Watershed Survey Findings .....	11
Summary of Watershed Survey Findings .....	11
Primary Land Use Activity .....	12
Summary of Findings by Land Use Type .....	14
Residential Sites .....	14
Private Roads .....	16
Driveways .....	18
Other Land Use Findings .....	20
Survey Recommendations .....	21
Summary of Recommendations by Sector .....	21
Next Steps .....	22
Where Do We Go From Here? .....	22
Where Do I Get More Information? .....	22
Contacts .....	22
Permitting Basics .....	23
Conservation Practices for Homeowners .....	23
Example Recommendations .....	24
Appendix A: Survey Maps .....	27
Appendix B: Forest Lake Watershed Survey Form .....	35
Appendix C: Survey Data Detail .....	37





# Introduction

This report was specifically designed for citizens living in the Forest Lake Watershed. It provides the results and analysis of a watershed survey conducted on April 29, 2017. In addition, the report includes basic information about how to protect lake water quality.

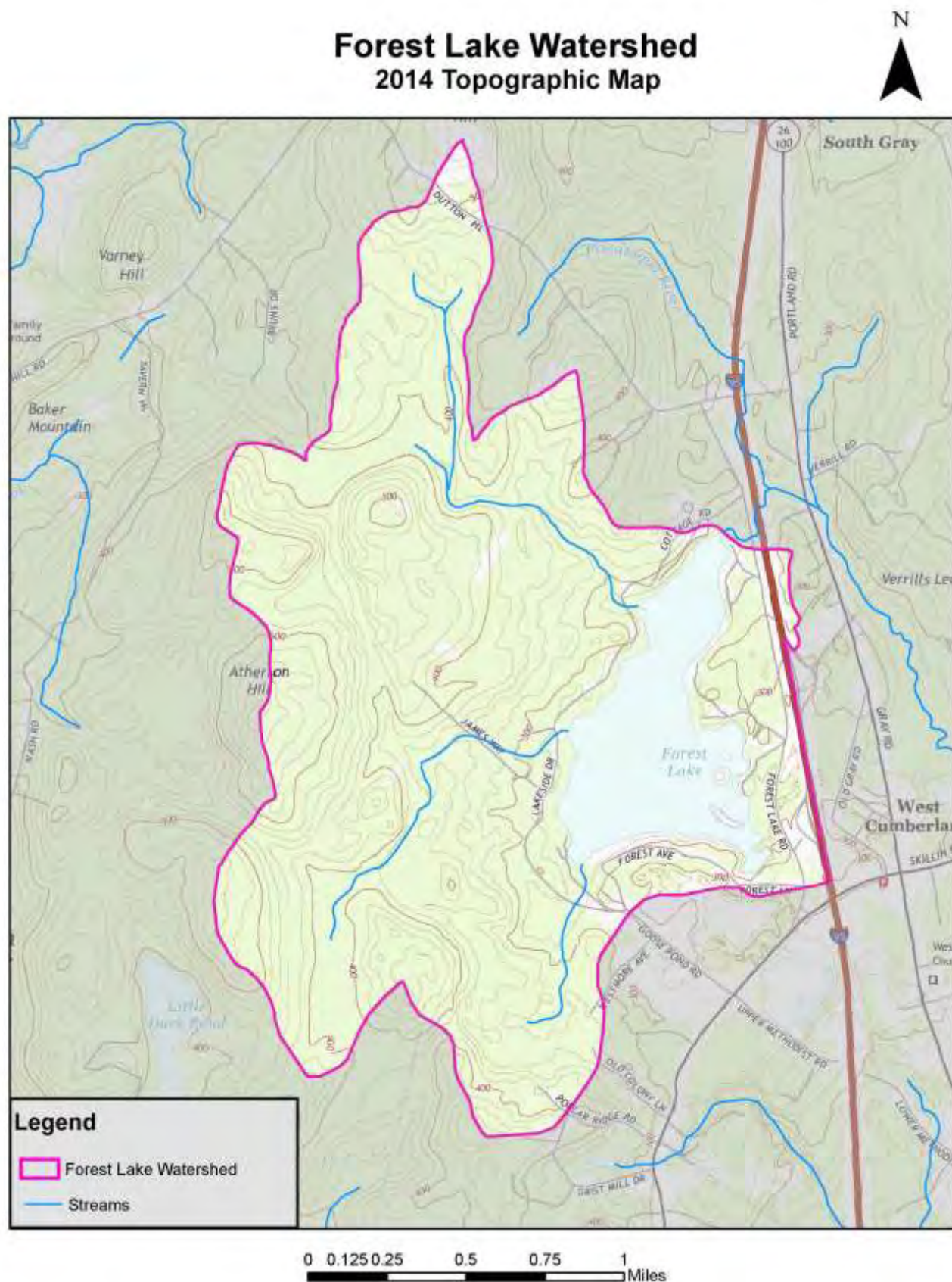
A watershed survey was first conducted in April 2003. As a result, 112 sites were identified with potential to impact the water quality in Forest Lake. Subsequent mitigation work helped to alleviate and/or ameliorate some of these issues. Our 2017 survey serves to supplement/enhance previous findings, identify new potential sources of runoff pollution, and to update planning for the continued protection of Forest Lake water quality.

## Forest Lake Watershed

For the purposes of this report, “the watershed” refers to the network of streams, ditches, and land that flow to Forest Lake (Figure 1). Our lake lies at the juncture of the towns of Cumberland, Gray, and Windham in Cumberland County, Maine. Forest Lake serves as the headwaters to the Piscataqua River, which then flows into the Presumpscot River and Casco Bay. Formerly also known as Goose Pond, the lake has a surface area of 211 acres, with over 4 miles of shoreline, most of which is privately owned. The entire watershed area encompasses just under 400 properties and covers about 3.3 square miles (2174 acres), a small portion of which extends into Falmouth, Maine. The majority of development in the watershed in recent years has been on the western shore, located in the Town of Windham. The 4.3 mile perimeter is developed with 179 lakefront properties, 96 properties adjacent to the lakefront, and an additional 119 properties in the surrounding watershed area according to a recent Forest Lake Association compilation of property assessment records.

The maximum depth of the lake is 38 feet with a mean depth of 12 feet. According to statistics maintained by the Volunteer Lake Monitoring Program (VLMP), *there are no known aquatic infestations as of this writing, and the water quality is noted as “above average”.*

FIGURE 1: FOREST LAKE TOPOGRAPHIC WATERSHED MAP



# Water Quality

## Forest Lake Water Quality

The Forest Lake Association has tested water quality in Forest Lake for more than 35 years. This testing has found the lake's water quality to be slightly above average based on Secchi disk transparency, total phosphorus and chlorophyll-a measurements.

*However, as a result of development trends in the area and the water quality conditions, Forest Lake has been placed on the March 2017 Maine Department of Environmental Protection (MDEP) Nonpoint Source Priority List (NPS) as one of 151 threatened lakes because it is “sensitive to additional phosphorus inputs”.<sup>1</sup>*

The purpose of this list is to encourage NPS abatement work in watersheds most vulnerable to NPS pollution. The list is used to help prioritize DEP NPS water pollution control efforts and attract local communities to take action to restore or protect waters impaired or threatened by NPS pollution. The NPS priority watersheds list is a part of the Maine NPS Management Plan.

The Maine Department of Environmental Protection (ME-DEP) and the Volunteer Lake Monitoring Program (VLMP) have collaborated in the collection of lake data to evaluate water quality, track algal blooms, and determine water quality trends. This dataset does not include bacteria, mercury, or nutrients other than phosphorus.

Water quality monitoring data for Forest Lake have been collected since 1974. During this period, 15 years of basic chemical information was collected in addition to Secchi Disk Transparencies (SDT).

In summary, the water quality of Forest Lake is considered above average based on measures of SDT, total phosphorus (TP), and Chlorophyll-a (Chla). The potential for nuisance algal blooms on Forest Lake is moderate.

## Water Quality Measures

Forest Lake is a non-colored lake (average color 19 SPU) with an average SDT of 5.2 m (17.1 ft.). The range of water column TP for Forest Lake is 6 - 12 parts per billion (ppb) with an average of 8 ppb. Chla ranges from 1.4 - 8.5 ppb with an average of 3.4 ppb. Recent dissolved oxygen (DO) profiles show moderate DO depletion in deep areas of the lake. The potential for phosphorus to leave the bottom sediments and become available to algae in the water column (internal loading) is moderate. Oxygen levels below 5 parts per million stresses certain cold water fish and persistent loss of oxygen may eliminate or reduce habitat for sensitive cold water species.

The following charts provided by [VLMP](#) display the values of water quality indicators for Forest Lake as compared to the range of values seen across all of Maine's surveyed lakes. Color ramps represent the range of values across all lakes. Yellow diamonds display the mean values for Forest Lake, as averaged across all sampling sites.

### NPS Priority Watersheds

Maine DEP maintains a list of watersheds where water quality is impaired or considered particularly threatened by polluted runoff.

A watershed must be listed by as a NPS Priority Watershed in order to be eligible to apply for 319 grant funding under the Clean Water Act.

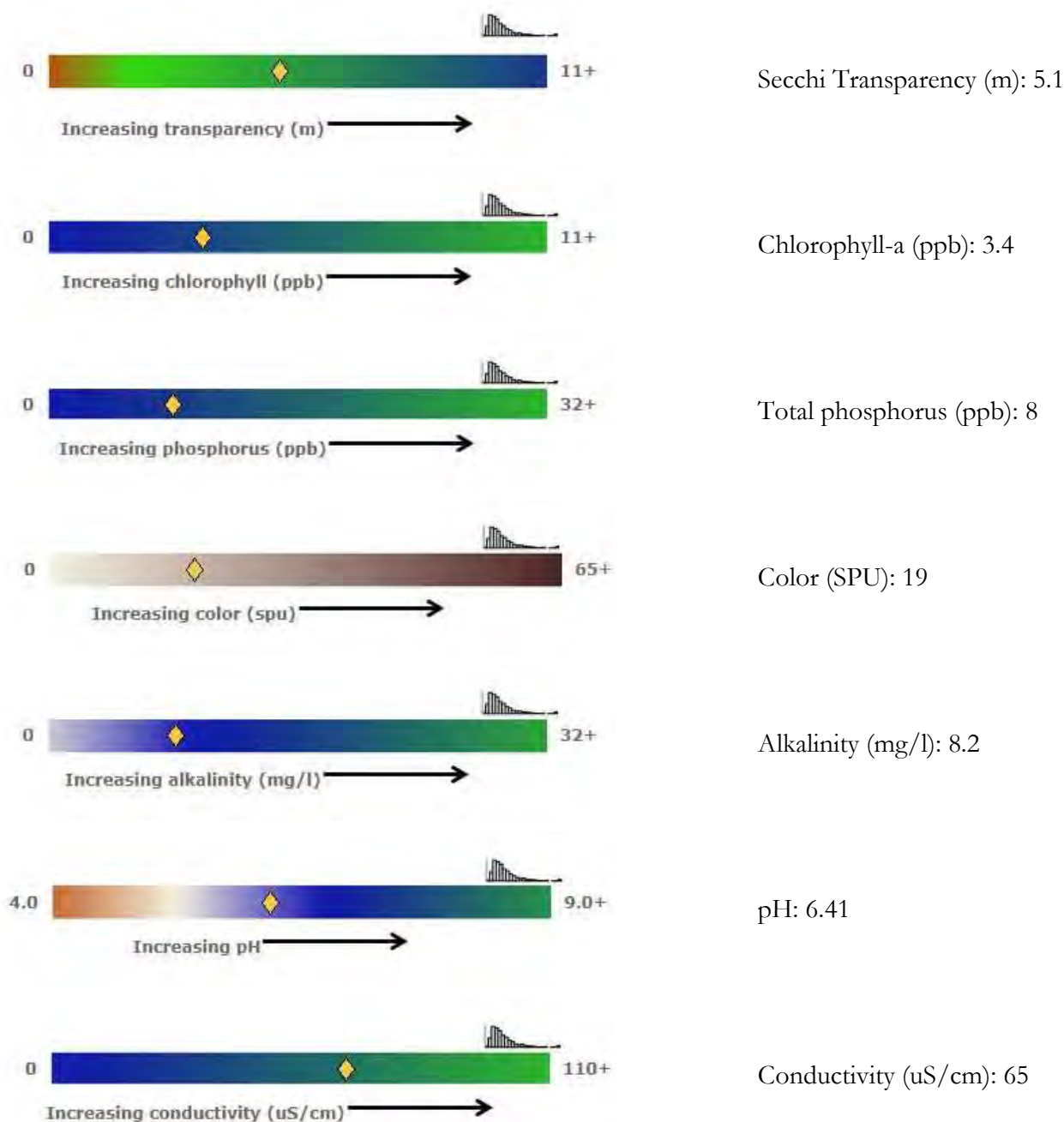
Forest Lake is on the NPS Priority Watersheds list.

---

<sup>1</sup> Maine Department of Environmental Protection; Nonpoint Source Priority Watersheds List; [http://www.maine.gov/dep/land/watershed/nps\\_priority\\_list/NPS%20Priority%20List%20-%20Lakes.pdf](http://www.maine.gov/dep/land/watershed/nps_priority_list/NPS%20Priority%20List%20-%20Lakes.pdf)



**TABLE 1: WATER QUALITY INDICATORS**



The color bars display the range of data seen in Maine lakes for each parameter. Lakes at the blue end of each range are generally clear. Lakes at the green end support more algae. Parameters having no to little effect on algae are monochrome. The yellow diamond indicates where 'your' lake falls on this range. Place your cursor over the diamond (1) to see the average value for your lake. Click on the Column Chart Icon (2) for more information on how your lake compares to other Maine lakes. Below the horizontal line at the bottom of the chart are numbers which align with values indicated by the Color Chart. Red lines (3) indicate data values for each lake station. Red lines superimposed on each other indicate that values are nearly identical (4). The vertical scale at the left of the chart (5) provides insight into what percentage of lakes are represented by the height of each column. Note that the column above the number '5' (for example) includes lakes with parameter values from 5.0 to 5.99. Data exceeding the maximum scale value are plotted to the extreme right of Color Bar and Column Chart (6).

## Water Quality Monitors

We are fortunate to have a dedicated group of trained and certified volunteers to monitor lake water quality and to patrol invasive plant species. Together, our Monitors and Patrollers create a first alert system, keeping careful watch for potential problems. As of this writing, our volunteers are:

### Certified Water Quality Monitors

- Paula Curcio
- Jim Gameros
- John Gorham
- Janene Gorham

### Certified Invasive Plant Patrollers

- Mike Caiola
- Jim Gameros
- Janene Gorham
- John Gorham
- Karen Hall
- Elizabeth Hamilton
- Donald Hughes
- Jen Hughes
- David Russell
- Duncan Smith
- William Spitzinger
- Cathy Whorf

## Threats to Lake Water Quality

What puts water quality at risk? The biggest pollution culprit in Forest Lake and other Maine lakes is **polluted runoff or nonpoint source (NPS) pollution**. Polluted runoff is found in storm water runoff from rain and snowmelt. During and after storms and snowmelt, streams and overland flow washes soil into lakes from the surrounding landscape.

In an undeveloped, forested watershed, stormwater runoff is slowed and filtered by tree and shrub roots, understory plants, 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 filtering treatment the forest once provided. Runoff shed from impervious surfaces, such as rooftops, compacted soil, and gravel camp roads collects and speeds up, often channelized. The runoff becomes a destructive erosive force as it is greater in both velocity and volume than stormwater in an undeveloped landscape.

Not only is the increase in stormwater volume and velocity problematic in a developed watershed, but also the nutrients and the sediment in the stormwater runoff 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 on land and in stormwater runoff, is a primary food for all plants, including **algae**.

### Phosphorus 101<sup>2</sup>

In natural conditions, the scarcity of phosphorus in a lake limits algae growth. Increases in phosphorus levels, however, usually result in noticeable changes to water. Algae need phosphorus in order to grow. So,

#### POLLUTED RUNOFF

Also called nonpoint source pollution or NPS. Pollution from diffuse, seemingly insignificant sources (such as erosion, roads, septic systems) that, when combined, add up to a significant amount of pollution to a watershed.

---

<sup>2</sup> Volume II: Phosphorus Control in Lake Watersheds: Appendix A: A Technical Guide to Evaluating New Development; <http://www.maine.gov/dep/land/stormwater/stormwaterbmps/vol2/appa.pdf>

when phosphorus levels increase, lake algal populations also increase, causing a decline in water transparency. These algal blooms may eventually lead to depletion of the lake water's oxygen supply, often resulting in the eventual loss of some fish species.

The quality of water in a lake depends on the condition of the land in its watershed. Phosphorus is abundant in the environment, but in an undisturbed environment it is tightly bound up by soil and organic matter for eventual use by plants. Natural systems conserve and recycle nutrients, water, and other materials needed to sustain plant growth. Water is stored in depressions on the uneven forest floor and seeps into the ground to become groundwater, thereby preventing it from running over the land surface and exporting valuable nutrients from the system. Land development changes the natural landscape in ways that alter the normally tight cycling of phosphorus. The removal of vegetation, smoothing of the land surface, compaction of soils, and creation of impervious surfaces combine to reduce the amount of precipitation stored and retained onsite, dramatically increasing the amount of water running off the land as surface runoff.

These changes to the land surface and the associated increase in surface runoff dramatically increase phosphorus export. Land disturbance upsets the environment's ability to retain phosphorus. Stormwater flowing over the land surface picks up phosphorus and transports it in soluble form or attached to eroded soil particles. The phosphorus in stormwater comes from natural and human sources, including eroded soil, road dust, plants, lawn fertilizer and detergents. The smooth surfaces, closely cropped lawns, and compacted soils common in developed areas do not retain phosphorus, and only speed its removal by generating surface runoff. The end result is more phosphorus in stormwater, and thus more phosphorus in lakes.

## Why Protect the Lake?

Why should we protect the lake from polluted runoff?

- The lake contains valuable habitat for fish, birds and other wildlife.
- Forest Lake provides recreational opportunities to watershed residents and to visitors. It is an important contributor to the local economy.
- A 1996 University of Maine study demonstrated that lake water quality affects property values. For every meter (3Ft.) decline in water clarity, shorefront property values can decline as much as 10 to 20 percent!<sup>3</sup> Declining property values affect individual landowners as well as the economics of the entire community.
- Once a lake has declined, it can be difficult and prohibitively expensive to restore.
- Sediment and nutrients that wash into the pond encourage the growth of invasive plants and can cause algae blooms, all of which impact the habitat for fish and other lake species.

## What Are We Doing Now?

What is being done to protect the lake from polluted runoff?

The steering committee for the Forest Lake Watershed Survey formed in order to identify soil erosion issues in the watershed, raise funds to conduct a survey, and continue educating users of the lake how to protect it now and for future generations. Volunteer watershed surveys have been found to be one of the most

---

<sup>3</sup> Bouchard, Roy; Boyle, Kevin; Michael, Holly, "Water Quality Affects Property Prices: A Case Study of Selected Maine Lakes," 1996. University of Maine.

effective ways to protect lake water quality by getting citizens involved in identifying existing and potential sources of polluted runoff.

It is the hope of the steering committee that through the survey and the creation of the watershed plan, the local community will find the social and financial resources it needs to further guard against the degradation of Forest Lake. Our 2017 Forest Lake Watershed Survey is the foundation of an overall watershed plan, which is needed in order to apply for federal funding to remedy some of the issues identified during the survey. Already, the community has secured municipal and private support. Both the financial and community support will need to grow in order for the plan to be put into action.



# Watershed Survey Overview

## Purpose of the Watershed Survey

The primary goals of the 2017 Forest Lake Watershed Survey are to:

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

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. Watersheds are complex and interconnected. While it is important to be accountable for the problems that arise, there is no individual or single entity responsible for any current or future water quality issues of Forest Lake. Rather it is the accumulation of all inputs, past and present that are responsible for water quality degradation. It is the hope that through future projects, the steering committee can work together with landowners to solve erosion problems on their properties, 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 as protection planning and project funding goals are pursued. With the leadership of the steering committee and assistance from agencies concerned with lake water quality, the opportunities for stewardship are limitless.

The steering committee 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

A watershed survey gives an idea of soil erosion impacts at one point in time. Land use in the Forest Lake watershed is constantly changing. All sites that were fixed after or throughout the survey could not be captured here. There may be improvements to or degradation of the watershed that is not represented in the report. It will be up to future surveyors to incorporate those changes.

The survey was conducted by volunteers with the assistance of trained technical staff from the DEP, CCSWCD, and hired independent consultants. On April 29, 2017, our fourteen (14) volunteers were trained in survey techniques during a two hour classroom workshop. 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, GPS units and standardized forms. The teams worked together throughout May and June to complete any unfinished sectors, putting in more than 400 combined hours. Although it was not originally planned as part of the project, a brief watercraft survey was also

### Problem Sites

If soil erosion reaches a stream or ditch that connects with the lake, it is considered a problem site. The distance to the lake does not make a difference. The attached or dissolved phosphorus can eventually reach the lake. According to DEP, the same holds true for erosion that enters wetlands.

conducted in July to assess the condition of shoreline area of three Forest Lake islands: Long Island, Cumberland; Loon Island, Windham; and little Loon Island, Gray.

For each identified NPS site, survey teams completed a Forest Lake Watershed Survey form (Appendix B). Volunteers rated the overall impact of each site using the rating system shown on the Lake Watershed Survey form (Figure 2). Project staff attempted to minimize variance in ratings by carefully reviewing surveyor notes and photos. Follow-up site visits were also conducted for sites where the documentation was insufficient. Adjustments were made to ratings that clearly deviated from these general guidelines.

**TABLE 1: LAKE SURVEY FORM – METHOD OF ASSIGNING IMPACT**

*Impact: Circle one choice in each column, add the three selected numbers together, and then circle the site's corresponding impact rating (high, medium, or low).*

Type of Erosion	Area	Buffers and Other Filters	IMPACT
Gully - 3	Large - 3	No filter, all channelized direct flow into lake or stream - 3	<u>High</u> : 8-9 pts
Rill - 2	Medium - 2	Some buffer or filtering, but visible signs of concentrated flow and/or sediment movement through buffer and into lake - 2	<u>Med</u> : 6-7 pts
Sheet - 1	Small - 1	Significant buffer or filtering* - 1	<u>Low</u> : 3-5 pts

\* Confirm there is likely sediment/runoff delivery. If not, do not write up as a site.

The collected data was entered into a computer database to create a spreadsheet, and the documented erosion sites were plotted on maps. The sites were 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 the Forest Lake Watershed Committee for additional site information.

## Survey Sectors

### Sector Teams

#### Sector 1

- Jeff Stern, Leader
- Bill Devoe
- Janene Gorham
- John Gorham
- Cathy Whorf

#### Sector 2

- Betty Smith, Leader
- Debi Curry
- Jon Curry
- Susan C.H. Siu

#### Sector 3

- Wendy Garland, Leader
- Ted Ney
- Glenn Sylvester

#### Sector 4

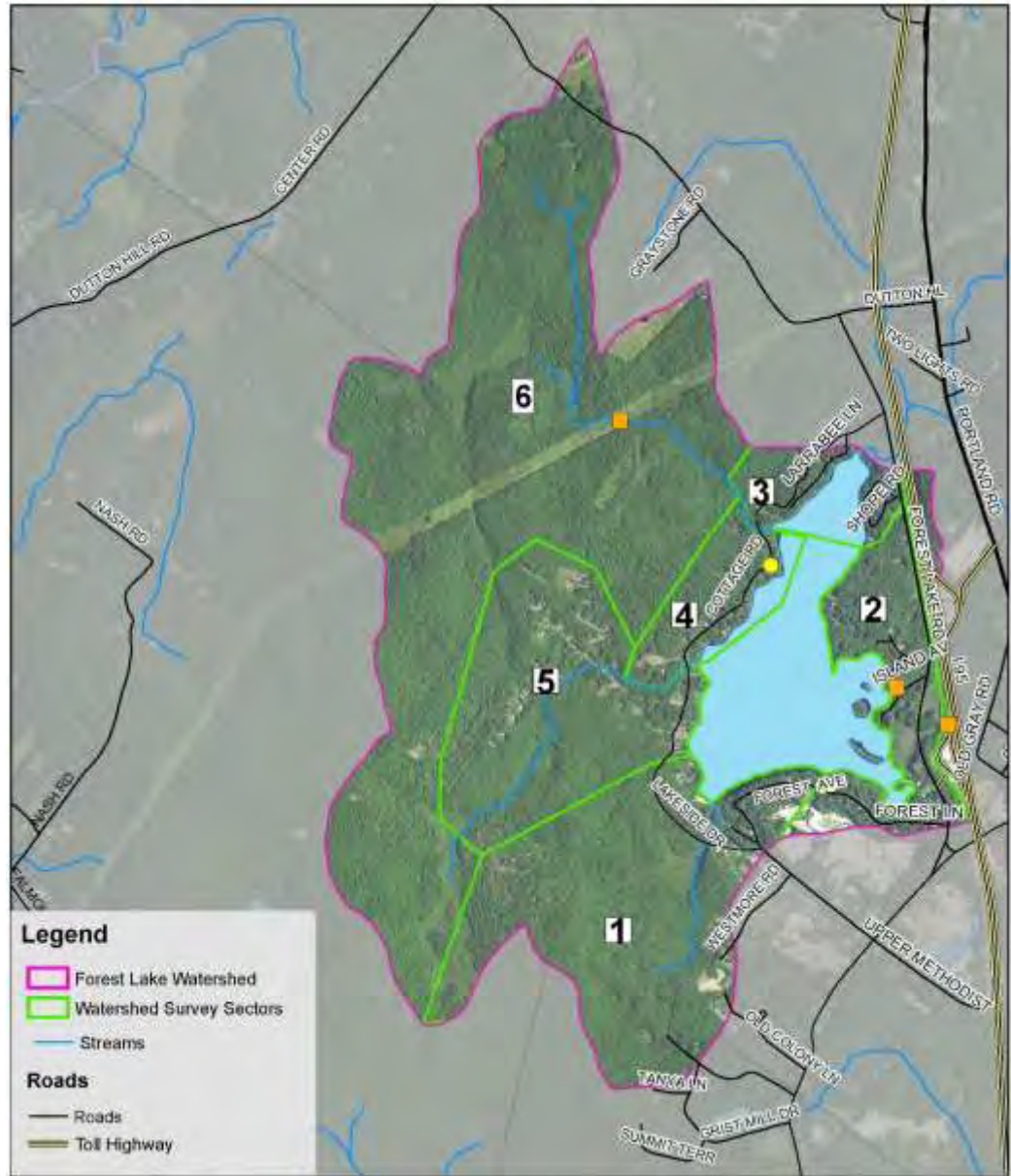
- Kristin Feindel, Leader
- Vanessa Blair-Glanz
- Paula Curcio

#### Sector 5

- Heather True, Leader
- Greg Schulz
- Don Scipione

#### Sector 6

- Wendy Garland
- John MacLaine



Survey volunteers were split into five teams to conduct field observation and documentation on April 29, 2017.

