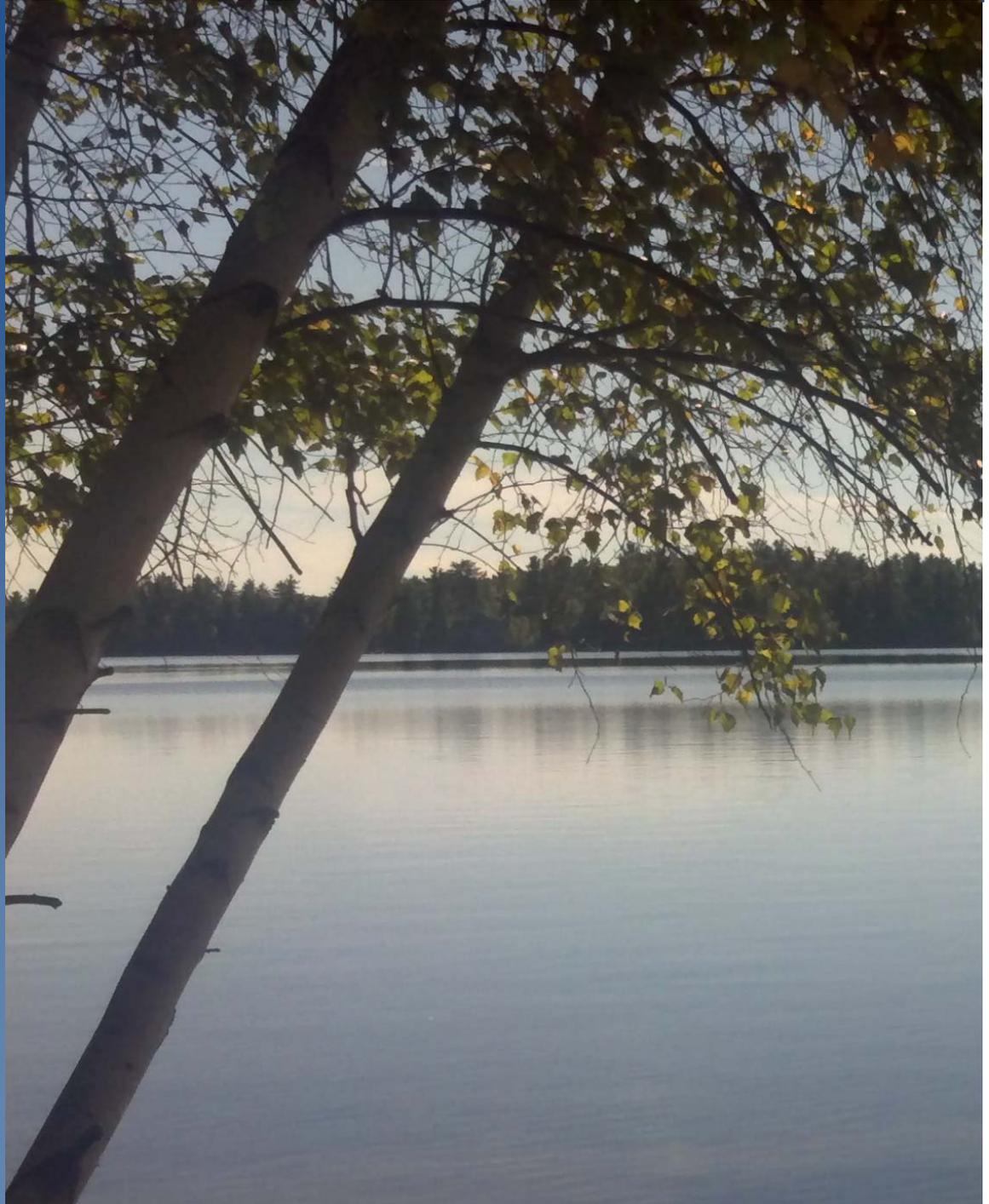


WATERSHED PROTECTION PLAN

# FOREST LAKE



Cumberland County Soil & Water Conservation District

Prepared by CCSWCD for the  
Forest Lake Association  
April 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 ten years (2018 to 2028). 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 and of the lake and west side of the upper watershed. On the eastern side of the lake, the watershed includes one mile of the Maine Turnpike and a rest area.

