MESSALONSKEE LAKE

(SNOW POND)

OAKLAND, BELGRADE, & SIDNEY, MAINE

WATERSHED-BASED PROTECTION PLAN

(2022-2032)

Friends of Messalonskee

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1. BACKGROUND

1.1 Document Scope and Purpose

The purpose of this Watershed-Based Protection Plan, herein referred to as the "Plan" or "WBPP", is to outline a strategy and schedule for nonpoint source (NPS) pollution mitigation and water quality protection efforts for the Messalonskee Lake watershed over the next 10 years (2022-2032). Ecological Instincts prepared the plan with assistance and input from Maine Department of Environmental Protection (MDEP), Friends of Messalonskee (FOM), 7 Lakes Alliance, and United States Environmental Protection Agency (EPA).

The plan was developed to satisfy national watershed planning guidelines provided by the EPA. EPA requires *nine-element* plans for impaired watersheds but allows *alternative* plans in several cases including for protection of high quality or unimpaired waters. MDEP accepts alternative plans for unimpaired lakes that have completed a recent watershed survey provided that the plans follow EPA and MDEP guidance and include minimum planning elements. Messalonskee Lake meets these eligibility criteria, and the plan was written to include the EPA and MDEP required planning elements (sections 2 through 6 in the plan cover EPA's five elements for alternative watershed-based plans).

Information collected during the 2021 Messalonskee Lake Watershed Survey establishes a baseline of watershed conditions, and a starting point for plan development. A copy of the watershed survey report is provided in Appendix D.

1.2 Watershed Background

Messalonskee Lake (aka Snow Pond) (MIDAS 5280) is a 3,691-acre[1], dimictic[2], mesotrophic[3] lake located in Kennebec County, in the central Maine towns of Belgrade, Sidney, and Oakland in the southeast region of the larger Belgrade Lakes watershed (Figure 1). Messalonskee Lake is the last lake in the chain of seven Belgrade Lakes. It is the second largest behind Great Pond, and the deepest lake in the Belgrade region, reaching 113 ft at its maximum depth at sampling station 1, yet only averaging 31 ft.

Much of the water that enters Messalonskee Lake comes from the watersheds of the upstream lakes via Belgrade Stream which connects the south basin of Long Pond with Messalonskee Lake. Other inflows into Messalonskee Lake include a number of smaller perennial and intermittent streams feeding either Belgrade Stream, or the lake itself. Messalonskee Lake has a flushing rate of 1.59 flushes/yr. Water level in Messalonskee Lake is controlled by two dams in the watershed including the Wings Mills/Belgrade Stream Dam located approximately two miles downstream of Long Pond

[1] LakesofMaine.org reports two different surface areas: 3,505 acres and 3,691 acres. The larger surface area matches GIS calculations completed by Ecological Instincts in 2022.

[2] Dimictic refers to a lake that turns over twice each year (spring and fall).

[3] Mesotrophic lakes have moderate levels of nutrients and average water quality. They fall somewhere between low nutrient (oligotrophic) lakes and high nutrient (eutrophic) lakes.

adjacent to Wings Mills Rd. in Mt. Vernon. The second dam is located at Messalonskee Lake's outlet at the north end of the lake. Water flows over this dam into Messalonskee Stream, which flows into the Kennebec River and eventually into the Gulf of Maine.

Figure 1. *Map of the Messalonskee Lake watershed.*

Messalonskee Lake's direct watershed covers 44 square miles in seven municipalities including a large portion of Belgrade Stream and developed land on the west shore in Belgrade (40%), a large portion of the east shore in Sidney (28%), and the less developed southern portion of the watershed in the towns of Readfield (9%), Manchester (9%), and Mount Vernon (7%). Oakland (8%) encompasses the more developed north end of the watershed. A very small sliver of the watershed is located near Summerhaven Rd. in Augusta (<1%).

Messalonskee Lake contains areas of dense residential development as well as areas of commercial development along the shoreline, especially on the north end of the lake in Oakland. A study conducted by Colby College in 1997 estimated that more than three quarters of the shoreline lots were developed, and a large percentage (74%) of the developed lots were used year-round.[4] Recent estimates indicate that there are a total of 650 shoreline properties on Messalonskee Lake and Belgrade Stream, with approximately 600 properties located on the lake itself.[5]

The lake is surrounded by a vast network of state, town, and private roads, as well as a privately-owned railroad that runs along the entire west side of the lake near the shoreline. Major roads include Oakland Rd./Belgrade Rd. (Rt. 8/11) on the west and northwest side of the lake, Snow Pond Rd. (Rt 23) which runs along the east side of the lake, Augusta Rd. (Rt. 27) on the south end of the lake crossing over Belgrade Stream near Hammond Lumber, and Manchester Rd. (Rt. 135) which runs south from Rt. 27

[4] Land Use Patterns in Relation to Lake Water Quality in the Messalonskee Lake, North Basin Watershed (1997), Department of Biology, Colby College.

[5] Personal communication, Kathy Moore (FOM). Email, February 3, 2022.

through Belgrade and Manchester. Numerous private gravel roads run perpendicular from these state roads to service shoreline development.

Due to the lake's close proximity to the cities of Augusta and Waterville, the lake and its surrounding watershed are used extensively for swimming, fishing, and boating as well as bird watching and hiking in the summer, and ice fishing, skiing, and snowmobiling in the winter. The lake contains three islands (Blake, Midway, and Greely). Four state-owned boat launches provide access to the lake, one in Oakland at the lake's northern end, one off Hosta Lane in Sidney on the eastern shore, and the third, which is carry-in only, off Rt. 27 in Belgrade at the south end of the lake at the Belgrade Stream inlet. A fourth state-owned boat launch provides access on Belgrade Stream in Mount Vernon. Land cover in the watershed is dominated by forestland (51%), including mixed forest (31%), deciduous forest (11%) and evergreen forest (9%) (Appendix A, Map 1). Open water (including the surface area of Messalonskee Lake) makes up 13% of the total watershed area. Agricultural land (row crops, grazing and hayfields) is estimated to make up another 7% of the land area. Including town and state roads located throughout the upper watershed, there are an estimated 125 miles of roads in the watershed.

Soils in the Messalonskee Lake watershed are dominated by fine sandy loams derived from coarse-loamy lodgement till. Soils formed in lodgement till are mostly characterized as moderately drained to well-drained. Soils formed in glaciolacustrine deposits, glaciofluvial deposits, and glaciomarine deposits make up a smaller percentage of soils in the watershed and are primarily located on the south end of the watershed near Belgrade Stream (Appendix A, Map 2).

There are over 800 acres of conserved lands in the watershed, including two Wildlife Management Areas (WMA), four state boat launches, municipal lands, and parcels and preserves managed by 7 Lakes Alliance (aka BRCA) (Appendix A, Map 3). Large undeveloped habitat blocks cover 17,778 acres, or 63% of the watershed (Appendix A, Map 4). These large undeveloped areas benefit wildlife by providing extensive habitat areas and help protect water quality by reducing impervious surfaces and bare soil in the watershed.

The Messalonskee Lake watershed contains a wealth of water resources including 3,730 acres of lakes and ponds, 79 miles of perennial and intermittent streams, 3,796 acres of freshwater wetlands, and 4,497 acres of riparian habitat[6] (Appendix A, Map 5). The largest wetland in the watershed, Messalonskee Lake Marsh, surrounds the outlet of Belgrade stream at the south end of the lake and includes nearly 1,300 acres of significant inland waterfowl and wading bird habitat (IWWH). It is the largest nesting site in Maine for the black tern (*Chlidonias niger*) and hosts other rare and uncommon species including the least bittern (*Ixobrychus exilis*), American Coot (*Fulica americana*), and the scarlet bluet (*Enallagma pictum*).

Messalonskee Lake's cool, deep water has historically supported a healthy and diverse coldwater fishery. Maine Department of Inland Fisheries and Wildlife reports 21 species of fish in Messalonskee

[6] Riparian habitat was calculated using GIS as the land within 250 ft. of lakes, ponds, and wetlands >10 acres, as well as land within 75 ft. of all streams and wetlands <10 acres.

Lake including coldwater fish. A decline in available oxygen in the deep water areas of the lake and an increase in predatory fish including northern pike (*Esox lucius*), white perch (*Morne americana*), and chain pickerel (*Esox niger*), which are not all native to Messalonskee Lake, along with a lack of a good forage base for salmon has resulted in a decline in the salmon fishery over several decades.[7]

Variable-leaf watermilfoil (*Myriophyllum heterophyullum*) is an invasive aquatic plant that was first documented in Messalonskee Lake in 1998 and confirmed in Messalonskee Stream in 2004. It has also been identified in Belgrade Stream and in the boat channel from the landing to the open lake, causing the boat launch to be closed to trailered boats.[8] Friends of Messalonskee (FOM) has worked closely with the MDEP through their Lake Milfoil Control Program since 2012 (see below).

1.3 Summary of Past Watershed Protection Work

The FOM and its partners including watershed towns, 7 Lakes Alliance, and landowners have already been taking steps to protect the water quality of Messalonskee Lake. A summary of these activities is provided below:

- **Clean Water Act Section 319 funds-** In 2001 the Belgrade Regional Conservation Alliance (BRCA) received $54,423 in US EPA 319 funding for the "Messalonskee Lake and Long Pond Watershed Survey and Management Plan Development Project" (#2001R-08). The project funded a watershed survey and developed a watershed plan and was completed in 2004.

  From 2004-2007, a Phase I US EPA 319 implementation grant supported seven town and camp road construction projects, eight vegetated buffer plantings, and thirteen riprap installation projects on Messalonskee Lake. Technical assistance was provided to more than 40 property owners and camp road associations. These projects are estimated to have resulted in a reduction of 2.2 pounds of phosphorus loading annually.

  The 7 Lakes Alliance Youth Conservation Corps (YCC) assisted landowners with eight vegetated buffer plantings and 13 rip-rap installation projects on Messalonskee Lake between 2004 – 2007 as a part of CWA 319-funded watershed projects. Between 1996 and 2021, 266 Best Management Practices (BMPs) were installed in the watershed of Messalonskee Lake, averaging 10 BMPs/yr.

- **Maine Stream Habitat Surveys-** In 2014, the Maine Department of Marine Resources Maine Coastal Program conducted stream habitat surveys across the state of Maine, identifying priority

[7] McNeish, D., ed. 1997. Sport Fisheries of the Belgrade Lakes. Maine Department of Inland Fisheries and Wildlife, Augusta, ME, USA, In: Problems in Environmental Science course (Biology 493), Colby College and Colby Environmental Assessment Team, Colby College, "Land Use Patterns in Relation to Lake Water Quality in the Messalonskee Lake Watershed" (1997). Colby College Watershed Study: Other Area Studies. https://digitalcommons.colby.edu/otherlakes/2

[8] Maine DEP. (2010). *Infestations of Invasive Aquatic Plants and Animals: Maine* [Excel spreadsheet] Available online: (http://www.gulfofmaine.org/kb/files/9030/InvasiveAquaticPlants_Animals.xls): Augusta, Maine

fish habitat and potential barriers. The survey found 41 potential barriers to fish passage in the Messalonskee Lake watershed.[9]

- **NPS Watershed Survey (2021)-** A locally-funded watershed survey was conducted in the fall of 2021 to assess sources of nonpoint source (NPS) pollution on developed land in the watershed. The survey identified 247 sites. Follow-up work is needed to mitigate these sites.
- **LakeSmart-** In response to documented changes in water quality in Messalonskee Lake, FOM started a LakeSmart program in 2019. Since inception, 10 shorefront properties have been evaluated and three LakeSmart awards have been distributed.
- **Milfoil Control-** Since 2012, FOM has had an active Milfoil Control program, working closely with MDEP to control and eradicate variable-leaf milfoil. FOM employs suction harvesting, lays burlap and plastic benthic barriers, conducts annual surveys, and coordinates a Courtesy Boat Inspection (CBI) program to prevent further infestations of aquatic invasive plants.
- **Water Quality Monitoring-** FOM, in collaboration with MDEP, Lake Stewards of Maine (LSM), 7 Lakes Alliance, and Colby College collect ongoing water quality data in the lake. Annual updates are provided to FOM by 7 Lakes Alliance regarding short- and long-term changes in water quality.

2. IDENTIFICATION OF THE CAUSES OR SOURCES OF THE NPS THREAT

2.1 Water Quality Summary

Water quality data has been collected in Messalonskee Lake since 1970 by MDEP and the LSM/Volunteer Lake Monitoring Program. The majority of the data has been collected at Station 1 at the deepest point in the lake (Appendix A, Map 6), with 43 total years of data collected. A total of 19 years of data have been collected at Station 2, the second deepest point in the lake, beginning in 1991. Since 2015, 7 Lakes and Colby College have collected regular Secchi disk transparency (SDT) and total phosphorus (TP) data at both Station 1 and Station 2.

The three primary parameters that indicate lake productivity (trophic state) include SDT, Chlorophyll a (Chl-a), and total phosphorus (TP). SDT has ranged from 3.5 - 7.5 m with an average of 5.3 m. Chl-a has ranged from 2.5 - 6.0 ppb with an average of 6.1 ppb, and TP in the epilimnion has ranged from 7 - 17 ppb annually with an average of 11 ppb.

Water quality in Messalonskee Lake is considered average based a recent condition analysis for Maine lakes and is classified as mesotrophic based on SDT and TP measurements.

2.2 Threatened Status

Messalonskee Lake currently meets state water quality standards. However, it is listed as **threatened on MDEP's Nonpoint Source (NPS) Priority Watersheds List** because it is on the DEP's watch list, and because its sediment chemistry makes it susceptible to phosphorus release from the sediments.

[9] https://webapps2.cgis-solutions.com/MaineStreamViewer/

Messalonskee Lake is also a **lake "most at risk from new development"** under DEP's Chapter 502 Stormwater Law. Upstream East Pond, Great Pond, and Long Pond are all listed as impaired on the NPS priority lakes list, while Salmon Lake and McGrath Pond are listed as threatened. All of the lakes in the Belgrade Lakes chain are sensitive to increases in NPS pollution. As the final lake in the chain, Messalonskee Lake could potentially be affected by water quality changes in upstream lakes, along with changes in land use in its own watershed, and internal phosphorus loading from the sediments.

2.3 Watershed NPS Threats

Phosphorus is a naturally occurring element that provides food for algae and other aquatic plants. Phosphorus is found in soils, septic waste, animal waste, and fertilizers. Under natural conditions, phosphorus is limited in freshwater systems, which helps limit algae growth. However, when a lake receives extra phosphorus, algae growth can increase dramatically. Sometimes this growth causes choking blooms, but more often it results in small changes in water quality that, over time, damage the ecology, aesthetics and economy of our lakes.

The biggest current threat to Messalonskee Lake is phosphorus enrichment due to polluted runoff (aka NPS pollution) from developed land including roads and boat access areas, shoreline development, and agriculture. Aging septic systems can also be a source of phosphorus. The 2021 watershed survey documented NPS pollution a total of 247 sites across 13 different land-use types (Table 1).

Table 1. *Total number of NPS sites by land use and impact in the Messalonskee Lake watershed.*

Land Use	High Impact	Medium Impact	Low Impact	Total # of Sites	% of Total
Residential	4	47	76	127	51%
Driveway	4	22	9	35	14%
Private Road	7	20	6	33	13%
Town Road	3	8	5	16	6%
Boat Access	0	6	2	8	3%
State Road	0	4	3	7	3%
Other	2	4	0	6	2%
Commercial	1	3	0	4	2%
Trail or Path	1	1	2	4	2%
Construction Site	0	1	1	2	1%
Logging	0	2	0	2	1%
Municipal / Public	0	2	0	2	1%
Beach Access	1	0	0	1	0%
Total	**23**	**120**	**104**	**247**	**100%**

The greatest number of sites were documented on residential properties (127 sites), closely followed by driveways (35 sites). Most sites were located directly around the shoreline of Messalonskee Lake. A majority of the recorded sites were in Oakland (39% of sites) at the highly developed north end of the

lake. Almost half of the sites ranked medium impact (49%), while 42% ranked low impact, and only 9% ranked high impact. A majority of high-impact sites were located on private roads, and a majority of low-impact sites were located on residential properties (Figure 2).

Potential solutions, rough estimates for the cost of labor and materials for improving the sites, the overall impact to water quality, and the level of technical assistance needed to complete the recommendations were determined in the field for each site. Survey results were summarized in a watershed survey report (Appendix D).[10]

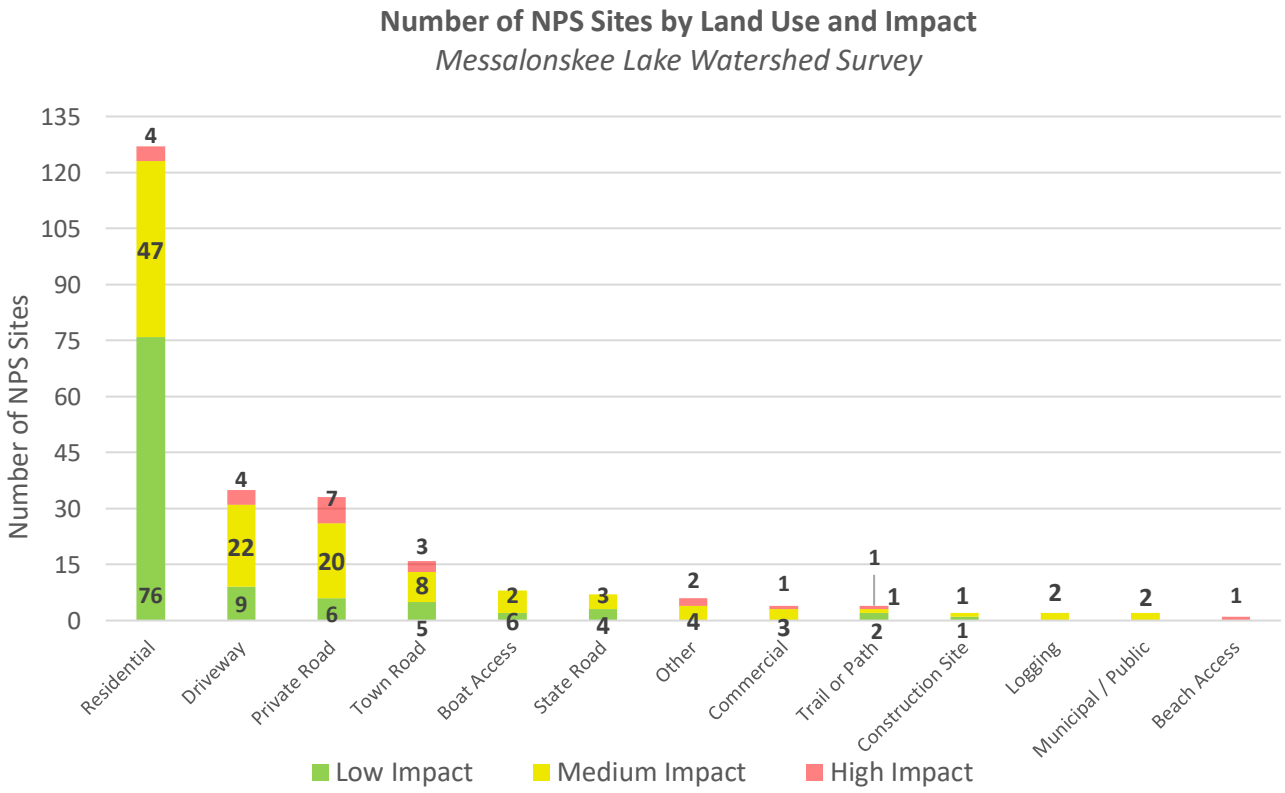


Figure 2. *Number of NPS sites by land use and impact in the Messalonskee Lake watershed.*

3. WATERSHED PROTECTION PLAN GOALS AND OBJECTIVES

The overall goal of the Messalonskee Lake WBPP is to protect and improve Class GPA water quality standards in Messalonskee Lake by preventing phosphorus, sediment, and other pollutants from entering the lake. This will be achieved through the following objectives over the next ten years (2022-2032).

1. **Reduce current sources of NPS** by addressing **156 total sites: 66 residential, 20 driveway, 25 private road, 16 town road, 7 state road, 6 boat access, 3 commercial, and 13 other sites** identified in the watershed survey report and preventing runoff from agriculture and forestry. This will be achieved through targeted outreach, coordination with project partners, technical

[10] *Messalonskee Lake Watershed Survey Report*. Prepared for Friends of Messalonskee by Ecological Instincts, January 2022.

assistance including through the YCC, and cost-sharing assistance to property owners for installing conservation practices.

2. **Prevent new sources of NPS pollution** by protecting undeveloped land, providing training to municipal officials regarding road maintenance, identifying at-risk septic systems, and coordinating with project partners to provide technical assistance.
3. **Review ordinances** that protect Messalonskee Lake by convening annual meetings with town code enforcement officers and reviewing current ordinances and proposed development projects.
4. **Build local capacity** for watershed stewardship by regularly updating town officials at town planning board and selectmen's meetings, recruiting volunteers for monitoring and buffer planting projects, and acquiring funding to support plan implementation.
5. **Conduct long-term monitoring and assessment** of lake and watershed conditions by recruiting new volunteer lake monitors, conducting baseline in-lake monitoring, stream monitoring at targeted tributaries, watershed assessments, invasive aquatic species monitoring, and developing and maintaining the NPS Site Tracker.

4. SCHEDULE & MILESTONES TO GUIDE PLAN IMPLEMENTATION

4.1 Action Plan & Schedule

Action items, an estimated schedule, and milestones were developed to prevent new NPS problems and address existing NPS sites with the highest impact and phosphorus loading to Messalonskee Lake. The number and types of sites targeted in the plan was based on local knowledge about potential funding sources, landowner cooperation, and other considerations. Other actions in the plan were included because they have proven to be cost effective and successful in the region. The plan is designed to be implemented over a 10-year period (2022-2032) which includes an estimated schedule for each action (Table 2 and Table 3). The plan will be carried out, in large part, with local funding and resources. However, state and federal funding will also be sought to help implement some actions in the plan. The steering committee should meet annually to review and update the plan.

Table 2. *Messalonskee Lake Implementation Schedule.*

Year(s)	Actions
2022 *Year 1*	• Set up a meeting with the watershed towns to review survey results and discuss next steps • Identify areas of the watershed for land conservation • Develop a detailed funding plan to support watershed planning activities • Apply for state and federal grants to help fund a first phase of improvement projects • Distribute post-survey landowner letters to all landowners with a documented NPS site • Prepare a press release about the WBPP and present the WBPP at a public meeting • Host a buffer workshop to teach residents to install their own effective shoreline buffers • Prepare and distribute a targeted buffer plant mailing for shoreline landowners • Develop a stream monitoring plan at targeted sites on tributaries to Messalonskee Lake • Conduct a shoreline "house count" to track long-term changes and inform septic estimates • Set up an NPS site tracker
2023-2024 *Years 2 - 3*	• Review shoreland zoning ordinances and assess the need for other improvements • Develop a septic system database to track age and condition of systems • Organize a gravel road workshop for road associations and town road crews • Implement BMPs at 39 NPS sites throughout the watershed • Collect additional stream data at targeted stream sites including Belgrade Stream (TP, DO, temp, conductivity, turbidity, flow, etc.) • Conduct a stream crossing assessment • Assess impact on water quality from town sand & salt storage areas
2025-2027 *Years 4 - 6*	• Protect sensitive headwater and shoreline parcels around the Messalonskee Lake watershed • Apply for state, federal or private foundation grants that support planning recommendations • Review NPS Site Tracker and determine which sites need follow-up/implementation • Implement BMPs at 57 NPS sites throughout the watershed • Conduct a septic system vulnerability analysis to identify "at-risk" septic systems in the watershed and follow-up with a targeted septic system mailing • Revisit watershed survey sites and identify any new NPS inputs
2028-2032 *Years 7 - 10*	• Apply for state, federal, or private foundation grants that support planning recommendations • Review and update funding plan • Organize a gravel road workshop for road associations and town road crews • Implement BMPs at 57 NPS sites throughout the watershed

Table 3. *Messalonskee Lake Watershed Action Plan (2022 - 2032).*

Action Plan & Milestones		Schedule	Who	Potential Funding Sources
A. Address Current Sources of NPS Pollution in the Watershed				
Address NPS on Residential Properties (Total Sites = 127 sites, 10-Yr Goal = 66 sites)				
A1	Address 100% of high-impact residential sites identified during the 2021 watershed survey (4 sites)	Years 1 - 5	Landowners, 7 Lakes Alliance YCC	Private, Grants
A2	Address 50% of medium-impact residential sites identified during the 2021 watershed survey (24 sites)	Years 1 - 10	Landowners, 7 Lakes Alliance YCC	Private, Grants
A3	Provide education and technical assistance to help landowners address 50% of low-impact residential sites (38 sites)	Years 1 - 10	FOM, 7 Lakes Alliance YCC	FOM
Address NPS on Driveways (Total Sites = 35 sites, 10-Yr Goal = 20 sites)				
A4	Implement BMPs on 100% of the high-impact driveway sites (4 sites)	Years 1 - 10	Landowners, 7 Lakes Alliance YCC	Private, Grants
A5	Implement BMPs on 50% of the medium-impact driveway sites (11 sites)	Years 1 - 10	Landowners, 7 Lakes Alliance YCC	Private, Grants
A6	Implement BMPs on 50% of the low-impact driveway sites (5 sites)	Years 1 - 10	Landowners, 7 Lakes Alliance YCC	Private, Grants
Address NPS on Private Roads (Total Sites = 33 sites, Goal = 25 sites)				
A7	Implement BMPs on 100% of high-impact private road sites (7 sites)	Years 1 - 10	Landowners, Road Associations	EPA (319) Grants, Foundation Grants
A8	Implement BMPs on 75% of all medium-impact private road sites (10 sites)	Years 1 - 10	Landowners, Road Associations	EPA (319) , Foundation Grants
A9	Implement BMPs on 50% of all low-impact private road sites (3 sites)	Years 5 - 10	Landowners, Road Associations	EPA (319) , Foundation Grants
Address NPS Sites on Town Roads (Total Sites = 16 sites, 10-Yr Goal =16 sites)				
A10	Set up a meeting with the watershed towns to review survey results & discuss next steps	Year 1	FOM, Steering Committee, Watershed Towns, 7 Lakes Alliance	n/a
A11	Implement BMPs on 100% of high-impact town road sites (3 sites)	Years 2 - 7	Watershed Towns	(EPA 319) , Foundation Grants

Action Plan & Milestones		**Schedule**	**Who**	**Potential Funding Sources**
A12	Implement BMPs on 100% of all medium-impact town road sites (8 sites)	Years 2-10	Watershed Towns	EPA (319) , Foundation Grants
A13	Implement BMPs on 100% of all low-impact town road sites (5 sites)	Years 1 - 5	Watershed Towns	EPA (319), Foundation Grants
Address NPS on Boat Access Sites (Total Sites = 8 sites, 10-Yr Goal = 6 sites)				
A14	Address erosion at 75% of all medium and low-impact boat access sites (6 sites)	Years 1-10	Landowners	Private, Grants
Address State Road NPS Sites (Total Sites = 7, 10-Yr Goal = 7 sites)				
A15	Address 100% of all medium and low-impact state road sites (7 sites)	Years 1 - 10	Maine DOT	Maine DOT, EPA (319)
Address NPS on Commercial Sites (Total Sites = 4, 10-Yr Goal = 3 sites)				
A16	Address erosion at 75% of high and medium-impact commercial sites (3 sites)	Years 1-10	Landowners	Private, Grants
Address NPS on Sites with Other Land-Use Types (Total Sites = 17 sites, 10-Yr Goal = 13 sites)				
A17	Return to two construction sites documented in the watershed survey to assess installed BMPs	Year 1	FOM, 7 Lakes Alliance	n/a
A18	Address 75% of all medium-impact "other sites" including 2 municipal/public sites and 6 other medium-impact sites	Years 1-10	Town of Oakland (municipal sites), Landowners	EPA (319) , Foundation Grants
A19	Address 100% of all other high-impact sites (4 sites)	Years 1 - 5	Landowners	EPA (319)
Prevent Runoff from Agriculture & Forestry				
A20	Identify agricultural & forestry landowners/producers in the watershed and develop an outreach strategy for connecting with landowners	Years 1 - 2	KCSWCD, USDA/NRCS, Steering Committee	n/a
A21	Offer agricultural producers financial incentives through USDA/NRCS to implement Best Management Practices	Years 1 - 10	USDA/NRCS	USDA/NRCS
B. Prevent New Sources of NPS Pollution				
Protect Undeveloped Land				
B1	Identify areas of the watershed for land conservation for water quality protection and wildlife habitat	Years 1 - 3	FOM, Towns, 7 Lakes Alliance	Land trusts, grants

Action Plan & Milestones		Schedule	Who	Potential Funding Sources
B2	Protect sensitive headwater and shoreline parcels around the Messalonskee Lake watershed identified through B1 (above)	Years 4 - 10	FOM, Towns, Landowners, 7 Lakes Alliance	Land & Water Conservation Fund, Maine Land Protection Grant, Land for Maine's Future, The Conservation Fund, MNRCP
Provide Training on Road Maintenance & Repair				
B3	Provide training to town road crews on proper use of erosion and sediment control BMPs for roadways	Annually	Watershed Towns, MDEP, KCSWCD	Towns, MDOT Local Roads Program
B4	Organize a gravel road workshop for road associations and town road crews	Years 2, 4, 6, 8	KCSWCD, FOM, DEP, 7 Lakes Alliance, LSM	Towns, FOM, Road Associations, Grants
B5	Work with towns to identify and implement Best Practices for winter sand and salt application in sensitive riparian areas	Year 1 & Ongoing	Watershed Towns, FOM	Towns
Conduct Regular Road Maintenance				
B6	Review annual town road maintenance schedule	Year 1 - 3	Watershed Towns	Towns
B7	Clean out ditches/culverts as needed following heavy storm events on private and town roads	Year 1 & Ongoing	Watershed Towns, Road Associations, Landowners	Towns, Road Associations, Landowners
B8	Conduct annual inspections at stream crossings and address problems (clean out/repair/replace culverts)	Year 1 & Ongoing	Watershed Towns, Road Associations	Towns, Road Associations
B9	Clean up excess winter sand each spring	Annually	Watershed Towns	Towns
Identify At-Risk Septic Systems				
B10	Conduct a septic system vulnerability analysis to identify "at-risk" septic systems in the watershed and follow-up with a targeted septic system mailing for developed "at-risk" properties within 150 ft of Messalonskee Lake and 75 ft of tributary streams	Year 4 - 5	FOM, Consultant	FOM, Grants
C. Educate Watershed Residents about Water Quality & Shoreland Zoning				
C1	Distribute post-survey landowner letters and summary handout to all landowners with a documented NPS site	Year 1	FOM, Consultant	FOM
C2	Post watershed survey results on partner websites	Year 1	FOM, Watershed Towns, KCSWCD, 7 Lakes Alliance	n/a
C3	Prepare and submit a press release following approval of the WBPP	Year 1	FOM, Consultant	FOM

Action Plan & Milestones		Schedule	Who	Potential Funding Sources
C4	Present the WBPP at a public meeting, such as town selectboard meeting	Year 1	FOM, Consultant	FOM
C5	Prepare and distribute a targeted buffer plant mailing for shoreline landowners	Years 1 - 3	FOM	FOM, Grants
C6	Design and host a buffer workshop to teach residents to install their own effective shoreline buffers	Year 1	FOM LakeSmart, 7 Lakes Alliance	FOM, EPA (319)
C7	Provide watershed project updates in town and lake association newsletters and other social media outlets	Ongoing	Watershed Towns, FOM, 7 Lakes Alliance	Watershed Towns, FOM, 7 Lakes Alliance
C8	Organize an Earth Day roadside clean-up event	Year 2 & Ongoing	FOM	FOM
C9	Encourage shoreline landowners to participate in the LakeSmart program (Goal= 120 new evaluations or 12 property evaluations/year)	Years 1 - 10	FOM, 7 Lakes Alliance	FOM, 7 Lakes
C10	Send a survey to landowners with an NPS site from the 2021 watershed survey to document number of sites complete and need for additional technical assistance	Year 5	FOM, 7 Lakes Alliance	FOM
C11	Design and implement a YardScaping education program to educate watershed residents about proper use of fertilizers and pesticides	Ongoing	FOM LakeSmart, Watershed Towns	FOM, Watershed Towns
D. Review and Enforce Ordinances that Protect Messalonskee Lake				
D1	Work with towns to ensure that all pending development projects are copied to the Steering Committee or FOM for review	Year 1 & Ongoing	Watershed Towns, FOM, Steering Committee	n/a
D2	Convene an annual meeting between FOM and Code Enforcement Officer to discuss changes to codes and watershed updates	Year 1 & Ongoing	Watershed CEO's, FOM	n/a
D3	Review shoreland zoning ordinances and assess the need for other improvements	Years 3 - 5	FOM, Watershed Towns, KVCOG	Watershed Towns
E. Build Local Capacity to Raise Awareness about Water Quality to Fund NPS Projects				
Build Watershed Capacity				
E1	Attend regular Planning Board/Selectmen meetings to update the towns about watershed projects	Ongoing	Steering Committee/ FOM	n/a
E2	Recruit volunteers to assist with local buffer planting projects, and water quality monitoring	Year 1 & Ongoing	Steering Committee/ FOM, 7 Lakes/YCC	n/a

Action Plan & Milestones		Schedule	Who	Potential Funding Sources
Acquire Funding to Support NPS Projects				
E3	Meet at least once/year to discuss action items and goals within the Watershed Protection Plan and adjust plan as needed	Years 1 - 10	Steering Committee	n/a
E4	Develop a detailed funding plan to support watershed planning activities	Year 1 - 2	Steering Committee, Consultant	Steering Committee/Lake Association
E5	Research potential grants that support watershed plan implementation (US EPA 319 Grant, MDEP Road Funding, Municipal Stream Crossing Grant, GOPIF, foundation grants, other)	Years 1 - 2	Steering Committee, Watershed Towns, Consultants	Towns, FOM
E6	Apply for US EPA 319 grant funds to implement the plan (Goal- four phases of grants)	Year 1, 4, 7, 10	FOM, 7 Lakes Alliance	FOM
F. Conduct Long-Term Monitoring & Assessment				
In-Lake Monitoring				
F1	Recruit and train new volunteers to become LSM certified for water clarity (May-September); train volunteers using DASH boat to collect SDT readings	Years 1 - 2 & Ongoing	Steering Committee, LSM volunteers, FOM, 7 Lakes Alliance	n/a
F2	Collect bi-monthly in-lake water quality data in Messalonskee Lake (SDT, DO, Temp, TP and Chl-a) (April-October)	Annually	LSM Volunteers, 7 Lakes Alliance, Colby College	FOM, Watershed Towns
F3	Continue tracking annual ice in and ice out	Year 1 & Ongoing	FOM, 7 Lakes Alliance	n/a
Stream Monitoring				
F4	Develop a stream monitoring plan at targeted sites on tributaries to Messalonskee Lake	Year 1 - 3	7 Lakes Alliance, FOM	7 Lakes Alliance
F5	Collect additional stream data at targeted stream sites including Belgrade Stream (TP, DO, temp, conductivity, turbidity, flow, etc.)	Years 1-3	7 Lakes Alliance, FOM Volunteers	7 Lakes Alliance, FOM
Watershed Assessments				
F6	Conduct an updated "house count" of shoreline development to track long-term changes to the shoreline and inform septic estimates	Year 1	FOM volunteers, Towns	n/a
F7	Assess impact on water quality from town sand & salt storage areas	Years 2 - 4	FOM, Towns, Steering Committee	FOM

Action Plan & Milestones		**Schedule**	**Who**	**Potential Funding Sources**
F8	Assess the condition and adequate sizing of stream crossings in the watershed	Year 3	FOM, 7 Lakes Alliance, Colby, Consultant	Grants
F9	Develop a septic system database to track age and condition of systems	Years 3 - 4	FOM, watershed towns, Consultant	FOM, Grants
Invasive Species Monitoring & Removal				
F10	Continue training and certifying volunteers to identify invasive aquatic plants (annually)	Year 1 & Ongoing	FOM, IPP Volunteers	n/a
F11	Continue milfoil management efforts to eradicate milfoil from Belgrade Stream & Messalonskee Lake	Annually	FOM, DEP, 7 Lakes Alliance	FOM, Towns, Grants
NPS Site Tracker				
F12	Set up an NPS Site Tracker database & update annually by documenting and adding new NPS sites and tracking sites that have been completed	Year 1 & Ongoing	FOM, KCSWCD, Consultant	EPA (319)

4.2 Plan Oversight and Partner Roles

Friends of Messalonskee (FOM) will serve as the designated entity for overseeing plan implementation and plan updates and serve on the Steering Committee. FOM will provide match as available and seek funding from outside sources to conduct public outreach, increase FOM membership, work with 7 Lakes YCC program, and continue building the FOM LakeSmart program.

7 Lakes Alliance will assist with plan implementation by providing technical support and resources as requested and provide technical assistance to landowners through the YCC program as funds become available, assist FOM with grant applications, track projects through the NPS Site Tracker, and continue collection of in-lake and stream monitoring.

Kennebec County Soil & Water Conservation District (KCSWCD) may provide technical assistance, including engineering assistance for road projects and assistance with LakeSmart certifications.

Landowners & Private Road Associations will address NPS issues on their properties and provide a private source of matching funds.

Maine Department of Environmental Protection (MDEP) will provide the FOM, 7 Lakes, and watershed towns with ongoing guidance, technical assistance and resources, and the opportunity for financial assistance through the NPS grants program including the US EPA's 319 grant program.

Maine Department of Transportation (MDOT) will help address NPS sites on state roads in the watershed, conduct ongoing maintenance of road related infrastructure, and will be a valuable partner for acquiring matching funds for state road projects.

Maine Lakes will serve as a technical resource and provide support for the local LakeSmart program.

Messalonskee Lake Steering Committee will meet annually to review planning objectives and work together to seek funding to implement projects outlined in the action plan.

Lake Stewards of Maine (LSM) will provide initial and ongoing training for new and experienced water quality monitors.

Natural Resources Conservation Service (NRCS) will provide support to agricultural and forestry operators in the watershed for installing conservation practices that protect water quality.

Towns of Belgrade, Oakland, and Sidney may provide funding support for 7 Lakes water quality initiatives and FOM's courtesy boat inspection program and milfoil removal projects. These towns also play key roles in addressing NPS sites on town roads and provide training and education for municipal employees.

Towns of Mt. Vernon, Manchester, and Readfield play key roles in addressing NPS sites on town roads and provide training and education for municipal employees.

US Environmental Protection Agency (US EPA) will provide guidance on grant programs, particularly Clean Water Act section 319, workplan guidance, and selected project funding, pending acceptability of grant proposals, final workplans and availability of federal funds.

