Sebago Lake

Subwatershed Assessment and Prioritization

Cumberland County Soil & Water Conservation District

Prepared by the Cumberland County Soil & Water Conservation District
September 2015

Sebago Lake Subwatershed Assessment and Prioritization

September 2015

Cumberland County Soil & Water Conservation District

Acknowledgements

Project Partners
Cumberland County Soil & Water Conservation District
Lakes Environmental Association
Maine Department of Environmental Protection
Maine Forest Service
Portland Water District
Town of Standish
United States Environmental Protection Agency
University of Southern Maine

Sebago Lake Steering Committee	
Kate McDonald*	Cumberland County Soil & Water Conservation District
Heather True *	Cumberland County Soil & Water Conservation District
Damon Yakovleff*	Cumberland County Soil & Water Conservation District
Colin Holme*	Lakes Environmental Association
Jeremy Deeds*	Maine Department of Environmental Protection
Jeff Dennis*	Maine Department of Environmental Protection
Kristin Feindel*	Maine Department of Environmental Protection
Jan Santerre	Maine Forest Service
Don Mansius	Maine Forest Service
Paul Hunt*	Portland Water District
Kirsten Ness*	Portland Water District
Nate Whalen*	Portland Water District
Roger Mosley	Town of Standish
Firooza Pavri*	University of Southern Maine

* indicates member of WQI Subcommittee

This report was written through the Sebago Lake Watershed Assessment and Prioritization Project. Funding for this project was provided in part by the U.S. Environmental Protection Agency (EPA) under Section 604(b) of the Clean Water Act. Section 604(b) grants are administered by the Maine Department of Environmental Protection in partnership with EPA.

Table of Contents

List of Tables

List of Figures

Appendices

I. Introduction

A. Project Purpose

This report serves as a synopsis of work completed through the *Sebago Lake Watershed Assessment and Prioritization Projec*t, a grant project funded in part by the U.S. Environmental Protection Agency (EPA) under Section 604(b) of the Clean Water Act and administered by the Maine Department of Environmental Protection (DEP). This project was conducted from March 2014 through September 2015. Partners who served on the project's steering committee included DEP, Cumberland County Soil and Water Conservation District (CCSWCD), Portland Water District (PWD), Lakes Environmental Association (LEA), Maine Forest Service (MFS), University of Southern Maine (USM), and the Town of Standish (Town).

The primary purpose of this project was to determine where efforts and resources should be applied throughout the greater Sebago Lake Watershed to help protect and improve the water quality of Sebago Lake. This was predominantly accomplished through a phosphorus sensitivity analysis **(Section VI.A)** which prioritized Sebago Lake's subwatersheds based on how much phosphorus each one contributes to the Lake. A Water Quality Index (WQI) process was also conducted to determine how to improve individual subwatersheds of Sebago Lake with methods and results discussed in **Section IV. B-G.** and on individual subwatershed factsheets in **Appendix D.** Through the WQI, subwatersheds were scored based on water quality and land cover trends and predicted effectiveness of completing successful water quality improvement projects on the ground. From the phosphorus sensitivity analysis and the WQI assessment, it has been determined where additional data are needed and where efforts to address pollution sources and improve water quality should be focused throughout the Watershed.

B. Sebago Lake and Watershed Characteristics

The greater Sebago Lake Watershed depicted in **Figure 1** encompasses 450 square miles and includes 34 subwatersheds including the Sebago Lake-Crooked River Direct Watershed (hereafter referred to as the Direct Watershed). The Direct Watershed depicted in **Figure 2** encompasses 171 square miles and includes the areas that drain directly into Sebago Lake and the Crooked River.

Sebago Lake covers 30,513-acres, is the second largest lake in Maine, and is located in the Towns of Sebago, Naples, Casco, Raymond, Standish, Windham, and Frye Island. Twenty-four towns in three counties make up the 450 square-mile watershed (**Table 1**). The Sebago Lake Watershed is part of the larger Casco Bay Watershed within the Gulf of Maine. According to PWD and DEP data, the Lake has a maximum depth of 316 feet, an average depth of 107 feet, and a flushing rate of 5.1 years.

A **WATERSHED** is the area of land where all of the water that is under it or drains off of it goes into the same place. A watershed can also be part of a larger watershed drainage system. For example, the Panther Pond Watershed is a subwatershed of the greater Sebago Lake Watershed. And the Sebago Lake Watershed is part of the greater Presumpscot River and Casco Bay Watersheds.

Sebago Lake

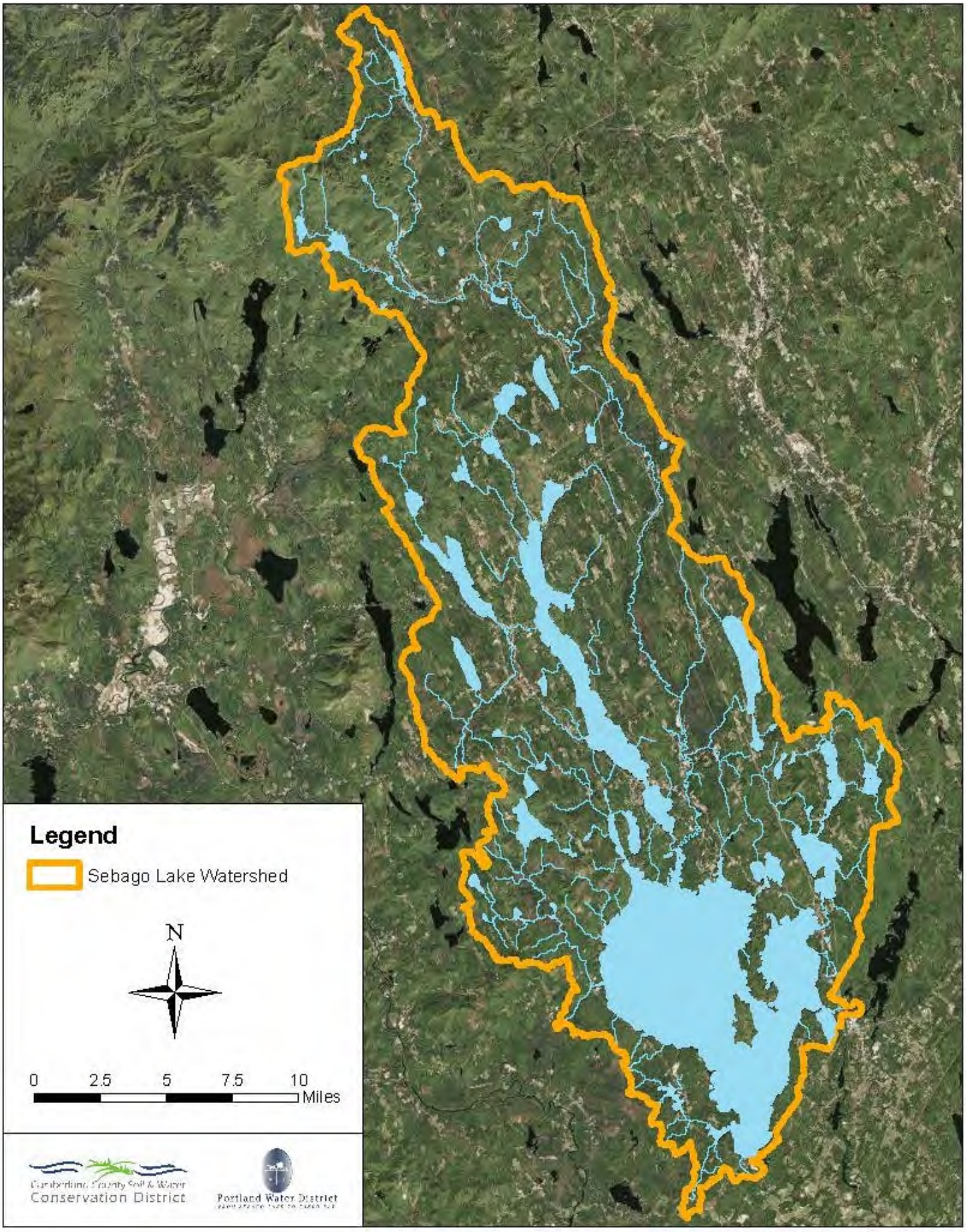


Figure 1. Greater Sebago Lake watershed.

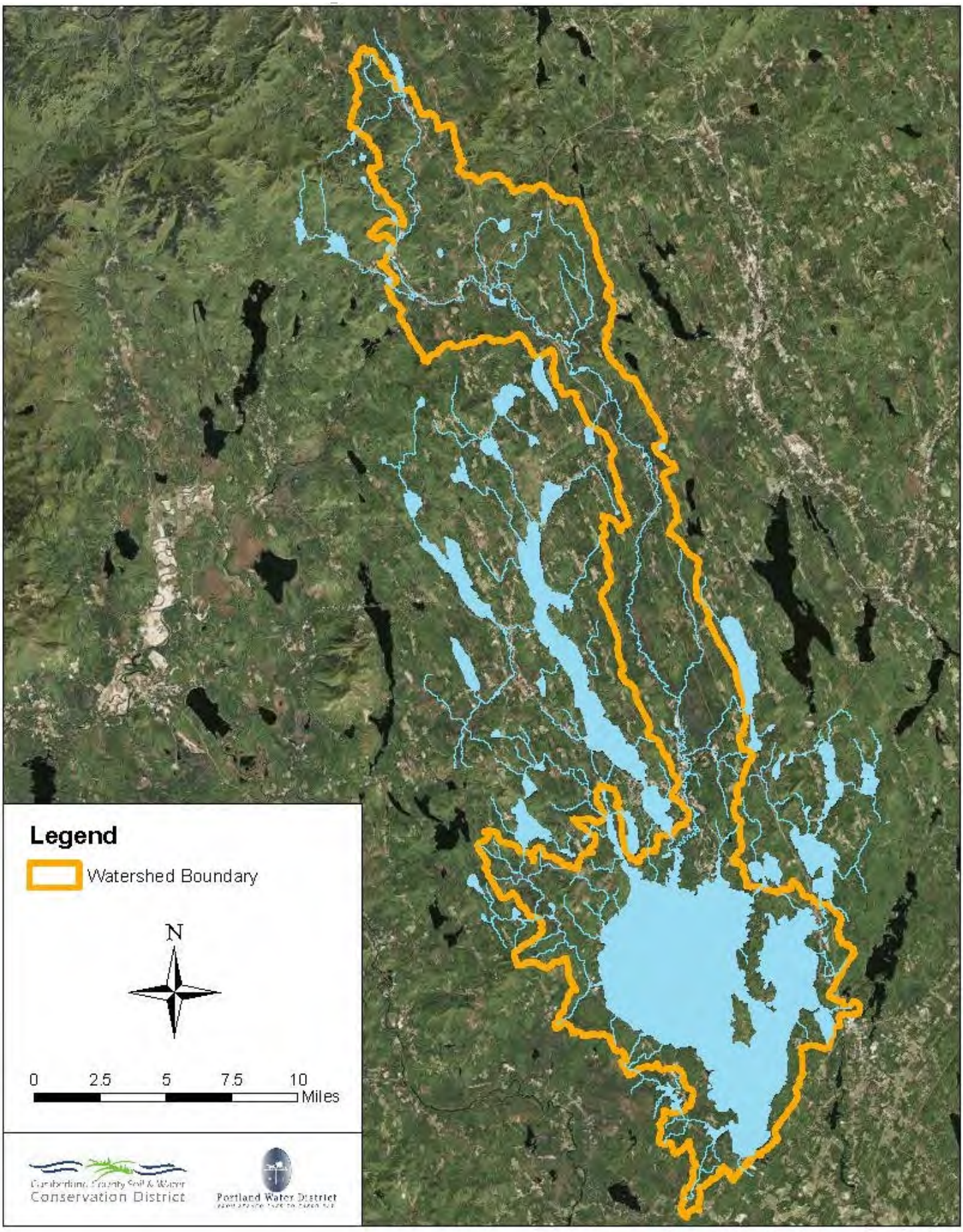


Figure 2. Sebago Lake direct watershed.

Table 1. Sebago Lake watershed municipalities.

Town	County
Albany Township	Oxford
Baldwin	Cumberland
Bethel	Oxford
Bridgton	Cumberland
Casco	Cumberland
Denmark	Oxford
Frye Island	Cumberland
Gray	Cumberland
Greenwood	Oxford
Harrison	Cumberland
Hiram	Oxford
Lovell	Oxford
Mason Township	Oxford
Naples	Cumberland
Norway	Oxford
Otisfield	Oxford
Poland	Androscoggin
Raymond	Cumberland
Sebago	Cumberland
Standish	Cumberland
Stoneham	Oxford
Sweden	Oxford
Waterford	Oxford
Windham	Cumberland

Eighty-two percent of the total watershed is forested. Of the remaining 18%, just over one third is residential and slightly less than that is agricultural land (**Figure 3**). Scientists from the University of Southern Maine have analyzed landscape trends in the Sebago Lake watershed using NASA's Landsat imagery from 1987 and 2009. During that period, green space / forested cover in the watershed decreased by over 3.5%.

Sebago Lake is the primary drinking water supply for 200,000 people in 11 communities (15% of the State's population). Since its inception in 1908, Portland Water District (PWD) has been actively monitoring and working to protect Sebago Lake. PWD expends $1.1 million annually on an extensive drinking water source protection program. This program includes development plan reviews, septic system inspections and permitting, watershed property consultations, Lakescaping cost sharing grants to address erosion issues, and a successful school-based education program in both watershed and service area schools. PWD owns approximately 2,500 acres of conservation land near its water supply intake, maintains a 3,000-foot limit no trespassing zone, and ensures a 2-mile no bodily contact zone to ensure the safety of the drinking water supply. At least 15 of the 24 watershed towns have adopted comprehensive plans, and all have been updated within the last 12 years (2003 or more recent). As implementation projects move forward in the Sebago Lake Watershed, applicable comprehensive plans will be reviewed and used to guide implementation projects.

The Lake has approximately 100 miles of shoreline, most of which is privately owned. There are more than 2,300 septic systems within 200 feet of the Lake. Sebago Lake currently has 12 public boat launches, eight marinas, and the Sebago Lake State Park that contains a campground, boat launch, and two beaches. There are currently seven popular youth summer camps on Sebago Lake. The Lake is highly valued as a year-round recreational destination. The Maine Department of Inland Fisheries and Wildlife manages Sebago Lake for lake trout and landlocked salmon. Sebago Lake is the only southern Maine lake that supports an indigenous landlocked salmon population. Additional fisheries include large and small mouth bass, brown trout, pickerel, shiners, lake chub, rainbow smelt, and perch.


Sebago Lake

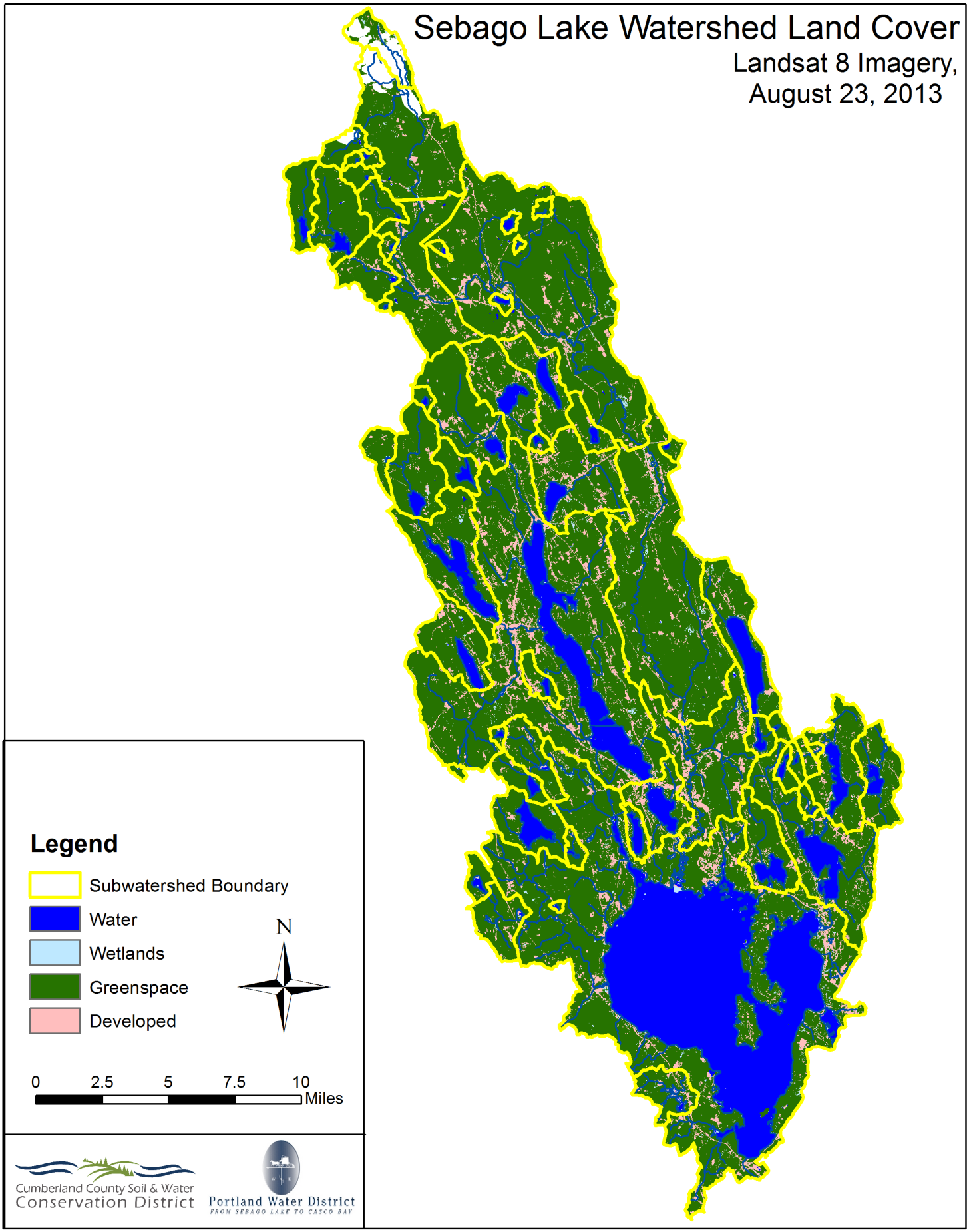


Figure 3. Sebago Lake watershed land cover.

C. Sebago Lake's Subwatersheds

For the purposes of this project, the greater Sebago Lake Watershed was divided into 34 subwatersheds (**Table 2**). Each subwatershed contains a pond or lake, and the Crooked River was included as part of the Sebago Lake Direct Watershed. More information about subwatershed selection is provided in **Section IV**.

Table 2. Sebago Lake subwatersheds.

Subwatershed/ Water Body	Towns
Adams Pond	Bridgton
Bear Pond	Waterford
Brandy Pond (Bay of Naples)	Naples
Coffee Pond	Casco
Cold Rain Pond	Naples
Crescent Lake	Raymond, Casco
Crystal Lake	Harrison
Dumpling Pond	Casco
Foster's Pond (Ingalls Pond)	Bridgton
Highland Lake	Bridgton, Sweden
Holt Pond	Bridgton, Naples
Island Pond	Harrison, Waterford
Keoka Lake	Waterford
Little Moose Pond	Waterford
Long Lake	Bridgton, Naples, Harrison
McWain Pond (Long Pond)	Waterford
Otter Pond	Bridgton
Panther Pond	Raymond, Casco
Papoose Pond	Waterford
Parker Pond	Casco
Peabody Pond	Bridgton, Naples, Sebago
Pleasant Lake	Casco, Otisfield
Raymond Pond	Raymond
Sebago Lake & Crooked River+	Sebago, Naples, Casco, Raymond, Standish, Windham, Frye Island, Bethel, Albany, Norway, Harrison, Otisfield
Songo Pond	Bethel
Stearns Pond	Sweden
Thomas Pond	Casco, Raymond
Trickey Pond	Naples
Woods Pond	Bridgton

+The Sebago Lake and Crooked River Watershed is comprised of six smaller subwatersheds that have been divided based on monitoring stations.

II. Water Quality

A. Sebago Lake's Water Quality Trends

WATER QUALITY PARAMETERS

Total Phosphorus, Chlorophyll-*a*, and Secchi Transparency are three parameters used to evaluate overall lake conditions and water quality trends. These parameters were used to rank the subwatersheds' current conditions and water quality trends in the Water Quality Index and are discussed further in Section IV.

PWD has monitored Sebago Lake's water quality since 1976. Current monitoring includes more than 15 monitoring and surveillance programs throughout the Watershed. In-lake monitoring occurs monthly from ice out until fall turnover and includes deep basin stations in Big Bay, Jordan Bay, and Lower Bay.

At present the water quality of Sebago Lake is very good. However, threats to the Lake's water quality are increasing. While average total phosphorus is currently less than 6 ppb and Secchi transparency varies between 8 and 12 meters, water quality data indicate that transparency has been declining since 1990, and total phosphorus levels have been increasing since 2006.

PWD's 2014 Lake Assessment report indicates that Secchi transparency, total phosphorous, and chlorophyll-*a* measurements from the deep basins are showing a water quality decline since 1990. However, the longer term record, starting in 1976 at the Lower Bay deep basin, is stable for these parameters. The lower layer of water (hypolimnion) in the deep basins is 75% saturated with oxygen prior to fall turnover. With an average Secchi transparency of 10.5 m, Sebago Lake is one of the clearest lakes in Maine. Fecal coliform data collected since 1979 at swimming beaches outside of the no bodily contact zone included several each year in excess of the EPA swimming beach guideline of 235 colony forming units (CFU) per 100 mL. Samples collected within the 2-mile no bodily contact zone are consistently well below this guideline.

Portland Water District monitors Sebago Lake's water quality.

B. Water Quality Trends of Sebago Lake's Subwatersheds

Many of the lakes and ponds in the greater Sebago Lake Watershed have been sampled by Lakes Environmental Association and other lake associations in conjunction with the Volunteer Lake Monitoring Program (VLMP). Data from some of these water bodies dates back to the 1970s. The most comprehensive dataset is the Secchi transparency. Different lakes have naturally different nutrient levels; therefore, a variety of Secchi depth readings occur in healthy lakes.

Parameter	Lake Productivity	Value Range
Secchi Disk Transparency	Productive	<4 m
	Moderately Productive	4 - 7 m
	Unproductive	>7 m

Chlorophyll-*a* is an indicator of algae and/or cyanobacteria (blue-green algae) as it is the pigment that provides these organisms with their green coloration.

LEA monitors many of Sebago Lake's subwatershed lakes and ponds .

In general, water quality trends in the subwatershed lakes and ponds are stable; however, 22 of the 28 lakes and ponds (excluding Sebago Lake and Crooked River) have mean Secchi transparency values of less than 7 meters. These meet the DEP criteria for a moderately productive lake, which has a Secchi transparency between 4 and 7 meters and may indicate increased nutrient loading and biological activity in the lake from natural or anthropogenic sources. For most of the lakes and ponds, these datasets cover more than 25 years, so recent decreases in clarity may not be immediately evident when evaluating long-term trends.

The remaining six of the subwatershed lakes and ponds (discussed in detail in **Section II.A**), have excellent clarity, with mean Secchi transparencies of greater than 7 meters. Like the moderately productive lakes and ponds described above, these lakes have long-term datasets spanning more than 25 years. Trickey Pond, located in Naples near the north end of Sebago Lake, has a mean Secchi transparency of 10.1 meters for a dataset spanning 34 years. However, an analysis of the chlorophyll-*a* median values for the past 24 years shows a decreasing water quality trend. Since Secchi transparency is a lagging indicator (i.e., it shows the effects on the lake after the 'damage has been done'), other indicators, described in detail in **Section IV**, have been used to further refine the interpretations of current water quality conditions and water quality trends in the Sebago Lake Watershed as a whole.

C. Efforts to Improve Sebago Lake and its Subwatersheds

The numerous moderately productive lakes in the greater Sebago Lake Watershed suggests that these lakes are at risk of significant water quality decline if nutrient sources are not controlled. The most common, and easily controlled, anthropogenic nutrient input is from non-point source (NPS) pollution also known as polluted runoff. Over the past 20-25 years, efforts have been made throughout the Watershed to identify and address sources of polluted runoff. Many of these local efforts have relied on grant funding from the U.S. Environmental Protection Agency's (EPA) Sections 319 and 604(b) of the Clean Water Act. The funding allocated to the State of Maine is overseen and distributed for water quality improvement work through a competitive grant process by the Maine Department of Environmental Protection (DEP).

Numerous NPS mitigation studies and projects have been completed in the Sebago Lake Watershed over the past 15 years. **Appendix B** provides a table of the watershed projects completed. The Sebago Lake Watershed has many committed partners: municipalities (including public works departments, conservation commissions, and other municipal staff), lake associations, residents, businesses, nonprofit organizations, and PWD, the watershed's most active stewardship organization. The upper watershed benefits from the involvement and stewardship of Lakes Environmental Association (LEA) and Oxford County Soil and Water Conservation District (OCSWCD), while the lower watershed is served by CCSWCD, PWD, and other stewardship groups such as Raymond Waterways Protective Association. DEP has been a committed partner supporting and administering funding for the NPS projects throughout the Sebago Lake Watershed.

III. Identifying NPS Pollution in the Direct Watershed of Sebago Lake

A. Surveys Conducted

As part of the *Sebago Lake Assessment and Prioritization Project*, surveying for NPS pollution/polluted runoff was conducted in Sebago Lake's Direct Watershed. The survey was done to update currently known NPS pollution sites within Sebago Lake's Direct Watershed and to inform the development of a watershed-based protection plan for the Lake's Direct Watershed (including Crooked River). The surveys included an *NPS Road Survey* conducted by PWD and an *NPS Neighborhood and Hotspot Survey* conducted by CCSWCD, both completed in 2014. Below is an overview of how these surveys were conducted and their results.

B. 2014 Sebago Lake NPS Road Survey

2014 NPS Road Survey

Over the summer of 2014, PWD carried out the Direct Watershed NPS Road Survey. Through this survey, all public and private roads and known road-stream crossings within the Direct Watershed were surveyed. Roads in the Crooked River Watershed were not surveyed because this Watershed was recently surveyed for NPS pollution through an EPA / DEP 319 grant project in 2011.

Survey methods were based on those outlined in DEP's publication, *A Citizen's Guide to Volunteer Lake Watershed Surveys: How to Conduct a Nonpoint Source Phosphorus Survey* (Sept. 2011) and were conducted in accordance with a DEP-approved *Survey Implementation Plan* following the *Maine Lake and Stream Watershed Survey Quality Assurance Project Plan,* dated December 15, 2009. PWD staff photographed and recorded sites digitally and downloaded results into a Sebago Lake NPS Site Tracker database. Parameters recorded included site description (global positioning system [GPS] location, land use, etc.), description of problems (erosion, slope, culverts, ditch, etc.), recommendations, and impact rating. Impact ratings were based on the type, extent, and area of erosion and the amount of vegetative buffer (if any) between the erosion site and water resource. A list of all parameters recorded for each NPS road site is available in the *Sebago Lake and Crooked River Watershed-Based Protection Plan, provided as* **Appendix C.**

This survey documented 61 specific road sites as having an impact to Sebago Lake's water quality. Out of these 61 sites, 21 (34%) were documented as having a high impact to water quality, 29 (48%) as medium impact, and 11 (18%) as low impact. Out of the 61 sites, there were 40 town roads, seven state roads, seven private roads, one parking lot, and six had unknown ownership. A list of these sites can be found in the *Sebago Lake and Crooked River Watershed-Based Protection Plan* **(Appendix C).**

C. 2014 Sebago Lake Neighborhood Assessment and Hotspot Inventory

The *Neighborhood Assessment and Hotspot Survey* was conducted by CCSWCD over the fall of 2014. Similar to the *NPS Road Survey*, the *Neighborhood Assessment and Hotspot Survey* was conducted in accordance with a DEP-approved *Survey Implementation Plan* following the *Maine Lake and Stream Watershed Survey Quality Assurance Project Plan,* dated December 15, 2009. The survey also focused on Sebago Lake's shoreland zone, since CCSWCD completed an NPS survey of the Crooked River Watershed in 2011. Survey methods and datasheets for the *Neighborhood Assessment and Hotspot Inventory* combined approaches specified in DEP's *A Citizen's Guide to Volunteer Lake Watershed Surveys: How to Conduct a Nonpoint Source Phosphorus Survey* (Sept. 2011) and the Center for Watershed Protection's *Urban Subwatershed Restoration Manual 11: Unified Subwatershed and Site Reconnaissance* (Feb. 2005).

Specific neighborhoods and hotspots surveyed were selected by the *Sebago Lake Watershed Assessment and Prioritization Project* steering committee based on proximity to the Lake (within the 250-foot shoreland zone), size (> 10 acres of developed ground surface), accessibility, and known drainage directly to the Lake or a main tributary of the Lake (**Figure 4**). For each neighborhood and hotspot, a survey datasheet was completed, GPS coordinates were taken, and a description of the issues observed and possible solutions were recorded.

Twenty-seven neighborhoods were surveyed to quantify the neighborhood's impact to the Lake's water quality. The survey looked at imperviousness, lawns, exposed soil, driveways, vegetation, and existing stormwater treatment. Based on these observations, a list of commonly observed erosion and runoff problems likely to affect water quality and generalized recommendations were compiled for each neighborhood.

Table 3 provides an overview of neighborhood factors surveyed. A more detailed list of survey results can be found in the *Sebago Lake and Crooked River Watershed-Based Protection Plan* (**Appendix C)**.

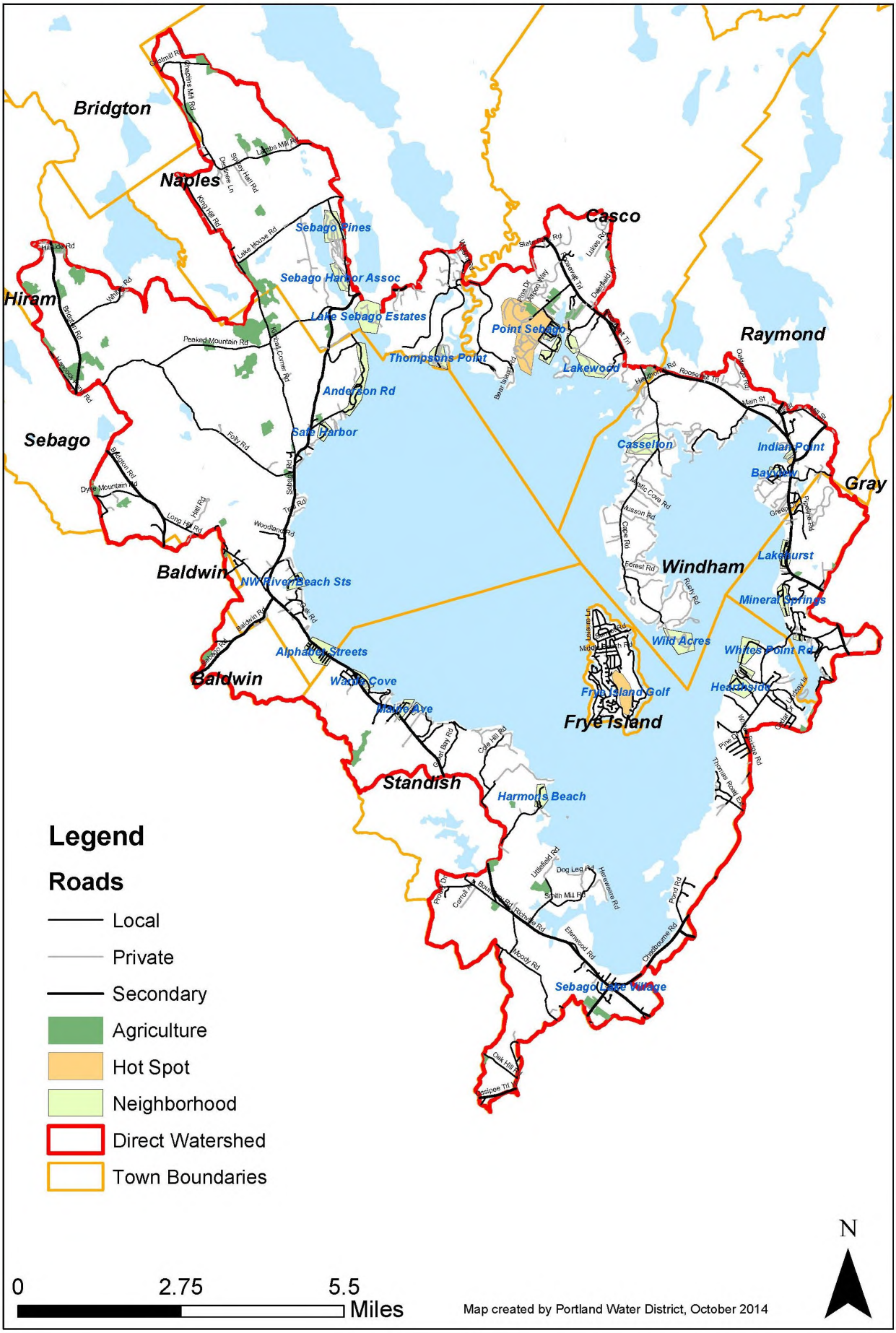


Figure 4. Sebago Lake direct watershed neighborhood and hotspot survey locations.

Table 3. Summary of neighborhood assessment findings.

Neighborhood factors surveyed	Why surveyed factor is of concern	Result of findings in Sebago Lake's surveyed neighborhoods
Imperviousness	Increased areas of imperviousness decrease the amount of stormwater from being infiltrated and filtered into the ground prior to reaching surface waters. Imperviousness also creates a greater amount and velocity of stormwater flowing down landscapes. This increased flow can cause erosion and the transport of excess sediment and nutrients offsite and potentially into nearby surface waters.	The average imperviousness of residential properties (excluding lawns and including gravel and paved driveways, buildings, and patios) ranged from 25% to 80% per neighborhood.
Lawns	Lawns tend to be intensively managed and can potentially be a significant source of nutrients, pesticides, sediment, and polluted runoff.	Neighborhoods varied in the average percentage of lawn coverage per property with some neighborhoods having an average percentage of lawn coverage at less than 10%, to some neighborhoods having an average of over 70%.
Exposed Soil	Exposed or bare soil can easily wash away during heavy rain events. This can lead to excess sediment, and nutrients that readily bind to sediment (such as phosphorus), to wash offsite and potentially into nearby waterways.	The average percentage of exposed or bare soil on a typical property (not including driveways) ranged from less than 5% to 20% per neighborhood.
Driveways	Driveways are typically impervious as most are either paved or gravel, and thus can increase the amount of untreated stormwater washing offsite. These driveways can also contribute excess nutrients, petroleum hydrocarbons (pavement), and sediment (gravel).	The average percent of driveways paved (as opposed to gravel) showed the largest range difference with some neighborhoods having an average of only 5% of residential driveways being paved to some neighborhoods having an average of 95% of their driveways paved.
Vegetation	Vegetation helps to infiltrate and filter stormwater runoff. Lack of vegetation reduces the chances of stormwater being naturally treated prior to entering surface waters.	Residential properties in general had approximately 17% coverage with native/ undisturbed vegetation. The range per neighborhood was from less than 5% to 60-70%.
Existing Treatment of Stormwater	There are a number of practices that can be installed to remove pollutants from stormwater and to prevent stormwater from causing erosion. The effectiveness of these practices depends on appropriate design for treatment area and on being frequently and properly maintained.	A very low number of existing stormwater treatment devices were observed on residential properties. The few treatments observed included: • One roof drip line trench; • Two rain gardens (one covered with erosion control mulch, one in which roof gutter was directly connected); • Five water diverters to direct stormwater into existing vegetation; and, Native vegetative buffer with trees that were strategically trimmed to allow lake views in one neighborhood.

For all of the neighborhoods surveyed, the amount of bare soil, lack of shoreline buffers, and stormwater runoff from driveways and roofs were the greatest water quality concerns. Erosion on private boat launches and the potential of fertilizer use on highly manicured lawns were also a concern in some areas.

Recommendations to improve water quality include:

- Eliminate fertilizer use in the shoreland zone unless soil test shows need.
- Educate on impact of coal tar-based driveway sealants to protect water quality.
- Work with landowners to infiltrate stormwater runoff on site and protect/restore/maintain native vegetative buffers.
- Install water diverters on gravel driveways.
- Establish native plants along shorefronts.
- Capture roof runoff in infiltration trenches, rain gardens, or rain barrels.
- Stabilize private boat launches.
- Stabilize areas of bare soil with native plants or three to four inches of erosion control mulch.

The Hotspot Survey, also conducted in 2014, looked at five commercial hotspot areas: Panther Run/Route 302 in Raymond, Port Harbor/Route 302 in Raymond, Sebago Lake Village in Standish, Point Sebago Golf Course in Casco, and Frye Island Golf Course on Frye Island. Sites surveyed were chosen by the *Sebago Lake Assessment and Prioritization Project* steering committee. A summary of information and recommendations are listed in **Table 4**.

Table 4: Hotspot survey results, commercial.

Location Description	Approx. % of Imperviousness	Primary Pollutants	Likelihood of Pesticide/ Fertilizer Use	BMPs Present (excluding catch basins)	Basic Recommendations
Panther Run/ Route 302 Corridor, Raymond	80%	Salt/sand, metals, trash	Unknown	None	Review whether salt is applied. Review catch basin drainage system for area (are catch basins present?). Encourage businesses to infiltrate stormwater onsite. Encourage vegetated buffers at Panther Run Marina and around Town of Raymond Memorial Park parking lot.
Port Harbor/ Route 302 Corridor, Raymond	80%	Salt/sand, metals, thermal, trash, motor oil, gas	<20%	None	Need to review BMP and maintenance practices of Port Marine and the two gas stations. Need to stabilize gravel parking lot next to Sunset Variety (Google mapping shows parking lot sediment washing into road). Outreach to Big Apple about salt/sanding practices (Google mapping shows a lot of sand on property).
Sebago Lake Village, Standish	80%	Salt/sand, metals, thermal, trash	<20%	None	Review salt application practices. Education regarding parking lot sealants and infiltration of runoff onsite.
Point Sebago Golf Course, Casco	<20%, but mostly golf course lawn	Nutrients (fertilizer), thermal	>90%	Unknown	Meet with golf course green managers to discuss practices and ways to reduce impact to water resources. Look into Audubon International's golf course certification for recognition of water quality protection efforts.
Frye Island Golf Course, Frye Island	<20%, but mostly golf course lawn	Nutrients (fertilizer), thermal	>90%	Unknown	Meet with golf course green managers to discuss practices and ways to reduce impact to water resources. Look into Audubon International's golf course certification for recognition of water quality protection efforts.

The Hotspot Survey (conducted in 2014) also reviewed 38 agricultural or prior agricultural properties to analyze their potential impact to Sebago Lake. Of the 38 sites ground-truthed, only nine appeared to be active agriculture sites showing a use in vegetable crops or livestock. Fifteen sites were wooded, seven of the sites showed recent signs of logging, and three sites were maintained as tree farms. Ten sites were fields or potential hayfields, with one of the hayfields being converted to house lots. The remaining four sites were prior agriculture lands that are now house lots. The survey results and recommendations are discussed in the *Sebago Lake and Crooked River Watershed-Based Protection Plan*, provided as **Appendix C**.

D. 2011 Crooked River Watershed Survey

Although conducted prior to the *Sebago Lake Watershed Assessment and Prioritization Project*, an NPS pollution survey of the entire Crooked River Watershed was conducted in 2011 through an EPA 604(b) grant, administered by DEP and coordinated by CCSWCD. This survey identified 164 NPS pollution sites along with 20 riparian corridor sites conducted under a Riparian Corridor Inventory. **Table 5** provides a summary of the number of sites identified by land use and impact to the River's water quality. Complete results from this survey were published in the *Crooked River Watershed Survey Report, March 2012* (*http://1drv.ms/1H4vXil*).

Table 5. Crooked River sites by land use and impact.

Land Use	High Impact	Medium Impact	Low Impact	Total
Agriculture	1			1
Beach/Boat Access	1	3	1	5
Commercial	3	2		5
Construction		2		2
Driveway		4	2	6
Gravel Pit/Mining	2			2
Logging			1	1
Municipal/Public	1	1		2
Power/Pipe Line	1	1		2
Private Road	5	20		25
Recreation	1	7		8
Residential	9	9		18
State Road	3	8		11
Stream Channel	2	5	1	8
Town Road	6	45	7	58
Trail/ATV/Path	4	6		10
Total	39	113	12	164

E. Summary of Cumulative NPS Findings in Direct Watershed of Sebago Lake

The NPS survey results for Sebago Lake's Direct Watershed indicate that roads, lack of significant shoreline vegetation, and lack of stormwater treatment are the most common NPS water quality threats.

Roads are the most common contributors of soil and phosphorus for both Crooked River and Sebago Lake. Municipalities own most of the road sites identified, followed by privately-owned roads and state roads. Lack of proper road drainage and maintenance is the most common issue that contributes eroded sediment to the Lake.

Lack of shoreland buffers and vegetation is the second most common condition that is likely to impact Sebago Lake's and

Crooked River's water quality. Most of the sites identified are associated with residential properties. Lack of effective shoreland buffers results in increased polluted runoff flowing into the Lake. Lack of shoreland buffers also reduces shoreline stability (lack of significant root structures) and reduces riparian habitat and waterbody shading (which affects water temperature). Areas lacking vegetation also tend to have extensive areas of bare soil, which results in sediment washing into the Lake. Many properties in the neighborhoods surveyed through the *Neighborhood Assessment* had established lawns rather than native trees or shrubs. The well-manicured lawns lack significant root structures that are important for shoreline stabilization and can contribute excess nutrients if fertilizer is used.

Lack of on-site stormwater treatment was the third most commonly observed NPS impact. Many residential and commercial properties lacked sufficient infiltration and diversion of stormwater runoff into vegetation. Instead, NPS pollutants (sediment, nutrients, salt, chemicals, metals, etc.) were observed to be washing directly into adjacent waterbodies. The combined accumulation of these sources is likely to have a very large impact to water quality over time. The *Sebago Lake and Crooked River Watershed Protection Plan* and accompanying site tracker provide additional details on watershed survey results and sites identified for further work.

Portland Water District scientists collect insects on rivers that flow to Sebago Lake. The number and types of insects found in are an indicator of how healthy each river is. Some insect species are sensitive to pollution in the water and cannot survive if pollution levels are too high.