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:

- 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

All projects, with the exception of the 2017 Forest Lake Watershed Survey, were funded in part by the United States Environmental Protection Agency with Clean Water Act Section 319(h) grants. Maine Department of Environmental Protection administered the grants and provided technical assistance on the projects.

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

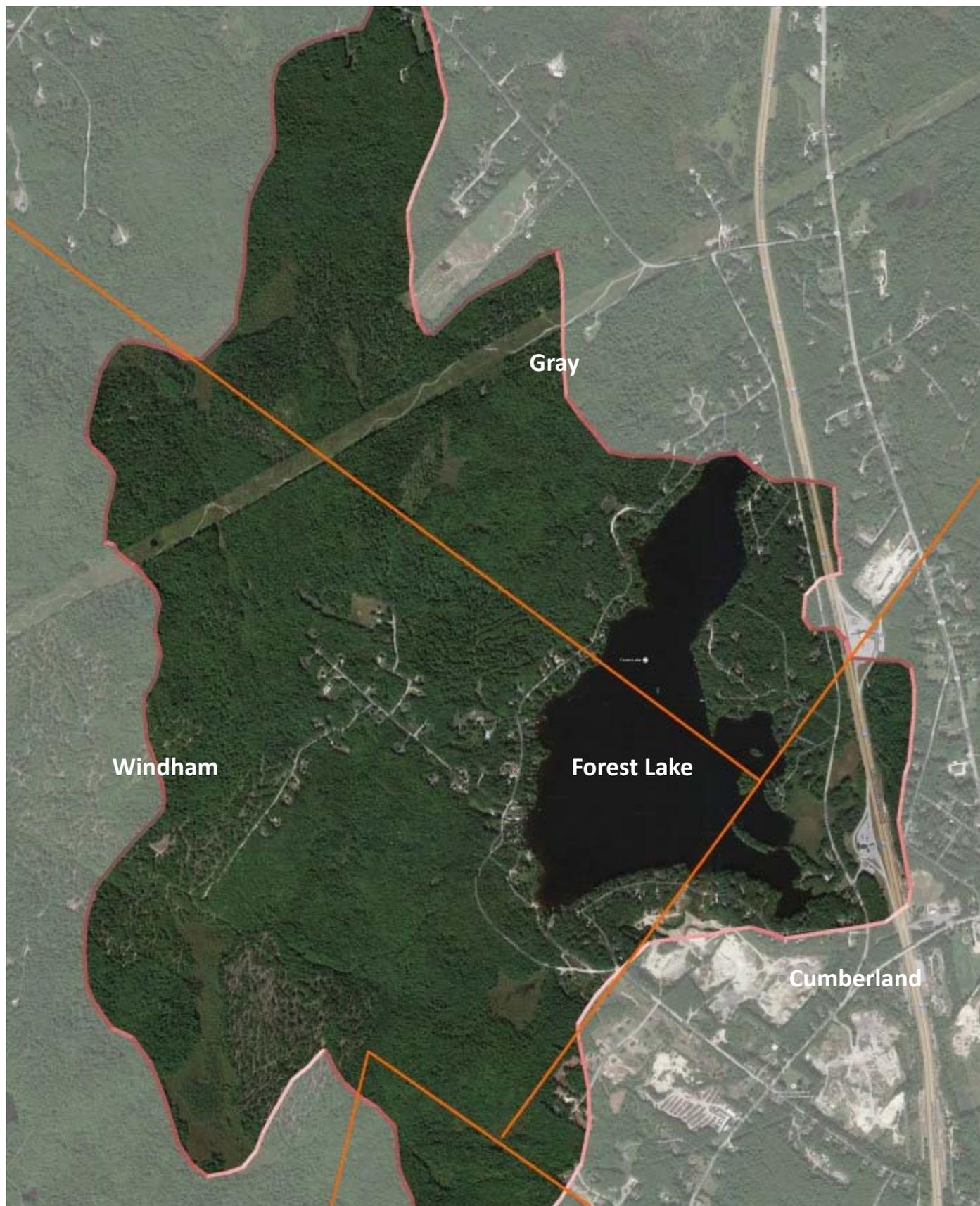
Water quality monitoring has occurred on Forest Lake