4.3 Plan Outputs and Milestones

1. Organizational Outputs

- Messalonskee Lake Watershed Steering Committee meets annually to update the plan
- FOM contacts all property owners with an NPS site identified in the watershed survey and follows-up with a survey in 5 years
- FOM applies for state and federal grants to implement NPS projects with support from 7 Lakes
- FOM's LakeSmart program is a catalyst for completing conservation practices at low-impact NPS sites
- 7 Lakes and FOM coordinate through the YCC program to offer landowners assistance with completing recommended conservation practices
- Watershed towns develop, review and/or update their annual road maintenance plans/schedules
- NPS Site Tracker created, maintained, and used to track projects

2. NPS Mitigation Outputs

- 100 NPS sites addressed by 7 Lakes YCC program
- 135 NPS sites addressed through cost-sharing grants
- 20 NPS sites addressed by landowners through private funding
- 120 new LakeSmart evaluations completed; 30 implemented

3. Water Quality Outcomes

- Messalonskee Lake continues to meet GPA water quality standards set by MDEP
- Stable or improved trend for water clarity (Secchi disk readings) over the next ten years
- Stable or decreasing total phosphorus levels over the next ten years (2022 – 2032)

5. PROPOSED MANAGEMENT MEASURES

The Messalonskee Lake Watershed Survey Report (Appendix D) lists specific management recommendations for the many NPS sites identified during the 2021 Messalonskee Lake Watershed Survey. Similarly, the report provides a more general list of recommendations for addressing the most common NPS problems. These recommendations can be found in online publications including these MDEP online publications:

- **Conservation Practices for Homeowners (24 fact sheets):**

http://www.maine.gov/dep/land/watershed/materials.html

- **Erosion & Sediment Control BMPs**
  http://www.maine.gov/dep/land/erosion/escbmps/index.html
- **Gravel Road Maintenance Manual: A Guide for Landowners on Camp and Other Roads:**
  http://www.maine.gov/dep/land/watershed/camp/road/gravel_road_manual.pdf
- **Maine Stormwater Best Management Practices Manual**
  http://www.maine.gov/dep/land/stormwater/stormwaterbmps/index.html
- **The Buffer Handbook:**
  http://www.maine.gov/dep/land/watershed/buffhandbook.pdf
- **The Buffer Handbook Plant List:**
  http://www.maine.gov/dep/land/watershed/buffer_plant_list.pdf
- **The Lake Library: Resources for Lake Protection**
  https://www.lakes.me/library
- **Messalonskee Lake Online Water Quality Data**
  https://www.lakesofmaine.org/lake-water-quality.html?m=5280
- **Volunteer Water Quality Monitoring Training & Certification Information**
  http://www.mainevlmp.org/volunteer-info/water-quality-monitors/training-certification/

5.1 Residential Sites

One hundred and twenty-seven residential sites were documented on the shores of Messalonskee Lake during the 2021 Watershed Survey. NPS problems were primarily associated with shoreline erosion and inadequate shoreline vegetation or unstable access to the shore, and unstable ditches draining to the lake.

Recommended solutions for residential NPS sites include:

- Stabilize footpaths
- Add infiltration steps
- Establish vegetated buffer
- Stabilize the shoreline using natural vegetation and other bioengineering principles where possible
- Armor unstable ditches with vegetation or stone

Maintenance for recommended solutions for residential NPS sites include:

- Water vegetation frequently during first year of growth, and replace dead/dying plants
- Reseed/over-seed bare soil and replenish erosion control mulch every 2 years or more frequently if needed (from plowing or high use)
- Clean out ditches regularly and stabilize as needed

This plan seeks to address **4 high, 24 medium, and 38 low-impact residential sites** over the course of the 10-year plan. The FOM LakeSmart program will provide technical resources and

incentives for making residential improvements in collaboration with 7 Lakes, the regional LakeSmart coordinator.

5.2 Driveway Sites

Thirty-five driveway sites were documented throughout the Messalonskee Lake watershed, with the majority of driveways associated with residential development on the shoreline. Four of these sites were ranked high impact, 22 were ranked medium impact, and 9 were ranked low impact.

Problems identified on these sites include:

- Surface erosion
- Shoulder erosion
- Ditch erosion
- Undersized culverts/broken culverts

Recommended solutions for these sites include:

- Reshape/crown and add gravel to driveways
- Install runoff diverters (broad-based dip or rubber razor)
- Establish vegetated buffer

Maintenance for recommended solutions for these sites includes:

- Re-establish and repair driveway surfaces and ditches following damage by snowplows each spring
- Check ditches and culverts after major storm events
- Remove clogs and debris from culverts annually and after storm events

This plan seeks to address **4 high impact, 11 medium impact, and 5 low-impact driveway sites by 2032.** This will require working cooperatively with landowners and helping to provide funding and incentives to support these projects.

5.3 Road Sites

Together, state roads (7 sites), town roads (16 sites), and private roads (33 sites) account for 22% of all NPS sites documented during the 2021 Messalonskee Lake watershed survey. Ten of these road sites were ranked high impact and should be prioritized for remediation in the near future.

Common problems identified on roads include:

- Surface erosion
- Shoulder erosion
- Ditch erosion
- Roadside plow/grader berm
- Undersized culverts/broken culverts
- Unstable culvert inlet/outlet

Recommended solutions for roads include:

- Clean up excess winter sand in the spring
- Reshape and line ditches with rock and vegetate for stability
- Replace failing culverts and stabilize culvert inlets/outlets with rip rap
- Add new surface materials to gravel roads and install runoff diverters and ditch turnouts
- Remove plow/grader berms
- Remove sediment from ditches

Maintenance for road sites includes:

- Re-establish and repair road shoulders and ditches following damage by snowplows each spring
- Check ditches and culverts after major storm events
- Remove clogs and debris from culverts annually and after storm events

This plan seeks to address **7 state road sites, 16 town road sites, and 25 private road sites by 2032.** This will require working with state and town officials, road associations, and private landowners, and seeking funding that supports road projects.

5.4 Boat Access Sites

Eight boat access sites were documented on the shoreline of Messalonskee Lake. Six of these sites were ranked medium impact, and two ranked low impact.

Problems identified on these sites include:

- Surface erosion due to bare soil
- Inadequate/lack of shoreline vegetation
- Unstable water access

Recommended solutions for these sites include:

- Reshape/crown and add gravel to access road
- Install runoff diverters (broad-based dip or rubber razor)
- Establish vegetated buffer
- Define/stabilize foot paths

This plan seeks to address **six boat access sites** over the course of the 10-year plan by collaborating with interested landowners.

5.5 Commercial Sites

Four commercial NPS sites were documented in the Messalonskee Lake watershed. One site was ranked high impact and the remaining three were medium impact.

Problems identified on these sites include:

- Surface erosion & bare soil
- Lack of shoreline vegetation
- Unstable water access

Recommended solutions for these sites include:

- Reshape/crown access roads
- Establish or add to vegetated buffers
- Define and stabilize footpaths
- Install runoff diverters

This plan seeks to address **three commercial sites** over the course of the 10-year plan by collaborating with interested landowners.

5.6 Other

Seventeen sites were documented across other land use types in the Messalonskee Lake watershed including beach access, municipal/public sites, construction sites, trails or paths, and logging.

Problems identified on these sites include:

- Surface erosion and bare soil
- Unstable culvert inlet/outlet
- Inadequate shoreline vegetation
- Roof runoff erosion

Recommended solutions for these sites include:

- Reshape/crown access roads
- Establish or add to vegetated buffers
- Define and stabilize footpaths
- Install runoff diverters

This plan seeks to address **thirteen sites across these other land-use types** over the course of the 10-year plan by collaborating with interested landowners.

6. POLLUTANT LOAD REDUCTION ESTIMATES

Pollutant load reductions will be estimated for completed NPS sites to help demonstrate phosphorus and sediment load reductions as result of BMP implementation and watershed planning in the Messalonskee Lake watershed. Pollutant loading reductions will be made using methods approved and recommended by MDEP and the US EPA and reported to MDEP for any work funded by US EPA 319 grants.

7. WATER QUALITY RESULTS MONITORING

Maine water quality criteria require that lakes and ponds have a stable or improving trophic state and be free of culturally induced algal blooms. FOM will continue work with project partners including Colby College and 7 Lakes, MDEP, and LSM volunteers to conduct long-term water quality monitoring at Messalonskee Lake.

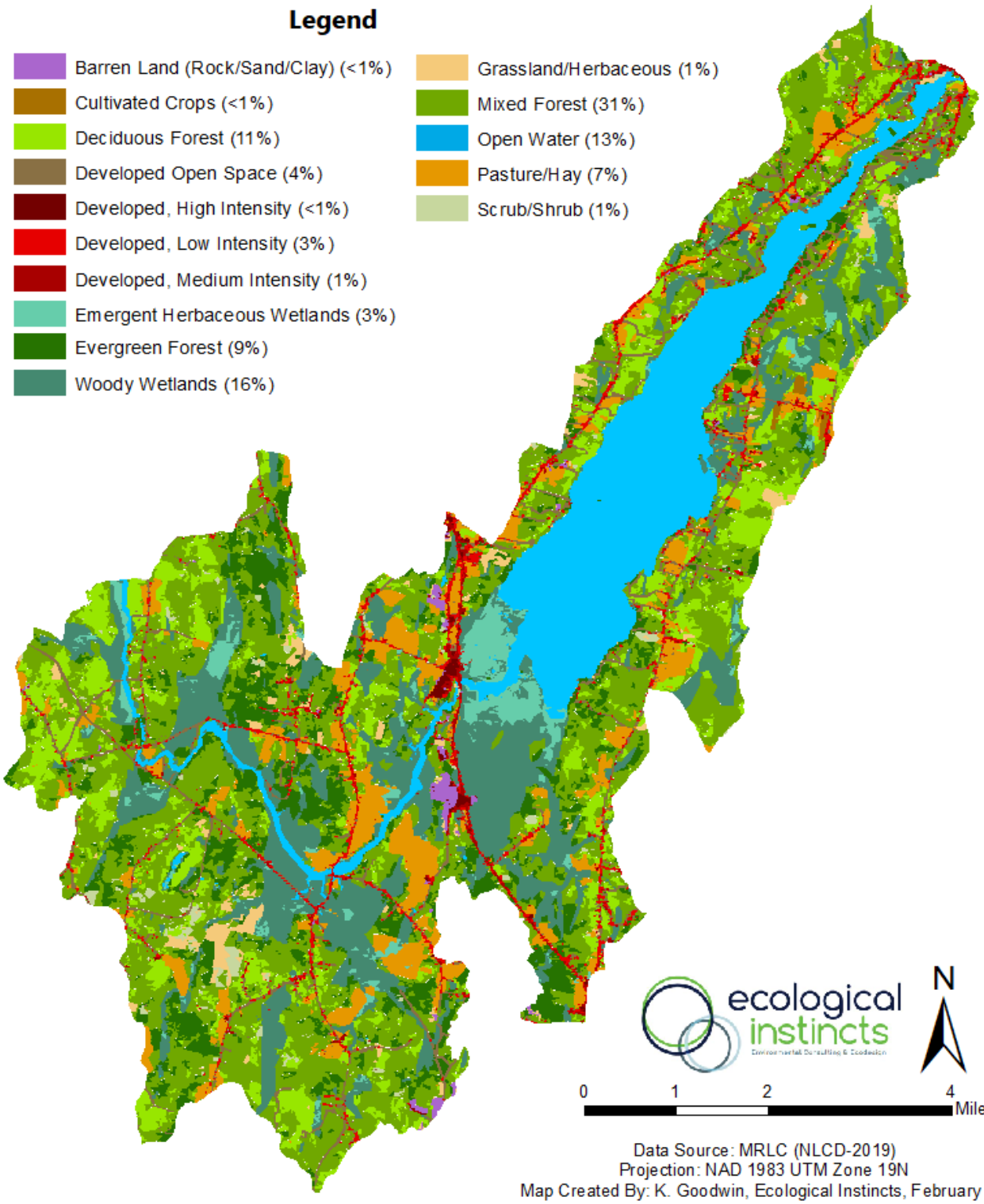
- At a minimum, volunteers will collect SDT measurements two times each month between May 1 - September 30.
- MDEP conducts monitoring on Messalonskee Lake on a five-year rotating schedule. This includes a full suite of monitoring parameters.
- Since 2015, 7 Lakes Alliance/Colby College have been collecting intensive baseline water quality data that includes weekly in-lake biological and chemical water sampling (as well as sediment sampling).
- In 2021, 7 Lakes and FOM volunteers began stream monitoring at five sampling locations in the watershed. Future stream monitoring goals include development of a formal stream monitoring plan and gaining a better understanding the influence of Belgrade Stream and other small tributaries that potentially contribute large quantities of phosphorus during large storm events.
- Secchi disk transparency and the measured in-lake total phosphorus concentration will be used to track changes in water quality over time.

APPENDIX A: MESSALONSKEE LAKE WATERSHED MAPS

MAP 1:

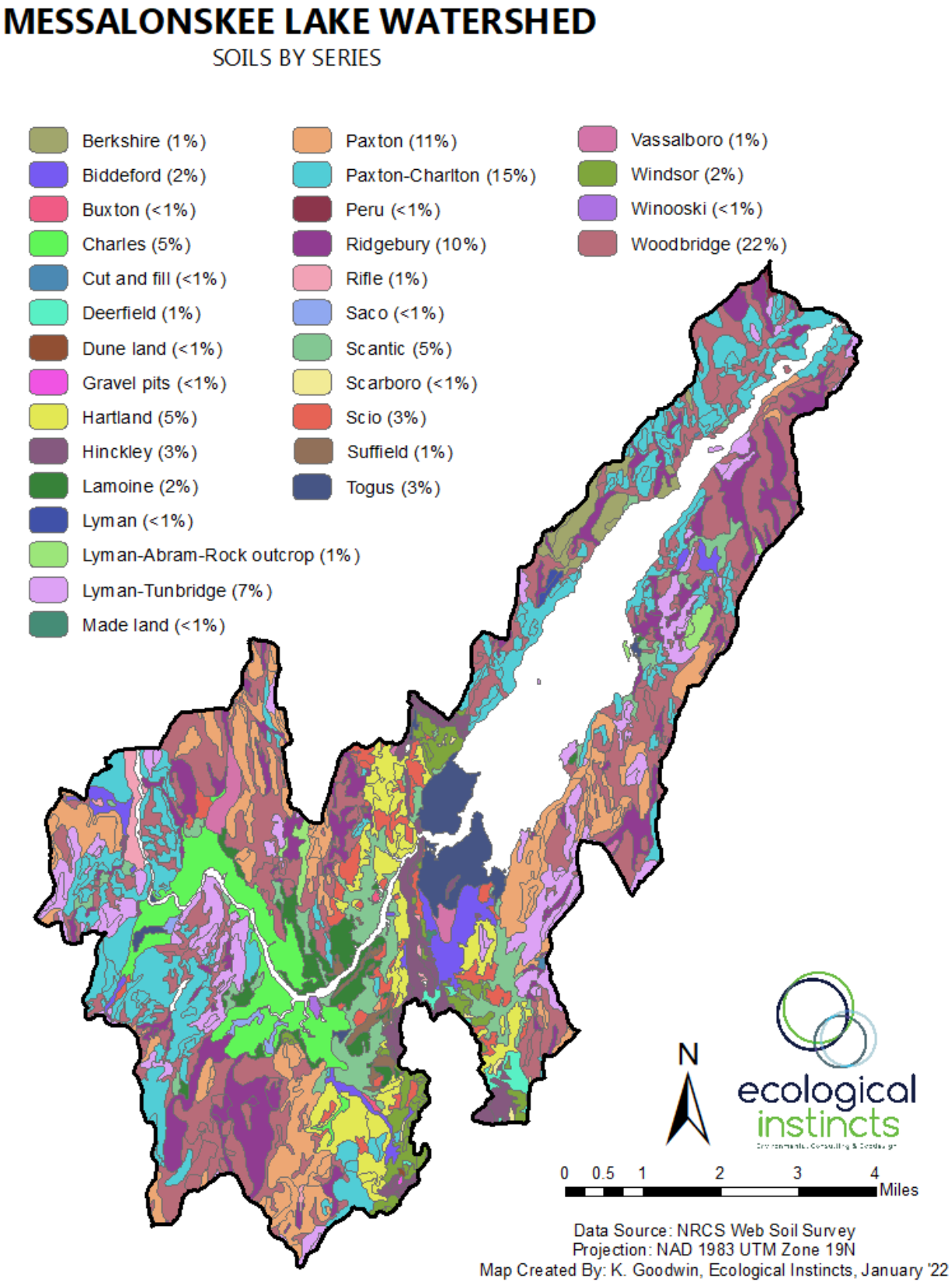
MESSALONSKEE LAKE WATERSHED

LAND COVER

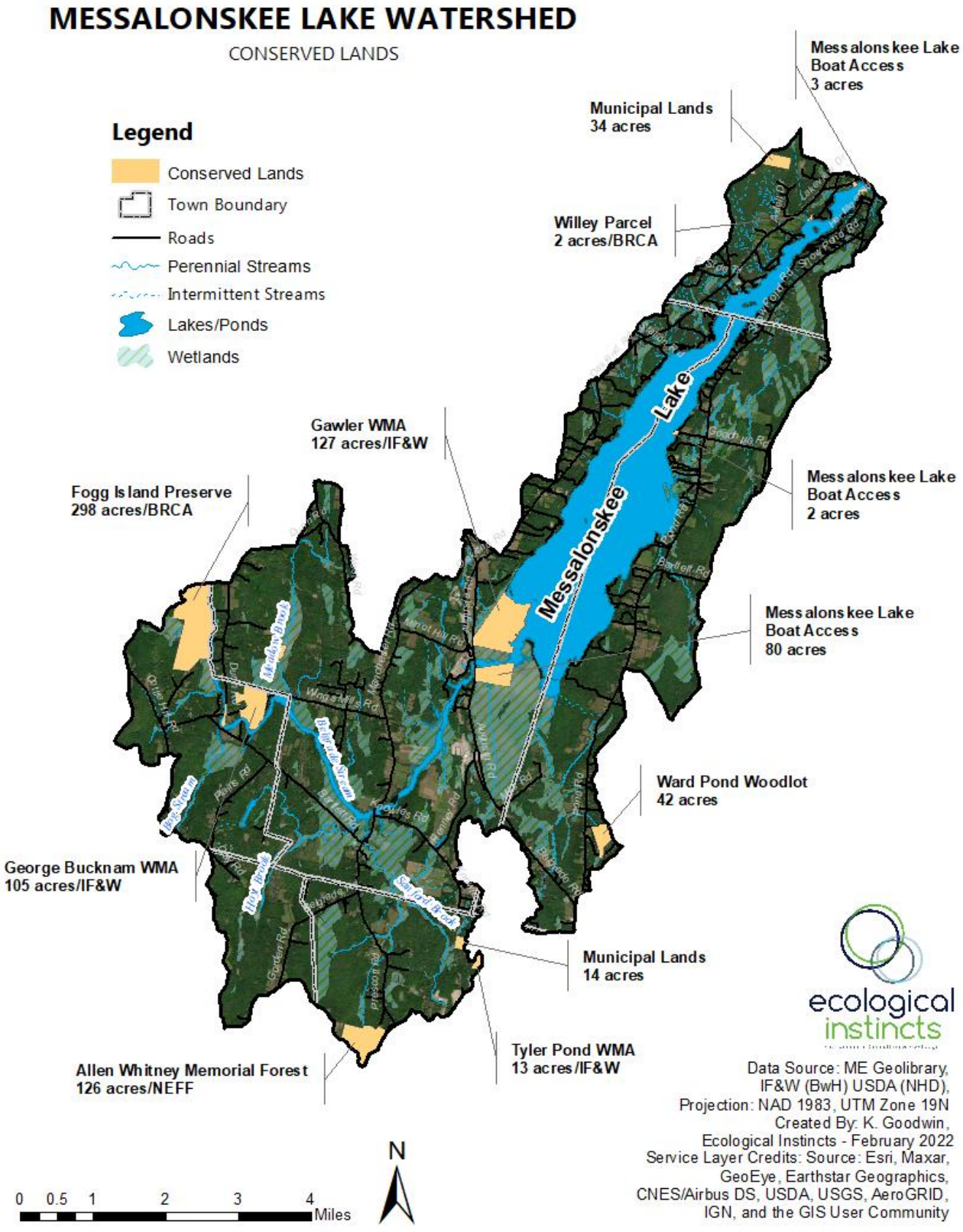


Data Source: MRLC (NLCD-2019)
Projection: NAD 1983 UTM Zone 19N
Map Created By: K. Goodwin, Ecological Instincts, February '22

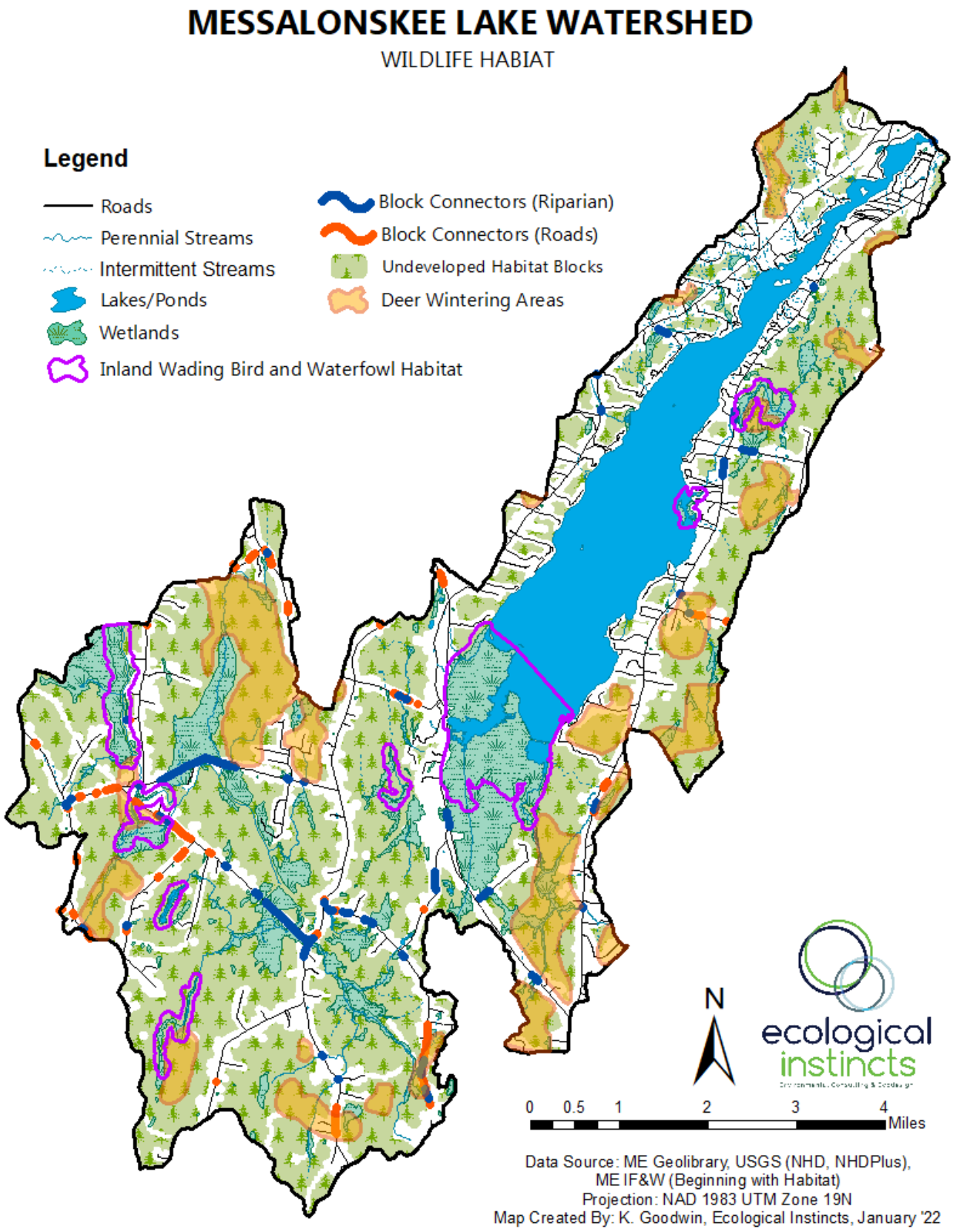
MAP 2:


MESSALONSKEE LAKE WATERSHED
SOILS BY SERIES
Berkshire (1%)
Biddeford (2%)
Buxton (<1%)
Charles (5%)
Cut and fill (<1%)
Deerfield (1%)
Dune land (<1%)
Gravel pits (<1%)
Hartland (5%)
Hinckley (3%)
Lamoine (2%)
Lyman (<1%)
Lyman-Abram-Rock outcrop (1%)
Lyman-Tunbridge (7%)
Made land (<1%)
Paxton (11%)
Paxton-Charlton (15%)
Peru (<1%)
Ridgebury (10%)
Rifle (1%)
Saco (<1%)
Scantic (5%)
Scarboro (<1%)
Scio (3%)
Suffield (1%)
Togus (3%)
Vassalboro (1%)
Windsor (2%)
Winooski (<1%)
Woodbridge (22%)
N
ecological instincts
0 0.5 1 2 3 4
Miles
Data Source: NRCS Web Soil Survey
Projection: NAD 1983 UTM Zone 19N
Map Created By: K. Goodwin, Ecological Instincts, January '22

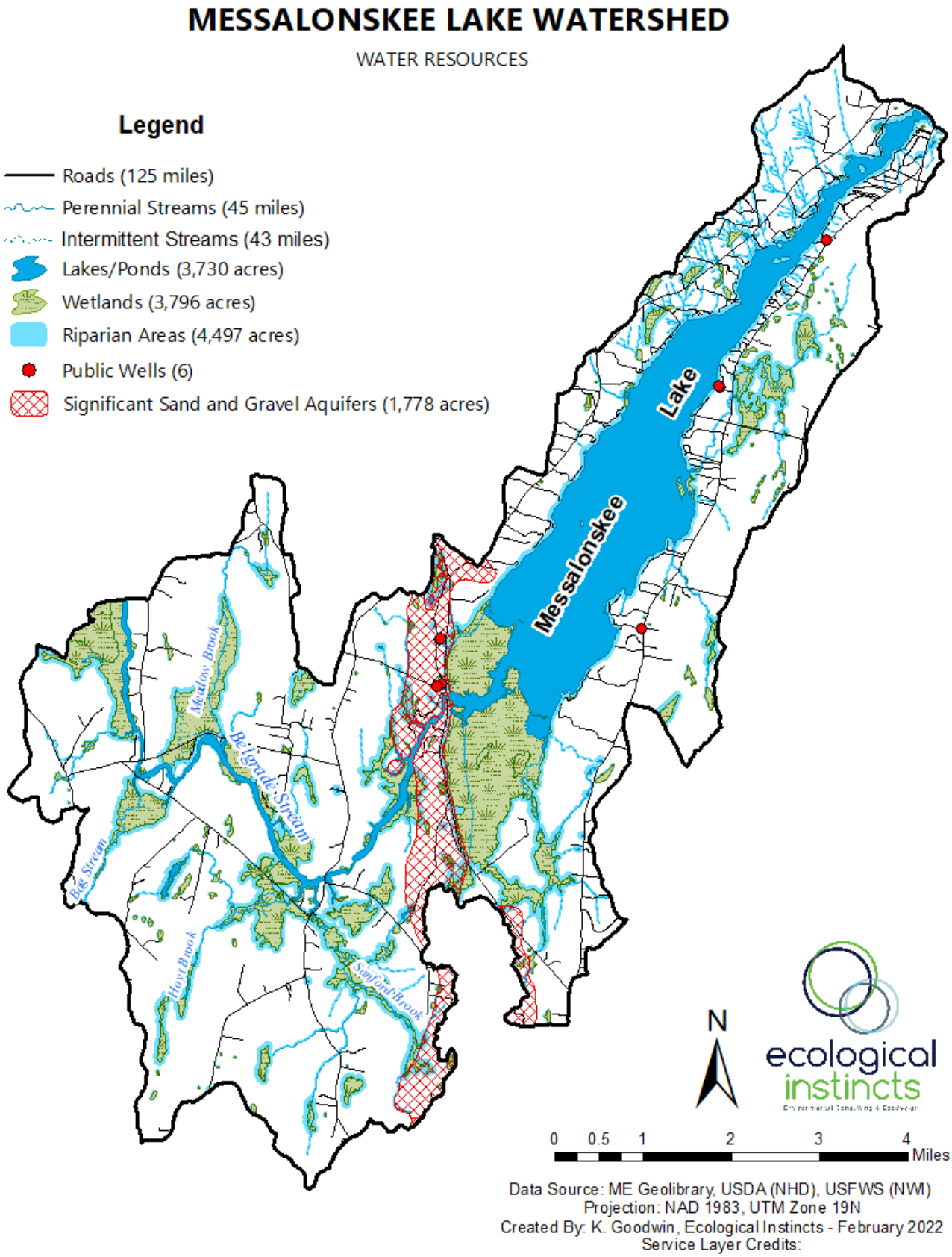
MAP 3:


MESSALONSKEE LAKE WATERSHED
CONSERVED LANDS
Legend
Conserved Lands
Town Boundary
Roads
Perennial Streams
Intermittent Streams
Lakes/Ponds
Wetlands
Messalonskee Lake
Boat Access
3 acres
Municipal Lands
34 acres
Willey Parcel
2 acres/BRCA
Gawler WMA
127 acres/IF&W
Fogg Island Preserve
298 acres/BRCA
Messalonskee Lake
Boat Access
2 acres
Messalonskee Lake
Boat Access
80 acres
Ward Pond Woodlot
42 acres
George Bucknam WMA
105 acres/IF&W
Municipal Lands
14 acres
Tyler Pond WMA
13 acres/IF&W
Allen Whitney Memorial Forest
126 acres/NEFF
Messalonskee Lake
ecological instincts
Data Source: ME Geolibrary, IF&W (BwH) USDA (NHD),
Projection: NAD 1983, UTM Zone 19N
Created By: K. Goodwin, Ecological Instincts - February 2022
Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
N
0 0.5 1 2 3 4
Miles

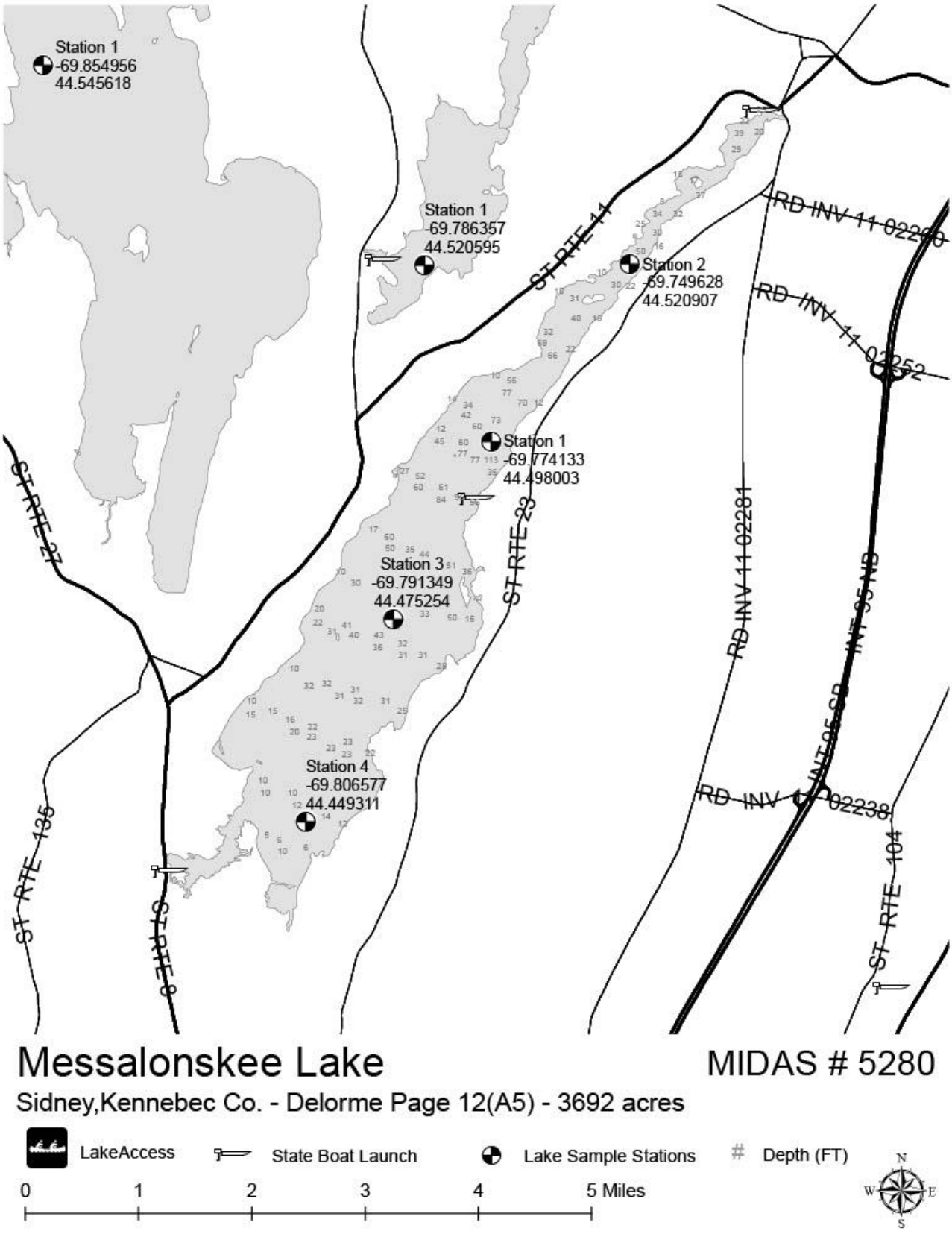
MAP 4:


MESSALONSKEE LAKE WATERSHED
WILDLIFE HABIAT
Legend
Roads
Perennial Streams
Intermittent Streams
Lakes/Ponds
Wetlands
Inland Wading Bird and Waterfowl Habitat
Block Connectors (Riparian)
Block Connectors (Roads)
Undeveloped Habitat Blocks
Deer Wintering Areas
N
ecological instincts
0 0.5 1 2 3 4
Miles
Data Source: ME Geolibrary, USGS (NHD, NHDPlus),
ME IF&W (Beginning with Habitat)
Projection: NAD 1983 UTM Zone 19N
Map Created By: K. Goodwin, Ecological Instincts, January '22

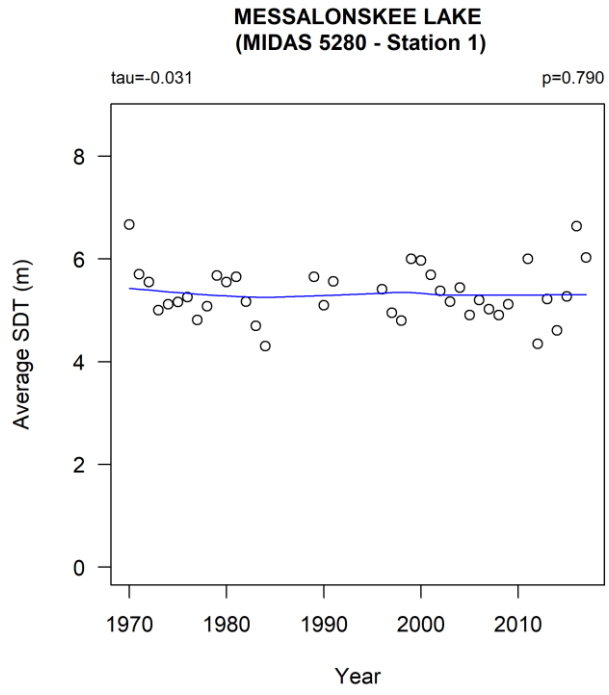
MAP 5:

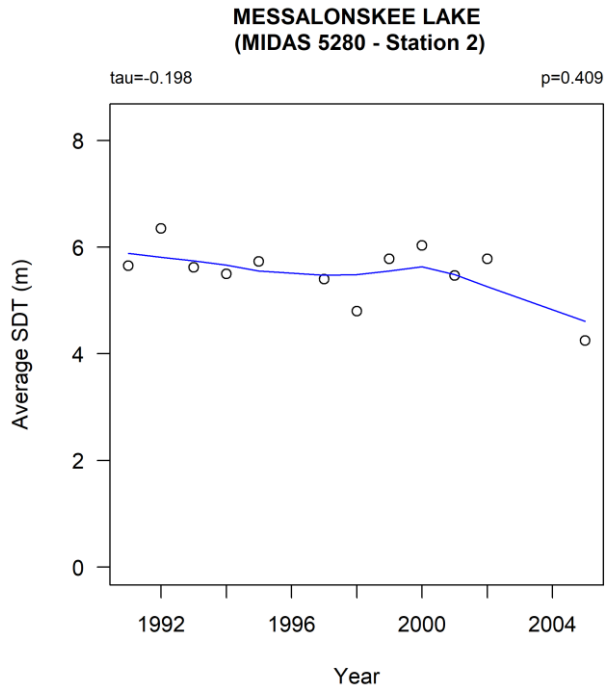

MESSALONSKEE LAKE WATERSHED
WATER RESOURCES
Legend
Roads (125 miles)
Perennial Streams (45 miles)
Intermittent Streams (43 miles)
Lakes/Ponds (3,730 acres)
Wetlands (3,796 acres)
Riparian Areas (4,497 acres)
Public Wells (6)
Significant Sand and Gravel Aquifers (1,778 acres)
Messalonskee Lake
Meadow Brook
Belgrade Stream
Bog Stream
Hoyt Brook
Stanford Brook
N
ecological instincts
0 0.5 1 2 3 4
Miles
Data Source: ME Geolibrary, USDA (NHD), USFWS (NWI)
Projection: NAD 1983, UTM Zone 19N
Created By: K. Goodwin, Ecological Instincts - February 2022
Service Layer Credits:

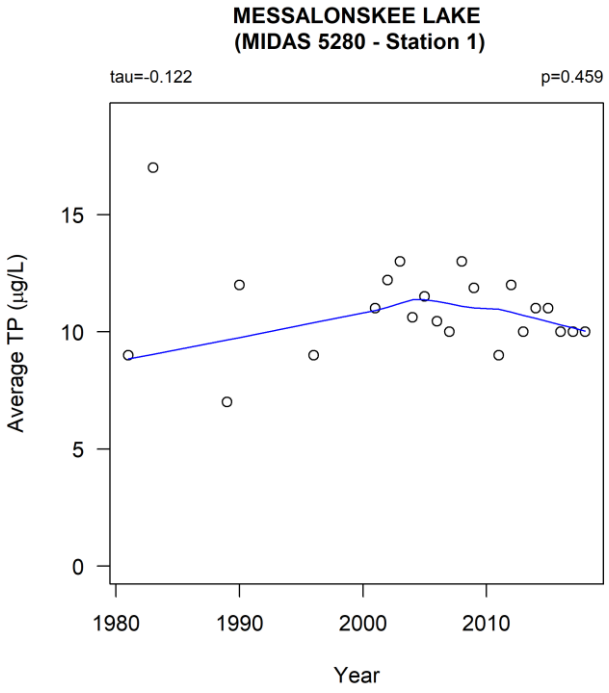
MAP 6:

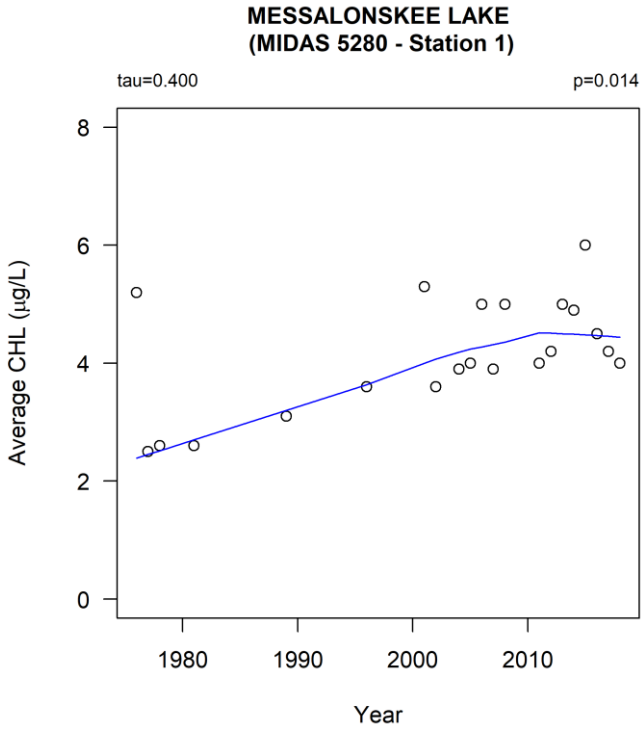

Station 1
-69.854956
44.545618
Station 1
-69.786357
44.520595
Station 2
-69.749628
44.520907
Station 1
-69.774133
44.498003
Station 3
-69.791349
44.475254
Station 4
-69.806577
44.449311
ST RTE 11
ST RTE 23
ST RTE 27
ST RTE 135
ST RTE 8
RD INV 11 02281
RD INV 11 02252
RD INV 11 02238
INT 95 NB
INT 95 SB
ST RTE 104
Messalonskee Lake
MIDAS # 5280
Sidney,Kennebec Co. - Delorme Page 12(A5) - 3692 acres
LakeAccess
State Boat Launch
Lake Sample Stations
Depth (FT)
0
1
2
3
4
5 Miles
N
W
E
S

APPENDIX B: MANN-KENDALL TREND PLOTS









APPENDIX C: DISSOLVED OXYGEN SUMMARY

Because Messalonskee is deep, it stratifies early and remains stratified until fall turnover in November. At station 2, which is much shallower than station 1, anoxia (DO <2 ppm) starts occurring at the bottom of the lake in late July and reaching depths as shallow as 10 m through the end of September (Figure C1). The highest phosphorus values observed in Messalonskee Lake occur at station 2 due to anoxic release of phosphorus from the sediments. At station 1, anoxia begins later, but persists longer.[11] In 2021, anoxic release of phosphorus did not begin occurring until mid-September at the deep hole, and phosphorus levels remained lower at station 1 than station 2 (Figure C1).