Throughout this report, sites are identified consecutively within each survey sector, using the format Sector 1, Site 1 and often abbreviated in the format 1-1, 1-2, 1-3, etc. Follow up field observation was completed by DEP representatives at a later date and identified collectively as Sector 6.

An overview map of the entire watershed area is provided here; a larger version is found in Appendix A along with detail maps that identify site locations by sector/site number.

# Watershed Survey Findings

## Summary of Watershed Survey Findings

Volunteers and technical staff documented 77 sites across the watershed that are currently, or have the potential to negatively affect the water quality of Forest Lake. The number of sites documented were fairly evenly distributed among the five primary sectors with (15) sites in Sector 1, (14) in Sector 2, (18) in Sector 3, (17) in Sector 4, and (11) in Sector 5. An additional two sites were documented by DEP technical staff at a later date and identified as Sector 6. Some key conclusions from the survey include:

As previously stated, each site was rated high, medium or low impact based on the type of erosion, the size of the area eroded, and the type of buffering or filtering that the erosion underwent before entering a stream, ditch, or the lake.

Of these, 33 sites were rated as low impact, 31 sites as medium impact and 13 as high impact (Table 2: Impact Counts per Sector). Overall, 57% of the sites found were rated high or medium impact.

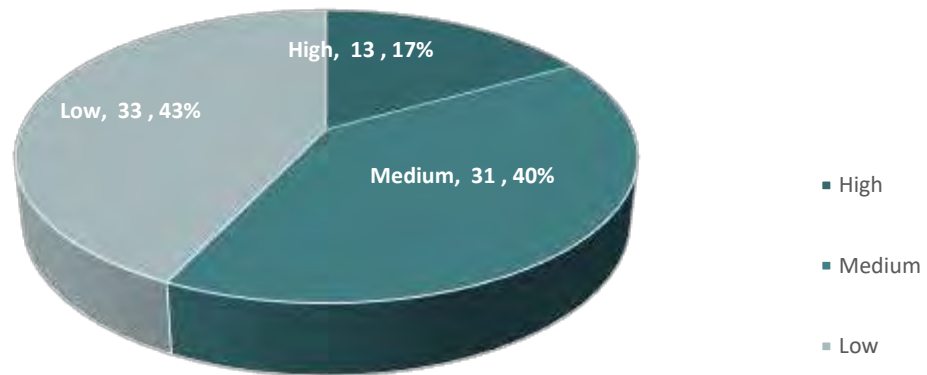
Some key conclusions include:

- **Everyone has a stake in improving water quality.** That's because NPS sites were identified across a variety of different land uses throughout the watershed. The residential landowners, towns, and the state will all need to work together to reduce the impact that NPS pollution has on the lake.
- **Residential Development:** In rural lake watersheds, residential development is typically located along the shoreline serviced by predominantly private gravel roads. Forest Lake is no exception, with dense residential development (year-round and seasonal) located off Cottage Road, Lakeside Drive, Forest Avenue, Forest Lane, and a number of smaller, unpaved gravel roads. The number of NPS sites stemming from residential development exceeds any other land-use type surveyed in the watershed (61%).
- **Driveways:** Although identified as a separate category of land use, private driveways account for an additional (10) sites, or almost 13% of the sites documented.
- **Roads:** In rural watersheds, development is typically focused along major roads with private gravel roads servicing residential homes. Eroding culverts and road shoulders and build-up of winter sand can have a significant impact on water quality if not well maintained. Combined, state, town and private road sites made up just 35% of all survey sites, with the greatest number of sites on private roads (25 sites). High impact road sites (10 sites), should be considered high priority for lake protection.

**TABLE 2: IMPACT COUNTS PER SECTOR**

Sector	Total Count	High (8-9)	Low (3-5)	Medium (6-7)
1	15		7	8
2	14		10	4
3	18	5	7	6
4	17	2	7	8
5	11	6	2	3
6	2			2
<b>TOTALS</b>	<b>77</b>	<b>13</b>	<b>33</b>	<b>31</b>

CHART 1: IMPACT RATING BY NUMBER AND PERCENT



## Primary Land Use Activity

While documenting erosion sites, surveyors were also asked to select land use categories associated with each site. These categories included roads/driveways, residential, commercial, municipal/public, beach access, boat access, trail/path, logging, agriculture, and construction sites. Any site that was not clearly defined by one of these categories was called “other”; in the case of the Forest Lake Watershed Survey, only one property – an associate right of way – was classified as “other”.

TABLE 3: LAND USE/ACTIVITY BY SECTOR

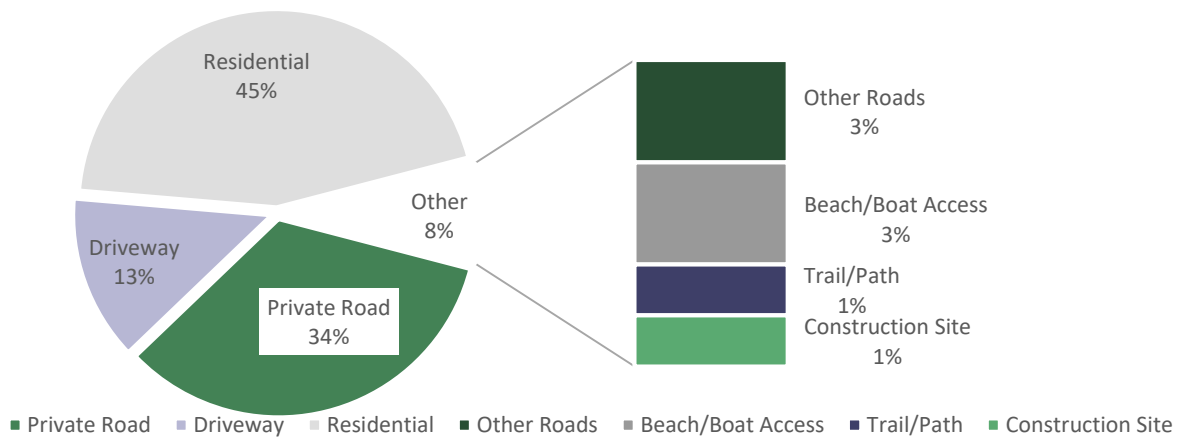
Sector:	1	2	3	4	5	6	Total of Use/Activity
Residential	7	9	10	7			33
Private Road	3	3	7	4	8		25
Driveway	2			5	3		10
Boat Access		1	1				2
Trail or Path	1					1	2
State Road						1	1
Town Road		1					1
Beach Access	1						1
Construction Site				1			1
Other	1						1

The overwhelming majority of sites were classified as residential properties (42%), private roads (32%), or driveways (13%). Most of the cited driveways were located on residential properties.

Residential sites accounted for the land use with the greatest number of sites. There were a total of 33 sites, plus an additional 10 driveways cited; the combined 43 sites account for 56% of sites identified. Private Roads accounted for 32% (25). All remaining land use types combined for 12% of the total with nine total sites documented as having an impact. Each of these categories will be explained in more detail in the subsequent land use sections.



Chart 2: Percent by Land Use Category

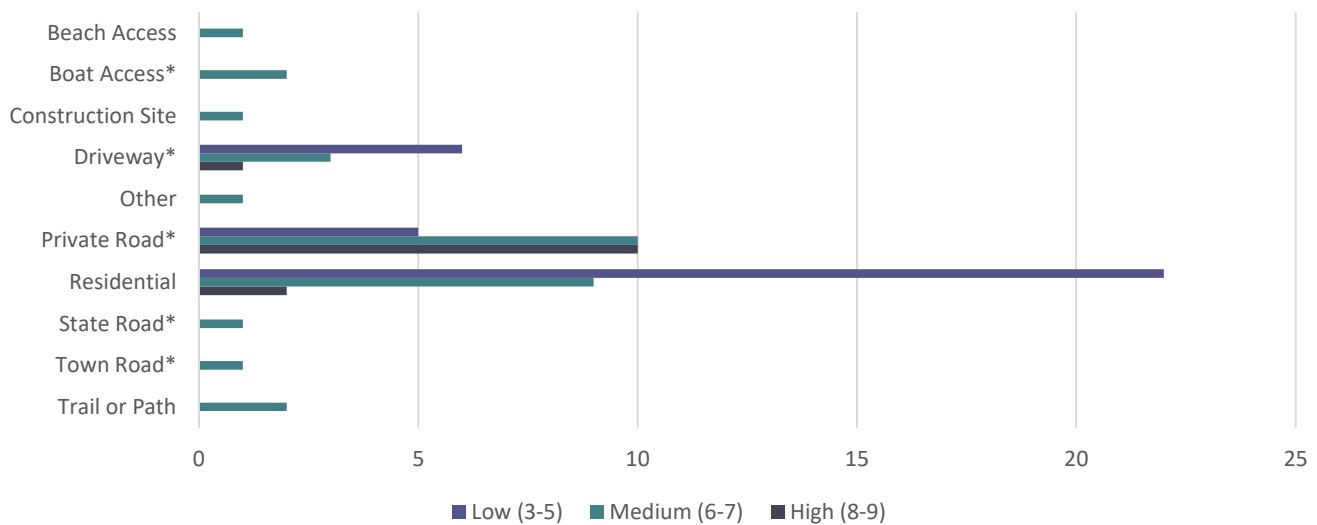


Another way of looking at the data is to compare the number of the high, medium, or low sites for each land use category (Table 5). Private Roads contributed the most medium to high impact sites (20 total). Only Residential sites neared this number, with eleven (11) sites in the medium to high impact category. Although all sites are important in the overall picture of a healthy watershed, these two land uses predominate; only thirteen (13) sites fell into the medium to high impact category in all other land use/activity categories.

TABLE 4: IMPACT RATING BY LAND USE

Primary Land Use Activity	High (8-9)	Medium (6-7)	Low (3-5)	Total Count
Residential	2	9	22	33
Private Road	10	10	5	25
Driveway	1	3	6	10
Boat Access		2		2
Trail or Path		2		2
Beach Access		1		1
Construction Site		1		1
Other		1		1
State Road		1		1
Town Road		1		1

**CHART 3: IMPACT RATINGS OF EACH LAND USE CATEGORY**



## Summary of Findings by Land Use Type

### Residential Sites

Residential sites (33) included any erosion that occurred on a residential property, including foot paths, roof runoff, ditches, shoreline erosion, and any other bare soil areas that delivered soil to a surface water body. The majority of residential sites were medium or low impact. Only two (2) residential sites were rated as having high impacts on the lake.

Bare soil, sheet erosion, and lack of shoreline vegetation account for 62% of the problems reported on residential sites.

### Examples:



#### Bare Soil

Bare soil surfaces directly affect runoff rates, which increase because there is nothing to absorb the rain water. Conversely, vegetation allows for greater infiltration because the roots in the plants absorb the water and pulls it into the ground.



### **Sheet Erosion**

Sheet erosion occurs when a thin layer of topsoil is removed by water runoff.



### **Lack of Shoreline Vegetation**

Native vegetation usually found at the shoreline strengthens its structural integrity and prevents the land from breaking apart. The deep roots of these plants bind the earth together while their foliage and branches protect from the erosion caused by rainfall and winds. Removing these plants can cause the shore to weaken and easily crumble into the water.

**TABLE 5: SUMMARY OF FINDINGS FOR RESIDENTIAL SITES**

Problem Description	Count of Sites
Soil: Bare	23
Surface Erosion: Sheet	18
Shoreline: Lack of Shoreline Vegetation	10
Roof Runoff Erosion	9
Surface Erosion: Rill	8
Shoreline: Inadequate Shoreline Vegetation	6
Surface Erosion: Gully	3
Shoreline: Erosion	2
Shoreline: Unstable Access	2
Agriculture: Manure Washing off Site	1

## Private Roads

Surveyors identified a total of twenty-five (25) private road sites, almost all of which were associated with gravel roads as opposed to pavement or other surfaces. Rill erosion, winter sand, and gully erosion accounted for 38% of the problems reported on private roads.

### Examples:



#### Surface Erosion: Rill

Rill erosion forms small channels, often only .3 cm deep. Rills are caused when water running across the surface of the ground gathers in a natural depression in the soil, and the concentrated water flows through and further erodes the depression.





### Winter Sand

Phosphorus is attached to winter sand. Winter sand along the road shoulder can also interrupt the flow of stormwater and cause erosion of the road surface or shoulder. When grading the road, blade the edge of the shoulder to eliminate any build-up of sand and gravel.



### Gully Erosion

Gully erosion is similar to rill erosion; it can occur when sheet flow becomes concentrated in large defined channels. This may occur in unrepaired rill erosion areas. It is associated with larger volumes of soil erosion.

**TABLE 6: SUMMARY OF FINDINGS FOR PRIVATE ROADS**

Problem Description	Count of Sites
Surface Erosion: Rill	12
Soil: Winter Sand	9
Surface Erosion: Gully	7
Culvert: Unstable Inlet/outlet	6
Road Shoulder Erosion: Rill	5
Road Shoulder Erosion: Gully	5
Roadside Plow/Grader Berm	4
Soil: Bare	4



Surface Erosion: Sheet	3
Culvert: Clogged	3
Culvert: Undersized	3
Ditch: Rill Erosion	3
Ditch: Gully Erosion	3
Ditch: Bank Failure	2
Soil: Delta in Stream/Lake	2
Road Shoulder Erosion: Sheet	1

## Driveways

In some watersheds, driveways tend to be problematic. In the Forest Lake watershed, driveways contributed to a small percentage of the overall residential impacts, with a total of ten (10) sites. One (1) of the driveway sites was rated as high impact, three (3) were medium impact, and six (6) were low impact.

### Examples:



#### Surface Erosion: Rill

Rill erosion forms small channels, often only .3 cm deep. Rills are caused when water running across the surface of the ground gathers in a natural depression in the soil, and the concentrated water flows through and further erodes the depression.



### Gully Erosion

Gully erosion is similar to rill erosion; it can occur when sheet flow becomes concentrated in large defined channels. This may occur in unrepaired rill erosion areas. It is associated with larger volumes of soil erosion.

**TABLE 7: SUMMARY OF FINDINGS FOR DRIVEWAYS**

Problem Description	Count of Sites
Surface Erosion: Rill	4
Surface Erosion: Gully	4
Soil: Bare	3
Surface Erosion: Sheet	1
Culvert: Clogged	1
Culvert: Crushed/Broken	1
Culvert: Undersized	1
Roof Runoff Erosion	1

## Other Land Use Findings

The remaining nine (9) sites were found in the land use categories boat or beach access, trail or path, construction site, association right of way (ROW) and town roads.

**TABLE 8: SUMMARY OF FINDINGS FOR OTHER LAND USES**

Problem Description	Beach Access	Boat Access	Construction	ROW	Town Road	Trail or Path	#
Soil: Bare	1	1	1	1	1		5
Surface Erosion: Gully	1		1		1	1	4
Surface Erosion: Rill		2			1		3
Surface Erosion: Sheet		2					2
Shoreline: Inadequate Shoreline Vegetation			1	1			2
Culvert: Unstable Inlet/outlet					1		1
Road Shoulder Erosion: Rill					1		1
Road Shoulder Erosion: Gully					1		1
Soil: Delta in Stream/Lake	1						1
Shoreline: Erosion		1					1
Shoreline: Unstable Access						1	1

# Survey Recommendations

## Summary of Recommendations by Sector

Recommendation	Total	Sec.1	Sec.2	Sec.3	Sec.4	Sec.5	Sec.6
Construction Site: Check Dams	1						1
Construction Site: Mulch	2				2		
Construction Site: Seed/Hay	1						1
Construction Site: Silt Fence/EC Berms	1				1		
Culvert: Armor Inlet/Outlet	7	1	2	1	2	1	
Culvert: Enlarge	3			1		2	
Culvert: Install Culvert	3			1		2	
Culvert: Install Plunge Pool	4			1		3	
Culvert: Lengthen	1		1				
Culvert: Remove Clog	4	1		1	2		
Culvert: Replace	1				1		
Ditch: Armor with Stone	6	2	1	2		1	
Ditch: Install	5		1	1		3	
Ditch: Install Check Dams	1					1	
Ditch: Install Sediment Pools	2					2	
Ditch: Install Turnouts	5		2			3	
Ditch: Remove Debris/Sediment	3			1		2	
Ditch: Reshape	8	2	1	3	1	1	
Ditch: Vegetate	3		1	1		1	
Other: Infiltration Trench	1		1				
Other: Install Runoff Diverter	6	3	2	1			
Other: Mulch/Erosion Control Mix	22	5	5	7	5		
Paths & Trails: Define Foot Path	11	2	3	3	3		
Paths & Trails: Infiltration Steps	5	1	2	2			
Paths & Trails: Install Runoff Diverter	4		2		2		
Paths & Trails: Stabilize Foot Path	5	1		3	1		
Roads/Driveways: Remove Grader/Plow Berms	7	1	1	2	2	1	
Roads/Driveways: Add New Material: Gravel	15	4	2	4	2	3	
Roads/Driveways: Add New Material: Pave	2					2	
Roads/Driveways: Add New Material: Recycled Asphalt	4		1	2		1	
Roads/Driveways: Build Up	6		1	1		4	
Roads/Driveways: Install Catch Basin	4	3				1	
Roads/Driveways: Install Detention Basin	2			1		1	
Roads/Driveways: Reshape Crown	12	1	2	4	3	2	
Roads/Driveways: Runoff Diverters: Broad-Based Tip	2					2	
Roads/Driveways: Runoff Diverters: Rubber Razor	4	1		1	1	1	
Roads/Driveways: Runoff Diverters: Unspecified Type	13			2	10		1
Roads/Driveways: Runoff Diverters: Waterbar	8	4	1	2	1		
Roads/Driveways: Vegetate Shoulder	2	1	1				
Roof Runoff: Drywell at Gutter Downspout	3	2	1				
Roof Runoff: Infiltration Trench at Dripline	10	5	4	1			
Roof Runoff: Rain Barrel	3	3					
Vegetation: Add to Buffer	16	7	4	2	3		
Vegetation: Establish Buffer	14	2	2	7	3		
Vegetation: No Raking	4	2	1		1		
Vegetation: Reseed Bare Soil/Thinning Grass	4	2	1	1			

# Next Steps

## Where Do We Go From Here?

The Forest Lake Steering Committee intends to utilize the information from the survey report in creating a watershed plan to be approved by the Maine DEP. This initial plan will include action steps towards:

- Comparing sites recorded in 2017 to those from our 2003 survey to see which sites are newly identified and which sites have ongoing issues.
- Looking for/identifying contributing factors for those sites previously identified/addressed that still have issues
- Organizing a continuous group effort for watershed protection and steering plan into action.
- Fundraising for remediation projects.
- Applying for federal 319 grant funding under the Clean Water Act to help carry out the plan.
- Continuous monitoring and updating a database of survey sites.
- Expanding outreach and education efforts.

## Where Do I Get More Information?

### Contacts

- **Forest Lake Association Steering Committee**  
25 Forest Lane, Cumberland, ME 04021  
Janene Gorham, Chair  
(207) 829-3878 / [jgorham6@maine.rr.com](mailto:jgorham6@maine.rr.com)
- **Cumberland County Soil & Water Conservation District**  
35 Main Street Suite 3, Windham, ME 04062  
Heather True, Project Manager  
(207) 892-4700 / [htrue@cumberlandswcd.org](mailto:htrue@cumberlandswcd.org)  
[www.cumberlandswcd.org](http://www.cumberlandswcd.org)
- **Maine Department of Environmental Protection**  
**Division of Environmental Assessment, Bureau of Water Quality**  
312 Canco Road, Portland, ME 04103  
John MacLaine, Environmental Specialist  
(207) 615-3279 / [John.MacLaine@maine.gov](mailto:John.MacLaine@maine.gov)
- **Volunteer Lakes Monitoring Program**  
24 Maple Hill Road, Auburn, ME 04210  
Scott Williams, Executive Director  
(207) 783-7733 / [scott.williams@mainevlmp.org](mailto:scott.williams@mainevlmp.org),



## Permitting Basics

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 each 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 rules are properly followed.

How to apply for a Permit by Rule with DEP:

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

- Fill out a notification form and submit fee and any required materials before starting any work. Forms are available from your town code enforcement officer, Maine DEP offices, or online at [www.maine.gov/dep/land/nrpa/pbrform.pdf](http://www.maine.gov/dep/land/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.

## 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 constructive change may be a challenge.

The Maine DEP and Portland Water District produced a series of 24 fact sheets that answer many common how-to questions. The fact sheets profile common conservation practices that homeowners can use to protect water quality and include detailed instructions, diagrams and color photos about installation and maintenance. The series includes the following:


- Construction BMPs
- Dripline Trench
- Drywells
- Erosion Control Mix
- Infiltration Steps (2)
- Infiltration Trench
- Open-Top Culverts
- Paths and Walkways
- Permitting
- Rain Barrels
- Rain Gardens
- Rubber Razors
- Shoreline Stabilization
- Turnouts
- Waterbars

The series also includes six native plant lists. Each one is tailored to different site conditions (e.g., full sun and dry soils). The lists include plant descriptions and color photos of each plant to make plant selection easier.

**Fact sheets are available to help you implement conservation techniques on your property.**  
Download at: <http://www.maine.gov/dep/land/watershed/materials.html>

## Example Recommendations

Following are brief descriptions of common runoff mediation recommendations and the number of sites with these recommendations (in parenthesis). Property owners are encouraged to discover additional information on the Forest Lake website.