IV. Assessing Sebago Lake's Subwatersheds

A. Defining Subwatersheds

The first step in assessing and prioritizing Sebago Lake's subwatersheds was to geographically define them. The lake subwatersheds were determined using the Maine drainage divide (MEDRDVD) shapefile obtained from the Maine Office of GIS. This shapefile is based on USGS 1:24,000 scale topography, and watershed boundaries were delineated using the 1:24,000 scale contours in 1989. Watershed boundaries are identified by USGS's 8-digit Hydrologic Unit Code (HUC).

The shapefile was edited for this project to create one polygon per waterbody. Some subwatersheds within the greater Sebago Lake Watershed were broken into multiple polygons. These polygons were merged to create one watershed polygon per lake or pond within the Sebago Lake Watershed. Additionally, a few polygons contained no bodies of water and were merged with the appropriate subwatershed polygon based on topography. The Crooked River Watershed was divided into four subwatersheds based on PWD's macro-invertebrate sampling locations on Route 35 in Albany Township, Route 118 in Waterford, Rt. 117 Twin Bridges in Harrison, and Edes Falls in Naples.

Highland Lake, Bridgton

The subwatershed list was further refined based on the availability of long-term monitoring data within the watershed. Ultimately the Sebago Lake Watershed was divided into 34 subwatersheds (**Table 2**). For the Water Quality Index (WQI) analysis, the subwatershed must have at least two of the following types of data: short-term water quality data, long-term water quality data, partnership information, or land cover analysis data. Watersheds that did not have water quality data were analyzed for land cover changes and partnerships, but were not included in the final Water Quality Index (WQI) analysis. **Figure 5** depicts the 34 subwatersheds that are included as part of the Sebago Lake WQI. **A** map listing the names of the Sebago Lake Watershed's lakes to use as reference is located in **Appendix A.**

B. Assessment Process

Each of Sebago Lake's subwatersheds were assessed through a phosphorus analysis and the Water Quality Index (WQI). The phosphorus contribution (also known as sensitivity) analysis utilized Vollenweider's mass balance equations to calculate phosphorous loads that each subwatershed contributes to Sebago Lake. The WQI was developed by project partners representing the Sebago Lake Steering Committee over a course of meetings throughout the project's duration (March 2014 – September 2015) and includes the following four key parameters (factsheet categories listed in parenthesis):

1. Current Conditions (Referred to as *Current Lake Clarity* in subwatershed factsheets, Appendix D) uses the prioritized trophic state index (TSI) to evaluate the lake or pond's current water quality conditions.
2. Water Quality Trends (Referred to as *Lake Health Trend* in subwatershed factsheets, Appendix D) uses the Mann-Kendall trend analysis tool to evaluate statistically significant changes in chlorophyll-*a* median values for July, August, and September for each year over a 10-year time period ending in 2013.

TROPHIC STATE INDEX (TSI)

Trophic State Index evaluates the amount of nutrients available to organisms (algae) in a lake. As the amount of nutrients (particularly phosphorus and nitrogen) increase there is more algae growth and decreased water clarity.

3. Land Cover Change (Referred to as *Land Use* in subwatershed factsheets, Appendix D evaluates the changes in land cover types since 1988 using detailed analysis of Landsat images.
4. Partnerships incorporates information about active watershed groups (i.e., lake associations, stewardship organizations, and municipal partners) as well as availability of NPS data to predict the effectiveness of completing successful water quality improvement projects in each subwatershed.

The WQI for each subwatershed synthesized between 10 and 40 years of data from each of these four categories to prioritize each subwatershed for investments in NPS and other water quality improvement projects. Detailed methodology for each WQI parameter is provided in **Section V**.

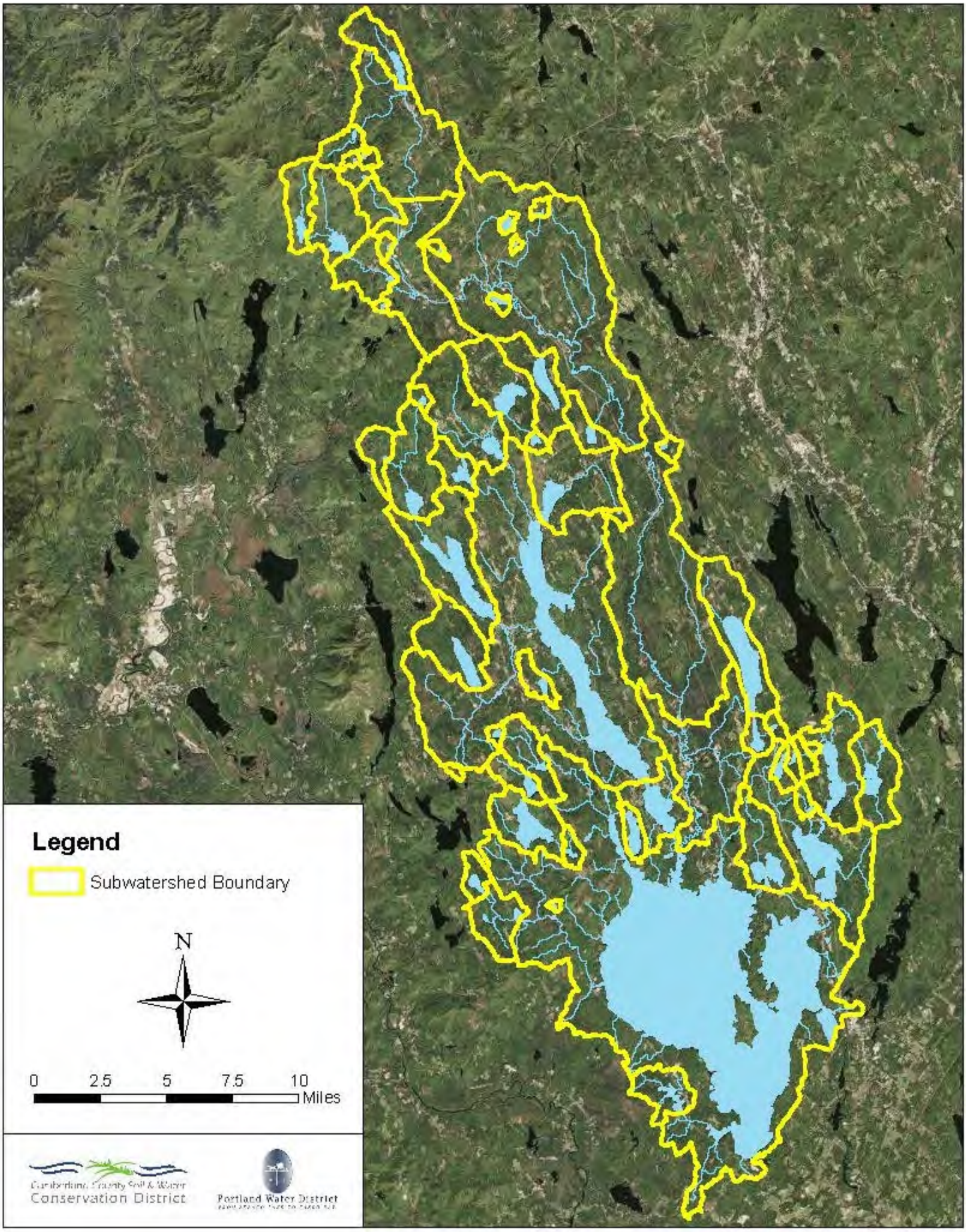


Figure 5. Sebago Lake subwatersheds for the water quality index.

V. Water Quality Index Parameters

Detailed methodology for the WQI parameters is presented in the following sections. For each parameter in the WQI (current conditions, water quality trends, land cover change, and partnerships), the scores were grouped into quintiles, with a score of 5 being the highest (or 'best'), and a score of 1 indicating that considerable effort would be required to improve the parameter within that subwatershed. Individual parameters were also calculated for the Direct Watershed, yet due to its magnitude and variable conditions (i.e., the Crooked River system and Sebago Lake proper along with numerous smaller tributary rivers and streams), a separate factsheet for the Direct Watershed was not developed. Instead, protection actions are listed in and will be guided by the *Sebago Lake and Crooked River Watershed-Based Protection Plan* (**Appendix C**). Prioritization of activities most important to protecting Sebago Lake proper is discussed under **Section VI. A.**

A. Current Conditions

The current condition of a waterbody is critical for determining protection priorities as well as providing impetus for partners to become involved in protection efforts. The current condition of each subwatershed for which there was water quality data was evaluated using the Maine Trophic State Index (TSI), which assigns a numerical value to the trophic condition of a lake. Lower numbers indicate low nutrient conditions (low biological productivity) and higher numbers indicate enriched nutrient conditions (higher biological productivity) (**Table 6**). The Maine TSI is calculated using slight adaptations to the methodology described in Carlson (1977). These adaptations reflect the range of trophic conditions observed in Maine lakes.

$$TSI_{(chlorophyll)} = 70*\log([mean\ chl\text{-}a] + 0.71)$$

$$TSI_{(phosphorus)} = 70*\log(0.33\ [mean\ tp] + 0.7)$$

$$TSI_{(Secchi)} = 70*\log((105/[mean\ Secchi\text{^}2]) + 0.7)$$

Lake transparency is measured using a Secchi disk.

TSI values are calculated as a yearly value for an individual lake and are based on multiple samples of chlorophyll-*a*, total phosphorus or Secchi disk transparency. Yearly values may be used to look for changes in trophic condition over time, or they may be summarized to calculate an overall TSI value for a lake.

Table 6. Parameter ranges and associated Maine TSI values used to describe the productivity levels (nutrient enrichment) of Maine lakes.

Parameter	Lake Productivity	Value Range	TSI Range
Secchi Disk Transparency	Productive	<4 m	>60.00
	Moderately Productive	4 - 7 m	31.76
	Unproductive	>7 m	<31.76
Chlorophyll *a*	Productive	>7 ppb	>62.09
	Moderately Productive	2 - 7 ppb	30.30
	Unproductive	<2 ppb	<30.30
Total Phosphorus	Productive	>20 ppb	>60.43
	Moderately Productive	6 - 20 ppb	29.97
	Unproductive	<6 ppb	<29.97
Overall TSI	Productive		>60.93
	Moderately Productive		30.68
	Unproductive		<30.68

m = meters; ppb = parts per billion

In order to calculate a TSI value for a lake in a given year, certain data availability requirements must be met:

- Samples must be taken from open water (usually the deep hole).
- Five months of data per year are necessary (May - November).
- Not permissible to miss any two consecutive months of data in any year.
- Annual mean value is the mean of the monthly means so that all months are weighted equally in calculations.
- Water samples should be taken as cores / discrete samples evenly spaced from the lake surface to the depth of the late summer epilimnion (the top layer of warmer water in a lake in summer).

For purposes of this study, the Sebago Lake subwatershed TSI calculations considered the following criteria:

- Only Station 1 data from all lakes were used.
- TSI values are based on yearly average TSI values for a minimum of five years of data.
- Data must have been from 1995 or newer and sampled since 2008 to have their TSI calculated.

Collecting water samples.

Chlorophyll-*a* data provide the best assessment of trophic state since it is a direct measure of algal abundance. Total phosphorus is the next best indicator, followed by Secchi disk transparency. As such, water quality parameters are not combined to summarize trophic state, since that would weaken the predictive capabilities of the results (Carlson 1983).

The parameter used to calculate TSI values for each lake in the Sebago Lake Watershed was prioritized by strength of indicator (chlorophyll-*a*, total phosphorus, Secchi transparency) and the length of the dataset (i.e., if a lake had 4 years of chlorophyll data, but 11 years of total phosphorus data, total phosphorus data were used to calculate TSI).

It was important to the current study that lakes in the Sebago Lake Watershed be compared to each other, rather than to the TSI values of lakes across the state of Maine (**Table 7**). To achieve this, quintiles of TSI values for the subwatersheds were calculated. This allowed the formation of five condition classes based on the ranges of TSI observed. The current condition ranking criteria are provided in **Table 8**. Current condition scoring of each subwatershed is shown in **Figure 6.**

Table 7: Current conditions scoring criteria.

Ranking	TSI Range	Percentile Range	Criteria
1	44 – 68	0-20%	Higher biological productivity
2	39 - 44	20-40%	
3	37 - 39	40-60%	
4	34-37	60-80%	Lower biological productivity
5	24-34	80-100%	

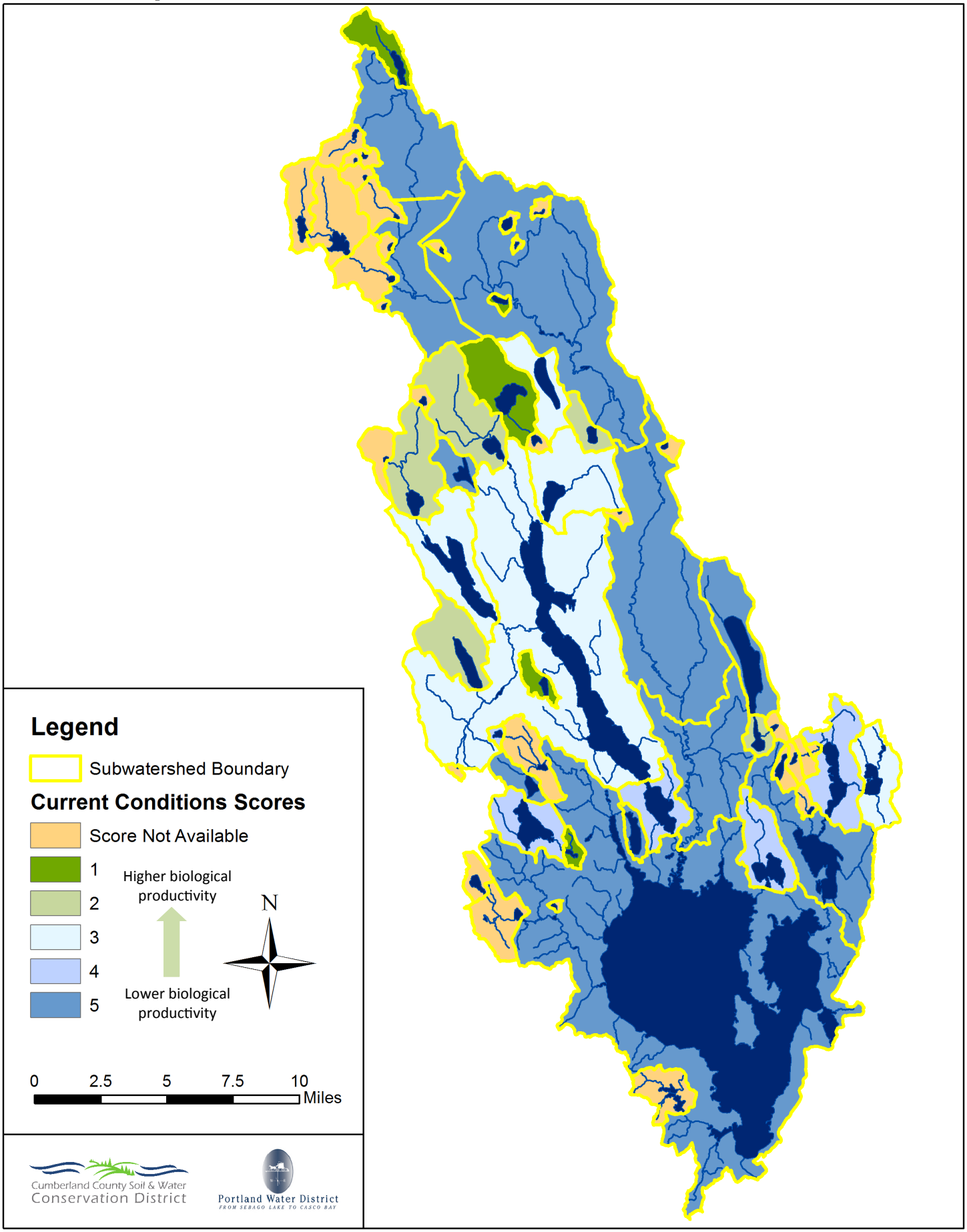


Figure 6: Sebago Lake subwatershed current conditions scores

Biological Productivity

Higher biological productivity (e.g., increased levels of phosphorus) indicates an elevated trophic state, which may increase chances of high algal abundance and loss of dissolved oxygen in deeper waters.

MIDAS Number

The MIDAS (Maine Inventory and Data Analysis System) number is a unique identification number assigned to Maine lakes and ponds that are monitored and managed by Maine state agencies.

Table 8: Current conditions scores.

Subwatershed Name	MIDAS Number	Current Conditions Score
Adams Pond	3396	4
Bear Pond	3420	2
Brandy Pond (Bay of Naples)	9685	4
Coffee Pond	3390	No Data
Cold Rain Pond	3376	1
Crescent Lake	3696	4
Crystal Lake	3452	3
Dumpling Pond	3698	No Data
Foster's Pond (Ingalls Pond)	3188	5
Highland Lake	3454	3
Holt Pond	3370	No Data
Island Pond	3448	2
Keoka Lake	3416	1
Little Moose Pond	3424	5
Long Lake	5780	3
McWain Pond (Long Pond)	3418	3
Otter Pond	3458	1
Panther Pond	3694	5
Papoose Pond	3414	1
Parker Pond	3388	2
Peabody Pond	3374	4
Pleasant Lake	3446	5
Raymond Pond	3690	3
Sebago Lake & Crooked River	5786	5
Songo Pond	3262	1
Stearns Pond	3234	2
Thomas Pond	3392	4
Trickey Pond	3382	5
Woods Pond	3456	2

B. Water Quality Trends

The Current Conditions assessment evaluated the analytical data related to each subwatershed lake. The Water Quality Trend was designed to evaluate whether a lake's water quality is improving, remaining constant, or worsening. While downward-trending lakes may not have immediately apparent evidence of water quality issues, ensuring protection of these lakes before they become impaired is critical to ensure protection of Sebago Lake.

The water quality trends were evaluated using Mann-Kendall trend analysis based on chlorophyll-*a* or Secchi median values for July, August, and September for each year and for a minimum of 10 years of data. The trend analysis criteria are provided in **Table 9**.

Table 9: Trend analysis criteria.

Trend Value	Criteria
Significantly decreasing chlorophyll-*a* or increasing Secchi median values	Improving water quality
No significant trend in chlorophyll-*a* or Secchi median values	Stable water quality
Significantly increasing chlorophyll-*a* or Secchi median values	Worsening water quality

The interpretation of water quality results is based on p-values (α = 0.05) and Tau values from the Mann-Kendall Trend test. A statistically significant *p*-value (α = 0.05) indicates there is a 95% or greater chance that the trend indicated with the Tau value will continue with subsequent data. Non-significant results indicate either a stable water quality trend, or the data are too variable to determine a trend.

Significant Mann-Kendall results with a positive Tau value indicate increasing chlorophyll-*a* concentration over the years, and therefore a worsening water quality trend. Alternatively, significant results with a negative Tau value indicate decreasing chlorophyll-*a* concentration over the years, and therefore an improving water quality trend. Secchi transparency decreases with increasing trophic state; therefore lakes with Secchi transparency data only (i.e., inadequate chlorophyll-*a* data for statistical analysis) show the inverse of the chlorophyll-*a* statistical criteria. The criteria for these overall scores are presented in **Table 10**. Water quality trend scores for each subwatershed are shown in **Table 11** and **Figure 7**.

P VALUE AND KENDALL TAU

A **P value** is the probability that the observation (in this case, the water quality trend) is due to chance.

The **Kendall Tau** is a statistical measure of the association between two measured quantities.

Table 10: Water quality trend scoring criteria.

Water Quality Trend Score	Trend Score Criteria	Statistical Qualifier
1	Significantly increasing trophic state (declining water quality)	Significant p-value, positive tau value (negative tau for Secchi data).
2	Potentially increasing trophic state	Non-significant p-value, tau value greater than 0.1 (less than -0.1 for Secchi data).
3	Not used for this parameter	--
4	Either stable or potentially decreasing trophic state	Non-significant p-value, tau value less than -0.1 (greater than 0.1 for Secchi data).
5	Significantly decreasing trophic state (improving water quality)	Significant p-value, negative tau value (positive tau value for Secchi data).

Table 11: Water quality trend scores.

Subwatershed Name	MIDAS Number	Water Quality Trend Score
Adams Pond	3396	4
Bear Pond	3420	2
Brandy Pond (Bay of Naples)	9685	2
Coffee Pond	3390	No Data
Cold Rain Pond	3376	4
Crescent Lake	3696	4
Crystal Lake	3452	4
Dumpling Pond	3698	No Data
Foster's Pond (Ingalls Pond)	3188	4
Highland Lake	3454	4
Holt Pond	3370	4
Island Pond	3448	4
Keoka Lake	3416	4
Little Moose Pond	3424	2
Long Lake	5780	5
McWain Pond (Long Pond)	3418	4
Otter Pond	3458	5
Panther Pond	3694	*4*
Papoose Pond	3414	4
Parker Pond	3388	*4*
Peabody Pond	3374	4
Pleasant Lake	3446	*4*
Raymond Pond	3690	4
Sebago Lake & Crooked River	5786	4
Songo Pond	3262	No Data
Stearns Pond	3234	4
Thomas Pond	3392	*4*
Trickey Pond	3382	1
Woods Pond	3456	4

Note: Waterbodies whose scores are in red italics had inadequate chlorophyll-a data to complete the trend analysis; therefore results are based on Secchi transparency trends.

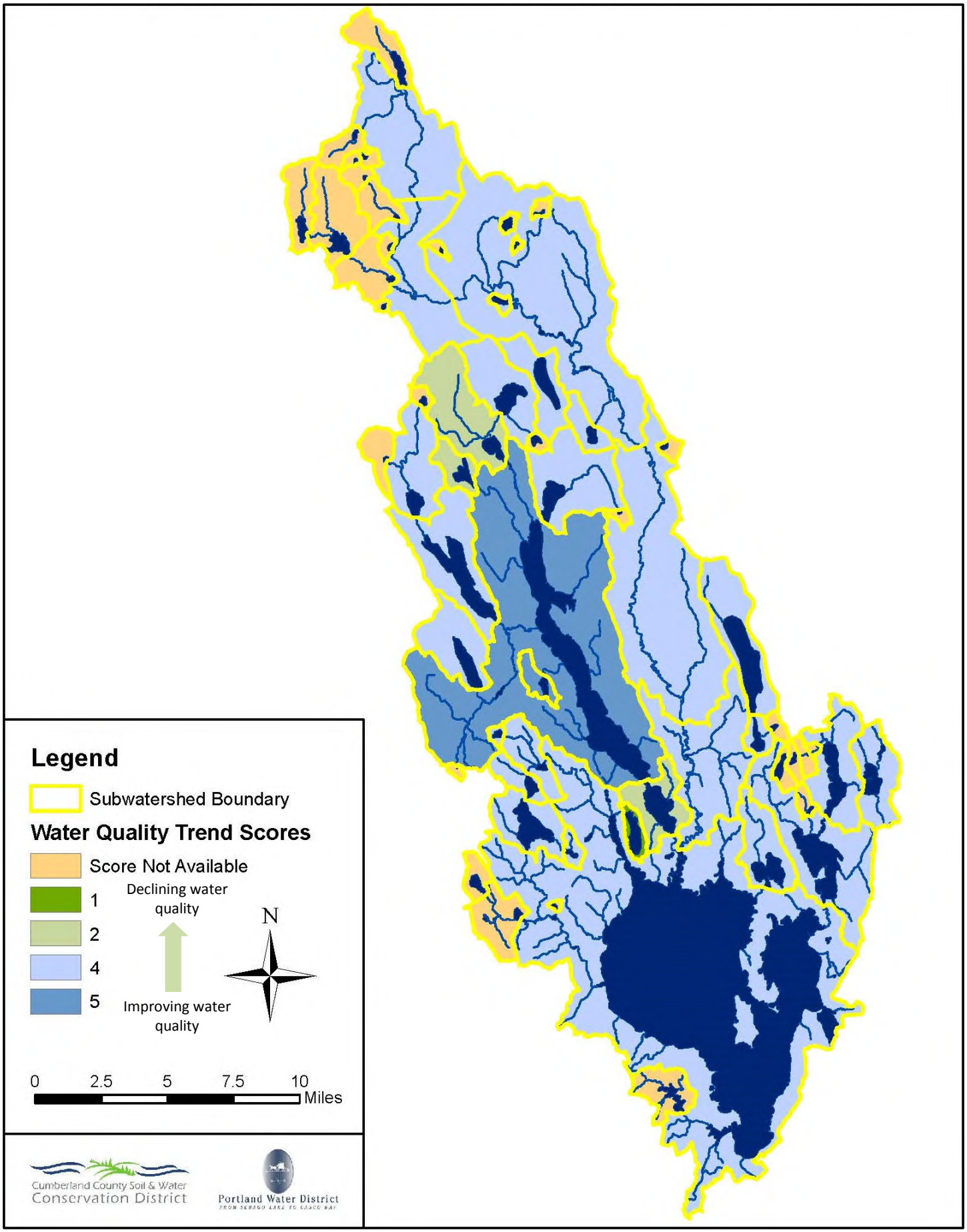


Figure 7: Sebago Lake subwatershed water quality trend scores.

C. Land Cover Change

A combined satellite image and Geographic Information Systems (GIS) analysis of land use and land cover change in the Sebago Lake Watershed was conducted. This analysis focused on the extent to which land use and cover types have changed between 1987 and 2013 across Sebago Lake's subwatersheds. Particular focus was conducted on the change between *developed land* and *undeveloped vegetated land*. The analysis, conducted by Professor Firooza Pavri at the University of Southern Maine working with CCSWCD and PWD staff, reflects threats to water quality due to substantial land cover conversions.

Dr. Pavri and her research team used data from Landsat satellites for the analysis of change. Landsat provides medium-resolution multi-spectral data free to the public and has been continuously collecting data since 1972. As such, it is an excellent source for data on land cover change at the regional scale.

Several Landsat images were considered for use in this analysis. Ultimately, the best, relatively cloud-free, sources were determined to be an image captured by the Landsat 5 Thematic Mapper satellite (WRS: Path 12/Row 29/30) on July 10, 1987 and an image captured by Landsat Operational Land Imager (OLI) from August 22, 2013. Both images have a spatial resolution of 30 meters, with OLI data possessing far superior radiometric resolution.

The other major data source used in this analysis was a delineation of subwatershed boundaries in the Sebago Lake Watershed. Lake watersheds form the basis for the delineation, with one subwatershed area per lake. However, in the case of the Sebago Lake direct watershed and its major tributary the Crooked River, 6 subcatchments were created.

Methodology

Step 1: Classification

The images from 1987 and 2013 were both processed and classified using the ERDAS Image software program. An unsupervised classification using the Iterative Self Organizing Data Analysis (ISODATA) algorithm produced the final land use maps from the Landsat datasets for each of the years of the study period. ISODATA groups pixels based on a minimum distance function (Lillesand et al. 2008). The classification algorithm reassigned the image pixel values into 30 initial classes. After some experimentation, the 30 classes were recoded into four broad land use classes that were of particular interest to our study. These classes included:

- *Developed land* (including rural, suburban, urban, and industrial built-up areas, impervious surfaces, infrastructure lines including roads, rails, power lines, gravel pits, open mines, and recently cleared areas)
- *Undeveloped vegetated land* (including open and green space, forest, pasture, agricultural fields, herbaceous vegetation, and areas regularly mowed or grazed such as golf courses and hay fields)
- *Wetland area* (including marsh and other intermittently wet areas)
- *Open water* (including lakes, ponds, and rivers)

Step 2: Accuracy assessment

Accuracy assessments were performed on each of the images using a stratified random sample of 40 or 41 points per class for each of the classes. Using a sample of points, these assessments measure how well the classification method performed in spectrally distinguishing each of the land use classes (Lilles and et al. 2008). The error matrix produced for each of the images through this process enabled an assessment of errors of omission and commission and calculated Kappa coefficients for individual land use classes (Congalton 1991). A description of the process and results for the 1987 image are available through a previously published paper (Pavri et al 2013). For the 2013 image, readily available and comprehensive National Agriculture Imagery Program (NAIP) 2013 aerial imagery provided on the Maine Office of GIS website was used for the comparison. For the 2013 image, 41 points within each of the four classes were selected, with a minimum value of 75 m between points.

The accuracy assessment determined estimated rates for errors to be within statistically acceptable bounds. The Kappa score and index of overall accuracy was 0.800, which is considered reasonably high for this type of analysis. In general, the greatest number of errors found in the classification process appeared to be generated by mis-classification of developed pixels as "wet" pixels. This misclassification could be due to weather conditions just prior to the image being taken.

Step 3: Geospatial analysis of results

Using the classified images from 1987 and 2013, the total percentage of area within each subwatershed corresponding to each of the four land cover types was tabulated using ESRI's ArcGIS software.

For each image, some portion of the area was obscured by clouds. The area obscured was greater in the 1987 image, however only one subwatershed was completely obscured. No other subwatersheds were obscured to a degree that a reasonable estimate of the proportions of land cover types within the subwatershed could not be estimated.

The value for amount of change for each subwatershed was generated by calculating the estimated developed area coverage change for 1987 from 2013. The subwatersheds were then ranked by quintile based on how much land has been converted from the *undeveloped vegetated land* class to the *developed land* class.

A comparison of each subwatershed's growth to the greater Sebago Lake Watershed's growth mean of 1.65% (with a standard deviation of 3.83%) is shown in **Figure 8**. Land cover change scoring criteria is listed in **Table 12.** The final land cover scores for each subwatershed are depicted in **Table 13** and **Figure 9**.

Table 12: Land cover change scoring criteria.

Ranking	Percent Land Cover Change Range	Criteria
1	+4.62% to +11.91%	Higher percent land cover change (from undeveloped to developed)
2	+2.28% to +4.31%	
3	+0.26% to +2.14%	
4	-0.88% to +0.23%	
5	-3.25% to -1.79%	Lower percent land cover change (from undeveloped to developed)

Table 13: Land cover change scores

Subwatershed Name	MIDAS Number	Land Cover Score
Adams Pond	3396	1
Bear Pond	3420	3
Brandy Pond (Bay of Naples)	9685	1
Coffee Pond	3390	4
Cold Rain Pond	3376	2
Crescent Lake	3696	2
Crystal Lake	3452	1
Dumpling Pond	3698	4
Foster's Pond (Ingalls Pond)	3188	5
Highland Lake	3454	3
Holt Pond	3370	2
Island Pond	3448	3
Keoka Lake	3416	3
Little Moose Pond	3424	4
Long Lake	5780	2
McWain Pond (Long Pond)	3418	2
Otter Pond	3458	1
Panther Pond	3694	3
Papoose Pond	3414	4
Parker Pond	3388	3
Peabody Pond	3374	3
Pleasant Lake	3446	2
Raymond Pond	3690	3
Sebago Lake & Crooked River	5786	2
Songo Pond	3262	No Data
Stearns Pond	3234	4
Thomas Pond	3392	1
Trickey Pond	3382	1
Woods Pond	3456	1

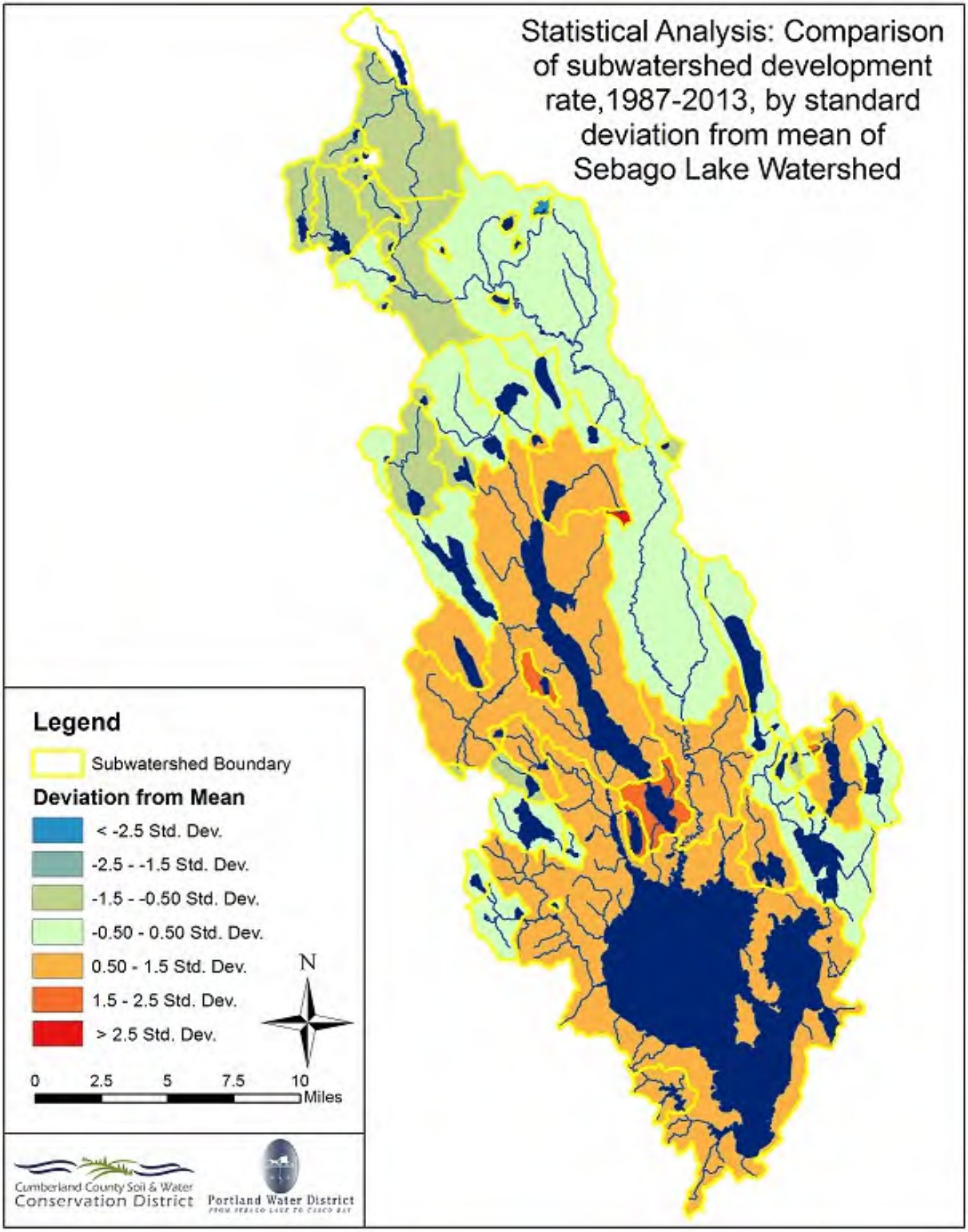


Figure 8. Comparison of individual subwatershed growth to greater watershed's growth median.

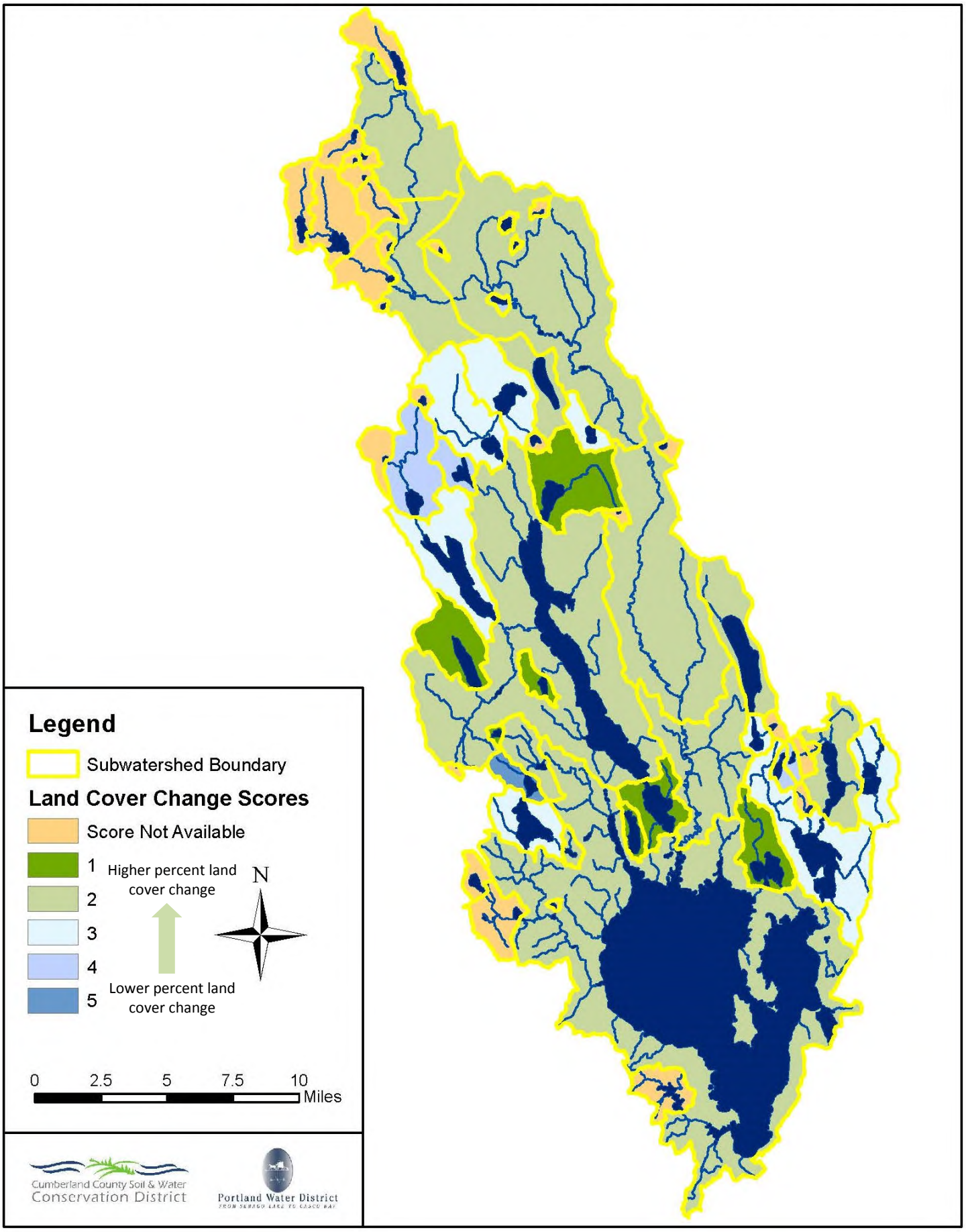


Figure 9. Sebago Lake subwatershed land cover change scores.

D. Partnerships

Successful watershed protection and restoration efforts require committed local partners. As such, local partnership potential was evaluated for each subwatershed. The partnership ranking consisted of two criteria: (1) evidence of past successful partnerships; and, (2) likelihood of successful implementation of a 319 or similar grant project in the future, including a recent NPS watershed survey, an approved watershed protection plan, and available in-kind or cash matching funds.

As with the other evaluation criteria, the local partnerships scores were grouped into quintiles, with a score of 5 being the highest likelihood of a successful partnership, and a score of 1 indicating that considerable outreach would be required to ensure a successful partnership. The criteria for each quintile are provided in **Table 14**, and the final scores are presented in **Table 15** and **Figure 10**.

Table 14: Partnership scoring criteria.

Ranking	Likelihood of Successful Partnership	Criteria
1	Low	• no partners and no obvious opportunity to build partnerships; or, • No NPS sites identified, no recent survey.
2	Medium Low	• 1 or 2 partners, opportunity to build partnerships with enough investment; or, • A few sites, but not enough to support a 319 grant alone, needs updated survey & Watershed Protection Plan.
3	Medium	• Few partners, needs a lot of support to make things happen, in-kind match only; or, • A lot of small sites, not great 319 grant opportunity, needs updated survey & Watershed Protection Plan.
4	Medium High	• Very active partners, well-established associations and/or conservation groups, provide some cash match, good in-kind match; or, • Sites appropriate for 319 opportunity, needs updated survey & Watershed Protection Plan.
5	High	• Very active & recent partnerships with active partners (town, associations, conservation groups). Able to provide good cash match as well as in-kind services where appropriate; or, • Ready to go with updated survey and watershed protection plan

Trillium

Table 15: Partnership scores

Subwatershed Name	MIDAS Number	Partnership Score
Adams Pond	3396	2
Bear Pond	3420	4
Brandy Pond (Bay of Naples)	9685	2
Coffee Pond	3390	2
Cold Rain Pond	3376	1
Crescent Lake	3696	4
Crystal Lake	3452	2
Dumpling Pond	3698	2
Foster's Pond (Ingalls Pond)	3188	1
Highland Lake	3454	3
Holt Pond	3370	1
Island Pond	3448	4
Keoka Lake	3416	5
Little Moose Pond	3424	1
Long Lake	5780	4
McWain Pond (Long Pond)	3418	3
Otter Pond	3458	2
Panther Pond	3694	5
Papoose Pond	3414	3
Parker Pond	3388	3
Peabody Pond	3374	3
Pleasant Lake	3446	3
Raymond Pond	3690	2
Sebago Lake & Crooked River	5786	5
Songo Pond	3262	1
Stearns Pond	3234	1
Thomas Pond	3392	4
Trickey Pond	3382	3
Woods Pond	3456	4

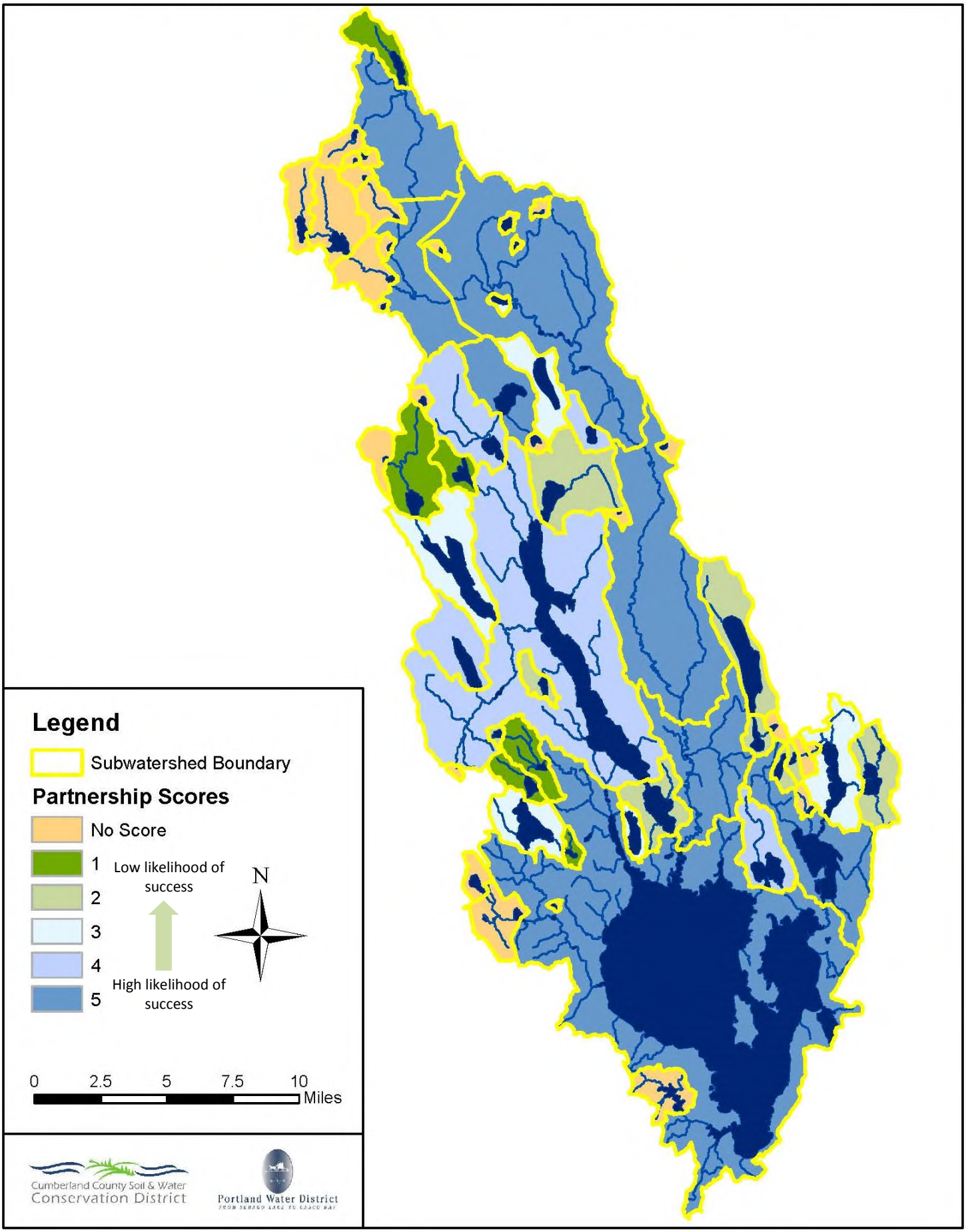


Figure 10. Sebago Lake subwatershed partnership scores.