<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)



# Forest Lake Watershed



**Figure 1:** Forest Lake Watershed

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. The lake has moderate dissolved oxygen depletion in the deep areas of the lake in late summer<sup>2</sup>.

## B. Threatened Status

Forest Lake currently meets its designated Class GPA standards. However, the watershed is listed as a threatened waterbody on DEP's list of *Nonpoint Source Priority Watersheds*. It is listed primarily due to being considered sensitive to additional inputs of phosphorous<sup>3</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>4</sup>. 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.

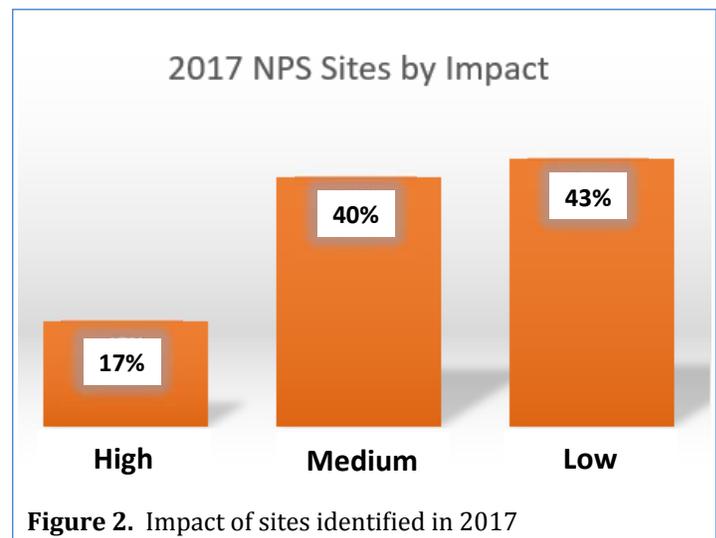
In 2002, the entire watershed was surveyed for sources of NPS pollution / polluted runoff into Forest Lake. A total of 112 NPS sites were identified. The greatest number of sites were identified on residential properties (61), which accounted for about 55% of sites documented. The next most documented 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

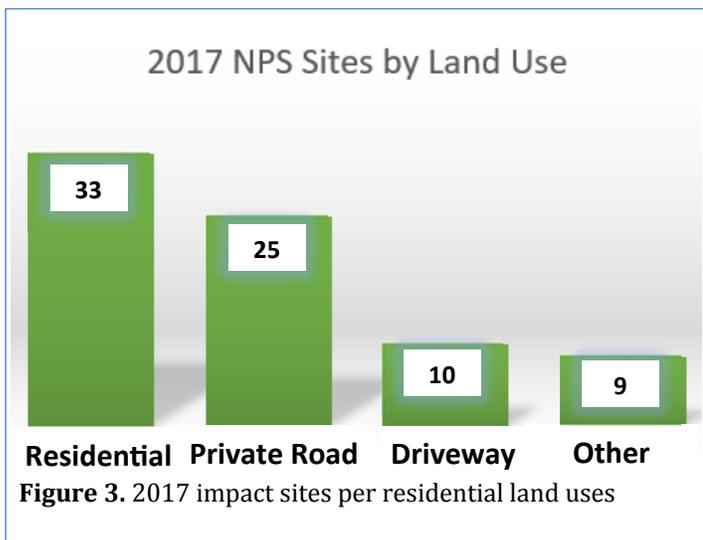


with private roads. The greatest changes from the 2002 survey are the decrease in number of sites associated with residential properties, which decreased by 28, and driveways, which decreased by 9. The 25 private road sites identified in 2017 was consistent with the number identified in 2002.