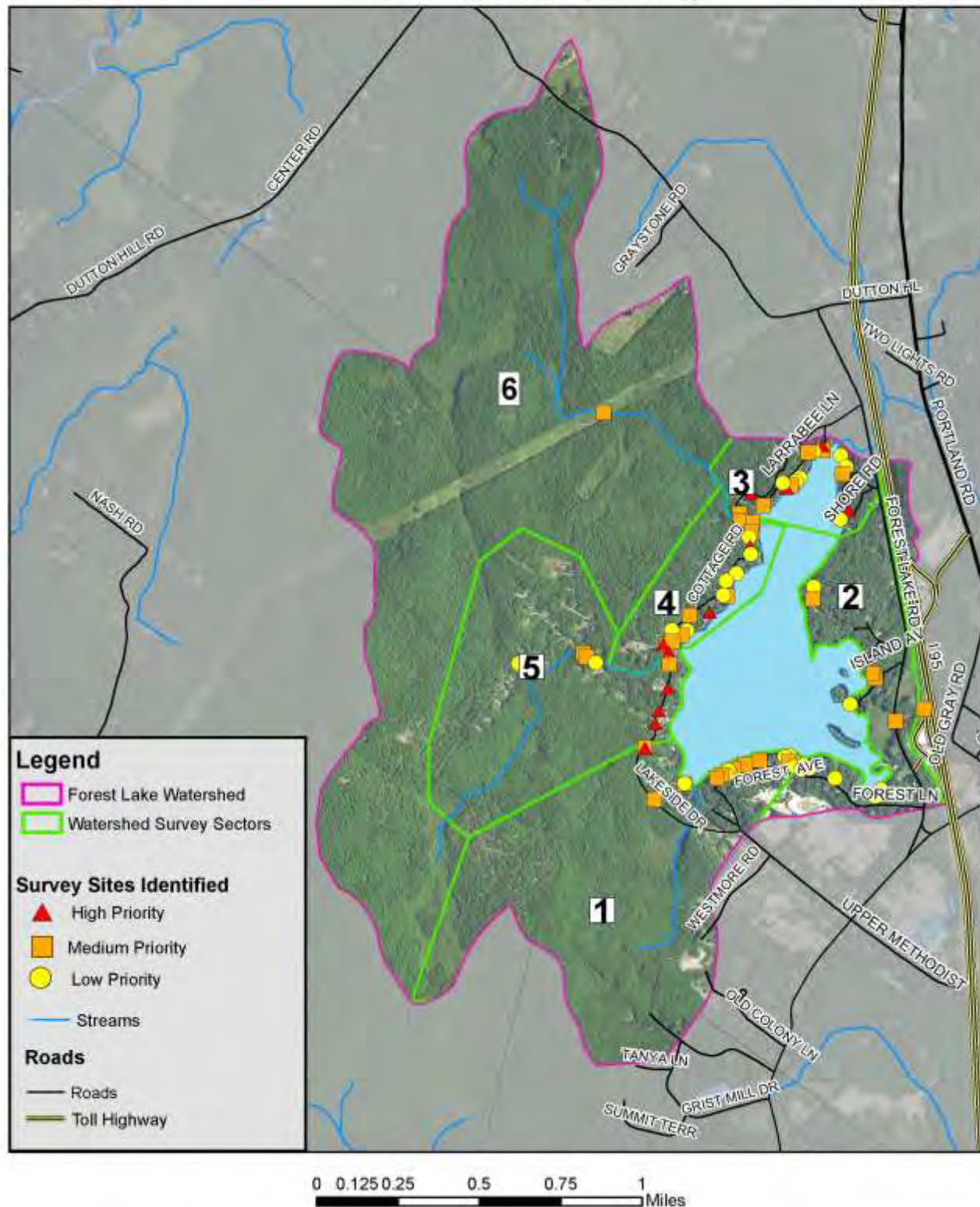
Recommendation (#sites)	Description
<b>CULVERTS</b>	
<b>Armor Inlet/Outlet (7)</b>	Material, typically stone, installed to protect sloped sides of culvert from erosion. Riprap should not be placed across the entire stream channel; it should be limited to the culvert inlet/outlet and banks of the stream around the crossing only. Placing riprap in the stream channel can smother habitat and cause problems with fish passage.
<b>Install Plunge Pool (4)</b>	<p>Plunge pools are designed to dissipate the flow of high velocity runoff. Plunge pools should NOT be installed in a stream channel.</p> 
<b>DITCHES</b>	
<b>Install Turnouts (5)</b>	<p>Turnouts return stormwater runoff as sheet flow to natural drainage areas. Often turnouts are simply extensions of ditches that redirect water into the woods and disperse runoff before it can cause erosion. Turnouts reduce the speed of runoff, allowing soil particles to settle out instead of being transported to a stream, river, or lake. Water and nutrients can then be filtered and absorbed by the surrounding vegetation.</p> <p>Learn more about turnouts: <a href="https://www.pwd.org/sites/default/files/turnouts.pdf">https://www.pwd.org/sites/default/files/turnouts.pdf</a></p>
<b>ROADS / DRIVEWAYS</b>	
<b>Gravel Road Maintenance</b>	<p>Refer to the Gravel Road Maintenance Manual: a Guide for Landowners on Camp and Other Gravel Roads for tips on surface materials, culverts, ditches, and general maintenance related to reduction in runoff and erosion.</p> <p><a href="http://www.maine.gov/dep/land/watershed/camp/road/gravel_road_manual.pdf">http://www.maine.gov/dep/land/watershed/camp/road/gravel_road_manual.pdf</a></p>

<b>Runoff Diverters Rubber Razor (4)</b>	<p>Rubber Razors divert water off gravel driveways and camp roads into stable vegetated areas. These structures are well suited for seasonal roads that are not plowed. They can be plowed over if the location is clearly marked and the plow operator lifts the plow blade slightly.</p> <p>Learn more:  <a href="https://www.pwd.org/sites/default/files/rubber_razors.pdf">https://www.pwd.org/sites/default/files/rubber_razors.pdf</a></p>
<b>Runoff Diverters Waterbar (8)</b>	<p>A waterbar intercepts water traveling down footpaths, trails and other areas and diverts it into stable vegetated areas.</p> <p>Learn more:  <a href="https://www.pwd.org/sites/default/files/waterbar.pdf">https://www.pwd.org/sites/default/files/waterbar.pdf</a></p>
<b>PATHS &amp; TRAILS</b>	
<b>Infiltration Steps (5)</b>	<p>Infiltration steps use crushed stone to slow down and infiltrate runoff. They are effective on moderate slopes, but consider building wooden stairways on 1:1 slopes (45°) or areas where rocks or surface roots make it difficult to set infiltration steps in the ground.</p> <p>Learn more:  <a href="https://www.pwd.org/sites/default/files/infiltration_steps.pdf">https://www.pwd.org/sites/default/files/infiltration_steps.pdf</a></p>
<b>ROOF RUNOFF</b>	
<b>Drywell at Gutter Downspout (3)</b>	<p>Drywells collect and infiltrate runoff at gutter downspouts and other places where large quantities of concentrated water flow off rooftops. These systems help control erosive runoff on your property, and reduce wear on your house by minimizing back splash</p> <p>Learn more:  <a href="https://www.pwd.org/sites/default/files/dry_wells.pdf">https://www.pwd.org/sites/default/files/dry_wells.pdf</a></p>
<b>Infiltration Trench at Dripline (10)</b>	<p>Dripline trenches collect and infiltrate stormwater, and control erosive runoff from the rooftop. The trenches collect roof runoff and store it until it soaks into the soil. These systems also minimize wear on your house by reducing back splash.</p> <p>Learn more: <a href="https://www.pwd.org/sites/default/files/dripline_trench.pdf">https://www.pwd.org/sites/default/files/dripline_trench.pdf</a></p>
<b>Rain Barrel (3)</b>	<p>Rain barrels provide an innovative way to capture rainwater from your roof, and store it for later use. Water collected from rain barrels can be used to water lawns, gardens, and indoor plants. This water would otherwise run off your roof or through downspouts and become stormwater, picking up pollutants on its way to a storm drain, stream, or lake. You can lower your water bill, conserve well water in the dry season, and reduce polluted stormwater runoff.</p> <p>Learn more about rain barrels:  <a href="https://www.pwd.org/sites/default/files/rain_barrels.pdf">https://www.pwd.org/sites/default/files/rain_barrels.pdf</a></p>
<b>OTHER</b>	
<b>Mulch/Erosion Control Mix (22)</b>	<p>Mulching is the application of an organic cover over exposed soil to protect its structure from the impact of raindrops, to reduce the potential for erosion, and to maintain soil permeability and moisture for vegetation uptake. Mulch must remain until the site is permanently stabilized or revegetated.</p>
<b>VEGETATION</b>	<p><i>Vegetated buffers are trees, shrubs and groundcover plants that catch sediment and other pollution before it reaches lakes or streams. Trees and shrubs intercept raindrops and reduce their impact on the soil.</i></p>
<b>Add to (16) or establish a vegetative buffer (14).</b>	<p>Install additional plant material, especially in areas closest to the lake and other bodies of water. Select plants suitable to the growing zone, light and soil conditions of the planting area. Ideally, native plants should be selected since these are better adapted to</p>

<b>Reseed Bare Soil and/or Thinning Grass (4)</b>	local conditions, fit in with the natural landscape and do not require fertilizers or pesticides.
<b>No Raking (4)</b>	Avoid raking fallen leaves and other plant material which, when left in place, can act as a natural mulch and assist with erosion control.