VI. Prioritizing Sebago Lake's Subwatersheds for the Health of Sebago Lake

A. Phosphorus Contribution to Sebago Lake

The phosphorus contribution (also known as sensitivity) analysis utilized Vollenweider's mass balance equations to calculate the phosphorous loads that each subwatershed contributes to Sebago Lake. The Vollenweider methodology calculates the phosphorous load coming into each lake, the phosphorus load exiting each lake, the phosphorous load from that particular lake's direct watershed, applies the retention coefficient for each subsequent lake downstream, and models how much phosphorous from each subwatershed contributes to the entire phosphorus load into Sebago Lake. Some of the smaller ponds lacked the necessary total phosphorous data required to model their subwatershed phosphorous load. PWD did some testing in remote ponds to get an estimate for the missing data. The values and percentages are provided in **Table 16** and are ordered from greatest contribution to least contribution of phosphorus to Sebago Lake. The phosphorus contribution analysis will be used by PWD and other watershed partners to prioritize match funding, land conservation and protection, and outreach efforts to reduce the subwatershed's overall impact on Sebago Lake.

B. Prioritizing Subwatersheds Using the Water Quality Index

Whereas the phosphorus analysis prioritized subwatersheds based on their impact to Sebago Lake, the WQI process prioritized subwatersheds based on needs to improve the health of individual subwatersheds, identifying which subwatersheds would likely have successful NPS projects or would benefit from additional municipal and landowner

Long Lake, Harrison

Table 16. Total phosphorus contribution to Sebago Lake by subwatershed.

Lake	Addition to Sebago (kg of phosphorus)	Percent (%)
Sebago Lake & Crooked River	5,493.2	67.7
Long Lake	812.5	10.0
Brandy Pond (Bay of Naples)	233.9	2.9
Panther Pond	183.9	2.3
Holt Pond	108.4	1.3
McWain Pond (Long Pond)	104.7	1.3
Crystal Lake	89.4	1.1
Bear Pond	79.3	1.0
Highland Lake	77.3	1.0
Crescent Lake	60.7	0.7
Thomas Pond	58.5	0.7
Pleasant Lake	52.1	0.6
Songo Pond	51.1	0.6
Peabody Pond	48.6	0.6
Woods Pond	28.0	0.3
Stearns Pond	21.3	0.3
Island Pond	20.9	0.3
Keoka Lake	19.3	0.2
Foster's Pond (Ingalls Pond)	18.3	0.2
Raymond Pond	11.4	0.1
Trickey Pond	9.4	0.1
Otter Pond	9.1	0.1
Papoose Pond	7.1	0.1
Little Moose Pond	6.9	0.1
Parker Pond	5.1	0.1
Cold Rain Pond	4.2	0.1
Adams Pond	3.4	<0.1
Dumpling Pond	3.2	<0.1
Coffee Pond	1.7	<0.1

*note: additional ponds not included in the WQI due to insufficient data contribute approximately 6.1% of the total phosphorus load to Sebago Lake

outreach to encourage lake protection efforts. The WQI prioritizes each subwatershed in relation to one another for based on four WQI parameters (as discussed in **Section IV**). The four WQI parameters combined provide each subwatershed with an overall score that indicates the subwatershed's overall condition. **Table 17a** compiles the WQI data for each of the subwatersheds for which there was adequate data to score each WQI parameter. The subwatersheds are arranged from lowest total score to highest total score; therefore, the subwatersheds listed first would benefit most from focused outreach, partnership-building, and NPS projects. When total scores were equal, the watersheds were then sorted by water quality trend then by current conditions. Specific recommendations for actions in each subwatershed are provided in **Table 18.** **Table 17b** summarizes the WQI scores for watersheds for which there was an incomplete dataset.

Appendix D provides factsheets summarizing the WQI results for each subwatershed for which there was adequate data to evaluate all four WQI parameters. Any methodology changes (for watersheds where data gaps prevented a complete analysis) are noted on the factsheets. Because the Sebago Lake Direct Watershed is fundamentally different than the other lakes and ponds, it is discussed separately and no factsheet was developed. Instead, the *Sebago Lake and Crooked River Watershed-Based Protection Plan* (**Appendix C**) has been completed and will be used to guide future work in this critical portion of the Sebago Lake Watershed.

Table 17a. Sebago Lake subwatershed WQI scores.

Subwatershed Name	MIDAS Number	Current Conditions Score	Water Quality Trend Score	Land Cover Score	Partnership Score	Total Score
Cold Rain Pond	3376	1	4	2	1	8
Brandy Pond (Bay of Naples)	9685	4	2	1	2	9
Otter Pond	3458	1	5	1	2	9
Crystal Lake	3452	3	4	1	2	10
Trickey Pond	3382	5	1	1	3	10
Adams Pond	3396	4	4	1	2	11
Bear Pond	3420	2	2	3	4	11
Parker Pond	3388	2	4	3	2	11
Stearns Pond	3234	2	4	4	1	11
Woods Pond	3456	2	4	1	4	11
McWain Pond (Long Pond)	3418	3	4	2	3	12
Little Moose Pond	3424	5	2	4	1	12
Papoose Pond	3414	1	4	4	3	12
Raymond Pond	3690	3	4	3	2	12
Crescent Lake	3696	4	4	2	3	13
Highland Lake	3454	3	4	3	3	13
Island Pond	3448	2	4	3	4	13
Keoka Lake	3416	1	4	3	5	13
Pleasant Lake	3446	5	4	2	2	13
Thomas Pond	3392	4	4	1	4	13
Long Lake	5780	3	5	2	4	14
Peabody Pond	3374	4	4	3	3	14
Foster's Pond (Ingalls Pond)	3188	5	4	5	1	15
Sebago Lake & Crooked River	5786	5	4[a]	2[b]	5	16
Panther Pond	3694	5	4	3	5	17

Notes:

[a] Based on PWD's observations that Secchi Transparency has been declining since approximately 1990.

[b] The Land cover analysis divided the Direct Watershed into 6 sub-areas with land cover changes ranging from 5 (little change) in the more rural portions of the watershed to 1 in the more rapidly changing middle- and lower direct watersheds. The Land Cover score presented here is for the entire subwatershed but does not reflect rapidly changing areas of the Sebago Lake & Crooked River Subwatershed.

Table 17b. Scores for Subwatersheds with incomplete WQI information.

Subwatershed Name	MIDAS Number	Current Conditions	Water Quality Trend	Land Cover	Partnership	Total Score
Coffee Pond	3390	No Data	No Data	4	2	--
Dumpling Pond	3698	No Data	No Data	4	2	--
Holt Pond	3370	No Data	4	2	1	--
Songo Pond	3262	1	No Data	No Data	1	--

C. Current Conditions

Referred to as "Current Lake Clarity" on the Sebago Lake Subwatershed Factsheets.

Cold Rain Pond, Keoka Lake, Otter Pond, Papoose Pond, and Songo Pond all ranked a score of 1 in current water quality conditions **(Table 8)** meaning they are the highest level of concern in this category due to poor water clarity compared to other lakes in the Sebago Lake Watershed. Combined, these five ponds contribute 1.1% (90.7kg) of the total phosphorus input to Sebago Lake each year.

Ponds that ranked a score of 2 in current water quality conditions indicating the next highest level of concern due to poor water quality were Bear Pond, Island Pond, Parker Pond, Stearns Pond, and Woods Pond. The combined total phosphorus input of these five ponds into Sebago Lake is 1.9% (154.5 kg) of Sebago Lake's total annual phosphorus input.

Subwatershed Fact Sheet Scoring Table

Score	Level of Concern
5	Lowest
4	Moderate-Low
3	Moderate
2	Moderate-High
1	Highest

D. Water Quality Trends

Referred to as "Lake Health Trend" on the Sebago Lake Subwatershed Factsheets.

Looking at water quality trends, the subwatersheds with the lowest scores, indicating declining water quality, were Trickey Pond, Brandy Pond, Bear Pond, and Little Moose Pond. Combined these four subwatersheds contribute 4.1% (329.5 kg) of Sebago Lake's total phosphorus input.

The three subwatershed lakes that contribute the most phosphorus to Sebago Lake are Long Lake, Brandy Pond (Bay of Naples), and Panther Pond contributing a combined total of 15.2% (1,230.3 kg) of Sebago Lake's total phosphorus input **(Table 16).** In regards to current water quality conditions and water quality trends, these three subwatersheds ranked the following:

- Long Lake – moderate concern for current water quality conditions, lowest level of concern in water quality trend
- Brandy Pond – moderate-low concern for current water quality conditions, moderate-high concern in water quality trend
- Panther Pond – lowest concern for current water quality conditions, moderate-low concern for water quality trend

These results indicate that the largest contributors of phosphorus to Sebago Lake are not exhibiting current signs of water quality concerns (although Long Lake and Brandy Pond may benefit from additional focus to protect their health with a moderate concern for water quality conditions and a moderate-high concern in water quality trend, respectively). However, they should be of considerable interest when prioritizing water bodies that are potentially contributing excess nutrients to Sebago Lake. While these lakes may naturally have higher chlorophyll-*a* values and a lower Secchi transparency (i.e., are a naturally more productive system), excess nutrient loads from NPS pollution can burden the overall system, resulting in higher nutrient outputs that make their way to Sebago Lake.

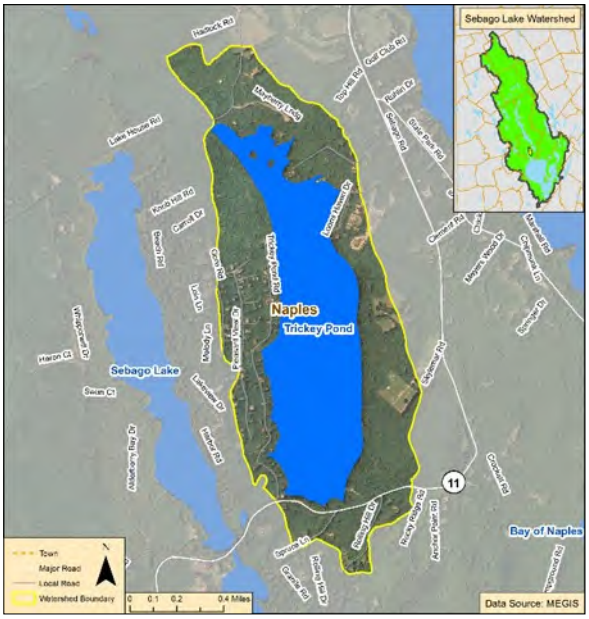
Long Lake, Bridgton

Conversely, the water bodies that show the poorest health do not appear to be contributing substantial quantities of nutrients to Sebago Lake because of their relative sizes. However, the phosphorus input modeling shows that they contribute larger than anticipated loads (i.e., more kilograms of phosphorus per cubic meter of water). While these lakes may not be a high priority to focus extensive Sebago Lake protection resources, their importance to their residents and communities should not be overlooked. Therefore they should be prioritized for investments to promote improved lake health, including outreach and investments in cultivating partnerships.

E. Land Cover Change and Impact to Sebago Lake

Referred to as "Land Use" in Sebago Lake Subwatershed Factsheets.

The Land Cover Change analysis completed by USM and CCSWCD indicates that the subwatersheds most impacted by negative land cover changes (i.e., development) were in close proximity to Sebago Lake: Adams Pond, Brandy Pond (Bay of Naples), Crystal Lake, Otter Pond, Thomas Pond, Trickey Pond, and Wood Ponds all scored a 1 in Land Cover Change **(Table 13)**, indicating the greatest land cover change between 1987 and 2013. When compared to the current water quality conditions information discussed previously (and summarized in **Table 8**), the small subwatersheds (Otter, Woods, and Crystal) all have reduced pond health (Current Conditions scores of 1, 2, and 3, respectively); while the larger ponds and lakes seem to have been able to absorb the development impacts without a considerable decrease in health, with the exception of Trickey Pond. Trickey Pond, while still exhibiting very good Current Conditions (in the top percentile when compared to other subwatersheds), shows a decreasing water quality trend. Trickey Pond is the only subwatershed in the greater Sebago Lake Watershed that is showing such a decreasing water quality trend; therefore, Trickey Pond should be prioritized for considerable investment in pond protection programs in order to maintain its current level of good pond health.



Trickey Pond

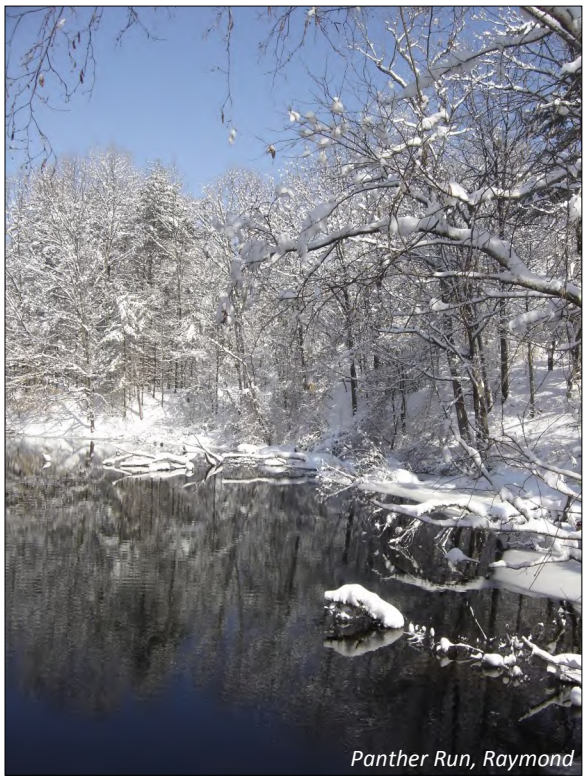
F. Local Partnerships and Impact to Sebago Lake

Committed and engaged watershed partners are critical to the success of any watershed protection or restoration project. The data gathered throughout this study demonstrate that many of the Sebago Lake subwatersheds have extremely active lake associations, land trusts, conservation groups, and municipal partners to support and complement the ongoing stewardship work of CCSWCD, LEA, PWD, and other stewardship organizations, such as Oxford County Soil and Water Conservation District, Small Woodland Owners Association of Maine, Loon Echo Land Trust, Western Foothills Land Trust, and Raymond Waterways Protective Association. The remaining subwatersheds may have excellent potential partnerships, but they require additional development of critical relationships in order to ensure successful projects. As previously discussed, the partnership scores also consider the likelihood of successful implementation of grant programs (including available matching funds, documented NPS sites, and a complete Watershed-Based Protection Plan). These data can be further refined for future efforts to identify the likelihood of successful implementation of NPS and non-NPS.

Several of the ponds that had low scores for current conditions, water quality trends, and land cover changes also scored low in the partnership category. For example, Cold Rain Pond has the lowest score for current water quality conditions, shows a stable water quality trend at this lowest level, and has shown considerable land cover change (score is 2). None of the organizations involved in the development of this Plan have active partnerships in the Cold Rain Pond area, and potential partnerships were not readily identified. As such, Cold Rain Pond scored a 1 for partnerships. However, due to the low scores in the other assessed areas, Cold Rain Pond should be a high priority for partnership cultivation. Similarly, Songo Pond, which showed poor current conditions, contributed a relatively large amount phosphorus to Sebago Lake, and lacked additional water quality data, would be a good candidate for further work in partnership identification.

Additional waterbodies that would benefit from increased partnership efforts (including identifying potential match sources for NPS grant projects) or should be the focus for NPS implementation work are Otter Pond, Stearns Pond, Papoose Pond, Parker Pond, Raymond Pond, Crystal Lake, Parker Pond, Bear Pond, Island Pond, Keoka Lake, Brandy Pond, Long Lake, and Panther Pond. Refer to **Table 18** in **Section VII** for more specific next steps for these waterbodies.

G. Direct Watershed (Sebago Lake Direct and Crooked River)


Panther Run, Raymond

Sections II and III discuss studies to identify NPS pollution and other potential stressors in the Sebago Lake Direct and Crooked River Watershed. In addition to the NPS work and PWD's extensive monitoring program, the sensitivity analysis was undertaken in order to identify the waterbodies that contribute the largest amounts of phosphorus to Sebago Lake each year. As expected, the Sebago Lake Direct and Crooked River Watershed are responsible for 65.1% (5286.9 kg) of Sebago Lake's total annual phosphorus input. As previously mentioned, the next highest contributors are Long Lake, Brandy Pond, and Panther Pond, which combined, contribute 15.2% of the total annual phosphorus input to Sebago Lake. Therefore, these data alone indicate that the Sebago Lake Direct and Crooked River Watershed should be the highest priority for NPS pollution mitigation and nutrient reduction initiatives that to protect Sebago Lake.

Furthermore, the land cover analysis identified portions of the Sebago Lake Direct and Crooked River Watershed that scored poorly (i.e., have had the greatest land cover change) since 1987: one section of the Crooked River and the subwatershed along Panther Run Stream (**Figure 8**) scored a 1 for land cover change, indicating a considerable risk of increased pollutant and nutrient loading to receiving waterbodies (i.e., the Crooked River and Sebago Lake). Due to the high rate of change in these sections of the Direct Watershed, they should receive education and outreach on lake protection practices. Depending on type of development in these areas, additional investments to develop conservation areas, support lake-friendly property maintenance practices, and install low-impact stormwater management systems or retrofit existing systems should be considered. Additional support should be provided for woodland owners to encourage them to keep their lands as forests through current use taxation programs, such as the Maine Tree Growth Tax program and Farm and Open Space programs.

In addition to focusing resources in areas that have already undergone development and other land cover changes, investments in conservation of undeveloped areas should continue. The remaining sections of the Sebago Lake Direct and Crooked River Watershed scored a 3 or greater for land cover change practices. To continue to protect these areas and reduce the impact of development on Sebago Lake, more analysis is needed to identify sections of the Crooked River Watershed and Direct Watershed that would benefit from updating municipal ordinances to support lake and river health and protecting critical areas through conservation easements.


Credit: PWD, Linda Panzera

Sebago Lake

VII. Next Steps

A. Additional Data Needs

Table 18 details specific actions that should be taken for each subwatershed. There were four subwatersheds (Coffee Pond, Dumpling Pond, Holt Pond, and Songo Pond) for which there was insufficient water quality data to calculate current conditions or water quality trends using the methodology selected for the WQI. In order to determine overall water quality and the water quality trends for these lakes, water quality monitoring programs should be considered. The remainder of the recommendations in **Table 18** are related to each subwatershed's individual WQI scores: many subwatersheds would benefit from outreach to municipal councils and committees to address increased development (low Land Cover scores), others would benefit from NPS mitigation activities (updating NPS survey data, developing a Watershed-Based Protection Plan, or identifying approaches to address NPS pollution outside of the Clean Water Act Section 319 grants program).

B. Watershed-Based Protection Plans

Only four of Sebago Lake's subwatersheds have completed EPA-approved Watershed-Based Protection Plans: Crescent Lake, Panther Pond, Sebago Lake Direct and Crooked River Watershed (combined), and Woods Pond. In addition to being listed by DEP as an NPS Priority Waterbody **(Table 2)**, a Watershed-Based Protection Plan (WPP) is needed for any of Sebago Lake's subwatersheds to receive funding through DEP's NPS grants program, funded by EPA's Section 319 Clean Water Act Program. Of Sebago Lake's subwatersheds that are NPS Priority Waterbodies, the following are recommended for updated NPS surveys and WPPs:

- Long Lake: Due to predicted number of remaining high impact NPS sites (observed from past NPS survey and watershed protection efforts) yet lack of updated NPS survey data.
- Trickey Pond: Due to significant declines in water quality and predicted quantity of high impact NPS sites.

Due to WQI ranking, NPS Priority Waterbody listing, and unknown status of NPS sites and recent improvements, the following subwatersheds should be evaluated to determine if NPS surveys and WPPs should be pursued:

- Highland Lake
- Island Pond
- Papoose Pond
- Raymond Pond
- Thomas Pond

All remaining subwatersheds should be considered for updated NPS surveys and pursuing NPS mitigation action outside of the Clean Water Act Section 319 grants program. These subwatersheds may also be good candidates to benefit from funds through EPA's Healthy Waters Initiative.

C. Next Steps per Subwatershed

The following table provides a prioritized list of recommended actions for each subwatershed. The subwatersheds are sorted by total WQI score with the lower numbers indicating a greater need for partnership cultivation, municipal outreach, and a comprehensive strategy for addressing NPS pollution to improve water quality.

Table 18. Subwatershed WQI scores with recommendations.

Subwatershed Name	MIDAS Number	Total Score	Recommended actions
Cold Rain Pond	3376	8	Strengthen partnerships and focus on NPS mitigation and strengthening municipal ordinances.
Brandy Pond (Bay of Naples)*	9685	9	Strengthen partnerships to ensure continued good water quality and evaluate municipal ordinances for lake protection.
Otter Pond*	3458	9	Strengthen partnerships and focus on NPS mitigation and strengthening municipal ordinances.
Crystal Lake	3452	10	Strengthen partnerships and focus on NPS mitigation and strengthening municipal ordinances.
Trickey Pond*	3382	10	Strengthen partnerships to address decreasing WQ trend, evaluate municipal ordinances. High Priority to develop NPS mitigation strategy (survey, protection plan, implementation).
Adams Pond	3396	11	Strengthen partnerships to ensure continued good water quality and evaluate municipal ordinances for lake protection.
Bear Pond	3420	11	Focus on NPS mitigation projects to improve water quality.
Parker Pond*	3388	11	Strengthen partnerships and focus on NPS mitigation and strengthening municipal ordinances.
Stearns Pond	3234	11	Strengthen partnerships and focus on NPS mitigation and strengthening municipal ordinances.
Woods Pond*	3456	11	Focus on NPS mitigation projects and evaluate municipal ordinances to improve water quality.
Little Moose Pond	3424	12	Strengthen partnerships to ensure continued good water quality.
McWain Pond (Long Pond)	3418	12	Strengthen partnerships and focus on NPS mitigation and strengthening municipal ordinances.
Papoose Pond*	3414	12	Strengthen partnerships and focus on NPS mitigation and strengthening municipal ordinances. Evaluate to determine if updated NPS survey and creation of watershed-based protection plan is appropriate.
Raymond Pond*	3690	12	Strengthen partnerships and focus on NPS mitigation and strengthening municipal ordinances. Evaluate to determine if updated NPS survey and creation of watershed-based protection plan is appropriate.

Crescent Lake*	3696	13	Support existing partnerships to ensure continued good water quality.
Highland Lake*	3454	13	Strengthen partnerships and focus on NPS mitigation and strengthening municipal ordinances. Evaluate to determine if updated NPS survey and creation of watershed-based protection plan is appropriate.
Island Pond*	3448	13	Focus on NPS mitigation projects to improve water quality. Evaluate to determine if updated NPS survey and creation of watershed-based protection plan is appropriate.
Keoka Lake	3416	13	Focus on NPS mitigation projects to improve water quality.
Pleasant Lake*	3446	13	Strengthen partnerships to ensure continued good water quality.
Thomas Pond*	3392	13	Support existing partnerships to ensure continued good water quality. Evaluate municipal ordinances to ensure continued lake protection. Evaluate to determine if updated NPS survey and creation of watershed-based protection plan is appropriate.
Long Lake*	5780	14	Update NPS survey data and create watershed-based protection plan. Focus on NPS mitigation projects to improve water quality.
Peabody Pond	3374	14	Support existing partnerships to ensure continued good water quality.
Foster's Pond (Ingalls Pond)*	3188	15	Strengthen partnerships to ensure continued good water quality.
Sebago Lake & Crooked River*	5786	16	See WPP for recommendations. Prioritize NPS funding to Crooked River & Direct Watershed. Update WPP to include Panther Run and other low-scoring land cover change portions of the Direct Watershed.
Panther Pond*	3694	17	Support existing partnerships to ensure continued good water quality.
Coffee Pond*	3390	--	Additional data collection needed, consider starting a volunteer monitoring program.
Dumpling Pond	3698	--	Additional data collection needed, consider starting a volunteer monitoring program.
Holt Pond	3370	--	Additional data collection needed, consider starting a volunteer monitoring program.
Songo Pond	3262	--	Strengthen partnerships and focus on NPS mitigation and strengthening municipal ordinances. Consider starting a volunteer monitoring program.

*Denotes DEP NPS priority waterbody (eligible for 319 grant funds with approved and current Watershed –Based Protection Plan)

D. Overall Next Steps

The action items listed in **Table 18** can be directly implemented by individual municipalities, lake associations, and conservation organizations. However, to strategically and collaboratively address the needs of the entire Sebago Lake Watershed, it is highly recommended that a yearly greater Sebago Lake Watershed Manager's Roundtable be held. A coordinated effort with invested Sebago Lake stakeholders comprised of local municipalities, lake associations, and land and water resource protection organizations would help identify how these steps can be implemented with the resources available. A yearly roundtable would also allow the opportunity to re-evaluate efforts (monitoring, research, implementation) to protect and improve the Watershed and review the overall health of the greater Watershed.

VIII. References

Carlson, R. E. 1977. A trophic state index for lakes. Limnological Research Center, University of Minnesota, Minneapolis 55455. http://www.lakeaccess.org/lakedata/datainfotsi.html.

Helsel, D.R. and R. M. Hirsch, 2002. Statistical Methods in Water Resources Techniques of Water Resources Investigations, Book 4, chapter A3. U.S. Geological Survey. 522 pages. http://pubs.usgs.gov/twri/twri4a3/pdf/chapter12.pdf.

Lillesand, T. M., Kiefer, R. W., & Chipman, J. W. (2008). Remote sensing and image interpretation. New York, USA: Wiley.

Congalton, R. (1991). A review of assessing the accuracy of classifications of remotely sensed data. Remote Sensing of Environment, 37(1), 35–46.

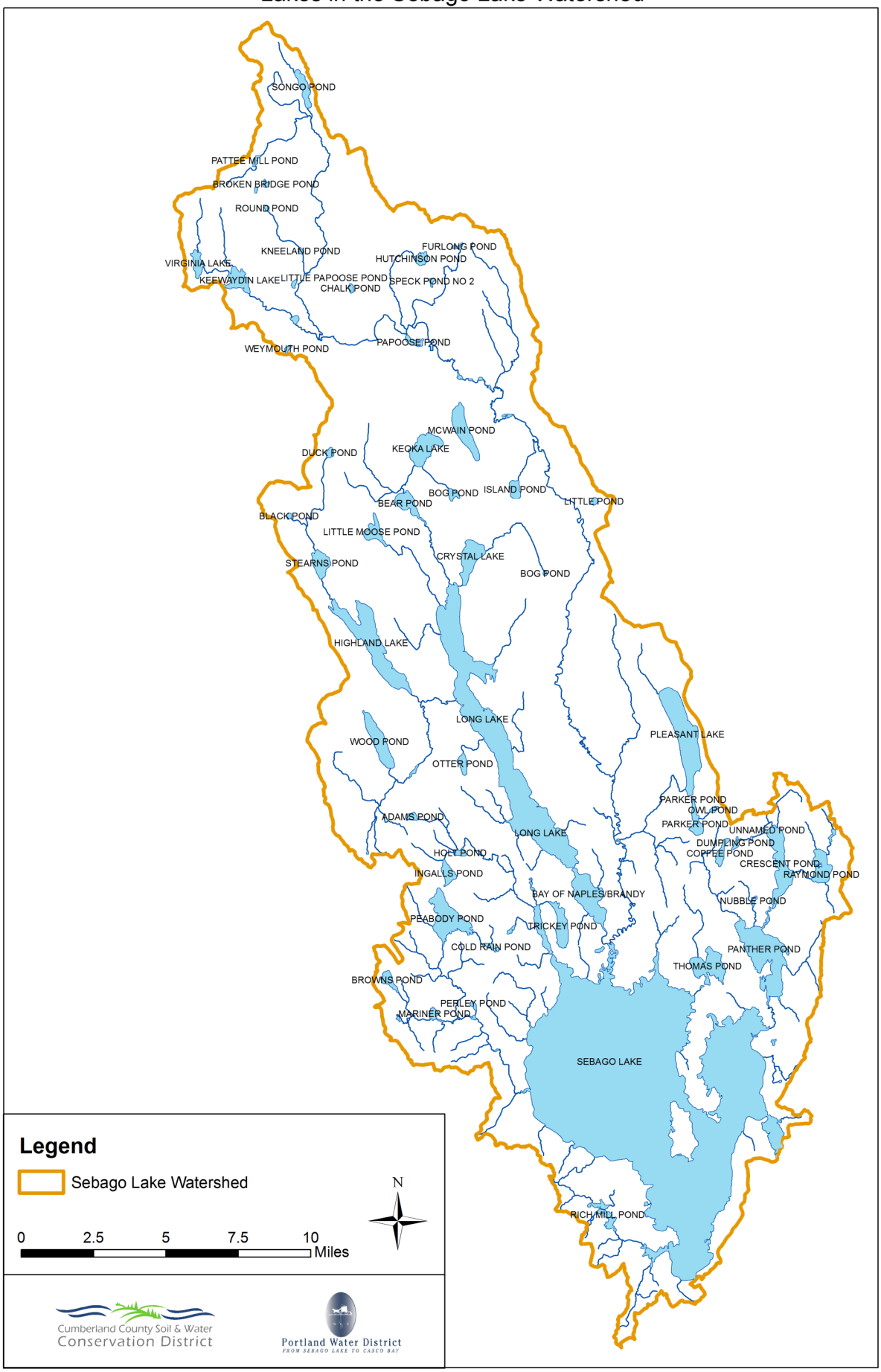
Pavri, F., A. Springsteen, A. Dailey and J. MacRae. (2013). Land use and socioeconomic influences on a vulnerable freshwater resource in northern New England, United States. Environment, Development and Sustainability, V 15 (3), 625-643.

Sebago Lake

Appendices

Appendix A Lakes in the Sebago Lake Watershed Map

Lakes in the Sebago Lake Watershed



Appendix B NPS Mitigation Projects in the Greater Sebago Lake Watershed

Appendix B NPS Mitigation Projects in the Greater Sebago Lake Watershed

Project Name	Waterbody Name	DEP Project Number	Type	Timeframe	Project Notes
Brandy Pond Watershed Survey	Brandy Pond	2008PP08	Survey	2008 - 2009	73 erosion sites identified
2000 Crescent Lake Watershed Survey	Crescent Lake		Survey	2000	139 erosion sites identified
(See Raymond Pond / Crescent Lake Demonstration Project)	Crescent Lake		Implementation	2001-2004	
2009 Crescent Lake Shoreland and Watershed Survey	Crescent Lake	N/A	Survey	2009	Shoreline survey conducted to identify potential LakeSmart properties and candidate erosion sites for a 319 grant proposal
Crescent Lake NPS Watershed Protection Project, Phase I (Includes 2011 Watershed Survey)	Crescent Lake	2011RR03	Survey and Implementation	2011-2013	78 erosion sites identified; 40 erosion sites addressed amounting to approximately 25 tons of sediment from entering the lake per year
Crescent Lake Watershed-Based Protection Plan	Crescent Lake	Not a DEP-Funded Project	Watershed-Based Management Plan	2013	10-year plan: 2013-2023
Crescent Lake NPS Watershed Protection Project, Phase II	Crescent Lake	2014RR03	Implementation	2014-2016	Goal: Install conservation practices at 24 sites identified in 2011 watershed survey
Crooked River Watershed Survey (includes Riparian Corridor Survey)	Crooked River	2010PT19	Survey	January 2011-April 2012	200 sites identified in NPS Survey and 20 sites identified in Riparian Corridor Inventory
Crooked River Implementation Project - Phase I	Crooked River	2013RR15	Implementation	2013-2015	Goal: Install conservation practices at 30 sites n the upper watershed (primarily Otisfield and Norway)
GIS hotspot model			Survey	1997 (based on 1990 data)	

Appendix B NPS Mitigation Projects in the Greater Sebago Lake Watershed

Project Name	Waterbody Name	DEP Project Number	Type	Timeframe	Project Notes
Highland Lake Watershed Project	Highland Lake		Implementation	1998-2000	
Highland Lake Phosphorus Control Action Plan (PCAP) and Total Maximum Daily Loading (TMDL)	Highland Lake	20040658	Management Plan	2004 - EPA approved	64% of the shoreline sites documented in the draft TMDL survey of 351 shoreline lots were deemed to need some enhancement. 17% (60) were high impact sites, 47% (165) were medium impact and 36% (126) were low impact. Hot spots mapping also identified areas of the shoreline as high priorities for potential phosphorus inputs; New GIS hotspot model created with data from 2000
Highland Lake Watershed Improvement Project, Phase I (Bridgton)	Highland Lake (Sweden/Bridgton)	2005R10	Implementation	2005-2008	46 sites addressed
Island Pond Watershed Survey	Island Pond	Not a DEP-Funded Project	Survey	2007 - 2008	47 impact sites identified, mostly town road and residential
Keoka Lake Watershed Project	Keoka Lake		Survey	2001-2002	64 erosion sites identified, primarily road and driveway sites
Keoka Lake Watershed Project	Keoka Lake		Implementation	2002-2005	15 sites addressed
Kettle Cove	Kettle Cove		Implementation	1999 - 2001	

Appendix B NPS Mitigation Projects in the Greater Sebago Lake Watershed

Project Name	Waterbody Name	DEP Project Number	Type	Timeframe	Project Notes
Long Lake Phosphorus Control Action Plan and Total Maximum Daily Load Report	Long Lake	Maine DEPLW 2005-0691	Management Plan	EPA Approved 5-17-2005	
Long Lake Watershed Improvement Project, Phase I	Long Lake	2005R24	Implementation	2005-2008	27 sites addressed
Long Lake Watershed Improvement Project, Phase II	Long Lake	2006R01	Implementation	2006-2009	36 sites addressed
McWain Pond Watershed Survey	McWain Pond		Survey	2006 - 2007	95 sites identified, mostly residential
McWain Pond I	McWain Pond		Implementation	2008 - 2010	
Panther Pond Watershed Survey	Panther Pond		Survey	2003	84 sites identified, mostly residential
Panther Pond Conservation Project, Phase I	Panther Pond	2005R17	Implementation	2005 - 2008	46 sites addressed
Panther Pond Conservation Project, Phase II	Panther Pond	2009RR02	Implementation	2009-2012	35 sites addressed
Panther Pond Watershed Survey	Panther Pond		Survey	2015	75 sites identified
Panther Pond Watershed-Based Protection Plan	Panther Pond		Watershed-Based Protection Plan	2015	

Appendix B NPS Mitigation Projects in the Greater Sebago Lake Watershed

Project Name	Waterbody Name	DEP Project Number	Type	Timeframe	Project Notes
Pleasant Lake - Parker Pond Survey	Pleasant Lake - Parker Pond	2007P11	Survey	2007 - 2008	64 sites identified
Pleasant Lake / Parker Pond Conservation Project	Pleasant Lake - Parker Pond	2009RR03	Implementation	2009 - 2011	38 sites addressed
Raymond Pond Watershed Survey	Raymond Pond		Survey	1998	
Raymond Pond/Crescent Lake Demonstration Project	Raymond Pond/Crescent Lake	2001R03	Implementation	2001-2004	15 sites addressed
Raymond Pond	Raymond Pond		Implementation	2007 - 2009	
Sebago Lake Conservation Project, Phase I	Sebago Lake	2009RR04	Implementation	2009 - 2011	10 NPS road sites completed, 13 Watershed Property Consultations, 255 Shoreland Zone inspections, 40 tons of sediment kept from entering the lake each year
Sebago Lake Watershed Implementation Project, Phase II	Sebago Lake	2012RR04	Implementation	2012-2014	15 high priority sites addressed, 118 watershed property consultations and erosion consultations conducted, 41 tons of sediment kept from entering the lake each year
Sebago Lake and Crooked River Watershed-Based Protection Plan	Sebago Lake	Funded in part through the *Sebago Lake Watershed Assessment and Prioritization Project* (2013PP05)	Watershed-Based Protection Plan		
Thomas Pond Survey	Thomas Pond	Not a DEP-Funded Project	Survey	2001	125 sites identified

Appendix B NPS Mitigation Projects in the Greater Sebago Lake Watershed

Project Name	Waterbody Name	DEP Project Number	Type	Timeframe	Project Notes
Thomas Pond I	Thomas Pond	2003R10	Implementation	2003 - 2005	34 sites addressed
Thomas Pond Conservation Project Phase II	Thomas Pond	2006R06	Implementation	2006 - 2009	35 sites addressed
Woods Pond Watershed Survey	Woods Pond	Not a DEP-Funded Project	Survey	2012-2013	79 sites identified, mostly private roads and residential
Woods Pond Watershed Protection Plan	Woods Pond	Not a DEP-Funded Project	Watershed-Based Protection Plan	2013	
Woods Pond Watershed Protection Project	Woods Pond	2014RR02	Implementation	2014-2016	

Appendix C Sebago Lake & Crooked River Watershed Protection Plan

Sebago Lake and Crooked River

Protection Plan

Photo credit: Heather True

Cumberland County Soil & Water Conservation District

EOE

July 2015

Table of Contents

Tables and Figures

Appendices

This report has been created under the Sebago Lake Watershed Assessment and Prioritization Project. Funding for this project was provided in part by the U.S. Environmental Protection Agency (EPA) under Section 604B of the Clean Water Act. Section 604B grants are administered by the Maine Department of Environmental Protection (Maine DEP) in partnership with EPA. Project partners include Maine DEP, Portland Water District, Cumberland County Soil & Water Conservation District, Lakes Environmental Association, Maine Forest Service, and the Town of Standish.

1. Watershed Background Information

A. Document Purpose and Scope

The purpose of this Watershed-based Protection Plan (WPP), is to lay out a strategy and schedule for non-point source (NPS) pollution mitigation and water quality protection efforts in the Sebago Lake direct watershed over the next five years (2015 to 2020). This WPP has been created by Cumberland County Soil and Water Conservation District (CCSWCD) with assistance from watershed stakeholders and partners including: Portland Water District (PWD), Lakes Environmental Association (LEA), Maine Forest Service (MFS), Maine Department of Environmental Protection (MDEP), and local municipalities.

This WPP has been developed to satisfy national watershed planning guidelines provided by the U.S. Environmental Protection Agency (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. This plan, which covers the direct watershed of Sebago Lake, including the Crooked River watershed, meets these requirements and was designed to plan implementation efforts at a geographically-appropriate scale. This watershed plan will also serve as an appendix to the greater Sebago Lake Watershed-Based Management Plan that, when completed, will include priorities, current status, and estimated timelines for addressing NPS pollution based on prioritization of the sub-watersheds within the greater Sebago Lake watershed.