<sup>3</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>4</sup> [www.maine.gov/dep/land/stormwater/storm.html](http://www.maine.gov/dep/land/stormwater/storm.html)





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**).

### 3. Watershed Plan Goals and Objectives

The overall goal of this Plan is to maintain Class GPA

**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%
<b>TOTALS</b>	<b>13</b>	<b>31</b>	<b>33</b>	<b>77</b>	<b>100%</b>

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 ten years (2018-2028):

- **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 ten 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

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>5</sup>

Activity	Management	Schedule	Cost Estimates	Potential Resources
<i>Reduce current sources of phosphorus loading</i>				
Notify landowners of observed sites needing to be addressed and provide guidance on solutions/ where to obtain solutions	Forest Lake Association (FLA)	2019-2028	\$2,500 in-kind or fee-for-service	FLA; Cumberland County Soil & Water Conservation District (CCSWCD)
Sites addressed based on FLA notification and guidance	Landowners	2019-2028	\$4,500	Landowners
Determine sites eligible for 319 grant cost sharing: Comparison of 2017 sites to sites previously addressed through 319 program	FLA	Winter/ Spring 2018	\$500 in-kind	FLA
Apply for EPA 319 watershed implementation grant funds (Phase III) through MDEP to address 25 impact sites identified in the 2017 watershed survey (approximately 1/3 of sites identified)	CCSWCD	Spring 2018	\$3,500 plus \$1,000 in-kind	CCSWCD, watershed towns, FLA
If funded, conduct a Phase III 319 watershed implementation project targeting 25 of the highest impact sites (primarily residential) 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 a potential Phase III 319 watershed implementation project, establish a yearly residential cost share program to provide landowners with up to \$300 matching grants to address erosion issues (At least 2-3 sites per year)	CCSWCD / FLA	2019-2028	\$30,000 grant, \$20,000 in-kind/ cost share	EPA and DEP 319 grant program, non-federal match from watershed towns and landowners
Apply for EPA 319 watershed implementation grant funds (Phase IV) through MDEP to address 25 impact sites identified in the 2017 watershed survey (approximately 1/3 of sites identified)	CCSWCD	Spring 2021	\$3,500 plus \$1,000 in-kind	CCSWCD, watershed towns, FLA
If funded, conduct a Phase IV 319 watershed implementation project targeting 25 of the highest remaining impact sites identified in the 2017 watershed survey	CCSWCD	January 2022 - December 2023	\$90,000 grant; \$60,000 in-kind/ cost share	EPA and DEP 319 grant program and local match
<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)	FLA and CCSWCD; Potentially EPA and DEP 319 grant program
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)	watershed towns, FLA
Reach out to private road associations to promote road maintenance	FLA	Yearly starting in spring 2018	\$1,000 in-kind	FLA
Provide technical assistance and summarize road problems and BMP recommendations in 5-year Private Road Operation and Maintenance Reports	CCSWCD	Yearly starting in 2019	\$10,000 (Approx. \$2,500 per road / up to four road reports)	Private road associations and watershed towns; Potentially EPA and DEP 319 grant program

<sup>5</sup>With the exception of CCSWCD, resources may be able to provide monetary and/or in-kind support.

Table 2 continued on next page



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

Activity	Management	Schedule	Cost Estimates	Potential Resources
Conduct presentations at FLA Annual Meetings to promote lake protection and residential BMPs; Highlight opportunities available through potential 319 watershed implementation grants	CCSWCD	Yearly/Summer	\$700 fee-for-service/grant, \$500 matching funds	Local match from watershed towns and FLA; Potentially EPA and DEP 319 grant program
Submit press releases to local papers to promote lake protection and highlight opportunities available through potential 319 watershed implementation grant	CCSWCD	Yearly/Spring	\$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 (Phase III) and 2023 (Phase IV)	\$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	FLA; Potentially through EPA and DEP 319 grant program
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	FLA; Potentially through EPA and DEP 319 grant program
Solicit local business support of FLA and its endeavors	FLA and CCSWCD	2019-2020	\$2,500 plus \$2,500 in-kind	FLA; Potentially through EPA and DEP 319 grant program
Create and install water signage to unify community and encourage FLA membership	FLA and CCSWCD	2019-2020	\$2,000 plus \$2,000 in-kind	FLA; Potentially through EPA and DEP 319 grant program
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	Yearly	\$2,500 in-kind	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
- Review local town ordinances of the three watershed municipalities to reduce phosphorous loading
- Establish NPS committee, meet up to three times per year
- Create NPS Site Tracker