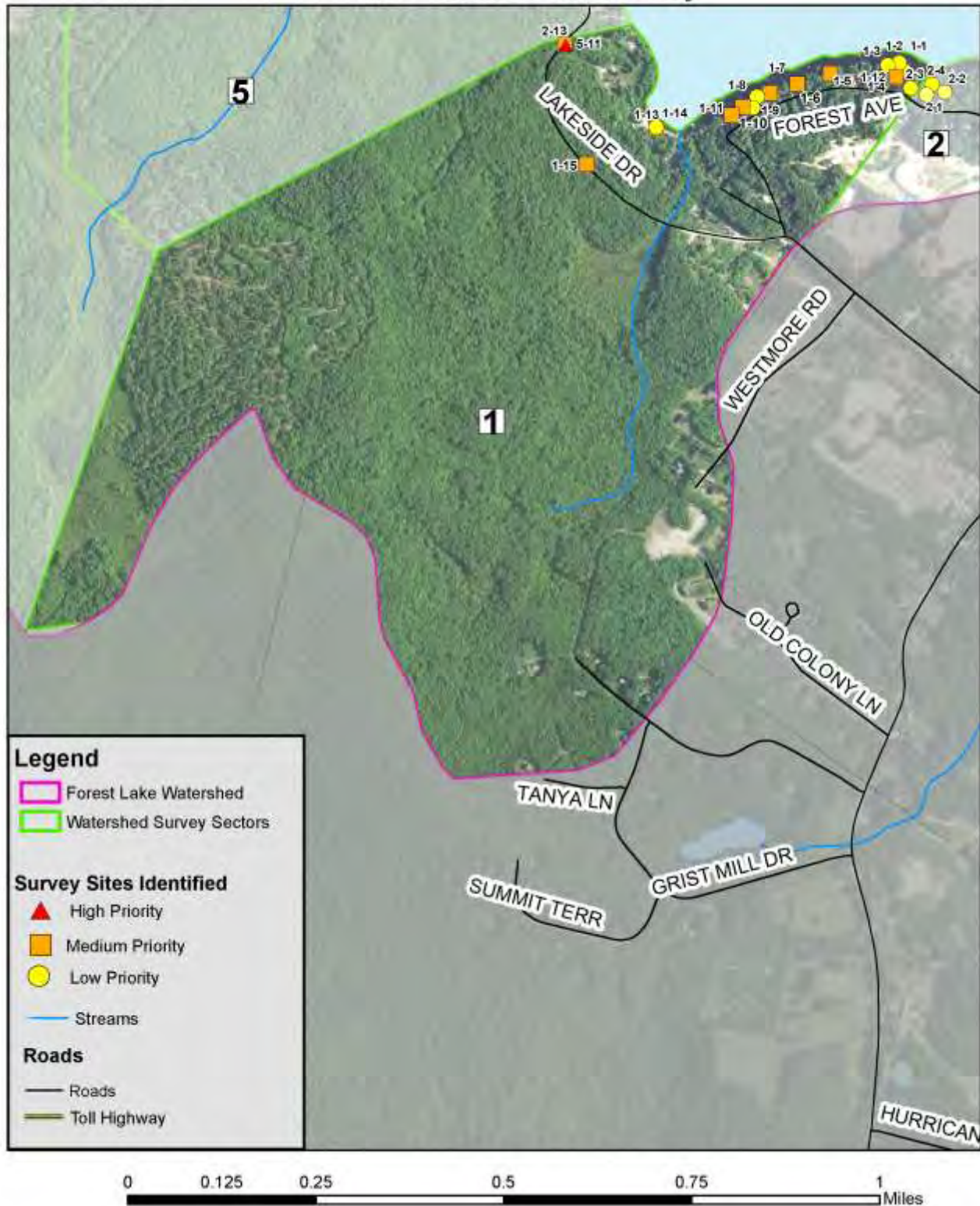
## Appendix A: Survey Maps

### Appendix A1 Forest Lake Watershed NPS Locations 2017 Watershed Survey



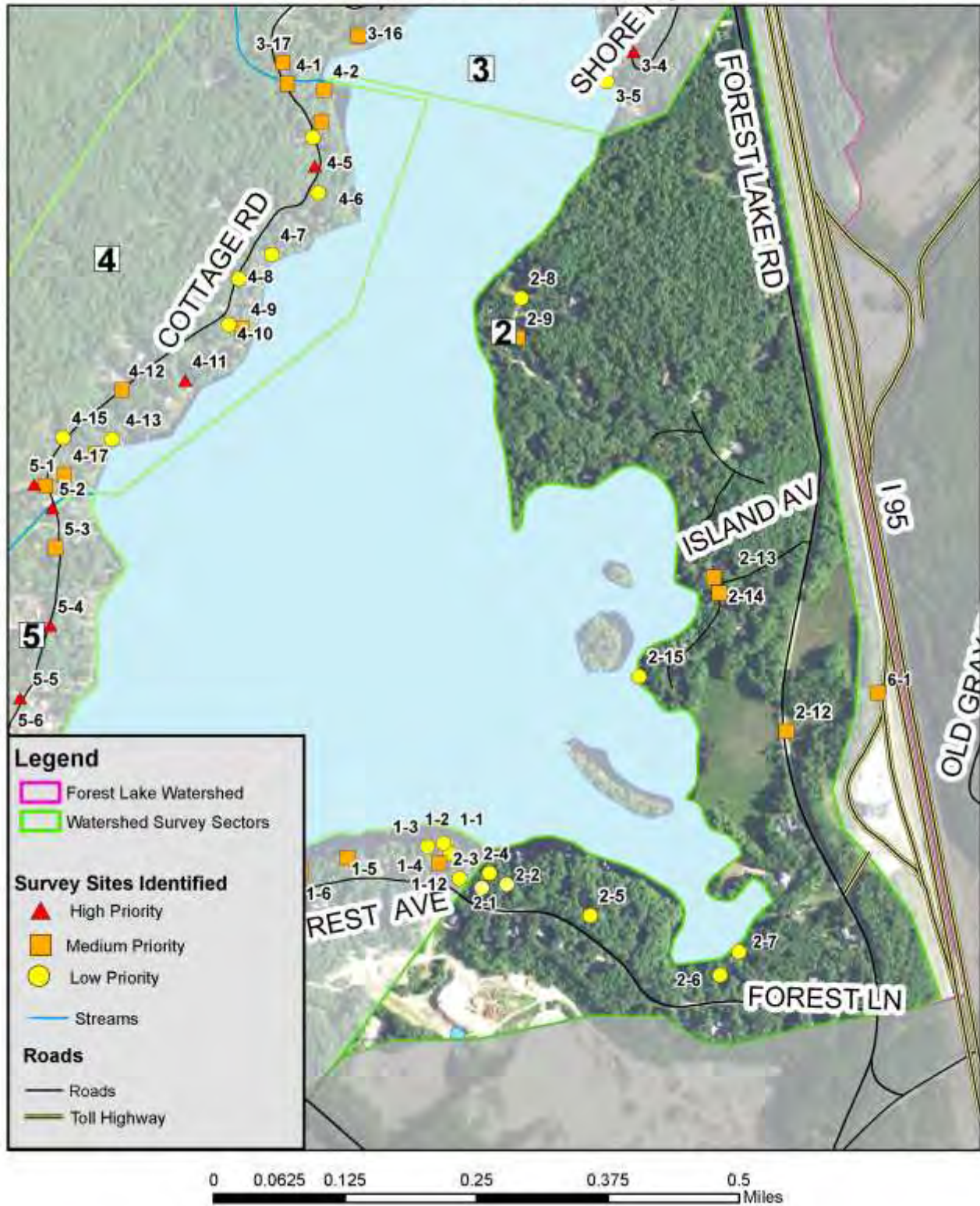


# **Appendix A2 : Sector 1** **Forest Lake Watershed NPS Locations** **2017 Watershed Survey**



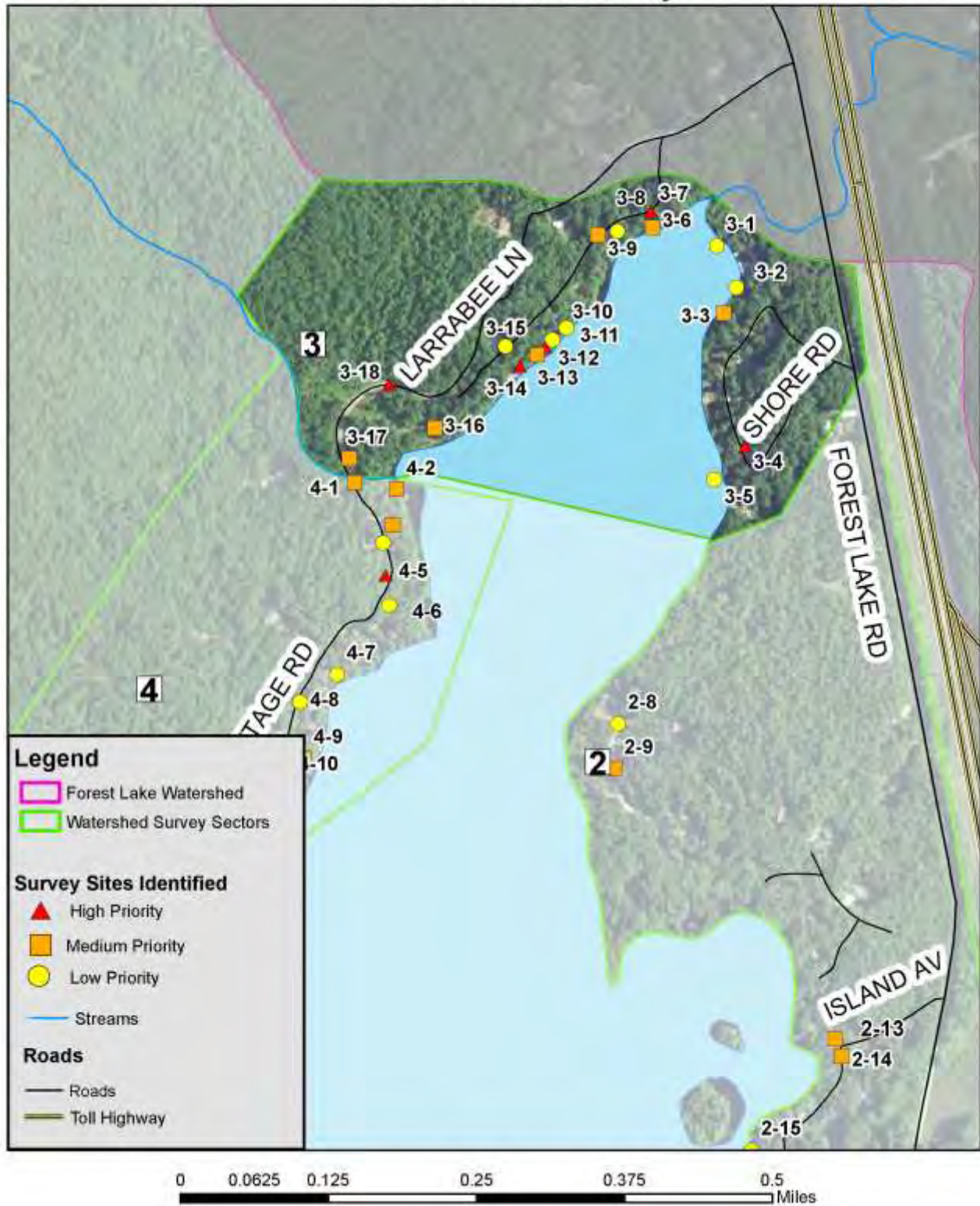
## Appendix A3: Sector 2

### Forest Lake Watershed NPS Locations 2017 Watershed Survey

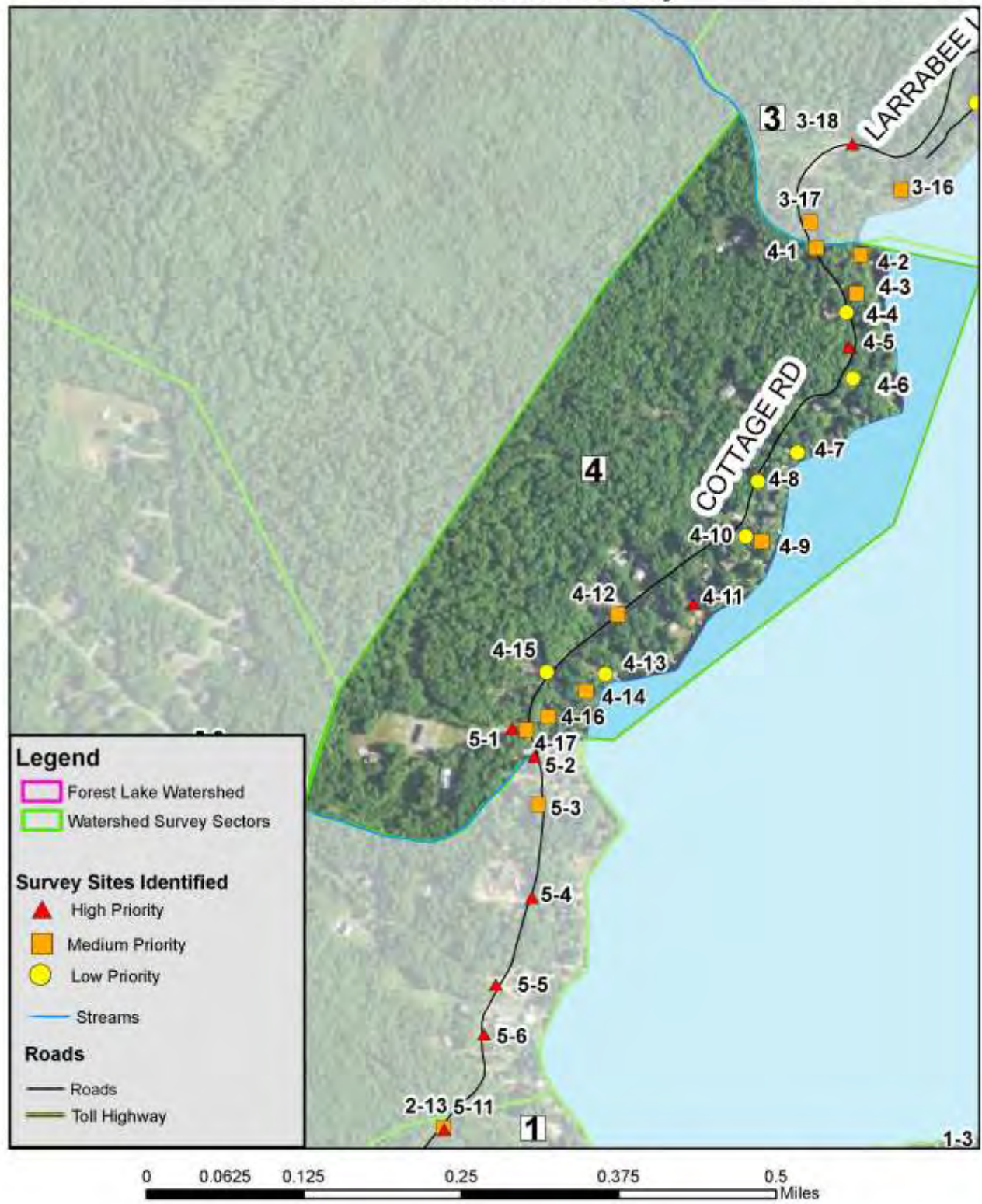




# **Appendix A4: Sector 3** **Forest Lake Watershed NPS Locations** **2017 Watershed Survey**

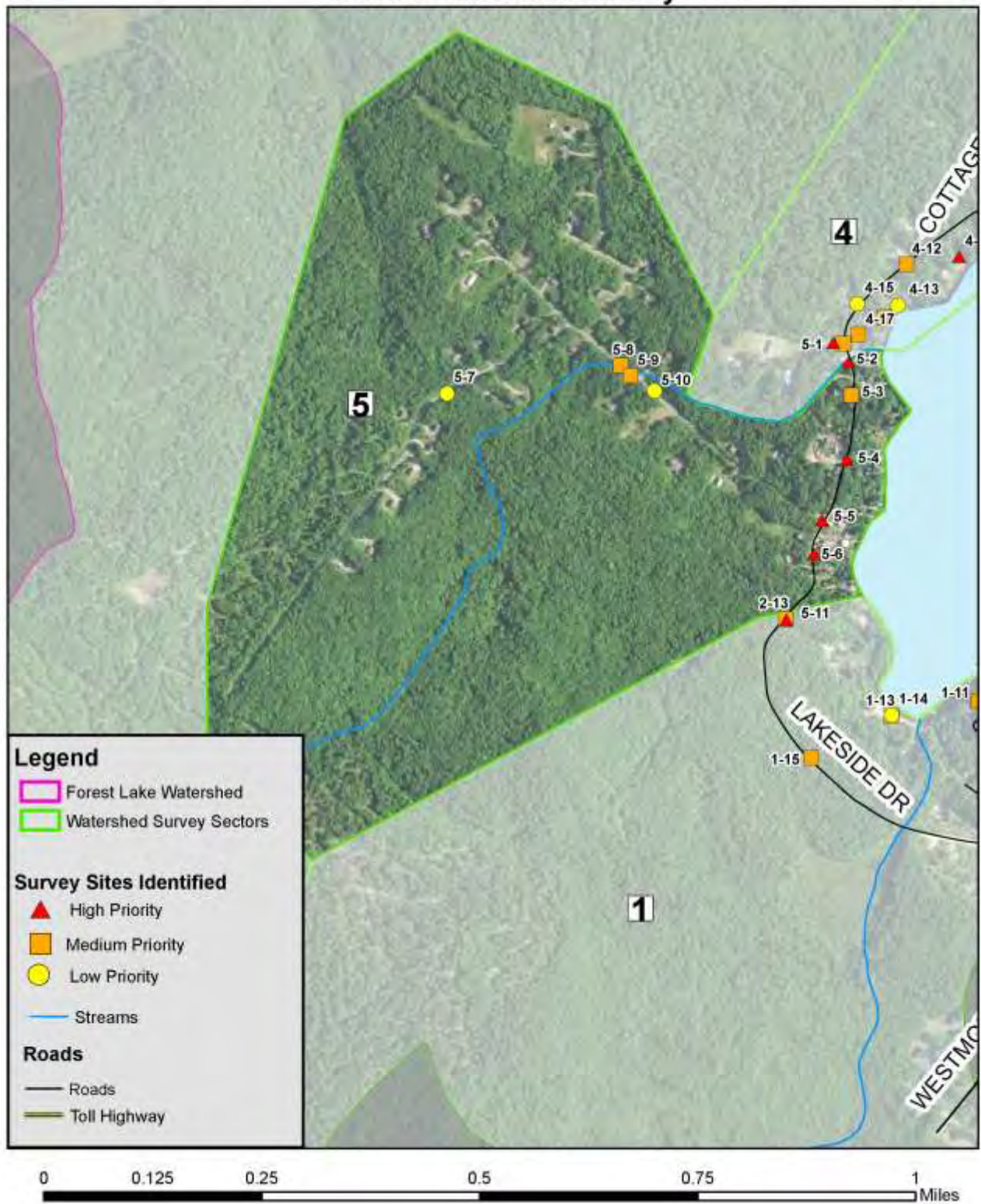


# **Appendix A5: Sector 4** **Forest Lake Watershed NPS Locations** **2017 Watershed Survey**





# **Appendix A6: Sector 5** **Forest Lake Watershed NPS Locations** **2017 Watershed Survey**



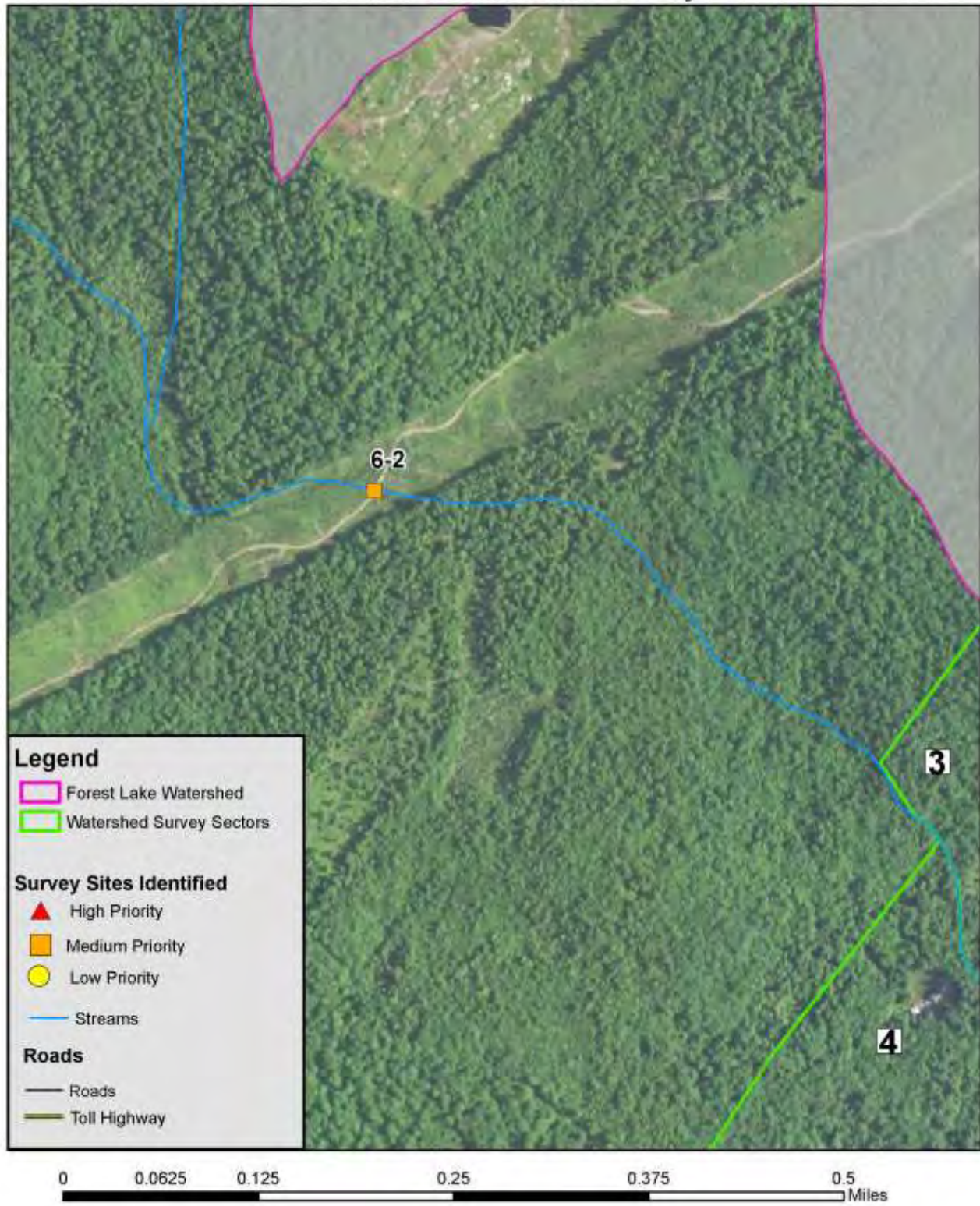


**Appendix A7 : Site 6-1**  
**Forest Lake Watershed NPS Locations**  
**2017 Watershed Survey**





**Appendix A8 : Site 6-2**  
**Forest Lake Watershed NPS Locations**  
**2017 Watershed Survey**



## Appendix B: Forest Lake Watershed Survey Form

Final Site # \_\_\_\_\_ Checked by \_\_\_\_\_ Date \_\_\_\_\_

### Forest Lake Watershed Survey

**REMINDER: Only write up if there is likely transport of sediment or phosphorus into the lake.**

Sector & Site \_\_\_\_\_ Date \_\_\_\_\_ Surveyor Initials \_\_\_\_\_

Location (house #, road, utility pole #) \_\_\_\_\_

Building Color \_\_\_\_\_ Landowner Name \_\_\_\_\_

Tax Map & Lot \_\_\_\_\_ Talked to Landowner? \_\_\_\_\_

Flow into Lake via (check ONE): ☐ Directly into Lake ☐ Stream ☐ Ditch ☐ Minimal Vegetation

*Note: If flow does not make it into lake, do not fill out a form. It would not be considered a site.*

GPS Coordinates in **UTM**

(no degrees or decimal points)

0						

Land Use/Activity Circle <u>ONE</u>	Description of Problems Circle <u>ALL</u> that apply	
State Road*	<b>Surface Erosion</b>	<b>Soil</b>
Town Road*	Sheet	Bare
Private Road*	Rill	Uncovered Pile
Driveway*	Gully	Delta in Stream/Lake
Residential	<b>Culvert</b>	Winter Sand
Commercial	Unstable Inlet / Outlet	<b>Roof Runoff Erosion</b>
Municipal / Public	Clogged	<b>Shoreline</b>
Beach Access	Crushed / Broken	Undercut
Boat Access*	Undersized	Lack of Shoreline Vegetation
Trail or Path	<b>Ditch</b>	Inadequate Shoreline Vegetation
Logging	Sheet Erosion	Erosion
Agriculture	Rill Erosion	Unstable Access
Construction Site	Gully Erosion	<b>Agriculture</b>
<b>OTHER:</b>	Bank Failure	Livestock Access to Waterbody
* Is it: paved, gravel or other/unknown?	Undersized	Tilled Eroding Fields
	<b>Road Shoulder Erosion</b>	Manure Washing off Site
	Sheet	<b>OTHER:</b>
	Rill	
	Gully	
	<b>Roadside Plow/Grader Berm</b>	

**Slope:** ☐ Flat ☐ Moderate ☐ Steep **Size of Area Exposed or Eroded** (length & width): \_\_\_\_\_

Recommendations		
<b>Culvert</b> Armor Inlet/Outlet Remove Clog Replace Enlarge Lengthen Install Culvert Install Plunge Pool  <b>Ditch</b> Vegetate Armor with Stone Reshape Ditch Install Turnouts Install Ditch Install Check Dams Remove debris/sediment Install Sediment Pools  <b>Other Suggestions:</b>	<b>Roads / Driveways</b> Remove Grader/Plow Berms Build Up Add New Surface Material <ul style="list-style-type: none"> <li>• Gravel</li> <li>• Recycled Asphalt</li> <li>• Pave</li> </ul> Reshape (Crown) Vegetate Shoulder Install Catch Basin Install Detention Basin Install Runoff Diverters <ul style="list-style-type: none"> <li>• Broad-based Dip</li> <li>• Open Top Culvert</li> <li>• Rubber Razor</li> <li>• Waterbar</li> </ul> <b>Construction Site</b> Mulch Silt Fence / EC Berms Seed / Hay Check Dams	<b>Paths &amp; Trails</b> Define Foot Path Stabilize Foot Path Infiltration Steps Install Runoff Diverter (waterbar)  <b>Roof Runoff</b> infiltration Trench @ roof dripline Drywell @ gutter downspout Rain Barrel  <b>Other</b> Install Runoff Diverter (waterbar) Mulch / Erosion Control Mix Rain Garden Infiltration Trench Water Retention Swales  <b>Vegetation</b> Establish Buffer Add to Buffer No Raking Reseed bare soil & thinning grass

**Impact:** Circle one choice in each column, add the three selected numbers together, and then circle the site's corresponding impact rating (high, medium, or low).

Type of Erosion	Area	Buffers and Other Filters	IMPACT
Gully - <b>3</b>	Large - <b>3</b>	No filter, all channelized direct flow into lake or stream - <b>3</b>	<u>High:</u> 8-9 pts
Rill - <b>2</b>	Medium - <b>2</b>	Some buffer or filtering, but visible signs of concentrated flow and/or sediment movement through buffer and into lake - <b>2</b>	<u>Med:</u> 6-7 pts
Sheet - <b>1</b>	Small - <b>1</b>	Significant buffer or filtering* - <b>1</b>	<u>Low:</u> 3-5 pts

\* Confirm there is likely sediment/runoff delivery. If not, do not write up as a site.

Cost to Fix		Technical Level to Install
High:	Greater than \$2,500	High: Site requires engineered design
Medium:	\$500-\$2,500	Medium: Technical person should visit site & make recommendations
Low:	Less than \$500	Low: Property owner can accomplish with reference materials

## Appendix C: Survey Data Detail



<b>1 - 01</b>	<b>Map/Lot 036049000000</b>	<b>GPS UTM Coordinates: 0393203 4852391</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Sheet		Roads/Driveways: Runoff Diverters: Waterbar
Soil: Bare		Paths & Trails: Define Foot Path
		Paths & Trails: Infiltration Steps
		Roof Runoff: Infiltration Trench at Dripline
		Other: Mulch/Erosion Control Mix
		Vegetation: No Raking
		Plant Pachysandra/minimize bare areas. Waterbar at corner of drive.
<b>Overall Impact: Low (3-5)</b>	<b>Approx. Cost: Medium</b>	<b>Skill Level: Medium</b>
<b>1 - 02</b>	<b>Map/Lot 036049000000</b>	<b>GPS UTM Coordinates: 0393192 4852407</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Rill		Roads/Driveways: Runoff Diverters: Waterbar
Soil: Bare		Roof Runoff: Infiltration Trench at Dripline
Roof Runoff Erosion		Other: Mulch/Erosion Control Mix
		Vegetation: Add to Buffer
<b>Overall Impact: Low (3-5)</b>	<b>Approx. Cost: Low</b>	<b>Skill Level: Low</b>
<b>1 - 03</b>	<b>Map/Lot 036049A000</b>	<b>GPS UTM Coordinates: 0393168 4852402</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Sheet		Roof Runoff: Drywell at Gutter Downspout
Soil: Bare		Roof Runoff: Rain Barrel
Shoreline: Lack of Shoreline Vegetation		Other: Mulch/Erosion Control Mix
		Vegetation: Add to Buffer
		Vegetation: No Raking
Left side of house as you face lake		
<b>Overall Impact: Low (3-5)</b>	<b>Approx. Cost: Medium</b>	<b>Skill Level: Low</b>
<b>1 - 04</b>	<b>Map/Lot 0360494000</b>	<b>GPS UTM Coordinates: 0393186 4852377</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Sheet		Roads/Driveways: Vegetate Shoulder
		Vegetation: Add to Buffer
Bare. There is a drywell @ very end.		Don't park at very end of driveway. Berm at end and side.
<b>Overall Impact: Medium (6-7)</b>	<b>Approx. Cost: High</b>	<b>Skill Level: High</b>
<b>1 - 05</b>	<b>Map/Lot 036043A000</b>	<b>GPS UTM Coordinates: 0393045 4852384</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Gully		Roads/Driveways: Runoff Diverters: Waterbar
Shoreline: Unstable Access		Paths & Trails: Define Foot Path
		Vegetation: Add to Buffer
		Buffer plantings at water's edge; logs to slow the process down.
		Define meandering foot path.
<b>Overall Impact: Medium (6-7)</b>	<b>Approx. Cost: Low</b>	<b>Skill Level: Low</b>

Detail of survey findings by Sector and Site Number. Refer to survey section maps and reference their municipal map/lot numbers to identify sites.

<b>1 - 06</b>	<b>Map/Lot 036040000000</b>	<b>GPS UTM Coordinates: 0392974 4852362</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Rill		Roof Runoff: Infiltration Trench at Dripline
Roof Runoff Erosion		Other: Install Runoff Diverter
		Vegetation: Add to Buffer
<b>Overall Impact: Medium (6-7)</b>	<b>Approx. Cost: Medium</b>	<b>Skill Level: Low</b>

<b>1 - 07</b>	<b>Map/Lot 0360360000000</b>	<b>GPS UTM Coordinates: 0392916 4852342</b>
<b>Site Problems</b>		<b>Recommendations</b>
Roof Runoff Erosion		Roof Runoff: Rain Barrel
<b>Overall Impact: Medium (6-7)</b>	<b>Approx. Cost: Medium</b>	<b>Skill Level: Medium</b>

<b>1 - 08</b>	<b>Map/Lot 0360350000000</b>	<b>GPS UTM Coordinates: 0392888 4852334</b>
<b>Site Problems</b>		<b>Recommendations</b>
Soil: Bare		Roof Runoff: Drywell at Gutter Downspout
Roof Runoff Erosion		Roof Runoff: Rain Barrel
		Good vegetation!
<b>Overall Impact: Low (3-5)</b>	<b>Approx. Cost: Low</b>	<b>Skill Level: Low</b>

<b>1 - 09</b>	<b>Map/Lot 036033000000</b>	<b>GPS UTM Coordinates: 0392879 4852311</b>
<b>Site Problems</b>		<b>Recommendations</b>
Soil: Bare		Roof Runoff: Infiltration Trench at Dripline
Shoreline: Inadequate Shoreline Vegetation		Vegetation: Add to Buffer
Shoreline: Erosion		
Needs buffer plants. Retention wall was put in early 2000's by YCC on lakefront.		Needs retaining wall on road side
<b>Overall Impact: Low (3-5)</b>	<b>Approx. Cost: High</b>	<b>Skill Level: Medium</b>

<b>1 - 10</b>	<b>Map/Lot</b>	<b>GPS UTM Coordinates: 0392857 4852312</b>
<b>Site Problems</b>		<b>Recommendations</b>
Soil: Bare		Roads/Driveways: Runoff Diverter: Rubber Razor
Shoreline: Inadequate Shoreline Vegetation		Paths & Trails: Stabilize Foot Path
		Other: Mulch/Erosion Control Mix
		Vegetation: Establish Buffer
Pathway erosion on Association ROW		Buffer needed at bottom of steps to right.
<b>Overall Impact: Medium (6-7)</b>	<b>Approx. Cost: Low</b>	<b>Skill Level: Low</b>

<b>1 - 11</b>	<b>Map/Lot 0360310000000</b>	<b>GPS UTM Coordinates: 0392833 4852295</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Rill		Roof Runoff: Infiltration Trench at Dripline
Soil: Bare		Other: Install Runoff Diverter
Roof Runoff Erosion		Other: Mulch/Erosion Control Mix
Shoreline: Lack of Shoreline Vegetation		Vegetation: Establish Buffer
Shoreline: Inadequate Shoreline Vegetation		Vegetation: Add to Buffer
		Vegetation: Reseed Bare Soil/Thinning Grass
		Stick to stairs; don't create new paths
<b>Overall Impact: Medium (6-7)</b>	<b>Approx. Cost: Medium</b>	<b>Skill Level: Medium</b>

<b>1 - 12</b>	<b>Map/Lot</b>	<b>GPS UTM Coordinates: 0393392 4852318</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Rill		Roads/Driveways: Add New Material: Gravel
Road Shoulder Erosion: Sheet		Roads/Driveways: Reshape Crown
Soil: Bare		Roads/Driveways: Install Catch Basin
Soil: Winter Sand		Vegetation: Reseed Bare Soil/Thinning Grass
Unpaved dirt road		
<b>Overall Impact: Low (3-5)</b>	<b>Approx. Cost: Medium</b>	<b>Skill Level: Medium</b>

<b>1 - 13</b>	<b>Map/Lot 036019000000</b>	<b>GPS UTM Coordinates: 0392672 4852267</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Gully		Roads/Driveways: Add New Material: Gravel
Soil: Bare		Roads/Driveways: Install Catch Basin
Soil: Delta in Stream/Lake		Roads/Driveways: Runoff Diverter: Waterbar
The property is posted "no trespassing/private property".		
Question whether to report to/inform landowner potentially		
bringing into question our access, even though we had permission		
of family member.		
<b>Overall Impact: Medium (6-7)</b>	<b>Approx. Cost: Low</b>	<b>Skill Level: Low</b>

<b>1 - 14</b>	<b>Map/Lot</b>	<b>GPS UTM Coordinates: 0392672 4852269</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Sheet		Culvert: Armor Inlet/Outlet
Surface Erosion: Rill		Culvert: Remove Clog
Ditch: Gully Erosion		Ditch: Armor with Stone
Road Shoulder Erosion: Gully		Ditch: Reshape
Soil: Bare		Roads/Driveways: Add New Material: Gravel
Soil: Winter Sand		Roads/Driveways: Install Catch Basin
		Other: Install Runoff Diverter
Area is Lakeside Drive from Goose Pond Rd to first culvert at		On culvert, water passing through is washing out the banks;
wetland. Road is washing away on both sides. Possible		banks need to be reinforced with rocks and wire. Sand runs
private/public road.		directly into southern-most culvert.
<b>Overall Impact: Low (3-5)</b>	<b>Approx. Cost: Medium</b>	<b>Skill Level: Medium</b>

1 - 15

Map/Lot

GPS UTM Coordinates: 0392524 4852190

**Site Problems**

Surface Erosion: Sheet  
Surface Erosion: Gully  
Ditch: Gully Erosion  
Ditch: Bank Failure  
Road Shoulder Erosion: Gully  
Soil: Bare  
Soil: Winter Sand  
Road is washing away on sides

**Recommendations**

Ditch: Armor with Stone  
Ditch: Reshape  
Roads/Driveways: Remove Grader/Plow Berms  
Roads/Driveways: Add New Material: Gravel

Second culvert on Lakeside coming from Goose Pond Rd at intersection with Glendale. Water passing through to the lake is washing out the banks; banks need to be rocked with wire reinforcement.

**Overall Impact: Medium (6-7)****Approx. Cost: High****Skill Level: Medium**

<b>2 - 01</b>	<b>Map/Lot 05060-0u22-000</b>	<b>GPS UTM Coordinates: 0374005 4901817</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Sheet		Roof Runoff: Infiltration Trench at Dripline Other: Mulch/Erosion Control Mix Vegetation: Add to Buffer Vegetation: No Raking Additional vegetation at side of stairs
<b>Overall Impact: Low (3-5)</b>	<b>Approx. Cost: Medium</b>	<b>Skill Level: Low</b>
<b>2 - 02</b>	<b>Map/Lot 05060-0u22-000</b>	<b>GPS UTM Coordinates: 0374005 4901817</b>
<b>Site Problems</b>		<b>Recommendations</b>
Roof Runoff Erosion Agriculture: Manure Washing off Site Large area of pet waste on steep slope running directly into lake 25'		Roof Runoff: Infiltration Trench at Dripline Other: Mulch/Erosion Control Mix Retaining wall construction in progress in lake - no evidence of permits.
<b>Overall Impact: Low (3-5)</b>	<b>Approx. Cost: Low</b>	<b>Skill Level: Low</b>
<b>2 - 03</b>	<b>Map/Lot 05060-0u22-000</b>	<b>GPS UTM Coordinates: 0393217 4852353</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Sheet Roof Runoff Erosion		Roof Runoff: Infiltration Trench at Dripline Vegetation: Establish Buffer Add mulch to lake side of house.
<b>Overall Impact: Low (3-5)</b>	<b>Approx. Cost: Low</b>	<b>Skill Level: Low</b>
<b>2 - 04</b>	<b>Map/Lot 05060-0u22-000</b>	<b>GPS UTM Coordinates: 0393263 4852361</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Sheet Soil: Bare		Paths & Trails: Define Foot Path Paths & Trails: Install Runoff Diverter Other: Install Runoff Diverter Vegetation: Establish Buffer Vegetation: Add to Buffer
<b>Overall Impact: Low (3-5)</b>	<b>Approx. Cost: Low</b>	<b>Skill Level: Low</b>
<b>2 - 05</b>	<b>Map/Lot 05060-0u22-000</b>	<b>GPS UTM Coordinates: 0393417 4852296</b>
<b>Site Problems</b>		<b>Recommendations</b>
Roof Runoff Erosion		Roof Runoff: Infiltration Trench at Dripline
<b>Overall Impact: Low (3-5)</b>	<b>Approx. Cost: Low</b>	<b>Skill Level: Low</b>



<b>2 - 06</b>	<b>Map/Lot</b>	<b>GPS UTM Coordinates: 0393616 4852205</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Sheet		Paths & Trails: Define Foot Path Paths & Trails: Infiltration Steps Paths & Trails: Install Runoff Diverter
<b>Overall Impact: Low (3-5)</b>	<b>Approx. Cost: Low</b>	<b>Skill Level: Low</b>

<b>2 - 07</b>	<b>Map/Lot 05060-0u22-001</b>	<b>GPS UTM Coordinates: 0393645 4852241</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Sheet Soil: Bare		Paths & Trails: Define Foot Path Paths & Trails: Infiltration Steps Other: Mulch/Erosion Control Mix Vegetation: Add to Buffer Vegetation: Reseed Bare Soil/Thinning Grass
<b>Overall Impact: Low (3-5)</b>	<b>Approx. Cost: Medium</b>	<b>Skill Level: Low</b>

<b>2 - 08</b>	<b>Map/Lot</b>	<b>GPS UTM Coordinates: 0393311 4853241</b>
<b>Site Problems</b>		<b>Recommendations</b>
Culvert: Unstable Inlet/outlet Culvert: Undersized Soil: Bare Soil: Winter Sand Culvert too short		Culvert: Armor Inlet/Outlet Culvert: Lengthen
<b>Overall Impact: Low (3-5)</b>	<b>Approx. Cost: Medium</b>	<b>Skill Level: Medium</b>

<b>2 - 09</b>	<b>Map/Lot</b>	<b>GPS UTM Coordinates: 0393306 4853181</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Rill Ditch: Rill Erosion Road Shoulder Erosion: Rill Roadside Plow/Grader Berm		Ditch: Install Turnouts Ditch: Install Roads/Driveways: Remove Grader/Plow Berms Roads/Driveways: Build Up Roads/Driveways: Add New Material: Recycled Asphalt Roads/Driveways: Reshape Crown
<b>Overall Impact: Medium (6-7)</b>	<b>Approx. Cost: Medium</b>	<b>Skill Level: Medium</b>

<b>2 - 10</b>	<b>Map/Lot</b>	<b>GPS UTM Coordinates:</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Sheet Soil: Bare Roof Runoff Erosion		Roof Runoff: Drywell at Gutter Downspout Other: Mulch/Erosion Control Mix Vegetation: Add to Buffer
<b>Overall Impact: Low (3-5)</b>	<b>Approx. Cost: Low</b>	<b>Skill Level: Low</b>

Detail of survey findings by Sector and Site Number. Refer to survey section maps and reference their municipal map/lot numbers to identify sites.