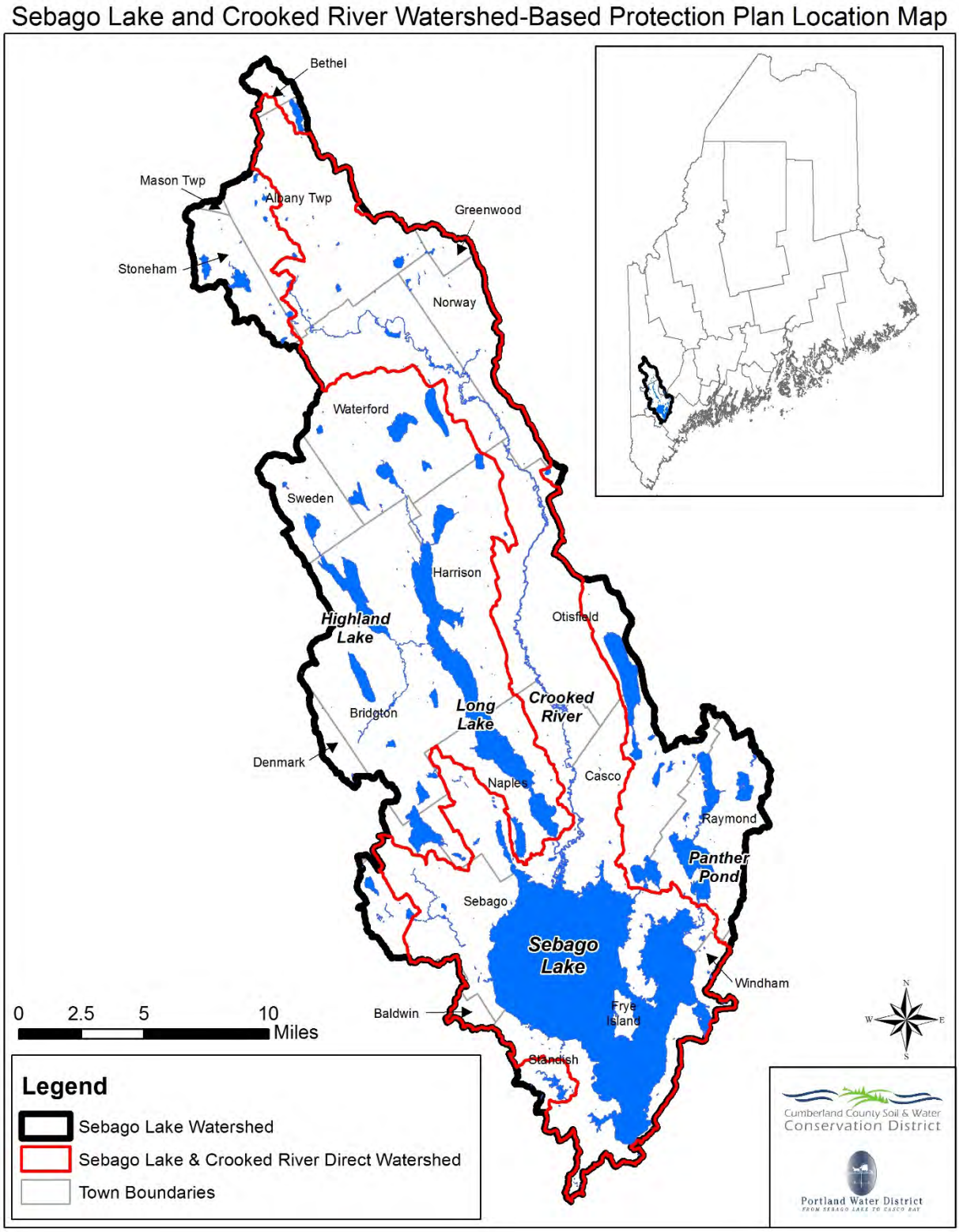
B. Watershed Information

Sebago Lake is a 30,513-acre lake, the second largest lake in Maine, and is located in the Towns of Sebago, Naples, Casco, Raymond, Standish, Windham, and Frye Island. The lake has a direct watershed of 171 square miles which includes the Crooked River and the towns of Bethel, Albany, Waterford, Norway, Harrison, and Otisfield (See Figure 1: Sebago Lake and Crooked River Watershed-Based Protection Plan Location Map). The Lake has a total watershed of 361 square miles located in 24 towns total (HUC code 0106000101). The Sebago Lake watershed is part of the larger Casco Bay Watershed. The lake has a maximum depth of 316 feet, an average depth of 107 feet, and a flushing rate of 5.1 years.

Eighty-two percent of the total watershed is forested. Of the remaining 18%, just over one third is residential and slightly less than that is agricultural land. Scientists from the University of Southern Maine have analyzed landscape trends in the Sebago Lake watershed using NASA's Landsat imagery from 1987 and 2009. During that period, green space in the watershed decreased by over 3.5%.

The Lake has approximately 99.7 miles of shoreline, most of which is privately owned. Sebago Lake's shoreline is heavily developed with over 2,300 seasonal and year-round homes. Sebago Lake currently has 12 public boat launches, eight marinas, and the Sebago Lake State Park that contains a campground, boat launch, and two beaches. There are currently seven popular youth summer camps. The lake is highly valued as a year-round recreational destination. The Maine Department of Inland Fisheries and Wildlife manages Sebago Lake for lake trout and landlocked salmon. Sebago Lake is the only southern Maine lake that supports an indigenous landlocked salmon population. Additional fisheries include large and small mouth bass, brown trout, pickerel, shiners, lake chub, rainbow smelt, and perch.

Figure 1: Sebago Lake and Crooked River Watershed-Based Protection Plan Location Map



Sebago Lake is the primary drinking water supply for 200,000 people in 11 communities (about 15% of the State's population). Since its inception in 1908, PWD has been actively monitoring and working to protect Sebago Lake. PWD expends more than $1.1 million annually on an extensive source protection program. This program includes development plan reviews, septic system inspections and permitting, LakeScaping consultations, and LakeScaping cost sharing grants to address erosion issues, a successful school-based education program in both watershed and service area schools, and a program for acquisition of watershed lands near the water intakes and conservation of watershed lands further away. PWD owns approximately 2,500 acres of conservation land near its water supply intake, maintains a 3,000-foot limit no trespassing zone, and ensures a 2-mile no bodily contact zone to ensure the safety of the drinking water supply.

In 1993, PWD was granted a waiver to the filtration requirements of the Federal Safe Drinking Water Act due in part to the purity of the water and the effectiveness of watershed protection efforts. This waiver agreement requires ongoing monitoring of lake water quality. PWD maintains more than 15 monitoring and surveillance programs around the lake and throughout its watershed. Continuing an extensive source protection program including successfully addressing NPS sites throughout the watershed as is discussed in this WPP is vital to maintaining PWD's drinking water filtration requirements waiver.

At least 12 of the 13 watershed towns making up the direct watershed of Sebago Lake have adopted comprehensive plans with more than half of them having been adopted or updated within the last 10 years.

C. Summary of Prior Watershed Work

- **Annual Inspections:** PWD inspects a variety of shoreland zone operations within the direct watershed of Sebago Lake. They currently employ 4.6 full time staff to conduct inspections, primarily in the seven towns directly surrounding the Lake.
- **LakeScaping Program:** In addition to shoreland inspections, PWD provides technical assistance in helping landowners, towns, and private roads to install BMPs that protect water quality. They also offer a set number of yearly $1,000 - $2,000 matching grants for installing water quality improvement recommendations through their LakeScaping grant program.
- **Conservation Easements:** To help protect undeveloped forested land in both the direct watershed of Sebago Lake and the Crooked River watershed, PWD has granted more than $450,000 in the past 5 years to land trusts, predominantly the Western Foothills Land Trust and the Loon Echo Land Trust to enable them to purchase in fee or easement more than 2,300 acres of with an estimated conservation value of more than $4 million. Their goal is to assist in the purchase of additional easements and fee purchases with priority given to those lands of greatest water protection value.
- **Sebago Lake Conservation Project, Phase I (MDEP Project #2009RR04):** From 2009 to 2011, CCSWCD assisted PWD in conducting an EPA 319 grant project to address 10 high priority NPS road sites in Naples and Sebago. Addressing these sites reduced an estimated 40 tons of sediment from entering the lake each year. In addition to improving the 10 identified sites, 13 Watershed Property Consultations and 255 Shoreland Zone Inspections were conducted in these towns by PWD. Project partners included PWD, CCSWCD, MDEP, Town of Naples, and Town of Sebago.
-

- **Sebago Lake Watershed Implementation Project, Phase II (MDEP Project #2012RR04):** From 2012 to 2014, CCSWCD assisted PWD in conducting an EPA 319 grant project to address 15 high priority NPS road sites in Standish and Frye Island reducing the amount of sediment washing into the lake by an estimated 47 tons per year. In addition to improving the 15 identified sites, PWD conducted 118 watershed property and erosion consultations to landowners, and CCSWCD conducted four Lake Living Seminars to two lake shorefront neighborhood associations. Project partners included PWD, CCSWCD, MDEP, Town of Frye Island, and Town of Standish.
- **Crooked River Watershed Survey Project (MDEP Project #2010PT19):** In 2011, through an EPA 604b grant, CCSWCD oversaw the training of volunteers and surveying of the entire Crooked River watershed for NPS pollution sites in which 164 sites were identified and recorded. CCSWCD also led a kayaked Riparian Corridor Inventory in which 20 sites were identified and recorded. Project partners included LEA, Oxford County Soil and Water Conservation District, PWD, Trout Unlimited, MDEP, Maine Department of Inland Fisheries and Wildlife, and Western Foothills Land Trust.
- **Crooked River Protection Project, Phase I (MDEP Project #2013RR15):** Currently in progress through the end of 2015, this EPA 319 grant project began in 2013 with the goal to address 15 of the highest NPS impact sites within the Towns of Norway and Otisfield. Project partners include CCSWCD (Grantee), Oxford County Soil and Water Conservation District, MDEP, Town of Norway, Town of Otisfield, Western Foothill Land Trust, PWD, and LEA. See Appendix A for Crooked River NPS Survey data.
- **Sebago Lake Watershed Assessment and Prioritization Project (MDEP Project #2013PP05):** This EPA 604b grant project began in March of 2014 and will be completed by September of 2015. The goal of this project is to conduct a watershed assessment and prioritization for the entire Sebago Lake watershed and to complete supporting lake watershed-based protection plans for a minimum of two sub-watersheds (this report serves as one of those watershed-based protection plans). Project partners include CCSWCD (Grantee), PWD, MDEP, LEA, Maine Forest Service, Town of Standish, and University of Southern Maine.
- **NPS (Non-point Pollution Source) Road Surveys:**
    - 2001: PWD hired a summer employee to conduct an intensive survey of private roads within 1000 feet of Sebago Lake in the Towns of Standish, Naples, Sebago, Casco, Raymond, Windham, and Frye Island (418 roads).
    - 2007: PWD groundtruthed the same private roads surveyed in 2001 to determine if new issues had arisen or if previously identified sites had been addressed. Of the 418 roads surveyed, 47 (11%) were documented as being a high impact to water quality, 66 (16%) as medium impact, and 305 (73%) as low impact to the lake.
    - 2014: Through the *Sebago Lake Watershed Assessment and Prioritization Project*, PWD surveyed all roads within the shoreland zone and identified 61 specific road sites as having an impact on Sebago Lake. Out of these sites, 21 (34%) were documented as having a high impact to water quality, 29 (48%) as medium impact, and 11 (18%) as low impact. See Appendix B for Sebago Lake NPS Road Survey data.
- **NPS Neighborhood and Hotspot Survey:** Through the *Sebago Lake Watershed Assessment and Prioritization Project*, CCSWCD surveyed 27 neighborhoods throughout the direct watershed of Sebago Lake to quantify the neighborhood's overall impact to the Lake's water

quality. Neighborhoods consisted of residential housing groupings which shared one to two access roads from a main road, were within the lake's 250-foot shoreland zone, and had greater than 10 acres of developed ground surface. Accessibility and known drainage directly to the lake or a main tributary of the lake was also a requirement for the neighborhoods selected. This survey reviewed the following conditions for each neighborhood: imperviousness, lawns, exposed soil, driveways, vegetation, and existing treatment of stormwater. Additionally, a Hotspot Survey was conducted to evaluate three heavily developed commercial hotspot areas and 38 agricultural or prior agricultural properties. Based on the data collected during the Neighborhood and Hotspot surveys, a list of commonly observed NPS issues likely to affect water quality were compiled along with generalized recommendations for each neighborhood and commercial area. See Appendix C and Appendix D for Sebago Lake NPS Neighborhood and Sebago Lake Hotspot survey map and data.

- **Additional 319 Grant Funded Projects:** Additional projects funded from Section 319 of the Clean Water Act through U.S. Environmental Protection Agency and administered by MDEP were conducted in the early to mid-1990s. These projects included work done in Kettle Cove and Trickey Pond.

D. Looking Ahead

To continue the successful NPS remediation work completed to-date, CCSWCD is seeking 319 Phase III implementation grant funds in 2015 to help address the highest priority NPS sites within the direct watershed of Sebago Lake (including the Crooked River sub-watershed). Sites to be addressed will be based on survey results from the NPS watershed survey of the Crooked River conducted in 2011, the 2014 NPS surveys of roads, neighborhoods, and hotspots within the direct watershed of Sebago Lake, and from town-specific NPS sites identified by PWD's Watershed Specialists. It is anticipated that Phase IV and Phase V implementation projects will be pursued in the future to adequately address all of the Lake's highest NPS water quality impacts.

2. Identification of the Causes or Sources of NPS Threats

A. Water Quality Summary

PWD has monitored Sebago Lake's water quality since 1976. Current monitoring includes more than 15 monitoring and surveillance programs throughout the watershed. In-lake monitoring occurs monthly from ice out until fall turnover and includes deep basin stations in Big Bay, Jordan Bay, and Lower Bay.

At present the water quality of Sebago Lake is good. However, the threats to the lake's water quality are increasing. While average total phosphorus is currently less than 6 ppb and Secchi transparency varies between 8 and 12 meters, water quality data indicate that transparency has been declining since 1990, and total phosphorus levels have been increasing since 2006. MDEP has also indicated in personal communications that water quality is declining.

PWD's 2014 Lake Assessment report indicates that Secchi transparency, total phosphorous and chlorophyll *a* measurements from the deep basins are showing a water quality decline since 1990. However, the longer term record, starting in 1976, at the Lower Bay deep basin is stable. The hypolimnion in the deep basins are 75% saturated with oxygen prior to fall turnover. With an

average Secchi transparency of 10.5 m, Sebago Lake is one of the clearest lakes in Maine. Fecal coliform data collected from since 1979 at swimming beaches outside of the no bodily contact zone included several each year in excess of the EPA swimming beach guideline of 235 CFU/100 mL. Samples collected within the 2-mile no bodily contact zone are consistently below this guideline.

B. Threatened Status

Sebago Lake, including the Crooked River, is listed by MDEP as an unimpaired, yet threatened, lake watershed. The Lake, including Crooked River, is included on MDEP's Threatened Lakes Priority List due to being a public water system and having outstanding water quality. Sebago Lake is also listed by MDEP as a lake "Most at Risk from New Development."

C. Watershed NPS Surveys

The following surveys were completed to document current sources of NPS pollution from Sebago Lake's direct watershed:

Crooked River Watershed Survey – 2011 to 2012:

This survey covered the entire Crooked River Watershed and included a land-based NPS pollution survey and a riparian corridor inventory. The land-based survey identified 164 NPS impact sites and 20 riparian corridor impact sites. Results were published in the *Crooked River Watershed Survey Report, March 2012* (http://1drv.ms/1H4vXil[1]). An overview of the types of sites and their impacts are listed in Table 1 below. More detailed information about the data collected can be found in Appendix A: 2011 Crooked River NPS Survey Data.

Table 1. Crooked River Sites by Land Use and Impact

Land Use	High Impact	Medium Impact	Low Impact	Total
Agriculture	1			1
Beach/Boat Access	1	3	1	5
Commercial	3	2		5
Construction		2		2
Driveway		4	2	6
Gravel Pit/Mining	2			2
Logging			1	1
Municipal/Public	1	1		2
Power/Pipe Line	1	1		2
Private Road	5	20		25
Recreation	1	7		8
Residential	9	9		18
State Road	3	8		11
Stream Channel	2	5	1	8
Town Road	6	45	7	58
Trail/ATV/Path	4	6		10
Total	39	113	12	164

[1] Please contact Cumberland County Soil and Water Conservation District if you are unable to access any of the online links provided in this publication.

Currently the *Crooked River Protection Project, Phase I (MDEP Project #2013RR15)* is underway to address 17 of the highest NPS impact sites within the Towns of Norway and Otisfield. Sites currently being pursued are Town Road sites (13) and ATV sites (4). An additional 13 residential sites have been targeted for work during 2015 making an overall goal of 30 sites to be addressed under this project.

NPS Road Survey:
Over the summer and fall of 2014, PWD staff surveyed all roads within the direct watershed of Sebago Lake for NPS impacts as part of the *Sebago Lake Watershed Assessment and Prioritization Project* (MDEP Project #2013PP05). Sixty-one specific road sites were documented as having an impact to Sebago Lake's Water Quality. Out of these sites, 21 (34%) were documented as having a high impact to water quality, 29 (48%) as medium impact, and 11 (18%) as low impact. Out of these 61 sites, 40 were documented as being town road sites, seven as state road sites, seven private roads, one parking lot and six that were unknown ownership. A list of these sites can be found in Appendix B: 2014 Sebago Lake NPS Road Survey Data.

Neighborhood Assessment and Hotspot Inventory:
During the fall of 2014, CCSWCD conducted a neighborhood assessment and hotspot inventory within the direct watershed of Sebago Lake as part of the *Sebago Lake Watershed Assessment and Prioritization Project* (MDEP Project #2013PP05). Figure 2 shows the approximate location of the neighborhood and hotspot sites surveyed.

Twenty-seven neighborhoods were surveyed to quantify the neighborhood's impact to the Lake's water quality. This survey looked at imperviousness, lawns, exposed soil, driveways, vegetation, and existing treatment of stormwater. Based on these observations, a list of commonly observed erosion and runoff problems likely to affect water quality along with generalized recommendations was compiled for each neighborhood.

Overview of neighborhood factors surveyed:

- Imperviousness - The average imperviousness of residential properties (excluding lawns and including gravel and paved driveways, buildings, and patios) ranged from 25% to 80% per neighborhood.

- Lawns – Neighborhoods varied in the average percentage of lawn coverage per property with some neighborhoods having an average percentage of lawn coverage at less than 10% to some neighborhoods having an average of over 70%.

- Exposed Soil – The average percentage of exposed or bare soil on a typical property (not including driveways) ranged from less than 5% to 20% per neighborhood.

- Driveways – The average percent of driveways paved (as opposed to gravel) showed the largest range difference with some neighborhoods having an average of only 5% of residential driveways being paved to some neighborhoods having an average of 95% of their driveways paved.

- Vegetation – Residential properties in general had approximately 17% coverage with native/undisturbed vegetation. The range per neighborhood was from less than 5% to 60-70%.

- Existing Treatment of Stormwater – A very low number of existing stormwater treatment devices were observed on residential properties. The few treatments observed included:
    - One roof drip line trench;
    - Two rain gardens (one covered with erosion control mulch, one in which roof gutter was directly connected into);
    - Riprap used for walkway stabilization at a couple of properties within one of the neighborhoods;
    - Water diverter on one gravel driveway;
    - Paved speed bump water diverters on 3-4 paved driveways in one neighborhood;
    - One water diverter (in need of repair) on the upslope of a private boat launch; and,
    - Native vegetative buffer with trees that were strategically trimmed to allow lake views in one neighborhood.

- Biggest Concerns Observed Likely to Affect Water Quality – For all of the neighborhoods surveyed, the amount of bare soil, lack of shoreline buffers, and stormwater runoff from driveways and roofs were the biggest water quality impact concerns. Erosion on private boat launches and the potential of fertilizer use on highly manicured lawns were also of concern in a few areas.

Recommendations to improve water quality include:

- Monitor neighborhood for use of fertilizer and pesticides and educate on minimizing impacts where needed.
- Educate on impact of types of driveway sealants to water quality.
- Work with landowners to infiltrate stormwater runoff on site.
- Install water diverters on gravel driveways.
- Install native plants along shorefronts.
- Capture roof runoff in infiltration trenches, rain gardens, or rain barrels.
- Stabilize private boat launches.
- Stabilize areas of bare soil with native plants or three to four inches of erosion control mulch.

A more detailed list of the neighborhoods surveyed and their results can be found in Appendix C: 2014 Sebago Lake NPS Neighborhood Survey Data.

In addition to the Neighborhood Survey a Hotspot Survey was conducted which looked at three heavily-developed commercial areas and 38 agricultural or prior agricultural properties.

The Hotspot Survey looked at the following five commercial hotspot areas: Panther Run/Route 302 in Raymond, Port Harbor/Route 302 in Raymond, Sebago Lake Village in Standish, Point Sebago Golf Course in Casco and Frye Island Golf Course in Frye Island. Sites surveyed were chosen by the *Sebago Lake Assessment and Prioritization Project* steering committee members. A summary of information and recommendations can be found in Table 2: Hotspot Survey Results, Commercial.

The Hotspot Survey also reviewed 38 agricultural or prior agricultural properties to analyze their potential impact to Sebago Lake. Of the 38 sites groundtruthed, only nine appeared to be active agriculture sites showing a use in vegetable crops or livestock. Fifteen sites were wooded with seven of the sites showing recent signs of logging and three being maintained as tree farms. Ten sites were fields or potential hayfields with one of the hayfields currently being converted to house lots. The remaining four sites were prior agriculture lands that are now house lots. The survey results and recommendations can be found in Appendix D: 2014 Sebago Lake Hotspot Survey Results, Agricultural.

Figure 2: Sebago Lake Neighborhood and Hotspot Location Map

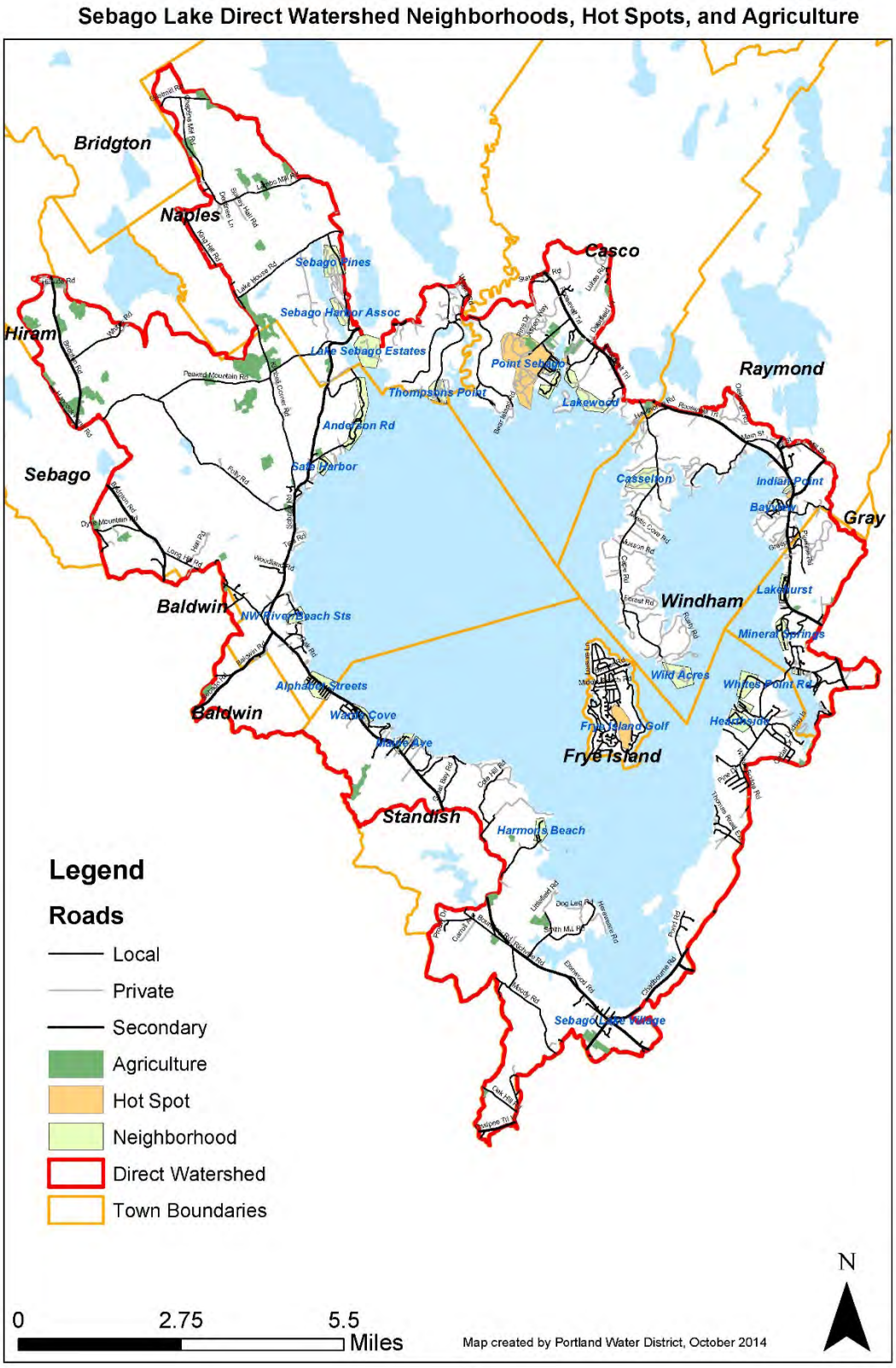


Table 2. Hotspot Survey Results, Commercial

Location Description	Approx. % of Imperviousness	Primary Pollutants	Likelihood of Pesticide/Fertilizer Use	BMPs Present (excluding catch basins)	Basic Recommendations
Panther Run/Route 302 Corridor, Raymond	80%	Salt/sand, metals, thermal, trash	Unknown	None	Review whether salt is applied. Review catch basin drainage system for area (are catch basins present?). Encourage businesses to infiltrate stormwater onsite. Encourage vegetated buffers at Panther Run Marina and around Town of Raymond Memorial Parking lot.
Port Harbor/ Route 302 Corridor, Raymond	80%	Sediment, metals, salt, thermal, trash, motor oil, gas	<20%	None	Need to review BMP and maintenance practices of Port Marine and the two gas stations. Need to stabilize gravel parking lot next to Sunset Variety (Google Mapping shows parking lot sediment washing onto road). Outreach to Big Apple about salting/sanding practices (Google Mapping shows a lot of sand on property).
Sebago Lake Village, Standish	80%	Salt/sand, metals, thermal, trash	<20%	None	Review salt application practices. Education regarding parking lot sealants and infiltration of runoff onsite.
Point Sebago Golf Course, Casco	<20% yet mostly golf course lawn	Nutrients (fertilizer), thermal	>90%	Unknown	Meet with golf course green managers to discuss practices and ways to reduce impact to water resources. Look into Audubon International's golf course certification for recognition of water quality protection efforts.
Frye Island Golf Course, Frye Island	<20% yet mostly golf course lawn	Nutrients (fertilizer), thermal	>90%	Unknown	Meet with golf course green managers to discuss practices and ways to reduce impact to water resources. Look into Audubon International's golf course certification for recognition of water quality protection efforts.

Chronic NPS Sites Identified by PWD's Water Resources Specialists:
Portland Water District's Water Resources Specialists are assigned to cover specific areas throughout the direct Watershed's shoreland zone in the towns of Standish, Sebago, Casco, Windham, Frye Island, Raymond, and Naples. In the spring of 2013 and 2015, these Specialists compiled known NPS erosion sites within the areas. This information has been added to the survey results from the 2014 road, neighborhood, and hotspot surveys into the Sebago Lake NPS Site Tracker database which can be found online at *http://1drv.ms/1H4vXil*.

D. Watershed NPS Threats

The biggest water quality threat to Sebago Lake is that of NPS pollution (i.e., polluted runoff), particularly soil erosion. Soil particles themselves can cause pollution by decreasing water clarity, covering fish beds, and clogging fish gills. However, it is the ability of soil particles to easily bind to other pollutants, particularly phosphorus, which can significantly affect lake water quality. Phosphorus is a nutrient that can cause algal blooms. When algae die, the water becomes depleted of oxygen through the breakdown process. Low levels of dissolved oxygen make it difficult for aquatic organisms, such as fish, to survive. Algae itself can turn a lake green making it undesirable, and potentially unusable, for fishing, boating, swimming, and wildlife. This can also impact the cost and efficacy of treatment, resulting in drinking water that is paradoxically more costly and less safe.

Roads are the most prevalent contributors of soil and phosphorus into Crooked River and Sebago Lake. Of the roads, municipal roads have the most sites identified followed by private roads and then state roads. Lack of proper road drainage and maintenance was observed to be contributing eroded sediment into the lake.

Likely the second largest observed impact to Sebago Lake's and Crooked River's water quality was lack of shoreland buffers and vegetation. Many of these sites were associated with residential properties and lack of shoreland buffers to absorb and infiltrate stormwater runoff, stabilize the shoreline with roots, and offer stream shading and riparian habitat. Areas lacking in vegetation were also more often prone to have extensive areas of bare soil in which sediment fines were washing into the lake. From the Neighborhood Assessment, many neighborhoods around Sebago Lake were observed to have been covered in lawn rather than native tree and shrubs. The well-manicured lawns can be of concern as they do not absorb and infiltrate stormwater runoff as well as trees and shrubs and because they could wash excessive nutrients, in particular fertilizer if used, directly into the lake.

The third primary NPS threat observed to the Sebago Lake and Crooked River Watershed was the lack of treating stormwater runoff on site. Many residential and commercial properties lacked sufficient infiltration and diversion of stormwater runoff into vegetation. Instead, NPS pollutants (sediment, nutrients, winter salt, chemicals, metals, etc.) were washing directly into adjacent waterbodies. The combined accumulation of these sources is likely to have a very large impact to water quality over time.

The disturbance of lakeshore and riparian areas is also a significant threat to Sebago Lake and Crooked River. According to EPA's National Lakes Assessment (http://water.epa.gov/type/lakes/upload/nla_surver_fact_sheet.pdf) poor habitat conditions along the lakeshore in addition to high levels of nitrogen and phosphorus are the most significant stressors to our Nation's lakes. These stressors can increase the relative risk of degraded biological condition. This suggests the need for a stronger management of shoreline development. To address this need, PWD conducts ongoing shoreline inspections, collaborates with watershed town

representatives on water quality protection efforts, and convenes code enforcement officers from the lake's municipalities once a year to promote informed administration of municipal shoreland zoning ordinances and a discussion for improving lake water quality impacts.

3. Watershed-based Protection Plan (WPP) Goals and Objectives

Overall Goal: The overall goal of this WPP is to maintain Class GPA water quality standards in Sebago Lake by reducing phosphorus and sediment loading to the Lake by approximately 75 tons of sediment per year. This will be achieved through the following actions over the next five years (2015-2020):

- **Reducing current sources of phosphorus loading** by addressing 48 of the highest water quality impact sites listed in the Sebago Lake and Crooked River NPS Site Tracker. This will be achieved by providing targeted outreach, technical assistance and cost-sharing assistance to install conservation practices at NPS sites.
- **Preventing new sources of phosphorus loading** by facilitating improved land use practices and ongoing maintenance activities. This objective will be met by conducting outreach and providing technical assistance to residents, road associations, and municipal officials.
- **Building local capacity** for watershed stewardship by establishing an NPS steering committee, promoting technical assistance service and cost share opportunities, and conducting targeted workshops to landowners, towns, and businesses whose actions greatly impact water quality.
- **Conducting ongoing assessment of lake and watershed conditions** by monitoring lake water quality and maintaining the Sebago Lake and Crooked River NPS Site Trackers.
- **Promoting maintenance of BMPs** by monitoring previously installed BMP sites and alerting property owners (municipalities, private road associations, neighborhood associations, and landowners) on when and what is needed to address sites properly should inaction occur.

4. Schedule and Milestones to Guide Watershed-based Protection Plan (WPP) Implementation

Actions to meet this WPP's goals and objectives are listed in Table 3: 2015-2020 Sebago Lake and Crooked River Action Plan, below. This table includes a description of activities, schedule, approximate cost estimates, potential funding sources, and an organization responsible for the implementation of each action item. This WPP is designed to be implemented over the next five years. The WPP will be carried out with a combination of local, state and federal resources.

A broken out overview of the implementation schedule is given in Table 4: Implementation Schedule, and a broken out overview of the WPP's milestones is listed in Table 5:Milestones and Outputs.

Table 4. Implementation Schedule

Yearly	• Continue to provide technical and financial assistance to landowners, towns, and stakeholders (through PWD's LakeScaping program, CCSWCD, and through federal/state grant funds) • Promote phosphorous reduction methods and distribute information to watershed residents, towns, and stakeholders biannually in PWD newsletter • Meet with NPS steering committee (2015) and meet up to three times per year to discuss methods to improve and protect the Lake's water quality • Provide elementary and secondary lake water quality protection education to the watershed towns for school-aged children • Continue yearly water quality monitoring • Update NPS Site Tracker with ongoing sites addressed • Add problem sites to NPS Site Tracker as they are discovered • Provide Sebago Lake neighborhood targeted workshops to educate about water quality impacts observed in 2014 Neighborhood Survey
2015, 2017, 2019	• Apply for EPA Section 319 Clean Water Act implementation grant through DEP and/or other water quality protection and improvement grant funds
2016-2021	• Address eight high priority water quality impact sites per year • Conduct two municipal Town Council presentations and one road association meeting per year to promote efforts in protecting and improving the lake's water quality
2018, 2021	• Create summary of list of sites recently addressed to distribute to watershed partners, municipalities, and stakeholders
2021	• Re-evaluate NPS reduction efforts and update WPP

Table 5: Milestones and Outputs

Organizational Outputs
• CCSWCD to apply for 319 grant funds for Phase III, IV, and V Implementation Projects
• PWD to continue to promote phosphorus reduction methods and distribute information to watershed residents, towns, and stakeholders biannually in PWD Newsletters
• Up to eight municipal town council presentations and a minimum of four private road association presentations given by CCSWCD to promote lake protection
• Numerous press release articles by CCSWCD distributed to promote lake protection to watershed residents and stakeholders
• Summary of sites addressed provided by CCSWCD to watershed partners, municipalities, and stakeholders
• NPS steering committee formed by CCSWCD
• Elementary and secondary lake water quality protection education provided to school-aged children in the watershed's towns by PWD and CCSWCD
• Targeted outreach and education workshops provided by PWD and CCSWCD to the watershed's neighborhoods surveyed in the 2014 Neighborhood Survey
NPS Mitigation Outputs
• 48 high priority water quality impact sites addressed (through 2021)
• Additional water quality impact sites addressed through continued LakeScaping technical assistance and matching grant funds provided by PWD
• NPS site tracker updated with NPS sites addressed by CCSWCD
• Estimated pollutant load reductions achieved by installed BMPs by CCSWCD
Water Quality Outcomes
• Continued yearly water quality monitoring by PWD
• Lake continues to meet State's GPA water quality standards
• Evaluation of water quality readings to establish trends and determine future remediation actions by PWD and MDEP

5. Proposed Management Measures

Specific management measures to address all of the watershed's remaining highest water quality impact sites can be found in the Sebago Lake Watershed NPS Site Tracker and the Crooked River Watershed NPS Site Tracker databases which can be found at *http://1drv.ms/1H4vXil*.

As previously stated (Section 2.D.), the most prevalent and one of the highest water quality NPS threats for both the Crooked River and Sebago Lake is from roads (largely municipal) followed by lack of shoreland buffers and vegetation mostly from residential sites, and lack of stormwater treatment on site on both residential and commercial properties. Following is a breakdown of sites identified per land use along with common problems, solutions, and maintenance recommendations.

A. Residential Sites

Crooked River

Eighteen of the 164 NPS sites (11%) identified in the 2011 Crooked River Watershed Survey were residential. Nine of these were ranked as high impact to water quality and nine were ranked as medium. Common problems, recommended solutions, and maintenance for Crooked River's residential sites can be found in Table 6 below.

Table 6. Crooked River Residential Sites: Common Problems, Solutions, and Maintenance

Common Problems	Recommended Solutions	Recommended Maintenance
• Slight or moderate surface erosion • Bare or sparsely vegetated soil • Lack of vegetated buffer along shoreline • Direct flow to the River • Roof runoff causing erosion • Trash	• Seed and mulch bare soil • Establish or enhance vegetated buffer • Limit foot traffic, define and stabilize walking paths • Install drip line trench to catch roof runoff • Install water diverters • Remove trash	• Reseeding/over-seeding and replenishing erosion control mulch every two years and when area has been scraped or damaged (often common from snow plowing and high traffic use) • Water plants frequently during first year of installation, water during summer months and times of drought; Replace dead and dying buffer plants • Replace decomposed erosion control mulch in walking paths (about every two years), clean out stone every two to five years to ensure proper infiltration • Clean out stone of drip line trenches every five years to ensure proper infiltration

Sebago Lake

Most residential sites documented within the shoreland zone of Sebago Lake are eligible for up to $1,000 cost sharing matching grants to implement water quality protection recommendations provided through PWD's LakeScaping program on a first come first serve basis. During the Neighborhood Survey completed in 2014, 28 neighborhoods were evaluated. Common problems, recommended solutions, and maintenance for Sebago Lake's residential sites can be found in Table 7 below.

Table 7. Sebago Lake Residential Sites: Common Problems, Solutions, and Maintenance

Common Problems	Recommended Solutions	Recommended Maintenance
• Bare soil • Lack of shoreline buffers • Stormwater runoff from driveways • Stormwater runoff from roofs • Erosion on private boat launches • Potential of fertilizer use on highly manicured lawns	• Cover areas of bares soil with erosion control mulch • Install vegetative buffer plantings • Install driveway stormwater diverters • Install roof drip line trenches (if no gutter) • Install rain gardens and rain barrels (if gutter) • Work with landowners to infiltrate stormwater runoff onsite • Divert stormwater runoff from and stabilize eroding boat launches • Monitor and educate on use of fertilizer and pesticides	• Replace mulched areas of bare soil every 2-3 years • Water plants frequently during first year of planting and during hot summer months. Replace dead or dying plants as needed. • Clean out driveway diverters every spring and after each significant storm event. Monitor and clean out diverter outlets as needed. Yearly inspect and repair any damage to water diverters. • Clean out crushed stone from drip line roof trenches every 5-10 years. • Inspect and repair any damage to rain gardens or rain barrels. Replace any dead or dying plants within rain gardens as needed. • Periodically inspect private boat launches to ensure erosion is no longer occurring. Repair as needed.

This WPP aims to address residential sites in the following manner based on the availability of federal, state, and local funding and resources. All maintenance recommendations will be the sole responsibility of the landowner to perform:

- PWD's Water Resources Specialists will continue to advertise for and provide education and technical assistance to interested landowners through their LakeScaping program. Cost share assistance of up to $1,000 will continue to be provided to qualifying landowners to implement water quality protection recommendations as the funds are available.
- CCSWCD will provide limited free technical assistance to select cases as needed and fee-for-service engineer designs. CCSWCD will provide free technical recommendations and education to all needed residential sites and engineered designs will be provided for the most significant residential impact sites through 319 implementation grant projects.
- PWD and CCSWCD will provide targeted neighborhood-wide education and outreach through 319 implementation grant(s) and other grant opportunities as appropriate.

B. Road Sites

Crooked River

Ninety four of the 164 NPS sites (57%) in the Crooked River subwatershed were associated with state, town, and private road sites (11 state, 58 town, and 25 private). Of these sites 14 were ranked as high impact to water quality, 73 were medium impact, and seven were low impact. Common problems, recommended solutions, and maintenance for Crooked River's road sites can be found in Table 8 below.

Table 8. Crooked River Road Sites: Common Problems, Solutions, and Maintenance

Common Problems	Recommended Solutions	Recommended Maintenance
• Unstable culvert inlets/outlets • Road shoulder erosion • Unstable ditching/erosion • Clogged or rusted culverts • Road surface erosion • Buildup of winter sand • Undersized culverts	• Clean out culverts and armor inlets/outlets with rip rap • Re-grade, vegetate to stabilize road shoulders • Clean, re-shape, and stabilize ditches • Clean out and/or replace clogged culverts • Grade, shape, and stabilize road surfaces with quality material • Remove winter sand build up • Replace undersized culverts with larger sized culverts and stabilize	• Re-establish and repair ditches were needed each spring from snow plow damage; Check ditches after heavy storm events to ensure they are functioning as intended • Replace fallen riprap at culvert inlets and outlets • Remove accumulated sediment from plunge pools and properly dispose of away from water resources • Ensure culvert inlets and outlets are free accumulated debris and sediment, check to make sure damage has not occurred to culvert itself • Re-grade gravel roads twice a year when damp to properly re-establish road crown

Sebago Lake

The 2014 Sebago Lake NPS Road Survey identified 61 road sites as having an impact to the Lake's water quality. Of these 61 sites, most were ranked as having a high impact (38 sites) and Town sites (40 sites). Common problems, recommended solutions, and maintenance for Sebago Lake's road sites can be found in Table 9 below.

Table 9. Sebago Lake Road Sites: Common Problems, Solutions, and Maintenance

Common Problems	Recommended Solutions	Recommended Maintenance
• Unstable culvert inlets/outlets • Poor road drainage • Lack of slowing down and infiltrating stormwater runoff • Unstable road surfaces and road shoulders • Clogged culverts and ditches	• Armor culvert inlets and outlets • Install road ditches and stabilize • Install turnouts, runoff diverters, and detention basins to help slow down and infiltrate runoff • Stabilize road surfaces with proper gravel road material, pave on steep hills • Remove sediment and debris from clogged culverts; If culverts are too clogged to remediate and/or are damaged, replace entire culvert considering necessity of installing a larger culvert if need be	• Replace fallen riprap at culvert inlets and outlets • Re-establish and repair ditches were needed each spring from snow plow damage; Check ditches after heaving storm events to ensure they are functioning as intended • Remove accumulated sediment from turnouts, runoff diverters, and detention basins and properly dispose of away from water resources • Re-grade gravel roads twice a year when damp to properly re-establish road crown • Ensure culvert inlets and outlets are free accumulated debris and sediment, check to make sure damage has not occurred to culvert itself

This WPP aims to address town road sites in the following manner based on the availability of federal, state, and local funding and resources. All maintenance recommendations will be the sole responsibility of the municipalities to perform:

Up to 50% cost sharing and free technical recommendations and engineered designs will be provided for the highest impact town road sites through 319 implementation grant projects. Towns will be notified of water quality impact sites needing to be addressed through survey reports, partner outreach, and information listed in the NPS site tracker.

C. Other Sites

Crooked River

The remaining 32% of the 164 NPS sites identified in the Crooked River Survey included the following "other sites":

- Agriculture – 1
- Beach/Boat Access – 5
- Commercial – 5
- Construction – 2
- Driveway – 6
- Gravel Pit – 2
- Logging – 1
- Municipal/Public – 2
- Power/Pipe Line – 2

Sebago Lake

"Other" Sebago Lake sites consist of boat launches, beach/lake access entries, parking lots, community areas/parks, marinas and other hotspot areas. All of these sites are listed in Sebago Lake Watershed NPS Site Tracker *http://1drv.ms/1H4vXil*.

Addressing all of Crooked River and Sebago Lake sites that are not residential nor road sites will require site specific reviews and recommendations. Due to the unique complexity of many of these sites, they will likely require engineer design and oversight and working with a variety of stakeholders (businesses, neighborhood associations, municipalities, ATV clubs, utilities, etc.) to assist in getting the work done. Maintenance for the work completed will also be site specific and involve cooperation from not just the landowner but from other community organizations and land use participants. PWD will continue to offer support to establish initiatives and develop opportunities to help address these sites and CCSWCD will seek out grant funding to also provide technical and cost-share assistance.