A metalimnetic oxygen minimum (anoxia higher in the water column in addition to the lake bottom) has been documented at station 1 between 10 – 14 m (Figure C1). This typically occurs because warm water is less dense than cold water, so there can be a sharp density gradient at the thermocline. When organic matter (e.g., dead algae) settles in the water column, it can be trapped on the thermocline, where it is degraded by microbes, a process which consumes oxygen.[12]

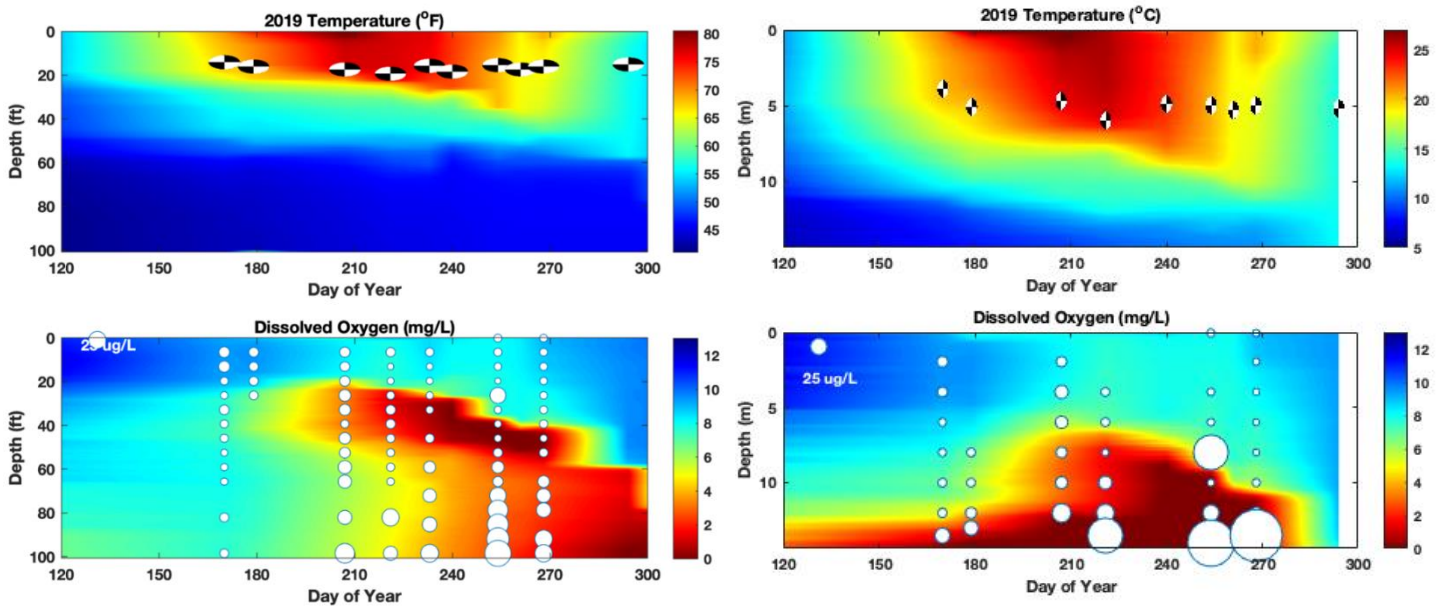


Figure C1. *Temperature & SDT (top) and dissolved oxygen & total phosphorus concentrations (bottom) for Messalonskee Lake, Station 1 (left) and Station 2 (right) in 2019.*[13] *(Source: 7 Lakes Alliance*

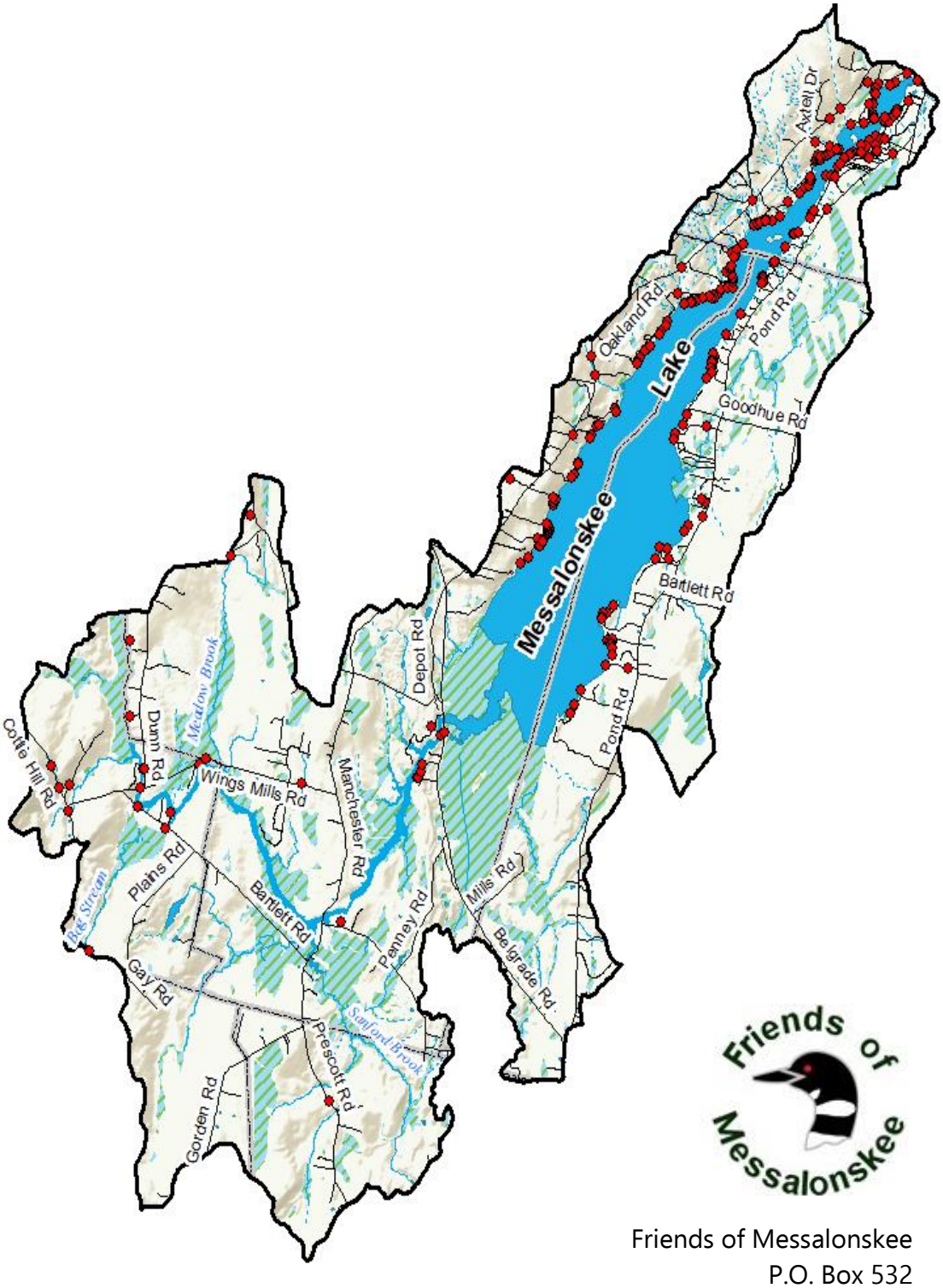
[11] Profilers used to sample DO in Messalonskee Lake have a maximum cable length of 100 ft, meaning that DO levels below 100 feet could not be sampled.

[12] 7 Lakes Alliance, 2018 Water Quality Data. Accessed online: https://www.7lakesalliance.org/post/2018-water-quality-data

[13] The depth of black and white circles in Figure C1 represents SDT, while the size of the white circles represents the amount of phosphorus at that depth in the water column; the larger the circle, the higher the concentration of phosphorus.

APPENDIX D: 2021 MESSALONSKEE LAKE WATERSHED SURVEY REPORT

WATERSHED SURVEY REPORT
MESSALONSKEE LAKE (AKA SNOW POND)
Oakland, Belgrade & Sidney, Maine



JANUARY 2022

Friends of Messalonskee
P.O. Box 532
Oakland, ME 04963
www.friendsofmessalonskee.com

MESSALONSKEE LAKE WATERSHED SURVEY REPORT

Prepared for:

Friends of Messalonskee
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Oakland, ME 04963
www.friendsofmessalonskee.com/

Prepared by:

Ecological Instincts
P.O. Box 682
Manchester, ME 04351
www.ecoinstincts.com

Cover Images: *Survey photos (Friends of Messalonskee) and results map (Ecological Instincts)*

ACKNOWLEDGEMENTS

The following people and organizations were instrumental in helping with the 2021 Messalonskee Lake Watershed Survey, and deserve special recognition for their efforts:

Watershed Survey Steering Committee Members

Charlie Baeder	7 Lakes Alliance
Gari Bowman	Town of Oakland
Mike Guarino	Friends of Messalonskee
Jennifer Jespersen	Ecological Instincts
Peter Kallin	7 Lakes Alliance & Maine Lakes
Kathy Moore	Friends of Messalonskee
Amanda Pratt	Maine Dept. of Environmental Protection
Ronda Snyder	Town of Sidney
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Report Prepared by: Katie Goodwin and Jennifer Jespersen, Ecological Instincts

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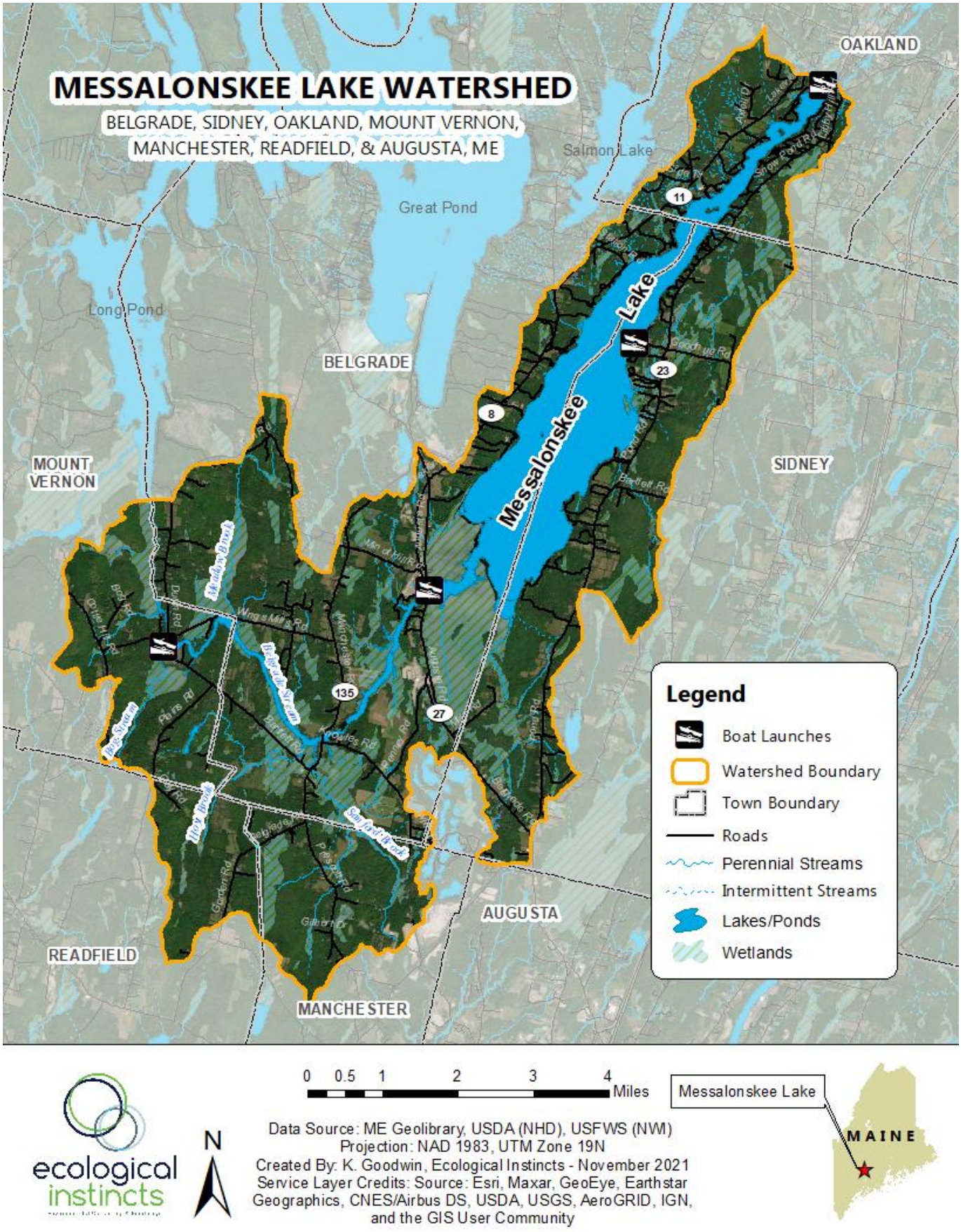


Figure 1. Map of the Messalonskee Lake watershed.

GLOSSARY OF TERMS

BEST MANAGEMENT PRACTICES (BMPs) Best Management Practices (BMPs) are conservation practices designed to minimize discharge of nonpoint source (NPS) pollution from developed land. BMPs include planting buffers, stabilizing steep slopes, upgrading culverts, using erosion control mulch on bare soil. "Non-structural" BMPs include road salt management, land conservation and improving ordinances to protect water quality.

CHLOROPHYLL-A (CHL-A) A measurement of the green pigment found in all plants, including microscopic plants such as algae. It is used as an estimate of algal biomass; higher Chl-a equates to greater amount of algae in the lake.

COLOR The influence of suspended and dissolved particles in the water as measured Platinum Cobalt Units (PCU). A variety of sources contribute to the types and amount of suspended material in lake water, including weathered geologic material, vegetation cover, and land use activity. Colored lakes (>25 SPU) can have reduced transparency readings and increased TP values.

DISSOLVED OXYGEN Dissolved oxygen (DO) is the measure of the amount of oxygen dissolved in the water. Organisms living in lakes use the oxygen in the water to breathe. Low DO conditions can severely reduce the diversity and populations of aquatic organisms. Water with < 1 part per million (ppm) of oxygen is considered anoxic (no oxygen present); less than 5 ppm of oxygen is considered so stressful that most coldwater fish will avoid these areas. Anoxic conditions can also promote phosphorus release (internal loading) from the lake sediments.

FLUSHING RATE The rate at which the volume of water in a lake is replaced. For example, a lake with a flushing rate of two flushes twice per year. A lake with a flushing rate of 0.5 flushes once every two years.

MIDAS (Maine Information Display and Analysis System) MIDAS numbers are unique identification numbers assigned in the 1970's to Maine lakes and ponds monitored and managed by Maine state agencies.

NONPOINT SOURCE POLLUTION (NPS) Nonpoint Source pollution, or polluted stormwater runoff comes from a number of diffuse sources within a watershed. This includes soil, fertilizers, septic waste, and other pollutants from diffuse sources across the landscape that are carried into a waterbody by rainfall.

SECCHI DISK TRANSPARENCY (SDT) A vertical measure of water transparency (ability of light to penetrate water) obtained by lowering a black and white disk into the water until it is no longer visible. Measuring SDT is one of the most useful ways to show whether a lake is changing from year to year. Changes in transparency may be due to increased or decreased algal growth, or the amount of dissolved or particulate materials in a lake, resulting from human disturbance or other impacts to the lake watershed area. Factors that affect transparency include algae, water color, and sediment. Since algal density is usually the most common factor affecting transparency in Maine lakes, transparency is an indirect measure of algae abundance.

TOTAL PHOSPHORUS (TP) The total concentration of phosphorus found in the water, including organic and inorganic forms. TP is one of the major nutrients needed for plant growth. It is generally present in small amounts and limits plant growth in freshwater ecosystems. As phosphorus increases, the amount of algae generally increases. Humans can add phosphorous to a lake through stormwater runoff, lawn, or garden fertilizers, and leaky or poorly maintained septic tanks.

INTRODUCTION

Messalonskee Lake (MIDAS 5280) is located in Kennebec County, in the central Maine towns of Belgrade, Sidney, and Oakland in the southeast region of the larger Belgrade Lakes watershed (Figure 2). Messalonskee Lake is last lake in the chain of seven Belgrade Lakes. It is also the second largest of the Belgrade Lakes behind Great Pond.

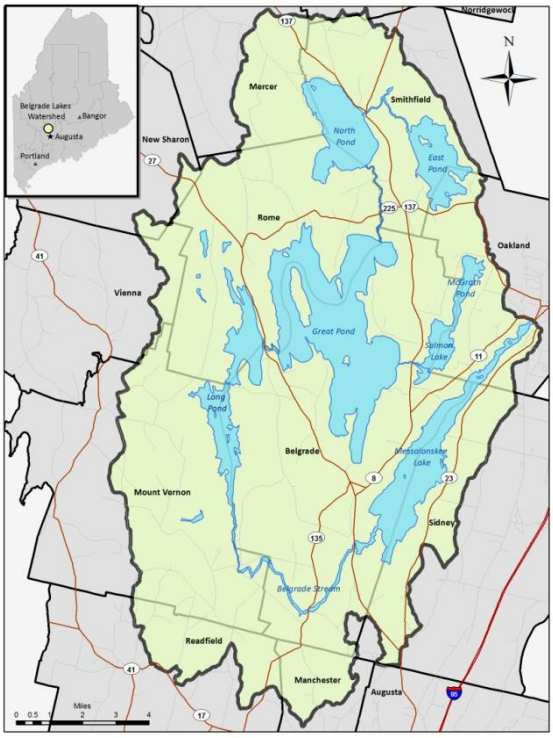


Figure 2. Map of the Belgrade Lakes watershed. (Colby.edu)

Much of the water that enters Messalonskee Lake comes from the watersheds of the upstream lakes and flows into Messalonskee Lake through Belgrade Stream at the lake's south end. Water also flows into Messalonskee Lake through a number of smaller tributaries feeding either Belgrade Stream, or the lake itself. Messalonskee Lake is dammed at both ends, with a dam on Wings Mills Rd. in Mt. Vernon on Belgrade Stream, and another dam at its northernmost point separating the lake from Messalonskee Stream which flows into the Kennebec River and eventually into the Gulf of Maine.

Messalonskee Lake's direct watershed covers 44 square miles, while the total drainage area, which includes the watersheds of the entire chain of seven Belgrade Lakes, covers about 180 square miles.[1] The watershed area includes seven municipalities, with the largest land area in the towns of Belgrade (40%) and Sidney (28%). Smaller areas of the watershed are located in Readfield (9%), Manchester (9%), Oakland (8%), and Mount Vernon (7%), along with a very small sliver of the watershed located in Augusta (<1%).

WATERSHED
The area of land around a lake that drains (or sheds) its water into the lake through streams, ditches, as overland flow, or through groundwater.

The shoreline of Messalonskee Lake is highly developed. A study conducted by Colby College in 1997 estimated that at that time, more than three quarters of the shoreline lots were developed. The study also estimated that a large percentage (74%) of the developed lots are year-round residences due to the lake's close proximity to the cities of Augusta and Waterville.[2]

Variable leaf milfoil (*Myriophyllum heterophyllum*), an invasive aquatic plant that can form dense mats and crowd out native plants, was introduced to Messalonskee Lake in the early 1990's. FOM runs a

[1] *https://web.colby.edu/epscor/about/*
[2] *Land Use Patterns in Relation to Lake Water Quality in the Messalonskee Lake, North Basin Watershed (1997), Department of Biology, Colby College.*

number of programs aimed at removing and controlling the spread of variable leaf milfoil in Messalonskee Lake.

Messalonskee Lake and its surrounding watershed are used extensively for swimming, fishing, and boating as well as bird watching and hiking in the summer, and ice fishing, skiing, and snowmobiling in the winter. Three state-owned boat launches provide access to the lake, one in Oakland at the lake's northern end, one in Sidney on the eastern shore, and one in Belgrade near the wetlands at the lake's southern end. The lake currently provides a warm-water fishery for species such as bass and white perch, among others. Maintaining the fishery and water quality for recreation is important to local residents.

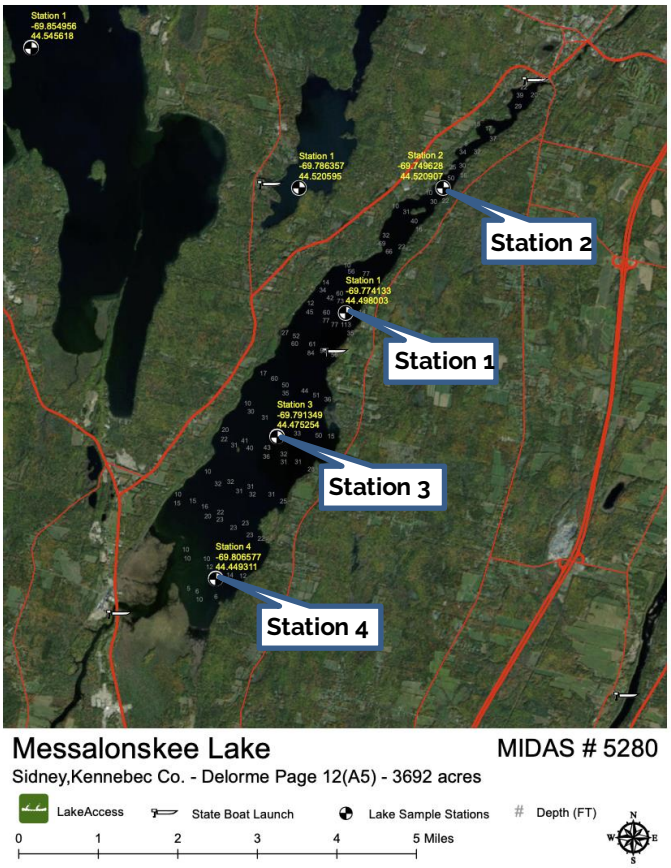


Figure 3. Map of water quality sampling stations in Messalonskee Lake. (lakesofmaine.org)

Water-quality data has been collected in Messalonskee Lake since 1970 by Maine DEP and the Lake Stewards of Maine/Volunteer Lake Monitoring Program. The majority of the data has been collected at Station 1, at the deepest part of the lake (Figure 3). Since 2015, more intensive data collection has been completed by 7 Lakes Alliance and Colby College. The water quality of Messalonskee Lake has remained relatively stable since monitoring began, despite declining water quality in upstream Long Pond and Great Pond. Although water quality in Messalonskee Lake is stable, the lake is listed as threatened by the Maine DEP because it is considered sensitive to water quality changes due to its sediment chemistry, and also because it is on the DEP's watch list. The large size of the watershed, extent of development, phosphorus inputs from the direct watershed and the watershed of upstream lakes, and the effects of a changing climate all play a role in the lake's water quality.

Messalonskee lake is considered mesotrophic based on its current water clarity (as measured by Secchi disk transparency) and total phosphorus levels. Mesotrophic lakes have elevated nutrient levels and are fairly productive, making them prone to algal blooms and decreased clarity. These lakes are in a transitional stage between oligotrophic (clear, minimal plant growth) and eutrophic (murky and muddy with elevated plant growth) stages.

Decreasing dissolved oxygen (DO) levels are also a concern because DO is essential to the plants and animals that live in the lake. Recent data shows occasional anoxia (DO <2 ppm) in the deepest areas of the lake (Station 1). Decreasing DO levels can result in loss of deep water habitat for fish and release of sediment-bound phosphorus into the water column (internal loading). Managing the input of pollutants from the watershed is essential to preventing these cycles from developing in Messalonskee Lake.

Table 1. Lake characteristics, Messalonskee Lake. (Source: LakesofMaine.org)

Lake Characteristics	Messalonskee Lake
Surface Area	3,691 acres
Elevation	234 ft
Maximum Depth	113 ft
Average Depth	31 ft
Flushing Rate	1.59/yr

Table 2. Water quality averages for Messalonskee Lake, Station 1 (1970-2018). (Data Source: LakesofMaine.org)

Water Quality Parameter[3]	Station 1
Secchi Disk Transparency (SDT)	5.4 m
Total Phosphorus (TP)	11 ppb
Chlorophyll-a (Chl-a)	4.1 ppb
Color	16 PCU

Figure 4 (below) shows the annual average water clarity for Messalonskee Lake at Station 1. Variability in water clarity measurements over time may be influenced by weather (e.g., annual fluctuations in rain/snow), or land-use changes in the watershed (e.g., period of heavy development or forestry activities or watershed improvements).

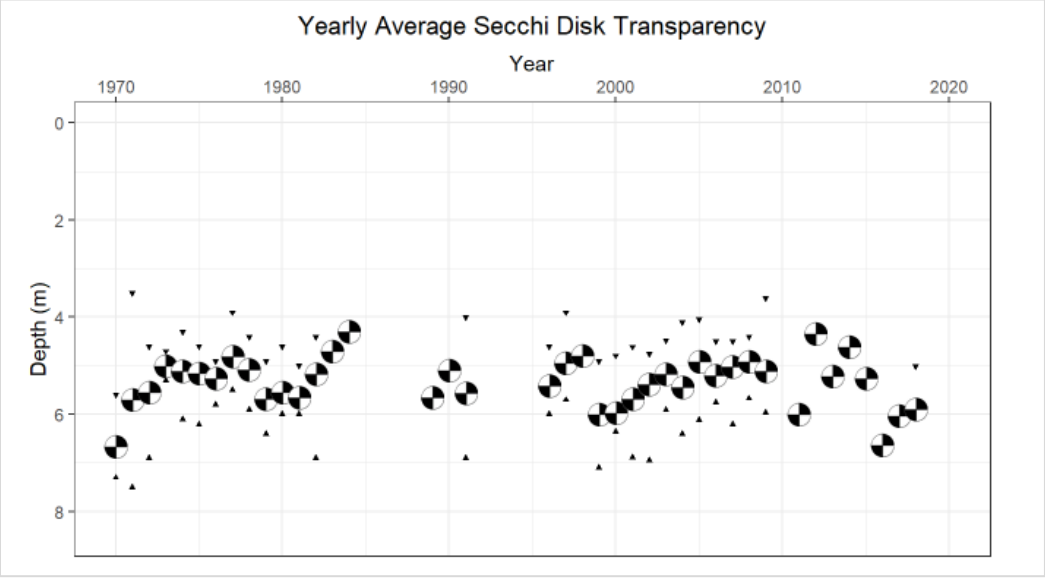


Figure 4. Average annual water clarity data for Messalonskee Lake (Station 1). (Source: LakesofMaine.org)

[3] Maine DEP Lake Reports for Messalonskee Lake. Averages are based on data collected between 1970-2018 at Station 1.

MESSALONSKEE LAKE WATER QUALITY – WHY IS WATER QUALITY AT RISK?

Along with phosphorus loading from upstream lakes, a primary threat to water clarity in Messalonskee Lake is **polluted runoff** or nonpoint source (NPS) pollution. Stormwater runoff from rain and snowmelt picks up soil, nutrients, and other pollutants as it flows across the land and washes into the lake.

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

In an undeveloped, forested watershed, stormwater runoff is slowed and filtered by tree and shrub roots, grasses, leaves, and other natural debris on the forest floor. It then soaks into the uneven forest floor and filters through the soil. In a developed watershed, however, stormwater does not always receive the filtering treatment the forest once provided. Rainwater picks up speed as it flows across impervious surfaces like rooftops, compacted soil, gravel roads and pavement, and it becomes a destructive erosive force.

More than two centuries of runoff from developed land, agriculture, and forestry in the watershed has resulted in delivery of phosphorus-laden sediment that accumulates in the bottom of the lake, adding to the potential for internal phosphorus loading when dissolved oxygen levels are low at the bottom of the lake. Runoff from current development and roads, as well as future development and conversion of small camps to larger year-round homes should be managed properly to prevent delivery of pollutants into Messalonskee Lake. Roads and their counterparts- poorly maintained gravel roads, and driveways, road shoulders, winter sanding, ditches, and culverts- all influence lake water quality.

*Messalonskee Lake is on **Maine DEPs Nonpoint Source Threatened Lakes Priority List** due to its sediment chemistry having the potential to release phosphorus into the water column, and because it is on the DEP's watch list.*

WHY IS RUNOFF A PROBLEM?

The problem with runoff is not the water itself, but the sediment and nutrients that get carried by and delivered to lakes in stormwater runoff. **Phosphorus**, a naturally occurring element, is a nutrient that provides food for algae and other aquatic plants. Phosphorus is found in soils, septic waste, animal waste, and fertilizers among other sources.

Soil erosion delivers phosphorus to the lake.

Phosphorus is typically the limiting nutrient for algae growth in most Maine lakes. Therefore, increased phosphorus being added to the lake by polluted runoff can result in increased plant and algae growth. Sometimes this growth causes choking blooms, but more often it results in small changes in water quality that, over time, damage the ecology, aesthetics, and economy of our lakes.

Soil is the biggest source of phosphorus in Maine lakes. As every gardener knows, phosphorus and other nutrients are naturally present in the soil. So, we are essentially "fertilizing" our lakes and ponds with the soil that erodes from our driveways, roads, ditches, pathways, and beaches. Studies have shown that runoff from even stable developed areas has **5 to 10 times the amount of phosphorus** compared to runoff from forested areas. Runoff from forestry activities can also contribute significant inputs of nutrients and sediments if not managed properly. Proper management strategies may include limiting clear cutting, protecting natural vegetative buffers along waterbodies (lakes and streams) and wetlands, and limiting runoff from roads that serve as access to the forest resources.

WHY PROTECT OUR LAKES FROM POLLUTED RUNOFF?

- Phosphorus reductions from developed land are needed to help protect the water quality of Messalonskee Lake.
- The U.S. Fish & Wildlife Service identified eight areas of inland wading bird and waterfowl habitats located throughout the watershed.
- The Maine Department of Inland Fisheries and Wildlife (MDIFW) documented seven rare wildlife occurrences in the watershed, mostly around wetlands at the north and south ends of the lake, as well as and numerous deer wintering areas which also provide habitat for resident moose populations.
- Messalonskee Lake provides an excellent fishery for warm-water species such as bass and white perch, among others. Maintaining the fishery is important to local residents.

- The 2021 Maine Audubon Loon count reported 40 adult loons and 4 chicks on Messalonskee Lake.[4]
- Messalonskee Lake is susceptible to changes in water quality resulting from too much phosphorus. Proper management of shorelines, maintenance of roads, and minimizing the effects of existing and new development, and forestry activities are critical lake protection activities.
- Sediment deposited into lakes and ponds from erosion creates the ideal environment for invasive aquatic plant species. A combination of sediment deposits and phosphorus-rich water makes Messalonskee Lake susceptible to invasive species. Since 2012, FOM has been working to control variable leaf milfoil in Messalonskee Lake.
- A 1996 University of Maine study found that lake water quality affects property values. For every three-foot decline in water clarity, shorefront property values can decline as much as 10 to 20%! Declining property values affect individual landowners as well as the entire community.

WHAT IS BEING DONE TO PROTECT MESSALONSKEE LAKE?

The FOM, watershed partners, and landowners have already begun taking steps to protect the water quality of Messalonskee Lake. In addition to the activities listed below, FOM holds an annual meeting for its members and the public each July, organizes the Messalonskee Lake Milfoil Control Program and Courtesy Boat Inspection (CBI) Program, participates in invasive plant patrols, LakeSmart, and water quality research. A summary of primary historical watershed activities is provided below:

- **Clean Water Act Section 319 funds-** From 2004-2007, a Phase I 319 implementation grant supported seven town and camp road construction projects, eight vegetated buffer plantings, and thirteen riprap installation projects on Messalonskee Lake. Technical assistance was provided to more than 40 property owners and camp road associations. These projects are estimated to have resulted in a reduction of 2.2 pounds of phosphorus loading annually.
- **LakeSmart-** In response to documented changes in water quality in Messalonskee Lake, FOM started a LakeSmart program in 2019. Since inception, 10 shorefront properties have been evaluated and 3 LakeSmart awards have been distributed.
- **Milfoil Control-** Since 2012, FOM has had an active Milfoil Control program, working closely with Maine DEP to control and eradicate Variable Leaf Milfoil. FOM employs suction harvesting, lays burlap and plastic benthic barriers, conducts annual surveys, and coordinates a Courtesy Boat Inspection (CBI) program.

[4] Maine Audubon, 2021 Maine Loon Count Results. Online: https://www.lakesofmaine.org/lake-loons.html?m=5280

- **Watershed Protection Planning-** FOM will be developing a Watershed-Based Protection Plan in 2022. This plan will outline strategies for lake protection over the next 10 years (2022 – 2031) and allow local conservation partners to apply for state and federal grants to address NPS sites identified during the watershed survey.
- **Water Quality Monitoring-** FOM is in collaboration with 7 Lakes Alliance and Colby College to collect ongoing water quality data in the lake. Annual updates are provided to FOM by 7 Lakes Alliance regarding short and long-term changes in water quality.
- **Youth Conservation Corps (YCC)-** The 7 Lakes Alliance YCC (formerly Belgrade Regional Conservation Alliance Conservation Corps) assisted landowners with eight vegetated buffer plantings and 13 rip-rap installation projects on Messalonskee Lake between 2004 – 2007 as a part of the 319 watershed improvement projects. Between 1996 and 2021, 266 BMPs have been installed in the watershed of Messalonskee Lake, averaging 10 per year.

Programs such as the 7 Lakes Alliance's Youth Conservation Corps (YCC) and FOM's LakeSmart program provide assistance to landowners to help protect the lake. (Photo: 7 Lakes Alliance)

SURVEY PURPOSE & METHODS

PURPOSE OF THE WATERSHED SURVEY

The primary purpose of the 2021 watershed survey was to:

- Identify and prioritize existing sources of polluted runoff, particularly soil erosion and stormwater runoff in the Messalonskee Lake watershed;
- Raise public awareness about the connection between land use and water quality and the impact of soil erosion on the water quality of Messalonskee Lake;
- Inspire people to become active watershed stewards by participating in watershed programs such as LakeSmart and the 7 Lakes Alliance's YCC Program;
- Use the information gathered to help write a Watershed-Based Protection Plan for Messalonskee Lake;
- Provide the basis to obtain funding to assist with addressing identified NPS sites;
- Provide recommendations to landowners so that they can voluntarily address NPS issues identified on their properties.

The purpose of the survey was NOT to point fingers at landowners with a documented NPS site, nor was it to seek enforcement action against landowners not in compliance with local ordinances. FOM hopes to work cooperatively with landowners, road associations, and towns to protect and improve water quality.

Thirty-two watershed survey volunteers and 11 technical leaders participated in the 2021 Messalonskee Lake Watershed Survey.

Local citizen participation was essential in completing the watershed survey and will be even more important in coming years. With the leadership of FOM and partners such as the 7 Lakes Alliance, Kennebec County Soil & Water Conservation District (KCSWCD), the towns of Belgrade, Oakland and Sidney, and the Maine DEP, there are ample opportunities for stewardship. The hope is that landowners will reflect on the results of the survey recommendations and make improvements on their own properties. Everyone in the watershed has a stake in helping protect and improve the water quality of Messalonskee Lake.

SURVEY METHODS

The Messalonskee Lake watershed survey took place on September 29th – 30th, 2021 with the help of 33 volunteers from FOM, 7 Lakes Alliance, local residents, and interested individuals from the nearby Belgrade Lakes watersheds. Trained technical staff from 7 Lakes Alliance, Maine DEP, and Ecological Instincts helped lead volunteers across twenty watershed survey sectors (Figure 5). Prior to the survey, FOM sent out 2,371 letters with an accompanying informational handout to all of the property owners in the watershed. 57 properties were not included in the survey at the landowners' request.

Volunteers and technical leaders attended trainings hosted by Ecological Instincts and Maine DEP prior to the survey. Survey volunteers who were not able to attend the webinar were provided with a recording to watch.

The survey commenced on September 29th with volunteers and technical leaders spreading out across the watershed to document sources of nonpoint source pollution (NPS). Roads and road crossings, commercial and residential properties and beach/boat landing sites were assessed using tablets equipped with Survey 123 fillable data forms, cameras, and GPS capability. Volunteers also carried paper datasheets (Appendix A) as backup. Volunteers were assigned to one or more of the twenty survey sectors (see Figure 5 and sector descriptions on pages 17 - 19).

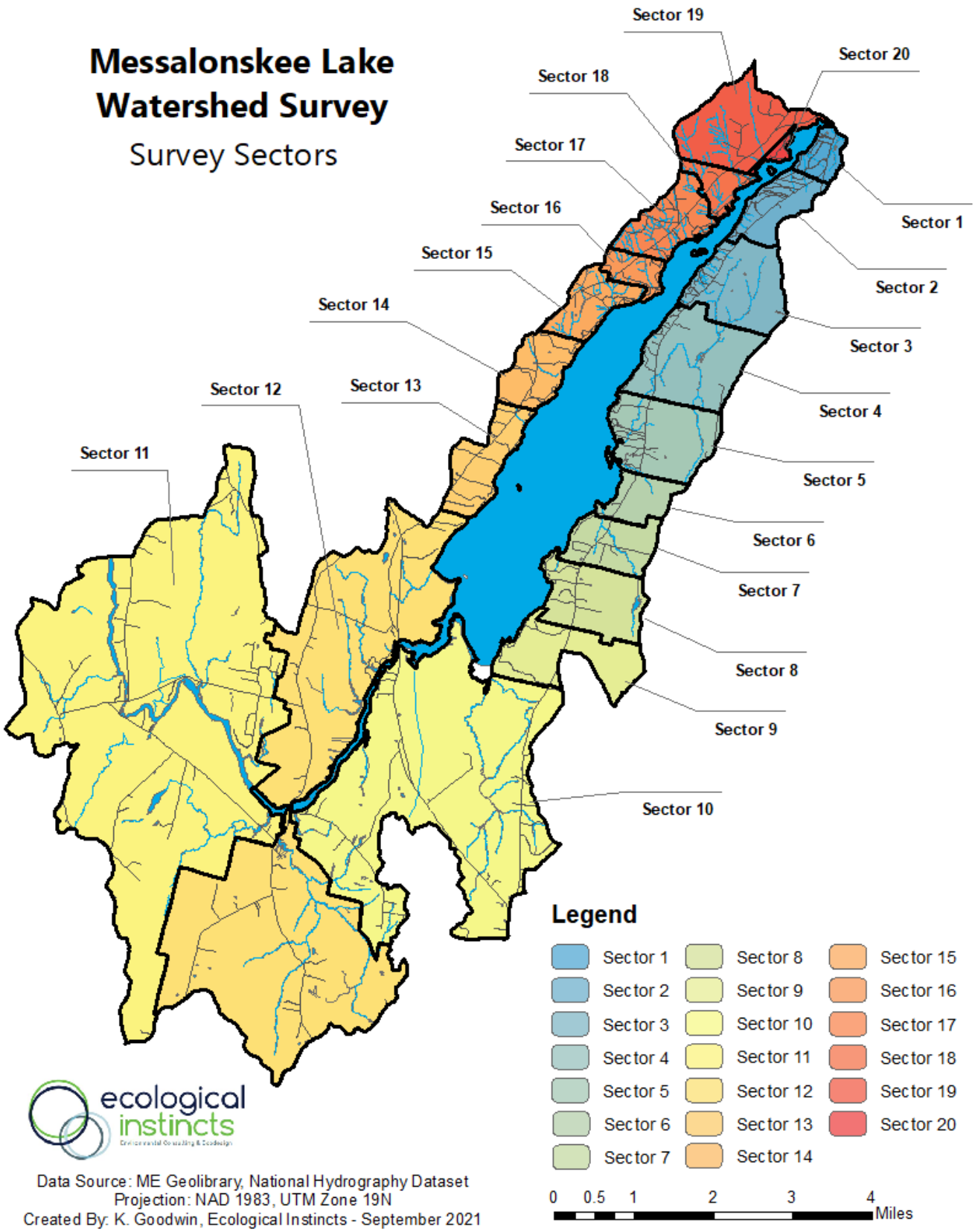


Figure 5. Map of the 20 survey sectors for the 2021 Messalonskee Lake Watershed Survey.