<b>2 - 12</b>	<b>Map/Lot</b>	<b>GPS UTM Coordinates: 0393718 4852579</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Rill		Culvert: Armor Inlet/Outlet
Surface Erosion: Gully		Ditch: Vegetate
Culvert: Unstable Inlet/outlet		Ditch: Armor with Stone
Road Shoulder Erosion: Rill		Ditch: Reshape
Road Shoulder Erosion: Gully		Ditch: Install Turnouts
Soil: Bare		
		Shoulder
<b>Overall Impact: Medium (6-7)</b>	<b>Approx. Cost: Medium</b>	<b>Skill Level: Medium</b>

<b>2 - 13</b>	<b>Map/Lot abutting 05060-</b>	<b>GPS UTM Coordinates: 0392477 4852446</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Sheet		Roads/Driveways: Add New Material: Gravel
Surface Erosion: Rill		Roads/Driveways: Reshape Crown
Soil: Bare		
Bare dirt access		
<b>Overall Impact: Medium (6-7)</b>	<b>Approx. Cost: Medium</b>	<b>Skill Level: Low</b>

<b>2 - 14</b>	<b>Map/Lot 0422000220000</b>	<b>GPS UTM Coordinates: 0393615 4852790</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Gully		Other: Mulch/Erosion Control Mix
		Other: Infiltration Trench
		Potential for French drain or dry well
<b>Overall Impact: Medium (6-7)</b>	<b>Approx. Cost: Medium</b>	<b>Skill Level: Low</b>

<b>2 - 15</b>	<b>Map/Lot 05060OU220033</b>	<b>GPS UTM Coordinates: 0393492 4852662</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Sheet		Roads/Driveways: Add New Material: Gravel
Soil: Bare		Roads/Driveways: Vegetate Shoulder
		Roads/Driveways: Runoff Diverters: Waterbar
		Other: Install Runoff Diverter
<b>Overall Impact: Low (3-5)</b>	<b>Approx. Cost: Low</b>	<b>Skill Level: Low</b>

<b>3 - 01</b>	<b>Map/Lot 073-202-032-000</b>	<b>GPS UTM Coordinates: 0393445 4853890</b>
<b>Site Problems</b>	<b>Recommendations</b>	
Surface Erosion: Sheet	Inspect septic system; possible high impact; further attention needed.	
Slight beach erosion; possible septic		
<b>Overall Impact: Low (3-5)</b>	<b>Approx. Cost: Low</b>	<b>Skill Level: Low</b>
<b>3 - 02</b>	<b>Map/Lot 073-202-002-000</b>	<b>GPS UTM Coordinates: 0393472 4853834</b>
<b>Site Problems</b>	<b>Recommendations</b>	
Surface Erosion: Sheet	Paths & Trails: Stabilize Foot Path Other: Install Runoff Diverter Other: Mulch/Erosion Control Mix Vegetation: Establish Buffer	
Soil: Bare		
<b>Overall Impact: Low (3-5)</b>	<b>Approx. Cost: Low</b>	<b>Skill Level: Low</b>
<b>3 - 03</b>	<b>Map/Lot 073-202-003-000</b>	<b>GPS UTM Coordinates: 0393455 4853799</b>
<b>Site Problems</b>	<b>Recommendations</b>	
Surface Erosion: Sheet	Paths & Trails: Stabilize Foot Path Paths & Trails: Infiltration Steps Other: Mulch/Erosion Control Mix Vegetation: Add to Buffer	
Soil: Bare		
Shoreline: Lack of Shoreline Vegetation		
<b>Overall Impact: Medium (6-7)</b>	<b>Approx. Cost: Medium</b>	<b>Skill Level: Low</b>
<b>3 - 04</b>	<b>Map/Lot 073-202-021-000</b>	<b>GPS UTM Coordinates: 0393484 4853618</b>
<b>Site Problems</b>	<b>Recommendations</b>	
Surface Erosion: Rill	Roads/Driveways: Remove Grader/Plow Berms Roads/Driveways: Add New Material: Gravel Roads/Driveways: Reshape Crown Install turnouts	
Culvert: Clogged		
Roadside Plow/Grader Berm		
<b>Overall Impact: High (8-9)</b>	<b>Approx. Cost: Medium</b>	<b>Skill Level: Medium</b>
<b>3 - 05</b>	<b>Map/Lot 075-202-026-000</b>	<b>GPS UTM Coordinates: 0393442 4853573</b>
<b>Site Problems</b>	<b>Recommendations</b>	
Surface Erosion: Sheet	Paths & Trails: Define Foot Path Other: Mulch/Erosion Control Mix Vegetation: Establish Buffer	
Soil: Bare		
Shoreline: Inadequate Shoreline Vegetation		
<b>Overall Impact: Low (3-5)</b>	<b>Approx. Cost: Low</b>	<b>Skill Level: Low</b>

Detail of survey findings by Sector and Site Number. Refer to survey section maps and reference their municipal map/lot numbers to identify sites.

<b>3 - 06</b>	<b>Map/Lot near 072-202-03</b>	<b>GPS UTM Coordinates: 0393358 4853915</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Sheet		Roads/Driveways: Runoff Diverters: Rubber Razor
Surface Erosion: Rill		Roads/Driveways: Runoff Diverters: Waterbar
Shoreline: Erosion		Paths & Trails: Define Foot Path
		Stabilize boat ramp
<b>Overall Impact: Medium (6-7)</b>	<b>Approx. Cost: Medium</b>	<b>Skill Level: Low</b>
<b>3 - 07</b>	<b>Map/Lot 072-202-035-000</b>	<b>GPS UTM Coordinates: 0393356 4853937</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Rill		Ditch: Reshape
Ditch: Rill Erosion		Ditch: Remove Debris/Sediment
Soil: Winter Sand		Roads/Driveways: Add New Material: Recycled Asphalt
		Roads/Driveways: Reshape Crown
<b>Overall Impact: High (8-9)</b>	<b>Approx. Cost: High</b>	<b>Skill Level: High</b>
<b>3 - 08</b>	<b>Map/Lot 072-202-037-000</b>	<b>GPS UTM Coordinates: 0393310 4853910</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Sheet		Roads/Driveways: Runoff Diverters: Waterbar
Surface Erosion: Rill		Roof Runoff: Infiltration Trench at Dripline
Soil: Bare		Vegetation: Establish Buffer
Roof Runoff Erosion		
Shoreline: Lack of Shoreline Vegetation		
<b>Overall Impact: Low (3-5)</b>	<b>Approx. Cost: Low</b>	<b>Skill Level: Low</b>
<b>3 - 09</b>	<b>Map/Lot</b>	<b>GPS UTM Coordinates: 0393284 4853905</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Rill		Culvert: Armor Inlet/Outlet
Culvert: Unstable Inlet/outlet		Culvert: Remove Clog
Culvert: Clogged		Culvert: Enlarge
Road Shoulder Erosion: Rill		Culvert: Install Plunge Pool
		Ditch: Vegetate
		Ditch: Armor with Stone
		Ditch: Reshape
		Roads/Driveways: Build Up
		Roads/Driveways: Add New Material: Gravel
		Roads/Driveways: Reshape Crown
		Rirap seeps on back slope ditch
<b>Overall Impact: Medium (6-7)</b>	<b>Approx. Cost: High</b>	<b>Skill Level: Medium</b>

<b>3 - 10</b>	<b>Map/Lot 073-202-043-000</b>	<b>GPS UTM Coordinates: 0393241 4853779</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Sheet		Other: Mulch/Erosion Control Mix
Soil: Bare		Vegetation: Establish Buffer
Shoreline: Inadequate Shoreline Vegetation		Vegetation: Reseed Bare Soil/Thinning Grass
<b>Overall Impact: Low (3-5)</b>	<b>Approx. Cost: Low</b>	<b>Skill Level: Low</b>
<b>3 - 11</b>	<b>Map/Lot 072-202-045-000</b>	<b>GPS UTM Coordinates: 0393222 4853763</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Sheet		Other: Mulch/Erosion Control Mix
Soil: Bare		Vegetation: Add to Buffer
Shoreline: Inadequate Shoreline Vegetation		
<b>Overall Impact: Low (3-5)</b>	<b>Approx. Cost: Low</b>	<b>Skill Level: Low</b>
<b>3 - 12</b>	<b>Map/Lot</b>	<b>GPS UTM Coordinates: 0393212 4853753</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Rill		Culvert: Install Culvert
		Ditch: Install
		Roads/Driveways: Add New Material: Recycled Asphalt
		Roads/Driveways: Install Detention Basin
Lots of sediment in stream		Or pave?
<b>Overall Impact: High (8-9)</b>	<b>Approx. Cost: High</b>	<b>Skill Level: High</b>
<b>3 - 13</b>	<b>Map/Lot 072-202-049-000</b>	<b>GPS UTM Coordinates: 0393201 4853742</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Rill		Paths & Trails: Infiltration Steps
Surface Erosion: Gully		Other: Mulch/Erosion Control Mix
Soil: Bare		Vegetation: Establish Buffer
Shoreline: Lack of Shoreline Vegetation		
<b>Overall Impact: Medium (6-7)</b>	<b>Approx. Cost: Medium</b>	<b>Skill Level: Medium</b>
<b>3 - 14</b>	<b>Map/Lot 072-202-051-000</b>	<b>GPS UTM Coordinates: 0393178 4853727</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Rill		Roads/Driveways: Add New Material: Gravel
Soil: Bare		Roads/Driveways: Runoff Diverters: Unspecified Type
Shoreline: Unstable Access		
<b>Overall Impact: High (8-9)</b>	<b>Approx. Cost: Medium</b>	<b>Skill Level: Medium</b>



<b>3 - 15</b>	<b>Map/Lot 072-202-053-000</b>	<b>GPS UTM Coordinates: 0393158 4853754</b>
<b>Site Problems</b>		<b>Recommendations</b>
Soil: Bare		Paths & Trails: Define Foot Path
Shoreline: Lack of Shoreline Vegetation		Paths & Trails: Stabilize Foot Path
		Other: Mulch/Erosion Control Mix
		Vegetation: Establish Buffer
Interested in f??g ROW & Road. RD ASSN Pres?		
<b>Overall Impact: Low (3-5)</b>	<b>Approx. Cost: Low</b>	<b>Skill Level: Low</b>
<b>3 - 16</b>	<b>Map/Lot 072-203-001</b>	<b>GPS UTM Coordinates: 0393062 4853643</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Rill		Roads/Driveways: Runoff Diverters: Unspecified Type
		Vegetation: Establish Buffer
<b>Overall Impact: Medium (6-7)</b>	<b>Approx. Cost: Low</b>	<b>Skill Level: Low</b>
<b>3 - 17</b>	<b>Map/Lot</b>	<b>GPS UTM Coordinates: 0392946 4853602</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Rill		Roads/Driveways: Remove Grader/Plow Berms
Road Shoulder Erosion: Rill		
		Install turnouts
<b>Overall Impact: Medium (6-7)</b>	<b>Approx. Cost: Low</b>	<b>Skill Level: Low</b>
<b>3 - 18</b>	<b>Map/Lot</b>	<b>GPS UTM Coordinates: 0393000 4853702</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Rill		Ditch: Armor with Stone
Road Shoulder Erosion: Rill		Ditch: Reshape
		Roads/Driveways: Add New Material: Gravel
		Roads/Driveways: Reshape Crown
<b>Overall Impact: High (8-9)</b>	<b>Approx. Cost: Low</b>	<b>Skill Level: Low</b>

<b>4 - 01</b>	<b>Map/Lot</b>	<b>GPS UTM Coordinates: 0392953 4853569</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Gully		Roads/Driveways: Add New Material: Gravel
Soil: Winter Sand		Roads/Driveways: Reshape Crown
		Roads/Driveways: Runoff Diverters: Unspecified Type
<b>Overall Impact: Medium (6-7)</b>	<b>Approx. Cost: Medium</b>	<b>Skill Level: Medium</b>
<b>4 - 02</b>	<b>Map/Lot 074-203-003-000</b>	<b>GPS UTM Coordinates: 0393010 4853560</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Gully		Roads/Driveways: Runoff Diverters: Rubber Razor
Soil: Bare		Roads/Driveways: Runoff Diverters: Waterbar
Shoreline: Inadequate Shoreline Vegetation		Paths & Trails: Define Foot Path
Shoreline: Erosion		Paths & Trails: Install Runoff Diverter
		Vegetation: Add to Buffer
<b>Overall Impact: Medium (6-7)</b>	<b>Approx. Cost: Low</b>	<b>Skill Level: Low</b>
<b>4 - 03</b>	<b>Map/Lot 074-203-005-000</b>	<b>GPS UTM Coordinates: 0393005 4853511</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Rill		Paths & Trails: Define Foot Path
Soil: Bare		Paths & Trails: Install Runoff Diverter
		Other: Mulch/Erosion Control Mix
		Vegetation: No Raking
<b>Overall Impact: Medium (6-7)</b>	<b>Approx. Cost: Low</b>	<b>Skill Level: Low</b>
<b>4 - 04</b>	<b>Map/Lot 074-203-005-001</b>	<b>GPS UTM Coordinates: 0392992 4853487</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Rill		Roads/Driveways: Runoff Diverters: Unspecified Type
Soil: Bare		
Contributing to road erosion		
<b>Overall Impact: Low (3-5)</b>	<b>Approx. Cost: Low</b>	<b>Skill Level: Low</b>
<b>4 - 05</b>	<b>Map/Lot</b>	<b>GPS UTM Coordinates: 0392995 4853443</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Gully		Culvert: Armor Inlet/Outlet
Culvert: Unstable Inlet/outlet		Roads/Driveways: Remove Grader/Plow Berms
Roadside Plow/Grader Berm		Roads/Driveways: Add New Material: Gravel
Soil: Winter Sand		Roads/Driveways: Reshape Crown
		Roads/Driveways: Runoff Diverters: Unspecified Type
<b>Overall Impact: High (8-9)</b>	<b>Approx. Cost: High</b>	<b>Skill Level: Medium</b>

Detail of survey findings by Sector and Site Number. Refer to survey section maps and reference their municipal map/lot numbers to identify sites.

<b>4 - 06</b>	<b>Map/Lot 074-203-011-000</b>	<b>GPS UTM Coordinates: 0392999 4853376</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Rill		Roads/Driveways: Runoff Diverters: Unspecified Type
<b>Overall Impact: Low (3-5)</b>	<b>Approx. Cost: Low</b>	<b>Skill Level: Low</b>
<b>4 - 07</b>	<b>Map/Lot 074-203-018-000</b>	<b>GPS UTM Coordinates: 0392929 4853308</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Sheet		Other: Mulch/Erosion Control Mix
Soil: Bare		Vegetation: Establish Buffer
Shoreline: Lack of Shoreline Vegetation		
<b>Overall Impact: Low (3-5)</b>	<b>Approx. Cost: Low</b>	<b>Skill Level: Low</b>
<b>4 - 08</b>	<b>Map/Lot 074-203-022-000</b>	<b>GPS UTM Coordinates: 0392879 4853271</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Rill		Roads/Driveways: Runoff Diverters: Unspecified Type
<b>Overall Impact: Low (3-5)</b>	<b>Approx. Cost: Low</b>	<b>Skill Level: Low</b>
<b>4 - 09</b>	<b>Map/Lot 074-203-028-000</b>	<b>GPS UTM Coordinates: 0392884 4853195</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Gully		Construction Site: Mulch
Soil: Bare		Construction Site: Silt Fence/EC Berms
Shoreline: Inadequate Shoreline Vegetation		Vegetation: Add to Buffer
<b>Overall Impact: Medium (6-7)</b>	<b>Approx. Cost: Low</b>	<b>Skill Level: Low</b>
<b>4 - 10</b>	<b>Map/Lot 074-203-028-000</b>	<b>GPS UTM Coordinates: 0392863 4853201</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Gully		Roads/Driveways: Runoff Diverters: Unspecified Type
		Define driveway better
<b>Overall Impact: Low (3-5)</b>	<b>Approx. Cost: Low</b>	<b>Skill Level: Low</b>
<b>4 - 11</b>	<b>Map/Lot 035025000000</b>	<b>GPS UTM Coordinates: 0392797 4853115</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Gully		Paths & Trails: Define Foot Path
Soil: Bare		Paths & Trails: Stabilize Foot Path
Shoreline: Lack of Shoreline Vegetation		Other: Mulch/Erosion Control Mix
		Vegetation: Establish Buffer
<b>Overall Impact: High (8-9)</b>	<b>Approx. Cost: Medium</b>	<b>Skill Level: Medium</b>

Detail of survey findings by Sector and Site Number. Refer to survey section maps and reference their municipal map/lot numbers to identify sites.

<b>4 - 12</b>	<b>Map/Lot 03503000000</b>	<b>GPS UTM Coordinates: 0392700 4853101</b>
<b>Site Problems</b>		<b>Recommendations</b>
Culvert: Unstable Inlet/outlet		Culvert: Armor Inlet/Outlet
Culvert: Clogged		Culvert: Remove Clog
Ditch: Rill Erosion		Ditch: Reshape
Roadside Plow/Grader Berm		Roads/Driveways: Remove Grader/Plow Berms
(4) driveway crossings		
<b>Overall Impact: Medium (6-7)</b>	<b>Approx. Cost: Medium</b>	<b>Skill Level: Medium</b>
<b>4 - 13</b>	<b>Map/Lot 03503200000</b>	<b>GPS UTM Coordinates: 0392684 4853025</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Sheet		Construction Site: Mulch
Shoreline: Lack of Shoreline Vegetation		Vegetation: Establish Buffer
Shoreline: Unstable Access		
<b>Overall Impact: Low (3-5)</b>	<b>Approx. Cost: Low</b>	<b>Skill Level: Low</b>
<b>4 - 14</b>	<b>Map/Lot 03503300000</b>	<b>GPS UTM Coordinates: 0392659 4853003</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Rill		Roads/Driveways: Runoff Diverters: Unspecified Type
Soil: Bare		Other: Mulch/Erosion Control Mix
<b>Overall Impact: Medium (6-7)</b>	<b>Approx. Cost: Low</b>	<b>Skill Level: Low</b>
<b>4 - 15</b>	<b>Map/Lot 03501000000</b>	<b>GPS UTM Coordinates: 0392609 4853028</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Gully		Culvert: Remove Clog
Culvert: Clogged		Culvert: Replace
Culvert: Crushed/Broken		Roads/Driveways: Runoff Diverters: Unspecified Type
Paved driveway causing road issues		
<b>Overall Impact: Low (3-5)</b>	<b>Approx. Cost: Medium</b>	<b>Skill Level: Medium</b>
<b>4 - 16</b>	<b>Map/Lot</b>	<b>GPS UTM Coordinates: 0392583 4852954</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Rill		Roads/Driveways: Reshape Crown
		Roads/Driveways: Runoff Diverters: Unspecified Type
<b>Overall Impact: Medium (6-7)</b>	<b>Approx. Cost: Medium</b>	<b>Skill Level: Medium</b>
<b>4 - 17</b>	<b>Map/Lot 03503600000</b>	<b>GPS UTM Coordinates: 0392611 4852971</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Rill		Roads/Driveways: Runoff Diverters: Unspecified Type
Shoreline: Lack of Shoreline Vegetation		Other: Mulch/Erosion Control Mix
		Vegetation: Add to Buffer
<b>Overall Impact: Medium (6-7)</b>	<b>Approx. Cost: Low</b>	<b>Skill Level: Low</b>

Detail of survey findings by Sector and Site Number. Refer to survey section maps and reference their municipal map/lot numbers to identify sites.

<b>5 - 01</b>	<b>Map/Lot 017025000000</b>	<b>GPS UTM Coordinates: 0392565 4852956</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Gully		Roads/Driveways: Add New Material: Recycled Asphalt
Soil: Winter Sand		Roads/Driveways: Runoff Diverters: Broad-Based Tip
		Need diverters/check dams and sed basin per diagram
<b>Overall Impact: High (8-9)</b>	<b>Approx. Cost: Medium</b>	<b>Skill Level: Low</b>
<b>5 - 02</b>	<b>Map/Lot</b>	<b>GPS UTM Coordinates: 0392593 4852920</b>
<b>Site Problems</b>		<b>Recommendations</b>
Road Shoulder Erosion: Gully		Culvert: Install Plunge Pool
Soil: Delta in Stream/Lake		Ditch: Vegetate
		Ditch: Reshape
		Ditch: Remove Debris/Sediment
		Roads/Driveways: Remove Grader/Plow Berms
		Roads/Driveways: Build Up
		Roads/Driveways: Add New Material: Gravel
		Roads/Driveways: Reshape Crown
Unstable ditch		
<b>Overall Impact: High (8-9)</b>	<b>Approx. Cost: High</b>	<b>Skill Level: High</b>
<b>5 - 03</b>	<b>Map/Lot</b>	<b>GPS UTM Coordinates: 0392598 4852859</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Gully		Roads/Driveways: Build Up
Soil: Bare		Roads/Driveways: Add New Material: Gravel
		Dry well for sump pump
<b>Overall Impact: Medium (6-7)</b>	<b>Approx. Cost: Medium</b>	<b>Skill Level: Low</b>
<b>5 - 04</b>	<b>Map/Lot 035002000000</b>	<b>GPS UTM Coordinates: 0392590 4852740</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Gully		Culvert: Install Culvert
		Ditch: Install
		Roads/Driveways: Runoff Diverters: Rubber Razor
		Roads/Driveways: Runoff Diverters: Broad-Based Tip
Driveway of #32 washes across road and down driveways of #31 & #33		
<b>Overall Impact: High (8-9)</b>	<b>Approx. Cost: Medium</b>	<b>Skill Level: High</b>
<b>5 - 05</b>	<b>Map/Lot</b>	<b>GPS UTM Coordinates: 0392544 4852629</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Gully		Culvert: Install Culvert
		Ditch: Install
<b>Overall Impact: High (8-9)</b>	<b>Approx. Cost: High</b>	<b>Skill Level: Medium</b>

Detail of survey findings by Sector and Site Number. Refer to survey section maps and reference their municipal map/lot numbers to identify sites.



<b>5 - 06</b>	<b>Map/Lot</b>	<b>GPS UTM Coordinates: 0392529 4852566</b>
<b>Site Problems</b>		<b>Recommendations</b>
Culvert: Unstable Inlet/outlet		Culvert: Install Plunge Pool
Road Shoulder Erosion: Gully		Ditch: Install Turnouts
		Ditch: Install
		Ditch: Install Sediment Pools
<b>Overall Impact: High (8-9)</b>	<b>Approx. Cost: Medium</b>	<b>Skill Level: Medium</b>

<b>5 - 07</b>	<b>Map/Lot</b>	<b>GPS UTM Coordinates: 0391851 4852862</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Rill		Ditch: Install Turnouts
		Roads/Driveways: Add New Material: Pave
Water pooling on top of culvert		Along steep hill
<b>Overall Impact: Low (3-5)</b>	<b>Approx. Cost: Medium</b>	<b>Skill Level: Low</b>

<b>5 - 08</b>	<b>Map/Lot</b>	<b>GPS UTM Coordinates: 0392172 4852914</b>
<b>Site Problems</b>		<b>Recommendations</b>
Culvert: Unstable Inlet/outlet		Culvert: Armor Inlet/Outlet
Road Shoulder Erosion: Rill		
<b>Overall Impact: Medium (6-7)</b>	<b>Approx. Cost: Low</b>	<b>Skill Level: Low</b>

<b>5 - 09</b>	<b>Map/Lot 017025A07000</b>	<b>GPS UTM Coordinates: 0392190 4852895</b>
<b>Site Problems</b>		<b>Recommendations</b>
Culvert: Undersized		Culvert: Enlarge
(2) 4' culverts with occasional washout		
<b>Overall Impact: Medium (6-7)</b>	<b>Approx. Cost: Medium</b>	<b>Skill Level: Medium</b>

<b>5 - 10</b>	<b>Map/Lot</b>	<b>GPS UTM Coordinates: 0392234 4852867</b>
<b>Site Problems</b>		<b>Recommendations</b>
Surface Erosion: Rill		Roads/Driveways: Build Up
Culvert: Undersized		Roads/Driveways: Add New Material: Pave
(2) 4' culverts with occasional washout		
<b>Overall Impact: Low (3-5)</b>	<b>Approx. Cost: High</b>	<b>Skill Level: Medium</b>

Detail of survey findings by Sector and Site Number. Refer to survey section maps and reference their municipal map/lot numbers to identify sites.