6. Watershed-based Protection Plan (WPP) Oversight and Partner Roles

PWD will take the lead in seeing that this WPP is being implemented according to schedule and taking the initiative to update the action items over time. Key partners assisting in the WPP's implementation are listed below with their general roles responsibilities. Specific action items that these partners will implement are listed in Appendix A.

Portland Water District (PWD) will serve as the designated entity in seeing the WPP is implemented and updated as appropriate. PWD will assist with the WPP's implementation by continuing to provide free technical assistance and education to the Lake's stakeholders. Cost share assistance will continue to be provided to qualified property owners through PWD's LakeScaping program. PWD will support CCSWCD in applying for state and federal funds to meet the WPP's objectives and will serve as a primary partner in providing in-kind and cash match support to funded projects. PWD will also continue to sample and monitor Sebago Lake's and Crooked River's water quality.

Cumberland County Soil and Water Conservation District (CCSWCD) will provide technical assistance, education, and engineered designs through a combination of grant funded projects and through fee-for-service opportunities. CCSWCD will also seek to achieve the WPP's goal in applying for state and federal funding and serving as the Lead Project Coordinator for any 319 grant projects funded.

Oxford County Soil and Water Conservation District (OCSWCD) will assist with the WPP's implementation by working with PWD and CCSWCD to apply for state and federal grant funds. OCSWCD will provide technical assistance and education through a combination of grant funded projects and through fee-for-service opportunities. OCSWCD will assist CCSWCD in implementing designated tasks of any grant funded projects awarded that address the goals of this WPP.

Lakes Environmental Association (LEA) will assist with the WPP's implementation by continuing to provide free technical assistance and education to the Lake's northern perimeter stakeholders. LEA will support CCSWCD in applying for state and federal funds to meet the WPP's objectives and will provide supporting technical assistance and in-kind match support where needed.

Maine Department of Environmental Protection (MDEP) will collaborate with Maine's Volunteer Lake Monitoring Program to conduct water quality monitoring and technical assistance and provide the opportunity for financial assistance through the NPS Grants Program.

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

The **Towns** in which the highest impact sites have been identified in will help to address sites within their municipal boundaries through a combination of cash and in-kind match. Based on survey information and sites listed in the NPS Site Tracker, they will work address NPS problems and conduct regular maintenance on town road sites.

Private road associations, Maine Department of Transportation, Maine Forest Service, and landowners will address NPS issues on their properties and conduct ongoing maintenance of BMPs.

Other potential project partners (Western Foothills Land Trust and other environmental stewardship groups) will be invited to participate in projects whenever possible and when the projects align with their mission and geographical reach.

7. Water Quality Monitoring

Throughout the 5-year duration of this WPP, water quality testing will continue to be performed by PWD. The Crooked River will continue to be monitored at four times a year at the following seven sites for total phosphorus, E. coli, and turbidity:

- State Park (this site is also part of the Trib Run and is monitored 12 months of the year, except when frozen, for E.coli and turbidity and for times for total phosphorus)
- Old Route 302 Bridge
- Bolster's Mills
- East Waterford
- Hunt's Corner
- Route 35
- North Waterford

PWD will continue to monitor the direct watershed of Sebago Lake from May through October for total phosphorus, chlorophyll a, dissolved oxygen, and temperature at the following sites:

- Lower Bay Deep Hole
- Big Bay
- Jordan Bay

8. Pollutant Load Reductions

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

9. Watershed Survey Reports

The most recent NPS watershed surveys include the *Crooked River Watershed Survey* (2011), *Sebago Lake Road Survey* (2014) and *Sebago Lake Neighborhood and Hotspot Survey* (2014). Survey data can be found in:

- Appendix A: 2011 Crooked River NPS Survey Data
- Appendix B: 2014 NPS Road Survey Data
- Figure 2: Sebago Lake NPS Neighborhood and Hotspot Survey Map
- Appendix C: 2014 NPS Neighborhood Survey Data
- Table 2. Hotspot Survey Results, Commercial
- Appendix D: Hotspot Survey Results, Agricultural.

The complete *Crooked River Watershed Survey Report,* March 2012 can be found online at *http://1drv.ms/1H4vXil*.

NPS survey data referenced in this WPP, including sites addressed by prior 319 grant projects, are listed in the Sebago Lake and Crooked River NPS Site Tracker which can be accessed online at *http://1drv.ms/1H4vXil*.

Cumberland County Soil & Water Conservation District

35 Main Street, Suite 3

Windham, ME 04062

207.892.4700

Appendix A: Crooked River NPS Survey Data

Sector	Site #	Tax Map	Tax Lot	City	Description of Problem(s)	Land Use	Est. Size of Impact Small=1 Medium=2 Large=3	Number of Pollutants Single=1 Multiple=2	Transport to River Limited=1 Direct=2	Impact Score
1A	1	N/A	N/A	Albany	Unstable Construction, Road Surface Erosion, Road Shoulder/Ditch, Inadequate Buffer	Private Road	3	1	2	3
1A	2	N/A	N/A	Albany	Unstable Construction, Road Shoulder/Ditch, Stream bank erosion/failure	Private Road	2	1	2	5
1A	3	N/A	N/A	Albany	Inadequate buffer, Poor/degraded buffer, Stream bank erosion/failure, Sediment build-up	Stream Channel	2	1	2	5
1A	4	N/A	N/A	Albany	Road Shoulder/ditch, Unstable Culvert, Misaligned, Hanging--no fish passage	Private Road	2	1	2	5
1A	5	N/A	N/A	Albany	Bare soil/fields, Inadequate Buffer	Recreational	1	1	2	4
1A	6	N/A	N/A	Albany	Stream bank erosion/failure, Poor/ degraded buffer	Stream Channel	n/a	1	2	3
1	1	75013	3	Waterford	Road surface erosion, road shoulder/ditch, parking lot drainage, drainage from paved area	Boat Access	1	1	1	3
1	2	74	29	Waterford	Road surface erosion, road shoulder/ditch. Drainage from paved area	State Road	2	1	1	4
1	3	75	N/A	Waterford	Stockpiled sawdust at stream, commercial activities, inadequate buffer, floodplain filled in	Commercial	3	2	2	7
1	4	75	N/A	Waterford	Industrial/Commercial activities, trash	commercial	1	1	1	3
1	5	75	36	Waterford	Bare soil/fields, unstable construction, inadequate buffer, trash	Residential	1	2	2	5
1	6	75	N/A	Waterford	Bare soil, poor degraded buffer, lack of stream shading, drainage from paved area, stream bank erosion	Commercial	3	1	2	6
1	7	76	N/A	Waterford	Road surface erosion, unstable standpipe	Town road	3	1	2	6
1	8	77	N/A	Waterford	Road surface erosion, impacts to stream temperature, stream channel	Town road	2	1	2	5
1	9	77	N/A	Waterford	Unstable culvert, blockage to stream	Driveway	2	1	2	5
1	10	77	N/A	Waterford	Road surface erosion, road shoulder/ditch, unstable culvert, drainage from paved area, hanging culvert, stream bank erosion/failure, sediment build up	Town road	2	1	2	5
1	11	67	N/A	Waterford	Road surface erosion, road shoulder/ditch, drainage from paved area	Town road	2	1	2	5
1	12	77	N/A	Waterford	Road Shoulder/Ditch, Drainage from paved area, Stream bank erosion/failure semi, floodplain filled in.	Driveway	2	1	2	5
1	13	77	N/A	Waterford	Road shoulder/ditch, sediment build up	Town Road	2	1	2	5

Appendix A: Crooked River NPS Survey Data

Sector	Site #	Tax Map	Tax Lot	City	Description of Problem (s)	Land Use	Est. Size of Impact Small=1 Medium=2 Large=3	Number of Pollutants Single=1 Multiple=2	Transport to River Limited=1 Direct=2	Impact Score
1	14	77	N/A	Waterford	Road surface erosion, unstable culvert?, misalignment?	Driveway	1	1	1	3
1	15	52	N/A	Waterford	Bare soil, road surface erosion, poor/degraded buffer	Trail or Path	2		2	4
1	16	52	N/A	Waterford	Bare soil/fields, road surface erosion, poor/degraded buffer, lack of stream shading, sediment build up	Trail or Path	2	1	2	5
1	17	52	N/A	Waterford	Bare soil/fields, Poor/degraded buffer, Lack of stream shading, stream bank erosion/failure	Trail or Path	1	1	2	4
1	18	63	N/A	Waterford	Road shoulder/ditch, inadequate buffer, drainage from paved area	State Road	3	1	2	6
1	19	63	N/A	Waterford	Unstable culvert, drainage from paved area	State Road	1	1	2	4
1	20	53	6	Waterford	Bare soil/fields, road surface erosion, inadequate buffer	Recreational	2	1	2	5
1	21	53	6	Waterford	Bare soil/fields, road surface erosion, inadequate buffer	Recreational	2	1	2	5
1	22	53	6	Waterford	Bare soil/fields, road surface erosion, inadequate buffer	Recreational	2	1	2	5
1	23	53	6	Waterford	Bare soil/fields, inadequate buffer	Beach/Boat Access	3	1	2	6
1	24	53	6	Waterford	Road surface erosion, road shoulder/ditch, inadequate buffer	Private Road	2	1	2	5
1	25	53	6	Waterford	Bare soil/field, inadequate buffer	Beach/Boat Access	2	1	2	5
1	26	53	6	Waterford	Bare soil/fields, road surface erosion, inadequate buffer	Recreational	2	1	2	5
1	27	53	6	Waterford	Road surface erosion, road shoulder/ditch	Private Road	2	1	2	5
1	28	53	6	Waterford	Bare soil/fields, road surface erosion, inadequate buffer	Recreational	1	1	2	4
1	29	53	5	Waterford	Poor/degraded buffer, bank/channel down cutting, sediment buildup	Stream Channel	3	1	2	6
1	30	53	N/A	Waterford	Road shoulder/ditch	State Road	3	1	2	6
1	31	53	N/A	Waterford	Road shoulder/ditch, unstable culvert	State Road	2	1	2	5
1	32	53	6	Waterford	Road surface erosion, road shoulder/ditch	Private Road	2	1	2	5
1	33	53	6	Waterford	Unstable construction, road surface erosion, road shoulder/ditch, unstable culvert, stream bank erosion, sediment buildup	Private Road	3	1	2	6
1	34	53	5	Waterford	Inadequate buffer, Poor/degraded buffer, Stream bank erosion/ failure, Sediment build-up, bank/channel down cutting	Stream Channel	3	1	2	6
1	35	53	6	Waterford	Road surface erosion, road shoulder/ditch, unstable culvert, stream bank erosion, sediment buildup, bank/channel down cutting	Private Road	2	1	2	5

Appendix A: Crooked River NPS Survey Data

Sector	Site #	Tax Map	Tax Lot	City	Description of Problem(s)	Land Use	Est. Size of Impact Small=1 Medium=2 Large=3	Number of Pollutants Single=1 Multiple=2	Transport to River Limited=1 Direct=2	Impact Score
1	36	53	6	Waterford	Unstable culvert, blockage	Private Road	1	1	2	4
1	37	53	6	Waterford	Bare soil/fields, unstable construction, road surface erosion, road shoulder/ditch, stream bank erosion, sediment buildup	Trail or Path	1	1	2	4
1	38	53	6	Waterford	Bare soil/fields, unstable culvert, road surface erosion, road shoulder/ditch, poor/degraded buffer, sediment buildup	Private Road	1	1	2	4
1	39	53	6	Waterford	Road shoulder/ditch, parking lot drainage	State Road	3	1	2	6
2	2	11	002-00B	Norway	Driveway Surface Erosion	Driveway	2	1	2	5
2	3	N/A	N/A	Norway	Road Surface Erosion, Road Shoulder/Ditch	Town Road	2	1	1	4
2	4	11	2	Norway	Bare Soil	Logging	1	1	1	3
2	5	11	3	Norway	Road Surface Erosion, Unstable Culvert, Sediment build up	Driveway	2	1	2	5
2	6	N/A	N/A	Norway	Unstable construction, Road Surface Erosion, Unstable Culvert, Sediment build up (on inlet side)	Town Road	2	1	1	4
2	7	11	5	Norway	Bare Soil/Fields	Driveway	1	1	1	3
2	9	N/A	N/A	Norway	Road Surface Erosion, Road Shoulder/Ditch	Town Road	2	1	2	5
2	18	10	35?	Norway	Road Shoulder/Ditch @ culvert inlet	Town Road	2	1	2	5
2	19	10	24?	Norway	Road Shoulder/ditch, Unstable Culvert (inlet), Sediment build up	Private Road	1	1	2	4
2	20	10	37	Norway	Road Surface Erosion, Road Shoulder/ditch, Trash in stream channel	Private Road	1	1	1	3
2	22	9	157	Norway	Road Shoulder, Unstable Culvert, Drainage from paved area, Inlet Erosion, Mild Surface Erosion on outlet side	State Road	2	1	2	5
2	23	9	148outlet/ 155inlet	Norway	Road shoulder, Unstable Culvert, No trees on outlet side, Lack of stream shading, Drainage from paved area, 2 rusted out culverts, Sediment build up	Town Road	1	1	2	4
2	24	10	003inlet/0 02outlet	Norway	Road Shoulder, Unstable Culvert	Town Road	1	1	2	4
2	25	N/A	N/A	Norway	Road Shoulder, Unstable Culvert-Stone Bridge, Outlet Erosion, Sediment build-up	Town Road	1	1	2	4
2	26	10	3	Norway	Road Shoulder erosion at inlet and outlet, Unstable culvert, Sediment in stream channel	Town Road	1	1	2	4
2	27	N/A	N/A	Norway	Unstable Culvert	Town Road	2	1	2	5
2	28	N/A	N/A	Norway	Unstable Culvert	Trail or Path	2	1	1	4

Appendix A: Crooked River NPS Survey Data

Sector	Site #	Tax Map	Tax Lot	City	Description of Problem(s)	Land Use	Est. Size of Impact Small=1 Medium=2 Large=3	Number of Pollutants Single=1 Multiple=2	Transport to River Limited=1 Direct=2	Impact Score
3	1	11	N/A	Otisfield	Road Shoulder/Ditch	Town Road	1	1	2	4
3	2	11	N/A	Otisfield	Road Shoulder/Ditch, Access to stream, Poor/Degraded buffer, Drainage from paved area	Town Road	n/a	n/a	n/a	0
3	3	11	N/A	Otisfield	Unstable Construction, Collapsed/Unstable Culvert, Sediment Build-up	Town Road	2	2	2	6
3	4	11	N/A	Otisfield	Road Surface Erosion, Road shoulder/Ditch*	Town Road	1	1	2	4
3	5	11	N/A	Otisfield	Road Shoulder/Ditch, Drainage from paved area, Stream bank erosion/failure, Sediment build-up	Town Road	n/a	1	2	3
3A	50	11	N/A	Otisfield	Road Shoulder/ditch, Unstable Culvert	Town Road	2	1	2	5
3A	5113	13	N/A	Otisfield	Road Shoulder/ditch, Unstable Culvert	Town Road	2	1	2	5
3A	52	13	N/A	Otisfield	Road Shoulder/ditch, Unstable Culvert	Town Road	1	1	1	3
3A	53	13	N/A	Otisfield	Road Shoulder/ditch, Unstable Culvert, Hanging-No fish passage	Town Road	2	1	2	5
3A	54	13	N/A	Otisfield	Road Shoulder/ditch, Unstable Culvert	Town Road	1	1	1	3
3A	55	13	N/A	Otisfield	Road Shoulder/ditch, Unstable Culvert	Town Road	2	1	2	5
3A	56	13	N/A	Otisfield	Road Shoulder/ditch, Unstable Culvert	Town Road	2	1	2	5
3A	57	7	N/A	Otisfield	Road Shoulder/ditch, Unstable Culvert	Town Road	1	1	2	4
3A	58	7	N/A	Otisfield	Road Shoulder/ditch, Unstable Culvert	Town Road	2	1	1	4
3A	59	7	N/A	Otisfield	Road Shoulder/ditch, Unstable Culvert	Town Road	2	1	2	5
3A	60	7	N/A	Otisfield	Road Shoulder/ditch, Unstable Culvert	Town Road	2	1	1	4
3A	61	7	N/A	Otisfield	Road Shoulder	Town Road	2	1	1	4
3A	62	7	N/A	Otisfield	Road Shoulder/ditch	Town Road	2	1	2	5
3A	63	7	N/A	Otisfield	Road Shoulder	Town Road	2	1	2	5
3A	64	7	N/A	Otisfield	Road Shoulder	Town Road	1	1	1	3
3A	65	7	N/A	Otisfield	Sediment build up (winter sand)	Town Road	1	1	1	3
3A	66	7	N/A	Otisfield	Trash, Sediment build up (winter sand)	Town Road	1	1	1	3

Appendix A: Crooked River NPS Survey Data

Sector	Site #	Tax Map	Tax Lot	City	Description of Problem(s)	Land Use	Est. Size of Impact Small=1 Medium=2 Large=3	Number of Pollutants Single=1 Multiple=2	Transport to River Limited=1 Direct=2	Impact Score
3A	67	13	N/A	Otisfield	Road shoulder/ditch	Town Road	1	1	2	4
3A	68	13	N/A	Otisfield	Road Shoulder/ditch, Unstable Culvert	Town Road	2	1	1	4
3A	69	13	N/A	Otisfield	Road Shoulder/ditch, Unstable Culvert	Private Road	2	1	1	4
3A	70	7	N/A	Otisfield	Road surface erosion, Road shoulder, Unstable culvert	Private Road	2	1	2	5
3A	71	7	N/A	Otisfield	Severe road surface erosion, road shoulder/ditch	Gravel Pit/ mining	3	1	2	6
3A	72	7	N/A	Otisfield	Severe road shoulder/ditch, stream bank erosion/failure, sediment build up	Town Road	3	1	2	6
3A	73	6	N/A	Otisfield	Bare soil/fields, unstable construction, Road shoulder/ditch, channel straightened, bank/channel down cutting, stream bank erosion/failure, sediment build up	Gravel Pit/ mining	3	1	2	6
3A	74	6	N/A	Otisfield	Road Shoulder/ditch	Town Road	3	1	1	5
3A	75	18	N/A	Otisfield	Road Surface Erosion, Road shoulder/ditch	Private Road	1	1	2	4
3A	76	18	N/A	Otisfield	Road Shoulder/ditch, Unstable Culvert	Private Road	2	1	2	5
3A	77	18	N/A	Otisfield	Road Surface Erosion, Road shoulder/ditch, Unstable Culvert	Private Road	3	1	2	6
3A	78	6	N/A	Otisfield	Road Surface Erosion, Stream bank erosion/failure, Trash	Recreational	3	1	2	6
4	1	51	0002B/0003	Harrison	Road Surface Erosion, Stream bank erosion/failure	Trail or Path	3	1	2	6
4	2	50	0030?	Harrison	Unstable Culvert	Town Road	1	1	2	4
4	3	50	14	Harrison	Road shoulder, Unstable Culvert, no fish passage	Town Road	1	1	2	4
4	4	40	16	Harrison	Road Surface Erosion, Road shoulder/ditch	Town Road	2	1	2	5
4	5	25	008?	Harrison	Bare soil/fields, unstable construction, trail surface erosion	Trail or Path	3	1	2	6
4	6	25	8	Harrison	Road Shoulder/ditch	Town Road	2	1	2	5
4	7	26	0030A	Harrison	Road Shoulder/ditch, Trash in stream channel	State Road	2	1	2	5
4	8	26	31	Harrison	Road Shoulder/ditch, Trash in stream channel	Town Road	2	1	2	5
4	9	28	0001F	Harrison	Road Shoulder/ditch, Trash in stream channel	Private Road	2	1	2	5

Appendix A: Crooked River NPS Survey Data

Sector	Site #	Tax Map	Tax Lot	City	Description of Problem(s)	Land Use	Est. Size of Impact Small=1 Medium=2 Large=3	Number of Pollutants Single=1 Multiple=2	Transport to River Limited=1 Direct=2	Impact Score
4	10	29	1	Harrison	Road Shoulder/ditch, unstable culvert, no fish passage,	Town Road	1	1	2	4
4	11 (PL1)	N/A	N/A	Harrison	Bare soil/fields, Poor/degraded buffer, Lack of stream shading	Power line	3	1	2	6
4	12	N/A	N/A	Harrison	Bare soil/fields, Poor/degraded buffer	Power line	2	1	2	5
5	1	1	N/A	Casco	Bare soil/fields, Road Shoulder/ditch, Inadequate Buffer,	State Road	1	1	2	4
5	2	1	N/A	Casco	Bare soil/fields, Inadequate Buffer, Drainage from paved area	State Road	2	1	2	5
5	3	1	N/A	Casco	Bare soil/fields, Inadequate Buffer, Drainage from paved area	State Road	2	1	2	5
5	4	1	N/A	Casco	Inadequate buffer, Bank/channel down cutting, Stream bank erosion/failure	Stream Channel	1	1	2	4
5	5	1	N/A	Casco	Inadequate buffer, Drainage from paved area, Bank/ channel down cutting, Stream bank erosion/failure	Stream Channel	2	1	2	5
5	6	1	N/A	Casco	Bare soil/fields, Inadequate Buffer, Drainage from paved area	Stream Channel	2	1	2	5
5	7	1	N/A	Casco	Trash in stream channel	Residential	1	1	1	3
5	8	1	N/A	Casco	Road Shoulder/ditch, Industrial/Commercial activities	Commercial	1	1	1	3
5	9	1	N/A	Casco	Inadequate buffer, Stream bank erosion/failure, sediment build up	Residential	3	1	2	6
5	10	1	N/A	Casco	Inadequate buffer, Poor/degraded buffer, Stream bank erosion/failure, Sediment build-up	Residential	3	n/a	n/a	3
5	12	28	N/A	Casco	Stream bank erosion/failure, Sediment build up	Residential	2	1	2	5
5	13	28	N/A	Casco	Inadequate buffer, Stream bank erosion/failure, sediment build up	Residential	3	1	2	6
5	14	28	N/A	Casco	Trash in stream channel	Residential	1	1	1	3
5	15	29	N/A	Casco	Road Surface Erosion, Trash	Beach/Boat Access	1	1	1	3
5	16	29	N/A	Casco	N/A	Private Road	1	1	2	4
5	17	3	N/A	Casco	Bare soil/fields, Inadequate buffer, Sediment build up	Beach/Boat Access	2	1	2	5

Appendix A: Crooked River NPS Survey Data

Sector	Site #	Tax Map	Tax Lot	City	Description of Problem(s)	Land Use	Est. Size of Impact Small=1 Medium=2 Large=3	Number of Pollutants Single=1 Multiple=2	Transport to River Limited=1 Direct=2	Impact Score
5A	50	5	N/A	Casco	Road Shoulder/ditch, Unstable Culvert	Town Road	1	1	2	4
5A	51	007	0001	Casco	Road Shoulder/ditch (erosion up to broadway), road sand entering river, inadequate buffer, lack of stream shading, riprap on stream banks, stream bank erosion/failure.	Residential	2	2	1	5
5A	52	8	N/A	Casco	Road surface erosion, Trash	Recreational	1	2	2	5
5A	53	8	N/A	Casco	Road surface erosion, Road shoulder/ditch, Trash	Private Road	2	2	2	6
5A	54	8	N/A	Casco	Road surface erosion, Road shoulder/ditch, Trash	Private Road	2	2	2	6
5A	55	8	N/A	Casco	Road shoulder/ditch, Trash	Town Road	2	1	1	4
5A	56	8	N/A	Casco	Road Shoulder/ditch, Unstable Culvert, Livestock access to the stream, Livestock manure, Inadequate buffer	Agriculture	2	2	2	6
5A	57	8	N/A	Casco	Road shoulder/ditch, Unstable culvert	Town Road	1	1	2	4
5A	58	8	N/A	Casco	Road surface erosion, Road shoulder/ditch, unstable culvert, Hanging Culvert	Private Road				0
5A	59	8	N/A	Casco	Road surface erosion, unstable culvert, Hanging Culvert- bottom has rusted out	Private Road	1	1	2	4
5A	60	8	N/A	Casco	Road surface erosion, Road shoulder/ditch, Invasive species present, Hanging Culvert	Private Road	1	1	2	4
5A	61	8	N/A	Casco	Road surface erosion	Private Road		1	2	3
5A	62	8	N/A	Casco	Trail surface erosion, inadequate buffer	Trail or Path	2	1	2	5
5A	63	8	N/A	Casco	Trail surface erosion	Trail or Path	3	1	2	6
5A	64	8	N/A	Casco	Trail surface erosion	Trail or Path	3	1	2	6
6	1		N/A	Naples	Trash	Private Road	2	1	2	5
6	2		N/A	Naples	Bank/channel down cutting, Stream bank erosion/failure	Stream Channel	2	1	2	5
6	3		N/A	Naples	Road shoulder/ditch	Town Road	2	1	2	5
6	4		N/A	Naples	Road shoulder/ditch, Hanging culvert-no fish passage	Town Road	1	1	2	4
6	5		N/A	Naples	Road shoulder/ditch	Town Road	1	1	2	4
6	6		N/A	Naples	Road shoulder/ditch, Trash	Town Road	3	2	2	7

Appendix A: Crooked River NPS Survey Data

Sector	Site #	Tax Map	Tax Lot	City	Description of Problem(s)	Land Use	Est. Size of Impact Small=1 Medium=2 Large=3	Number of Pollutants Single=1 Multiple=2	Transport to River Limited=1 Direct=2	Impact Score
6	7	N/A	N/A	Naples	Stockpiled soil (sand piles on outside of gravel pit), road shoulder/ditch	Commercial	3	1	2	6
6	8	N/A	N/A	Naples	Road shoulder/ditch	Town Road	1	1	1	3
6	9	N/A	N/A	Naples	Road shoulder/ditch, Hanging culvert-no fish passage, culvert too small	Town Road	1	1	0	2
6A	1	N/A	N/A	Naples	Road Shoulder	Town Road	3	1	2	6
6A	2	N/A	N/A	Naples	Road Shoulder and bank, Inadequate Buffer	Town Road	3	1	2	6
6A	3	N/A	N/A	Naples	Road surface erosion, Road Shoulder and bank, Inadequate buffer	Town Road	2	1	2	5
6A	4	N/A	N/A	Naples	Inadequate Buffer	Residential	3	1	2	6
6A	5	N/A	N/A	Naples	Inadequate Buffer	Residential	3	1	2	6
6A	6	N/A	N/A	Naples	Bare soil, Inadequate buffer	Residential	2	2	2	6
6A	7	N/A	N/A	Naples	Bare soil	Residential	2	1	2	5
6A	8	N/A	N/A	Naples	Bare soil, Inadequate buffer, riprap shoreline	Residential	1	2	2	5
6A	9	N/A	N/A	Naples	Inadequate buffer	Residential	3	1	2	6
6A	10	N/A	N/A	Naples	Inadequate buffer at beach	Residential	2	2	2	6
6A	11	N/A	N/A	Naples	Inadequate buffer, Bank down cutting, stream bank erosion	Municipal/ Public	3	2	2	7
6A	12	N/A	N/A	Naples	Road surface erosion	Municipal/ Public	2	1	2	5
6A	13	N/A	N/A	Naples	Inadequate buffer	Residential	3	1	2	6
6A	14	N/A	N/A	Naples	Inadequate buffer, Trash	Residential	3	2	2	7
6A	15	N/A	N/A	Naples	Bare soil, Unstable construction	Construction Site	3	1	1	5
6A	16	N/A	N/A	Naples	Bare soil, Road shoulder/ditch	Construction Site	2	1	1	4

Appendix B: 2014 Sebago Lake NPS Road Survey Data

Site Description:					Description of Problems:									Recommendations:				Impact:
Sector	Site	Town	Road Name	Land Use Activity	Surface Erosion	Culvert	Ditch	Road Shoulder Erosion	Roadside Plow/Grader Berm	Soil	Slope	Size (sq ft)	Other	Culvert	Ditch	Roads/Driveways	Other Suggestions	Impact Rating
3	11	Naples	State Park parking lot road at Songo Locks	Other / Parking Lot	Moderate			Moderate			Moderate	111				Add new Surface Material (Gravel)	Pitch away from lake, install turnouts	Low (3-5 pts.)
1	13	Standish	Trickey Rd.	Private Road	Moderate			Moderate	present	Bare	Steep	2860	erosion on road itself; exposed culvert			Install Runoff Diverter	also add new surface material (gravel)	High (8-9 pts.)
6	1	Raymond	Jones Rd	Private Road	Slight				absent		Flat	125				Install Detention Basin	Swale part way up side of road	Low (3-5 pts.)
5	7	Casco	Alice Rd	Private Road	Moderate			Moderate	present		Moderate	150				Remove Grader/Plow Berms		Low (3-5 pts.)
7	3	Windham	Marstons Way	Private Road	Slight						Moderate	160				Install Detention Basin	Road needs general maintenance of ditches and settling basin that already exist	Low (3-5 pts.)
7	1	Windham	Sokokis Pt Rd	Private Road	Moderate	Unstable Inlet/Outlet			absent		Steep	32		Armor Inlet/Outlet				Medium (6-7 pts.)
5	1	Casco	Sunny Hill Rd	Private Road	Moderate			Moderate	absent		Steep	48				Add new Surface Material (Pave)		Medium (6-7 pts.)
7	2	Windham	Keeps Way	Private Road	Moderate	Unstable Inlet/Outlet		Severe	present	Bare	Moderate	200			Install Ditch	Remove Grader/Plow Berms	Formalize turnouts	Medium (6-7 pts.)
3	10	Naples	Rt 114	State Road	Severe			Severe	absent	Bare	Steep	400					armor side of road with stone	High (8-9 pts.)
3	9	Naples	Rt 114	State Road	Moderate				absent	Bare	Steep	550			Install Sediment Pools	Add new Surface Material (Gravel)	Grade away from lake, install rubber razor blades, direct water to settlement pool	High (8-9 pts.)
1	4	Standish	Northeast Rd.	State Road	Moderate			Moderate		Bare	Moderate	180	also noticeable winter sand accumulation		Install Ditch		install sediment pool	Low (3-5 pts.)
1	3	Standish	Richville Rd.	State Road	Severe	Unstable Inlet/Outlet				Bare	Steep	12		Armor Inlet/Outlet				Medium (6-7 pts.)
2	10	Sebago	Sebago Road	State Road	Severe			Severe	absent	Bare	Steep	21		Armor Inlet/Outlet				Medium (6-7 pts.)
1	6	Standish	Northeast Rd.	State Road	Moderate		Moderate Erosion	Moderate	absent	Bare	Steep	224	also noticeable winter sand accumulation		Armor with Stone			Medium (6-7 pts.)
2	11	Sebago	Sebago Road	State Road	Severe			Slight	absent	Bare	Steep	290	bank failure & road shoulder erosion				stabilize bank	Medium (6-7 pts.)
3	13	Naples	State Park Rd	Town Road	Severe			Severe	present		Moderate	212				Install Detention Basin	Remove berm along side of road; install basin behind guard rail	High (8-9 pts.)
3	7	Naples	Lambs Mill Rd	Town Road	Severe	Unstable Inlet/Outlet			absent	Bare	Steep	220		Armor Inlet/Outlet				High (8-9 pts.)

Appendix B: 2014 Sebago Lake NPS Road Survey Data

Site Description:					Description of Problems:									Recommendations:				Impact:
Sector	Site	Town	Road Name	Land Use Activity	Surface Erosion	Culvert	Ditch	Road Shoulder Erosion	Roadside Plow/Grader Berm	Soil	Slope	Size (sq ft)	Other	Culvert	Ditch	Roads/Driveways	Other Suggestions	Impact Rating
2	18	Sebago	Anderson Rd	Town Road	Severe			Severe	absent	Bare	Steep	300		Armor Inlet/Outlet		Vegetate Shoulder		High (8-9 pts.)
5	5	Casco	Point Sebago Rd	Town Road	Severe			Severe	absent		Flat	360				Add new Surface Material (Pave)		High (8-9 pts.)
6	2	Raymond	Mill St.	Town Road	Severe			Severe	absent	Bare	Steep	360						High (8-9 pts.)
6	3	Raymond	Mill St.	Town Road	Severe			Severe	absent	Bare	Steep	450						High (8-9 pts.)
2	21	Sebago	Anderson Rd	Town Road	Severe	Unstable Inlet/Outlet		Severe	absent	Bare	Steep	530		Armor Inlet/Outlet		Install Catch Basin	Reshape road?	High (8-9 pts.)
3	6	Naples	Lakehouse Rd	Town Road	Moderate			Moderate	absent	Bare	Moderate	555			Install Ditch		install Check Dams and sediment pool	High (8-9 pts.)
2	1	Sebago	Shore Rd.	Town Road	Moderate			Moderate	present	Bare	Moderate	580				Install Runoff Diverter	revegetate area of soil accumulation	High (8-9 pts.)
2	15	Sebago	Kimball Corner Rd	Town Road	Severe			Severe	absent	Bare	Steep	640			Install Sediment Pools			High (8-9 pts.)
4	3	Frye Island	Leisure Lane	Town Road	Moderate			Moderate	present	Bare		750				Install Detention Basin		High (8-9 pts.)
1	1	Standish	Stuart Shores Rd.	Town Road	Moderate	Clogged		Moderate	present		Steep	900		Remove Clog	Install Ditch		Install turnouts	High (8-9 pts.)
3	12	Naples	State Park Rd	Town Road	Severe			Severe			Steep	1465			Install Turnouts		Reshape road shoulder; install sediment basin; increase rip rap along riverbank	High (8-9 pts.)
2	3	Sebago	Baldwin Rd.	Town Road	Severe	Unstable Inlet/Outlet		Severe	absent	Bare	Moderate	1645	actually in Baldwin	Armor Inlet/Outlet	Install Ditch	Install Runoff Diverter		High (8-9 pts.)
1	9	Standish	Smith Mill Rd.	Town Road	Severe	Unstable Inlet/Outlet		Severe	absent	Bare	Moderate	2340		Armor Inlet/Outlet				High (8-9 pts.)
2	7	Sebago	Long Hill Rd	Town Road	Severe		Severe Erosion	Moderate		Bare	Steep	3000	bank failure - erosion of sides of ditch		Armor with Stone		clean out ditch	High (8-9 pts.)
2	6	Sebago	Fitch Rd	Town Road	Slight			Slight		Winter Sand	Moderate	42					remove sand pile	Low (3-5 pts.)
2	8	Sebago	Woodland Road	Town Road	Moderate			Moderate	present	Bare	Moderate	140			Install Ditch	Install Detention Basin		Low (3-5 pts.)
2	20	Sebago	Sebaik Rd	Town Road	Moderate			Moderate	absent	Bare	Moderate	160				Add new Surface Material (Gravel)	add riprap to road shoulder	Low (3-5 pts.)
2	4	Sebago	Peaked Mnt. Rd.	Town Road	Severe	Unstable Inlet/Outlet				Bare	Moderate	8		Armor Inlet/Outlet				Medium (6-7 pts.)
1	7	Standish	Moody Rd.	Town Road	Moderate	Unstable Inlet/Outlet			absent	Bare	Steep	28	also noticeable winter sand accumulation	Armor Inlet/Outlet				Medium (6-7 pts.)
5	2	Casco	Cold Springs Rd	Town Road	Severe	Crushed/Broken		Severe	absent		Flat	41		Replace			Armor inlet/outlet	Medium (6-7 pts.)

Appendix B: 2014 Sebago Lake NPS Road Survey Data

Site Description:					Description of Problems:									Recommendations:				Impact:
Sector	Site	Town	Road Name	Land Use Activity	Surface Erosion	Culvert	Ditch	Road Shoulder Erosion	Roadside Plow/Grader Berm	Soil	Slope	Size (sq ft)	Other	Culvert	Ditch	Roads/Driveways	Other Suggestions	Impact Rating
5	6	Casco	Marina Rd	Town Road	Slight	Unstable Inlet/Outlet		Slight	present		Flat	45		Armor Inlet/Outlet		Add new Surface Material (Gravel)		Medium (6-7 pts.)
2	17	Sebago	Kimball Corner Rd	Town Road	Moderate	Unstable Inlet/Outlet			absent	Bare	Steep	50		Armor Inlet/Outlet				Medium (6-7 pts.)
5	4	Casco	Point Sebago Rd	Town Road	Moderate	Unstable Inlet/Outlet		Moderate	absent	Bare	Moderate	60		Armor Inlet/Outlet				Medium (6-7 pts.)
5	3	Casco	Point Sebago Rd	Town Road	Moderate	Unstable Inlet/Outlet		Moderate	absent	Bare	Moderate	72		Armor Inlet/Outlet				Medium (6-7 pts.)
1	5	Standish	Maple Ridge Rd.	Town Road	Severe	Unstable Inlet/Outlet		Severe		Bare	Steep	75	also noticeable winter sand accumulation	Armor Inlet/Outlet				Medium (6-7 pts.)
1	2	Standish	Gilman Rd.	Town Road	Moderate	Unstable Inlet/Outlet		Severe	absent		Steep	100		Armor Inlet/Outlet				Medium (6-7 pts.)
1	12	Standish	Rt. 114	Town Road	Severe	Crushed/Broken		Severe	absent	Bare	Steep	100	spray paint marking the site already; maybe already being fixed by town?	Replace				Medium (6-7 pts.)
3	5	Naples	Lakehouse Rd	Town Road	Moderate	Unstable Inlet/Outlet			absent	Delta in Stream/ Lake	Steep	120		Armor Inlet/Outlet				Medium (6-7 pts.)
2	2	Sebago	Julian Ave.	Town Road	Moderate	Unstable Inlet/Outlet		Slight	absent	Bare	Moderate	130		Armor Inlet/Outlet	Vegetate			Medium (6-7 pts.)
2	16	Sebago	Kimball Corner Rd	Town Road	Slight	Unstable Inlet/Outlet	Undersized	Severe	absent	Bare	Flat	150		Armor Inlet/Outlet	Install Turnouts		Dig out ditch	Medium (6-7 pts.)
3	8	Naples	Gore rd	Town Road	Moderate	Unstable Inlet/Outlet		Moderate	absent	Bare	Steep	160		Armor Inlet/Outlet				Medium (6-7 pts.)
2	19	Sebago	Anderson Rd	Town Road	Moderate	Unstable Inlet/Outlet		Moderate	absent	Bare	Moderate	180		Armor Inlet/Outlet		Vegetate Shoulder	armor road shoulder?	Medium (6-7 pts.)
2	9	Sebago	Woodland Road	Town Road	Moderate			Moderate	present	Bare	Moderate	265			Install Ditch	Install Detention Basin		Medium (6-7 pts.)
2	14	Sebago	Safe Harbor Rd	Town Road	Slight	Unstable Inlet/Outlet		Slight	absent	Bare	Flat	375	Not 100% sure it reaches the lake	Armor Inlet/Outlet		Install Runoff Diverter	Divert runoff from driveway to house number 95	Medium (6-7 pts.)
2	5	Sebago	Fitch Rd	Town Road	Moderate			Severe		Winter Sand	Steep	595	ditch is full, large pile of sand at end of road		Remove debris/sediment		remove sand pile in road; fix/reshape road shoulder	Medium (6-7 pts.)
4	2	Frye Island	Leisure Lane	Town Road	Slight			Slight	present	Bare	Steep	630				Install Detention Basin		Medium (6-7 pts.)

Appendix B: 2014 Sebago Lake NPS Road Survey Data

Site Description:					Description of Problems:									Recommendations:				Impact:
Sector	**Site**	**Town**	**Road Name**	**Land Use Activity**	**Surface Erosion**	**Culvert**	**Ditch**	**Road Shoulder Erosion**	**Roadside Plow/Grader Berm**	**Soil**	**Slope**	**Size (sq ft)**	**Other**	**Culvert**	**Ditch**	**Roads/Driveways**	**Other Suggestions**	**Impact Rating**
1	8	Standish	Moody Rd.	Town Road	Severe			Severe		Bare	Steep	900	also noticeable winter sand accumulation			Install Runoff Diverter	multiple diverters + potential for a sediment pool	Medium (6-7 pts.)
4	1	Frye Island	Beach Road 4	Town Road	Slight		Slight Erosion		absent	Bare	Moderate	1200			Remove debris/sediment	Build Up	build up rod based diverter	Medium (6-7 pts.)
2	13	Sebago	South Beach Street	Unknown, possibly Town Road	Severe		Severe Erosion	Severe	absent	Bare	Moderate	3000				Add new Surface Material (Pave)	pave road and create paved swale, clean out settling basin at end of road full of material due to large amount of erosion uphill	High (8-9 pts.)
2	12	Sebago	Northwest River Rd	Unknown, possibly Town Road	Slight			Slight	present		Moderate	25				Install Runoff Diverter		Low (3-5 pts.)
3	3	Naples	Clark Ln	Unknown	Moderate			Moderate			Steep	2460			Install Ditch	Reshape (Crown)	Pitch to ditch	High (8-9 pts.)
3	4	Naples	Harbor Rd	Unknown		Clogged					Steep	24		Remove Clog			Replace ??	Low (3-5 pts.)
3	2	Naples	Clark Ln	Unknown		Crushed/Broken					Steep	38		Replace			install lower than current culvert	Low (3-5 pts.)
3	1	Naples	Clark Ln	Unknown	Slight						Flat	1615				Add new Surface Material (Gravel)	Reshape; pitch road to ditch on opposite side so it doesn't erode driveway/property	Medium (6-7 pts.)