Sources of NPS pollution were identified within each of the twenty sectors. Potential solutions were recommended, rough estimates were made for the cost of labor and materials for improving the sites, and the overall impact to water quality and the level of technical assistance needed to complete the recommendations were also determined in the field for each site along with photographs and a GPS point. If there was not a direct connection from the potential source of NPS pollution to a ditch, stream, wetland, or the lake, then the site was not documented on the field sheet (e.g., an eroding hillslope in which the soil did not leave the site). The FOM plans to send follow-up letters to all landowners with an identified watershed survey site. The letter will let them know the problem identified and recommendations for addressing the problem as well a list of options for helping complete the project.

September 4, 2021

Gary L & Esther Tuttle
1115 Summerhaven Rd
Augusta, ME 04330

Dear Messalonskee Lake Watershed Landowner,

On September 29 – 30, 2021, the Friends of Messalonskee (FOM) will be conducting a survey of the Messalonskee Lake watershed. The watershed includes parts of the towns of Belgrade, Oakland, Sidney, Manchester, Readfield, Mount Vernon and Augusta (see attached flyer). The survey will identify and prioritize sources of soil erosion and stormwater runoff on developed land in the watershed. Follow-up work may be needed through early October to visit all the developed land in the watershed.

Messalonskee Lake is on the State of Maine's Priority List of Threatened Lakes due to development pressure that results in delivery of excess phosphorus that leads to an increase in algae in the lake and a decrease in water clarity. Current information is needed about the condition of the watershed to help develop long-term planning strategies that will protect and improve water quality and assist FOM and its partners with acquiring state and federal funding to begin addressing the sites identified during the survey, including cost-share grants for towns, road associations and landowners.

Information gathered during the survey will not be used for enforcement purposes or require that a landowner make improvements. **Participation in the survey is voluntary**, and you do not need to be present at the time of the survey. We would like to include your land in this survey. However, **if you do not wish to participate, please call the FOM office** at (207) 618-8723, or email: friendsofmessalonskee@gmail.com **by September 24th to have your property removed from the survey list.** The survey will be conducted in full compliance with Maine COVID-19 guidelines so as not to put any landowners or volunteers at risk. While watershed surveys are always conducted outdoors, additional precautions will include requiring social distancing between volunteers and landowners, and holding an online volunteer training.

Recent experiences have shown us that being outside in nature, being able to fish and swim in our lakes, and to escape to the lakes is more important than ever. The quality of our lakes affects us all with their recreational, social, and economic values. If we do not take immediate actions to prevent more phosphorus from entering the lake, then water quality in Messalonskee Lake will continue to get worse. The cost of fixing a polluted lake is expensive and can affect our local tax base and property values. We hope you will join in this effort by participating in the survey. For more information, visit the FOM website: https://www.friendsofmessalonskee.com.

Sincerely,

Linda Warner
President, Friends of Messalonskee

Copy of the landowner letter that was sent to 2,371 landowners in the Messalonskee Lake watershed in August 2021.

Shoreline properties that did not meet the criteria of an NPS site (active erosion with a direct connection the waterbody) but were deemed worthy of some additional technical support were documented on a "LakeSmart Referral" field sheet. Examples of properties in this category may include sites with large areas of lawn and little to no shoreline buffer, small buffers that need enhancing, shorelines with invasive plants, landowners that requested a LakeSmart visit or YCC assistance, and private boat launches. The FOM intends to follow-up with educational materials to these landowners and offer technical assistance where it is needed.

Examples of volunteers documenting NPS sites in the Messalonskee Lake watershed.

The data collected during the survey was uploaded from the tablets and entered into an Excel database. Documented NPS sites were plotted on maps using Geographical Information Systems (GIS). Mapping coordinates were manually corrected if needed to account for poor satellite reception or human error in the field based on recorded address or tax map/lot number.

DESCRIPTION OF SURVEY SECTORS

The watershed was divided into 20 survey sectors based on the number of roads and developed lots in each area of the watershed and the estimated time needed to survey these areas. Most of the sectors extend from the shoreline to the high point of the watershed. The exceptions are sector 11 and a portion of sector 12, which encompass the southern portion of the upper watershed along Belgrade Stream. A brief description of each sector is provided below.

Sector 1- Sector 1 is located at the northern tip of the watershed in the Town of Oakland. This sector runs along the northeastern shore of the lake, extending to the outer watershed. It begins south of the lake's outlet on Middle Road and is bordered on the south by Webb Road, Gallagher Road, and Cedar Village Drive. Other major roads include Cedar Village Place, Heritage Road, Swett Place, and the beginning of Candy Hill Road.

Sector 2- This sector is within the Town of Oakland and includes a stretch of land on the northeastern shore of the lake. Sector 2 extends south from the border of Sector 1 at Cedar Village Drive to Sunny Shore Place. All of Sunny Shore Place is included in this sector, along with Morse Point Place, Staghorn Place, Hemlock Place, Aviator Place, Andrew Terrace, and the south fork of Cedar Village Drive. Snow Pond Road runs north to south through the length of the sector.

Sector 3- Sector 3 is located in the towns of Oakland and Sidney. This sector begins just south of Sunny Shore Place and continues south to include Daisy Land. Pond Road runs through the sector as well as other shoreline roads, including Bluebell Lane, Azalea Lane, Aster Lane, and Gifford Place. This sector extends from the lake shore to the outer watershed.

Sector 4- Entirely within the Town of Sidney, this sector encompasses another stretch of the watershed's eastern edge along the lake shore, beginning south of Daisy Lane and continuing to Hosta Lane and Goodhue Road, which form the southern border and are just outside the sector. Pond Road runs north to south through the sector. Other roads in the sector include Hosta Lane North, Gardenia Lane, Foxglove Lane, Dockside Lane, and Bailey Road on the southeast corner of the sector. Although most development is concentrated along the shoreline, there are a few farms in the upper watershed within Sector 4.

Sector 5- Sector 5 begins with Hosta Lane and Goodhue Road as its northern border and continues to include Lily Lane to the south. A state-owned boat launch is located at the very north end of the sector. Sector 5 encompasses the entire stretch of the watershed between these two roads, including the intersection of Goodhue Road and Tiffany Road at the northeast corner of the watershed, and a small portion of Tiffany Road before it leaves the watershed. Pond Road runs through the west side of the sector, which also includes Juniper Lane, Ivy Lane, Iris Lane, Hollyhock Road, and Hosta Lane South. Development is mostly concentrated around Pond Road, as well as portions of the shoreline.

Sector 6- This sector is located in the Town of Sidney on the east side of the watershed and encompasses another stretch of Pond Road and all the shoreline development along Pond Road. This sector begins just south of Lily Lane and continues to include Lupine Lane, Marigold Lane, and Milkweed Lane.

Sector 7- Sector 7 is in the Town of Sidney and follows Pond Road south from Morning Glory Lane to Lake Ridge Drive. It includes Lake Ridge Drive, as well as Bartlett Drive which stretches from Pond Road east to the outer edge of the watershed. Almost the entire shoreline in this sector is highly developed.

Sector 8- This sector continues following Pond Road south from the border of Sector 7 and continues to include Pepper Ridge Road on its southwest corner. Other roads include Orchid Lane, Poppy Lane, Poinsettia Lane, Cowan Ridge Road, Primrose Lane, and Rolling Acres Drive. There are several farms along Pond Road in this sector.

Sector 9- Sector 9 is in the Town of Sidney south of Sector 8 and includes Redcedar Lane, Snow Pond Lane, Rainbow Lane, and a stretch of Pond Road. The outer portion of the watershed in this sector is undeveloped. There is development along most of the shoreline, and a few farms along Pond Road.

Sector 10- Sector 10 is located in the towns of Sidney and Belgrade, as well as a small portion at the southern tip of the sector in Manchester. It encompasses the southeastern tip of the watershed and is bordered on the northwest by Belgrade Stream. It includes a large wetland area to the south of the lake, as well as the state-owned boat launch at the south end of the lake. Major roads include Pond Road and Route 27 (Belgrade Road), Knowles Road, Penny Road, Mills Road, and Bean Glenn. The southern border of the sector roughly parallels Sanford Brook.

Sector 11- This sector encompasses the southwestern corner of the watershed and is located in the towns of Belgrade, Readfield, and Mount Vernon. This is the only sector that does not include any direct shoreline on Messalonskee Lake. Its southeastern border roughly parallels Hoyt Brook, and Belgrade Stream runs through the middle of the sector. The entire length of Meadow Brook is located in the north end of the sector. Major roads include Wings Mills Rd, Dunn Rd, Bartlett Rd, and Plains Rd. This sector includes the Wings Mill Dam at the outlet of Long Pond.

Sector 12- Sector 12 is located in the Towns of Belgrade, Mount Vernon, and Readfield. It follows Route 32 as it runs through the south end of the watershed and is split by Belgrade Stream. Augusta Road runs through the north end of the sector, and most of the commercial and municipal development in the sector is located along this road, including Hammond Lumber, Christy's Country Store, a post office, softball fields, and the Belgrade town office. The sector includes most of the reach of Sanford Brook in the south, as well as the large wetland area on the southwest shore of the lake. Other major roads include Gordan Rd, Minot Hill Rd, and Depot Rd.

Sector 13- This sector is a narrow strip of land that makes up the western side of the watershed, from the lake shore to the outer edge. It is located entirely within the Town of Belgrade. Route 8 (Oakland Road) runs north to south through the sector, which begins just south of Child's Lane and continues to include Thistle Hill Lane at its north end. Other roads in the sector include Blethen Rd, Dustin Dr, and Hayslett Woods Rd. Development is concentrated around Route 8, with some shoreline development along the shoreline.

Sector 14- Sector 14 forms another stretch of the western watershed in the Town of Belgrade. It begins just north of Thistle Hill Lane and continues to include Balsam Lane on its north end. Oakland Road runs through the length of the sector, and other roads include Walnut Lane, Ash Road, Cyr Road, Wanser Lane, Apple Lane,

and Balsam Lane. Most development is located on Route 8, but the shoreline along Ash Road and Walnut Lane is also developed with camps.

Sector 15- Sector 15 is located in the Town of Belgrade on the west shore of the lake. Belgrade Road runs along the western edge of the sector. The sector encompasses the shoreline along Station Road and its offshoots, including Kayak Lane, Higher Ground Drive, Five Fingers Lane, and Drummond Lane.

Sector 16- This sector includes a highly developed portion of the lake's western shoreline. It is entirely within the Town of Belgrade and its northern border is the town line between Belgrade and Oakland. Route 11 (Oakland Road) runs through the middle of the sector. Roads along the shoreline include Croquet Lane, Savage Way, Cathedral Pines, and Ambrose Cove. Stoney Ridge Road and West Hill Drive are located on the west side of the sector, in the outer watershed.

Sector 17- Sector 17 is another stretch of the eastern watershed, located entirely within the Town of Oakland. It includes Dore Lane on its south end and Blake Lane on its north end. Route 11 (Belgrade Road) runs north to south through the sector, which also includes Sparkling Lake Lane, as well as portions of East Side Trail and Town Farm Road on the western edge of the watershed.

Sector 18- This sector is entirely within the Town of Oakland and stretches across the western watershed from the shoreline to its outer boundary. Route 11 (Belgrade Road) runs through the middle of the sector, which also includes Gabriels Way, Fire Road B-2, and Rocky Shore Lane. Most of the shoreline in this sector is developed with camps.

Sector 19- Sector 19 encompasses the northwest corner of the watershed. There is a small strip of shoreline within this sector that includes development along Summer Street, Belgrade Road, and Belgrade Avenue, and ends at Oakland Waterfront Park. The rest of the sector includes a large area of managed forest in the upper watershed, as well as farms and development around Route 11, Axtell Drive, NW Road, and Lakeview Drive. This sector is highly developed due to its proximity to downtown Oakland.

Sector 20- Sector 20 includes the lake's shoreline between Oakland Waterfront Park and Fire Road B-2. It includes Wiley Point Road and the shoreline development along the road.

WATERSHED SURVEY RESULTS

SUMMARY OF SURVEY FINDINGS

A total of 247 NPS pollution sites were documented in the Messalonskee Lake watershed.

Volunteers and technical staff identified 247 sites across the watershed that are currently affecting or have the potential to negatively affect the water quality of Messalonskee Lake (Appendix C). The greatest number of sites were documented on the northern shores of Messalonskee Lake, with Sector 13 having the greatest number of total sites (30 sites), followed closely by Sector 2 (26 sites), Sector 18 (21 sites), and Sector 16 (20 sites). There was at least one site documented in each of the 20 survey sectors. Some key conclusions from the survey include:

- **Everyone has a stake in improving water quality** because NPS sites were identified across 13 different land-use types throughout the watershed. Residential and commercial landowners, homeowner and road associations, and state and town officials will all need to work together to reduce the impact that NPS pollution has on the water quality of Messalonskee Lake.

- **Residential Development:** In rural lake watersheds, residential development is typically located along the shoreline serviced by both major roadways and private gravel roads. Messalonskee Lake is no exception, with dense residential development (year-round and seasonal) along the shoreline. The number of NPS sites stemming from residential development far exceeds any other land-use type surveyed in the watershed (51%). The high- (4 sites) and medium-impact residential sites (47 sites) should be considered a priority for lake protection. However, low-impact residential sites make up the majority of the documented residential sites (76 sites) and could easily be addressed by landowners with assistance of programs such as the FOM LakeSmart program and the 7 Lakes Alliance YCC program to provide guidance to landowners about designing and installing Best Management Practices (BMPs), including establishing or adding to existing shoreline buffers, building rain gardens, mulching bare soil, and installing roof dripline trenches.

Lack of shoreline vegetation and bare soil near the shoreline creates erosion problems that allow nutrients and sediments to get to the lake.

Many of the other documented problems such as trails and paths, and boat and beach access sites are associated with residential development, making the total impact from residential development higher than what is reflected in the summary statistics.

- **Beach, Boat Access & Trails & Paths:** Easy access to our lakes is an important consideration for shoreland residents and recreational enthusiasts alike. However, the soil in these areas can become compacted as a result of vehicle and foot traffic over many years creating a direct route for soil erosion to get into the lake. Combined, shoreline access issues including trails and paths leading to the beach and boat access sites on Messalonskee Lake account for 5% of all documented NPS sites (13 sites), nine of which ranked either high- or medium-impact. One boat site is associated with the public boat launch on Augusta Road and one with an informal boat launch on Bartlett Road in Mount Vernon. The majority of the other lake access sites are associated with private camps and residences.

- **Driveways & Private Roads:** In rural watersheds, development is typically focused along major roads servicing residential homes. Cumulatively, poorly maintained gravel driveways and private roads, culverts, road shoulders, and build-up of winter sand can have a significant impact on water quality if not well maintained. Combined, driveways and private-road sites account for 27% of survey sites (35 driveway sites, 33 private-road sites) including 11 high- or medium-impact sites.

Erosion on private roads can result in significant delivery of nutrients and sediments to Messalonskee Lake.

- **Commercial Development:** Commercial development often contains larger areas of impervious surfaces (e.g., roads, buildings, parking lots, etc.), as well as a more intensive use (e.g., greater foot and vehicle traffic). Therefore, commercial properties have a greater potential for stormwater runoff and erosion if not managed properly. A total of four commercial sites were documented, making up just 2% of all survey sites.

- **State and Towns Roads:** Combined, state and town road sites make up 9% of all documented NPS sites in the watershed. Town road sites were documented at 16 locations including three in the Town of Belgrade, eight in Mount Vernon, and five in Oakland. There are 7 state road sites, associated with Oakland Road in Belgrade, Belgrade Road in Oakland, and Snow Pond Road in Oakland.

- **Other (Municipal/Public & Construction):** Two municipal/public sites were documented during the survey, both located at Lakeview Cemetery in Oakland. These sites are both medium-impact. NPS pollution caused by construction was documented at four residential sites where surface erosion was actively occurring. Follow-up visits should be conducted over the next year to ensure that the problems have been resolved following completion of the construction.

Survey results are presented in more detail below. Survey data is provided in Appendix C.

RESULTS MESSALONSKEE LAKE WATERSHED

A total of 247 NPS sites were documented in the Messalonskee Lake watershed across 13 different land-use types (Figures 6 & 7). (Note: residential homes and driveways were documented separately in the field for tracking purposes.) The number of residential properties far outweighed the other land-use types. Many other sites associated with trails/paths, boat and beach access, and construction are also located on residential properties.

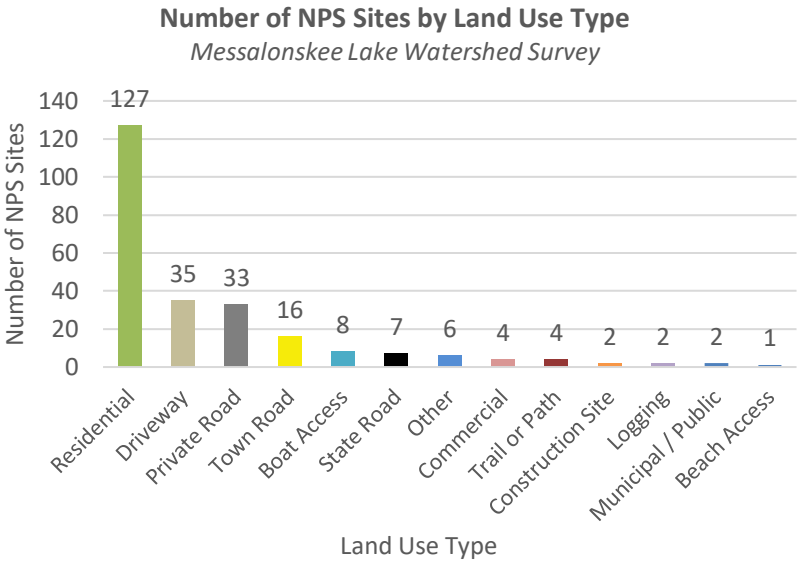


Figure 6. NPS sites in the Messalonskee Lake watershed by land-use type.

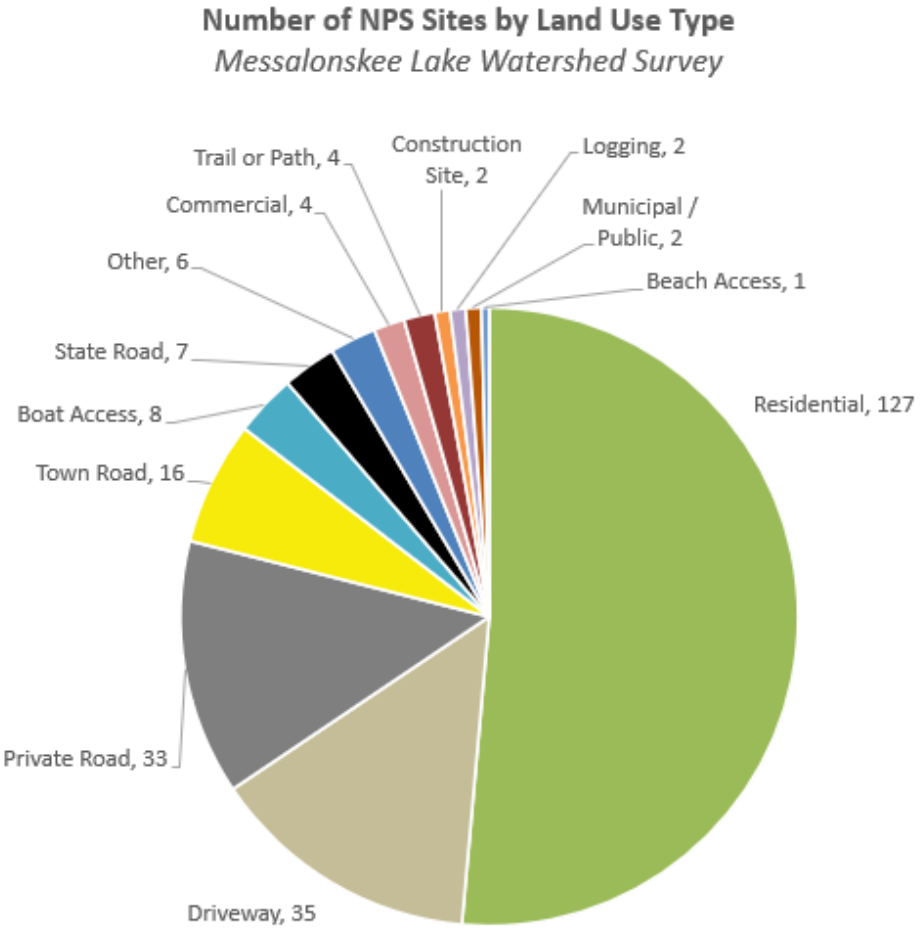


Figure 7. Distribution of NPS sites in the Messalonskee Lake watershed by land-use type.

Geographically, NPS sites were located mostly on the shoreline or on roads near the shoreline, especially concentrated at the north end of the Lake. Most sites outside of the immediate shoreline are located on state/town roads and involved stream crossings or ditches. Many of the sites in the upper watershed are associated with Belgrade Stream or its tributaries.

The greatest number of sites were documented in residential areas in Sector 13 (western shoreline), followed by Sector 2 (northeast shore), and Sectors 16 and 18 (northwest shore), which all include dense shoreline development. Density of residential development appears to be a primary factor in the number of sites per sector. Despite Sector 13 having the greatest number of sites, it also has the highest number of low-impact sites, whereas Sector 2 has the greatest number of high- and medium-impact sites (Figure 8). Areas with more high- and medium-impact sites should be focused on for improvement because they may be delivering more sediment to the lake, even if they have a lower number of sites.

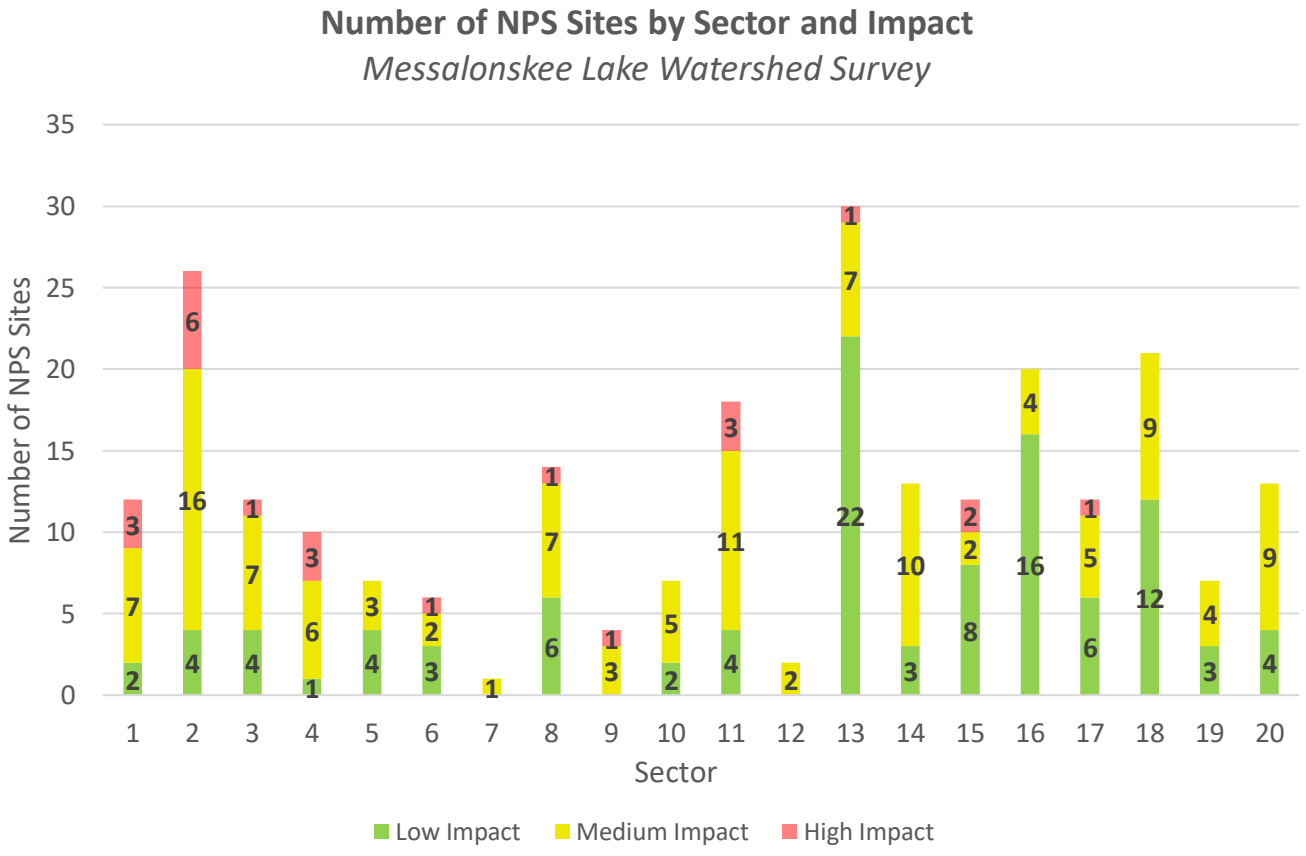


Figure 8. NPS sites by sector in the Messalonskee Lake watershed.

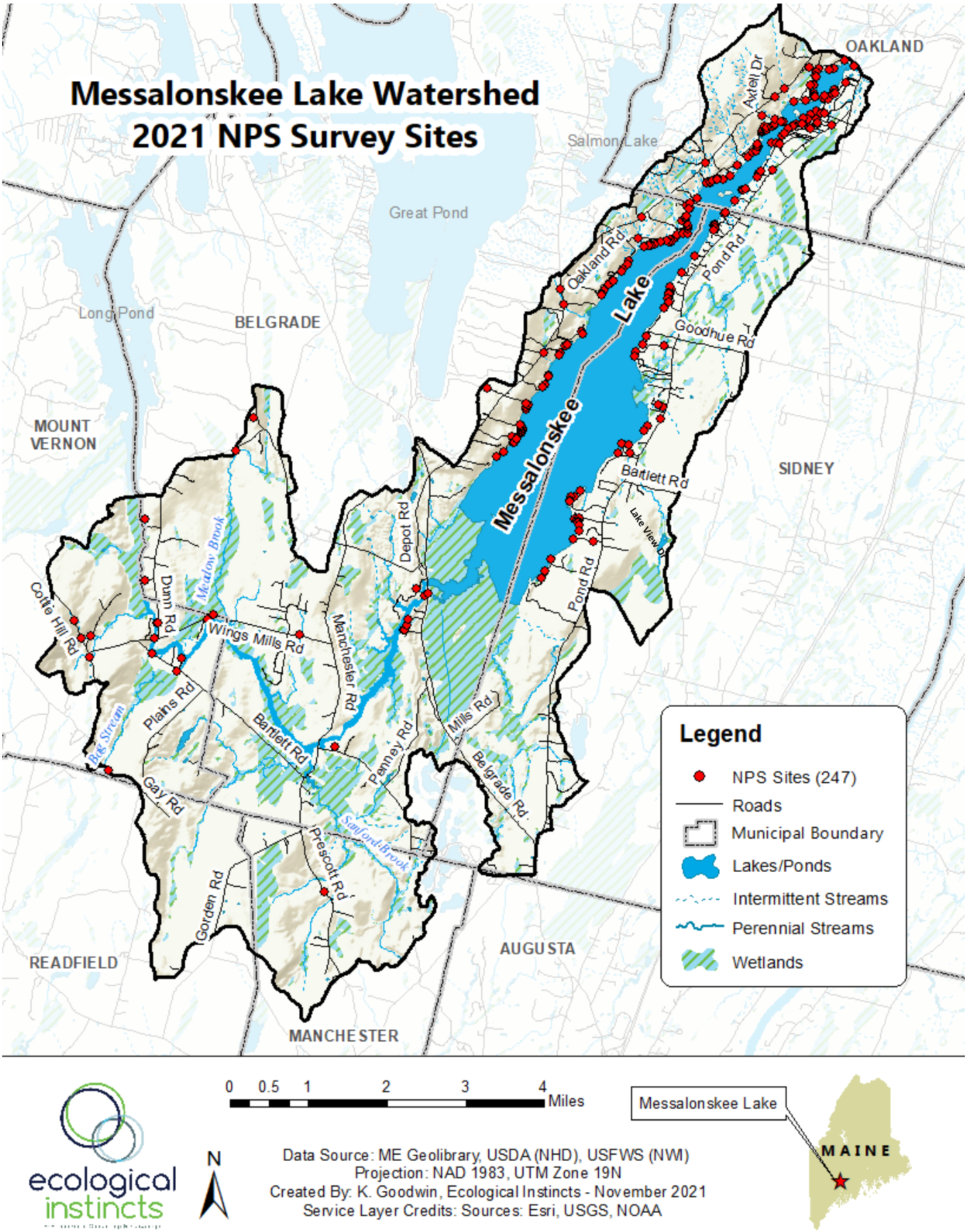


Figure 9. Map of NPS sites in the Messalonskee Lake watershed.

Impact of NPS Sites: The impact that documented NPS sites may have on the water quality of Messalonskee Lake was determined in the field based on the proximity to a waterbody and the magnitude of the problem. Factors such as slope, soil type, amount of eroding soil, and buffer size were also considered. A closer look at the estimated impact of these sites indicates that only 23 of the 247 NPS sites ranked high-impact compared to 120 medium- and 104 low-impact sites (Table 3). Residential NPS sites had the greatest number of low- and medium-impact sites, accounting for 51% of all sites, and 73% of the low-impact sites. Private roads had the greatest number of high-impact sites, accounting for 30% of high-impact sites.

Table 3. Summary of NPS sites in the Messalonskee Lake watershed by land use and impact.

Land Use	High Impact	Medium Impact	Low Impact	Total	% of Total
Residential	4	47	76	127	51%
Driveway	4	22	9	35	14%
Private Road	7	20	6	33	13%
Town Road	3	8	5	16	6%
Boat Access	0	6	2	8	3%
State Road	0	4	3	7	3%
Other	2	4	0	6	2%
Commercial	1	3	0	4	2%
Trail or Path	1	1	2	4	2%
Construction Site	0	1	1	2	1%
Logging	0	2	0	2	1%
Municipal / Public	0	2	0	2	1%
Beach Access	1	0	0	1	0%
Total	**23**	**120**	**104**	**247**	**100%**

Examples of residential NPS sites: a) Shoreline erosion caused by removal of native vegetation to create a beach on a residential site in Sector 8 (above); and b) an eroding path to the lake in Sector 13 (right).

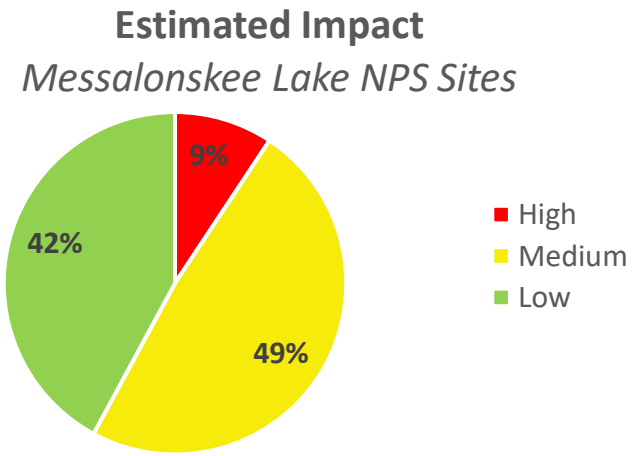


Figure 10. Estimated impact of NPS sites in the Messalonskee Lake watershed.

Low-impact sites are those with limited transport of soil off-site.

Medium-impact sites exhibit sediment transportation off-site, but the erosion does not reach high magnitude.

High-impact sites are those with large areas of significant erosion and direct flow to water.

Examples of residential sites ranked high (left), medium (middle), and low (right) impact.

Examples of road sites ranked high (left), medium (middle), and low (right) impact.

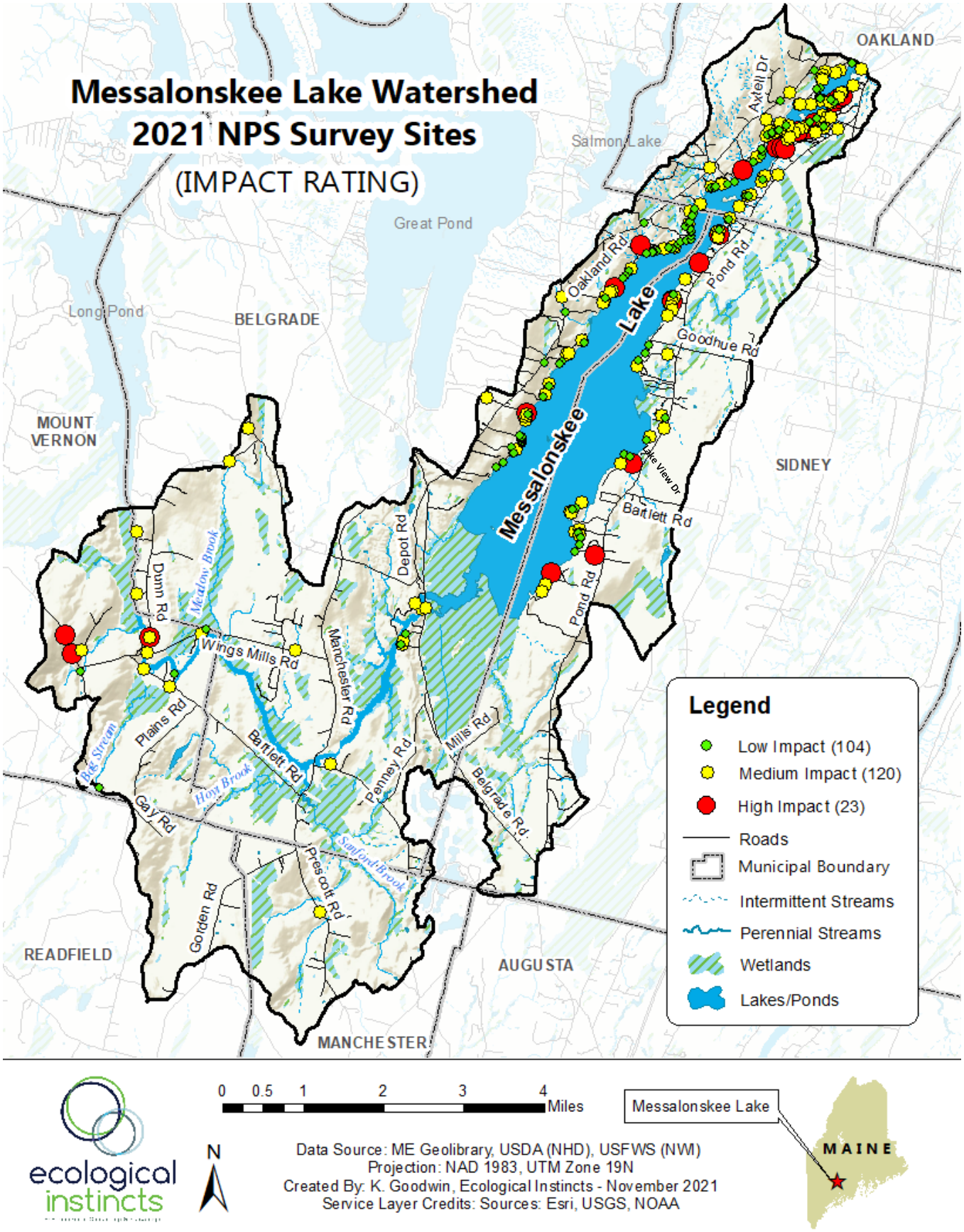


Figure 11. Map of NPS sites in the Messalonskee Lake watershed by impact ranked low to high.

The majority (91%) of sites are medium- or low-impact, while only 9% of sites are high-impact. High-impact sites are primarily associated with private roads and town roads (43%), residential development (17%) and driveways (17%). Maps showing NPS results by sector, land-use type and impact are presented in Appendix C.

Residential: 127 residential sites were documented in the Messalonskee Lake watershed, representing 51% of the total documented sites. Common problems include bare soil, surface erosion, roof runoff, unstable access to the shoreline, and lack of shoreline vegetation to filter and prevent runoff from getting to the lake. While the majority of residential sites are low-impact (76 of the 127 sites), the cumulative impact of these sites, combined with the 47 medium- and 4 high-impact sites undoubtedly results in a significant load of phosphorus making its way to the lake.

Example of a medium-impact residential site in Sector 2.

Driveways: Driveways provide conduits for water to travel during rainstorms, and if not properly built or maintained, or with proper runoff controls, can result in surface erosion, carrying nutrients and sediment to the nearest ditch, stream, or directly to the lake. Driveways often lead directly to a house on the shoreline, are unpaved (gravel), or run perpendicular to the lake and create a straight path for runoff to flow into the lake.

- Gravel driveway sites account for 35 of the 247 documented NPS sites across the watershed including 22 medium-impact, 9 low-impact, and 4 high-impact sites.
- Most of the driveway sites are associated with residential development. Geographically, the sites are concentrated along the shoreline.

Example of a medium-impact driveway site in Sector 10.

Roads: Road sites generally have larger erosion problems, which in turn result in a more significant impact on the water quality of the lake and can be more costly than other fixes. A total of 56 road sites were documented in the watershed including private, town, and state roads. Seven private-road sites and three town-road sites ranked high-impact. These sites should be prioritized for remediation in the near future.

Example of a medium-impact private-road site in Sector 18.

- **Private-road** sites make up the majority of documented road sites (33 sites), or 66% of all road sites. Common problems associated with private roads include surface erosion (resurfacing needed), plow/grader berms, ditch erosion, and unstable, clogged and/or undersized culverts.
- Sixteen **town-road** sites were documented in the watershed. Most of the sites resulted in flow of nutrients and sediments into a stream that connects to Messalonskee Lake, but some were documented on roads directly adjacent to the lake with potential to cause erosion through small ditches or drainage areas with inadequate vegetation. The majority of the town road sites are located in Mount Vernon. Problems with town road sites are a result of unstable or clogged culverts, direct discharge to a stream (need turnouts and retention/detention basins), and unstable road shoulders.
- Three of the seven **state-road** sites are located on Rt. 8 (Oakland Road in Belgrade), two are located on Snow Pond Road in Oakland, and two are on Belgrade Road in Oakland on the northwest side of the watershed. Problems at these sites include road shoulder erosion, and unstable and/or undersized culverts. All the road sites identified are either low- or medium-impact.

Trails/Paths: Four trail/path sites are associated with residential properties or commercial camps to access the shoreline, docks, boats, or camp sites. Erosion on paths is exacerbated by continuous foot traffic, bare soil, and moderate to steep slopes. Trails and paths without runoff diverters, infiltration steps or erosion control mulch will continue to carry runoff into the lake.

- While two of these sites ranked low-impact, one site ranked medium-impact, and one ranked high-impact. These should be prioritized for remediation.

An eroding trail requires repair to prevent soil erosion from getting to a stream and then into the lake on this high-impact site in Sector 1.

Commercial: A total of four commercial NPS sites were documented during the survey. These sites are associated mostly with businesses in Belgrade and Oakland.

- Three of the commercial sites ranked medium-impact, and one ranked high-impact. The majority of problems are associated with surface erosion as a result of bare soil and inadequate shoreline vegetation. At one site, problems were associated with a pond that drains to a stream and eventually into the lake.