**5 - 11****Map/Lot****GPS UTM Coordinates: 0392478 4852444****Site Problems**

Surface Erosion: Gully  
Culvert: Undersized  
Ditch: Gully Erosion  
Ditch: Bank Failure  
Road Shoulder Erosion: Gully  
Soil: Delta in Stream/Lake  
Soil: Winter Sand

**Recommendations**

Culvert: Enlarge  
Culvert: Install Plunge Pool  
Ditch: Armor with Stone  
Ditch: Install Turnouts  
Ditch: Install Check Dams  
Ditch: Remove Debris/Sediment  
Ditch: Install Sediment Pools  
Roads/Driveways: Build Up  
Roads/Driveways: Add New Material: Gravel  
Roads/Driveways: Reshape Crown  
Roads/Driveways: Install Catch Basin  
Roads/Driveways: Install Detention Basin

**Overall Impact: High (8-9)****Approx. Cost: High****Skill Level: High**

<b>6 - 01</b>	<b>Map/Lot</b>	<b>GPS UTM Coordinates: 0393833 4852573</b>
<b>Site Problems</b>		<b>Recommendations</b>
		Construction Site: Seed/Hay
		Construction Site: Check Dams
ECM Berm has concerns		Rake out ECM and allow to sheet flow into buffer
<b>Overall Impact: Medium (6-7)</b>	<b>Approx. Cost: Low</b>	<b>Skill Level: Low</b>

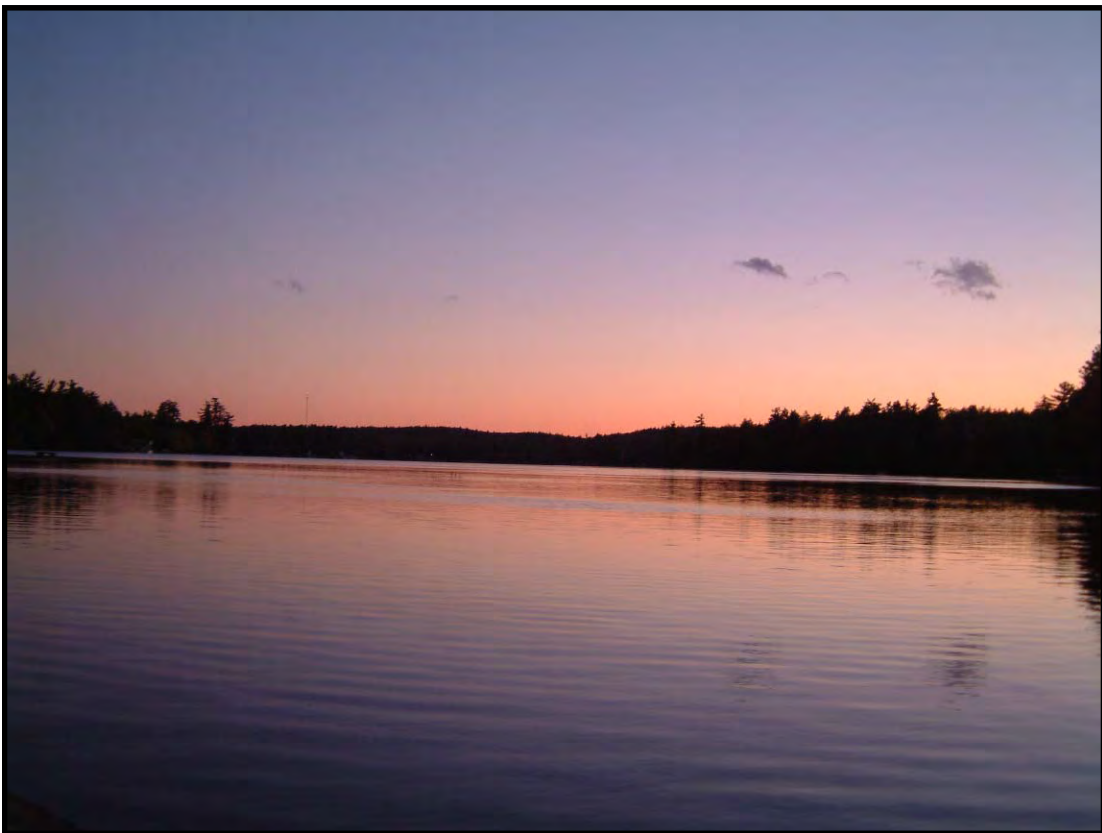
<b>6 - 02</b>	<b>Map/Lot</b>	<b>GPS UTM Coordinates: 0392285 4854129</b>
<b>Site Problems</b>		<b>Recommendations</b>
		Roads/Driveways: Runoff Diverters: Unspecified Type
Slight erosion; stream crossing broken		Repair and reset stream crossing bridge; install signs
<b>Overall Impact: Medium (6-7)</b>	<b>Approx. Cost: Low</b>	<b>Skill Level: Low</b>

## **Appendix B: 2003 Forest Lake Watershed Survey Report**





# **Forest Lake Watershed Survey Report**



**Cumberland County Soil and Water Conservation District  
Forest Lake Association  
Maine Department of Environmental Protection**

**April 2003**

# Acknowledgments

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

## Watershed Survey Volunteers

Donald Hughes  
Ray Mercier  
Ralph Ludington  
Greg Schultz

Anthony Hughes  
Brad Rounds  
Lyn Ludington  
Jane Swan

Bob Heyner  
Joe Garland  
Rob Berube  
Jim Gameros

## Steering Committee

Brad Rounds  
Bob Heyner  
Don Hughes

Ralph Ludington  
John McGinnis  
Mitch Berkowitz

## Technical Staff

Betty Williams, Cumberland County Soil & Water Conservation District

Wendy Garland, Maine Department of Environmental Protection

Tamara Lee Pinard, Lakes Program Manager, Cumberland Co. Soil & Water Conservation District

Noralee Raymond, AmeriCorps

Don Kale, Maine Department of Environmental Protection

Mary Ellen Dennis, Maine Department of Environmental Protection

Jessie Mae MacDougall, Maine Department of Environmental Protection

## Report Prepared by

Betty Williams

---

*This project was funded in part by a grant from the Maine Department of Environmental Protection. Funds were provided from the U.S. Environmental Protection Agency through the Clean Water Act, Section 319. The contents of this document do not necessarily reflect the view or policies of the EPA or Maine DEP, nor does the mention of trade names or commercial products constitute endorsement or recommendation for use.*

*All programs and services of the Cumberland County Soil & Water Conservation District are offered on a non-discriminatory basis, without regard to race, ethnicity, color, gender, religion, age, disability, political belief, sexual orientation, or marital or family status.*

# Table of Contents

Introduction	1
Figure 1: Forest Lake Watershed	2
Purpose of the Watershed Survey	4
Summary of Watershed Survey Findings	5
Residential	6
Driveways	7
Private Roads	8
Boat & Beach Access	9
Where Do We Go From Here?	11
Permitting ABC's	12
Maps of Forest Lake Erosion Sites	Appendix
Glossary of Common Conservation Practices	Inside Back Cover
Where Do I Get More Information?	Back Cover



# Introduction

## Is there a water quality problem in the Forest Lake Watershed?

The Forest Lake Association has tested water quality in Forest Lake for more than 25 years. This testing has found the lake's water quality to be slightly above average based on secchi disk transparency, total phosphorus and chlorophyll-a measurements.

As a result of development trends in the area and the water quality conditions Forest Lake has been placed on the Maine Department of Environmental Protection (DEP) list of *Priority Watersheds* and the State's list lakes *Most at Risk from New Development* under the Maine Stormwater Law.

However, recent dissolved oxygen profiles show moderate oxygen depletion in deep areas of the lake to levels that pose a moderate risk of phosphorus recycling problems. Based on observations at other Maine lakes, these trends indicate that the lake is under stress.

### WATERSHED

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

The Forest Lake Watershed covers 3 square miles (1913 acres) (Fig. 1).

## What is polluting Forest Lake?

### NONPOINT SOURCE POLLUTION



Also called NPS or polluted runoff. Pollution that can not be traced back to a discharge from a particular direct source (e.g., an industrial outfall pipe).

One way to visualize NPS pollution is to think of rain and snow melt as a giant broom that sweeps over the watershed, moving debris and soil into the lake from the surrounding land and streams.

Declining water quality may be a result of the concentrated development around the lake and extensive network of gravel roads to reach these homes. The biggest pollution culprit in Maine's lakes is **nonpoint source (NPS) pollution** found in the runoff from rain and snowmelt. During and after storms, soil, and nutrients like phosphorus and nitrogen, wash into lakes from the surrounding landscape by streams and overland flow.

In an undeveloped, forested watershed, storm water runoff is slowed and filtered by trees, shrubs and other vegetation. It then soaks into the uneven forest floor.

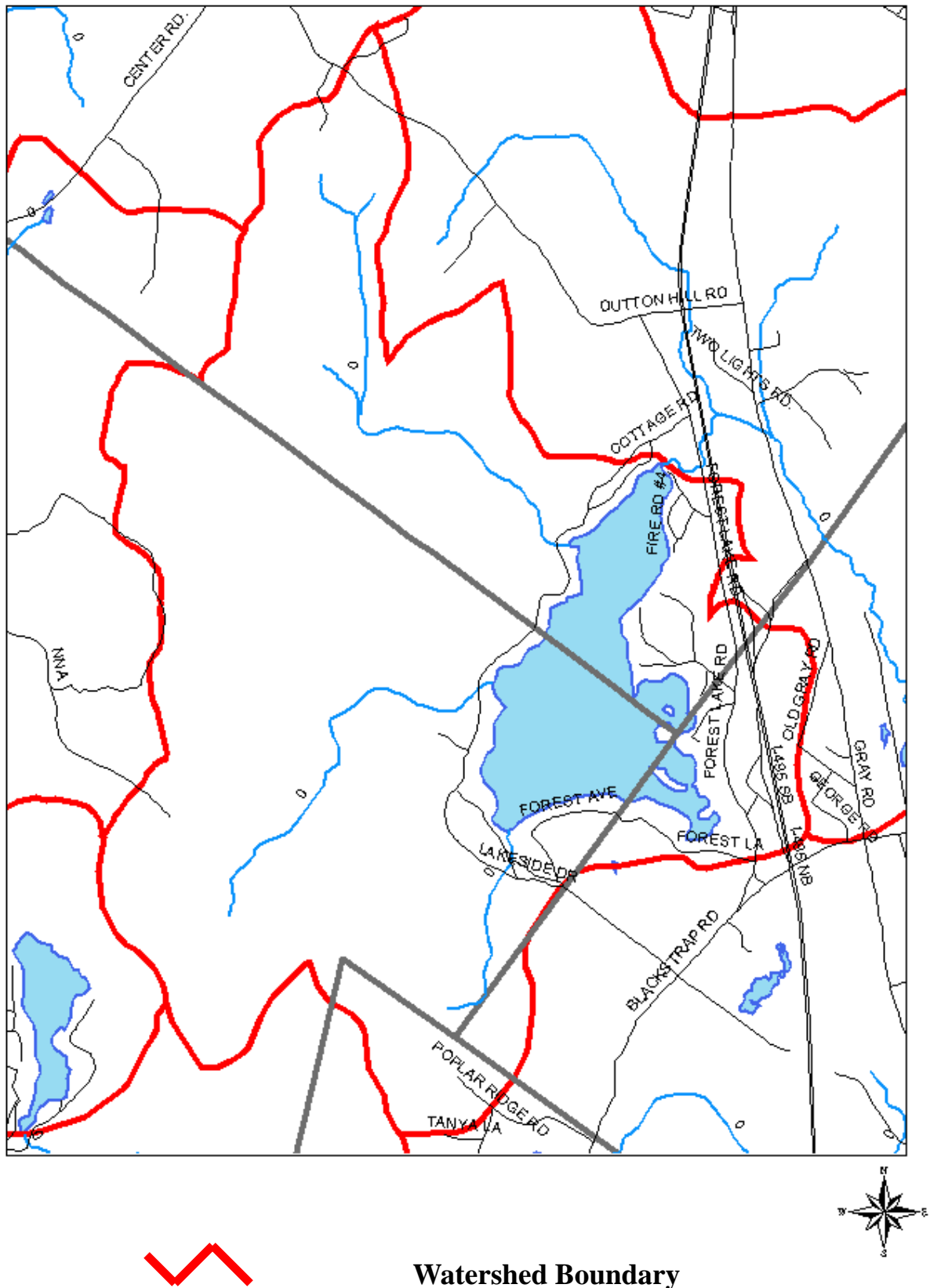
In a developed watershed, storm water velocity increases on impervious surfaces like rooftops, compacted soil, gravel camp roads and pavement, and does not always receive the filtering treatment the forest once provided.

The nutrients in storm water runoff can be bad news for lakes. **Phosphorus**, a nutrient that is common on land, 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.



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

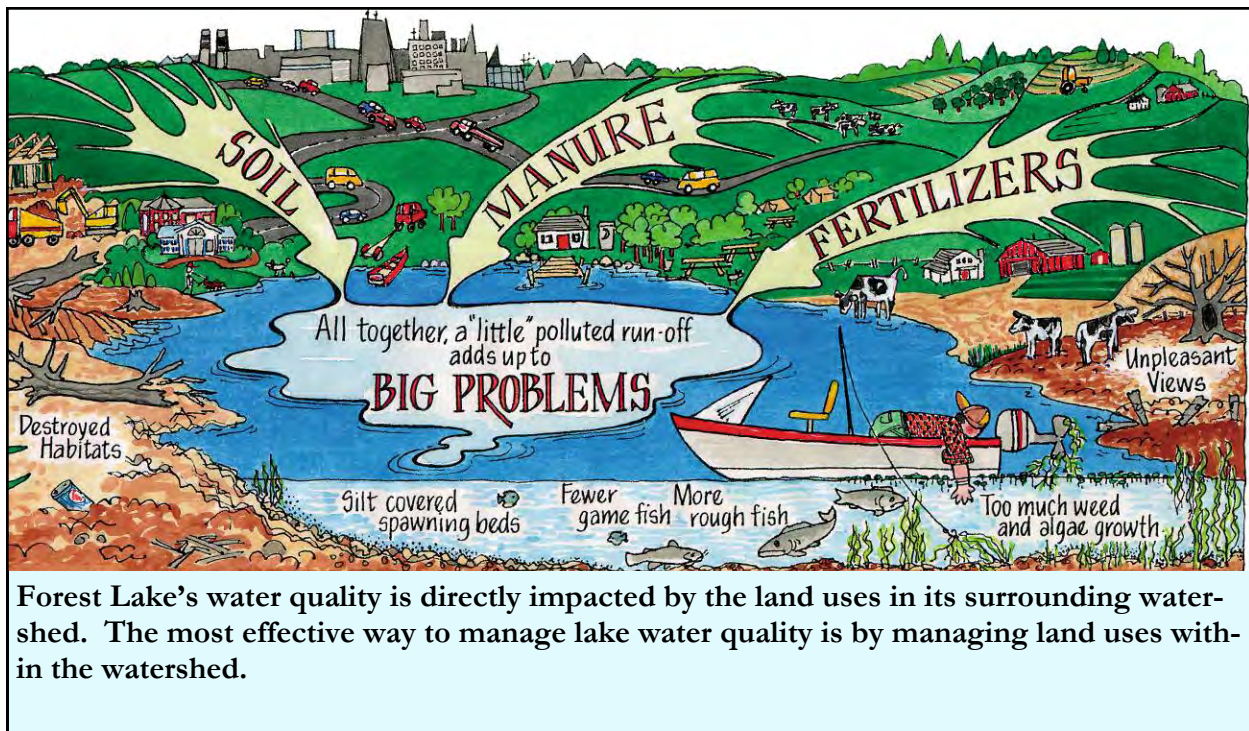
Figure 1: Forest Lake Watershed





## Why is it important to protect Forest Lake's water quality?

- ◆ Forest Lake contains valuable habitat for fish, birds and other wildlife.
- ◆ Forest Lake serves as the headwaters to the Piscataqua River, which then flows into the Presumpscot River and Casco Bay.
- ◆ A 1996 University of Maine study demonstrated that lake water quality affects property values. For every meter (3 ft) decline in water clarity, shoreline 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 difficult or impossible to restore.



Forest Lake's water quality is directly impacted by the land uses in its surrounding watershed. The most effective way to manage lake water quality is by managing land uses within the watershed.

## What is being done to protect the Forest Lake Watershed?

The Forest Lake Association (FLA) tests water quality in Forest Lake as part of the Maine Volunteer Lake Monitoring Program. FLA also works with agencies and watershed residents to promote environmental stewardship.

Volunteer watershed surveys have been found to be one of the most effective ways to protect lake water quality by getting citizens involved in identifying existing and potential sources of polluted runoff. During the summer and fall of 2002, the Forest Lake Association and the Cumberland County SWCD and DEP conducted a watershed survey. In addition, a Septic Survey was conducted to assess the condition of septic systems near the lake and a Shoreline Survey was carried out as well to assess the composition of vegetated buffers around the lake.

This report is specifically designed for citizens living in the Forest Lake Watershed. It contains a summary of the survey findings and recommendations to protect the health of the lake.

## 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 Forest Lake Watershed. However, of equal importance was to:

- ◆ Raise public awareness of the connection between land use and water quality, and the impact of polluted runoff on Forest Lake.
- ◆ Inspire people to become active stewards of the watershed.
- ◆ Use the information gathered to help develop the Forest Lake Management Plan.
- ◆ Make general recommendations to landowners for fixing erosion problems on their properties.

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



Numerous lakeshore properties were observed to have little or no **vegetated buffer** at the water's edge. These sites were not included in the survey results but it is important to note that buffers of shrubs and trees do a much more effective job than bare ground or grass at keeping polluted runoff from entering lakes. The deep roots of shrubs and trees also help stabilize the shoreline.

Buffers can be installed inexpensively. You can stop mowing and raking at the water's edge and let plants grow up naturally. Or you can plant the area with native trees and shrubs.

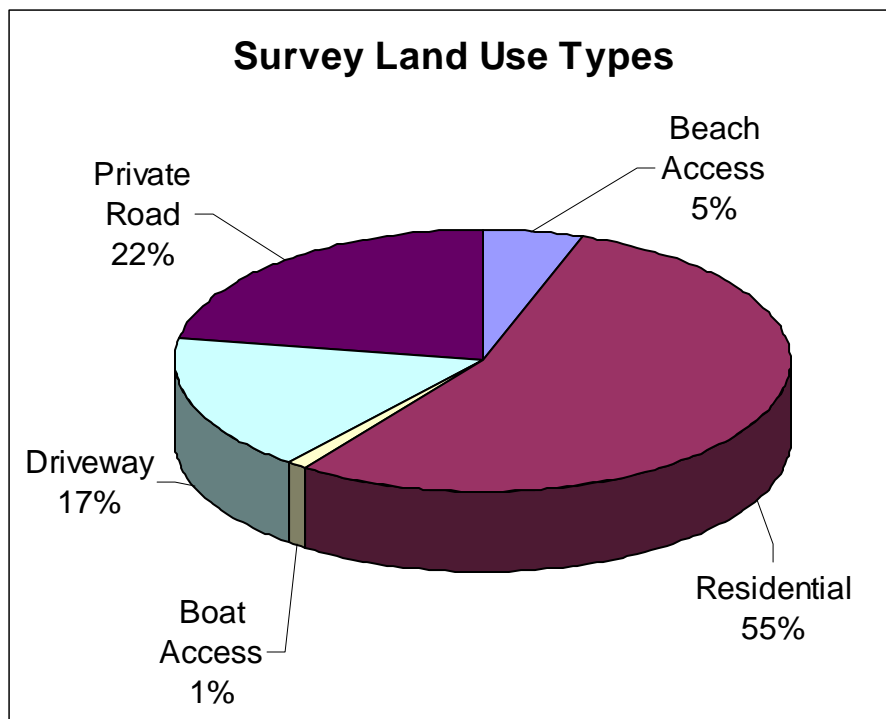
Buffers enhance the appearance of shorefront property and attract birds and other wildlife without ruining the landowner's view.



## Summary of Watershed Survey Findings

Volunteers and technical staff identified 112 sites that are currently impacting or have the potential to impact water quality in the Forest Lake Watershed.

A total of five land use types were associated with the identified sites. The largest number of problems were associated with residential areas, driveways, and private roads. Detailed descriptions of these sites are on the following pages.



### Vegetated Buffers

Survey teams identified many sites that showed good watershed protection techniques. These good practices include vegetated buffers. A vegetated buffer strip is an area of natural vegetation which has been left undisturbed or replanted. Vegetated buffers filter soil that erodes from surrounding uplands. Soil carried by runoff is trapped in the uneven forest floor. Water soaks into the leaf litter and the soil settles out.



## Residential

Of the 61 sites associated with residential areas, 44 were low impact, 14 were medium impact, and three were high impact. Over half of the sites can be fixed with little technical expertise and low cost.

### Common Problems Identified:

- Slight or moderate surface erosion
- Bare and sparsely vegetated soil
- Lack of vegetated buffer along shoreline
- Direct flow of runoff to lake
- Roof runoff causing erosion
- Stockpiled soil
- No erosion controls at construction sites

### Recommended Solutions:

- Seed and mulch bare soil
- Establish or enhance vegetated buffer
- Limit foot traffic in eroding areas
- Install dripline trench to catch roof runoff
- Install silt fence around construction sites
- Install waterbar, open-top culvert, rubber razor or other runoff diverter
- Place mulch or stone on footpaths



### Problems:

- Lack of silt fence
- Bare soil with direct flow to lake
- Lack of vegetated buffer

### Solutions:

- Properly install and maintain silt fence
- Seed and mulch bare areas
- Remove stockpiled soil
- Establish vegetated buffer along shoreline

Residential areas were associated with 55% of the identified sources of polluted runoff to Forest Lake. These problems pose a significant threat to lake water quality. Fortunately, most of these sites can be corrected with easy, low cost fixes.

*It's the cumulative impact of all the sites that causes water quality to decline.*

## Driveways

Of the 19 driveways, 12 were low impact, five were medium impact, and two were high impact. Most of the sites could be fixed with low to medium cost and technical expertise.

### Common Problems Identified:

- Slight to moderate surface erosion
- Direct flow to lake or ditch
- Poor shaping
- Poor (too sandy) surface material

### Recommended Solutions:

- Crown driveway so that water flows to either side
- Install diverters such as waterbars, open top culverts or rubber razors to get water off road
- Install turnouts to direct water into wooded depressions



### Problems

- Poor driveway shaping and ruts cause water to concentrate and erode the surface
- Direct flow of sediment to lake

### Solutions

- Add new surface material
- Reshape and crown driveway so water moves quickly from the surface
- Install diverters such as waterbars, open top culverts or rubber razors to get water off driveway

**Preserve water quality and save time, money, and wear and tear on your vehicle by having a well crowned driveway. Use adequate surface material and add diversions to direct runoff into buffers.**

***It's great for watershed residents and it's great for the lakes!***



## Private Roads

Of the 25 private road sites, 17 were low impact, four were medium impact and four were high impact. The problems are more expensive to fix and would require technical assistance.

### Common Problems Identified:

- Slight to moderate surface erosion
- Direct flow to lake or stream
- Slight to moderate ditch erosion
- Undersized ditches
- Poor (too sandy) surface material
- Unstable culvert inlet and outlet
- Clogged ditches and culverts

### Recommended Solutions:

- Crown and reshape road to get water off road
- Install diverters such as waterbars, open top culverts or rubber razors to get water off road
- Build up road with cohesive surface material
- Clean out culverts
- Clean, reshape and armor ditches with stone rip rap or plant grass
- Remove grader berms and winter sand to allow proper drainage
- Install culverts and stabilize ends with stone



### Problems:

- ◆ Lack of ditches
- Moderate surface erosion
- Poor surface material

### Solutions:

- Build up road with cohesive surface material
- Reshape and crown
- Install proper ditching

**Unpaved roads are one of the biggest sources of pollution to Maine lakes.**

***While a one time fix may cost more up front, it will reduce lake pollution and reduce maintenance costs on your road, ditches and vehicle.***

## Boat & Beach Access

Of the six beach sites and one boat site, two were low impact, three were medium impact and two were high impact. Over half of the problems can be fixed with low technical expertise and low cost.