Appendix C: 2014 Sebago Lake NPS Neighborhood Survey Data

Neighborhood Information					Imperviousness		Lawns		Bare Soil	Driveways		Vegetation			Wrap Up and Recommendations		
Neighborhood Name	**Town**	**Approx. # of properties**	**Typical Property Sizes**	**General Characteristics (older camps, newer houses, mostly seasonal, steep, flat, smoothed out, rocky, etc.)**	**Avg. Imperviousness of Properties (including gravel and paved driveways, buildings, and patios - not including lawns)**	**Biggest Source of Imperviousness**	**Avg. % of Property that is Lawn**	**Est. % of Properties Using Pesticides or Fertilizers**	**Avg. % of Exposed Soil on Typical Property**	**% of Neighborhood that has Paved Driveways**	**Common Driveway Erosion Problems**	**Avg. % of a Typical Property Covered with Undisturbed, Native Veg. (not including tree canopy cover)**	**Avg. % of a Typical Property Covered with Tree Canopy**	**Avg. % of a Typical Property Covered with Landscaped Plants (includes native and non-native)**	**Commonly Observed Erosion and Runoff Problems Likely to Affect Water Quality**	**Overall Comments**	**Basic Recommendations for Neighborhood**
Hearthside	Standish	50	Medium (1-3 acres)	Mostly residential, newer houses (past 20 years), flat, mostly lawns	30%	Building(s)	60%	unknown	<5%	95%	No obvious erosion issues	10%	30%	<5%		Most properties stabilized with lawn and paved driveways, no significant erosion issues observed. Stream goes through neighborhood into lake, appears to be buffered by native vegetation.	Monitor neighborhood for use of fertilizer and pesticides, and educate on driveway sealants
Shaw Acres	Standish	50	Small (< 1 acre)	Half year-round, half seasonal. Neighborhood has moderate slope. Rocky and wooded.	40-50%	Building(s)	30%	unknown	10% not including driveways	50%	No significant driveway erosion, but may want to consider water bar diverters.	20%	60%	<5%	Gravel driveways washing into road, leading directly to lake along fairly steep grade.	Fairly small and compact properties, heavily wooded area. Sandy soils, but appear fairly compacted in places. Three or four properties likely using fertilizer.	Work with landowners to infiltrate runoff on site, and possibly install diverters for gravel driveways.
Whites Point	Standish	80	Medium (1-3 acres)	Mostly year round, steep grade of neighborhood and shore-front driveways.	30-40%	Building(s)	50%	50-80% of properties	<5%	90%	No obvious erosion issues	20%	30-40%	<10%	Lack of shoreline buffer, steep grade of properties and driveways leading right to water, possible fertilizer use.	Most properties have garage on uphill side of road. Lack of gutters on many properties.	Buffer plantings, driveway diverters, roof gutters/roof infiltration, education on driveway sealants, education on lawn fertilization.
Trigs and Prosperity	Windham	25	Small (< 1 acre)	Some older and some newer/renovated, converted camps.	60%	Driveways	20-30%	Unknown	<5%/beaches at shoreline	50%	No obvious erosion issues	<10%	70%	<5%	Gravel road, lack of shoreline buffer. Unfiltered driveway runoff.		Buffer plantings, infiltrating runoff on site from both driveway and roof. Possibly installing rain gardens.
Mineral Springs	Windham	25	Medium (1-3 acres)	Heavily wooded, steep, mostly year round, a lot of old camps being converted.	30%	Building(s)	30%	Unknown	Pine needle and leaf litter, unable to determine percentage	90%	No significant, common problems.	20%	70-80%	<10%	Lack of shoreline buffer, roof and driveway runoff	Found pesticide application sign on one property, large amount of leaf and pine needle debris	Plant shoreline vegetative buffer, roof infiltration, driveway diverters, investigate pesticide and fertilizer use.
Lakehurst	Windham	60	Medium (1-3 acres)	Mix of larger and smaller properties, and old and new properties, as well as camp and year round. Relatively flat with a	40%	Building(s)	60-70%	Unknown	<5%, not including beaches	95%	No obvious erosion issues						
Bayview Estates	Raymond	15	Medium (1-3 acres)	Flat, sparse vegetation, lots of lawn, fairly landscaped. Larger homes, around 2500 sq. ft.	30%	Building(s)	60-70% +	20-50% of properties	<5%	100%	No obvious erosion issues	<10%	25%	10%	Many downspouts discharge directly onto driveway. Water pooling at end of driveways, even during small rain event. Lack of vegetated buffer along shoreline,	Highly manicured properties.	Encouragement of drywells or rain gardens for gutter downspouts, education on lawn care practices, education on importance of vegetative
Indian Point	Raymond	25		Seasonal trailers, flat area													

Appendix C: 2014 Sebago Lake NPS Neighborhood Survey Data

Neighborhood Information					Imperviousness		Lawns		Bare Soil	Driveways		Vegetation			Wrap Up and Recommendations		
Neighborhood Name	**Town**	**Approx. # of properties**	**Typical Property Sizes**	**General Characteristics (older camps, newer houses, mostly seasonal, steep, flat, smoothed out, rocky, etc.)**	**Avg. Imperviousness of Properties (including gravel and paved driveways, buildings, and patios - not including lawns)**	**Biggest Source of Imperviousness**	**Avg. % of Property that is Lawn**	**Est. % of Properties Using Pesticides or Fertilizers**	**Avg. % of Exposed Soil on Typical Property**	**% of Neighborhood that has Paved Driveways**	**Common Driveway Erosion Problems**	**Avg. % of a Typical Property Covered with Undisturbed, Native Veg. (not including tree canopy cover)**	**Avg. % of a Typical Property Covered with Tree Canopy**	**Avg. % of a Typical Property Covered with Landscaped Plants (includes native and non-native)**	**Commonly Observed Erosion and Runoff Problems Likely to Affect Water Quality**	**Overall Comments**	**Basic Recommendations for Neighborhood**
Casselton	Raymond	20	Medium (1-3 acres)	New (last 30 years) large houses (3500 sq. ft.), relatively flat with a steep shoreline, subdivision	25%	Building(s)	30%	50-80% of properties	<5%	95%	No obvious erosion issues	60-70%	80%	20%	Roof runoff	Neighborhood seems fairly stable, not many issues found. A good amount of native vegetation and trees still in place.	Education about pavement sealants, lawn care practices, and roof runoff infiltration.
Wild Acres	Raymond	90	Small (< 1 acre)	Wooded, steep shorefront, smaller houses, seasonal and year-round mixture	40%	Building(s)	20%	< 20% of properties	20%	50%	Steep driveways	40%	80-90%	<5%	Bare soil, lack of shoreline buffers	Some lawns and some bare camp lots, very narrow road, rocky, lots of tree cover	Improve shoreline buffer, cover bare soil with erosion control mulch, implement infiltration onsite
Lakewood	Casco	100	Small (< 1 acre)	wooded, camps and year round residences, gravel road and gravel driveways	40%	Building(s)	15%	< 20% of properties	20%	<20%	Road runoff, steep gravel driveways, roof and garage runoff	30%	60%	<5%	Gravel roads and driveways combined with runoff (Gravel road is pitching towards lake in places), lack of vegetation right on shoreline		Neighborhood would be a great site for 319 grant funds for roads, driveways, and properties. Education on diverting and infiltrating on
Sebago Haven	Casco	35	Small (< 1 acre)	wooded, camps and year round residences, gravel road and gravel driveways	30%	Building(s)	10%	< 20% of properties	20%	25%	Road runoff, steep gravel driveways, roof and garage runoff	40-50%	80%	<5%	Gravel roads and driveways combined with runoff, lack of vegetation right along shoreline		Neighborhood would be a great site for 319 grant funds for residential BMPs and gravel road drainage improvements.
Lake Shore Dr.	Casco	85	Small (< 1 acre)	Camp and residential mix, moderately steep slope to neighborhood and shoreline	50-60%	Building(s)	<20%	< 20% of properties	20%	<20%	Steep gravel driveways, no roof runoff infiltration	20%	60%	<10%	Gravel driveways, gravel roads, public beach		Would be great 319 site for both road and properties, planting between road and beach to protect and preserve beach sand. Working with
Acadia	Casco	45	Small (< 1 acre)	Houses less than 1000 Sq. ft., dirt road, houses on uphill side, docks and boat launches on downhill side.	60%	Building(s)	<10%	< 20% of properties	20%	30%	roof runoff and steepness	50%	50%	<5%	Roof runoff, dirt road with little buffer between road and lake, steep driveways, lots with compacted soils, individually owned boat launches being eroded		319 funds to help landowners infiltrate on site, stabilize driveways and boat launches
Mondor White	Casco	45	Small (< 1 acre)	Flat, with moderate slope at shoreline. Slightly newer houses (past 30 years), with paves road and mostly paved	50%	Building(s)	40%	Unknown	<10%	80%	None	10%	25%	<10%	Lack of vegetative buffer along shoreline. Lack of infiltration on property.		Educate about effects of lawn chemicals and driveway sealants. Encourage buffer plantings and roof runoff infiltration.
Harmons Beach	Standish	70	Small (< 1 acre)	Flat neighborhood, with only slightly sloping shorefront. Mix of residential and seasonal camps. Partially wooded.	50%	Building(s)	30%	Unknown	10-15%	40%	Some dirt/gravel driveways washing out slightly onto road.	10%	30%	<10%	A substantial amount of bare soil is present in the neighborhood, both on driveway and rest of property. Also, almost no vegetative buffer along shoreline, with a sandy		Reach out to landowners to encourage infiltration of runoff onsite (water diverters, rain gardens/barrels, etc.). Plant vegetative buffer along
Sebago Acres	Standish	30	Small (< 1 acre)	Mostly seasonal, relatively recent (past 30 yrs) construction. Gently sloping neighborhood, all small dirt/gravel roads	60%	Building(s)	30%	< 20% of properties	<10%	25%	No specific problems noticed.	10%	50%	<10%	Gently sloping dirt road (main neighborhood road) leads right down to boat launch, with no vegetative buffer present. Also, prevalence of dirt/gravel		Reach out to landowners to encourage infiltration of runoff onsite. Diverters, rain gardens, rain barrels could all be helpful.

Appendix C: 2014 Sebago Lake NPS Neighborhood Survey Data

Neighborhood Information					Imperviousness		Lawns		Bare Soil	Driveways		Vegetation			Wrap Up and Recommendations		
Neighborhood Name	**Town**	**Approx. # of properties**	**Typical Property Sizes**	**General Characteristics (older camps, newer houses, mostly seasonal, steep, flat, smoothed out, rocky, etc.)**	**Avg. Imperviousness of Properties (including gravel and paved driveways, buildings, and patios - not including lawns)**	**Biggest Source of Imperviousness**	**Avg. % of Property that is Lawn**	**Est. % of Properties Using Pesticides or Fertilizers**	**Avg. % of Exposed Soil on Typical Property**	**% of Neighborhood that has Paved Driveways**	**Common Driveway Erosion Problems**	**Avg. % of a Typical Property Covered with Undisturbed, Native Veg. (not including tree canopy cover)**	**Avg. % of a Typical Property Covered with Tree Canopy**	**Avg. % of a Typical Property Covered with Landscaped Plants (includes native and non-native)**	**Commonly Observed Erosion and Runoff Problems Likely to Affect Water Quality**	**Overall Comments**	**Basic Recommendations for Neighborhood**
Maine Ave.	Standish	40	Small (< 1 acre)	Mostly year round residential. Flat neighborhood, sparse vegetation and tree cover.	50%	Building(s)	30%	Unknown	<5%	30%	No specific problems noticed.	10%	25%	5%	Prevalence of dirt/gravel roads/driveways and lack of vegetative buffer along shoreline. Runoff from roofs and other impervious could lead to erosion,		Encourage planting of vegetative buffer along shoreline. Also reach out to property owners about rain gardens, rain barrels, and
Wards Cove	Standish	120	Small (< 1 acre)	A mix of residential year-round and seasonal camps. A flat neighborhood, moderately forested.	70-80%	Building(s)	15%	< 20% of properties	5-10%	50%	Some dirt/gravel driveways washing out slightly onto road. No major gullies formed	15%	30%	<5%	Dirt and gravel driveways directly adjacent to shoreline, with no vegetative buffer present.		Recommend infiltration measures to residents, especially those abutting lake so closely (there are a number of them in this neighborhood).
Alphabet Streets	Sebago	85	Small (< 1 acre)	Slightly older houses, mix of year round and seasonal, flat with gentle slope towards shoreline, mix of paved and	50%	Building(s)	45%	< 20% of properties	10-15%	25%	Some dirt/gravel driveways washing out slightly onto road as a result of roof runoff. Accumulated	5%	20%	5%	Quite a substantial amount of exposed soil in this neighborhood, besides the dirt and gravel roads and driveways. Small lot size has lead to high % IC (houses), which		Infiltrate runoff on property to prevent erosion of dirt and gravel roads and driveways, utilize rain gardens/barrels and water diverters. Plant buffer
NW River/Beach Sts	Sebago	70	Small (< 1 acre)	Mix of year round and seasonal houses, hilly neighborhood, dirt roads, mix of dirt/gravel and paved driveways. Small	40%	Building(s)	50%	< 20% of properties	10%	30%	A few driveways being eroded away right where driveway meets road (have photo). Could be due	5%	50-60%	<5%	Prevalence of dirt/gravel roads/driveways and lack of vegetative buffer along shoreline. Runoff from roofs and other impervious could lead to erosion,		Work with property owners to infiltrate runoff onsite, plant buffers along shoreline,.
Safe Harbor	Sebago	Unknown: tree cover too dense to estimate by aerial photos	Small (< 1 acre)	Mix of seasonal and year-round properties. Neighborhood slopes moderately towards lake, and is highly forested.	40%	Building(s)	50%	Unknown	10-15%	5%	Dirt/gravel driveways washing out onto road due to roof runoff. Some also being eroded away at	10%	70-80%	5%	Roof and road runoff eroding away dirt and gravel driveways, with limited to no vegetative buffer along shoreline. Boat launch also being eroded by road runoff, and		Work with property owners to infiltrate runoff onsite, plant buffers along shoreline. Install improved water diverters at boat launch and at strategic
Anderson Rd.	Sebago	120	Medium (1-3 acres)	Mix of older and newer homes, seems mostly residential but some seasonal. Neighborhood slopes steeply towards	40%	Building(s)	50%	20-50% of properties	5%	50%	Most dirt/gravel driveways washing out due to runoff from roof and downspouts	5%	50-60%	<5%	Many homes had downspouts discharging directly onto steep driveways, allowing water to build momentum before reaching road, leading to scouring of the road		Reach out to property owners regarding rain gardens and rain barrels to try to infiltrate water on site. Look into improved drainage system
Lake Sebago Estates	Naples	65	Medium (1-3 acres)	Mostly very large, newer (past 20-30 years) homes. Many appear to be second homes. All have large setback distance	30%	Building(s)	60%	20-50% of properties	<5%	95%	No significant issues	<5%	40-50%	5%	Many homes had downspouts discharging directly onto long, steep driveways. However, main road paved, and drainage ditches seem to be in good condition.	Despite the couple issues mentioned in last column, due to large lots, each home surrounded by substantial forested buffer area. Even homes along lakeshore have substantial	Outreach to property owners regarding rain barrels/rain gardens, and also distribute yardscaping materials (or get in touch with companies doing
Thompsons Point	Naples	100	Small (< 1 acre)	Mix of older and newer homes, seem to be mostly seasonal vacation camps. Flat neighborhood.	60%	Building(s)	30%	< 20% of properties	5-15%	10%	A few gravel/dirt driveways being eroded by roof/downspout runoff, but nothing	5%	30%	5%	Large number of dirt/gravel roads and driveways, with limited vegetative buffer along shoreline.	While there is limited buffer along shoreline and some driveway and road erosion in certain spots, the neighborhood is very flat, and there are many properties that are not	Plant vegetative buffer along shoreline, work with landowners to infiltrate runoff onsite using rain barrels/rain gardens.
Sebago Harbor Assoc.	Naples	65	Small (< 1 acre)	Newer (past 30 yrs) homes, seems mostly residential year-round. Very steeply slopes towards lake.	60%	Building(s)	30%	Unknown	<5%	70%	All of the driveways are very steep, and many being eroded by roof runoff.	5%	50%	<5%	Very steep slope combined with roof runoff issues, and lack of vegetative buffer along shoreline.		Work with landowners to infiltrate roof runoff onsite, install vegetative buffer along shoreline and water diverters along driveways and roadway.

Appendix C: 2014 Sebago Lake NPS Neighborhood Survey Data

Neighborhood Information					Imperviousness		Lawns		Bare Soil	Driveways		Vegetation			Wrap Up and Recommendations		
Neighborhood Name	**Town**	**Approx. # of properties**	**Typical Property Sizes**	**General Characteristics (older camps, newer houses, mostly seasonal, steep, flat, smoothed out, rocky, etc.)**	**Avg. Imperviousness of Properties (including gravel and paved driveways, buildings, and patios - not including lawns)**	**Biggest Source of Imperviousness**	**Avg. % of Property that is Lawn**	**Est. % of Properties Using Pesticides or Fertilizers**	**Avg. % of Exposed Soil on Typical Property**	**% of Neighborhood that has Paved Driveways**	**Common Driveway Erosion Problems**	**Avg. % of a Typical Property Covered with Undisturbed, Native Veg. (not including tree canopy cover)**	**Avg. % of a Typical Property Covered with Tree Canopy**	**Avg. % of a Typical Property Covered with Landscaped Plants (includes native and non-native)**	**Commonly Observed Erosion and Runoff Problems Likely to Affect Water Quality**	**Overall Comments**	**Basic Recommendations for Neighborhood**
Sebago Pines	Naples	120	Small (< 1 acre)	Mix of older and newer houses, as well as permanent and seasonal. Slopes very steeply towards lake, moderately	50%	Building(s)	40%	Unknown	5%	30%	All of the driveways are very steep, and many being eroded by roof runoff.	5%	40-60%	<5%	Very steep slope combined with roof runoff issues, and lack of vegetative buffer along shoreline.		Work with landowners to infiltrate roof runoff onsite, install vegetative buffer along shoreline and water diverters along driveways and roadway.

Appendix D: 2014 Sebago Lake Hotspot Survey Results - Agricultural

Site Number and/or Physical Address/Location	Town	Primary Farming Use	Primary Pollutants	Summary of Recommendations	Comments
A01 - Across from Mineral Springs Rd.	Windham	No Ag present			Completely wooded, no agriculture
A02	Windham	No Ag present			Field currently being sold as house lots
A03	Casco	No Ag present			Old farmland now converted into three to four house lots with remaining area forested
A04	Casco	No Ag present			Old farmland now converted to house lot with pasture
A05	Casco	No Ag present			Unused overgrown/wooded land amongst Point Sebago Golf Course
A06	Casco	Apple orchard	Nutrients	Landowner outreach to determine management practices and ensure that fertilizer & pesticide BMPs and erosion/runoff control measures are utilized.	No erosion or sediment control issues observed
A07	Casco	Apple orchard	Nutrients	Landowner outreach to determine management practices and ensure that fertilizer & pesticide BMPs and erosion/runoff control measures are utilized.	No erosion or sediment control issues observed
A08	Standish	Possible hayfield	Nutrients	Landowner outreach to determine management practices and ensure that fertilizer & pesticide BMPs and erosion/runoff control measures are utilized.	This area is now a large, grassy field. The grass is obviously mowed, but at time of inspection was at least 3 to 4 inches in height.
A09	Standish	Possible hayfield	Sediment	Landowner outreach to determine management practices and ensure that fertilizer & pesticide BMPs and erosion/runoff control measures are utilized.	The area is currently a large, open, grassy lot with a large pile of unstabilized soil buffered by grassy area.
A10	Standish	Possible hayfield	Sediment	Outreach to landowner to determine whether or not fertilizers and/or pesticides are used, ensure that there are no erosion and/or runoff issues further towards interior of site.	This lot is large and grassy, empty now but probably hayed. There is a large pile of what appears to be hay on the property.
A11	Standish	No Ag present	Sediment	Landowner outreach to determine management practices and ensure that fertilizer & pesticide BMPs and erosion/runoff control measures are utilized.	Unmanaged property, patchy vegetation, no obvious agricultural activity.
A12	Standish	Cultivated tree farm	Sediment	Landowner outreach to determine management practices and ensure that fertilizer & pesticide BMPs and erosion/runoff control measures are utilized.	Area of tree cultivation seems to be a good deal larger than it appears on map. No bare soil observed from the road.
A13	Standish	Possible logging	Sediment		Unable to find access site to property for accuarate land use verification

Appendix D: 2014 Sebago Lake Hotspot Survey Results - Agricultural

Site Number and/or Physical Address/Location	Town	Primary Farming Use	Primary Pollutants	Summary of Recommendations	Comments
A14	Baldwin	Logging	Sediment	Landowner outreach to determine management practices and ensure that BMPs and erosion/runoff control measures are utilized.	Could not make any observations due to distance of area from road.
A15	Sebago	Logging	Sediment	Landowner outreach to determine management practices and ensure that BMPs and erosion/runoff control measures are utilized.	There appear to be some pretty large clear-cuts, with no erosion control that can be seen from the road.
A16	Sebago	Possible agriculture			Could not review on-site due to it being private property
A17	Sebago	Maine Tree Growth Program	Sediment	Landowner outreach to determine management practices and ensure that BMPs and erosion/runoff control measures are utilized.	No active harvesting observed from the road.
A18	Sebago	Agriculture crops			Unable to view completely although farm machinery on property. Aerial photos show row crops.
A19	Sebago	No Ag present			Converted to house lots
A20	Sebago	No Ag present			Converted to house lots
A21	Sebago	Agriculture			Land cleared and agriculutre present yet no tresspassing and therefore unable to determine exact land use
A22	Sebago	Logging	Sediment	Landowner outreach to determine management practices and ensure that BMPs and erosion/runoff control measures are utilized.	Large area with logging roads cleared throughout. Did not observe active timber harvesting.
A23	Naples	No Ag present			Unused wooded lot
A24	Sebago	No Ag present	Sediment		Unable to access lot, appears to be house lots and/or logging.
A25	Sebago	Grazing land for cattle	Animal or Human Waste	Landowner outreach to determine management practices and ensure that BMPs and erosion/runoff control measures are utilized.	Large, grassy grazing area for cattle (2 observed). West side of road is forested.
A26		Grazing land for cattle	Animal or Human Waste	Landowner outreach to determine management practices and ensure that BMPs and erosion/runoff control measures are utilized.	Large, grassy grazing area for cattle, but cattle were not present. This is directly next-door to A25.
A27	Sebago	Possible hayfield	Sediment	Landowner outreach to determine management practices and ensure that BMPs and erosion/runoff control measures are utilized.	Large, grassy area for hay or grazing. No significant erosion or runoff issues observed. Area is buffered quite well on all sides by forest.
A28	Sebago	Livestock and cultivated tree farm	Animal or Human Waste	Landowner outreach to determine management practices and ensure that BMPs and erosion/runoff control measures are utilized.	Likely two agricultural properties

Appendix D: 2014 Sebago Lake Hotspot Survey Results - Agricultural

Site Number and/or Physical Address/Location	Town	Primary Farming Use	Primary Pollutants	Summary of Recommendations	Comments
A29		No Ag present			Unable to view completely view site yet no agriculture/logging appears to be occuring on property
A32	Sebago	Possible hayfield	Animal or Human Waste	Landowner outreach to determine management practices and ensure that BMPs and erosion/runoff control measures are utilized.	Hayfield or pastureland
A33		Logging	Sediment		Unable to completely view property yet appears to be active logging site
A34	Sebago	Logging	Sediment	Landowner outreach to determine management practices and ensure that BMPs and erosion/runoff control measures are being utilized.	Large, grassy area with active land clearing.
A35	Naples	Possible logging	Sediment		Unable to access lot from road, aerial photos show wooded land and appears to be a logging site.
A36	Naples	Possible tree farm and/or hayfield	Nutrients		Unable to access lot due to no trespassing signs.
A37	Naples	Hayfield	Sediment	Contact current property owner to determine use of land. Also, install buffers along roadways. Buffered well by forest on two sides, but two sides abut road.	Large, grassy area. Probably used for hay or grazing, but most likely hay because no sign of livestock. Property is for sale by owner.
A38	Naples	Multiple agriculture uses	Nutrients		Unable to access property yet appears to have a variety of agriculture uses.
A39	Naples	Hayfield	Sediment	Contact property owner to determine use of land, and ensure that any erosion and/or runoff issues are taken care of.	Large, grassy area. Probably used for hay or grazing, but most likely hay because no sign of livestock.
A40	Naples	Hayfield and Maine Tree Growth Program	Sediment	Reach out to property owner to see what their erosion and runoff control measures are, work with them to ensure infiltration on site.	One part is large, grassy area, presumably for hay. Other area is tree farm (saw sign).

Appendix D Subwatershed Factsheets Summarizing WQI Findings

Adams Pond

Protecting Water Resources Region-Wide.

September 2015

Adams Pond, Bridgton, Maine. *Photo credit: Colin Holme*

Adams Pond

Adams Pond is located in Bridgton, Maine, to the west of Route 107 (Bridgton Road). The 1.3 miles shoreline is about half wooded, with a road close to the pond on the east side and veering off on the north side. Quiet summer camps and one Girl Scouts camp use the pond regularly. Most of the area that drains into the Pond is covered with woods, though recent development has cropped up, increasing the threat of soil and extra nutrients making their way into the pond.

Adams Pond is quiet and known for wildlife spotting , swimming, and fishing or paddling with carry-in boats. Fishing includes bass and perch and the native brook trout. Beneath the surface, there are concerns and hardships for wildlife: bottom waters frequently run out of oxygen and are overloaded with nutrients. Bass and perch provide stiff competition for native brook trout. Overall, though, Adams Pond enjoys clean, clear water. The outflow in the southeast winds its way downstream to Holt Pond in Bridgton, which then feeds into a series of lakes, ponds, and streams that feed Sebago Lake.

Part of the Sebago Lake System

Adams Pond's health is an important factor in the health of Sebago Lake, which is the source of drinking water for 15% of Maine's residents. Portland Water District (PWD) treats and delivers this water and is the largest water utility in Maine. PWD has a vested interest in keeping Sebago Lake clean and supports conservation efforts in the upland areas. The cleanliness and health of Sebago Lake likewise play an important role in the health of Casco Bay, found downstream.

Sebago Lake itself is the second largest lake in Maine. Approximately 361 square miles of land and numerous lakes, ponds, rivers, and streams in 24 towns drain into Sebago Lake. Over 80% of the land that surrounds the Lake is forested. Many partners work together to ensure a clean, healthy Sebago Lake.

Sebago Lake.

Adams Pond Score Card.

What does this number mean?

- The total possible score is between 4 and 20.
- Each score is the sum of four equally important parts described on the page to the right. Each part is scored from 1 to 5, with 5 being the best.
- Higher numbers are better. The higher the number, the healthier the lake and surrounding area. The table to the right shows the scoring categories.

Overall Lake Score	Level of Concern
19-20	Lowest
16-18	Moderate-Low
12-15	Moderate
8-11	Moderate-High
4-7	Highest

Land Use

Changes in forested versus developed land over decades determined using satellite imagery.

1

Lake Health Trend

Changes in biological activity over at least ten years.

4

11

Partnerships

Activity of local organizations that protect and use the lake and availability of non point source data.

2

4

Current Lake Clarity

Chrolorophyll-*a,* phosphorus, and clarity measurements that indicate a lake's biological activity and nutrient levels.

Next steps for Adams Pond: Strengthen partnerships, including with the town, to ensure continued clean water.

How Healthy is Adams Pond?

Many lakefront property owners unintentionally pollute their lake. Using less fertilizer, fewer pesticides, and preventing soil erosion are all ways to ensure a cleaner lake. *Photo credit: Colin Holme*

A vegetated buffer at the water's edge is beautiful and also helps to keep the lake clean. A swath of plants catches sediment and other pollutants before they enter the lake.

Land Use (scored 1 out of 5)

Most of the land that drains into Adams Pond is well forested, enabling soil to filter pollution. However, the percentage of the land area covered in woods has changed a lot in the past decades due to new development. Erosion on gravel roads washes soil and nutrients into Adams Pond, which can lead to algal blooms that are detrimental to the Pond.

Partnerships (scored 2 out of 5)

Adams Pond has been enjoyed by local residents for decades. A few local partners have supported measures to care for the pond, though the opportunity to build more partnerships with enough investment is promising to maintain a healthy pond.

Lake Health Trend (scored 4 out of 5)

Biological activity trends over the past decade indicate that Adams Pond is healthy! The clean water trend has persisted even as many waterbodies in the area suffer from pollution washed off of the land. Residents can anticipate future years of clean water for recreation.

Current Lake Clarity (scored 4 out of 5)

Clean, clear water is found in Adams Pond year-round. Aquatic plants and animals are able to thrive and local residents are able to benefit from the seemingly limitless recreation opportunities.

Landowners can implement many simple practices to help keep their lake clean. Providing a clear path to the lakefront can also prevent soil loss.

For More Information

To learn more about your local waterbody, resources for property owners, or the Sebago Lake Watershed Assessment and Prioritization Project:

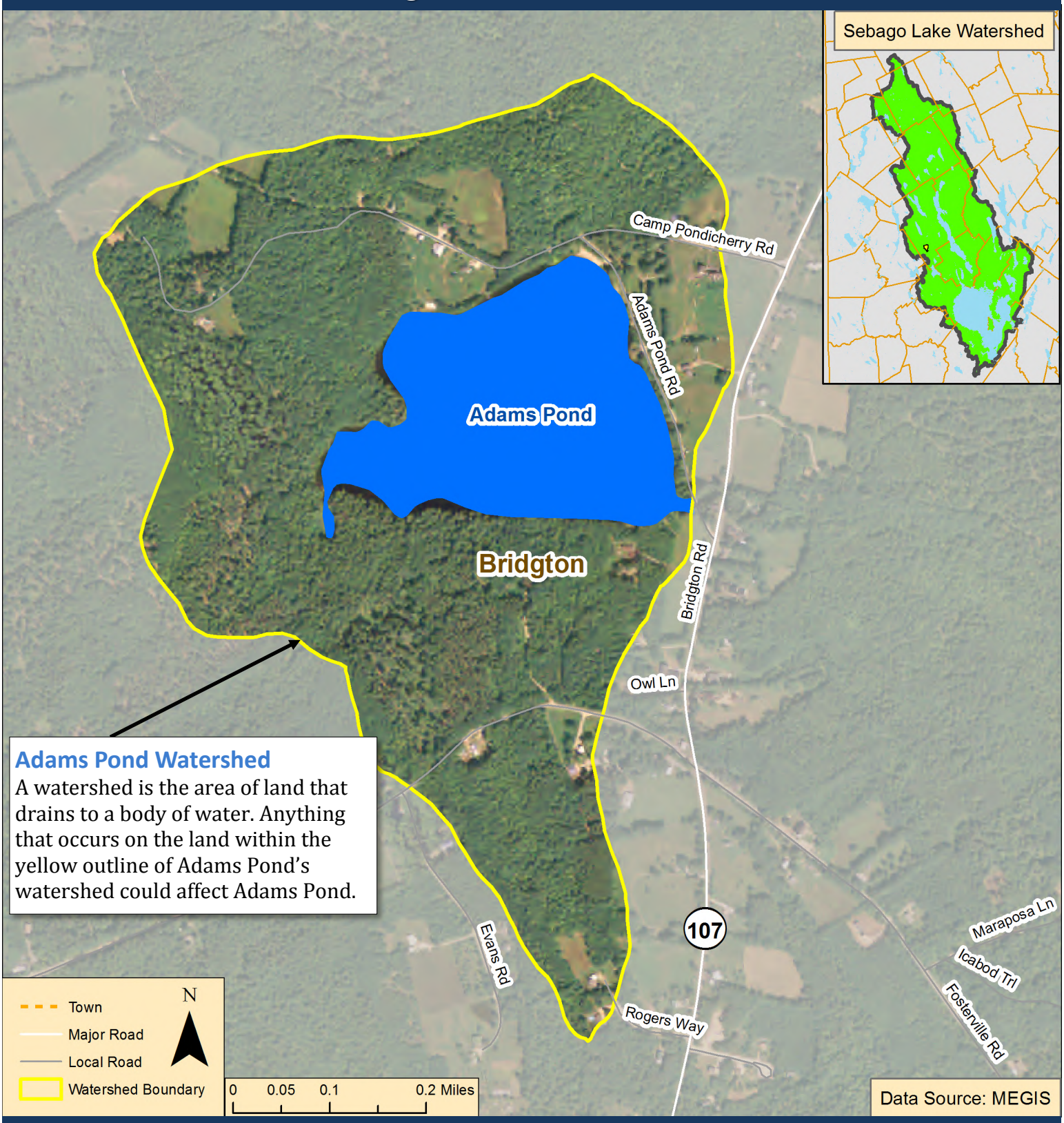
Visit: **www.cumberlandswcd.org**

Call: **Cumberland County Soil & Water Conservation District (207) 892-4700**

Adams Pond is enjoyed by youth campers, summer residents, and the local community from Bridgton and beyond.

Volunteers and scientists have used Secchi disks (inset) to measure water clarity in lakes and seas since the late 1800s.

Adams Pond and Surrounding Area.



Partners

This fact sheet was created under the Sebago Lake Watershed Assessment and Prioritization Project. Funding for this project was provided in part by the U.S. Environmental Protection Agency under Section 604(b) of the Clean Water Act. Section 604(b) grants are administered by the Maine Department of Environmental Protection (Maine DEP) in partnership with EPA. Project partners include Maine DEP, Portland Water District, Cumberland County Soil & Water Conservation District, Lakes Environmental Association, Maine Forest Service, and the Town of Standish.

Cumberland County Soil & Water Conservation District

Cumberland County Soil & Water Conservation District
35 Main Street, Suite 3 | Windham, ME 04062
207.892.4700 | www.cumberlandswcd.org

Bear Pond

Protecting Water Resources Region-Wide.

Bear Pond, Waterford, Maine. *Photo Credit: Lakes Environmental Association*

Bear Pond

Bear Pond is in Waterford, Maine, just west of Route 35. Bear Pond is the deepest lake in Waterford and provides habitat for many fish and shoreline species as well as year-round recreational opportunities. Bear Pond's 4.3-mile shoreline is developed with 70 seasonal and year-round residences and a summer youth camp. Over 90% of the land that drains into Bear Pond is wooded, allowing soil to absorb rainwater. In recent years, however, rain events have washed an increasing amount of soil off of land and roads surrounding the pond, washing extra soil and nutrients into the lake.

The Bear Pond community has demonstrated commitment to protecting and improving Bear Pond. In 2013, a Watershed Survey identified pollution sources that could be addressed. Bear Pond receives water from Mutiny Brook, Scoggins Brook, and Mill Brook, which comes from Keoka Lake to the northeast. Bear River flows from Bear Pond and eventually into Sebago Lake.

Part of the Sebago Lake System

Bear Pond's health is an important factor in the health of Sebago Lake, which is the source of drinking water for 15% of Maine's residents. Portland Water District (PWD) treats and delivers this water and is the largest water utility in Maine. PWD has a vested interest in keeping Sebago Lake clean and supports conservation efforts in the upland areas. The cleanliness and health of Sebago Lake likewise play an important role in the health of Casco Bay, found downstream.

Sebago Lake itself is the second largest lake in Maine. Approximately 361 square miles of land and numerous lakes, ponds, rivers, and streams in 24 towns drain into Sebago Lake. Over 80% of the land that surrounds the Lake is forested. Many partners work together to ensure a clean, healthy Sebago Lake.

Sebago Lake.

Bear Pond Score Card.

What does this number mean?

- The total possible score is between 4 and 20.
- Each score is the sum of four equally important parts described on the page to the right. Each part is scored from 1 to 5, with 5 being the best.
- Higher numbers are better. The higher the number, the healthier the lake and surrounding area. The table to the right shows the scoring categories.

Overall Lake Score	Level of Concern
19-20	Lowest
16-18	Moderate-Low
12-15	Moderate
8-11	Moderate-High
4-7	Highest

Land Use

Changes in forested versus developed land over decades determined using satellite imagery.

3

Lake Health Trend

Changes in lake clarity over at least ten years.

2

11

Partnerships

Activity of local organizations that protect and use the lake and availability of non point source data.

4

2

Current Lake Clarity

Chrolorophyll-*a,* phosphorus, and clarity measurements that indicate a lake's biological activity and nutrient levels.

Next steps for Bear Pond: Focus on mitigating pollution from many diffuse sources, like soil erosion sites.

How Healthy is Bear Pond?

The shoreline planting at Bear Pond drew many community members. Other soil erosion measures observed during the Watershed Survey include water diverters, waterbars across driveways, and dripline trenches under roof edges.

A vegetated buffer at the water's edge is beautiful and also helps to keep the lake clean. A swath of plants catches sediment and other pollutants before they enter the lake.

Land Use (scored 3 out of 5)

Most of the land that drains into Bear Pond is woods, enabling soil to filter pollution. The overall percentage of woods and vegetated land has not changed much over the past quarter century. However, road erosion and yard care chemicals are common pollution sources in the region.

Partnerships (scored 4 out of 5)

Bear Pond has enjoyed an involved citizenry and well-established partners for decades. Community support has enabled collaboration among the town, property owners, and road associations. Together they identified several locations to prevent soil erosion.

Lake Health Trend (scored 2 out of 5)

Biological activity levels over the past decade indicate that Bear Pond has become less healthy for pond life. Surface runoff from surrounding land often contains soil and excess nutrients, leading to too much algal growth and lower oxygen levels in the water.

Current Lake Clarity (scored 2 out of 5)

Bear Pond's water is less clear than other lakes in the region. Lower water clarity is often due to soil erosion and fertilizer washed off of land. This could be indicative of algal blooms, low oxygen levels, and a stressful environment for aquatic species in Bear Pond.

Landowners can implement many simple practices to help keep their lake clean. Providing coverage for roots helps keep trees healthy and can prevent erosion as well.

For More Information

To learn more about your local waterbody, resources for property owners, or the Sebago Lake Watershed Assessment and Prioritization Project:

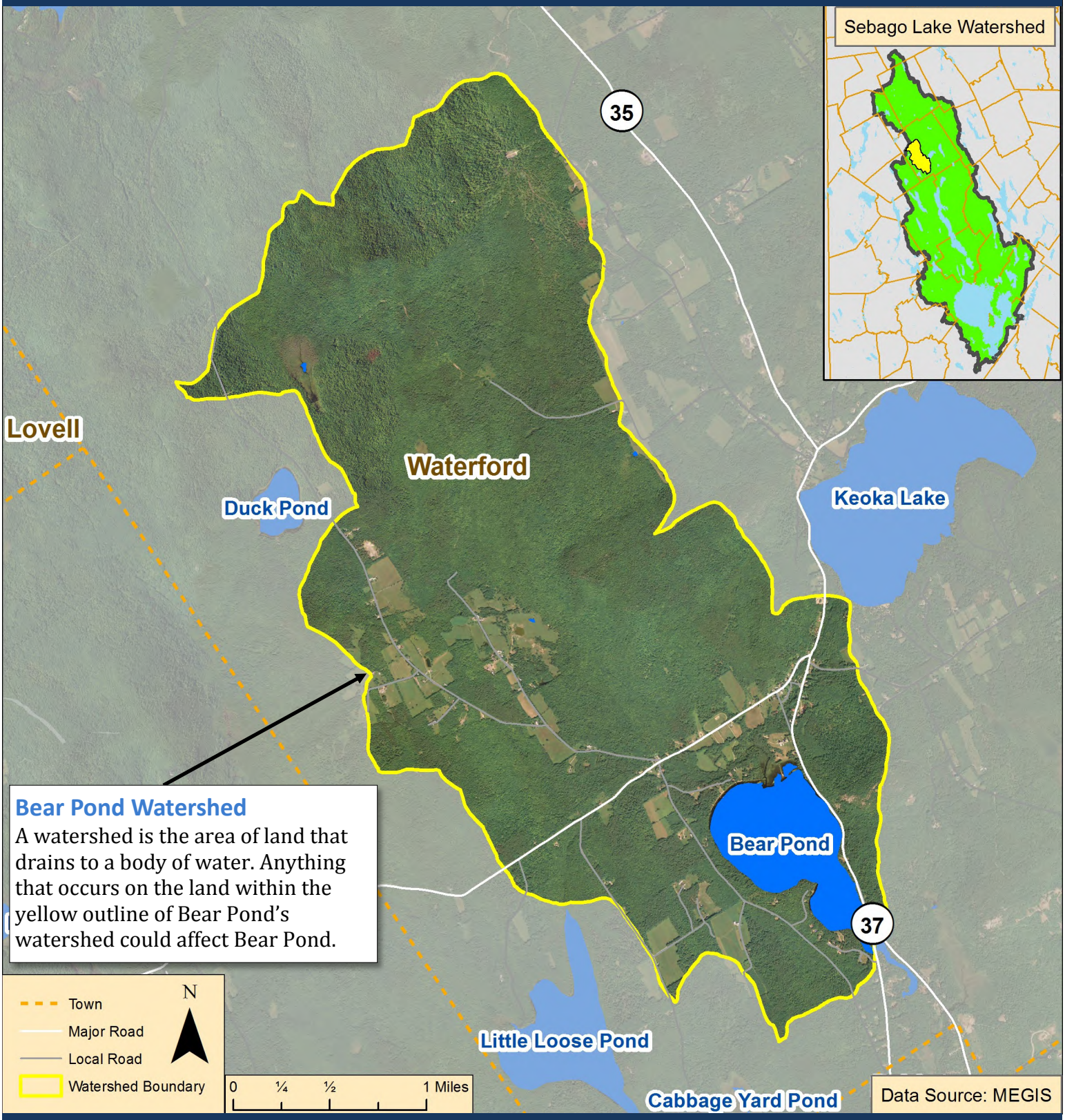
Visit: **www.cumberlandswcd.org**

Call: **Cumberland County Soil & Water Conservation District (207) 892-4700**

Bear Pond is enjoyed by youth campers, summer residents, and the local community from Waterford and beyond.

Volunteers and scientists have used Secchi disks (inset) to measure water clarity in lakes and seas since the late 1800s.

Bear Pond and Surrounding Area.



Partners

This fact sheet was created under the Sebago Lake Watershed Assessment and Prioritization Project. Funding for this project was provided in part by the U.S. Environmental Protection Agency under Section 604(b) of the Clean Water Act. Section 604(b) grants are administered by the Maine Department of Environmental Protection (Maine DEP) in partnership with EPA. Project partners include Maine DEP, Portland Water District, Cumberland County Soil & Water Conservation District, Lakes Environmental Association, Maine Forest Service, and the Town of Standish.

Cumberland County Soil & Water Conservation District

Cumberland County Soil & Water Conservation District
35 Main Street, Suite 3 | Windham, ME 04062
207.892.4700 | www.cumberlandswcd.org
CCSWCD is an equal opportunity provider and employer.

Brandy Pond

September 2015

Protecting Water Resources Region-Wide.

Brandy Pond, Naples, Maine

Brandy Pond

Brandy Pond, also called the Bay of Naples, is located in Naples, Maine. Just north of Sebago Lake, between Routes 302 and 114, Brandy Pond's strategic location has contributed to its history as a transportation route. Many fish are also found there, largely due to its location between Long Lake and Sebago Lake. Development along Brandy Pond's 6.2-mile shoreline is largely residential but also enables recreational activities like fishing and parasailing and includes a Golf and Country Club. Despite recent development and increasing risk on non-point pollution, the water is still quite clear.