Lack of shoreline vegetation and a steep slope is causing erosion at this commercial site in Sector 15.

Boat & Beach Access: In addition to trails and paths that lead to the lake, eight boat-access and one beach-access site was documented in the watershed. Most of the boat access sites are located on residential properties or private camps, while one is associated with the state-owned boat launch on Augusta Road. The beach access site is rated high-impact, while the boat access sites are ranked medium-impact (6 sites), or low-impact (2 sites).

Cost of NPS Sites: Recommendations were made for improving each site, along with the estimated cost of labor and materials for all 247 sites. Only 31 of these sites are estimated to incur a high cost (over $2,500), while the remainder of sites were split between low- (less than $500/111 sites) and medium-cost ($500- $2,500/105 sites) (Figure 12).

Example of a medium-impact boat access site in Sector 4.

Private roads (12), driveways (10 sites), and town roads (4 sites) have the greatest number of high-cost sites. Residential sites make up the greatest number of medium (34) and low-cost (90) sites. There are eight more high-cost sites than high-impact sites as a result of five high-cost, low-impact sites and 13 high-cost, medium-impact sites. On the other hand, ten of the high-impact sites ranked either low or medium-cost. These should be prioritized for remediation. Around 50% of all residential sites are both low-impact and low-cost.

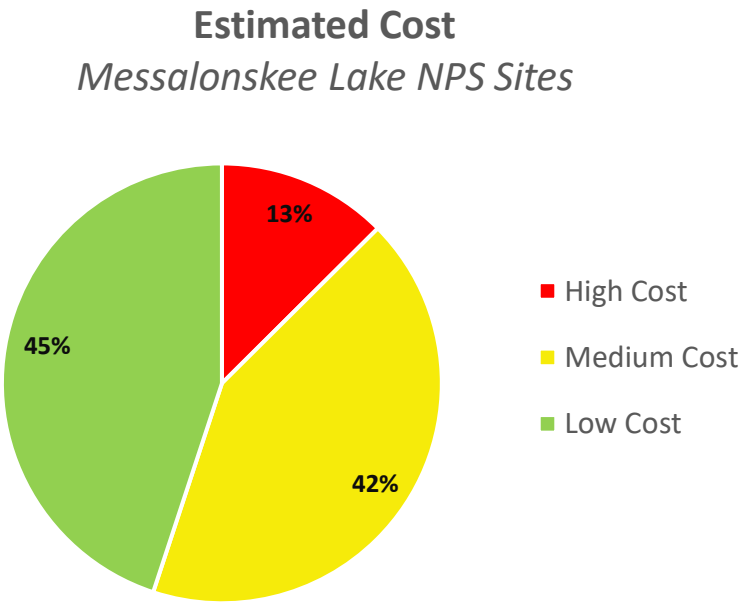


Figure 12. Estimated cost of NPS sites in the Messalonskee Lake watershed.

Low-cost sites are estimated to cost less than $500.

Medium-cost sites range from $500 to $2,500.

High-cost refers to sites estimated to cost more than $2,500.

RESIDENTIAL AREAS

Problem: BARE SOIL, SURFACE EROSION, INADEQUATE SHORELINE VEGETATION

Solution: Control runoff from impervious surfaces. Use erosion control mulch in areas with exposed soil, and plant hardy native vegetation along the shoreline to stabilize banks and filter runoff. Consider planting vegetation before using rip rap, or use a combination of both, minimize lawn areas, and add dripline trenches to roof driplines.

Sector 13: Site 2

Vegetated buffers filter out pollutants
(Photo: Maine DEP)

Erosion control mulch & vegetative planting
(Photo: AWWA)

Problem: UNSTABLE BEACH & BOAT ACCESS

Solution: Stabilize eroding shorelines by planting a vegetated buffer consisting of a combination of native plants and erosion control mulch or install a rain garden. The roots from these plants will stabilize the shoreline, filter pollutants running off the land, and provide habitat for wildlife. Alternatively, just let the shoreline naturalize by not mowing a wide strip along the shoreline.

Sector 14: Site 4

Allow the shoreline to naturalize by not mowing right to the edge
(Photo: Maine DEP)

Gather neighbors to plant a buffer of flowering shrubs that attract butterflies and provide color year-round
(Photo: J. Jespersen)

Residential Areas Continued…

Problem: UNSTABLE TRAILS & PATHS & ERODING ROOF DRIPLINES

Solution: Retrofit trails and paths so that they are well defined, narrow (<3 ft), and winding. Install water bars or infiltration steps on steeper slopes to divert or infiltrate runoff and mulch all bare soil areas and install infiltration trenches on roof driplines.

Sector 2: Site 10

Dripline trench & erosion control mulch (Photo: AWWA)

Infiltration steps protect steep slopes w/foot traffic

DRIVEWAYS & ROADS

Problem: MODERATE TO SEVERE SURFACE EROSION ON DRIVEWAYS

Solution: Re-grade, reshape and/or crown driveways; add new surface material; install runoff diverters such as rubber razors or water bars; maintain and repair existing rubber razors or other driveway runoff diverter annually and after large storm events.

Sector 5: Site 4

Rubber razors direct water off driveways and into vegetation

Resurfacing driveways with hard-packing, cohesive surface material prevents erosion

Problem: ROAD EROSION, UNSTABLE OR UNDERSIZED CULVERTS

Solution: Reshape and regrade gravel roads, add new surface material, install ditching where needed, and line ditches with rock and vegetate for stability. Replace failing, plugged, crushed or undersized culverts, and stabilize inlets/outlets with rip rap; add runoff diverters; clean up winter sand.

Sector 5: Site 7

Reshape gravel roads, add new surface material, and install runoff diverters

Replace undersized and perched culverts, remove clogs, armor inlets/outlets and install plunge pools

CONSTRUCTION SITES

Problem: ROOF RUNOFF EROSION, SURFACE EROSION, BARE SOIL

Solution: Install temporary Best Management Practices (BMPs) before construction begins to prevent delivery of sediment to the lake. These may include erosion control mulch berms, hay bales and/or silt fences. Permanent BMPs must be installed following construction to stabilize all bare soil areas. This includes installing a healthy buffer of vegetation along the shoreline and vegetating or mulching all bare soil.

Sector 8: Site 8

Install temporary BMPs such as an erosion control mulch berm prior to beginning construction (Photo: Maine DEP)

Install permanent BMPs once construction is complete including seed/ haying bare soil and installing vegetation on the shoreline (Photo: Maine DEP)

SUMMARY & NEXT STEPS

SUMMARY

The 2021 Messalonskee Lake watershed survey identified 247 individual NPS sites throughout the watershed. The survey focused on all developed land (with permitted access) that drains to or has the potential to drain to the lake, carrying stormwater and other pollutants of concern. Survey results indicate that a majority of NPS sites are located on residential properties, mostly associated with lack of native vegetation on the shoreline to filter pollutants. This does not account for all beach and boat access sites, driveways, or trails and paths located on residential properties, or the private gravel roads that provide access to these homes and camps.

Example of an excellent shoreline buffer between the lake and the house with multiple types and heights of vegetation.

The cumulative effect of all NPS sites across numerous land-use types results in the delivery of excess phosphorus to Messalonskee Lake via stormwater runoff. With leadership from FOM's LakeSmart Program and help from the 7 Lakes Alliance's YCC, landowners can be better informed about the impact that their property has on the lake and have access to the technical assistance needed to address these problems. Follow-up work is needed to meet with state and town officials, and road and homeowner associations to discuss next steps and potential funding opportunities.

PRIORITIZING NPS SITES

Addressing runoff from existing watershed development is currently the best solution for protecting and improving water quality in the Messalonskee Lake as well as supporting activities that result in reduction of pollutants in upstream lakes. An efficient means by which to prioritize sites includes sorting all sites by impact and cost to select sites with the greatest impact to water quality for the lowest cost to fix. Additional factors include identifying sites with a high likelihood of being completed (landowner willingness), and consideration of sites with a good educational value (public beach, boat launch, etc.).

Preliminary prioritization of the 247 survey sites began with feedback from the watershed survey steering committee at the December 1, 2021 meeting (Table 4). Further prioritization and specific recommendations for these sites will be completed by FOM and 7 Lakes Alliance as part of the development of the 2022 Watershed Protection Plan and for future grant applications to address these sites.

Table 4. Prioritized list of NPS sites in the Messalonskee Lake watershed.

Location	Notes
Sector/Site Specific Priorities	
Sector 1	Path and streambank sites on Cedar Village Place (1-3, 1-9)
Sector 2	High- and medium-impact driveway sites on Cedar Village Place (2-1, 2-4), high-impact residential site (2-13a), high-impact driveway sites on Pratt Place and Hemlock Lane (2-32, 2-35), High-impact private road sites on Morse Point Place (2-13b, 2-14)
Sector 3	Medium impact driveway and residential sites on Gaunce Place (3-1 through 3-4), Medium and high impact sites on Bayberry Lane (3-9 through 3-12)High-impact driveway site on Bayberry Lane (3-11)
Sector 4	High-impact residential site on Daisy Lane (4-1), high- and medium-impact sites at NEMC (4-5 through 4-10)
Sector 6	High-impact private road site on Milkweed Lane (6-4)
Sector 8	High-impact residential site on Pond Road (8-14)
Sector 9	High-impact residential site on Red Cedar Lane (9-1)
Sector 11	High- and medium-impact town road sites on Dunn Road, Bartlett Road, Cottle Hill Road, and Spring Hill Road (11-5 through 11-9, 11-14 through 11-16), four medium- and low-impact town road sites on Wings Mill Road in Belgrade and Mount Vernon (11-7, 11-11, 11-13, 11-17)
Sector 13	High and medium-impact private road sites on Dustin Drive (13-28, 13-26), medium- and low-impact residential sites on Dustin Drive (13-25, 13-27, 13-27a), one medium-impact town road site on Burton Woods Road (13-29)
Sector 15	High-impact private road site on Five Fingers Road (15-7), high-impact site at a commercial camp (15-12)
Sector 17	High-impact private road site on Blake Lane (17-12), high-impact state road site on Belgrade Road (17-7)
Sector 20	Four medium- and low-impact town road sites on Willey Point Road (20-1 through 20-3, 20-6), medium-impact residential sites on Willey Point Road
General Priorities	
State and Town Sites	Prepare a list of town-owned watershed survey sites and send to the towns for their annual budget planning (town beaches, parks, and roads); set up a meeting with Maine DOT to discuss sites located on state roads
Private Roads	Prepare a list of NPS sites on private roads and reach out to road associations; send a letter and present results at annual road association meetings
Residential Neighborhoods & Homeowner Associations	Target residential neighborhoods with multiple sites for greater reach and impact (e.g. Cedar Village Place, Dustin Drive, Willey Point Road); target high-impact residential sites in Phase I restoration efforts. Conduct a YardScaping campaign to educate landowners about the effects of fertilizers and pesticides on lake health
LakeSmart	Follow-up with educational materials focused on buffers and runoff prevention for landowners on the LakeSmart referral form

NEXT STEPS - WHERE DO WE GO FROM HERE?

Improving the NPS sites identified during the watershed survey will require efforts by state and local municipal officials, FOM, 7 Lakes Alliance, commercial businesses, individual landowners, and road and homeowner associations. Developing a plan for addressing these sites should be a high priority for FOM and watershed towns. A Watershed-Based Protection Plan (WBPP) is needed to ensure that high- and medium-impact sites are addressed within a reasonable timeframe, and that a plan is developed for the many low-impact residential sites across the watershed. The plan will also help to identify potential funding sources and identify the roles and responsibilities of partners and local stakeholders over the next 10 years. Action steps in the Messalonskee Lake WBPP may include:

1. Presenting the results of the survey to the public, distributing summaries of the survey results to key stakeholders, and posting copies of the survey report on the FOM, 7 Lakes Alliance, and town websites;
2. Sending letters to all property owners with a documented NPS site, and giving them guidance and recommendations for addressing the problems;
3. Setting up meetings with state and town officials to review survey results and to develop a schedule for addressing these sites;
4. Developing a detailed funding and implementation plan and schedule;
5. Submitting 319 grants to address high-priority NPS sites and to help fund YCC;
6. Identifying potential LakeSmart properties and developing an outreach strategy to address the numerous low-impact shoreline sites.

In addition to the actions identified by the Watershed Survey Steering Committee, there are many things that individual landowners, commercial property owners, and municipal officials can start doing now to help with this effort.

Individual Landowners

- If you have a documented NPS site on your property, contact the FOM today for advice about how to get started.
- Become LakeSmart! Join together with your neighbors to certify your property through the FOM's successful LakeSmart program by establishing best practices on your properties. Call the FOM LakeSmart Coordinator today at (207) 618-8723 to get started!
- Replace portions of your lawn with a rain garden, buffer strip or let naturalize to filter pollutants before they reach the lake.

- Install native vegetation along the shoreline to stabilize the soil, improve wildlife habitat and help keep shoreline areas shaded and cool.
- Stop mowing and raking your shoreline and other parts of your property to bare soil. Let lawn and raked areas revert back to natural vegetation. Deep shrub and tree roots help hold the soil in place and help prevent erosion.

Remember – the long-term health of Messalonskee Lake depends on you! Help protect and improve the water quality of our lakes

- Avoid exposing bare soil. Seed and mulch bare areas. Use erosion control mulch.
- Manually remove invasive terrestrial plants that are growing on the shoreline. Contact the Kennebec County Soil & Water Conservation District for advice on managing these plants.
- Never use herbicides or pesticides in the shoreland zone unless you have a permit.
- Avoid using fertilizer within 250 ft. of the lake, and always get a soil test before applying fertilizer outside the shoreland zone to determine the correct application rate.
- Read "Permitting ABCs" (below) and call your local Code Enforcement Officer and Maine DEP before starting any cutting or soil disturbance projects.
- Maintain septic systems properly. Pump septic tanks (every 2 to 3 years for year-round residences; 4-5 years if seasonal) and upgrade marginal systems or old systems installed prior to the current state plumbing codes for septic systems (pre-1995).
- Support FOM by becoming a member, and get involved with their programs and activities, including annual meetings, LakeSmart, and other workshops.

Commercial Property Owners

- Work with FOM to become LakeSmart-certified. Clean lakes are good for business!
- Consider sponsoring a stewardship event to plant buffers and spread mulch as a marketing tool and invite the press.
- Work with the 7 Lakes Alliance to line up free labor and technical assistance to address NPS sites through the Youth Conservation Corps.

Municipal Officials

- Conduct regular maintenance on town roads in the watershed and address the town road and public sites documented in this survey.
- Enforce shoreland zoning and other ordinances to ensure the long-term protection of Messalonskee Lake.

- Participate in and support long-term watershed management projects by serving on watershed committees, serving as a sponsor for grant applications and setting aside funding for long-term water quality monitoring and lake protection projects.
- Promote education and training for road crews, code enforcement officers, selectmen, planning board members and other decision makers.

CONSERVATION PRACTICES FOR HOMEOWNERS

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

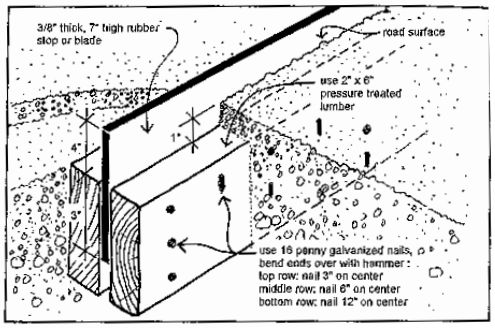
Fact sheets are available to help you install conservation practices on your property. Download at: https://www.maine.gov/dep/land/watershed/materials.html

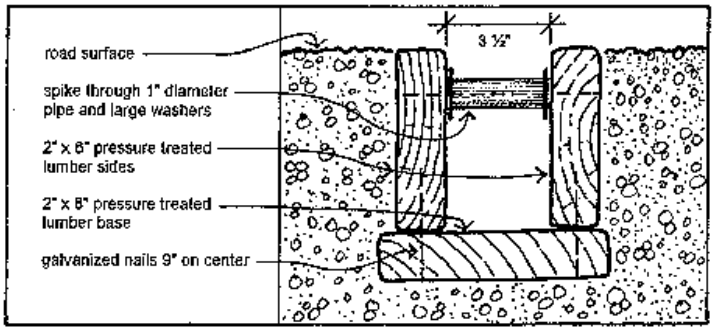
A series of fact sheets are available that answer many common how-to questions about installing Best Management Practices (BMPs). The fact sheets profile 20 common conservation practices and include detailed instructions, diagrams and color photos about installation and maintenance. The series includes the following:

Construction BMPs	Native Plant Lists (4)	Rain Gardens
Dripline Trench	Open-Top Culverts	Rubber Razors
Drywells	Paths and Walkways	Shoreline Riprap
Erosion Control Mix	Permitting	Turnouts
Infiltration Steps (2)	Pervious Pathways	Waterbars
Infiltration Trench	Planting & Maintaining Buffers	Selecting Plants for Shade (3)
Live Staking	Rain Barrels	Selecting Plants for Sun (3)

Below are a few examples of Best Management Practices (BMPs), including how to install a rubber razor and open top culvert- both of which are used for getting water off of gravel roads and driveways. A drywell is useful for collecting runoff from gutters. Similarly, a gravel dripline trench can be used on homes that do not have gutters. These are typically 18 - 24" wide and slightly longer than the roof.

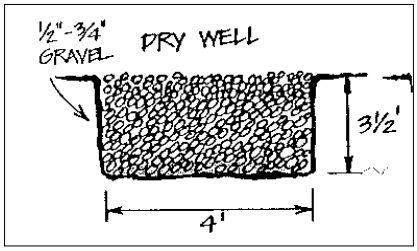
Rubber Razor Blade: Use this structure in a gravel driveway or camp road. It can be plowed over only if the plow operator is aware of its presence and lifts the plow blade slightly. Place it at a 30 degree angle to the road edge and direct the outlet toward a stable vegetated area.





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

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



PERMITTING ABC'S

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

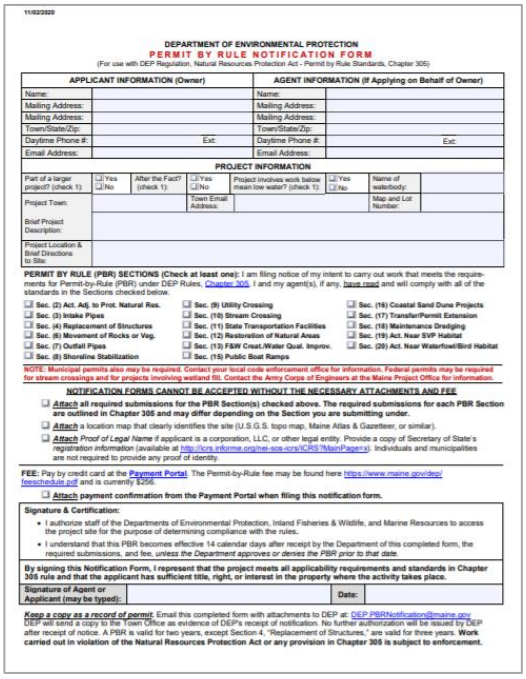
Shoreland Zoning Law **-** Construction, clearing of vegetation and soil movement within 250 feet of lakes, ponds, and many wetlands, and within 75 feet of most streams, falls under the Shoreland Zoning Act, which is administered by the towns through the Code Enforcement Officer and the Planning Board.

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

Contact the Maine 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 the town to be sure.

HOW TO APPLY FOR A PERMIT BY RULE WITH THE MAINE DEP

To ensure that permits for small projects are processed swiftly, the DEP has established a streamlined permit process called **Permit by Rule**. The one-page form (right) is simple to fill out and allows the DEP to quickly review the project.



DEPARTMENT OF ENVIRONMENTAL PROTECTION

PERMIT BY RULE NOTIFICATION FORM

(For use with DEP Regulation, Natural Resources Protection Act - Permit by Rule Standards, Chapter 305)

APPLICANT INFORMATION (Owner)		AGENT INFORMATION (If Applying on Behalf of Owner)	
Name:		Name:	
Mailing Address:		Mailing Address:	
Mailing Address:		Mailing Address:	
Town/State/Zip:		Town/State/Zip:	
Daytime Phone #:	Ext:	Daytime Phone #:	Ext:
Email Address:		Email Address:	

PROJECT INFORMATION

Part of a larger project? (check 1):	☐Yes ☐No	After the Fact? (check 1):	☐Yes ☐No	Project involves work below mean low water? (check 1):	☐Yes ☐No	Name of waterbody:	
Project Town:		Town Email Address:				Map and Lot Number:	
Brief Project Description:							
Project Location & Brief Directions to Site:							

PERMIT BY RULE (PBR) SECTIONS (Check at least one): I am filing notice of my intent to carry out work that meets the requirements for Permit-by-Rule (PBR) under DEP Rules, Chapter 305. I and my agent(s), if any, have read and will comply with all of the standards in the Sections checked below.

☐ Sec. (2) Act. Adj. to Prot. Natural Res.	☐ Sec. (9) Utility Crossing	☐ Sec. (16) Coastal Sand Dune Projects
☐ Sec. (3) Intake Pipes	☐ Sec. (10) Stream Crossing	☐ Sec. (17) Transfer/Permit Extension
☐ Sec. (4) Replacement of Structures	☐ Sec. (11) State Transportation Facilities	☐ Sec. (18) Maintenance Dredging
☐ Sec. (6) Movement of Rocks or Veg.	☐ Sec. (12) Restoration of Natural Areas	☐ Sec. (19) Act. Near SVP Habitat
☐ Sec. (7) Outfall Pipes	☐ Sec. (13) F&W Creat./Water Qual. Improv.	☐ Sec. (20) Act. Near Waterfowl/Bird Habitat
☐ Sec. (8) Shoreline Stabilization	☐ Sec. (15) Public Boat Ramps	

NOTE: Municipal permits also may be required. Contact your local code enforcement office for information. Federal permits may be required for stream crossings and for projects involving wetland fill. Contact the Army Corps of Engineers at the Maine Project Office for information.

NOTIFICATION FORMS CANNOT BE ACCEPTED WITHOUT THE NECESSARY ATTACHMENTS AND FEE

☐ ***Attach*** **all required submissions for the PBR Section(s) checked above. The required submissions for each PBR Section are outlined in Chapter 305 and may differ depending on the Section you are submitting under.**

☐ ***Attach*** a location map that clearly identifies the site (U.S.G.S. topo map, Maine Atlas & Gazetteer, or similar).

☐ ***Attach*** *Proof of Legal Name* if applicant is a corporation, LLC, or other legal entity. Provide a copy of Secretary of State's *registration information* (available at http://icrs.informe.org/nei-sos-icrs/ICRS?MainPage=x). Individuals and municipalities are not required to provide any proof of identity.

FEE: Pay by credit card at the **Payment Portal**. The Permit-by-Rule fee may be found here https://www.maine.gov/dep/feeschedule.pdf and is currently $256.

☐ ***Attach*** **payment confirmation from the Payment Portal when filing this notification form.**

Signature & Certification:

- 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 understand that this PBR becomes effective 14 calendar days after receipt by the Department of this completed form, the required submissions, and fee, *unless the Department approves or denies the PBR prior to that date.*

By signing this Notification Form, I represent that the project meets all applicability requirements and standards in Chapter 305 rule and that the applicant has sufficient title, right, or interest in the property where the activity takes place.

Signature of Agent or Applicant (may be typed):		**Date:**	

Keep a copy as a record of permit. Email this completed form with attachments to DEP at: DEP.PBRNotification@maine.gov. DEP will send a copy to the Town Office as evidence of DEP's receipt of notification. No further authorization will be issued by DEP after receipt of notice. A PBR is valid for two years, except Section 4, "Replacement of Structures," are valid for three years. **Work carried out in violation of the Natural Resources Protection Act or any provision in Chapter 305 is subject to enforcement.**

- Fill out a notification form before starting any work. Forms are available from your town code enforcement officer, Maine DEP offices, or online at https://www.maine.gov/dep/land/nrpa/nrpa-pbr-notification.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.

CONTACT INFORMATION

Friends of Messalonskee
Linda Warner, President
Phone: (207) 618-8723
Email: friendsofmessalonskee@gmail.com
Web: www.friendsofmessalonskee.com

7 Lakes Alliance
Charlie Baeder
137 Main St. Belgrade Lakes, ME 04918
(207) 495-6039 or charlie.baeder@7lakesalliance.org
Web: www.7lakesalliance.org

Kennebec County Soil & Water Conservation District
Dale Finseth, Executive Director
2305 N. Belfast Ave. Augusta, ME 04333
(207) 622-7847 x 3 or dale@kcswcd.org ~ Web: www.kcswcd.org

Maine Lakes ~ LakeSmart Program
Susan Gallo, Executive Director
P.O. Box 427, Brunswick, ME 04011
Phone: (207) 495-2301 ~ Web: lakes.me

Maine Department of Environmental Protection
17 State House Station, Augusta, Maine 04333
Toll Free in Maine (800) 452-1942 **or** (207) 287-7688
Web: http://www.maine.gov/dep/land/watershed/index.html

PUBLICATIONS & OTHER RESOURCES

A Guide to Forming Road Associations. Maine DEP. July 2014. DEPLW-1071. 21 pgs.
https://www.maine.gov/dep/land/watershed/road_assoc_guide_2020_edit.pdf

Contractors Certified in Erosion Control Practices. Maine DEP.
maine.gov/dep/land/training/ccec.html

Environmental Fact Sheets, Brochures, and Posters. Maine DEP and Portland Water District.
https://www.maine.gov/dep/land/watershed/materials.html

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

LakeSmart Toolkit. Maine Lakes. lakes.me/LakeSmart-resources

Lake Library. Maine Lakes. https://www.lakes.me/library

Maine Mandatory Shoreland Zoning- Supplemental Materials. Maine DEP.
maine.gov/dep/land/slz/index.html

Town of Belgrade, Maine Website. townofbelgrade.com

Town of Manchester, Maine Website. manchester.govoffice2.com

Town of Mt. Vernon, Maine Website. mtvernonme.org

Town of Oakland, Maine Website. oaklandmaine.us

Town of Readfield, Maine Website. readfieldmaine.org

Town of Sidney, Maine Website. sidneymaine.org

APPENDICES

APPENDIX A: WATERSHED SURVEY FIELD DATA SHEET

Final Site #_____ Checked by _____ Date _____

2021 Messalonskee Lake Watershed Survey

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

Sector & Site_____ Date_____ Surveyor Initials _____ Time_____

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 ONE)	**Description of Problems** Circle ALL that apply	
State Road*	**Surface Erosion**	**Soil**
Town Road*	Slight	Bare
Private Road*	Moderate	Uncovered Pile
Driveway*	Severe	Delta in Stream/Lake
Residential	**Culvert**	Winter Sand
Commercial	Unstable Inlet / Outlet	**Roof Runoff Erosion**
Municipal / Public	Clogged	**Shoreline**
Beach Access	Crushed / Broken	Undercut
Boat Access*	Undersized	Lack of Shoreline Vegetation
Trail or Path	**Ditch**	Inadequate Shoreline Vegetation
Logging	Slight Erosion	Erosion
Agriculture	Moderate Erosion	Unstable Access
Construction Site	Severe Erosion	**Agriculture**
OTHER:	Bank Failure	Livestock Access to Waterbody
Potential Septic Issue	Undersized	Tilled Eroding Fields
Fertilizer Use in SLZ	**Road Shoulder Erosion**	Manure Washing off Site
Hazardous Materials	Slight	**OTHER:**
** Is it: paved, gravel or other/unknown?*	Moderate	Invasive Plants on Shoreline
	Severe	
	Roadside Plow/Grader Berm	

Slope: ❒ Flat ❒ Moderate ❒ Steep **Size of Area Exposed or Eroded** (length & width): _____

Site is linked to another: Cause of Site # _____ Result of Site # _____

Recommendations		
Culvert	**Roads / Driveways**	**Paths & Trails**
Armor Inlet/Outlet	Remove Grader/Plow Berms	Define Foot Path
Remove Clog	Build Up	Stabilize Foot Path
Replace	Add New Surface Material	Infiltration Steps
Enlarge	• Gravel	Install Runoff Diverter (waterbar)
Lengthen	• Blue Stone Gravel	Erosion Control Mulch
Install Culvert	• Pavement	**Roof Runoff**
Install Plunge Pool (I/O)	Reshape (Crown)	Infiltration Trench @ roof dripline
Ditch	Vegetate Shoulder	Drywell @ gutter downspout
Vegetate	Install Catch Basin	Rain Barrel
Armor with Stone	Install Detention Basin	**Other**
Reshape Ditch	Install Runoff Diverters	Install Runoff Diverter (waterbar)
Install Turnouts	• Broad-based Dip	Mulch / Erosion Control Mix
Install Ditch	• Open Top Culvert	Rain Garden
Install Check Dams	• Rubber Razor	Infiltration Trench
Remove debris/sediment	• Waterbar	Water Retention Swales
Install Sediment Pools	**Construction Site**	Rip Rap
Other Suggestions:	Mulch	**Vegetation**
Remove invasive plants	Silt Fence / EC Berms	Establish Buffer
	Seed / Hay	Add to/Extend Buffer
	Check Dams	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
Gully - **3**	Large - **3**	No filter, all channelized direct flow into lake or stream - **3**
Rill - **2**	Medium - **2**	Some buffer or filtering, but visible signs of concentrated flow and/or sediment movement through buffer and into lake - **2**
Sheet - **1**	Small - **1**	Significant buffer or filtering* - **1**

IMPACT

High: 8-9 pts

Med: 6-7 pts

Low: 3-5 pts

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

Cost to Fix

High:	Greater than $2,500
Medium:	$500-$2,500
Low:	Less than $500

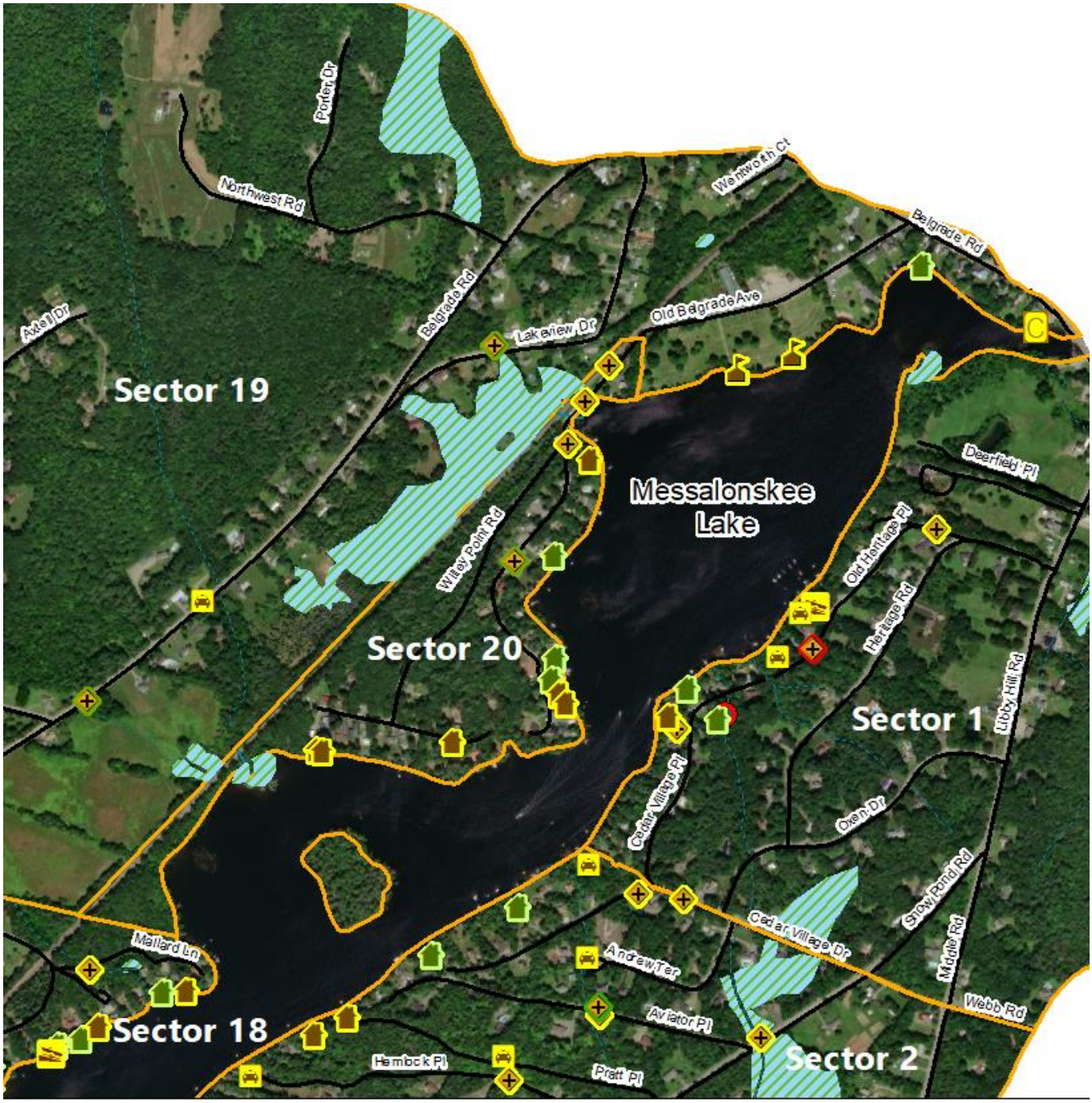
Technical Level to Install

High:	Site requires engineered design
Medium:	Technical person should visit site & make recommendations
Low:	Property owner can accomplish with reference materials

Certified LakeSmart Property? ❒ Yes ❒ No **Potential YCC Project?** ❒ Yes ❒ No ❒ Maybe

APPENDIX B: SECTOR SPECIFIC WATERSHED MAPS

Legend (Land Use, Impact Rating)



2021 MESSALONSKEE LAKE WATERSHED SURVEY - SECTORS 19, 20, & 1

Survey Sector Boundary — Roads — Perennial Streams ------- Intermittent Streams Wetlands

N

ecological instincts

0 0.075 0.15 0.3 Miles

Site icons represent the type of NPS problem and level of impact identified at each site. Red = High Impact, Yellow = Medium Impact, and Green = Low Impact. Please refer to the legend at the beginning of this section for a full list of icons.

Data Source: ME Geolibrary, USGS (NHD, NHDPlus), ME DEP (NPS Site Locations) Projection: NAD 1983 UTM Zone 19N, Map Created By: K. Goodwin, Ecological Instincs, November '21 Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

2021 MESSALONSKEE LAKE WATERSHED SURVEY - SECTOR 2

Survey Sector Boundary — Roads — Perennial Streams ------ Intermittent Streams Wetlands

N

ecological instincts

0 0.075 0.15 0.3 Miles

Site icons represent the type of NPS problem and level of impact identified at each site. Red = High Impact, Yellow = Medium Impact, and Green = Low Impact. Please refer to the legend at the beginning of this section for a full list of icons.

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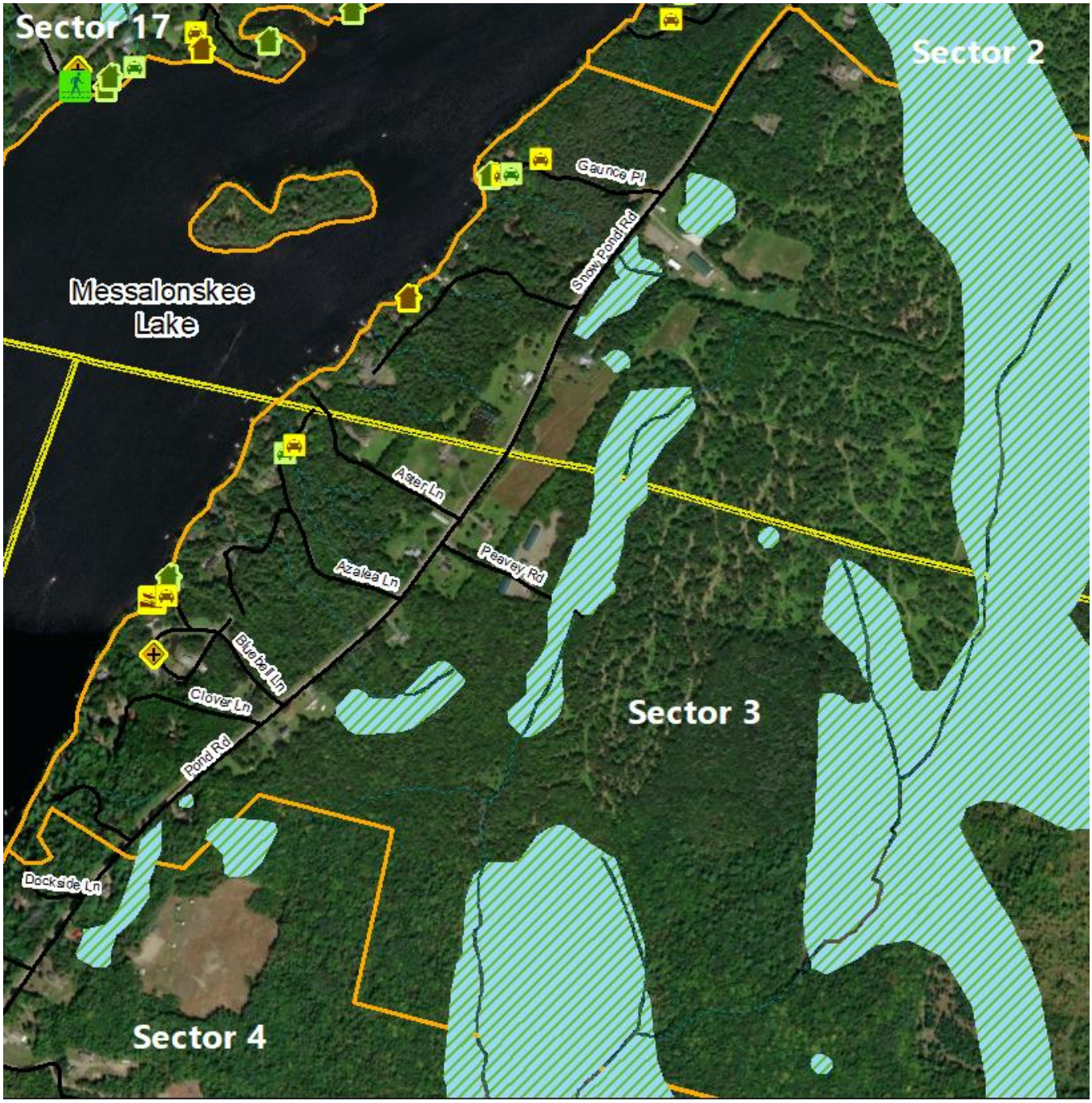


2021 MESSALONSKEE LAKE WATERSHED SURVEY - SECTOR 3

Survey Sector Boundary — Roads — Perennial Streams ------ Intermittent Streams Wetlands

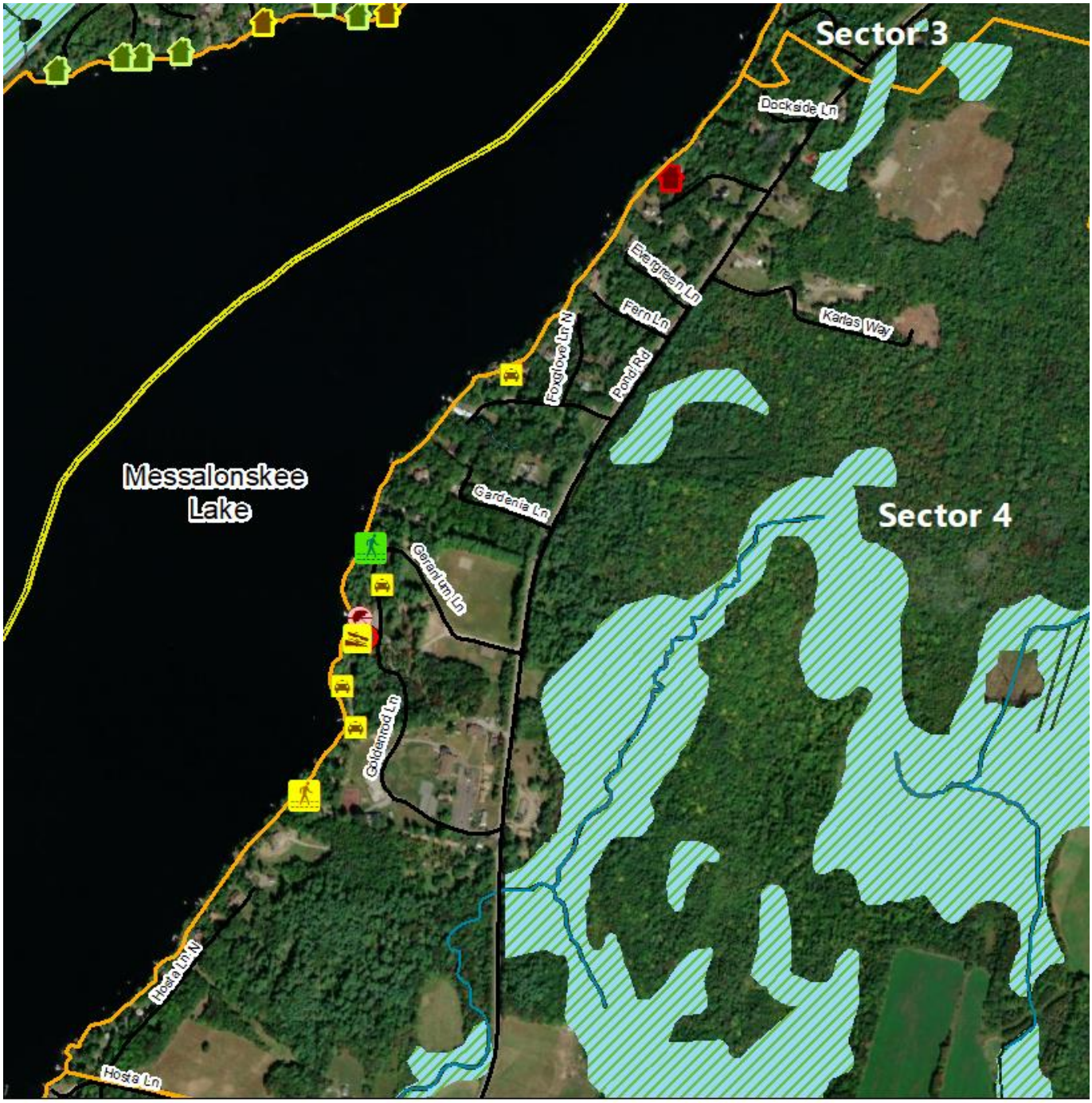
N

ecological instincts

0 0.075 0.15 0.3 Miles

Site icons represent the type of NPS problem and level of impact identified at each site. Red = High Impact, Yellow = Medium Impact, and Green = Low Impact. Please refer to the legend at the beginning of this section for a full list of icons.