### Common Problems Identified:

- Slight to moderate surface erosion
- Bare soil
- Direct flow of sediment to stream or lake
- Shoreline degradation
- Unstable beach access

### Recommended Solutions:

- Seed and mulch
- Plant or enhance buffer
- Install runoff diverters; i.e. water bars
- Define path for foot traffic
- Tri-lock blocks to create swale for boat access



### Problems:

- Severe erosion
- Direct flow of sediment and winter sand into lake

### Solutions:

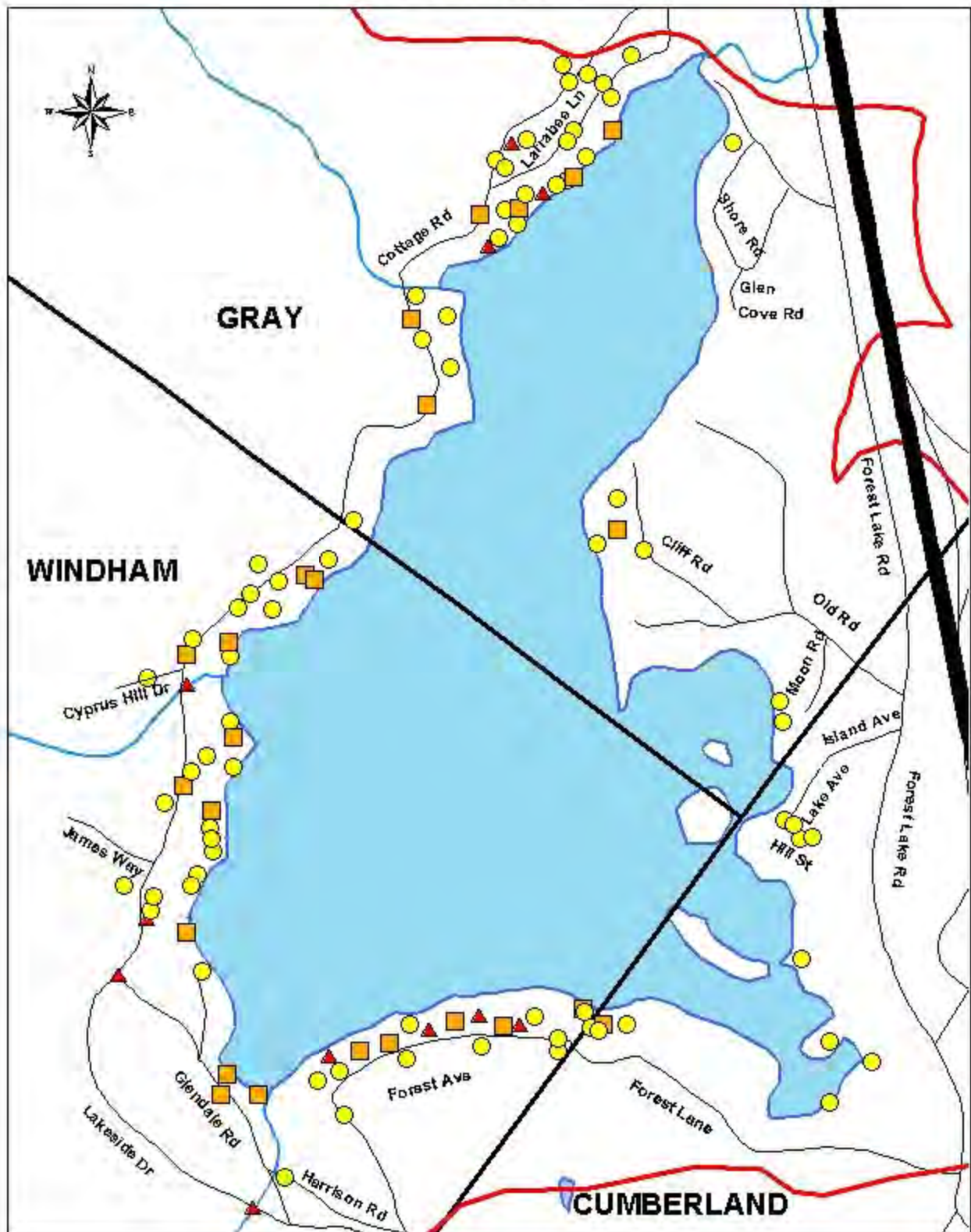
- Install tri-lock blocks to create swale
- Install rubber razor blade
- Install runoff diverter at top of boat access to trap sediment before it reaches the lake



With a few exceptions, virtually all of the sites identified in the survey are significant to one degree or another. The cumulative effect of many “low” and “medium” impact sites can exceed that of any one “high” impact site. This should be considered when a strategy is developed to address problems in the watershed.

# Forest Lake Watershed Survey

## Erosion Sites



### Legend

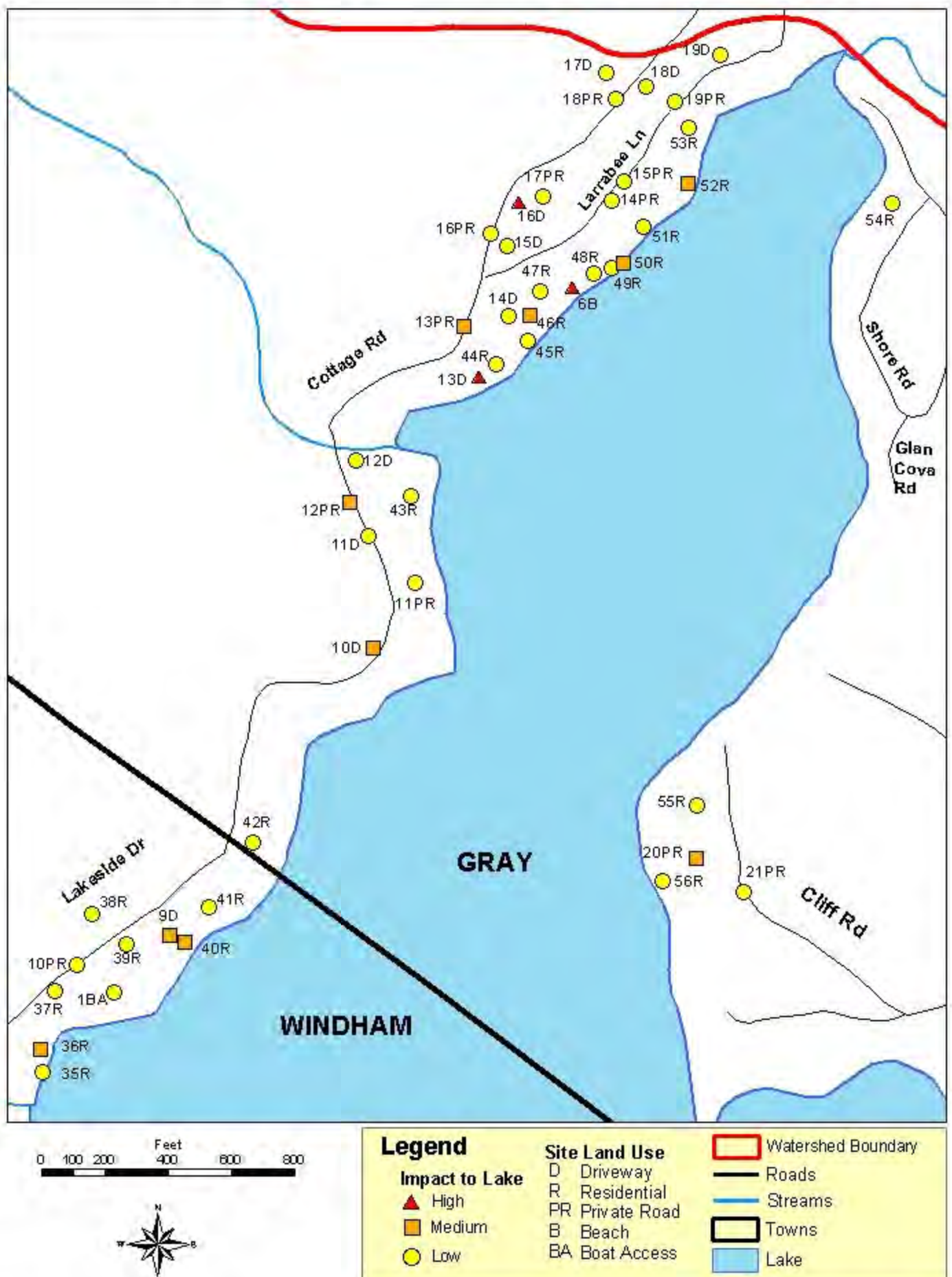
#### Site Impact to Lake

- ▲ High
- Medium
- Low

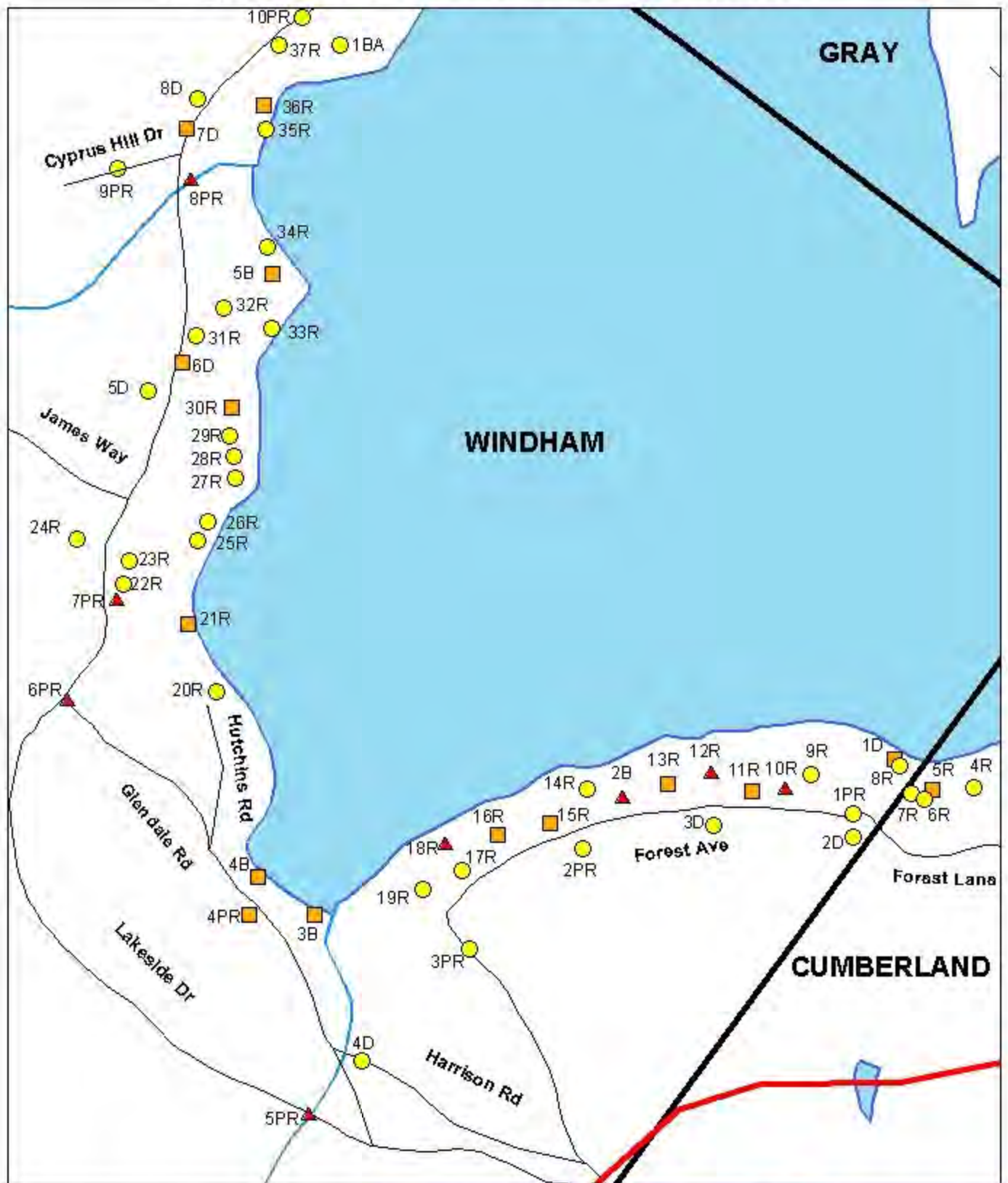
- Watershed Boundary
- Roads
- Streams
- Towns
- Lake



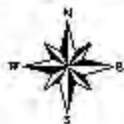
# Figure 3: Forest Lake Erosion Sites



# Figure 4: Forest Lake Erosion Sites



0 100 200 400 600 800  
Feet



## Legend

### Impact to Lake

- ▲ High
- Medium
- Low

### Site Land Use

- D Driveway
- R Residential
- PR Private Road
- B Beach
- BA Boat Access

Watershed Boundary

Roads

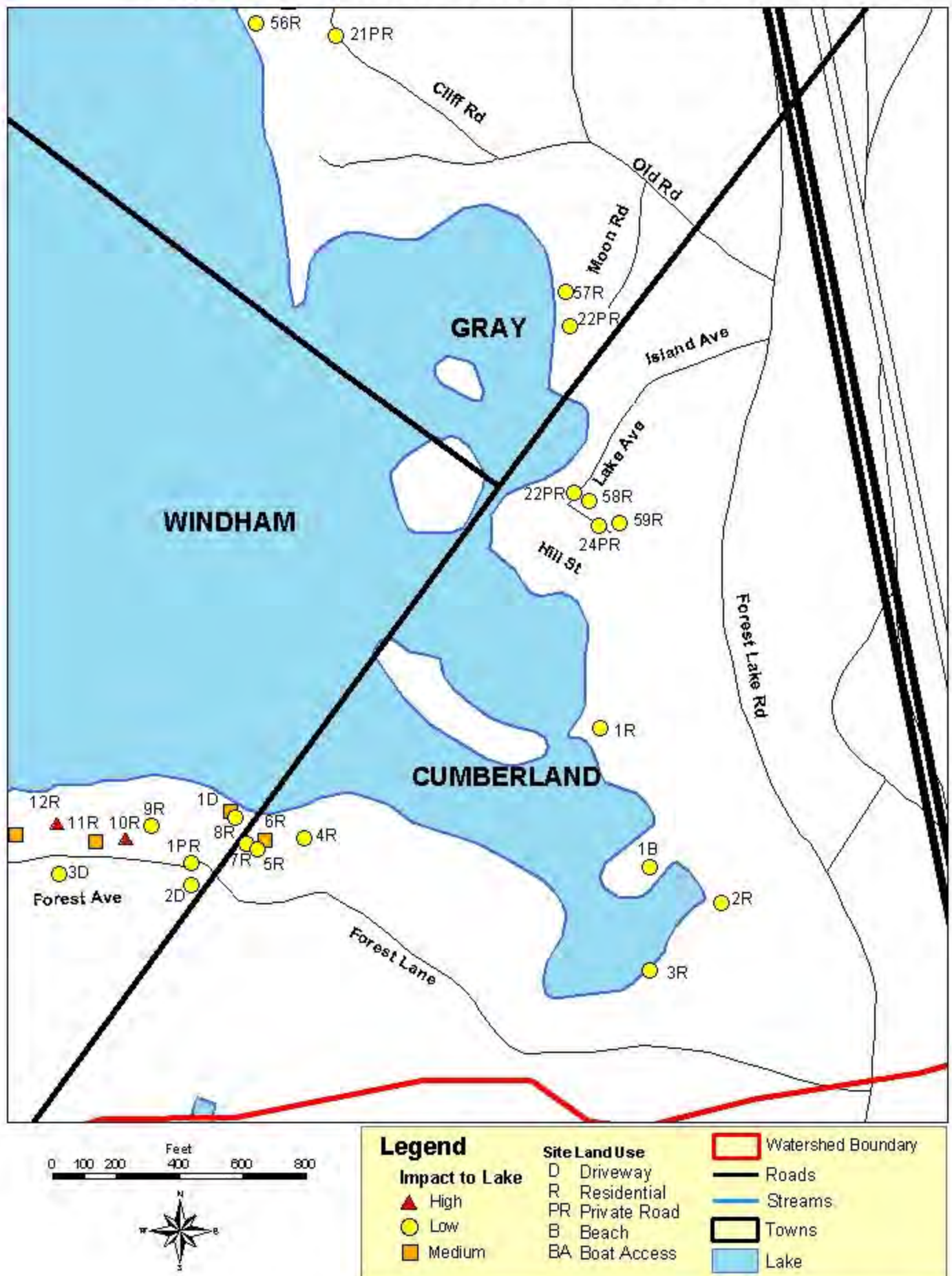
Streams

Towns

Lake



**Figure 5: Forest Lake Erosion Sites**



Map ID	Sector & Site #	Land Use	Type of problem	Area Affected	Recommendations	Impact of Problems	Technical Level to Install	Cost
1B	2 #2	Beach Access	Unstable beach access, slight surface erosion with direct flow to lake	90 X 90	Install log barrier and terracing	Low	Medium	Low
2B	1 #9	Beach Access	Direct flow to lake; baresoil with moderate to severe surface erosion	125 x 4	Construct infiltration steps and mulch along steps to shore near deck; detention basin; plant trees and shrubs	High	Medium	Medium
3B	1 #15	Beach Access	Severe shoreline and surface erosion with direct flow to lake	10 x 10	Recommend installing tri-lock blocks to create swale	Medium	Medium	Medium
4B	1 #17	Beach Access	Shoreline erosion with severe surface erosion with direct flow to lake	12 X 4	need engineered solution - erosion seems to be due to underlay of clay soils.	Medium	High	Medium
5B	5 #12	Beach Access	Moderate to severe surface erosion	5 x 5	Add bed of crushed stone and perforated pipe to spring area; stabilize bank and base of tree	Medium	Low	Low
6B	4 #11	Beach Access	Unstable beach access with severe surface erosion ; lack of buffer and shoreline erosion	15 x 200	Install runoff diverter; rubber razor blade; establish buffer; infiltration steps; define path for foot traffic	High	Medium	Medium
1BA	5 #31	Boat Access	Lack of buffer with slight to moderate surface erosion ; slightly unstable boat access	50 x 10	Install runoff diverter at top of boat launch - reshape boat launch area. Close boat access and diverter at top and establish buffer at left of access.	Low	Medium	Medium
1D	1 #3	Driveway	Moderate surface erosion at bottom of driveway and roof runoff	175 x 10	Install catch basin at bottom of driveway; install dry well at gutter downspout	Medium	Medium	Medium
2D	1 #4	Driveway	Slight surface erosion with direct flow to lake	15 x 40 +	Enhance depression at bottom of driveway; reshape driveway and surface material; install waterbar/runoff diverter	Low	Low	Low
3D	1 #8b	Driveway	Moderate surface erosion	30 x 15	Add new surface material and reshape & crown driveway	Low	Low	Low
4D	1 #14	Driveway	Direct flow to stream with severe surface erosion	55 x 10	Discontinue use of as driveway, can utilize Harrison Road; install Rubber Razor Blade	Low	Low	Low
5D	5 #17	Driveway	Moderate surface erosion	30 x 30	Natural depression exists at left of drive entrance can send H2O there.	Low	Medium	Medium
6D	5 #16a	Driveway		60 x 12	better define low area for pooling	Medium	Medium	Low
7D	5 #23	Driveway	Clogged culvert with severe ditch erosion	80 x 20	Clean out culvert or replace culvert; add new surface material; extend broken pavement	Medium	Medium	Medium
8D	5 #23b	Driveway	Moderate surface erosion	50 x 10	close off & vegetate upper driveway; install waterbar	Low	Low	Low
9D	5 #33b	Driveway	Bare soil with moderate surface erosion	150 x 60	Add new surface material; no raking; mulch; restrict cars to defined area	Medium	Low	Low
10D	4 #22	Driveway	Moderate road shoulder erosion with severe surface erosion	10 x 80	Add new surface material; build up road and reshape and crown road; runoff diverter	Medium	Medium	Medium
11D	4 #20b	Driveway	Roof runoff with slight surface erosion	12 x 20	Install drywell at gutter spout; install rubber razor blade or waterbar; plant trees and shrubs on bank	Low	Low	Low

Map ID	Sector & Site #	Land Use	Type of problem	Area Affected	Recommendations	Impact of Problems	Technical Level to Install	Cost
12D	4 #20	Driveway	Moderate surface erosion	12 x 30	add new surface material and close off and vegetate steep end	Low	Low	Low
13D	4 #6a	Driveway	Shoreline erosion; lack of buffer with moderate surface erosion		Install turnout; establish buffer; install rubber razor blade and waterbar at top of driveway and seed & mulch	High	Low	Low
14D	4 #8a	Driveway	Moderate surface erosion	30 x 15	Add new surface material or pave driveway	Low	Low	Medium
15D	4 #5a	Driveway	Severe surface erosion	30 x 15	Add new surface material and reshape road; take care of road problems 4#5	Low	Low	Low
16D	4 #4	Driveway	Moderate shoulder erosion with severe surface erosion	15 x 50	Waterbar or french drain or close off and revegetate first section	High	Low	Low
17D	4 #2a	Driveway	Direct flow to ditch with moderate surface erosion	40 x 15	Add new surface material and reshape or crown road	Low	Low	Low
18D	4 #2b	Driveway	Direct flow to ditch with moderate surface erosion	50 x 3	Add new surface material and reshape or crown road; install waterbar	Low	Low	Low
19D	4 #18a	Driveway	Moderate surface erosion		Add new surface material; remove winter sand; reshape and crown; install drywell at gutter spout.	Low	Low	Low
24D	5 #6	Driveway	Moderate surface erosion	80 x 12	Add new surface material	Low	Low	Medium
25R	5 #8	Driveway	Slight surface erosion	12 x 80	Add new surface material and reshape & vegetate shoulder	Low	Low	Medium
1PR	1 #1	Private Road	Moderate surface erosion, direct flow to lake	75 x 4	Build up road and crown; install turnouts	Low	Low	Low
2PR	1 #10a	Private Road	Moderate surface erosion with direct flow to lake	70 x 5	Install turnouts and detention basin	Low	Medium	Medium
3PR	1 #13b	Private Road	Moderate ditch erosion and slight surface erosion	160 x 3	Reshape/redefine ditch, stall turnout and remove winter sand; install detention basin	Low	Medium	Medium
4PR	1 #16	Private Road	Moderate surface erosion with direct flow to lake	170' x 12	Add new surface material; build up and crown road and install turnouts near abandon building	Medium	Medium	Medium
5PR	5 #0	Private Road	Direct flow to stream with slight road shoulder erosion; large sediment delta in stream	300 x 8	Install several turnouts either side of stream bridge	High	Low	Low
6PR	5 #1	Private Road	Direct flow to stream; moderate to severe surface erosion	30 x 62	Install plunge pool and culvert; install ditch and rubber razor balde including detention basin	High	High	High
7PR	5 #3	Private Road	Direct flow to stream with slight surface erosion and moderate road shoulder erosion	210 x 20	Install ditch; build up road; reshape and crown road and install detention basin	Medium	High	High
8PR	5 #11	Private Road	Moderate to severe surface erosion	20 x 600	Install culvert; install ditching, cut back bank to ease slope;	High	Medium	High
9PR	5 #23a	Private Road	Ditch capability exceeded at top of road with slight surface erosion and direct flow to stream	25 x 4	Top portion of road to lake(install ditch) Install paved speed bump to divert water.	Low	Medium	Medium
10PR	5 #30	Private Road	Ditch capability exceeded	300 x 6	remove large rock in ditch and install ditch; remove grader berms	Low	Medium	Medium

Map ID	Sector & Site #	Land Use	Type of problem	Area Affected	Recommendations	Impact of Problems	Technical Level to Install	Cost
11PR	4 #21	Private Road	Unstable culvert inlet and outlet	4 x 5	Clen out culvert install plunge pool and stabilize inlet & outlet	Low	Low	Low
12PR	4 #19	Private Road	Slight Road shoulder erosion with moderate surface erosion on side slopes	3 x 250	Add new surface material; install ditch; build up road and enhance turnout and level spreader	Medium	Medium	Medium
13PR	4 #6	Private Road	Slight surface erosion with direct flow to lake	100 x 15	Reshape ditch; and install turnout; rehsape and vegetate shoulder	Medium	Medium	Medium
14PR	4 #13	Private Road	Clogged cluvert with moderate ditch erosion	80 x 4	Clean out culvert, stabilize inlet and outlet; install ditch; build up road; reshape and vegetate shoulder; plant trees and shrubs	Low	Medium	Medium
15PR	4 #15	Private Road	Unstable culvert inlet/outlet with stockpiled soil, slight ditch erosion and ditch capability exceeded	75 x 8	Clen out culvert; stabilize inlet and outlet; install and reshape ditch	Low	Medium	Medium
16PR	4 #5	Private Road	Moderate ditch erosion and ditch capability exceeded	200 x 5	Install ditch; build up road; install turnouts and remove grader berms	Low	Low	Medium
17PR	4 #3	Private Road	Unstable culvert inlet/outlet with direct flow to ditch and slight surface erosion and moderate shoulder erosion	600 x 15	Clean out culvert; install plunge pool lengthen and stabilize inlet & outlet; install turnout; build up road and crown; install detention basin	Low	High	High
18PR	4 #2	Private Road	Direct flow to ditch; stockpiled soil and moderate surface erosion	100 X 6	Build up, and crown road; install turnouts, reshape and vegetate shoulder; seed & mulch soil pile	Low	Low	Medium
19PR	4 #18	Private Road	Unstable culvert inlet and outlet; slight ditch erosion with direct flow to lake	5 x 20	Clean out culvert; stabilize inlet and outlet; armor ditch with stone or curlex; seed and mulch	Low	Low	Low
20PR	3 #7	Private Road	Moderate surface erosion with direct flow to lake	203 X 12	Will need engineered solution	Medium	High	High
21PR	3 #8	Private Road	Slight surface erosion with direct flow to lake	220 X 12	Install ditch and turnout; add new surface material	Low	Medium	Medium
22PR	3 #4	Private Road	Slight surface erosion with direct flow to lake	127 x 10	Add new surface material; reshape and crown road; install waterbar and establish buffer	Low	Low	Medium
23PR	3 #3	Private Road	Moderate surface erosion with direct flow to lake	200 x 11	Add new surface material and extend buffer	Low	Low	Low
24PR	3 #1	Private Road	Slight surface erosion of road with direct flow to lake	67 x 11.4	Add new surface material; build up and crown road	Low	Low	Low
1R	2 #1	Residential	Direct flow to wetland, baresoil and slight surface erosion	10 X 90	Plant trees and shrubs; seed and mulch	Low	Low	Low
2R	2 #3	Residential	Lack of buffer at shoreline, all lawn	90 X 60	Establish buffer	Low	Medium	Low
3R	2 #4	Residential	Roof runoff; bare soil with slight surface erosion	6 X 15	Install stone filled dripline trench and mulch	Low	Low	Low
4R	2 #5	Residential	Roof runoff with slight surface erosion	60 X 6	Plant trees and shrubs on terraced slope; install infiltration trench @ edge of patio and extend existing drywell and no raking	Low	Low	Low