The Brandy Pond community has monitored water conditions in the pond for over 30 years and have completed a Watershed Surveys to identify pollution sources that could be addressed. Overall, Brandy Pond enjoys clean water, but is mobilizing to mediate health concerns. Brandy Pond receives water from Long Lake to the north and itself feeds into the Crooked River at its south end, which feeds into Sebago Lake.

Part of the Sebago Lake System

Brandy Pond's health is an important factor in the health of Sebago Lake, which is the source of drinking water for 15% of Maine's residents. Portland Water District (PWD) treats and delivers this water and is the largest water utility in Maine. PWD has a vested interest in keeping Sebago Lake clean and supports conservation efforts in the upland areas. The cleanliness and health of Sebago Lake likewise play an important role in the health of Casco Bay, found downstream.

Sebago Lake itself is the second largest lake in Maine. Approximately 361 square miles of land and numerous lakes, ponds, rivers, and streams in 24 towns drain into Sebago Lake. Over 80% of the land that surrounds the Lake is forested. Many partners work together to ensure a clean, healthy Sebago Lake.

Sebago Lake.

Brandy Pond Score Card.

What does this number mean?

- The total possible score is between 4 and 20.
- Each score is the sum of four equally important parts described on the page to the right. Each part is scored from 1 to 5, with 5 being the best.
- Higher numbers are better. The higher the number, the healthier the lake and surrounding area. The table to the right shows the scoring categories.

Overall Lake Score	Level of Concern
19-20	Lowest
16-18	Moderate-Low
12-15	Moderate
8-11	Moderate-High
4-7	Highest

Land Use

Changes in forested versus developed land over decades determined using satellite imagery.

1

Lake Health Trend

Changes in biological activity over at least ten years.

2

9

Partnerships

Activity of local organizations that protect and use the lake and availability of non point source data.

2

4

Current Lake Clarity

Chrolorophyll-*a,* phosphorus, and clarity measurements that indicate a lake's biological activity and nutrient levels.

Next steps for Brandy Pond: Strengthen partnerships, including with the town, to ensure continued clean water.

How Healthy is Brandy Pond?

A watershed survey throughout the land that drains to Brandy Pond identified areas that should be improved. Above, shoreline erosion has cut into tree roots. The combination of many such sites can add up, damaging pond health.

A vegetated buffer at the water's edge is beautiful and also helps to keep the lake clean. A swath of plants catches sediment and other pollutants before they enter the lake.

Land Use (scored 1 out of 5)

Most of the land that drains into Brandy Pond is woods, enabling soil to filter pollution. However, the high rate of development in the past quarter century may increase pond pollution from road erosion and runoff, since hard surfaces cannot filter or absorb rainfall or snowmelt.

Partnerships (scored 2 out of 5)

Brandy Pond is a popular recreation spot and is enjoyed by residents. However, there are not local partners and no obvious opportunities to build partnerships. There are some locations which, with proper advance surveying and planning, could qualify for funding to remediate pollution.

Lake Health Trend (scored 2 out of 5)

Biological activity, as monitored over the past decade, indicates that Brandy Pond has become less healthy for pond life. Surface runoff from surrounding land often contains soil and excess nutrients, leading to too much algal growth and lower oxygen levels in the water.

Current Lake Clarity (scored 4 out of 5)

Clean, clear water is found in Brandy Pond. Aquatic plants and animals are able to thrive and people enjoy the clear swimming water and healthy fish populations. The currently clear conditions could change if there are increases in area soil erosion or polluted surface runoff.

Landowners can implement many simple practices to help keep their lake clean. Providing a clear path to the lakefront can also prevent soil loss.

For More Information

To learn more about your local waterbody, resources for property owners, or the Sebago Lake Watershed Assessment and Prioritization Project:

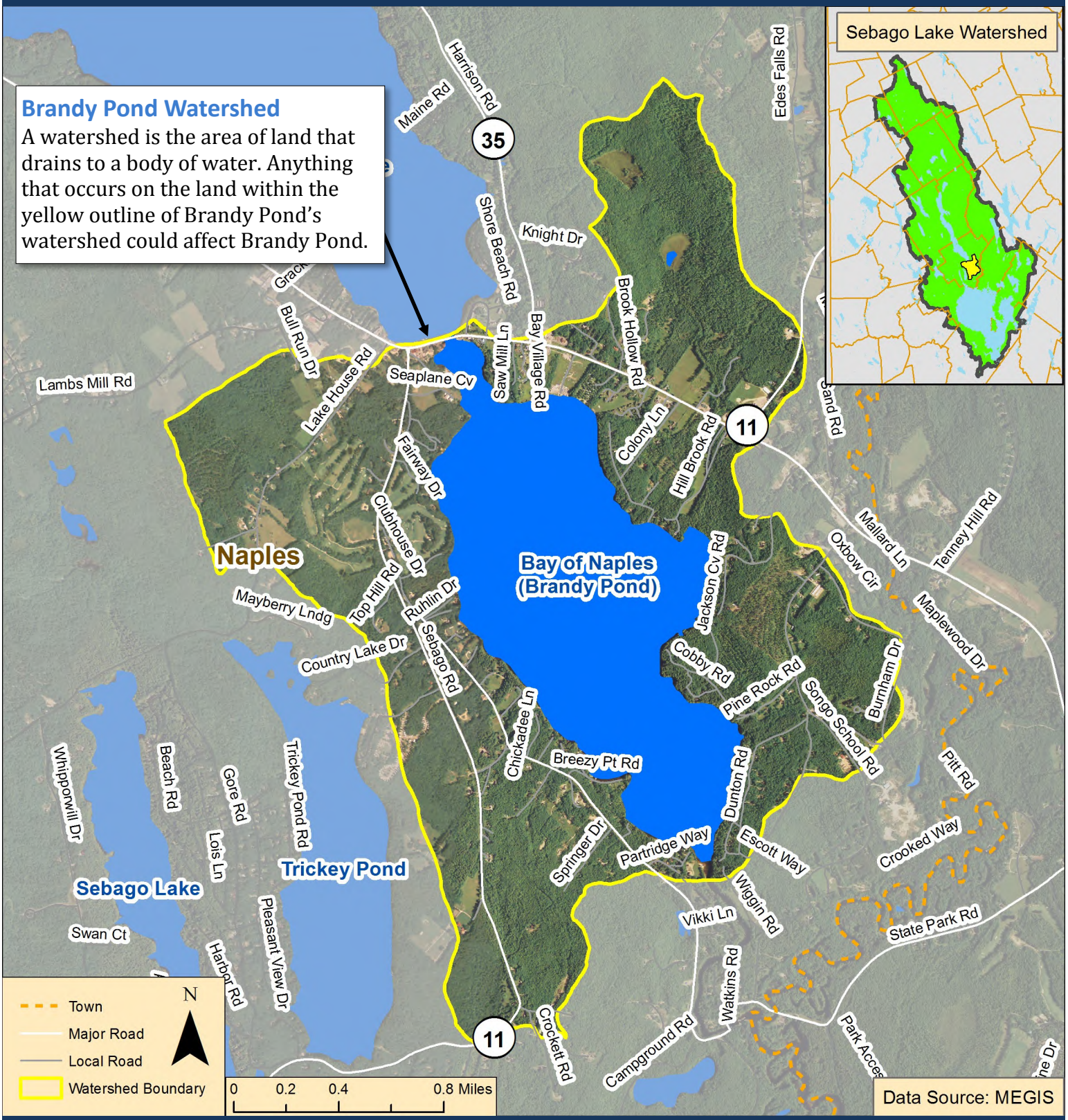
Visit: **www.cumberlandswcd.org**

Call: **Cumberland County Soil & Water Conservation District (207) 892-4700**

Brandy Pond is enjoyed by youth campers, summer residents, and the local community from Naples and beyond.

Volunteers and scientists have used Secchi disks (inset) to measure water clarity in lakes and seas since the late 1800s.

Brandy Pond and Surrounding Area.



Partners

This fact sheet was created under the Sebago Lake Watershed Assessment and Prioritization Project. Funding for this project was provided in part by the U.S. Environmental Protection Agency under Section 604(b) of the Clean Water Act. Section 604(b) grants are administered by the Maine Department of Environmental Protection (Maine DEP) in partnership with EPA. Project partners include Maine DEP, Portland Water District, Cumberland County Soil & Water Conservation District, Lakes Environmental Association, Maine Forest Service, and the Town of Standish.

Cumberland County Soil & Water Conservation District

Cumberland County Soil & Water Conservation District
35 Main Street, Suite 3 | Windham, ME 04062
207.892.4700 | www.cumberlandswcd.org
CCSWCD is an equal opportunity provider and employer.

Cold Rain Pond *Protecting Water Resources Region-Wide.*

Cold Rain Pond, Naples, Maine *Photo credit: Colin Holme*

Cold Rain Pond

Cold Rain Pond is in Naples, Maine, to the northwest of Sebago Lake. Nestled away among conserved lands, this pond is accessible only as a carry-in destination. It is a quiet fishing destination and is stocked with cold-water fish. Though the pond is near highly populated areas, a variety of collaborations have ensured that the shoreline of this pond remains undeveloped yet open for public use. Only one camp is on the pond's 1.7-mile shoreline.

Despite its pristine appearance, decreasing levels of oxygen in the pond and decreasing clarity are concerning. The pond drains 0.78 square miles of surrounding land. Recent development along Kimball Farm Road to the east may be affecting pond health. Cold Rain Pond has no stream inlets. It's one outlet is to the northwest, from where it feeds Peabody Pond.

Part of the Sebago Lake System

Cold Rain Pond's health is an important factor in the health of Sebago Lake, which is the source of drinking water for 15% of Maine's residents. Portland Water District (PWD) treats and delivers this water and is the largest water utility in Maine. PWD has a vested interest in keeping Sebago Lake clean and supports conservation efforts in the upland areas. The cleanliness and health of Sebago Lake likewise play an important role in the health of Casco Bay, found downstream.

Sebago Lake itself is the second largest lake in Maine. Approximately 361 square miles of land and numerous lakes, ponds, rivers, and streams in 24 towns drain into Sebago Lake. Over 80% of the land that surrounds the Lake is forested. Many partners work together to ensure a clean, healthy Sebago Lake.

Sebago Lake.

Cold Rain Pond Score Card.

What does this number mean?

- The total possible score is between 4 and 20.
- Each score is the sum of four equally important parts described on the page to the right. Each part is scored from 1 to 5, with 5 being the best.
- Higher numbers are better. The higher the number, the healthier the lake and surrounding area. The table to the right shows the scoring categories.

Overall Lake Score	Level of Concern
19-20	Lowest
16-18	Moderate-Low
12-15	Moderate
8-11	Moderate-High
4-7	Highest

Land Use

Changes in forested versus developed land over decades determined using satellite imagery.

2

Lake Health Trend

Changes in biological activity over at least ten years.

4

8

Partnerships

Activity of local organizations that protect and use the lake and availability of non point source data.

1

1

Current Lake Clarity

Chrolorophyll-*a,* phosphorus, and clarity measurements that indicate a lake's biological activity and nutrient levels.

Next steps for Cold Rain Pond: Strengthen local partnerships. Mitigate nonpoint pollution. Strengthen municipal ordinances.

How Healthy is Cold Rain Pond?

To preserve the health of Cold Rain Pond, modifications will be needed to area roads. Erosion of unpaved roads washes soil and nutrients into ponds, which can lead to algal blooms and decreased oxygen levels.

A vegetated buffer at the water's edge is beautiful and also helps to keep the lake clean. A swath of plants catches sediment and other pollutants before they enter the lake.

Land Use (scored 2 out of 5)

Most of the land that drains into Cold Rain Pond is woods, enabling soil to filter pollution. However, the rate development in the past quarter century may increase pond pollution from road erosion and runoff, since hard surfaces cannot filter or absorb rainfall or snowmelt.

Partnerships (scored 1 out of 5)

For this score, the presence and involvement of community groups and the possibility for fixing pollution problems were assessed. Cold Rain Pond did not have obvious opportunities to build partnerships and there also has not also not been a recent survey throughout the pond's land area.

Lake Health Trend (scored 4 out of 5)

Biological activity, as monitored over the past decade, indicates that Cold Rain Pond is healthy! The clean water trend has persisted even as many waterbodies in the area suffer from pollution washed off of the land. Residents can anticipate future years of clean water for recreation.

Current Lake Clarity (scored 1 out of 5)

Cold Rain Pond is susceptible to algal blooms, low oxygen levels, and a stressful environment for aquatic species. Low water clarity is often due to soil erosion and fertilizer washed off of land. Clarity is related to nutrient levels and biological productivity.

Landowners can implement many simple practices to help keep their lake clean. Providing a clear path to the lakefront can also prevent soil loss.

For More Information

To learn more about your local waterbody, resources for property owners, or the Sebago Lake Watershed Assessment and Prioritization Project:

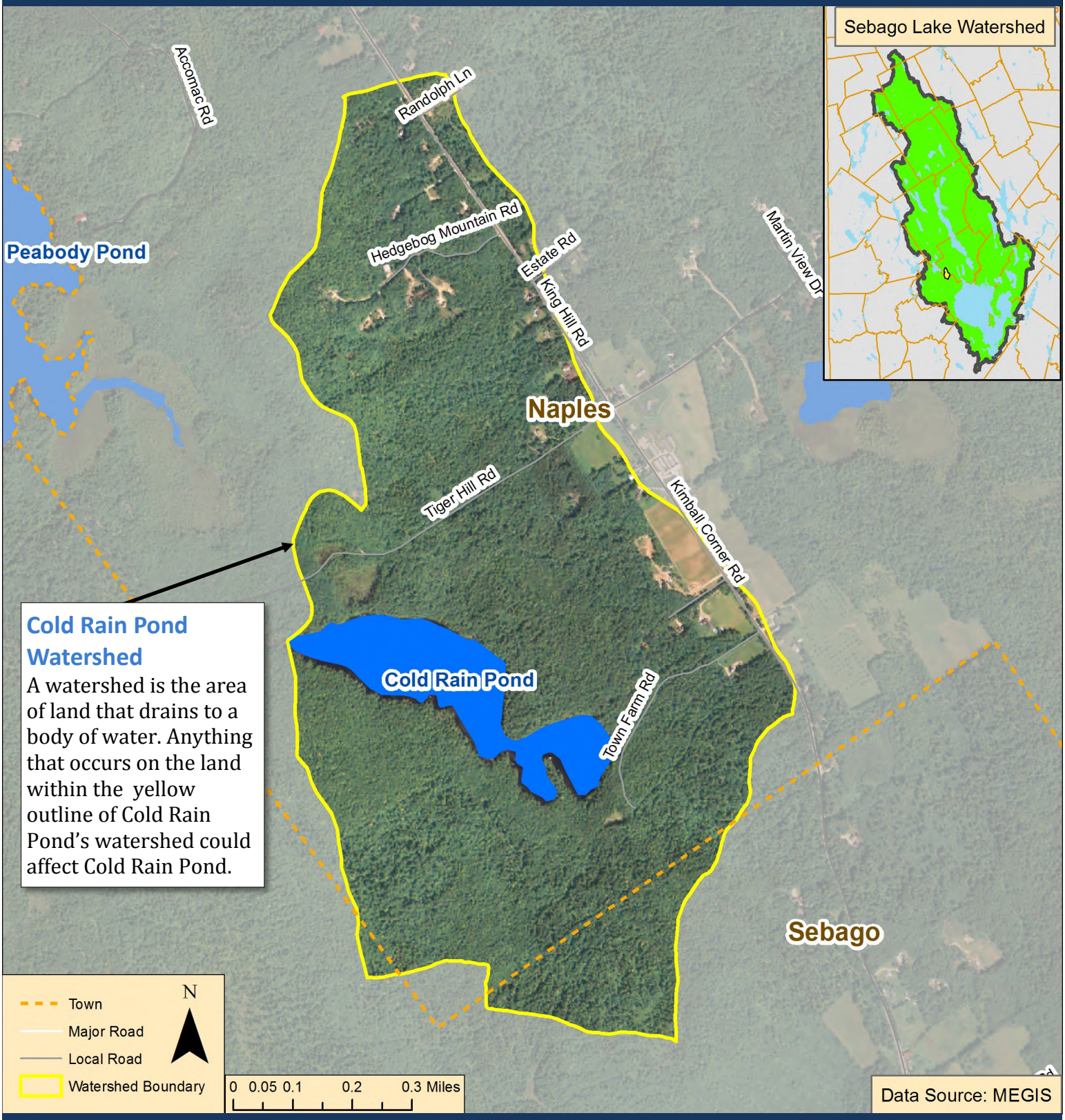
Visit: **www.cumberlandswcd.org**

Call: **Cumberland County Soil & Water Conservation District (207) 892-4700**

Cold Rain Pond is enjoyed by anglers and those looking for a respite from the development along other area waterbodies.

Volunteers and scientists have used Secchi disks (inset) to measure water clarity in lakes and seas since the late 1800s.

Cold Rain Pond and Surrounding Area.



Partners

This fact sheet was created under the Sebago Lake Watershed Assessment and Prioritization Project. Funding for this project was provided in part by the U.S. Environmental Protection Agency under Section 604(b) of the Clean Water Act. Section 604(b) grants are administered by the Maine Department of Environmental Protection (Maine DEP) in partnership with EPA. Project partners include Maine DEP, Portland Water District, Cumberland County Soil & Water Conservation District, Lakes Environmental Association, Maine Forest Service, and the Town of Standish.

Cumberland County Soil & Water Conservation District

Cumberland County Soil & Water Conservation District
35 Main Street, Suite 3 | Windham, ME 04062
207.892.4700 | www.cumberlandswcd.org

September 2015

Crescent Lake

Protecting Water Resources Region-Wide.

Crescent Lake, Raymond, Maine and Naples, Maine.

Crescent Lake

Crescent Lake is located in Raymond and Casco, Maine. The northernmost part of the lake is in Casco and the majority of the lake falls within Raymond, aligned north-south to the East of Route 85. Crescent Lake's 8.9-mile shoreline is developed with seasonal and year-round residences. Much of the land surrounding the Lake is undeveloped woods, and several feeder streams flow through these woods into Crescent Lake. The 2.5-mile long and half-mile wide lake provides ample recreation for area residents and seasonal visitors.

The Crescent Lake community has demonstrated a strong and ongoing commitment to protecting and improving Panther Pond. The community completed a NonPoint Source Watershed Protection Project program 2011-2013 and in 2015 received state funding to raise awareness of and fix erosion and pollution problems. Overall, Crescent Lake enjoys water quality that is, according to the Department of Environmental Protection, "above average" in Maine. This clean water flows out of Crescent Lake and into Panther Pond, which itself drains to Sebago Lake.

Part of the Sebago Lake System

Crescent Lake's health is an important factor in the health of Sebago Lake, which is the source of drinking water for 15% of Maine's residents. Portland Water District (PWD) treats and delivers this water and is the largest water utility in Maine. PWD has a vested interest in keeping Sebago Lake clean and supports conservation efforts in the upland areas. The cleanliness and health of Sebago Lake likewise play an important role in the health of Casco Bay, found downstream.

Sebago Lake itself is the second largest lake in Maine. Approximately 361 square miles of land and numerous lakes, ponds, rivers, and streams in 24 towns drain into Sebago Lake. Over 80% of the land that surrounds the Lake is forested. Many partners work together to ensure a clean, healthy Sebago Lake.

Sebago Lake.

Crescent Lake Score Card.

What does this number mean?

- The total possible score is between 4 and 20.
- Each score is the sum of four equally important parts described on the page to the right. Each part is scored from 1 to 5, with 5 being the best.
- Higher numbers are better. The higher the number, the healthier the lake and surrounding area. The table to the right shows the scoring categories.

Overall Lake Score	Level of Concern
19-20	Lowest
16-18	Moderate-Low
12-15	Moderate
8-11	Moderate-High
4-7	Highest

Land Use

Changes in forested versus developed land over decades determined using satellite imagery.

2

Lake Health Trend

Changes in biological activity over at least ten years.

4

14

Partnerships

Activity of local organizations that protect and use the lake and availability of non point source data.

4

4

Current Lake Clarity

Chrolorophyll-*a,* phosphorus, and clarity measurements that indicate a lake's biological activity and nutrient levels.

Next steps for Crescent Lake: Support existing partnerships to ensure continued good water quality.

How Healthy is Crescent Lake?

At Crescent Pond, volunteers gather to plant a buffer of woody shrubs in 2013.

A vegetated buffer at the water's edge is beautiful and also helps to keep the lake clean. A swath of plants catches sediment and other pollutants before they enter the lake.

Land Use (scored 2 out of 5)

Most of the land that drains into Crescent Lake is woods, enabling soil to filter pollution. However, the rate of development in the past quarter century may increase pond pollution from road erosion and runoff, since hard surfaces cannot filter or absorb rainfall or snowmelt.

Partnerships (scored 4 out of 5)

Crescent Lake has enjoyed an involved citizenry and well-established partners for decades. Community support has enabled collaboration among many partners. Small areas of erosion and pollution add up to impact on the lake, but the area needs an updated survey on these sites

Lake Health Trend (scored 4 out of 5)

Biological activity, as monitored over the past decade, indicates that Crescent Lake is healthy! The clean water trend has persisted even as many waterbodies in the area suffer from pollution washed off of the land. Residents can anticipate future years of clean water for recreation.

Current Lake Clarity (scored 4 out of 5)

Clean, clear water is found in Crescent Lake. Aquatic plants and animals are able to thrive and local residents are able to benefit from clear swimming water and healthy fish populations. The currently clear conditions could change if there are increases in polluted surface runoff.

Landowners can implement many simple practices to help keep their lake clean. Providing a clear path to the lakefront can also prevent soil loss.

For More Information

To learn more about your local waterbody, resources for property owners, or the Sebago Lake Watershed Assessment and Prioritization Project:

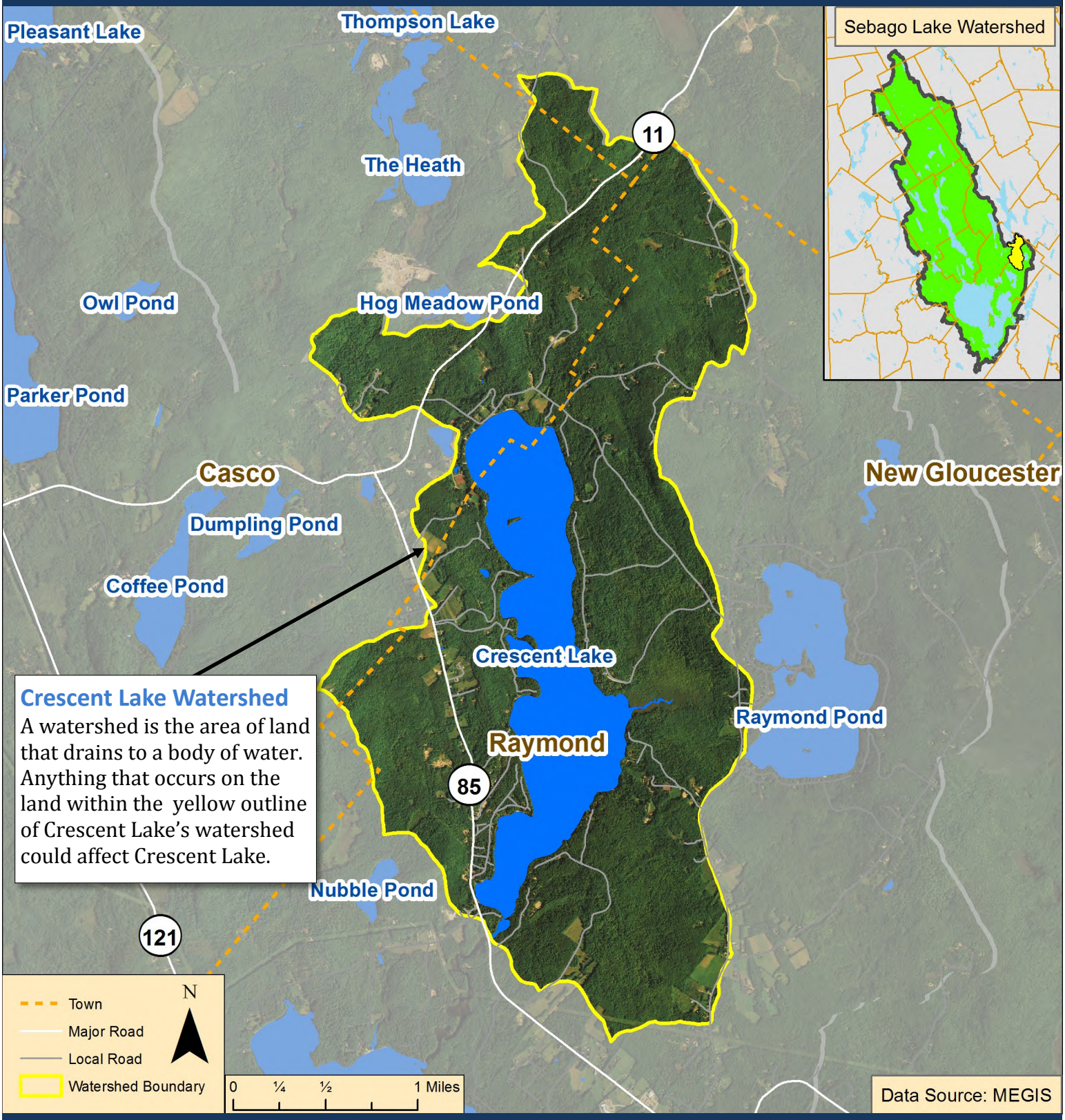
Visit: **www.cumberlandswcd.org**

Call: **Cumberland County Soil & Water Conservation District**

Crescent Pond is enjoyed by youth campers, summer residents, and the local community from Raymond and beyond.

Volunteers and scientists have used Secchi disks (inset) to measure water clarity in lakes and seas since the late 1800s.

Crescent Lake and Surrounding Area.



Partners

This fact sheet was created under the Sebago Lake Watershed Assessment and Prioritization Project. Funding for this project was provided in part by the U.S. Environmental Protection Agency under Section 604(b) of the Clean Water Act. Section 604(b) grants are administered by the Maine Department of Environmental Protection (Maine DEP) in partnership with EPA. Project partners include Maine DEP, Portland Water District, Cumberland County Soil & Water Conservation District, Lakes Environmental Association, Maine Forest Service, and the Town of Standish.

Cumberland County Soil & Water Conservation District

Cumberland County Soil & Water Conservation District
35 Main Street, Suite 3 | Windham, ME 04062
207.892.4700 | www.cumberlandswcd.org

September 2015

Crystal Lake

Protecting Water Resources Region-Wide.

Crystal Lake, Harrison, Maine. *Photo Credit: Colin Holme*

Crystal Lake

Crystal Lake, also referred to as Anonymous Pond, is located in Harrison, Maine. Route 117 (Norway Road) hugs the eastern shore of the pond for most of its length. Crystal Lake's 4.2-mile shoreline is developed with seasonal and year-round residences, a youth summer camp, and a lakefront campground. Much of the near-shore land has gravel roads and driveways, though much of the surrounding land is undeveloped woods, and feeder streams flow through these woods into Crystal Lake.

A public park at the north end of the lake provides easy public access and many enjoy fishing, swimming, and boating at Crystal Lake. Despite being a popular destination, Crystal Lake still enjoys clean water. Water flows out of Crystal Lake and into Long Lake and eventually makes its way into Sebago Lake.

Part of the Sebago Lake System

Crystal Lake's health is an important factor in the health of Sebago Lake, which is the source of drinking water for 15% of Maine's residents. Portland Water District (PWD) treats and delivers this water and is the largest water utility in Maine. PWD has a vested interest in keeping Sebago Lake clean and supports conservation efforts in the upland areas. The cleanliness and health of Sebago Lake likewise play an important role in the health of Casco Bay, found downstream.

Sebago Lake itself is the second largest lake in Maine. Approximately 361 square miles of land and numerous lakes, ponds, rivers, and streams in 24 towns drain into Sebago Lake. Over 80% of the land that surrounds the Lake is forested. Many partners work together to ensure a clean, healthy Sebago Lake.

Sebago Lake.

Crystal Lake Score Card.

What does this number mean?

- The total possible score is between 4 and 20.
- Each score is the sum of four equally important parts described on the page to the right. Each part is scored from 1 to 5, with 5 being the best.
- Higher numbers are better. The higher the number, the healthier the lake and surrounding area. The table to the right shows the scoring categories.

Overall Lake Score	Level of Concern
19-20	Lowest
16-18	Moderate-Low
12-15	Moderate
8-11	Moderate-High
4-7	Highest

Land Use

Changes in forested versus developed land over decades determined using satellite imagery.

1

Lake Health Trend

Changes in biological activity over at least ten years.

4

10

Partnerships

Activity of local organizations that protect and use the lake and availability of non point source data.

2

3

Current Lake Clarity

Chrolorophyll-*a,* phosphorus, and clarity measurements that indicate a lake's biological activity and nutrient levels.

Next steps for Crystal Lake: Strengthen partnerships, including with the town, to address increasing pollution problems.

How Healthy is Crystal Lake?

The Crystal Lake Watershed Survey found several improperly cared for unpaved roads. Above, a diversion bar directs surface runoff into vegetation to absorb the water, preventing it from flowing directly into the lake.

A vegetated buffer at the water's edge is beautiful and also helps to keep the lake clean. A swath of plants catches sediment and other pollutants before they enter the lake.

Land Use (scored 1 out of 5)

Most of the land that drains into Crystal Lake is woods, enabling soil to filter pollution. However, the high rate of development in the past quarter century may increase pond pollution from road erosion and runoff, since hard surfaces cannot filter or absorb rainfall or snowmelt.

Partnerships (scored 2 out of 5)

Crystal Lake received this Medium-Low partnership score based on community potential. There is opportunity to build partnerships among the 1-2 partners with enough investment. Additionally, an updated survey of the land area of the lake could enable qualifying for federal funding.

Lake Health Trend (scored 4 out of 5)

Biological activity, as monitored over the past decade, indicates that Crystal Lake is healthy! The clean water trend has persisted even as many waterbodies in the area suffer from pollution washed off of the land. Residents can anticipate future years of clean water for recreation.

Current Lake Clarity (scored 3 out of 5)

Crystal Lake's water clarity represents the middle range for upstream waters of Sebago Lake. Soil erosion and fertilizer washed off of land can decrease clarity, which is related to nutrient levels and biological productivity.

Landowners can implement many simple practices to help keep their lake clean. Providing a clear path to the lakefront can also prevent soil loss.

For More Information

To learn more about your local waterbody, resources for property owners, or the Sebago Lake Watershed Assessment and Prioritization Project:

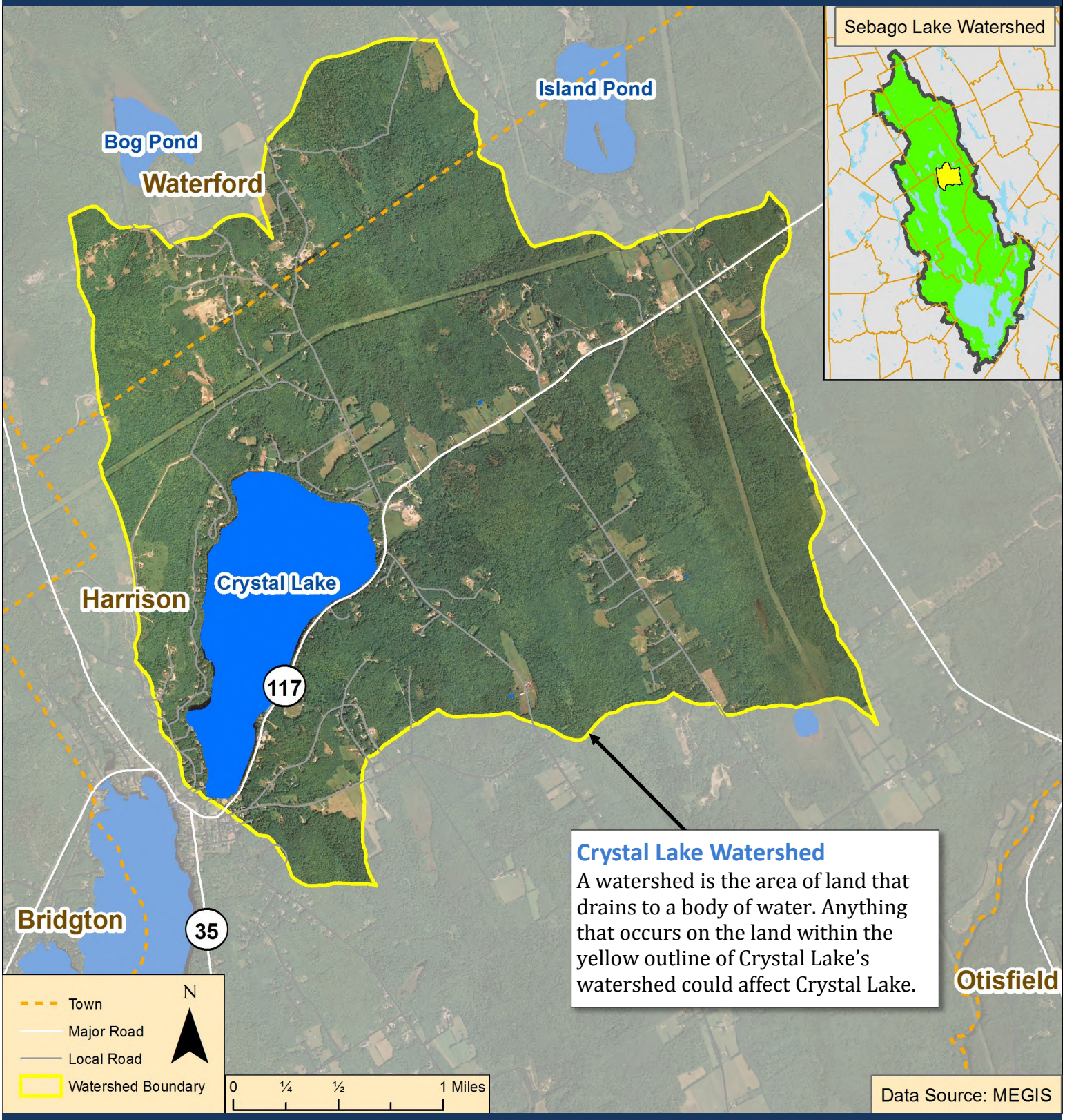
Visit: **www.cumberlandswcd.org**

Call: **Cumberland County Soil & Water Conservation District**

Crystal Lake is enjoyed by summer residents and the local community from Harrison and beyond.

Volunteers and scientists have used Secchi disks (inset) to measure water clarity in lakes and seas since the late 1800s.

Crystal Lake and Surrounding Area.



Partners

This fact sheet was created under the Sebago Lake Watershed Assessment and Prioritization Project. Funding for this project was provided in part by the U.S. Environmental Protection Agency under Section 604(b) of the Clean Water Act. Section 604(b) grants are administered by the Maine Department of Environmental Protection (Maine DEP) in partnership with EPA. Project partners include Maine DEP, Portland Water District, Cumberland County Soil & Water Conservation District, Lakes Environmental Association, Maine Forest Service, and the Town of Standish.

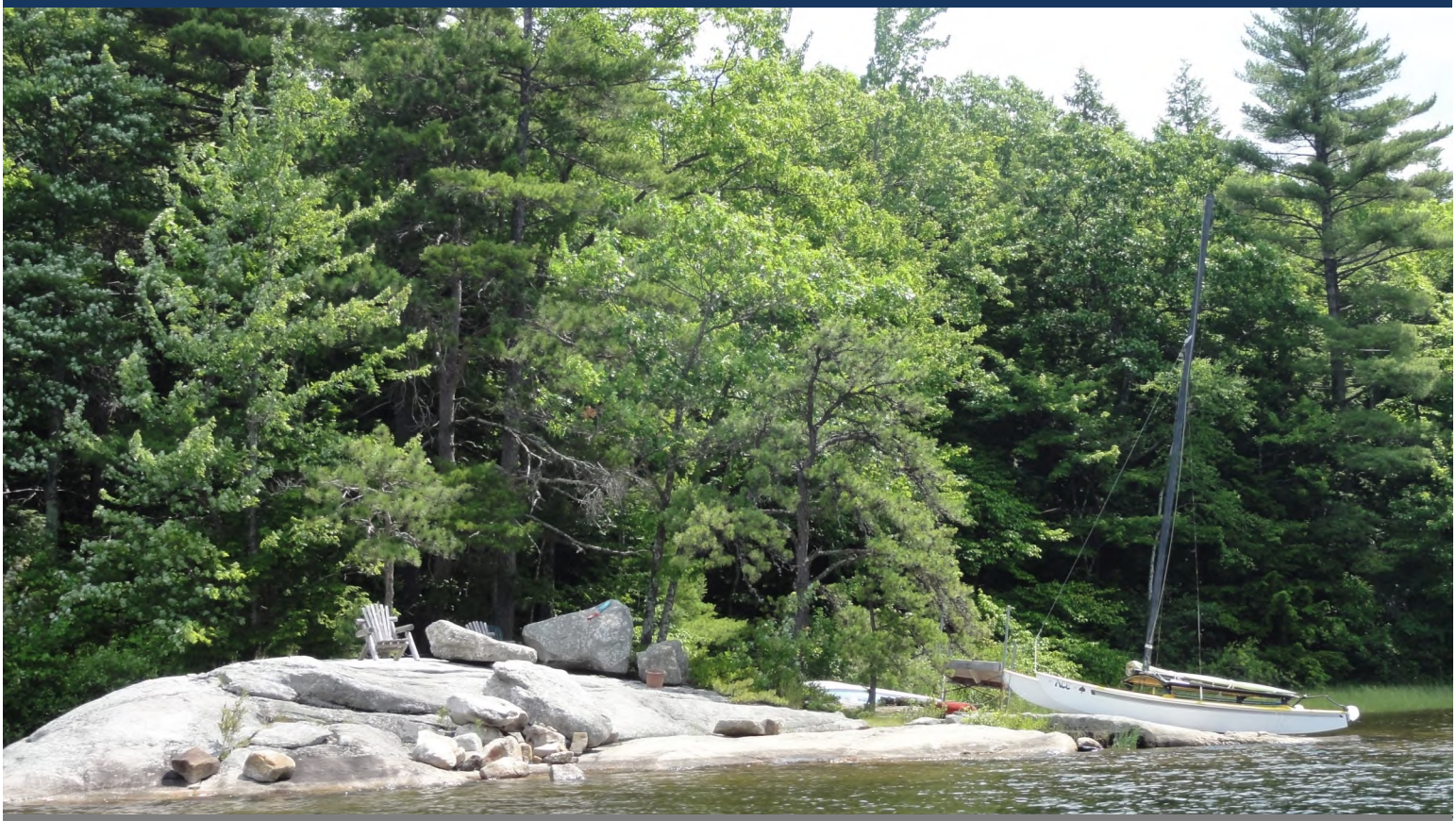
Cumberland County Soil & Water Conservation District

Cumberland County Soil & Water Conservation District
35 Main Street, Suite 3 | Windham, ME 04062
207.892.4700 | www.cumberlandswcd.org

Foster Pond

September 2015

Protecting Water Resources Region-Wide.



Foster Pond, Bridgton, Maine. *Photo Credit: Colin Holme*

Foster Pond

Foster Pond is in Bridgton, Maine, and is also sometimes called Ingalls Pond. It is fed by Holt's Pond to the north, which is part of a preserve. Foster Pond's 2.5-mile shoreline is somewhat developed with several residences, though much of the shoreline is still currently not developed. In fact, the land surrounding Foster Pond has actually become more wooded and covered with vegetation in the past decades, which is unique in a region that is undergoing significant development.

Recreational activities includes fishing, swimming, and boating; Foster Pond is stocked with brook trout by the State. Regional pollution concerns include runoff from gravel roads that aren't maintained properly. Overall, Foster Pond is quite clean and the biggest threat to its health may be the absence of strong area partners. Foster Pond drains into Peabody Pond to the south and the waters end up downstream in Sebago Lake.

Part of the Sebago Lake System

Foster Pond's health is an important factor in the health of Sebago Lake, which is the source of drinking water for 15% of Maine's residents. Portland Water District (PWD) treats and delivers this water and is the largest water utility in Maine. PWD has a vested interest in keeping Sebago Lake clean and supports conservation efforts in the upland areas. The cleanliness and health of Sebago Lake likewise play an important role in the health of Casco Bay, found downstream.

Sebago Lake itself is the second largest lake in Maine. Approximately 361 square miles of land and numerous lakes, ponds, rivers, and streams in 24 towns drain into Sebago Lake. Over 80% of the land that surrounds the Lake is forested. Many partners work together to ensure a clean, healthy Sebago Lake.

Sebago Lake.

Foster Pond Score Card.

What does this number mean?

- The total possible score is between 4 and 20.
- Each score is the sum of four equally important parts described on the page to the right. Each part is scored from 1 to 5, with 5 being the best.
- Higher numbers are better. The higher the number, the healthier the lake and surrounding area. The table to the right shows the scoring categories.

Overall Lake Score	Level of Concern
19-20	Lowest
16-18	Moderate-Low
12-15	Moderate
8-11	Moderate-High
4-7	Highest

Land Use

Changes in forested versus developed land over decades determined using satellite imagery.

5

Lake Health Trend

Changes in biological activity over at least ten years.

4

15

Partnerships

Activity of local organizations that protect and use the lake and availability of non point source data.

1

5

Current Lake Clarity

Chrolorophyll-*a,* phosphorus, and clarity measurements that indicate a lake's biological activity and nutrient levels.

Next steps for Foster Pond: Strengthen partnerships to ensure that the pond remains clean and healthy.

How Healthy is Foster Pond?

Other ponds in the area have enlisted volunteers to reduce soil erosion. Above, volunteers are planting shrubs and perennials to hold soil in place.

A vegetated buffer at the water's edge is beautiful and also helps to keep the lake clean. A swath of plants catches sediment and other pollutants before they enter the lake.

Land Use (scored 5 out of 5)

Most of the land that drains into Foster Pond is woods, enabling soil to filter pollution. Today, more land is covered with woods and vegetation than a quarter of a century ago! Regional pollution concerns include erosion from unpaved roads and runoff from chemically treated yards.