Data Source: ME Geolibrary, USGS (NHD, NHDPlus), ME DEP (NPS Site Locations) Projection: NAD 1983 UTM Zone 19N, Map Created By: K. Goodwin, Ecological Instincs, November '21 Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



2021 MESSALONSKEE LAKE WATERSHED SURVEY - SECTOR 4

Survey Sector Boundary — Roads — Perennial Streams ------ Intermittent Streams Wetlands

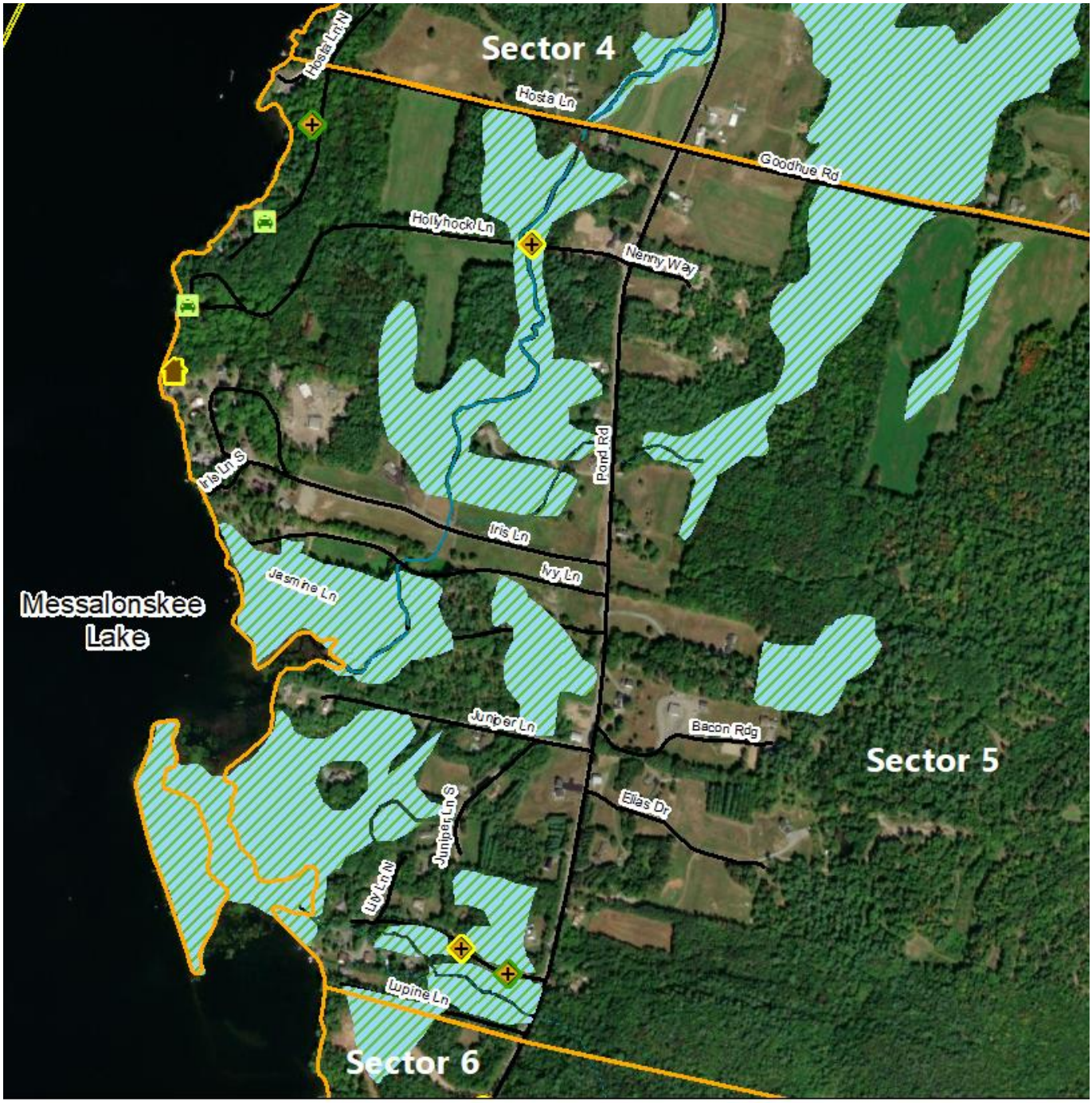
Site icons represent the type of NPS problem and level of impact identified at each site. Red = High Impact, Yellow = Medium Impact, and Green = Low Impact. Please refer to the legend at the beginning of this section for a full list of icons.

Data Source: ME Geolibrary, USGS (NHD, NHDPlus), ME DEP (NPS Site Locations) Projection: NAD 1983 UTM Zone 19N, Map Created By: K. Goodwin, Ecological Instincs, November '21 Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

N

ecological instincts

0 0.075 0.15 0.3 Miles



2021 MESSALONSKEE LAKE WATERSHED SURVEY - SECTOR 5

Survey Sector Boundary — Roads — Perennial Streams ------ Intermittent Streams Wetlands

N

ecological instincts

0 0.075 0.15 0.3 Miles

Site icons represent the type of NPS problem and level of impact identified at each site. Red = High Impact, Yellow = Medium Impact, and Green = Low Impact. Please refer to the legend at the beginning of this section for a full list of icons.

Data Source: ME Geolibrary, USGS (NHD, NHDPlus), ME DEP (NPS Site Locations) Projection: NAD 1983 UTM Zone 19N, Map Created By: K. Goodwin, Ecological Instincs, November '21 Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

2021 MESSALONSKEE LAKE WATERSHED SURVEY - SECTORS 6 & 7

Survey Sector Boundary — Roads — Perennial Streams ------ Intermittent Streams Wetlands

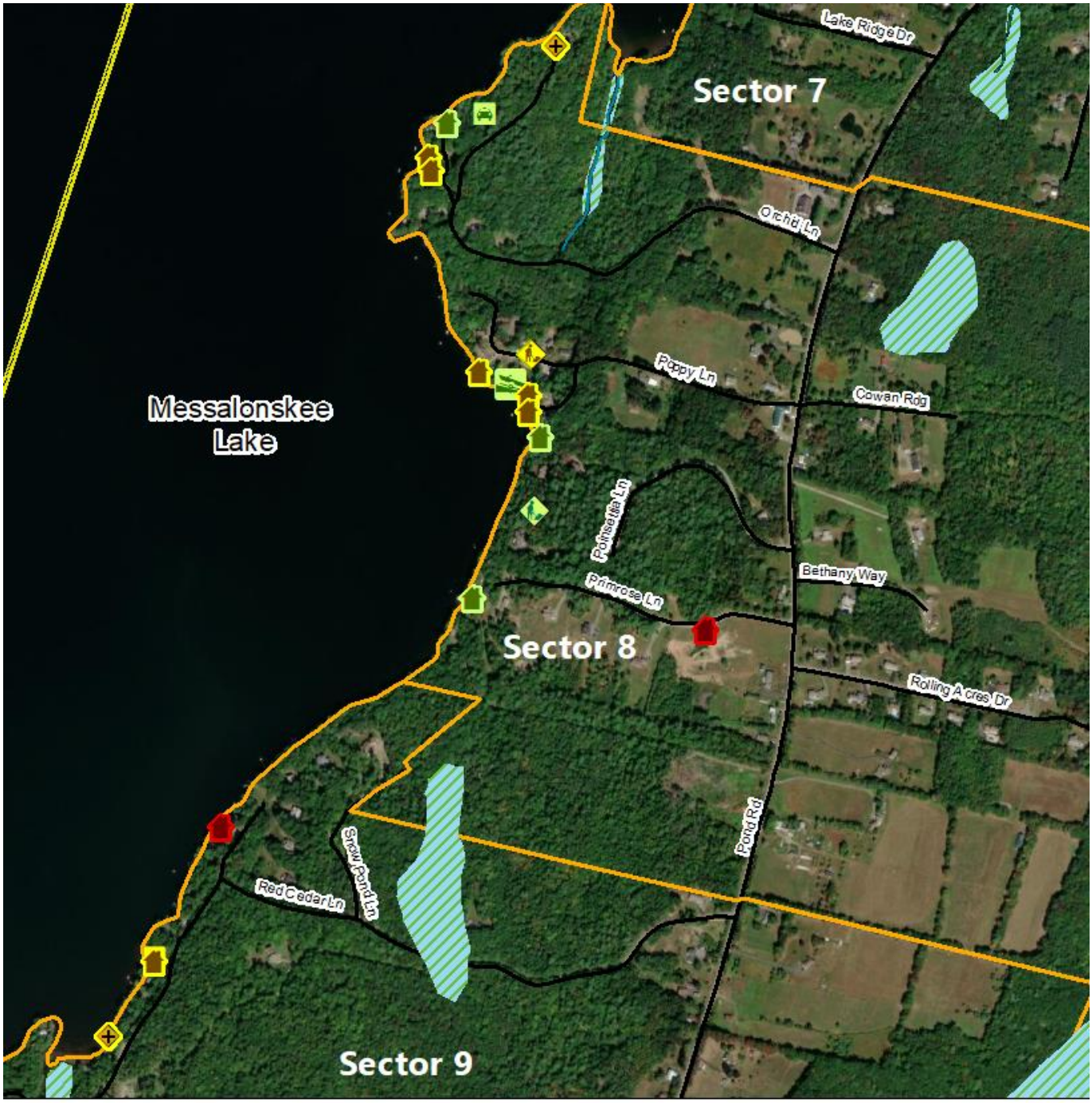
N

ecological instincts

0 0.075 0.15 0.3 Miles

Site icons represent the type of NPS problem and level of impact identified at each site. Red = High Impact, Yellow = Medium Impact, and Green = Low Impact. Please refer to the legend at the beginning of this section for a full list of icons.

Data Source: ME Geolibrary, USGS (NHD, NHDPlus), ME DEP (NPS Site Locations) Projection: NAD 1983 UTM Zone 19N, Map Created By: K. Goodwin, Ecological Instincs, November '21 Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



2021 MESSALONSKEE LAKE WATERSHED SURVEY - SECTORS 8 & 9

Survey Sector Boundary — Roads — Perennial Streams ------ Intermittent Streams Wetlands

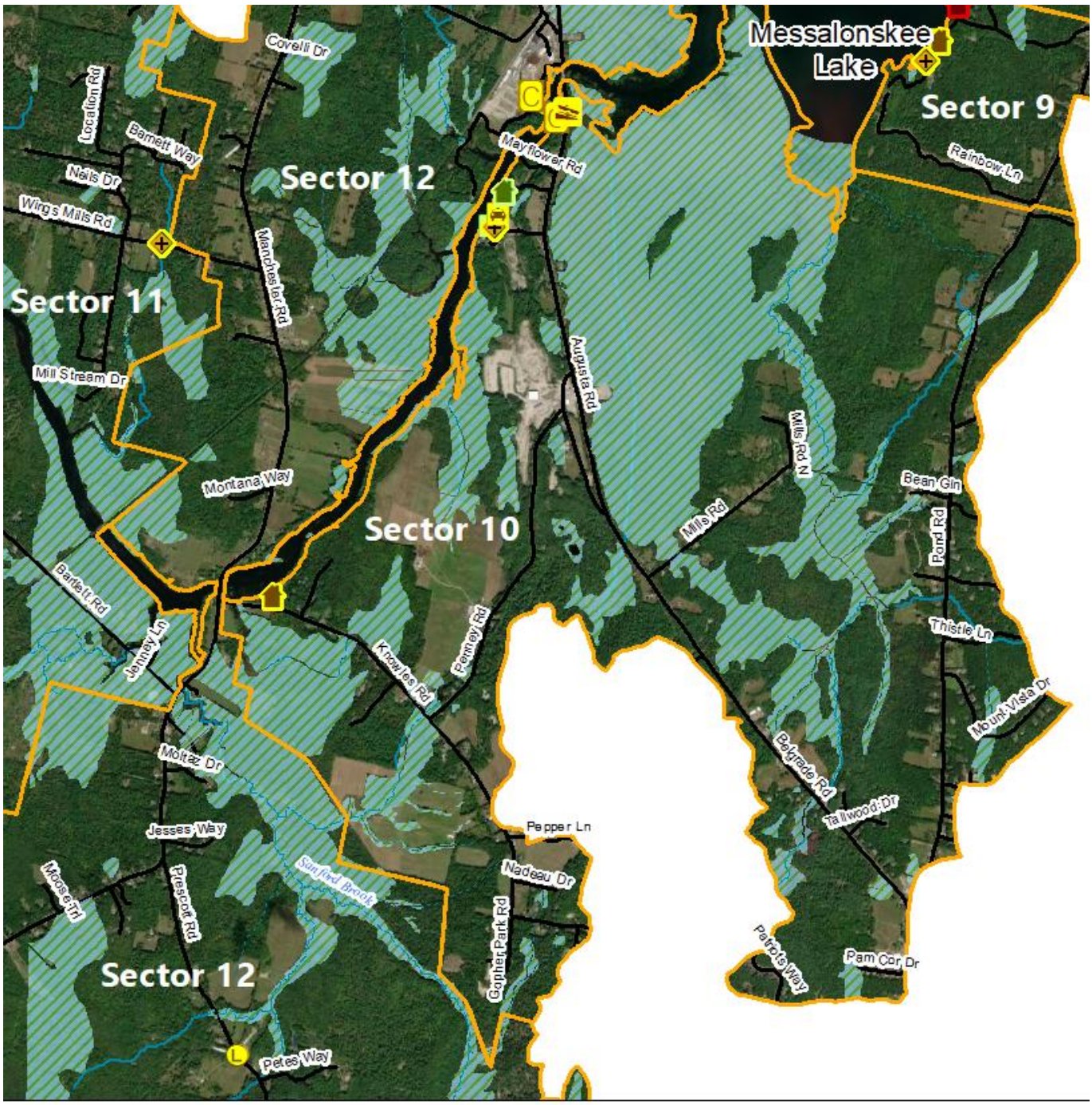
N

ecological instincts

0 0.075 0.15 0.3 Miles

Site icons represent the type of NPS problem and level of impact identified at each site. Red = High Impact, Yellow = Medium Impact, and Green = Low Impact. Please refer to the legend at the beginning of this section for a full list of icons.

Data Source: ME Geolibrary, USGS (NHD, NHDPlus), ME DEP (NPS Site Locations) Projection: NAD 1983 UTM Zone 19N, Map Created By: K. Goodwin, Ecological Instincs, November '21 Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



2021 MESSALONSKEE LAKE WATERSHED SURVEY - SECTORS 10 & 12

Survey Sector Boundary — Roads — Perennial Streams ------ Intermittent Streams Wetlands

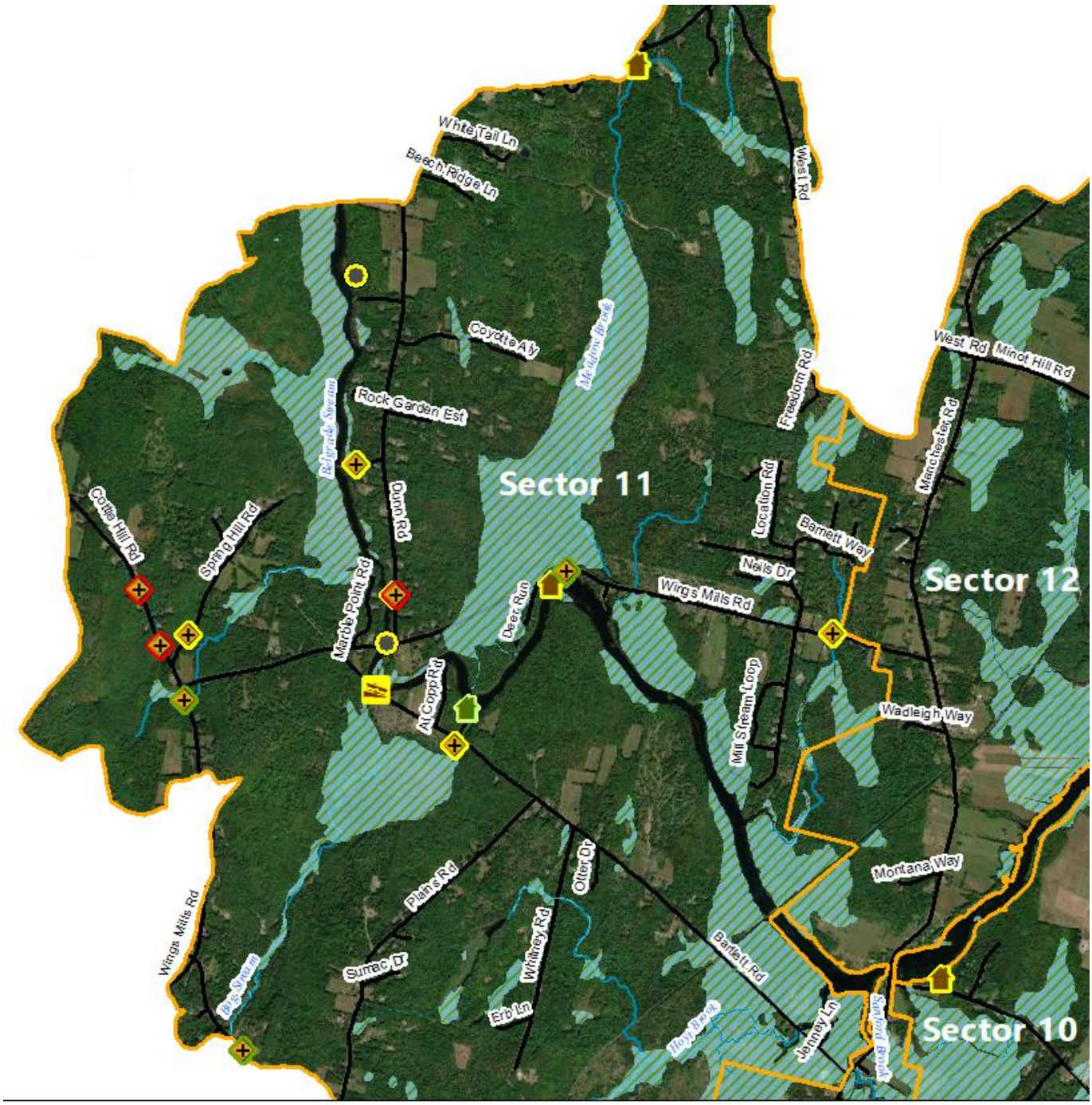
N

ecological instincts

0 0.25 0.5 1 Miles

Site icons represent the type of NPS problem and level of impact identified at each site. Red = High Impact, Yellow = Medium Impact, and Green = Low Impact. Please refer to the legend at the beginning of this section for a full list of icons.

Data Source: ME Geolibrary, USGS (NHD, NHDPlus), ME DEP (NPS Site Locations) Projection: NAD 1983 UTM Zone 19N, Map Created By: K. Goodwin, Ecological Instincs, November '21 Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



2021 MESSALONSKEE LAKE WATERSHED SURVEY - SECTOR 11

Survey Sector Boundary — Roads — Perennial Streams ------ Intermittent Streams Wetlands

Site icons represent the type of NPS problem and level of impact identified at each site. Red = High Impact, Yellow = Medium Impact, and Green = Low Impact. Please refer to the legend at the beginning of this section for a full list of icons.

Data Source: ME Geolibrary, USGS (NHD, NHDPlus), ME DEP (NPS Site Locations) Projection: NAD 1983 UTM Zone 19N, Map Created By: K. Goodwin, Ecological Instincs, November '21 Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

N

ecological instincts

0 0.25 0.5 1 Miles

2021 MESSALONSKEE LAKE WATERSHED SURVEY - SECTOR 13

Survey Sector Boundary — Roads — Perennial Streams ------ Intermittent Streams Wetlands

N

ecological instincts

0 0.075 0.15 0.3 Miles

Site icons represent the type of NPS problem and level of impact identified at each site. Red = High Impact, Yellow = Medium Impact, and Green = Low Impact. Please refer to the legend at the beginning of this section for a full list of icons.

Data Source: ME Geolibrary, USGS (NHD, NHDPlus), ME DEP (NPS Site Locations) Projection: NAD 1983 UTM Zone 19N, Map Created By: K. Goodwin, Ecological Instincs, November '21 Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

2021 MESSALONSKEE LAKE WATERSHED SURVEY - SECTOR 14

Survey Sector Boundary — Roads — Perennial Streams ------ Intermittent Streams Wetlands

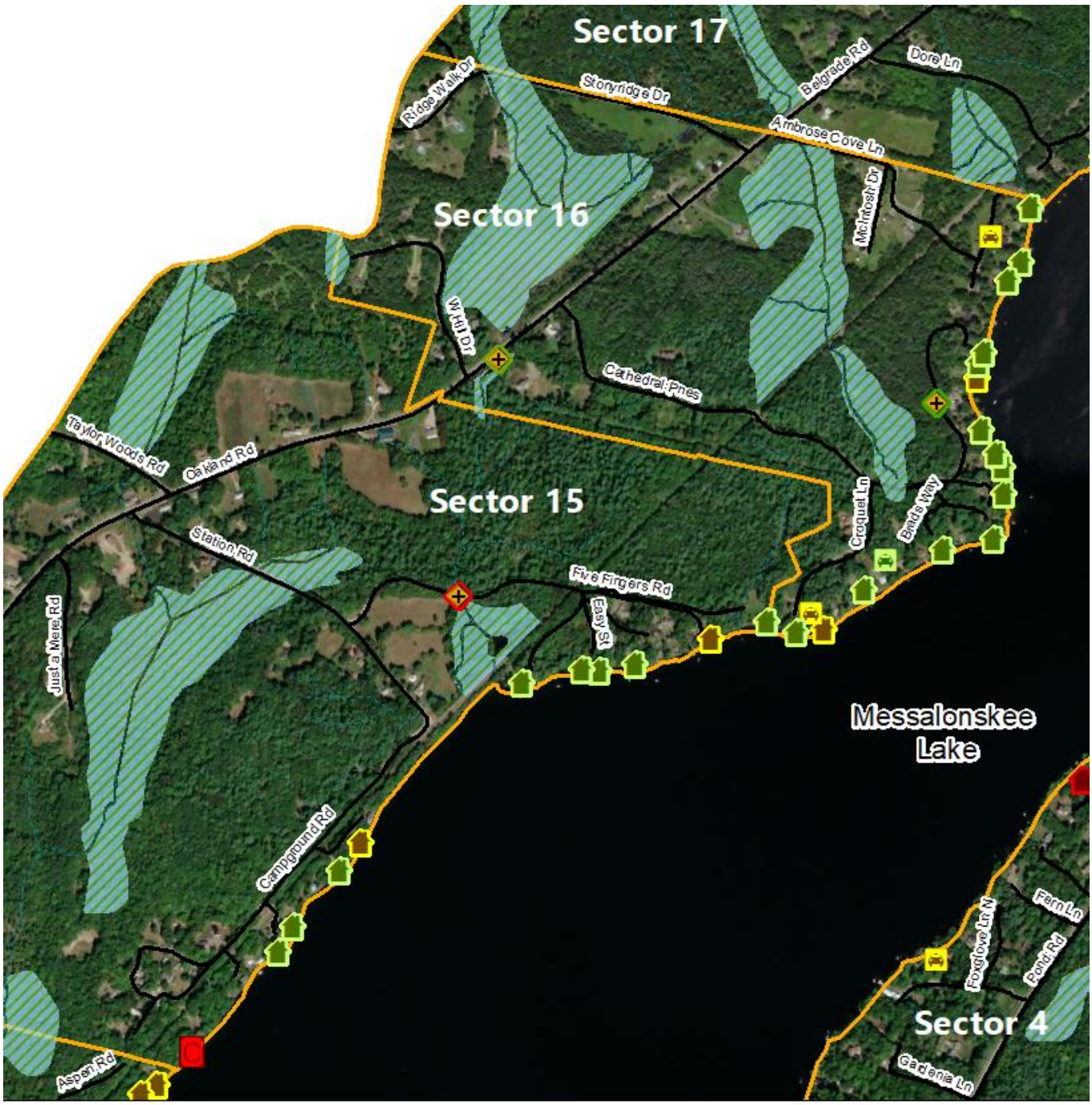
Site icons represent the type of NPS problem and level of impact identified at each site. Red = High Impact, Yellow = Medium Impact, and Green = Low Impact. Please refer to the legend at the beginning of this section for a full list of icons.

Data Source: ME Geolibrary, USGS (NHD, NHDPlus), ME DEP (NPS Site Locations) Projection: NAD 1983 UTM Zone 19N, Map Created By: K. Goodwin, Ecological Instincs, November '21 Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

N

ecological instincts

0 0.075 0.15 0.3 Miles



2021 MESSALONSKEE LAKE WATERSHED SURVEY - SECTORS 15 & 16

Survey Sector Boundary — Roads — Perennial Streams ------ Intermittent Streams Wetlands

N

ecological instincts

0 0.075 0.15 0.3 Miles

Site icons represent the type of NPS problem and level of impact identified at each site. Red = High Impact, Yellow = Medium Impact, and Green = Low Impact. Please refer to the legend at the beginning of this section for a full list of icons.

Data Source: ME Geolibrary, USGS (NHD, NHDPlus), ME DEP (NPS Site Locations) Projection: NAD 1983 UTM Zone 19N, Map Created By: K. Goodwin, Ecological Instincs, November '21 Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

2021 MESSALONSKEE LAKE WATERSHED SURVEY - SECTORS 17 & 18

Survey Sector Boundary — Roads — Perennial Streams ------ Intermittent Streams Wetlands

Site icons represent the type of NPS problem and level of impact identified at each site. Red = High Impact, Yellow = Medium Impact, and Green = Low Impact. Please refer to the legend at the beginning of this section for a full list of icons.

Data Source: ME Geolibrary, USGS (NHD, NHDPlus), ME DEP (NPS Site Locations) Projection: NAD 1983 UTM Zone 19N, Map Created By: K. Goodwin, Ecological Instincs, November '21 Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

N

ecological instincts

0 0.075 0.15 0.3 Miles

APPENDIX C: LIST OF MESSALONSKEE LAKE NPS SITES

Site	Location	Flow into lake via	Land Use	Problems	Size of Area Exposed or Eroded	Recommendations	Impact Rating	Cost to Fix	Technical Level to Install
1-1	Cedar Village Place	Directly into lake	Private Road	Surface Erosion- Gully	200x20	Build Up, Add gravel, Install Runoff Diverters- Broad- based Dip, Might need a cross culvert. Flowing down road, cutting across road surface and onto residential property where its washing out to lake.	Medium	Medium	Medium
1-2	Cedar Village Place	Directly into lake	Residential	Surface Erosion- Gully, Shoreline- Erosion	100×5	Infiltration Trench, Water Retention Swales, Runoff from road onto neighbors (#54) parking area, then outlet at bottom of retaining wall and channeling/eroding down to lake. Homeowner has installed and rock swale but still eroding. An infiltration basin and larger swale may improve.	Medium	Medium	Medium
1-3	Cedar Village Place	Stream	Other- Streambank Erosion	Shoreline- Undercut, Shoreline- Erosion	200x8	Stream shoreline stabilization.	High	Medium	Medium
1-4	Cedar Village Place	Stream	Residential	Surface Erosion- Sheet, Soil- Bare	40x40	Mulch/Erosion Control Mulch, Could place stone around fire pit and mulch bare areas.	Low	Low	Low
1-5	Cedar Village Place	Directly into lake	Residential	Surface Erosion- Sheet, Soil- Bare	80x 4	Stabilize Foot Path, Infiltration Steps, Install Runoff Diverter (waterbar), Erosion Control Mulch	Low	Low	Medium

APPENDIX C: LIST OF MESSALONSKEE LAKE NPS SITES

Site	Location	Flow into lake via	Land Use	Problems	Size of Area Exposed or Eroded	Recommendations	Impact Rating	Cost to Fix	Technical Level to Install
1-6	Old Heritage Place	Directly into lake	Boat Access	Surface Erosion- Rill, Soil-Bare, Shoreline- Lack of Shoreline Vegetation, Shoreline- Erosion	75x10	Install Runoff Diverter (waterbar), Infiltration Trench, Water Retention Swales, Existing rubber razors are failing and could be angled better to send water into an infiltration area. Currently positioned to send runoff onto residential property, and another across the boat storage area that is starting to wash out.	Medium	Medium	Medium
1-7	Old Heritage Place	Directly into lake	Driveway	Surface Erosion- Gully	30x5 (two areas)	Install Runoff Diverters- Rubber Razor, Add gravel, Water Retention Swales, Driveway is a loop with eroded gully on both ends. Flow overtops/bypasses and old rubber razor on one end. Rubber razor should be longer and reset on one end. New diverter installed on the other, with a new infiltration device to receive flow and treat. Currently flows directly into lake.	Medium	Medium	Medium
1-8	Old Heritage Place	Directly into lake	Driveway	Surface Erosion- Gully	40x3	Build Up, Add gravel, Install Runoff Diverters- Rubber Razor	Medium	Medium	Low
1-9	Old Heritage Place/Cedar Village Place	Stream	Trail or Path	Surface Erosion- Gully, Soil-Bare, Soil- Delta in Stream/Lake	150 x 10	Stabilize Foot Path, Install Runoff Diverter (waterbar), Erosion Control Mulch	High	Medium	Medium

APPENDIX C: LIST OF MESSALONSKEE LAKE NPS SITES

Site	Location	Flow into lake via	Land Use	Problems	Size of Area Exposed or Eroded	Recommendations	Impact Rating	Cost to Fix	Technical Level to Install
1-10	Old Heritage Place	Stream	Private Road	Surface Erosion- Rill, Road Shoulder Erosion- Rill	400x20	Add gravel, Build Up, Road needs new ditch, super elevated to ditch on east side with turnout into woods away from stream.	High	High	Medium
1-11	Old Heritage Place	Ditch	Private Road	Surface Erosion- Rill, Road Shoulder Erosion- Rill, Soil- Winter Sand	150x20	Remove Grader/Plow Berms, Add gravel, Reshape (Crown), Install Runoff Diverters- Broad- based Dip Resurface and reshape, redirect/divert into natural low-lying area adjacent.	Medium	High	Medium
1-12	Cedar Village Place	Ditch	Private Road	Surface Erosion- Gully, Ditch- Gully Erosion, Road Shoulder Erosion- Gully	150x4	Armor with Stone, Vegetate, Remove Grader/Plow Berms, Add gravel, Vegetate Shoulder	Medium	Medium	Medium
2-1	Cedar Village Place	Minimal Vegetation	Driveway	Surface Erosion- Sheet, Ditch- Gully Erosion	60x1 each side	Reshape Ditch, Install Turnouts, Install Check Dams, Add gravel, Pave, Add recycled asphalt Crushed stone to cover bare soil at end of ditch. Ditches on both sides needed.	Medium	Medium	Medium
2-2	Cedar Village Place	Stream	Private Road	Ditch- Gully Erosion, Ditch- Bank Failure, Other	175x2x8	Reshape Ditch, Vegetate, Armor with Stone, Install Check Dams, Reseed bare soil & thinning grass; May need to turn out above where ditch starts to decrease runoff	Medium	Medium	Medium
2-3	Cedar Village Place	Minimal Vegetation	Residential	Surface Erosion- Sheet, Soil- Bare	10x3	Reseed bare soil & thinning grass, Establish Buffer, Very minor site, but mower tracks are causing strips of bare soil	Low	Low	Low

APPENDIX C: LIST OF MESSALONSKEE LAKE NPS SITES

Site	Location	Flow into lake via	Land Use	Problems	Size of Area Exposed or Eroded	Recommendations	Impact Rating	Cost to Fix	Technical Level to Install
2-4	Cedar Village Place	Stream	Driveway	Surface Erosion- Gully	50x20	Install Runoff Diverters- Open Top Culvert, Install Runoff Diverters- Rubber Razor, Install Runoff Diverters- Waterbar, Build Up, Reshape (Crown), Infiltration Trench @ roof dripline, Drywell @ gutter downspout, Establish Buffer, Rain Garden, The volume is likely coming from steep slope behind house, slow and infiltrate runoff before driveway. Rain garden for example.	High	High	Medium
2-5	Cedar Village Place	Minimal Vegetation	Residential	Surface Erosion- Sheet, Soil- Bare	5x10	Define Foot Path, Stabilize Foot Path, Erosion Control Mulch, Add to Buffer, Mulch/Erosion Control Mulch, Looks like it's used as path from boat house, crushed stone	Low	Low	Low
2-6	Andrew Terrace	Stream	Driveway	Culvert- Unstable inlet/outlet	2x6	Armor Inlet/Outlet, Install Plunge Pool, Undercut already, in heavy rainfall it'll likely takeout downstream bank	Medium	High	High
2-7	Aviator Place	Stream	Private Road	Ditch- Gully Erosion, Ditch- Bank Failure, Ditch- Undersized	25x2x2	Reshape Ditch, Armor with Stone, Install Check Dam, Rip Rap; This area receives a significant amount of runoff from the ditch above, recommend ditch check dams and increase widths above just this area	Medium	Medium	Medium

APPENDIX C: LIST OF MESSALONSKEE LAKE NPS SITES

Site	Location	Flow into lake via	Land Use	Problems	Size of Area Exposed or Eroded	Recommendations	Impact Rating	Cost to Fix	Technical Level to Install
2-8	Aviator Place	Stream	Private Road	Surface Erosion- Sheet, Culvert- Unstable inlet/outlet, Culvert- Clogged, Culvert- Crushed Broken, Culvert- Undersized	Banks 6hx7w	Armor Inlet/Outlet, Remove Clog, Enlarge, Lengthen, Install Plunge Pool	Low	Medium	Medium
2-9	Sunny Shore Place	Directly into lake	Residential	Ditch- Gully Erosion	30x1	Armor with Stone, Vegetate, Install Check Dams, Infiltration Steps, Add to Buffer	Medium	Low	Medium
2-10	Sunny Shore Place	Minimal Vegetation	Residential	Soil- Bare	30x2	Infiltration Steps, Install Runoff Diverter (waterbar), Erosion Control Mulch	Low	Medium	Low
2-11	Sunny Shore Place	Minimal Vegetation	Driveway	Surface Erosion- Gully	200x1	Install Ditch, Build Up, Reshape (Crown), Install Runoff Diverters- Rubber Razor, Install Runoff Diverters- Waterbar, Establish Buffer	Medium	High	Medium
2-12	Sunny Shore Place	Stream	Private Road	Surface Erosion- Gully, Soil- Delta in Stream/Lake	Many gullies 2' deep by 100	Install Turnouts, Reshape Ditch, Install Ditch, Build Up, Reshape (Crown)	Medium	High	High
2-13a	Morse Point Place	Directly into lake	Residential	Surface Erosion- Rill, Soil- Bare	100x30	Rip Rap, Significant bare soil under deck directly above boat house inlet. Cover with geotextile fabric and riprap.	High	Medium	Medium
2-13b	Morse Point Place	Ditch	Private Road	Culvert- Unstable inlet/outlet, Ditch- Gully Erosion	200x2	Armor Inlet/Outlet, Install Plunge Pool, Reshape Ditch, Install Check Dams, Armor with Stone, Remove debris/sediment	High	High	Medium
2-14	Morse Point Place	Stream	Private Road	Ditch- Bank Failure, Ditch- Gully Erosion	8h, 10Lx10w	Install Plunge Pool, Reshape Ditch, Armor with Stone	High	High	High

APPENDIX C: LIST OF MESSALONSKEE LAKE NPS SITES

Site	Location	Flow into lake via	Land Use	Problems	Size of Area Exposed or Eroded	Recommendations	Impact Rating	Cost to Fix	Technical Level to Install
2-15	Snow Pond Road	Stream	State Road	Culvert- Unstable inlet/outlet, Culvert- Undersized	US 10x10, DS 10x10	Armor Inlet/Outlet, Enlarge	Medium	Medium	Medium
2-16	Snow Pond Road	Stream	State Road	Surface Erosion- Rill, Culvert- Unstable inlet/outlet, Culvert- Clogged	10x5	Armor Inlet/Outlet, Remove Clog, Install Plunge Pool	Medium	Medium	Medium
2-30	Pratt Place	Ditch	Driveway	Culvert- Unstable inlet/outlet, Ditch- Rill Erosion, Other, Long, continuous ditch that drains directly to a stream	500x6	Armor Inlet/Outlet, Vegetate, Armor with Stone, Install Turnouts, Install Check Dams, Remove debris/sediment, Install Sediment Pools	Medium	Medium	Medium
2-31	Pratt Place	Ditch	Residential	Ditch- Rill Erosion, Other, Unusual drainage on this site. A stream and a ditch meet near the house and the landowner has tried to address it by laying down geotextile and covering with rocks. Not entirely successful.	25x10 plus ditch	Install Sediment Pools, Install Check Dams, Install Turnouts, Separate ditch from stream, do not drain ditch into stream, stabilize stream?	Medium	Medium	Medium
2-32	Pratt Place	Stream	Driveway	Ditch- Gully Erosion, Ditch- Bank Failure, Other, Ditch is long and continuous and drains directly to a stream (similar to site 2- 30)	150x5	Armor Inlet/Outlet, Install Turnouts, Install Check Dams, Install Sediment Pools, Separate ditch from stream	High	Medium	Medium
2-33	Hemlock Place	Ditch	Driveway	Ditch- Rill Erosion, Ditch- Bank Failure, Ditch- Undersized, Other, Culvert drains driveway ditch onto lawn and straight to lake. Drainageway is unstable	5x100	Armor with Stone, Install Turnouts, Install Sediment Pools, Install Check Dams, Add to Buffer, Need to stabilize lawn drainage	Medium	High	Medium