Map ID	Sector & Site #	Land Use	Type of problem	Area Affected	Recommendations	Impact of Problems	Technical Level to Install	Cost
5R	2 #6	Residential	bare soil due to construction projects; lack of buffer and slight surface erosion	20 x 10	Establish buffer; install waterbar and define path for foot traffic and restrict foot traffic from bank	Low	Low	Low
6R	2 #7	Residential	Roof runoff; baresoil; stockpiled soil and lack of buffer	35 x 10	Establish buffer; seed and mulch; no raking and establish steps to water; refill trench with stockpile soil and reset landscape timbers to hold soil	Medium	Low	Low
7R	2 #8	Residential	Roof runoff with slight surface erosion and bare soil	6 x 15	Extend buffer and install infiltration steps to lake; install stone filled dripline trench	Low	Low	Low
8R	1 #2	Residential	bare soil with slight surface erosion with direct flow to lake	10 x 4	Install waterbar, catch basin and direct gutter downspout into drywell	Low	Low	Low
9R	1 #6	Residential	Slight ditch erosion, direct flow to lake	30 x 15	Install dry well at base of house closest to lake and replace steps; enhance buffer	Low	Low	Low
10R	1 #7	Residential	Direct flow to lake; stockpiled soil; shoreline erosion and slight surface erosion	4 x 20	Replace riprap along shoreline and replace steps with infiltration steps. Seed and mulch ditch.	High	Low	Low
11R	1 #8	Residential	Roof runoff; baresoil with moderate surface erosion	50 x 8	use stairs, not steep bank next to stairs; large infiltration step at base of steps before lower deck.	Medium	Low	Low
12R	1 #8a	Residential	Roof runoff with severe shoreline erosion	75 x 20	replace/install retaining wall; define path for foot traffic; extend buffer and install stone filled dripline trench	High	Medium	Low
13R	1 #8c	Residential	Roof runoff; baresoil ; no buffer at shoreline moderate to slight surface erosion	50 x 50	Establish buffer at shoreline; seed and mulch, no raking define path for foot traffic; install stone filled dripline trench	Medium	Low	Low
14R	1 #9a	Residential	Direct flow to lake; baresoil with slight surface erosion (nice shrub plantings)	20 x 10	Cover area with curlex and seed	Low	Low	Low
15R	1 #10	Residential	Moderate surface erosion and direct flow to lake		install series of check dams; seed and mulch	Medium	Medium	Low
16R	1 #11	Residential	Bare soil with lack of buffer at shoreline; moderate surface erosion	20 x 50	buffer below deck to water; mulch under deck; install dry wells, 1 by new deck walkway and the other at front left corner.	Medium	Medium	Low
17R	1 #13	Residential	Lack of buffer at shoreline with moderate surface erosion	50 x 50	Establish buffer ; seed and mulch; define path for foot traffic with infiltration steps	Low	Medium	Medium
18R	1 #12	Residential	Shoreline erosion with severe surface erosion; failed retaining wall	10 x 40	Replace failed retaining wall and install erosion controls; install dripline trench	High	High	High
19R	1 #13a	Residential	Side house-roof runoff; baresoil; lack of buffer at shoreline with moderate surface erosion	40 x 10	Install stone filled dripline trench and drywell at gutter downspout; establish buffer and install runoff diverters	Low	Low	Low
20R	1 #18	Residential	Baresoil/fields with slight surface erosion with direct flow to lake	35 X 12	install stone filled dripline trench; establish buffer; seed and mulch	Low	Low	Low
21R	5 #2	Residential	Unstable stream-ditch bank with moderate surface erosion	3 x 15	Reshape and armor ditch with stone or curlex; seed and mulch	Medium	Medium	Low



Map ID	Sector & Site #	Land Use	Type of problem	Area Affected	Recommendations	Impact of Problems	Technical Level to Install	Cost
22R	5 #5	Residential	Moderate surface erosion	5 x 10	Plant trees and shrubs	Low	Low	Low
23R	5 #4	Residential	Moderate to severe surface erosion with direct flow to stream	90 x 5	Establish buffer; seed and mulch	Low	Low	Low
26R	5 #7	Residential	Roof runoff; slight surface erosion with bare soil	500 sq.ft.	Install stone filled dripline trench; establish buffer; seed and mulch	Low	Low	Low
27R	5 #9	Residential	Slight surface erosion	80 x 45	Establish buffer; seed and mulch and armor side ditches with stone	Low	Low	Low
28R	5 #10	Residential	Roof runoff; bare soil with moderate surface erosion	120 x 20	Install drywell at gutter down spout; seed and mulch; install stone filled dripline trench	Low	Low	Low
29R	5 #18	Residential	Bare soil with slight surface erosion	40 x 10	Plant trees and shrubs on bank; mulch; define path for foot traffic and install waterbar	Low	Low	Low
30R	5 #16	Residential	Lack of buffer with moderate surface erosion at shoreline; driveway has moderate surface erosion	140 x 30 60 x 12	Establish buffer; seed and mulch; no raking; install rubber razor blade in driveway and mulch high use areas	Medium	Low	Low
31R	5 #15	Residential	Lack of buffer with moderate surface erosion	5 x 4	turnout before driveway, plant bearberry and fragrant sumac	Low	Low	Low
32R	5 #14	Residential	Slight surface erosion	20 x 10	install end of driveway barrier/waterbar; remove berm	Low	Low	Low
33R	5 #13	Residential	Shoreline erosion; lack of buffer	80 x 5	Establish and extend buffer; install riprap; possible no mow zone	Low	Low	Low
34R	5 #21	Residential	Lack of buffer with severe surface erosion may be due to natural spring	10 x 10	add water loving plants to suck up water. Gullied area seems like poor access to lake. Change foot traffic area	Low	Low	Low
35R	5 #25	Residential	Bare soil; lack of buffer and shoreline erosion	8 x 5	Extend buffer, establish new slope and define path for foot traffic	Low	Low	Low
36R	5 #26	Residential	Roof runoff with shoreline erosion under stairs; lack of buffer with moderate surface erosion	65 x 6	Establish new slope; mulch; no raking; hand place riprap under stairs and define path for foot traffic	Medium	Low	Low
37R	5 #28	Residential	Lack of buffer with slight surface erosion; odd crib wall behind beach has washed out	15 x 15	Establish buffer; remove sand; remove crib wall and establish vegetation on bank of intermittent stream	Low	Low	Low
38R	5 #32	Residential	Roof runoff with slight surface erosion	35 x 100	Establish buffer; install drywell at gutter spout	Low	Medium	Medium
39R	5 #33	Residential	Bare soil; Lack of buffer with slight surface erosion	50 x 15	Establish buffer and mulch play area; define path for foot traffic; need to determine	Low	Low	Low
40R	5 #33a	Residential	Bare soil with direct flow to lake	50 x 30	Establish buffer; seed mulch; no raking; define path for foot traffic	Medium	Low	Low
41R	4 #24	Residential	Roof runoff; lack of buffer	3 x 65	Extend buffer, mulching on high use areas; build up road and install stone filled dripline trench	Low	Low	Medium
41R	5 #34	Residential	Bare soil with shoreline erosion and slight surface erosion	40 x 15	replace landscape timbers; establish buffer and seed and mulch	Low	Low	Low

Map ID	Sector & Site #	Land Use	Type of problem	Area Affected	Recommendations	Impact of Problems	Technical Level to Install	Cost
43R	4 #20a	Residential	Roof runoff with slight surface erosion	5 x 26 5 x 30	Intall stonefilled dripline trench; establish buffer; define path for foot traffic	Low	Low	Low
44R	4 #7	Residential	Lack of buffer with slight surface erosion		Establish buffer and no raking	Low	Low	Low
45R	4 #8	Residential	Roof runoff with shoreline erosion; lack of buffer at shoreline with moderate surface erosion	20 x 20	Install drywell at gutter spout; add new surface material; establish buffer and seed and mulch	Low	Low	Low
46R	4 #9	Residential	Roof runoff with baresoil; lack of buffer and moderate surface erosion	65 x 3	Establish buffer; install stone filled dripline trench and drywell at gutter spout; no raking; define path for foot traffic	Medium	Low	Low
47R	4 #10	Residential	Roof runoff with baresoil; lack of buffer	1 x 20	Establish buffer and install dry well at gutter down spout	Low	Low	Low
48R	4 #11a	Residential	Roof runoff with slight surface erosion and lack of buffer	80 x 8	Establish buffer; mulch, define path for foot traffic; install waterbar and install stone filled dripline trench	Low	Low	Low
49R	4 #12	Residential	Unstable beach access with slight surface erosion and lack of buffer; unstable culvert	6 x 1	Armor culvert inlet/outlet with stone; establish buffer	Low	Low	Low
50R	4 #13a	Residential	Bare soil with direct flow to lake		Extend buffer; no raking; seed and mulch	Medium	Low	Low
51R	4 #14	Residential	Bare soil and stockpiled soil on construction site	20 x 20	install erosion controls (construction finished)	Low	Low	Low
52R	4 #16	Residential	Roof runoff; bare soil; shoreline erosion; lack of buffer with slight surface erosion	60 x 100	Install drywell at gutter spout at base of garage; no raking; establish buffer; seed and mulch	Medium	Low	Low
53R	4 #17	Residential	Roof runoff with moderate surface erosion	45 x 10	Establish buffer; mulch; no raking; define path for foot traffic and install stone filled dripline trench	Low	Low	Low
54R	3 #10	Residential	Compacted bare soil and lack of shoreline buffer	30 x 10	Establish buffer; mulch and define path for foot traffic	Low	Low	Low
55R	3 #6	Residential	Bare soil with moderate surface erosion	71 x 32	Plant trees and shrubs and terrace	Low	Low	Low
56R	3 #9	Residential	Bare soil with lack of buffer at shoreline	100 X 40	Establish buffer; seed mulch; no raking define path for foot traffic	Low	Low	Low
57R	3 #5	Residential	bare soil with slight surface erosion with direct flow to lake	15' x 35'	Establish buffer and seed mulch	Low	Low	Low
58R	3 #3a	Residential	Bare soil and unstable contruction site	40 x 10	Install erosion controls; seed and mulch	Low	Low	Low
59R	3 #2	Residential	Bare soil on banking with direct flow to lake	39 x 12	Seed and mulch	Low	Low	Low

# Next Steps ~ Where Do We Go From Here?

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

## Individual Citizens

- Prevent runoff from washing sediment into the lakes. Detain runoff in depressions or divert flow to vegetated areas. Call the Cumberland County SWCD or DEP for free technical assistance.
- Minimize the amount of cleared land and road surfaces on your property.
- Stop mowing and raking, and let lawn and raked areas revert back to natural plants. Deep shrub and tree roots help hold the shoreline.
- Avoid exposing bare soil. Seed and mulch bare areas.
- Don't bring in sand or rebuild beaches without permits and technical assistance.
- Call the Town Code Enforcement Officer before cutting vegetation within 250' of the shore.
- 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.

## Forest Lake Association

- Develop an active membership, help implement the Forest Lake Management Plan and provide educational materials and guidance to members of the Forest Lake watershed community.
- 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.

## Road Associations (or private roads without associations)

- Minimize road runoff by doing regular, comprehensive maintenance. Form a road association if one does not already exist.
- Get a copy of "Camp Road Maintenance Manual – A Guide for Landowners." This reference is a must for anyone managing a gravel road. (Call the DEP at 822-6300 to order a free copy.)
- For more extensive problems, seek free technical help. Contact the Cumberland County SWCD or DEP to request technical assistance and inquire about the free Loan of the Frontrunner Program.

## Municipal Officials

- Enforce shoreland zoning ordinance to assure full protection of Forest Lake.
- Conduct regular maintenance on town roads in the watershed.
- Participate in and support the implementation of the Forest Lake Watershed Management plan.
- Promote training for road crews, planning boards and conservation commissions.

## After the Watershed Survey Action Plan



Forest Lake Association in conjunction with Cumberland County Soil & Water Conservation District will pursue grant funding for a Phased Implementation Project that will consists of on-the-ground fixes, community workshops and education.

<b>Tasks:</b>	<b>Who</b>	<b>When</b>
1. Apply for MDEP 319 grant funding	CCSWCD	5/03
2. Present recommendations for BMP's to watershed municipalities.	CCSWCD	9/03
3. Work with Forest Lake Association and Steering Committee to develop BMP education program for citizens and municipalities in the Watershed.	CCSWCD & FLA	9/03
4. Incorporate the Community Watershed Forum outcomes into the Management Plan.	CCSWCD & FLA	9/03



Key: CCSWCD = Cumberland County Soil & Water Conservation District  
 FLA = Forest Lake Association

# Permitting ABC's

Protection of the Forest Lake Watershed is ensured through the good will of residents around the lakes and through laws and ordinances created and enforced by the State and Towns.

## How do you know when you need a permit?

- Construction, clearing of vegetation and soil movement within 250 feet of the lake shore falls under the Shoreland Zoning Act, which is administered by the Towns through the Code Enforcement Officer and the Planning Board.
- Soil disturbance within 75 feet of waterbodies also falls under the Natural Resources Protection Act, which is administered by the DEP.

To ensure that permits for projects that will not result in significant disturbance are processed swiftly, the DEP has established a streamlined permit process called **Permit by Rule**. These one page forms (shown below) are simple to fill out and allow the DEP to quickly review the project.

The Natural Resources Protection Act seeks to establish reasonable regulation in order to assure responsible development that does not harm Maine's precious natural systems.

~from Protecting Maine's Natural Resources~Volume 1, DEP 1996

The project partners encourage you to contact the DEP and Town Code Enforcement Officer if you have any plans to construct 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—such as installing some of the practices mentioned in this report—contact the DEP and Town to be sure. See last page for contact information.

6/99

DEPARTMENT OF ENVIRONMENTAL PROTECTION (DEP)  
PERMIT BY RULE NOTIFICATION FORM  
(For use with DEP Regulation, Chapter 305)

PLEASE TYPE OR PRINT IN BLACK INK ONLY (3 COPIES, PLEASE BEAR DOWN)

Name of Applicant: <i>Lumberland County SWCD</i>	Name of Owner: <i>Norm &amp; Michelle Groleau</i>
Mailing Address: <i>381 Main St Suite 3</i>	Town/City: <i>Yorkham</i>
State: <i>Maine</i>	Zip Code: <i>04038</i>
Daytime Telephone No: (Include area code)	<i>207 831-7839</i>
Name of Wetland, Water Body or Stream: <i>Subsidiary Lake</i>	
Detailed Directions to Site: <i>121 Outlet Road, Rte. 26 North, turn right onto Outlet Road. 121 Outlet Road is on the left 440 to 5 houses before you reach Barefoot Beach.</i>	
Town/City: <i>New Gloucester</i>	Map #: <i></i>
Lot #: <i></i>	County: <i></i>
Description of Project: <i>Installation of a drywell to allow infiltration of roof runoff.</i>	
Part of a larger project?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>

(CHECK ONE) This project: ☐ does not ☒ involve work below mean low water.

I am filing notice of my intent to carry out work which meets the requirements for Permit by Rule (PBR) under DEP Regulation, Chapter 305. I have a copy of PBR Sections checked below. I have read and will comply with all of the standards.

<input checked="" type="checkbox"/> Sec. (2) Soil Disturbance	<input type="checkbox"/> Sec. (9) Utility Crossing	<input type="checkbox"/> Sec. (14) Piers, Wharves & Fillings
<input type="checkbox"/> Sec. (3) Intake Pipes	<input type="checkbox"/> Sec. (10) Stream Crossing	<input type="checkbox"/> Sec. (15) Public Boat Ramps
<input type="checkbox"/> Sec. (4) Replacement of Structures	<input type="checkbox"/> Sec. (11) State Transportation Facilities	<input type="checkbox"/> Sec. (16) Coastal Sand Dune Projects
<input type="checkbox"/> Sec. (5) REPEALED	<input type="checkbox"/> Sec. (12) Restoration of Natural Areas	<input type="checkbox"/> Sec. (17) Transfers/Permit Extension
<input type="checkbox"/> Sec. (6) Movement of Rocks or Vegetation	<input type="checkbox"/> Sec. (13) FSW Creation/Enhance/Water Quality Improvement	<input type="checkbox"/> Sec. (18) Maintenance Dredging
<input type="checkbox"/> Sec. (7) Outfall Pipes		

I authorize staff of the Departments of Environmental Protection, Inland Fisheries & Wildlife, and Marine Resources to access the project site for the purpose of determining compliance with the rules. I also understand that this permit is not valid until approved by the Department or 14 days after receipt by the Department, whichever is less.

I have attached all of the following required submittals. NOTIFICATION FORMS CANNOT BE ACCEPTED WITHOUT THE NECESSARY ATTACHMENTS:

- ☐ Attach a check for \$50 (non-refundable) made payable to: "Treasurer, State of Maine".
- ☐ Attach a U.S.G.S. top map or Maine Atlas & Gazetteer map with the project site clearly marked.
- ☐ Attach photographs showing existing site conditions (unless not required under standards).

Signature of Applicant: *[Signature]* Date: *7/28/00*

Keep the bottom copy as a record of permit. Send the form with attachments via certified mail to the Maine Dept. of Environmental Protection at the appropriate regional office listed below. The DEP will send a copy to the Town Office as evidence of the DEP's receipt of notification. No further authorization by DEP will be issued after receipt of notice. Permits are valid for two years. Work carried out in violation of any standard is subject to enforcement action.

AUGUSTA DEP STATE HOUSE STATION 17 AUGUSTA, ME 04333-0017 (207)587-5111	PORTLAND DEP 312 CANCO ROAD PORTLAND, ME 04103 (207)522-6300	BANGOR DEP 106 HOGAN ROAD BANGOR, ME 04401 (207)841-4670	PRESQUE ISLE DEP 1235 CENTRAL DRIVE PRESQUE ISLE, ME 04769 (207)768-0477
--	---	---	---

OFFICE USE ONLY	CLK	Staff	Staff	After
PBR #	FP	Date	Acc. Date	Out. Date

DEPLN-27-999

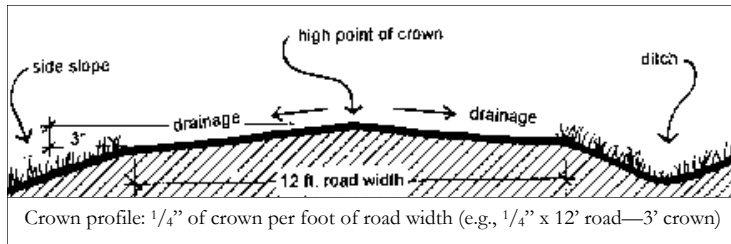
## How to apply for Permit by Rule with DEP:

1. Fill out a notification form. Forms are available from your town code enforcement officer or the Maine DEP offices in Portland or Augusta.
2. Permit by Rule requires that you follow certain standards such as installing silt fence. It is important that you obtain a copy of the standards so you will be familiar with the law's requirements.

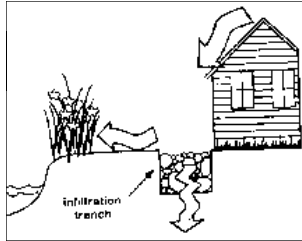
The permit will be reviewed within 14 days. If you do not hear from DEP within 14 days, you can assume your permit is valid. If you bring the permit directly to a DEP office, you may be able to get your permit approved immediately.



# Glossary of Common Conservation Measures

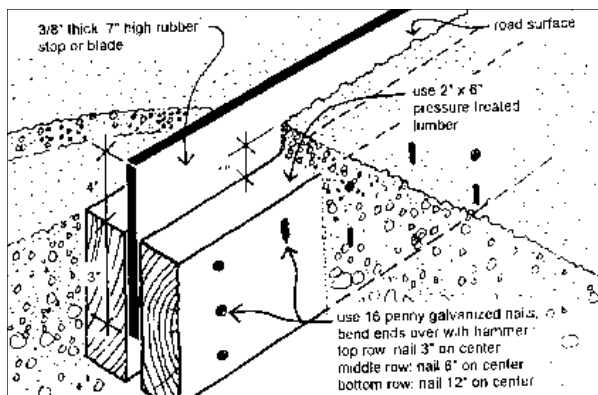
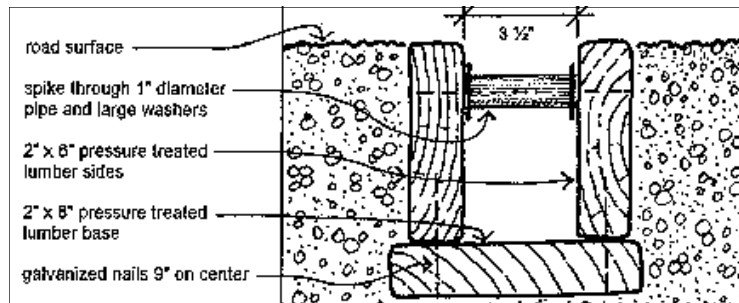


**Crown**—High point that runs lengthwise along the center of a road or driveway. The high point slopes gently away from the center toward the outer edge of the road, allowing water to drain off the road and preventing erosion of the road surface.



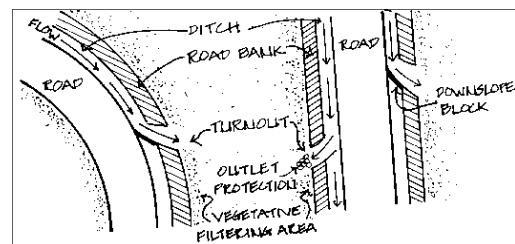
**Dripline Trench**—Rock-filled trench beneath the roof edge dripline that collects and stores roof runoff until it soaks into the ground. Helps control erosion and reduce wear on the house by preventing backsplash. A typical trench is 6-8" deep and 12-18" wide and filled with  $\frac{3}{4}$ " stone. Can also be used along the edges of driveways to encourage infiltration of runoff.

**Open Top Culvert**—Box-like structure that collects and diverts road surface runoff away from a sloped driveway or camp road. They are seldom recommended for year-round roads due to the likelihood of plow damage. Install at a 30° angle to the road and direct the outlet into a stable buffer. Clean out leaves and debris periodically.



**Rubber Bar**—Structure that protrudes above the road surface high enough to intercept and collect water, while allowing traffic to pass over it. It is generally used on seasonal roads and driveways because of the likelihood of plow damage. Install at a 30° angle to the road and direct the outlet into a stable buffer. The rubber conveyor belts can be purchased at some hardware stores or Augusta Rubber (582-6200).

**Turnout**—A conservation practice used to direct runoff from a ditch (or road ruts) into a vegetated buffer. The turnout should have a flared end section that is level and lined with rock to spread out the flow.



**Waterbar**—Ridge (like a speed bump) that runs diagonally across a road, driveway or path, typically at a 30° angle. Stops water from running down the road and diverts it to the side. Easy to construct and most appropriate for roads with low traffic volume. Needs to be rebuilt periodically.

# Where Do I Get More Information?

## Contacts

### **Cumberland County Soil and Water Conservation District**

201 Main Street, Suite 6  
Westbrook, Maine 04092  
(207) 856-2777

Offers assistance with watershed planning and survey work, 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  
Toll Free (888) 769-1036 or (207) 822-6300

17 State House Station, Augusta, ME 04333  
Toll Free (800) 452-1942 or (207) 287-7688

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

## Publications

---

Androscoggin Valley SWCD and Lake and Watershed Resources Management Associates. 1998. *The Buffer Handbook: A Guide to Creating Vegetated Buffers for Lakefront Properties*. 20 pgs. plus inserts.

Kennebec County SWCD and Maine DEP. June, 2000. *Camp Road Maintenance Manual: A Guide for Landowners*. 54 pgs.

Maine DEP. December, 1997. *A Homeowner's Guide to Environmental Laws Affecting Shorefront Property in Maine's Organized Towns*. DEPLW-38-B98. 28 pgs.

Maine DEP. 1999. *Maine Shoreland Zoning—A Handbook for Shoreland Owners*. DEPLW 1999-2. 34 pgs.

University of Maine Cooperative Extension. *Gardening to Conserve Maine's Native Landscape: Plants to Use and to Avoid*. Bulletin #2500. June, 1999. Folded leaflet.

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