**2019**

- Address up to 10 NPS abatement sites through a potential Phase III 319 grant project
- Establish yearly residential cost share program to address erosion issues
- Devise incentives plan for new members to join FLA and increase outreach efforts to encourage community participation and FLA membership
- Review local town ordinances of the three watershed municipalities to reduce phosphorous loading
- 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

**2020**

- Address up to 15 NPS abatement sites through a potential Phase III 319 grant project
- Conduct yearly residential cost share program to address erosion issues
- Devise incentives plan for new members to join FLA and increase outreach efforts to encourage community participation and FLA membership
- Update and install new water signage to unify community and encourage FLA membership
- Review local town ordinances of the three watershed municipalities to reduce phosphorous loading
- 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
- Create summary of sites addressed through potential Phase III implementation grant project

**2021**

- Apply for Phase IV EPA Section 319 Clean Water Act implementation grant through MDEP to address eligible sites
- If funding allows, continue conducting yearly residential cost share program to address erosion issues at a minimum of 2-3 properties per year

**2022**

- Address up to 10 NPS abatement sites through a potential Phase IV 319 grant project
- Conduct yearly residential cost share program to address erosion issues
- Submit press releases to promote lake protection and highlight cost share opportunities
- Conduct residential BMP presentation at yearly lake association meeting and highlight cost share opportunities

**2023**

- Address up to 15 NPS abatement sites through a potential Phase IV 319 grant project
- Conduct yearly residential cost share program to address erosion issues
- Submit press releases to promote lake protection and highlight cost share opportunities
- Conduct residential BMP presentation at yearly lake association meeting and highlight cost share opportunities
- Create summary of sites addressed through potential Phase IV implementation grant project

Table 3 continued on next page



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

2024-2028
<ul style="list-style-type: none"> <li>• If funding allows, continue conducting yearly residential cost share program to address erosion issues at a minimum of 2-3 properties per year</li> <li>• 5-year check-in: Strategize methods for long-term lake protection based; Create addendum to add to this watershed protection plan</li> <li>• In 2027 and 2028, pursue updating this watershed protection plan for the next 10-years</li> </ul>
Ongoing/Yearly
<ul style="list-style-type: none"> <li>• Distribute FLA newsletter promoting phosphorous reduction methods and to recruit new members, volunteers, and funding for FLA</li> <li>• Conduct presentations to Towns of Cumberland, Gray, and Windham on lake water quality trends, opportunities, and recommendations to reduce negative lake water quality impacts</li> <li>• Promote road maintenance to private road associations</li> <li>• Provide 5-year Private Road Operation and Maintenance Plans</li> <li>• Conduct two to three NPS committee meetings per year</li> <li>• Conduct annual lake association meeting to educate and recruit members</li> <li>• Conduct water quality monitoring</li> <li>• Update NPS Site Tracker as sites are addressed</li> </ul>

*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 trying to continue offering matching grant funds once the 319 implementation grant project has been completed through possible funding from FLA.
- FLA will distribute yearly newsletters and hold a yearly annual lake association meeting to promote phosphorous reduction methods on residential sites.
- Presentations on residential BMPs to occur at yearly annual lake association meetings.
- 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>6</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).
- Technical assistance to be offered to private roads by CCSWCD on a fee-for-service basis. Potential 319 implementation grants may be able to provide up to 50% matching funds to address the highest priority erosion issues.
- Private road technical assistance, and operation and maintenance reports, which summarize erosion problems and recommendations, will be offered to private road associations by CCSWCD for a fee. Potential 319 implementation grants may be able to provide private roads with cost reductions of these services.