APPENDIX C: LIST OF MESSALONSKEE LAKE NPS SITES

Site	Location	Flow into lake via	Land Use	Problems	Size of Area Exposed or Eroded	Recommendations	Impact Rating	Cost to Fix	Technical Level to Install
				(just grass). Ditch has no turnouts, long and steep.					
2-34	Hemlock Place	Directly into lake	Residential	Surface Erosion- Sheet, Soil- Bare, Shoreline- Inadequate Shoreline Vegetation	30x20	Add to Buffer, Reseed bare soil & thinning grass, No Raking, Mulch/Erosion Control Mulch	Medium	Low	Low
2-35	Hemlock Place	Minimal Vegetation	Driveway	Surface Erosion- Gully, Ditch- Gully Erosion, Soil- Bare, Other- Invasive Plants	300x30	Armor with Stone, Reshape Ditch, Install Turnouts, Install Check Dams, Remove debris/sediment, Install Sediment Pools, Reshape (Crown), Add gravel, Remove Invasive Plants, Long steep continuous driveway badly washed out into parking area. Ditch drains through a culvert that goes straight to the lake.	High	High	Medium
2-36	Hemlock Place	Stream	Private Road	Culvert- Unstable inlet/outlet, Ditch- Rill Erosion, Road Shoulder Erosion- Sheet, Other, Ditch drains directly into the stream	50x5	Armor Inlet/Outlet, Lengthen, Vegetate, Armor with Stone, Install Check Dams, Install Sediment Pools, Install Turnouts	Medium	Medium	Medium
2-37	Staghorn Place	Minimal Vegetation	Residential	Surface Erosion- Rill, Soil- Bare, Shoreline- Inadequate Shoreline Vegetation, Other, Drainage coming down slope on left side of house and pipe diverting water from side of property is creating unstable drainage.	75 x20	Install Ditch, Install Check Dams, Install Sediment Pools, Vegetate, Armor with Stone, Install Turnouts, Add to Buffer, Reseed bare soil & thinning grass, Mulch/Erosion Control Mulch	Medium	Medium	Medium

APPENDIX C: LIST OF MESSALONSKEE LAKE NPS SITES

Site	Location	Flow into lake via	Land Use	Problems	Size of Area Exposed or Eroded	Recommendations	Impact Rating	Cost to Fix	Technical Level to Install
2-38	Staghorn Place	Minimal Vegetation	Residential	Surface Erosion- Gully, Road Shoulder Erosion- Gully, Shoreline- Lack of Shoreline Vegetation, Other, Pipe diverts stormwater from driveway/hill, goes across lawn, not stabilized	20x65	Add gravel, Reshape (Crown), Install Runoff Diverters- Rubber Razor, Install Runoff Diverters- Waterbar, Build Up, Mulch/Erosion Control Mulch	Medium	Medium	Medium
3-1	Gaunce Place	Minimal Vegetation	Residential	Surface Erosion- Sheet, Surface Erosion- Rill, Soil- Bare	20x10	Establish Buffer, Add to Buffer, Reseed bare soil & thinning grass, Mulch/Erosion Control Mulch	Low	Low	Low
3-2	Gaunce Place	Minimal Vegetation	Driveway	Surface Erosion- Rill, Surface Erosion- Gully	100x50	Reshape (Crown), Build Up, Establish Buffer, Install Runoff Diverter (waterbar), Rain Garden, Three sections of driveway converge. Significant runoff coming from the hill that could be captured by raingarden before getting to driveway turnout. Natural divot in land that could be the location of rain garden	Medium	High	Medium
3-3	Gaunce Place	Minimal Vegetation	Driveway	Culvert- Undersized, Culvert- Clogged	5x5 outlet and 5x5 inlet	Armor Inlet/Outlet, Enlarge, Install Plunge Pool, Remove Clog, Reshape Ditch, Vegetate, Remove debris/sediment	Low	High	High
3-4	Gaunce Place	Ditch	Driveway	Surface Erosion- Rill	3-4 rills 40x2	Vegetate, Reshape Ditch, Install Turnouts, Install Check Dams, Remove debris/sediment, Build Up, Install Runoff Diverter (waterbar), Infiltration Trench, Landowner has tried to divert runoff from hill around upper driveway to the road ditch. This is a good approach, but ditch	Medium	Medium	High

APPENDIX C: LIST OF MESSALONSKEE LAKE NPS SITES

Site	Location	Flow into lake via	Land Use	Problems	Size of Area Exposed or Eroded	Recommendations	Impact Rating	Cost to Fix	Technical Level to Install
						should be enlarged and go around the whole driveway. The culvert inlet will therefore need to be enlarged including plunge pool enlarged at outlet.			
3-5	Gifford Place	Minimal Vegetation	Residential	Soil- Bare	25x5	Silt Fence/EC Berms, Rip Rap, Appears the site is under construction. However, bare soil on steep slope needs to be covered. They are likely installing riprap on steep banks (not on the lake shore) to stabilize. May need someone to return to ensure it was installed.	Medium	Low	Low
3-6	Azalea Lane	Stream	Driveway	Roadside Plow/Grader Berm	50x2	Remove Clog, Remove Grader/Plow Berms. Looks like a car rut exposed road material right where pavement starts.	Low	Medium	Medium
3-7	Azalea Lane	Stream	Driveway	Culvert- Clogged, Culvert- Undersized, Ditch- Bank Failure	30x6	Remove Clog, Replace, Lengthen, Establish Buffer. Strategic placement of rock at tow of bank, vegetation, coir logs, Culvert inlet and outlet covered by filter fabric that's redirecting flow to banks. Two culverts positioned towards bank, causing bank erosion. Replace with one large culvert	Medium	High	High
3-8	Bluebell Lane	Directly into lake	Residential	Surface Erosion- Sheet, Soil- Bare, Shoreline- Lack of Shoreline Vegetation	6x10	Establish Buffer, Reseed bare soil & thinning grass, Mulch/Erosion Control Mulch, Looks like they recently removed a deck and bare soil remains.	Low	Low	Low

APPENDIX C: LIST OF MESSALONSKEE LAKE NPS SITES

Site	Location	Flow into lake via	Land Use	Problems	Size of Area Exposed or Eroded	Recommendations	Impact Rating	Cost to Fix	Technical Level to Install
3-9	Bayberry Lane	Directly into lake	Boat Access	Surface Erosion- Rill	40 x 10	Add gravel, Add recycled asphalt, Vegetate Shoulder, Add to Buffer, Significant foot traffic in a low wet spot, may be best to put in crushed stone in this area, and add buffer wherever isn't in the way of recreational activities	Medium	Medium	Medium
3-10	Bayberry Lane	Directly into lake	Driveway	Surface Erosion- Rill, Shoreline- Unstable Access	2 rills 10'x5"	Build Up, Install Runoff Diverters- Rubber Razor, Install Runoff Diverters- Waterbar, Install diverters above these rills as well to slow the flow and reduce volume	Medium	Medium	Medium
3-11	Bayberry Lane	Stream	Driveway	Surface Erosion- Gully	300x2	Install Runoff Diverters- Open Top Culvert, Install Runoff Diverters- Broad- based Dip, Install Runoff Diverters- Rubber Razor, Install Runoff Diverters- Waterbar, Establish Buffer, Rain Garden, Runoff causing this gully needs to be addressed above site where the volume is coming from. Diverters installed (Colby crew building roof runoff, driveway, and pavement) then what remains should be directed into channel near yellow building with culvert, outlet into a large rain garden before that outlets into final culvert to lake. Remove excess pavement.	High	High	High

APPENDIX C: LIST OF MESSALONSKEE LAKE NPS SITES

Site	Location	Flow into lake via	Land Use	Problems	Size of Area Exposed or Eroded	Recommendations	Impact Rating	Cost to Fix	Technical Level to Install
3-12	Bayberry Lane	Minimal Vegetation	Private Road	Surface Erosion- Gully, Road Shoulder Erosion- Gully, Roof Runoff Erosion	150 x 2	Install Turnouts, Install Ditch, Reshape (Crown), Pave, Infiltration Trench @ roof dripline, Small dip between road and Colby Crew garage is diverting some water to vegetated area, but it is blowing out and heading down to paved private driveway causing site 3-11. Add material up or pave and create a ditch to allow all runoff to make it into a ditch turnout.	Medium	Medium	Medium
4-1	Daisy Lane	Directly into lake	Residential	Surface Erosion- Gully, Soil-Bare	80ft. X. 6ft	Seed/Hay, Mulch	High	Medium	Low
4-2	Foxglove Lane	Directly into lake	Driveway	Surface Erosion- Gully	50ft x 4ft	Add gravel, Reshape (Crown), Install Runoff Diverters- Broad-based Dip, Install Runoff Diverter (waterbar)	Medium	Medium	Low
4-3	NEMC	Minimal Vegetation	Driveway	Surface Erosion- Gully, Road Shoulder Erosion- Rill	100 x 3	Add gravel, Reshape (Crown), Rain Garden	Medium	Medium	Low
4-4	NEMC	Directly into lake	Trail or Path	Surface Erosion- Sheet	25 x 5	Install Detention Basin, Infiltration Steps	Low	Low	Low
4-5	NEMC	Directly into lake	Beach Access	Surface Erosion- Gully	50 x 50	Stop adding sand to beach, retain existing sand with landscaping timbers	High	Low	Low
4-6	NEMC	Directly into lake	Other	Surface Erosion- Gully, Roof Runoff Erosion	100 x 15	Infiltration Trench @ roof dripline, Drywell @ gutter downspout	High	Medium	Medium

APPENDIX C: LIST OF MESSALONSKEE LAKE NPS SITES

Site	Location	Flow into lake via	Land Use	Problems	Size of Area Exposed or Eroded	Recommendations	Impact Rating	Cost to Fix	Technical Level to Install
4-7	NEMC	Directly into lake	Boat Access	Surface Erosion- Sheet, Soil- Bare	90 x 50	Establish Buffer, Reseed bare soil & thinning grass, Cover bare area with wood chips or compacted bluestone	Medium	Medium	Low
4-8	NEMC	Directly into lake	Driveway	Surface Erosion- Rill	70 x 25	Add gravel, Reshape (Crown), Vegetate Shoulder, Add to Buffer	Medium	Medium	Medium
4-9	NEMC	Minimal Vegetation	Driveway	Surface Erosion- Rill	50 x 20	Stabilize Foot Path, Infiltration Trench @ roof dripline, Add to Buffer	Medium	Medium	Low
4-10	NEMC	Minimal Vegetation	Trail or Path	Surface Erosion- Sheet, Soil- Bare, Shoreline- Inadequate Shoreline Vegetation	100 x 25	Stabilize Foot Path, Infiltration Trench @ roof dripline, Mulch/Erosion Control Mulch, Install Runoff Diverter (waterbar)	Medium	Medium	Medium
5-1	Hollyhock Lane	Stream	Private Road	Surface Erosion- Sheet, Culvert- Unstable inlet/outlet, Culvert- Clogged	100ft x 12ft	Armor Inlet/Outlet, Install Turnouts, Build Up, Add gravel, Reshape (Crown), Vegetate Shoulder, Reseed bare soil & thinning grass	Medium	High	Medium
5-2	Host Lane South	Minimal Vegetation	Private Road	Surface Erosion- Sheet, Culvert- Unstable inlet/outlet, Road Shoulder Erosion- Sheet	60ft x 12ft	Replace, Enlarge, Lengthen, Armor Inlet/Outlet, Remove Grader/Plow Berms, Reshape (Crown), Add gravel	Low	High	Medium
5-3	Hosta Lane South	Minimal Vegetation	Driveway	Surface Erosion- Rill, Soil- Uncovered Pile	40ft x 12ft	Add gravel, Install Runoff Diverter (waterbar)	Low	Medium	Low
5-4	Hollyhock Lane	Minimal Vegetation	Driveway	Surface Erosion- Rill	35ft x 12ft	Reshape (Crown), Add gravel, Add to Buffer, Install Runoff Diverter (waterbar)	Low	Medium	Medium

APPENDIX C: LIST OF MESSALONSKEE LAKE NPS SITES

Site	Location	Flow into lake via	Land Use	Problems	Size of Area Exposed or Eroded	Recommendations	Impact Rating	Cost to Fix	Technical Level to Install
5-5	Iris Lane	Directly into lake	Residential	Surface Erosion- Rill, Shoreline- Erosion, Shoreline- Unstable Access	10ft x 3ft	Stabilize Foot Path	Medium	Low	Low
5-6	Lily Lane	Minimal Vegetation	Private Road	Ditch- Sheet Erosion	100ft x 20ft	Vegetate ditch	Low	Low	Low
5-7	Lily Lane	Ditch	Private Road	Ditch- Bank Failure	150ftx 50ft	Armor Inlet/Outlet, Install Plunge Pool, Vegetate ditch	Medium	High	Medium
6-1	Pond Road	Directly into lake	Residential	Surface Erosion- Gully, Soil- Uncovered Pile	40x40	Silt Fence/EC Berms, Mulch, Seed/Hay, Mulch/Erosion Control Mulch	Medium	Low	Low
6-2	Pond Road	Directly into lake	Boat Access	Surface Erosion- Sheet	20x10	Install Runoff Diverter (waterbar)	Low	Medium	Medium
6-3	Milkweed Lane	Directly into lake	Residential	Surface Erosion- Sheet, Soil- Bare, Shoreline- Erosion, Shoreline- Lack of Shoreline Vegetation, Roof Runoff Erosion	50x50	Define Foot Path, Erosion Control Mulch, Infiltration Trench @ roof dripline, Establish Buffer, Mulch/Erosion Control Mulch, Rip Rap	Low	Medium	Medium
6-4	Milkweed Lane	Directly into lake	Private Road	Surface Erosion- Gully, Culvert- Unstable inlet/outlet	30’	Armor Inlet/Outlet, Lengthen	High	High	High
6-5	Milkweed Lane	Directly into lake	Residential	Surface Erosion- Sheet, Shoreline- Undercut, Shoreline- Lack of Shoreline Vegetation, Shoreline- Erosion	60’ plus	Establish Buffer, Rip Rap	Low	High	Medium
6-6	Pond Road	Ditch	Logging	Surface Erosion- Rill, Soil- Bare	100 x 100	Seed/Hay	Medium	Medium	Low
7-1	Morning Glory Lane	Directly into lake	Residential	Surface Erosion- Sheet, Soil- Bare, Soil- Uncovered Pile, Shoreline- Lack of Shoreline Vegetation	100x35	Mulch, Silt Fence/EC Berms, Seed/Hay, Infiltration Trench @ roof dripline, Establish Buffer	Medium	Medium	Medium

APPENDIX C: LIST OF MESSALONSKEE LAKE NPS SITES

Site	Location	Flow into lake via	Land Use	Problems	Size of Area Exposed or Eroded	Recommendations	Impact Rating	Cost to Fix	Technical Level to Install
8-1	Orchid Lane North	Directly into lake	Private Road	Surface Erosion- Sheet, Soil- Bare, Shoreline- Inadequate Shoreline Vegetation, Shoreline- Erosion, Shoreline- Unstable Access, Roof Runoff Erosion	400 x 12	Install Ditch, Build Up, Add gravel, Reshape (Crown), Install Detention Basin, Install Runoff Diverters- Rubber Razor, Define Foot Path, Erosion Control Mulch, Infiltration Trench @ roof dripline, Add to Buffer	Medium	Medium	Medium
8-2	Orchid Lane North	Directly into lake	Driveway	Surface Erosion- Sheet, Soil- Bare, Shoreline- Inadequate Shoreline Vegetation	60 x 12 x 2	Add gravel, Reshape (Crown), Infiltration Trench @ roof dripline, Establish Buffer, Add to Buffer, Reseed bare soil & thinning grass, Infiltration Trench	Low	High	Medium
8-3	Orchid Lane	Directly into lake	Residential	Surface Erosion- Sheet, Soil- Bare, Shoreline- Inadequate Shoreline Vegetation, Roof Runoff Erosion	30 x 40	Infiltration Trench @ roof dripline, Drywell @ gutter downspout, Rain Barrel, Add to Buffer, Reseed bare soil & thinning grass, Mulch/Erosion Control Mulch, Infiltration Trench	Low	Medium	Medium
8-4	Orchid Lane	Directly into lake	Residential	Surface Erosion- Rill, Soil- Bare, Soil- Delta in Stream/Lake, Shoreline- Undercut, Shoreline- Lack of Shoreline Vegetation, Shoreline- Erosion, Shoreline- Unstable Access	20 x 10	Drywell @ gutter downspout, Add to Buffer, Reseed bare soil & thinning grass, Rip Rap, Terrace	Medium	Medium	Medium
8-5	Orchid Lane	Directly into lake	Residential	Surface Erosion- Rill, Soil- Bare, Shoreline- Undercut, Shoreline- Lack of Shoreline Vegetation, Shoreline- Inadequate Shoreline Vegetation, Shoreline-	100 x 50	Mulch, Silt Fence/EC Berms, Seed/Hay, Erosion Control Mulch, Infiltration Trench @ roof dripline, Drywell @ gutter downspout, Rain Barrel, Establish Buffer, Add to Buffer, Reseed	Medium	Medium	Medium

APPENDIX C: LIST OF MESSALONSKEE LAKE NPS SITES

Site	Location	Flow into lake via	Land Use	Problems	Size of Area Exposed or Eroded	Recommendations	Impact Rating	Cost to Fix	Technical Level to Install
				Erosion, Roof Runoff Erosion		bare soil & thinning grass, Rip Rap			
8-6	Poppy Lane	Directly into lake	Residential	Surface Erosion- Sheet, Soil- Bare, Shoreline- Lack of Shoreline Vegetation, Shoreline- Inadequate Shoreline Vegetation, Shoreline- Erosion, Shoreline- Unstable Access	40 x 60	Define Foot Path, Erosion Control Mulch, Establish Buffer, Add to Buffer, Reseed bare soil & thinning grass, Mulch/Erosion Control Mulch, Boat launch. Discuss milfoil.	Medium	Medium	Medium
8-7	Poppy Lane	Directly into lake	Boat Access	Shoreline- Lack of Shoreline Vegetation, Shoreline- Inadequate Shoreline Vegetation, Shoreline- Unstable Access	20 x 20	Define Foot Path, Establish Buffer, Add to Buffer Plane access site. Stabilize access. Ask about boat use.	Low	Medium	Medium
8-8	Poppy Lane	Stream	Construction Site	Surface Erosion- Sheet, Culvert- Unstable inlet/outlet, Soil- Bare, Roof Runoff Erosion	100 x 100	Armor Inlet/Outlet, Add gravel, Reshape (Crown), Mulch, Silt Fence/EC Berms, Seed/Hay, Infiltration Trench @ roof dripline, Drywell @ gutter downspout, Establish Buffer, Reseed bare soil & thinning grass	Medium	Medium	Medium
8-9	Poppy Lane South	Directly into lake	Residential	Surface Erosion- Sheet, Soil- Bare, Shoreline- Lack of Shoreline Vegetation, Shoreline- Inadequate Shoreline Vegetation, Shoreline- Unstable Access	70 x 30	Silt Fence/EC Berms, Mulch, Seed/Hay, Establish Buffer, Add to Buffer, Reseed bare soil & thinning grass, Mulch/Erosion Control Mulch, Topsoil on ground. Need to contour and revegetate. Check again 2022.	Medium	Medium	Medium
8-10	Poppy Lane South	Directly into lake	Residential	Surface Erosion- Gully, Soil- Bare, Shoreline- Undercut, Shoreline- Lack of Shoreline Vegetation, Shoreline- Inadequate Shoreline	20 x 10	Establish Buffer, Add to Buffer, Rip Rap	Medium	Medium	Medium

APPENDIX C: LIST OF MESSALONSKEE LAKE NPS SITES

Site	Location	Flow into lake via	Land Use	Problems	Size of Area Exposed or Eroded	Recommendations	Impact Rating	Cost to Fix	Technical Level to Install
				Vegetation, Shoreline- Unstable Access					
8-11	Poinsettia Lane	Directly into lake	Residential	Surface Erosion- Sheet, Shoreline- Undercut, Shoreline- Erosion, Shoreline- Unstable Access	30 x 10	Add gravel, Reshape (Crown)Establish Buffer, Rip Rap, Mulch/Erosion Control Mulch	Low	Medium	Medium
8-12	Poinsettia Lane	Directly into lake	Construction Site	Culvert- Unstable inlet/outlet, Culvert- Undersized, Soil- Bare	200 x 100	Add gravel, Reshape (Crown), Install Detention Basin, Mulch, Silt Fence/EC Berms, Mulch/Erosion Control Mulch, New house construction. Steep slopes. Visit again in 2022.	Low	High	High
8-13	Primrose Lane	Directly into lake	Residential	Surface Erosion- Sheet, Soil- Bare, Shoreline- Lack of Shoreline Vegetation, Shoreline- Inadequate Shoreline Vegetation	30 x 40	Reshape Ditch, Add gravel, Reshape (Crown)Define Foot Path, Establish Buffer, Add to Buffer, Reseed bare soil & thinning grass, Check lake access - used as boat launch? Commercial camp rentals?	Low	Medium	Medium
8-14	Pond Road	Ditch	Residential	Surface Erosion- Sheet, Ditch- Gully Erosion, Soil- Bare, Soil- Delta in Stream/Lake	500 x 400	Mulch, Silt Fence/EC Berms, Seed/Hay, Establish Buffer, Add to Buffer, Mulch/Erosion Control Mulch, Water Retention Swales	High	High	Medium
9-1	Red Cedar Lane North	Directly into lake	Residential	Surface Erosion- Gully, Ditch- Gully Erosion, Soil- Bare, Shoreline- Erosion	100x3’	Armor with Stone	High	Medium	Medium
9-2	Red Cedar Lane	Directly into lake	Driveway	Surface Erosion- Sheet, Soil- Bare	100x75	Install Runoff Diverters- Rubber Razor, Replace and re- angle rubber razor	Medium	Medium	Medium
9-3	Red Cedar Lane	Directly into lake	Residential	Surface Erosion- Sheet, Surface Erosion- Rill, Soil- Bare, Roof Runoff Erosion	40x3	Infiltration Trench @ roof dripline, Drywell @ gutter downspout, Rain Barrel, Reseed	Medium	Medium	Medium

APPENDIX C: LIST OF MESSALONSKEE LAKE NPS SITES

Site	Location	Flow into lake via	Land Use	Problems	Size of Area Exposed or Eroded	Recommendations	Impact Rating	Cost to Fix	Technical Level to Install
						bare soil & thinning grass, Add mulch			
9-4	Red Cedar Lane	Directly into lake	Private Road	Surface Erosion- Rill, Culvert- Unstable inlet/outlet, Ditch- Rill Erosion, Ditch- Gully Erosion, Road Shoulder Erosion- Sheet, Road Shoulder Erosion- Rill, Soil- Bare	25x8	Armor Inlet/Outlet, Install Plunge Pool, Armor with Stone, Install Check Dams, Remove debris/sediment	Medium	Medium	Medium
10-1	Eagle Lane	Stream	Residential	Surface Erosion- Sheet, Soil- Bare, Shoreline- Lack of Shoreline Vegetation, Shoreline- Inadequate Shoreline Vegetation, Agriculture- Manure Washing off Site	50 x 70	Mulch, Silt Fence/EC Berms, Seed/Hay, Check site in 2022 to make sure it is stabilized	Medium	Medium	Low
10-2	Lupine Drive	Stream	Driveway	Surface Erosion- SheetDitch- Rill Erosion, Road Shoulder Erosion- Rill	50 x 12	Reshape Ditch, Install Turnouts, Remove debris/sediment, Add gravel, Reshape (Crown), Infiltration Trench @ roof dripline, Drywell @ gutter downspout, Establish Buffer, Install Runoff Diverter (waterbar), Water Retention Swales, Swale to direct roof and driveway runoff to wetlands before getting to lawn.	Low	Medium	Medium
10-3	Lupine Drive	Ditch	Private Road	Surface Erosion- Rill, Ditch- Rill Erosion, Road Shoulder Erosion- Rill, Roadside Plow/Grader Berm	800 x 12	Remove debris/sediment, Install Turnouts, Remove Grader/Plow Berms, Add gravel, Reshape (Crown) Road causes driveway erosion.	Medium	High	Medium

APPENDIX C: LIST OF MESSALONSKEE LAKE NPS SITES

Site	Location	Flow into lake via	Land Use	Problems	Size of Area Exposed or Eroded	Recommendations	Impact Rating	Cost to Fix	Technical Level to Install
10-4	Lupine Drive	Directly into lake	Driveway	Surface Erosion- Gully, Roadside Plow/Grader Berm	12 x 70	Reshape Ditch, Install Turnouts, Remove Grader/Plow Berms, Add gravel, Reshape (Crown)	Medium	Medium	Medium
10-5	Lupine Drive	Directly into lake	Residential	Soil- Bare, Soil- Uncovered Pile	50 x 40	Mulch, Silt Fence/EC Berms, Seed/Hay	Low	Medium	Medium
10-6	Augusta Road	Directly into lake	Commercial	Surface Erosion- Rill, Soil-Bare, Shoreline- Lack of Shoreline Vegetation, Shoreline- Inadequate Shoreline Vegetation	80 x 12	Build Up, Add gravel, Reshape (Crown), Add to Buffer, Check boat rental business for milfoil inspection protocols. Boat launch.	Medium	Medium	Medium
10-7	Augusta Road	Directly into lake	Boat Access	Surface Erosion- Sheet	100 x 50	Add gravel, Build Up, Reshape (Crown), Install Detention Basin	Medium	High	Medium
11-1	Murdock Place	Ditch	Private Road	Road Shoulder Erosion-Gully	4 x 200	Install Ditch, Install Check Dams, Add gravel, Reshape (Crown), Good woods available for ditch turnouts	Medium	Medium	Medium
11-2	Dunn Road	Stream	Residential	Surface Erosion- Gully, Shoreline- Erosion, Shoreline- Inadequate Shoreline Vegetation, Roof Runoff Erosion, Other, 3 bridges across stream. Uppermost is eroding from runoff on downstream side.	5 ft by 20 ft	Add Infiltration Trench, Mulch/Erosion Control Mulch, Infiltration Trench, Drip infiltration trench	Medium	Low	Low
11-3	Dunn Road	Directly into lake	Other	Surface Erosion- Rill, Soil-Bare	3 ft by 300	Define Foot Path, Stabilize Foot Path, Install Runoff Diverter (waterbar), Erosion Control Mulch, Armor path install water bars	Medium	Low	Low

APPENDIX C: LIST OF MESSALONSKEE LAKE NPS SITES

Site	Location	Flow into lake via	Land Use	Problems	Size of Area Exposed or Eroded	Recommendations	Impact Rating	Cost to Fix	Technical Level to Install
11-4	Spaulding Bridge Road	Directly into lake	Private Road	Surface Erosion- Rill, Road Shoulder Erosion- Rill, Other, Road is used as snowmobile trail in winter. Erosion between driveway and bridge.	10 x 100	Add gravel, Reshape (Crown), Install Runoff Diverters- Broad-based Dip, Stabilize Foot Path	Medium	Medium	Medium
11-5	Dunn Road	Directly into lake	Town Road	Culvert- Unstable inlet/outlet, Ditch- Gully Erosion, Road Shoulder Erosion- Gully	Both ends of culvert need armor	Armor Inlet/Outlet, Install Plunge pool on downstream side.	Medium	Medium	Medium
11-6	Dunn Road	Directly into lake	Town Road	Road Shoulder Erosion- Gully, Shoreline- Inadequate Shoreline Vegetation, Shoreline- Erosion, Shoreline- Unstable Access	8ft by 45 ft	Reshape (Crown), Vegetate Shoulder, Mulch, Rip Rap, Riprap would stabilize shoulder. Road should be regraded to slope away from lake into the ditch and to the lake via 11- 05 culvert. Any loose sandy soil is dug up by snapping turtles. Need more trees along shoreline.	High	High	High
11-7	Wings Mills Road	Directly into lake	Other- Dam/Bridge	Surface Erosion- Gully	8 x 8	All 4 bridge shoulders recently armored with riprap. SE corner needs more rock.	Medium	Low	Medium
11-8	Bartlett Road	Directly into lake	Boat Access	Surface Erosion- Gully, Road Shoulder Erosion- Gully, Shoreline- Unstable Access	10 x 20	Should either be armored which could increase use or blocked off. Signage helps.	Medium	Medium	Medium
11-9	Bartlett Road	Directly into lake	Town Road	Culvert- Clogged, Culvert- Crushed Broken, Culvert- Undersized	2 ft by 3ft	Remove Clog, Replace, Enlarge	Medium	Medium	High
11-10	Wings Mills Road	Stream	Residential	Surface Erosion- Rill, Soil- Bare, Shoreline- Inadequate Shoreline Vegetation, Shoreline- Erosion	25x10	Establish Buffer, Reseed bare soil & thinning grass, Gutters to underground drywells but does lead to lake. Homeowner wants	Medium	Low	Medium

APPENDIX C: LIST OF MESSALONSKEE LAKE NPS SITES

Site	Location	Flow into lake via	Land Use	Problems	Size of Area Exposed or Eroded	Recommendations	Impact Rating	Cost to Fix	Technical Level to Install
						rip rap. We suggested letting veg grow on bank no mowing.			
11-11	Wings Mills Road	Minimal Vegetation	Town Road	Surface Erosion- Rill, Culvert- Clogged, Road Shoulder Erosion- Rill, Soil- Bare	30x10	Remove Clog, Vegetate Shoulder	Low	Low	Low
11-12	Al Copp Road	Directly into lake	Residential	Surface Erosion- Rill, Soil- Bare, Shoreline- Erosion, Shoreline- Unstable Access, Shoreline- Lack of Shoreline Vegetation, Other, 2 porta potties and outdoor washing station.	15x5	Mulch/Erosion Control Mulch, Infiltration steps to boat access	Low	Low	Low
11-13	Wings Mills Road	Stream	Town Road	Surface Erosion- Gully, Culvert- Unstable inlet/outlet, Road Shoulder Erosion- Rill, Soil- Bare	10x10 US, 10x10 DS	Armor Inlet/Outlet, Enlarge, Vegetate Shoulder, Extend rip rap upslope on DS side. Stabilize bank on US side. Vegetate shoulder between road and culvert. Consider larger culvert. Beaver activity creating ponding?	Medium	Medium	Medium
11-14	Cottle Hill Road	Stream	Town Road	Surface Erosion- Gully, Culvert- Unstable inlet/outlet, Culvert- Undersized, Ditch- Sheet Erosion, Road Shoulder Erosion- Sheet, Other, 4' drop below culvert eating away soil and trees. Hanging culvert.	4h x 10w x 10l	Armor Inlet/Outlet, Install Plunge Pool, Enlarge, Install Check Dams	High	High	Medium

APPENDIX C: LIST OF MESSALONSKEE LAKE NPS SITES

Site	Location	Flow into lake via	Land Use	Problems	Size of Area Exposed or Eroded	Recommendations	Impact Rating	Cost to Fix	Technical Level to Install
11-15	Cottle Hill Road	Stream	Town Road	Surface Erosion- Gully, Ditch- Gully Erosion, Ditch-Bank Failure	150 x 10	Reshape Ditch, Install Check Dams, Armor with Stone, Vegetate, The stream is serving as a ditch on east side of road.	High	High	Medium
11-16	Spring Hill Road	Stream	Town Road	Surface Erosion- Rill, Culvert- Unstable inlet/outlet	5x5	Armor Inlet/Outlet, Enlarge, Replace large stone that fell from top of culvert. Consider upsizing.	Medium	Low	Low
11-17	Wings Mills Road	Stream	Town Road	Surface Erosion- Rill, Culvert- Unstable inlet/outlet, Soil- Bare, Other, Bare soil build up on top of culvert and road runoff on S side. Possible turtle nests?	10x5	Armor Inlet/Outlet	Low	Low	Low
11-18	Rat Mill Hill Road	Stream	Town Road	Surface Erosion- Rill, Ditch-Bank Failure, Road Shoulder Erosion- Rill	25x10	Build Up, Remove Grader/Plow Berms, Reshape (Crown), Vegetate Shoulder, Remove trash from ditch	Low	Low	Low
12-1	Prescott Road	Stream	Logging	Surface Erosion- Rill, Road Shoulder Erosion- Gully, Soil- Bare	100' plus road	Mulch, Seed/Hay	Medium	Medium	Low
12-2	Hammond Drive	Stream	Commercial	Other, Green scum on surface of pond, white foam coming out of culvert downstream, lots of organic matter built up at culvert outlet.	N/A	Address any erosion on banks. Minimize runoff from parking area. Aerate pond? Investigate source of foam.	Medium	Medium	Medium

APPENDIX C: LIST OF MESSALONSKEE LAKE NPS SITES

Site	Location	Flow into lake via	Land Use	Problems	Size of Area Exposed or Eroded	Recommendations	Impact Rating	Cost to Fix	Technical Level to Install
13-1	Oakland Road	Directly into lake	Residential	Surface Erosion- Sheet, Shoreline- Lack of Shoreline Vegetation, Shoreline- Erosion, Shoreline- Unstable Access	30 x 24 ft	Infiltration Steps, Erosion Control Mulch, Add to Buffer, Stabilize wooden platform base	Low	Low	Low
13-2	Blethen Road	Directly into lake	Residential	Surface Erosion- Rill, Road Shoulder Erosion- Sheet, Shoreline- Lack of Shoreline Vegetation, Shoreline- Erosion, Roof Runoff Erosion	50x50	Install Runoff Diverters- Rubber Razor, Erosion Control Mulch, Infiltration Trench @ roof dripline, Add to Buffer, Install Runoff Diverter (waterbar), Infiltration Trench, Mulch/Erosion Control Mulch	Low	Medium	Medium
13-3	Blethen Road	Directly into lake	Residential	Surface Erosion- Sheet, Surface Erosion- Rill	25x5	Infiltration Steps, Install Runoff Diverter (waterbar), Erosion Control Mulch, Mulch/Erosion Control Mulch, On opposite side of deck- repair waterbar for pipeline runoff.	Low	Low	Low
13-4	Maine Central Railroad	Stream	Private Road	Road Shoulder Erosion- Gully, Other- Invasive Plants,	5x3	Build Up, Install Runoff Diverters- Broad- based Dip	Low	Low	Low
13-5	Blethen Road	Directly into lake	Residential	Surface Erosion- Sheet, Shoreline- Lack of Shoreline Vegetation	45x2	Infiltration Steps, Drywell @ gutter downspout, Add to Buffer, Establish Buffer	Low	Low	Low
13-6	Kerschner Road	Directly into lake	Residential	Surface Erosion- Rill, Shoreline- Lack of Shoreline Vegetation, Shoreline- Unstable Access	30x5	Infiltration Steps, Install Runoff Diverter (waterbar), Erosion Control Mulch, Infiltration Trench @ roof dripline, Establish Buffer	Medium	Medium	Low
13-7	Whispering Pines Road	Minimal Vegetation	Residential	Surface Erosion- Sheet, Shoreline- Lack of Shoreline Vegetation	25x5	Define Foot Path, Erosion Control Mulch, Infiltration Steps, Add to Buffer, Establish Buffer	Low	Low	Low

APPENDIX C: LIST OF MESSALONSKEE LAKE NPS SITES

Site	Location	Flow into lake via	Land Use	Problems	Size of Area Exposed or Eroded	Recommendations	Impact Rating	Cost to Fix	Technical Level to Install
13-8	Whispering Pines Road	Minimal Vegetation	Residential	Surface Erosion- Rill, Shoreline- Lack of Shoreline Vegetation, Roof Runoff Erosion	20x5	Stabilize Foot Path, Erosion Control Mulch, Infiltration Trench @ roof dripline, Add to Buffer	Low	Low	Low
13-9	Whispering Pines Road	Minimal Vegetation	Residential	Surface Erosion- Rill, Roof Runoff Erosion	50x5	Erosion Control Mulch, Define Foot Path, Stabilize Foot Path, Install Runoff Diverter (waterbar), Drywell @ gutter downspout, Infiltration Trench @ roof dripline	Low	Low	Low
13-10	Whispering Pines Road	Minimal Vegetation	Residential	Surface Erosion- Sheet, Roof Runoff Erosion	20x5	Define Foot Path, Stabilize Foot Path, Erosion Control Mulch, Infiltration Trench @ roof dripline	Low	Low	Low
13-11	Whispering Pines Road	Directly into lake	Residential	Surface Erosion- Sheet, Surface Erosion- Rill, Roof Runoff Erosion	20x5	Define Foot Path, Infiltration Steps, Erosion Control Mulch, Install Runoff Diverter (waterbar), Infiltration Trench @ roof dripline, Mulch/Erosion Control Mulch	Low	Low	Low
13-12	Whispering Pines Road	Ditch	Private Road	Surface Erosion- Sheet, Road Shoulder Erosion- Rill, Shoreline- Lack of Shoreline Vegetation, Roof Runoff Erosion	40x5	Vegetate Shoulder, Reshape (Crown)Infiltration Steps, Infiltration Trench @ roof dripline, Add to Buffer	Low	Low	Medium
13-13	Whispering Pines Road	Minimal Vegetation	Residential	Surface Erosion- Sheet, Shoreline- Lack of Shoreline Vegetation	10x3	Infiltration Trench @ roof dripline, Add to Buffer, Mulch/Erosion Control Mulch	Low	Low	Low
13-14	Whispering Pines Road	Directly into lake	Residential	Surface Erosion- Sheet, Shoreline- Lack of Shoreline Vegetation, Roof Runoff Erosion	25x5	Erosion Control Mulch, Infiltration Steps, Infiltration Trench @ roof dripline, Add to Buffer, Rain Garden, Infiltration Trench	Low	Low	Low

APPENDIX C: LIST OF MESSALONSKEE LAKE NPS SITES

Site	Location	Flow into lake via	Land Use	Problems	Size of Area Exposed or Eroded	Recommendations	Impact Rating	Cost to Fix	Technical Level to Install
13-15	Whispering Pines Road	Directly into lake	Residential	Surface Erosion- Sheet, Roof Runoff Erosion	20x5	Define Foot Path, Infiltration Steps, Infiltration Trench @ roof dripline	Low	Low	Low
13-16	Whispering Pines Road	Directly into lake	Residential	Surface Erosion- Rill, Roof Runoff Erosion	5x2	Infiltration Trench @ roof dripline, Drywell @ gutter downspout	Low	Low	Low
13-17	Whispering Pines Road	Directly into lake	Residential	Surface Erosion- Sheet, Roof Runoff Erosion	30x2	Infiltration Trench @ roof dripline	Low	Low	Low
13-18	Thistle Hill Lane	Directly into lake	Residential	Surface Erosion- Rill, Roof Runoff Erosion	30x2	Infiltration Trench @ roof dripline	Low	Low	Low
13-19	Thistle Hill Lane	Directly into lake	Residential	Surface Erosion- Sheet, Roof Runoff Erosion	25x5	Infiltration Steps, Define Foot Path, Erosion Control Mulch, Infiltration Trench @ roof dripline, Drywell @ gutter downspout	Low	Low	Low
13-20	Oakland Road	Minimal Vegetation	Residential	Other, Construction	50x50	Mulch, Silt Fence/EC Berms, Seed/Hay	Low	Low	Low
13-21	Hayslett Woods Road	Directly into lake	Residential	Surface Erosion- Gully, Shoreline- Lack of Shoreline Vegetation	30x5	Define Foot Path, Stabilize Foot Path, Infiltration Steps, Install Runoff Diverter (waterbar), Erosion Control Mulch, Add to Buffer	Medium	Low	Low
13-22	Hayslett Woods Road	Directly into lake	Residential	Surface Erosion- Sheet, Shoreline- Lack of Shoreline Vegetation	40x3	Infiltration Steps, Erosion Control Mulch, Add to Buffer	Low	Low	Low
13-23	Hayslett Woods Road	Directly into lake	Residential	Surface Erosion- Rill, Shoreline- Lack of Shoreline Vegetation, Roof Runoff Erosion	30x3	Erosion Control Mulch, Infiltration Trench @ roof dripline, Drywell @ gutter downspout, Add to Buffer, Mulch/Erosion Control Mulch, Hole in pipe causing leakage	Medium	Low	Low