## 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)

## 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

<sup>6</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)



- 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.
- Technical assistance to be offered to landowners by CCSWCD on a fee-for-service basis. Potential 319 implementation grants may be able to provide up to 50% matching funds to address the highest priority erosion issues.
- 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

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

This Plan aims to these remaining water quality impact sites in the following manner, based on the availability of federal, state, and local funding and resources:

- FLA will notify landowners whose properties were identified in the 2017 NPS watershed survey of findings and basic corrective actions.
- Technical assistance to be offered to landowners by CCSWCD on a fee-for-service basis. Potential 319 implementation grants may be able to provide up to 50% matching funds to address the highest priority erosion issues.

## 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 5-10 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

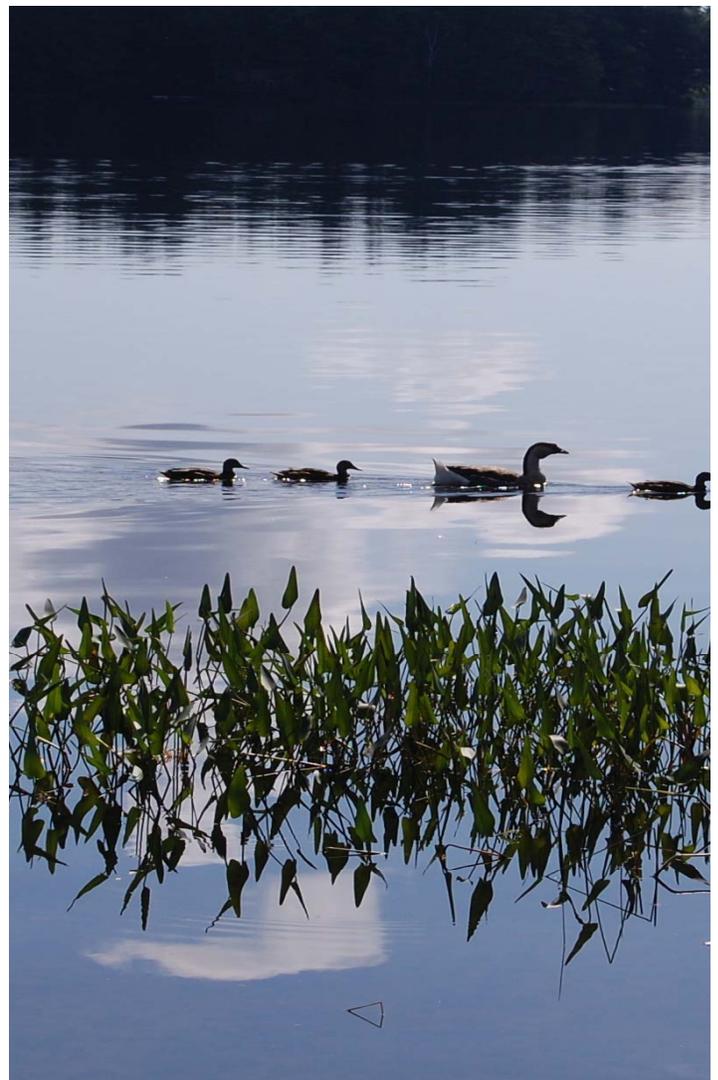
Throughout the 10-year duration of this Plan, water quality testing will be performed by Volunteer Lake Monitors under the guidance and collaboration of Maine's Volunteer Lake Monitoring Program (VLMP) and DEP. Readings on water clarity and dissolved oxygen will be taken by FLA volunteers at two-week intervals through the spring, summer, and fall months.

MDEP also conducts baseline monitoring on Forest Lake every five years and collects data on SDT, temperature, dissolved oxygen, chlorophyll a and other parameters.

MDEP conducts Secchi disk trend analysis every two years as part of their Integrated Water Quality Monitoring and Assessment report. Trend reporting (positive, negative or stable) will assist in determining whether the plan meets its goal of having stable or improving water quality over time.

## 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.





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