APPENDIX C: LIST OF MESSALONSKEE LAKE NPS SITES

Site	Location	Flow into lake via	Land Use	Problems	Size of Area Exposed or Eroded	Recommendations	Impact Rating	Cost to Fix	Technical Level to Install
						above pipe outlet in photo 2; needs stabilization			
13-24	Hayslett Woods Road	Directly into lake	Residential	Surface Erosion- Rill, Surface Erosion- Gully, Shoreline-Erosion, Roof Runoff Erosion	10x5	Infiltration Steps, Infiltration Trench @ roof dripline, Add to Buffer	Low	Low	Low
13-25	Dustin Drive	Directly into lake	Residential	Surface Erosion- Rill, Shoreline- Lack of Shoreline Vegetation, Roof Runoff Erosion	50x50	Define Foot Path, Stabilize Foot Path, Infiltration Steps, Install Runoff Diverter (waterbar), Erosion Control Mulch, Infiltration Trench @ roof dripline, Add to Buffer, Mulch/Erosion Control Mulch	Medium	Medium	Low
13-26	Dustin Drive	Stream	Private Road	Culvert- Unstable inlet/outlet, Culvert-Crushed Broken	5x2	Armor Inlet/Outlet, Enlarge, Lengthen	Medium	Medium	High
13-27	Dustin Drive	Stream	Driveway	Culvert- Unstable inlet/outlet, Culvert-Crushed Broken	5x3	Install Culvert, Install new culvert	Medium	Medium	High
13-27a	Dustin Drive	Directly into lake	Residential	Surface Erosion- Rill	30x6	Define Foot Path, Infiltration Steps, Stabilize Foot Path, Erosion Control Mulch	Low	Low	Low
13-28	Dustin Drive	Stream	Private Road	Road Shoulder Erosion-Gully	500x10	Reshape (Crown), Install Runoff Diverters- Waterbar, Install Runoff Diverters- Rubber Razor, Install Runoff Diverters- Open Top Culvert	High	High	High
13-29	Burton Woods Road	Stream	Town Road	Culvert- Clogged, Culvert-Undersized	5x5	Remove Clog, Enlarge	Medium	High	High
14-1	Balsam Road	Directly into lake	Residential	Surface Erosion- Rill, Soil-Bare, Shoreline- Undercut,	150x3	Define Foot Path, Infiltration Steps, Install Runoff Diverter (waterbar), Erosion Control	Medium	Medium	Medium

APPENDIX C: LIST OF MESSALONSKEE LAKE NPS SITES

Site	Location	Flow into lake via	Land Use	Problems	Size of Area Exposed or Eroded	Recommendations	Impact Rating	Cost to Fix	Technical Level to Install
				Shoreline- Erosion, Roof Runoff Erosion		Mulch, Infiltration Trench @ roof dripline, Rip Rap			
14-2	Balsam Road	Stream	Residential	Surface Erosion- Sheet, Other- Invasive Plants	10x10	Mulch/Erosion Control Mulch, Install Runoff Diverter (waterbar), Remove Invasive Plants, Invasive: yellow iris	Low	Low	Low
14-3	Balsam Road	Directly into lake	Residential	Surface Erosion- Rill, Soil- Uncovered Pile	25x10	Install Runoff Diverters- Rubber Razor, Reshape (Crown), Build Up, Establish Buffer, Reseed bare soil & thinning grass, Install Runoff Diverter (waterbar), Mulch/Erosion Control Mulch, Rip Rap	Medium	Medium	Medium
14-4	Balsam Road	Directly into lake	Residential	Surface Erosion- Sheet, Shoreline- Lack of Shoreline Vegetation, Shoreline- Erosion, Shoreline- Unstable Access	35x20	Establish Buffer, Reseed bare soil & thinning grass, Stabilize private boat launch	Medium	Medium	Low
14-5	Aspen Road	Directly into lake	Residential	Surface Erosion- Sheet, Shoreline- Lack of Shoreline Vegetation, Shoreline- Undercut, Shoreline- Unstable Access, Roof Runoff Erosion	35x5	Define Foot Path, Infiltration Steps, Install Runoff Diverter (waterbar), Erosion Control Mulch, Infiltration Trench @ roof dripline, Establish Buffer, Reseed bare soil & thinning grass	Medium	Low	Low
14-6	Aspen Road	Directly into lake	Residential	Surface Erosion- Gully, Shoreline- Lack of Shoreline Vegetation, Roof Runoff Erosion	5x3	Drywell @ gutter downspout, Rain Barrel, Add to Buffer	Medium	Low	Low
14-7	Ash Road	Directly into lake	Residential	Surface Erosion- Rill, Surface Erosion- Sheet, Road Shoulder Erosion- Rill, Soil- Bare, Shoreline- Lack of Shoreline Vegetation,	150x30	Add gravel, Reshape (Crown), Install Runoff Diverters- Rubber Razor, Erosion Control Mulch, Infiltration Trench @ roof dripline, Drywell @ gutter	Medium	Medium	Medium

APPENDIX C: LIST OF MESSALONSKEE LAKE NPS SITES

Site	Location	Flow into lake via	Land Use	Problems	Size of Area Exposed or Eroded	Recommendations	Impact Rating	Cost to Fix	Technical Level to Install
				Shoreline- Erosion, Roof Runoff Erosion		downspout, Rain Barrel, Add to Buffer, Mulch/Erosion Control Mulch			
14-8	Ash Road	Directly into lake	Residential	Surface Erosion- Sheet, Shoreline- Erosion, Roof Runoff Erosion	10x5	Infiltration Trench @ roof dripline, Rain Barrel, Rain Garden, Mulch/Erosion Control Mulch, Repair boat house footing- gully erosion!	Low	Medium	Medium
14-9	Chestnut Road	Directly into lake	Residential	Surface Erosion- Rill, Shoreline- Erosion, Shoreline- Undercut	15x5	Rip Rap, Build up bank from erosion	Medium	Low	Low
14-10	Chestnut Road	Directly into lake	Residential	Surface Erosion- Sheet, Soil- Bare, Shoreline- Unstable Access	40x10	Define Foot Path, Erosion Control Mulch, Install Runoff Diverter (waterbar), Mulch/Erosion Control Mulch	Medium	Low	Low
14-11	Chestnut Road	Directly into lake	Residential	Surface Erosion- Sheet, Shoreline- Undercut, Shoreline- Erosion, Shoreline- Lack of Shoreline Vegetation, Roof Runoff Erosion	30x15	Drywell @ gutter downspout, Add to Buffer, Reseed bare soil & thinning grass, Install Runoff Diverter (waterbar), Mulch/Erosion Control Mulchero Rip Rap	Medium	Low	Low
14-12	Oakland Road	Stream	State Road	Culvert- Unstable inlet/outlet	3x3	Armor Inlet/Outlet	Low	Low	Low
14-13	Oakland Road	Stream	State Road	Culvert- Clogged, Road Shoulder Erosion- Rill	50x5	Remove Clog, Build Up, Add recycled asphalt, Extend 633 Oakland Road Driveway Apron	Medium	Medium	Medium
15-1	Michaud Lane	Stream	Residential	Surface Erosion- Sheet, Soil- Delta in Stream/Lake	10 by 3 ft	Armor with Stone, Add to Buffer, Establish Buffer, Reseed bare soil & thinning grass, Remove Invasive Plants, There is an intermittent stream running along the north side of the	Low	Medium	Low

APPENDIX C: LIST OF MESSALONSKEE LAKE NPS SITES

Site	Location	Flow into lake via	Land Use	Problems	Size of Area Exposed or Eroded	Recommendations	Impact Rating	Cost to Fix	Technical Level to Install
						property that drains through a short culvert into the lake. The water is murky after this morning's rain, and it is forming a small delta in the lake. The culvert could be removed and replaced with a vegetated rain garden/ wetland area to improve filtering from the stream.			
15-2	Labun Lane	Directly into lake	Residential	Surface Erosion- Sheet, Shoreline- Lack of Shoreline Vegetation, Shoreline- Inadequate Shoreline Vegetation, Shoreline- Erosion, Shoreline- Unstable Access	20 x7 ft	Stabilize Foot Path, Define Foot Path, Erosion Control Mulch, Establish Buffer, Install Runoff Diverter (waterbar), Rain Garden, Add a water bar and an area of crushed stone in front of the seating area to address erosion from the drip line of the tent. Define paths and seating areas and plant around the edges. Remove pavement at the outlet of the culvert and replace with stone, plant the low area where the culvert drains to with a rain garden.	Medium	Medium	Medium
15-3	Nottingham Lane	Directly into lake	Residential	Surface Erosion- Sheet, Soil- Bare, Shoreline- Lack of Shoreline Vegetation, Shoreline- Inadequate Shoreline Vegetation, Roof Runoff Erosion	30 by 10	Define Foot Path, Stabilize Foot Path, Erosion Control Mulch, Infiltration Trench @ roof dripline, Add to Buffer, Establish Buffer, No Raking, Mulch/Erosion Control Mulch, Define/stabilize seating areas.	Low	Low	Low

APPENDIX C: LIST OF MESSALONSKEE LAKE NPS SITES

Site	Location	Flow into lake via	Land Use	Problems	Size of Area Exposed or Eroded	Recommendations	Impact Rating	Cost to Fix	Technical Level to Install
15-4	Easy Street	Directly into lake	Residential	Surface Erosion- Sheet, Shoreline- Inadequate Shoreline Vegetation	3 by 20 ft	Define Foot Path, Stabilize Foot Path, Infiltration Steps	Low	Low	Low
15-5	Easy Street	Directly into lake	Residential	Surface Erosion- Sheet, Shoreline- Unstable Access, Shoreline- Erosion	10 by 5 ft	Install Runoff Diverter (waterbar), Rain Garden, Water Retention Swales, Adding swales or rain gardens up the hill in the yard could slow runoff from the road. Stabilize the dock access area. This property has a great buffer other than at the access point.	Low	Low	Low
15-6	Drummond Lane	Minimal Vegetation	Residential	Surface Erosion- Sheet, Shoreline- Inadequate Shoreline Vegetation	5 by 5 ft	Stabilize Foot Path, Define Foot Path, Install Runoff Diverter (waterbar), Adding shrubs along the curved path on the north side of the house would help define the path, keep mulch in place, and add to the existing buffer. Adding a water bar in front of the beach area to the south of the house could divert water to the gardens and prevent erosion of the sand.	Low	Low	Low
15-7	Five Fingers Road	Stream	Private Road	Surface Erosion- Gully, Ditch- Gully Erosion	3 x 40 ft	Install Turnouts, Install Sediment Pools, Gully at road edge drains to another gravel area which then washes over the culvert. I'm not sure exactly what the best recommendation would be, I would say a settling basin next to the culvert but that might be an	High	Medium	High

APPENDIX C: LIST OF MESSALONSKEE LAKE NPS SITES

Site	Location	Flow into lake via	Land Use	Problems	Size of Area Exposed or Eroded	Recommendations	Impact Rating	Cost to Fix	Technical Level to Install
						issue if plows need to use the area as a turnout.			
15-8	Old Cottage Lane	Minimal Vegetation	Residential	Surface Erosion- Rill, Shoreline- Inadequate Shoreline Vegetation, Shoreline- Erosion, Roof Runoff Erosion	20 x 30 ft	Define Foot Path, Stabilize Foot Path, Rain Barrel, Drywell @ gutter downspout, Add to Buffer. Could create a platform down lower on the hill for the dock and plant the hill to slow runoff.	Medium	Low	Low
15-9	Old Cottage Lane	Minimal Vegetation	Residential	Surface Erosion- Sheet, Shoreline- Inadequate Shoreline Vegetation, Shoreline- Erosion	10 x 3 ft	Stabilize Foot Path, Define Foot Path, Add to Buffer, the access area looks great but adding a line of shrubs to the shoreline along the back of the house would help improve that area.	Low	Low	Low
15-10	Kayak Lane	Minimal Vegetation	Residential	Surface Erosion- Sheet, Shoreline- Inadequate Shoreline Vegetation	3 x 5 ft	Add to Buffer, Rain Garden, Add a rain garden or some plantings in the sunken area next to the staircase, add to the buffer around the shoreline, and stabilize and add plants wherever possible to the dock access areas.	Low	Low	Low
15-11	Kayak Lane	Minimal Vegetation	Residential	Surface Erosion- Sheet, Soil- Bare, Shoreline- Inadequate Shoreline Vegetation, Shoreline- Lack of Shoreline Vegetation, Shoreline- Erosion	30 by 10 ft	Define Foot Path, Stabilize Foot Path, Establish Buffer, No Raking	Low	Low	Low
15-12	Campground Road	Directly into lake	Commercial	Surface Erosion- Rill, Soil- Bare, Shoreline- Lack of Shoreline Vegetation, Shoreline- Erosion, Shoreline- Unstable Access	50 by 20 ft	Define Foot Path, Stabilize Foot Path, Install Runoff Diverter (waterbar), Erosion Control Mulch, Establish Buffer, Add to Buffer, Reseed bare soil & thinning grass, Fix the sides of by	High	Low	Low

APPENDIX C: LIST OF MESSALONSKEE LAKE NPS SITES

Site	Location	Flow into lake via	Land Use	Problems	Size of Area Exposed or Eroded	Recommendations	Impact Rating	Cost to Fix	Technical Level to Install
						the volleyball court to stop the sand from leaving where the sides are broken.			
16-1	Croquet Lane	Minimal Vegetation	Residential	Surface Erosion- Sheet, Shoreline- Undercut, Shoreline- Lack of Shoreline Vegetation, Shoreline- Erosion	5 x 5	Define Foot Path, Erosion Control Mulch, Add to Buffer	Low	Low	Low
16-2	Croquet Lane	Directly into lake	Residential	Surface Erosion- Sheet, Shoreline- Lack of Shoreline Vegetation, Shoreline- Inadequate Shoreline Vegetation, Shoreline- Erosion, Shoreline- Unstable Access	40 x 40	Stabilize Foot Path, Erosion Control Mulch, Define Foot Path, Add to Buffer, Establish Buffer, Rain Garden, Water Retention Swales, Mulch/Erosion Control Mulch,	Medium	Low	Low
16-3	Croquet Lane	Minimal Vegetation	Driveway	Surface Erosion- Sheet	30 x 60	Install Runoff Diverters- Waterbar, Reshape (Crown), Add gravel, Build Up, Define Foot Path, Stabilize Foot Path, Stabilize the end of the driveway/parking area, add a water bar at the end to divert the flow of runoff.	Medium	Medium	Medium
16-4	Croquet Lane	Directly into lake	Residential	Surface Erosion- Sheet, Shoreline- Undercut, Shoreline- Lack of Shoreline Vegetation, Shoreline- Inadequate Shoreline Vegetation, Shoreline- Erosion	5 x 20	Define Foot Path, Erosion Control Mulch, Establish Buffer, Add to Buffer, Reseed bare soil & thinning grass, Mulch/Erosion Control Mulch	Low	Low	Low
16-5	Croquet Lane	Minimal Vegetation	Driveway	Surface Erosion- Sheet	20 x 70	Reshape (Crown), Add gravel, Install Runoff Diverters- Waterbar, Rain Garden, Water Retention Swales, Stabilize	Low	Medium	Medium

APPENDIX C: LIST OF MESSALONSKEE LAKE NPS SITES

Site	Location	Flow into lake via	Land Use	Problems	Size of Area Exposed or Eroded	Recommendations	Impact Rating	Cost to Fix	Technical Level to Install
						parking area and add a runoff diverter at the end to send water into the woods or a rain garden.			
16-6	Brad's Way	Directly into lake	Residential	Surface Erosion- Sheet, Shoreline- Inadequate Shoreline Vegetation, Shoreline- Erosion	3 x 6 ft	Infiltration Trench @ roof dripline, Add to Buffer, Establish Buffer	Low	Low	Low
16-7	Savage Way	Directly into lake	Residential	Surface Erosion- Sheet, Shoreline- Lack of Shoreline Vegetation, Shoreline- Inadequate Shoreline Vegetation, Shoreline- Erosion	3 x 15 ft	Add to Buffer, Establish Buffer, No Raking	Low	Low	Low
16-8	Great Blue Lane	Minimal Vegetation	Residential	, Shoreline- Inadequate Shoreline Vegetation, Shoreline- Erosion, Roof Runoff Erosion	6 x 15	Infiltration Trench @ roof dripline, Establish Buffer	Low	Low	Low
16-9	Cathedral Pines Lane	Directly into lake	Residential	, Shoreline- Undercut, Shoreline- Lack of Shoreline Vegetation	2 x 8 ft	Establish Buffer, Add to Buffer	Low	Low	Low
16-10	Cathedral Pines Lane	Minimal Vegetation	Residential	Surface Erosion- Sheet, Shoreline- Lack of Shoreline Vegetation	30 x 30	Establish Buffer, Mulch/Erosion Control Mulch, Rain Garden, Add vegetation above and below retaining wall	Low	Low	Low
16-11	Cathedral Pines Lane	Directly into lake	Residential	Surface Erosion- Sheet, Shoreline- Inadequate Shoreline Vegetation, Shoreline- Erosion	4 x 5 ft	Add to Buffer	Low	Low	Low
16-12	Cathedral Pines Lane	Stream	Private Road	Surface Erosion- Sheet, Culvert- Unstable inlet/outlet, Road Shoulder Erosion- Sheet	3 x 20 ft	Armor Inlet/Outlet	Low	Medium	Medium

APPENDIX C: LIST OF MESSALONSKEE LAKE NPS SITES

Site	Location	Flow into lake via	Land Use	Problems	Size of Area Exposed or Eroded	Recommendations	Impact Rating	Cost to Fix	Technical Level to Install
16-13	Cathedral Pines Lane	Directly into lake	Residential	Surface Erosion- Sheet, Shoreline- Lack of Shoreline Vegetation	30 x 30	Establish Buffer, Add to Buffer, Reseed bare soil & thinning grass	Medium	Low	Low
16-14	Cathedral Pines Lane	Directly into lake	Residential	Surface Erosion- Sheet, Shoreline- Inadequate Shoreline Vegetation	2 x 4 feet	Add to Buffer, No Raking	Low	Low	Low
16-15	Cathedral Pines Lane	Directly into lake	Residential	Surface Erosion- Sheet, Shoreline- Lack of Shoreline Vegetation, Shoreline- Inadequate Shoreline Vegetation, Shoreline- Erosion	10 x 15 ft	Establish Buffer, Add to Buffer, No Raking	Low	Low	Low
16-16	Oakland Road	Stream	State Road	Culvert- Unstable inlet/outlet, Road Shoulder Erosion- Sheet	20 x 5	Vegetate, Install Turnouts, Vegetate Shoulder	Low	Low	Medium
16-17	Ambrose Cove Lane	Directly into lake	Residential	Surface Erosion- Sheet, Shoreline- Lack of Shoreline Vegetation, Shoreline- Inadequate Shoreline Vegetation, Shoreline- Erosion, Shoreline- Undercut	2 x 10	Establish Buffer, Add to Buffer	Low	Low	Low
16-18	Ambrose Cove Lane	Minimal Vegetation	Driveway	Surface Erosion- Gully	70 x 30	Add gravel, Reshape (Crown), Install Runoff Diverters- Waterbar, Establish Buffer	Medium	Medium	Low
16-19	Ambrose Cove Lane	Directly into lake	Residential	Surface Erosion- Sheet, Shoreline- Undercut, Shoreline- Lack of Shoreline Vegetation, Shoreline- Inadequate Shoreline Vegetation, Shoreline- Erosion	5 x 10 ft	Establish Buffer, Add to Buffer	Low	Low	Low

APPENDIX C: LIST OF MESSALONSKEE LAKE NPS SITES

Site	Location	Flow into lake via	Land Use	Problems	Size of Area Exposed or Eroded	Recommendations	Impact Rating	Cost to Fix	Technical Level to Install
16-20	Ambrose Cove Lane	Directly into lake	Residential	Surface Erosion- Sheet, Shoreline- Lack of Shoreline Vegetation, Shoreline- Erosion	5 x 5 ft	Establish Buffer, Add to Buffer, Rain Garden, Rain garden at the end of the drainage around the flagpole	Low	Low	Low
17-1	Dore Lane	Directly into lake	Residential	Surface Erosion- Sheet, Shoreline- Lack of Shoreline Vegetation, Shoreline- Erosion	5×10	Add to Buffer, Stabilize area to the right and left of the dock entrance	Medium	Low	Medium
17-2	Sparkling Lake Lane	Minimal Vegetation	Residential	Surface Erosion- Rill, Shoreline- Lack of Shoreline Vegetation, Roof Runoff Erosion, Other, Runoff from walkway onto road	20x4	Infiltration Steps, Erosion Control Mulch, Infiltration Trench @ roof dripline, Establish Buffer, cover bare soil under picnic table	Low	Low	Low
17-3	Sparkling Lake Lane	Directly into lake	Private Road	Surface Erosion- Gully, Road Shoulder Erosion- Gully	50x10	Build Up, Add gravel, Reshape (Crown), Install Runoff Diverters- Broad- based Dip	Medium	Medium	Medium
17-4	Sparkling Lake Lane	Directly into lake	Trail or Path	Surface Erosion- Sheet, Soil- Bare, Shoreline- Inadequate Shoreline Vegetation, Shoreline- Unstable Access	10x10	Define Foot Path, Stabilize Foot Path, Install Runoff Diverter (waterbar), Erosion Control Mulch, No Raking, Add to Buffer	Low	Low	Low
17-5	Sparkling Lake Lane	Minimal Vegetation	Residential	Surface Erosion- Sheet, Soil- Bare, Shoreline- Inadequate Shoreline Vegetation, Roof Runoff Erosion	30x20	Infiltration Trench @ roof dripline, Add to Buffer, Rain Garden, Add a rain garden above road.	Low	Medium	Medium
17-6	Sparkling Lake Lane	Minimal Vegetation	Driveway	Surface Erosion- Sheet, Soil- Bare, Other, Stormwater passes by ash pile in fire pit	20x20	Install Detention Basin, Mulch/Erosion Control Mulch, Add ECM on slope above driveway	Low	Low	Medium

APPENDIX C: LIST OF MESSALONSKEE LAKE NPS SITES

Site	Location	Flow into lake via	Land Use	Problems	Size of Area Exposed or Eroded	Recommendations	Impact Rating	Cost to Fix	Technical Level to Install
17-7	Belgrade Road	Stream	State Road	Surface Erosion- Rill, Culvert- Unstable inlet/outlet, Road Shoulder Erosion- Sheet, Other, Hanging culvert	10x20	Install Plunge Pool, Armor Inlet/Outlet	Medium	Medium	Medium
17-8	Blake Lane	Directly into lake	Residential	Surface Erosion- Rill, Soil- Bare, Shoreline- Erosion, Shoreline- Lack of Shoreline Vegetation	20x5	Establish Buffer	Low	Low	Low
17-9	Blake Lane	Minimal Vegetation	Driveway	Surface Erosion- Rill	60x15	Add gravel, Reshape (Crown), Install Runoff Diverters- Rubber Razor, at least 2 water bars including one at end	Medium	Medium	Medium
17-10	Blake Lane	Directly into lake	Residential	Surface Erosion- Sheet, Soil- Bare, Shoreline- Lack of Shoreline Vegetation, Roof Runoff Erosion	60x20	Infiltration Trench @ roof dripline, Establish Buffer, Rain Garden, Rain garden around fire pit area	Medium	Low	Medium
17-11	Blake Lane	Minimal Vegetation	Residential	Surface Erosion- Sheet, Soil- Bare, Shoreline- Lack of Shoreline Vegetation	20x15	Erosion Control Mulch, Infiltration Trench @ roof dripline, Add to Buffer, No Raking, Reseed bare soil & thinning grass, Mulch/Erosion Control Mulch, White hose coming from basement to lake. Evidence of liquid coming out. Unknown source.	Low	Low	Low
17-12	Blake Lane	Stream	Private Road	Surface Erosion- Gully, Culvert- Unstable inlet/outlet, Road Shoulder Erosion- Gully	15x10 and 5x5	Replace/Need 2 new culverts	High	High	Medium
18-1	Rocky Shore Lane	Minimal Vegetation	Residential	Surface Erosion- Sheet, Soil- Bare, Shoreline- Lack of	30x20	Infiltration Trench @ roof dripline, Establish Buffer, Reseed bare soil & thinning grass	Low	Low	Low

APPENDIX C: LIST OF MESSALONSKEE LAKE NPS SITES

Site	Location	Flow into lake via	Land Use	Problems	Size of Area Exposed or Eroded	Recommendations	Impact Rating	Cost to Fix	Technical Level to Install
				Shoreline Vegetation, Roof Runoff Erosion					
18-2	Rocky Shore Lane	Stream	Private Road	Surface Erosion- Rill, Culvert- Unstable inlet/outlet, Culvert- Clogged, Culvert- Undersized	5x5	Armor Inlet/Outlet, Remove Clog, Enlarge, Lengthen, Remove old metal culvert from stream	Medium	Medium	Medium
18-3	Rocky Shore Lane	Minimal Vegetation	Residential	Surface Erosion- Sheet, Soil- Bare, Shoreline- Inadequate Shoreline Vegetation, Roof Runoff Erosion	40x15	Define Foot Path, Infiltration Steps, Erosion Control Mulch, Infiltration Trench @ roof dripline, Add to Buffer, No Raking, Reseed bare soil & thinning grass	Low	Low	Low
18-4	Rocky Shore Lane	Minimal Vegetation	Residential	Surface Erosion- Sheet, Shoreline- Inadequate Shoreline Vegetation, Roof Runoff Erosion, Other, Runoff from driveway makes it down to roofline toward lake	20x10	Infiltration Trench @ roof dripline, Add to Buffer, Extend infiltration trench to include walkway area to capture both roof and driveway runoff. Dripline on front too. Move firepit away from water.	Low	Low	Low
18-5	Rocky Shore Lane	Minimal Vegetation	Driveway	Surface Erosion- Sheet, Roof Runoff Erosion	30x15	Add gravel, Install Runoff Diverters- Open Top Culvert, Infiltration Trench @ roof dripline, Trench for garage runoff	Low	Medium	Medium
18-6	Rocky Shore Lane	Minimal Vegetation	Residential	Surface Erosion- Sheet, Shoreline- Lack of Shoreline Vegetation, Roof Runoff Erosion, Other, Gutter downspout, and paved walkway creating runoff to lake	30x10	Infiltration Steps, Establish Buffer	Low	Medium	Medium

APPENDIX C: LIST OF MESSALONSKEE LAKE NPS SITES

Site	Location	Flow into lake via	Land Use	Problems	Size of Area Exposed or Eroded	Recommendations	Impact Rating	Cost to Fix	Technical Level to Install
18-7	Rocky Shore Lane	Directly into lake	Other	Surface Erosion- Gully, Soil- Delta in Stream/Lake, Shoreline- Erosion, Other, Erosion caused by drainage from road and RR tracks. Possible sand brought in for beach? Other: sod and other landscaping materials pushed into edge of drainage area.	30x15	Install Detention Basin, Properly dispose of yard waste.	Medium	Medium	Medium
18-8	Rocky Shore Lane	Minimal Vegetation	Residential	Surface Erosion- Sheet, Soil- Bare, Shoreline- Inadequate Shoreline Vegetation, Other, Runoff from stairs and walkway at driveway flows down over lawn to lake	20x10	Install Runoff Diverter (waterbar)Add to Buffer, Mulch/Erosion Control Mulch, ECM under stairs; install waterbar from corner of house by door to little garden by birdbath	Low	Low	Low
18-9	Rocky Shore Lane	Minimal Vegetation	Residential	Surface Erosion- Sheet, Soil- Bare, Shoreline- Inadequate Shoreline Vegetation, Other, Paved walkway carries water downhill across grass to water	20x10	Stabilize Foot Path, Infiltration Steps, Install Runoff Diverter (waterbar), Erosion Control Mulch, Add to Buffer, Reseed bare soil & thinning grass. 2 sets of infiltration steps needed.	Low	Low	Low
18-10	Rocky Shore Lane	Minimal Vegetation	Residential	Surface Erosion- Rill, Surface Erosion- Sheet, Soil- Bare, Shoreline- Lack of Shoreline Vegetation, Roof Runoff Erosion	25x20	Define Foot Path, Infiltration Steps, Drywell @ gutter downspout, Add to Buffer, Reseed bare soil & thinning grass. Define seating area	Medium	Low	Medium
18-11	Rocky Shore Lane	Minimal Vegetation	Residential	Surface Erosion- Sheet, Soil- Bare, Shoreline- Inadequate Shoreline Vegetation, Roof Runoff	30x20	Define Foot Path, Drywell @ gutter downspout, Add to Buffer, Reseed bare soil & thinning grass	Low	Low	Low

APPENDIX C: LIST OF MESSALONSKEE LAKE NPS SITES

Site	Location	Flow into lake via	Land Use	Problems	Size of Area Exposed or Eroded	Recommendations	Impact Rating	Cost to Fix	Technical Level to Install
				Erosion, Other, Yard waste dumped at edge of stream; pesticide application sign in yard.					
18-12	Railroad	Stream	Other-Railroad Track	Surface Erosion- Rill, Soil-Bare, Shoreline- Erosion, Other, Bank erosion adjacent to stone culvert. Unstable steep bank above stream.	30x10	Stabilize bank below track	Medium	Medium	Medium
18-13	Mallard Lane	Stream	Residential	Surface Erosion- Sheet, Soil- Bare	30x20	No Raking, Reseed bare soil & thinning grass, Mulch/Erosion Control Mulch, Define parking area	Low	Low	Low
18-14	Mallard Lane	Minimal Vegetation	Residential	Surface Erosion- Sheet, Soil- Bare, Shoreline- Lack of Shoreline Vegetation, Roof Runoff Erosion	20x10	Infiltration Trench @ roof dripline, Drywell @ gutter downspout, Establish Buffer, Reseed bare soil & thinning grass	Low	Low	Low
18-15	Mallard Lane	Minimal Vegetation	Boat Access	Surface Erosion- Rill, Soil-Bare, Other, Private boat launch straight to lake	75x10	Install Runoff Diverters- Rubber Razor, Stabilize or revegetate boat launch	Medium	Medium	Medium
18-16	Mallard Lane	Directly into lake	Residential	Surface Erosion- Sheet, Soil- Bare, Shoreline- Lack of Shoreline Vegetation, Other, Other- Invasive Plants, Sediment plume coming out from under boat house; invasive barberry.	15x5	Infiltration Steps, Establish Buffer, Reseed bare soil & thinning grass, Mulch/Erosion Control Mulch, Investigate boat house issue; mulch bare soil around side of house.	Low	Low	Low
18-17	Mallard Lane	Directly into lake	Residential	Surface Erosion- Rill, Soil-Bare, Shoreline- Inadequate Shoreline Vegetation, Other, Runoff from large	20x20	Define Foot Path, Add to Buffer, Install Runoff Diverter (waterbar), Mulch/Erosion Control Mulch, Rain Garden	Medium	Low	Medium

APPENDIX C: LIST OF MESSALONSKEE LAKE NPS SITES

Site	Location	Flow into lake via	Land Use	Problems	Size of Area Exposed or Eroded	Recommendations	Impact Rating	Cost to Fix	Technical Level to Install
				area of lawn creating channel over bank into lake					
18-18	Mallard Lane	Stream	Private Road	Surface Erosion- Sheet, Road Shoulder Erosion- Rill, Roadside Plow/Grader Berm	10x10 x 2 culverts	Armor Inlet/Outlet, Remove Grader/Plow Berms	Medium	Medium	Medium
18-19	Mallard Lane	Directly into lake	Residential	Surface Erosion- Rill, Shoreline- Unstable Access, Other, Wooden retaining wall starting to fail	30x10	Infiltration Steps, Erosion Control Mulch, Replace retaining wall eventually	Medium	High	Medium
18-20	Mallard Lane	Minimal Vegetation	Residential	Surface Erosion- Sheet, Soil- Bare	20x20	Define Foot Path, Stabilize Foot Path, Erosion Control Mulch, Reseed bare soil & thinning grass, Install Runoff Diverter (waterbar)	Low	Low	Low
18-21	Mallard Lane	Stream	Private Road	Surface Erosion- Rill, Culvert- Unstable inlet/outlet, Other, Hemp compost spread adjacent to stream	10x5	Armor Inlet/Outlet, Enlarge	Medium	Low	Medium
19-1	Belgrade Road	Directly into lake	Residential	Surface Erosion- Sheet, Soil- Bare, Shoreline- Lack of Shoreline Vegetation, Roof Runoff Erosion	30x30	Infiltration Trench @ roof dripline, Establish Buffer, Mulch/Erosion Control Mulch, Install Runoff Diverter (waterbar), Rain Garden, Vegetation needed, wet area on grass	Low	Low	Low
19-2	Libby Hill Road	Directly into lake	Commercial	Surface Erosion- Sheet, Soil- Bare, Shoreline- Lack of Shoreline Vegetation, Shoreline- Erosion, Shoreline- Undercut	75x30 ft	Pave, Vegetate Shoulder, Reshape (Crown)Add to Buffer, Mulch/Erosion Control Mulch	Medium	Medium	Medium

APPENDIX C: LIST OF MESSALONSKEE LAKE NPS SITES

Site	Location	Flow into lake via	Land Use	Problems	Size of Area Exposed or Eroded	Recommendations	Impact Rating	Cost to Fix	Technical Level to Install
19-3	Lakeview Cemetery	Directly into lake	Municipal / Public	Surface Erosion- Rill, Soil-Bare, Shoreline- Lack of Shoreline Vegetation, Shoreline- Inadequate Shoreline Vegetation, Shoreline- Erosion	10x15	Add to Buffer, Establish Buffer, Mulch/Erosion Control Mulch, Buffer needed along road, hay mulch	Medium	Low	Low
19-4	Lakeview Cemetery	Directly into lake	Municipal / Public	Surface Erosion- Gully, Ditch- Gully Erosion, Soil-Bare, Shoreline- Inadequate Shoreline Vegetation	5x25	Add gravel, Build Up/Add to Buffer, Mulch/Erosion Control Mulch, False ditch drains to lake, need to fill in and berm so water from road doesn't drain to lake	Medium	Low	Medium
19-5	Lakeview Drive	Stream	Town Road	Surface Erosion- Rill, Ditch-Rill Erosion, Road Shoulder Erosion- Rill, Soil- Winter Sand	5x5 on both sides	Vegetate, Vegetate Shoulder, Reseed bare soil & thinning grass, Encourage infiltration rather than draining ditch into stream. False ditch on one side.	Low	Medium	Medium
19-6	Belgrade Road	Ditch	State Road	Culvert- Unstable inlet/outlet, Ditch- Sheet Erosion, Other- Invasive Plants, Other- HazMat, Possible herbicide use on invasive plants around culvert	15x15	Armor Inlet/Outlet, Vegetate, Remove Invasive Plants, Mulch/Erosion Control Mulch	Low	Low	Medium
19-7	Belgrade Road	Ditch	Driveway	Surface Erosion- Gully, Ditch- Sheet Erosion, Road Shoulder Erosion- Sheet, Soil- Winter Sand	25x10	Vegetate, Build Up, Reshape (Crown), Remove winter sand	Medium	Medium	Medium
20-1	Willey Point Road	Minimal Vegetation	Town Road	Road Shoulder Erosion-Gully	2x75	Install Ditch, Armor with Stone	Medium	Medium	Medium
20-2	Willey Point Road	Directly into lake	Town Road	Surface Erosion- Sheet, Surface Erosion- Rill, Road Shoulder Erosion- Rill, Soil-Bare, Shoreline- Lack of	100x5	Establish Buffer, Add to Buffer, Mulch/Erosion Control Mulch, Stop cutting shoreline vegetation	Medium	Low	Medium

APPENDIX C: LIST OF MESSALONSKEE LAKE NPS SITES

Site	Location	Flow into lake via	Land Use	Problems	Size of Area Exposed or Eroded	Recommendations	Impact Rating	Cost to Fix	Technical Level to Install
				Shoreline Vegetation, Shoreline- Inadequate Shoreline Vegetation, Shoreline- Erosion					
20-3	Willey Point Road	Directly into lake	Town Road	Surface Erosion- Sheet, Road Shoulder Erosion- Gully	2x20	Install Sediment Pools, Install Ditch, Armor with Stone, Clean up shoulder material that has eroded into the road.	Medium	Medium	Medium
20-4	Willey Point Road	Minimal Vegetation	Residential	Surface Erosion- Rill, Soil-Bare, Shoreline- Inadequate Shoreline Vegetation	25x30	Define Foot Path, Stabilize Foot Path, Add to Buffer, Reseed bare soil & thinning grass, Mulch/Erosion Control Mulch, Vegetate	Medium	Medium	Low
20-5	Willey Point Road	Directly into lake	Residential	Ditch- Sheet Erosion, Soil-Bare, Shoreline- Inadequate Shoreline Vegetation	2x25	Install Sediment Pools; nice rock lined ditch but needs to contain and infiltrate water; build basin with spreader at the end of ditch.	Low	Low	Low
20-6	Willey Point Road	Minimal Vegetation	Town Road	Surface Erosion- Gully, Soil-Bare	25x5	Build Up, Reshape (Crown), Install Catch Basin.	Low	Medium	Medium
20-7	Willey Point Road	Directly into lake	Residential	Surface Erosion- Sheet, Soil- Bare, Shoreline- Lack of Shoreline Vegetation, Roof Runoff Erosion	15x40	Reshape (Crown), Install Runoff Diverters- Waterbar, Add gravel, Build Up, Infiltration Trench @ roof dripline, Establish Buffer	Low	Low	Low
20-8	Willey Point Road	Ditch	Residential	Surface Erosion- Sheet, Ditch- Rill Erosion, Road Shoulder Erosion- Sheet	5x20	Armor with Stone, Install Sediment Pools, Install Check Dams, Vegetate.	Low	Low	Medium
20-9	Willey Point Road	Directly into lake	Residential	Surface Erosion- Sheet, Soil- Bare, Roof Runoff Erosion	20x20	Infiltration Trench @ roof dripline, Establish Buffer, Add to Buffer, Reseed bare soil & thinning grass, Mulch/Erosion Control Mulch, Rain Garden,	Medium	Low	Low

APPENDIX C: LIST OF MESSALONSKEE LAKE NPS SITES

Site	Location	Flow into lake via	Land Use	Problems	Size of Area Exposed or Eroded	Recommendations	Impact Rating	Cost to Fix	Technical Level to Install
						Runoff from neighboring property, need infiltration trench under porch			
20-10	Willey Point Road	Directly into lake	Residential	Surface Erosion- Rill, Soil-Bare, Shoreline- Inadequate Shoreline Vegetation	10x30	Add to Buffer, Reseed bare soil & thinning grass, Mulch/Erosion Control Mulch, Rain Garden	Medium	Low	Low
20-11	Willey Point Road	Directly into lake	Residential	Surface Erosion- Rill, Soil-Bare, Shoreline- Inadequate Shoreline Vegetation	5x100	Install Check Dams, Mulch, Seed/Hay, Add to Buffer, Reseed bare soil & thinning grass, Rain Garden, Mulch/Erosion Control Mulch, Recent construction. They put in a rubber razor, but it doesn't seem to have fixed the problem. Need to stop runoff from road getting to lake.	Medium	Low	Low
20-12	Willey Point Road	Directly into lake	Residential	Surface Erosion- Rill, Shoreline- Inadequate Shoreline Vegetation, Roof Runoff Erosion	100x5	Define Foot Path, Stabilize Foot Path, Erosion Control Mulch, Infiltration Trench @ roof dripline, Add to Buffer, Reseed bare soil & thinning grass, Mulch/Erosion Control Mulch, Rain Garden	Medium	Low	Medium
20-13	Willey Point Road	Directly into lake	Residential	Surface Erosion- Gully, Shoreline- Inadequate Shoreline Vegetation, Other, Impervious driveway and path go straight down to the water and wash out the pea stone/soil on shoreline	5x5	Add to Buffer, Need runoff diverter for paved driveway/path	Medium	Low	Medium