Partnerships (scored 1 out of 5)

For this score, the presence and involvement of community groups and the possibility for fixing pollution problems were assessed. Foster Pond did not have obvious opportunities to build partnerships and there also has not also not been a recent survey throughout the pond's land area.

Lake Health Trend (scored 4 out of 5)

Biological activity, as monitored over the past decade, indicates that Foster Pond is healthy. The clean water trend has persisted even as many waterbodies in the area suffer from pollution washed off of the land. Residents can anticipate future years of clean water for recreation.

Current Lake Clarity (scored 5 out of 5)

Clean, clear water is found in Foster Pond year-round. Aquatic plants and animals are able to thrive and local residents are able to benefit from the seemingly limitless recreation opportunities. The currently clear conditions indicate minimal polluted runoff from the surrounding land.

Landowners can implement many simple practices to help keep their lake clean. Providing a clear path to the lakefront can also prevent soil loss.

For More Information

To learn more about your local waterbody, resources for property owners, or the Sebago Lake Watershed Assessment and Prioritization Project:

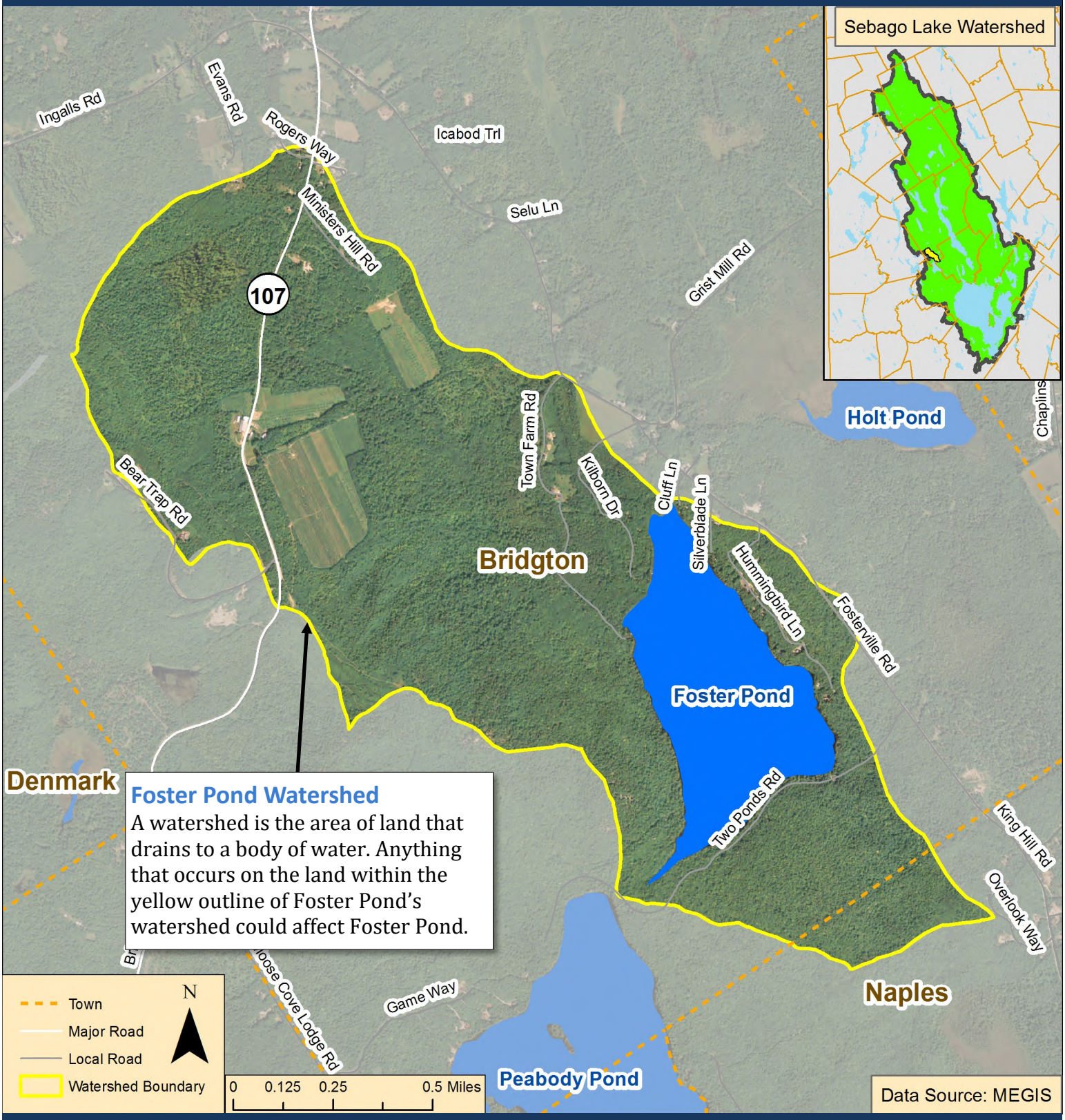
Visit: **www.cumberlandswcd.org**

Call: **Cumberland County Soil & Water Conservation District (207) 892-4700**

Foster Pond is enjoyed by youth campers, summer residents, and the local community from Raymond and beyond.

Volunteers and scientists have used Secchi disks (inset) to measure water clarity in lakes (shown here on Foster Pond) and seas since the late 1800s. *Photo credit: Colin Holme*

Foster Pond and Surrounding Area.



Partners

This fact sheet was created under the Sebago Lake Watershed Assessment and Prioritization Project. Funding for this project was provided in part by the U.S. Environmental Protection Agency under Section 604(b) of the Clean Water Act. Section 604(b) grants are administered by the Maine Department of Environmental Protection (Maine DEP) in partnership with EPA. Project partners include Maine DEP, Portland Water District, Cumberland County Soil & Water Conservation District, Lakes Environmental Association, Maine Forest Service, and the Town of Standish.

Cumberland County Soil & Water Conservation District

Cumberland County Soil & Water Conservation District
35 Main Street, Suite 3 | Windham, ME 04062
207.892.4700 | www.cumberlandswcd.org
CCSWCD is an equal opportunity provider and employer.

Highland Lake

Protecting Water Resources Region-Wide.

Highland Lake, Bridgton and Sweden, Maine.

Highland Lake

Highland Lake stretches from Bridgton to Sweden, Maine, between Routes 93 and 117. Highland Lake's 16.3-mile shoreline is developed with many camps, cottages, and summer residences. Much of the land surrounding the Lake is undeveloped woods, and many feeder streams flow through these woods into Highland Lake.

The south end of the Lake is home to the town beach and public boat launch. The northern end of the four mile long lake is more remote and more visited by wildlife enthusiasts. The Lake is popular for fishing, swimming, and other boating activities. In the winter, the lake also provides recreation such as ice fishing cross-country skiing, and snowmobiling. Overall, Highland Lake enjoys water quality that is, according to the Department of Environmental Protection, "above average" in Maine. This clean water feeds into parallel Long Lake, which eventually feeds Sebago Lake.

Part of the Sebago Lake System

Highland Lake's health is an important factor in the health of Sebago Lake, which is the source of drinking water for 15% of Maine's residents. Portland Water District (PWD) treats and delivers this water and is the largest water utility in Maine. PWD has a vested interest in keeping Sebago Lake clean and supports conservation efforts in the upland areas. The cleanliness and health of Sebago Lake likewise play an important role in the health of Casco Bay, found downstream.

Sebago Lake itself is the second largest lake in Maine. Approximately 361 square miles of land and numerous lakes, ponds, rivers, and streams in 24 towns drain into Sebago Lake. Over 80% of the land that surrounds the Lake is forested. Many partners work together to ensure a clean, healthy Sebago Lake.

Sebago Lake.

Highland Lake Score Card.

What does this number mean?

- The total possible score is between 4 and 20.
- Each score is the sum of four equally important parts described on the page to the right. Each part is scored from 1 to 5, with 5 being the best.
- Higher numbers are better. The higher the number, the healthier the lake and surrounding area. The table to the right shows the scoring categories.

Overall Lake Score	Level of Concern
19-20	Lowest
16-18	Moderate-Low
12-15	Moderate
8-11	Moderate-High
4-7	Highest

Land Use

Changes in forested versus developed land over decades determined using satellite imagery.

3

Lake Health Trend

Changes in biological activity over at least ten years.

4

13

Partnerships

Activity of local organizations that protect and use the lake and availability of non point source data.

3

3

Current Lake Clarity

Chrolorophyll-*a,* phosphorus, and clarity measurements that indicate a lake's biological activity and nutrient levels.

Next steps for Highland Lake: Strengthen partnerships, focus on mitigating pollution, and strengthen municipal ordinances.

How Healthy is Highland Lake?

The Highland Lake Watershed Project, which ended in 2008, reduced soil erosion around the lake. Area volunteers and members of supporting organizations installed improvements like the water diverter shown above.

A vegetated buffer at the water's edge is beautiful and also helps to keep the lake clean. A swath of plants catches sediment and other pollutants before they enter the lake.

Land Use (scored 3 out of 5)

Most of the land that drains into Highland Lake is woods, enabling soil to filter pollution. The overall % of woods and vegetated land has not changed much over the past quarter century. However, road erosion and yard care chemicals are common pollution sources in the region .

Partnerships (scored 3 out of 5)

The Highland Lake community has a few active partners who are committed to protecting the lake. Though partners can provide in-kind support, external financial support would help facilitate projects. An updated land survey would be needed to apply for federal funding.

Lake Health Trend (scored 4 out of 5)

Biological activity, as monitored over the past decade, indicates that Highland Lake is healthy! The clean water trend has persisted even as many waterbodies in the area suffer from pollution washed off of the land. Residents can anticipate future years of clean water for recreation.

Current Lake Clarity (scored 3 out of 5)

Highland Lake's water clarity represents the middle range for upstream waters of Sebago Lake. Soil erosion and fertilizer washed off of land can decrease clarity, which is related to nutrient levels and biological productivity.

Landowners can implement many simple practices to help keep their lake clean. Providing a clear path to the lakefront can also prevent soil loss.

For More Information

To learn more about your local waterbody, resources for property owners, or the Sebago Lake Watershed Assessment and Prioritization Project:

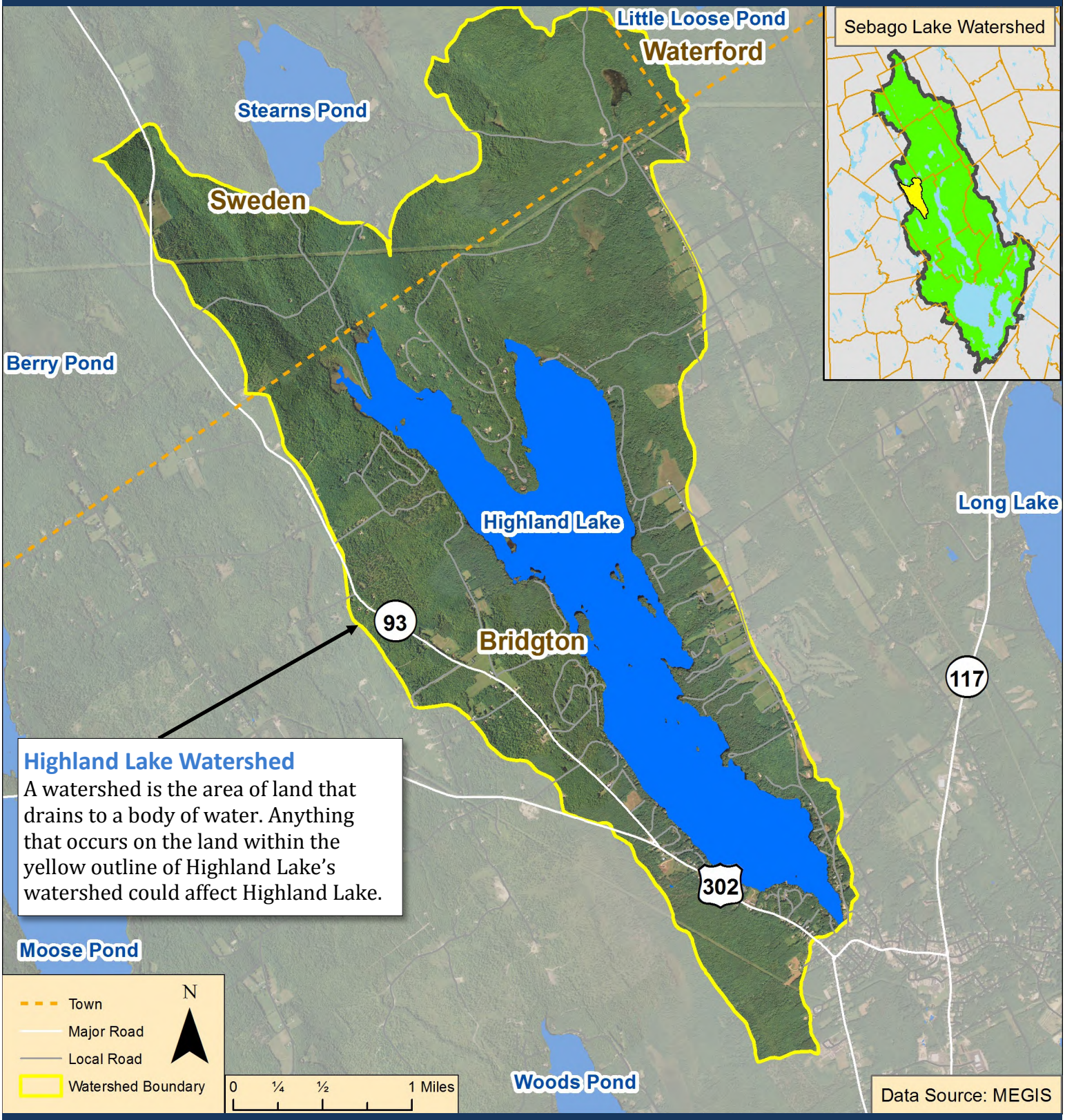
Visit: **www.cumberlandswcd.org**

Call: **Cumberland County Soil & Water Conservation District (207) 892-4700**

Highand Lake is enjoyed by youth campers, summer residents, and the local community.

Volunteers and scientists have used Secchi disks (inset) to measure water clarity in lakes and seas since the late 1800s.

Highland Lake and Surrounding Area.



Partners

This fact sheet was created under the Sebago Lake Watershed Assessment and Prioritization Project. Funding for this project was provided in part by the U.S. Environmental Protection Agency under Section 604(b) of the Clean Water Act. Section 604(b) grants are administered by the Maine Department of Environmental Protection (Maine DEP) in partnership with EPA. Project partners include Maine DEP, Portland Water District, Cumberland County Soil & Water Conservation District, Lakes Environmental Association, Maine Forest Service, and the Town of Standish.

Cumberland County Soil & Water Conservation District

Cumberland County Soil & Water Conservation District
35 Main Street, Suite 3 | Windham, ME 04062
207.892.4700 | www.cumberlandswcd.org

Island Pond

Protecting Water Resources Region-Wide.

Island Pond, Harrison and Waterford, Maine. *Photo Credit: Colin Holme*

Island Pond

Island Pond is located on the border between Harrison and Waterford, Maine, to the east of Temple Hill Road. Island Pond's 2.2-mile shoreline is home to only 16 residences and one summer camp for girls on the north and west. Much of the land surrounding the Lake is undeveloped woods that drain downhill into Island Pond. There is no stream inlet to the Pond.

In 2007, a survey of problematic erosion sites was performed to document areas of concern and to serve as an educational tool for citizens. The community has monitored Pond health since the 1980s, keeping track of changes in the water column. Recently, lower oxygen levels and decreased clarity are of concern to the community. Still, Island Pond is an enjoyable fishing destination. Each summer hundreds of summer campers enjoy its natural beauty. Island Pond's water feeds into the Crooked River, which itself feeds Sebago Lake.

Part of the Sebago Lake System

Island Pond's health is an important factor in the health of Sebago Lake, which is the source of drinking water for 15% of Maine's residents. Portland Water District (PWD) treats and delivers this water and is the largest water utility in Maine. PWD has a vested interest in keeping Sebago Lake clean and supports conservation efforts in the upland areas. The cleanliness and health of Sebago Lake likewise play an important role in the health of Casco Bay, found downstream.

Sebago Lake itself is the second largest lake in Maine. Approximately 361 square miles of land and numerous lakes, ponds, rivers, and streams in 24 towns drain into Sebago Lake. Over 80% of the land that surrounds the Lake is forested. Many partners work together to ensure a clean, healthy Sebago Lake.

Sebago Lake.

Island Pond Score Card.

What does this number mean?

- The total possible score is between 4 and 20.
- Each score is the sum of four equally important parts described on the page to the right. Each part is scored from 1 to 5, with 5 being the best.
- Higher numbers are better. The higher the number, the healthier the lake and surrounding area. The table to the right shows the scoring categories.

Overall Lake Score	Level of Concern
19-20	Lowest
16-18	Moderate-Low
12-15	Moderate
8-11	Moderate-High
4-7	Highest

Land Use

Changes in forested versus developed land over decades determined using satellite imagery.

3

Lake Health Trend

Changes in biological activity over at least ten years.

4

13

Partnerships

Activity of local organizations that protect and use the lake and availability of non point source data.

4

2

Current Lake Clarity

Chrolorophyll-*a,* phosphorus, and clarity measurements that indicate a lake's biological activity and nutrient levels.

Next steps for Island Pond: Focus on non-point source pollution mitigation to improve the health of the pond.

How Healthy is Island Pond?

In 2007, the Island Pond Survey found that erosion along the lakefront was concerning. Reducing soil erosion can be completed by area volunteers. Planting shrubs and perennials (as shown above) helps hold soil in place.

A vegetated buffer at the water's edge is beautiful and also helps to keep the lake clean. A swath of plants catches sediment and other pollutants before they enter the lake.

Land Use (scored 3 out of 5)

Most of the land that drains into Island Pond is woods, enabling soil to filter pollution. The overall % of woods and vegetated land has not changed much over the past quarter century. However, road erosion and yard care chemicals are common pollution sources in the region.

Partnerships (scored 4 out of 5)

The Island Pond community has a few active partners who are committed to protecting the lake. Partners comprehensively looked at non-point pollution sources in 2007. Updating this survey could potentially qualify Island Pond for federal funding opportunities.

Lake Health Trend (scored 4 out of 5)

Biological activity, as monitored over the past decade, indicates that Island Pond is healthy! The clean water trend has persisted even as many waterbodies in the area suffer from pollution washed off of the land. Residents can anticipate future years of clean water for recreation.

Current Lake Clarity (scored 2 out of 5)

Island Pond might be susceptible to algal blooms, low oxygen levels, and a stressful environment for aquatic species. Lower water clarity is often due to soil erosion and fertilizer washed off of land. Clarity is related to nutrient levels and biological productivity.

Landowners can implement many simple practices to help keep their lake clean. Providing a clear path to the lakefront can also prevent soil loss.

For More Information

To learn more about your local waterbody, resources for property owners, or the Sebago Lake Watershed Assessment and Prioritization Project:

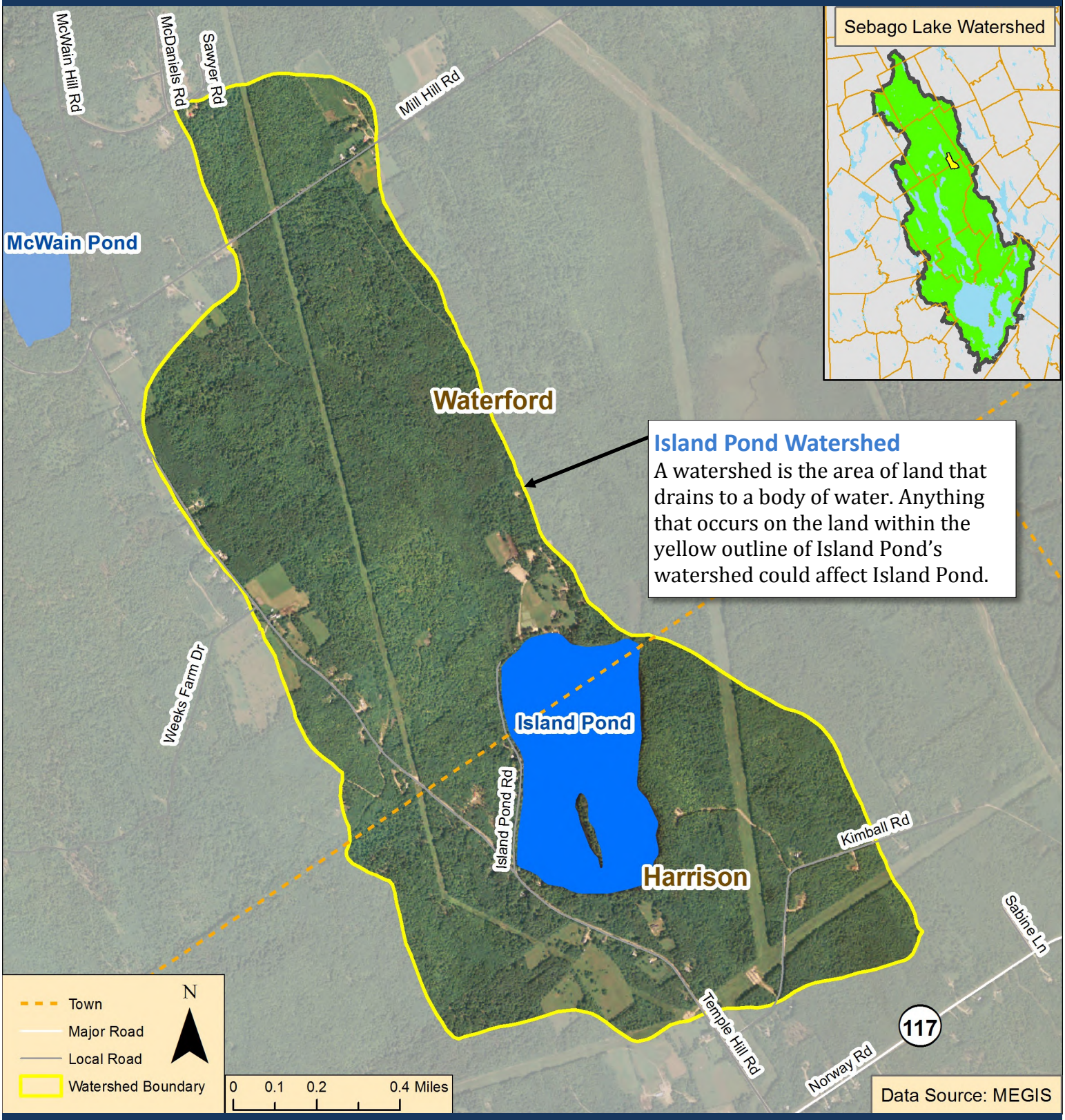
Visit: **www.cumberlandswcd.org**

Call: **Cumberland County Soil & Water Conservation District (207) 892-4700**

Island Pond is enjoyed by youth campers, summer residents, and the local community.

Volunteers and scientists have used Secchi disks (inset) to measure water clarity in lakes and seas since the late 1800s.

Island Pond and Surrounding Area.



Partners

This fact sheet was created under the Sebago Lake Watershed Assessment and Prioritization Project. Funding for this project was provided in part by the U.S. Environmental Protection Agency under Section 604(b) of the Clean Water Act. Section 604(b) grants are administered by the Maine Department of Environmental Protection (Maine DEP) in partnership with EPA. Project partners include Maine DEP, Portland Water District, Cumberland County Soil & Water Conservation District, Lakes Environmental Association, Maine Forest Service, and the Town of Standish.

Cumberland County Soil & Water Conservation District

Cumberland County Soil & Water Conservation District
35 Main Street, Suite 3 | Windham, ME 04062
207.892.4700 | www.cumberlandswcd.org

Keoka Lake

September 2015

Protecting Water Resources Region-Wide.

Keoka Lake, Waterford, Maine. *Photo Credit: Colin Holme*

Keoka Lake

Keoka Lake is located in Waterford, Maine, to the east of Route 35. Keoka Lake's 4.5-mile shoreline is home to over one hundred private lots and a lakefront beach campground at the southern end. Much of the land surrounding the Pond is undeveloped woods, and several feeder streams flow through these woods into Keoka Lake.

In 2002-2005, a watershed survey investigated and addressed problematic erosion sites. It also served as an educational tool for citizens. The community has monitored Pond health since the 1970s, keeping track of changes in the water column. Overall, Keoka Lake enjoys water quality that is, according to the Department of Environmental Protection, "slightly above average" in Maine. Keoka Lake's water exits to the south, where it heads to Bear Pond and eventually downstream into Sebago Lake.

Part of the Sebago Lake System

Keoka Lake's health is an important factor in the health of Sebago Lake, which is the source of drinking water for 15% of Maine's residents. Portland Water District (PWD) treats and delivers this water and is the largest water utility in Maine. PWD has a vested interest in keeping Sebago Lake clean and supports conservation efforts in the upland areas. The cleanliness and health of Sebago Lake likewise play an important role in the health of Casco Bay, found downstream.

Sebago Lake itself is the second largest lake in Maine. Approximately 361 square miles of land and numerous lakes, ponds, rivers, and streams in 24 towns drain into Sebago Lake. Over 80% of the land that surrounds the Lake is forested. Many partners work together to ensure a clean, healthy Sebago Lake.

Sebago Lake.

Keoka Lake Score Card.

What does this number mean?

- The total possible score is between 4 and 20.
- Each score is the sum of four equally important parts described on the page to the right. Each part is scored from 1 to 5, with 5 being the best.
- Higher numbers are better. The higher the number, the healthier the lake and surrounding area. The table to the right shows the scoring categories.

Overall Lake Score	Level of Concern
19-20	Lowest
16-18	Moderate-Low
12-15	Moderate
8-11	Moderate-High
4-7	Highest

Land Use

Changes in forested versus developed land over decades determined using satellite imagery.

3

Lake Health Trend

Changes in biological activity over at least ten years.

4

13

Partnerships

Activity of local organizations that protect and use the lake and availability of non point source data.

5

1

Current Lake Clarity

Chrolorophyll-*a,* phosphorus, and clarity measurements that indicate a lake's biological activity and nutrient levels.

Next steps for Keoka Lake: Focus on mitigating non-point source pollution to improve lake health.

How Healthy is Keoka Lake?

The Keoka Lake Improvement Project utilized area volunteers and members of supporting organizations to install measures to reduce soil erosion. Water diverters, shown above, reduce erosion of unpaved roads.

A vegetated buffer at the water's edge is beautiful and also helps to keep the lake clean. A swath of plants catches sediment and other pollutants before they enter the lake.

Land Use (scored 3 out of 5)

Most of the land that drains into Keoka Lake is woods, enabling soil to filter pollution. The overall % of woods and vegetated land has not changed much over the past quarter century. However, road erosion and yard care chemicals are common pollution sources in the region.

Partnerships (scored 5 out of 5)

Keoka Lake Pond has enjoyed an involved citizenry and has drawn outdoor enthusiasts for decades. Community support has enabled various improvement projects over the years, including recent work to prevent soil erosion from polluting the Lake.

Lake Health Trend (scored 4 out of 5)

Biological activity, as monitored over the past decade, indicates that Keoka Lake is healthy. The clean water trend has persisted even as many waterbodies in the area suffer from pollution washed off of the land. Residents can anticipate future years of clean water for recreation.

Current Lake Clarity (scored 1 out of 5)

Keoka Lake is susceptible to algal blooms, low oxygen levels, and a stressful environment for aquatic species. Low water clarity is often due to soil erosion and fertilizer washed off of land. Clarity is related to nutrient levels and biological productivity.

Landowners can implement many simple practices to help keep their lake clean. Providing a clear path to the lakefront can also prevent soil loss.

For More Information

To learn more about your local waterbody, resources for property owners, or the Sebago Lake Watershed Assessment and Prioritization Project:

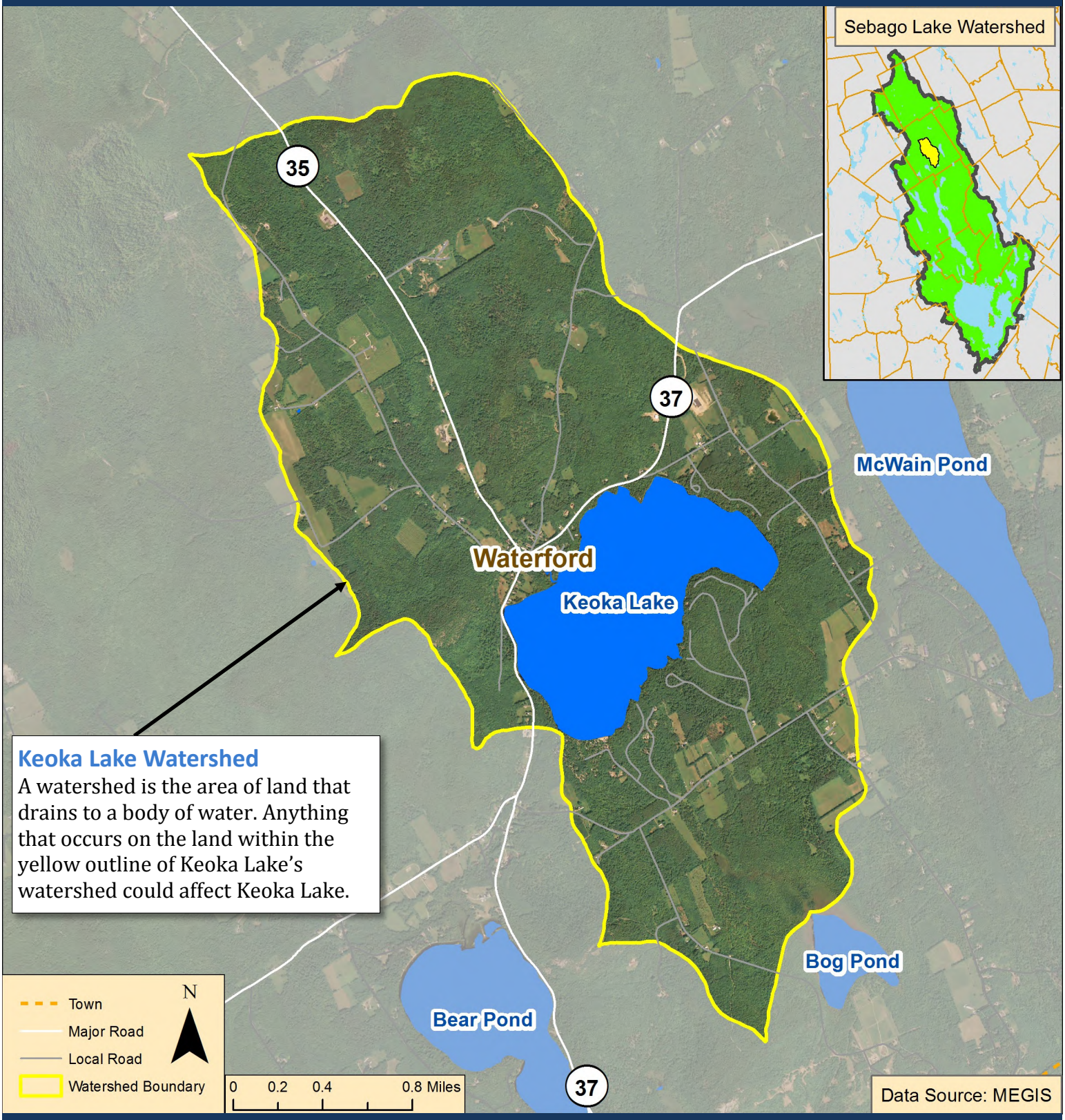
Visit: **www.cumberlandswcd.org**

Call: **Cumberland County Soil & Water Conservation District (207) 892-4700**

Keoka Lake is enjoyed by youth campers, summer residents, and the local community.

Volunteers and scientists have used Secchi disks (inset) to measure water clarity in lakes and seas since the late 1800s.

Keoka Lake and Surrounding Area.



Partners

This fact sheet was created under the Sebago Lake Watershed Assessment and Prioritization Project. Funding for this project was provided in part by the U.S. Environmental Protection Agency under Section 604(b) of the Clean Water Act. Section 604(b) grants are administered by the Maine Department of Environmental Protection (Maine DEP) in partnership with EPA. Project partners include Maine DEP, Portland Water District, Cumberland County Soil & Water Conservation District, Lakes Environmental Association, Maine Forest Service, and the Town of Standish.

Cumberland County Soil & Water Conservation District

Cumberland County Soil & Water Conservation District
35 Main Street, Suite 3 | Windham, ME 04062
207.892.4700 | www.cumberlandswcd.org

Little Moose Pond

September 2015

Protecting Water Resources Region-Wide.

Little Moose Pond, Waterford, Maine. *Photo Credit: Colin Holme*

Little Moose Pond

Little Moose Pond is located in the southwest corner of Waterford, Maine, in between Routes 93 and 35/37. Little Moose Pond's 3.7-miles shoreline is sparsely developed with only a few camps and residences. Much of the land surrounding the Pond is undeveloped woods and includes land over the town line in Sweden.

The Pond's health and water science has been monitored since the 1980s. During that time, the pond has remained clear and consistently supported warm and coldwater fish. The quiet pond draws people to paddle, fish, and explore the rocky ledges and coves. Water from Little Moose Pond makes its way downstream, passing through other ponds and streams before entering Sebago Lake.

Part of the Sebago Lake System

Little Moose Pond's health is an important factor in the health of Sebago Lake, which is the source of drinking water for 15% of Maine's residents. Portland Water District (PWD) treats and delivers this water and is the largest water utility in Maine. PWD has a vested interest in keeping Sebago Lake clean and supports conservation efforts in the upland areas. The cleanliness and health of Sebago Lake likewise play an important role in the health of Casco Bay, found downstream.

Sebago Lake itself is the second largest lake in Maine. Approximately 361 square miles of land and numerous lakes, ponds, rivers, and streams in 24 towns drain into Sebago Lake. Over 80% of the land that surrounds the Lake is forested. Many partners work together to ensure a clean, healthy Sebago Lake.

Sebago Lake.

Little Moose Pond Score Card.

What does this number mean?

- The total possible score is between 4 and 20.
- Each score is the sum of four equally important parts described on the page to the right. Each part is scored from 1 to 5, with 5 being the best.
- Higher numbers are better. The higher the number, the healthier the lake and surrounding area. The table to the right shows the scoring categories.

Overall Lake Score	Level of Concern
19-20	Lowest
16-18	Moderate-Low
12-15	Moderate
8-11	Moderate-High
4-7	Highest

Land Use

Changes in forested versus developed land over decades determined using satellite imagery.

4

Lake Health Trend

Changes in biological activity over at least ten years.

2

12

Partnerships

Activity of local organizations that protect and use the lake and availability of non point source data.

1

5

Current Lake Clarity

Chrolorophyll-*a,* phosphorus, and clarity measurements that indicate a lake's biological activity and nutrient levels.

Next steps for Little Moose Pond: Strengthen partnerships to ensure continued pond health.

How Healthy is Little Moose Pond?

Soil erosion is a common concern around the region's lakes and ponds. Above, a water diverter on another lake minimizes erosion by funneling surface water into a vegetated swath to the side of the road.

A vegetated buffer at the water's edge is beautiful and also helps to keep the lake clean. A swath of plants catches sediment and other pollutants before they enter the lake.

Land Use (scored 4 out of 5)

Most of the land that drains into Little Moose Pond is woods, enabling soil to filter pollution. Today, slightly more land is covered with woods and vegetation than a quarter of a century ago. Regional pollution concerns include erosion from unpaved roads and excess yardcare chemicals.

Partnerships (scored 1 out of 5)

For this score, the presence and involvement of community groups and the possibility for fixing pollution problems were assessed. Little Moose Pond did not have obvious opportunities to build partnerships. There also has not also not been a recent survey throughout the pond's land area.

Lake Health Trend (scored 2 out of 5)

Biological activity, as monitored over the past decade, indicates that Little Moose Pond has become less healthy for pond life. Surface runoff from surrounding land often contains soil and excess nutrients, leading to too much algal growth and lower oxygen levels in the water.

Current Lake Clarity (scored 5 out of 5)

Clean, clear water is found in Little Moose Pond year-round. Aquatic plants and animals are able to thrive and local residents are able to benefit from the seemingly limitless recreation opportunities. The currently clear conditions indicate minimal polluted runoff from the surrounding land.

Landowners can implement many simple practices to help keep their lake clean. Providing a clear path to the lakefront can also prevent soil loss.

For More Information

To learn more about your local waterbody, resources for property owners, or the Sebago Lake Watershed Assessment and Prioritization Project:

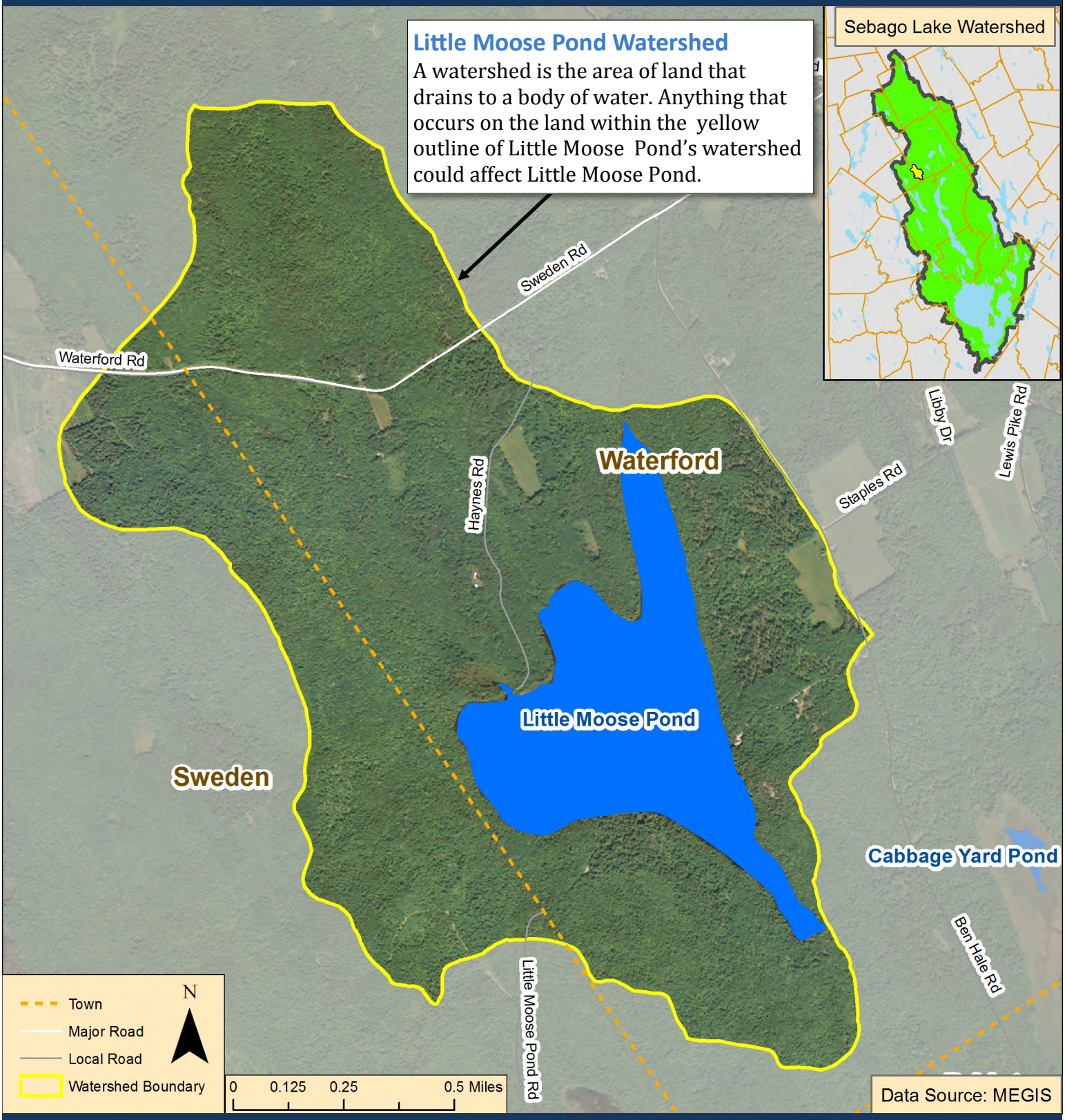
Visit: **www.cumberlandswcd.org**

Call: **Cumberland County Soil & Water Conservation District (207) 892-4700**

The quiet on Little Moose Pond is enjoyed by area residents.

Volunteers and scientists have used Secchi disks (inset) to measure water clarity in lakes and seas since the late 1800s.

Little Moose Pond and Surrounding Area.



Partners

This fact sheet was created under the Sebago Lake Watershed Assessment and Prioritization Project. Funding for this project was provided in part by the U.S. Environmental Protection Agency under Section 604(b) of the Clean Water Act. Section 604(b) grants are administered by the Maine Department of Environmental Protection (Maine DEP) in partnership with EPA. Project partners include Maine DEP, Portland Water District, Cumberland County Soil & Water Conservation District, Lakes Environmental Association, Maine Forest Service, and the Town of Standish.

Cumberland County Soil & Water Conservation District

Cumberland County Soil & Water Conservation District
35 Main Street, Suite 3 | Windham, ME 04062
207.892.4700 | www.cumberlandswcd.org

Long Lake

September 2015

Protecting Water Resources Region-Wide.

Long Lake, Bridgton, Harrison, and Naples Maine.

Long Lake

Long Lake is located in Bridgton, Harrison, and Naples, Maine, between Routes 302 and 35. Long Lake's 38.1-mile shoreline is developed with many seasonal and year-round residences, two public boat launches, and several tie-up locations for boaters to patronize local businesses. Despite this shoreline development, much of the land surrounding the Long Lake is still undeveloped woods. Long Lake is fed at its northern end from Crystal Lake in Harrison and Waterford.

The 11-mile north-south stretch provides ample space for its many boaters, swimmers, and anglers. Long Lake is the second largest waterbody in southern Maine. The community around Long Lake has demonstrated a strong and ongoing commitment to protecting the Lake, continually monitoring the Lake since the 1970s. In 2006-2007, funding was secured to reduce soil erosion into the lake. Area youth installed several measures to improve the health of the Lake. Overall, Long Lake enjoys water quality that is, according to the Department of Environmental Protection, "slightly above average" in Maine. Long Lake's water flows out at its southern end, entering Brandy Pond which then flows into Sebago Lake.

Part of the Sebago Lake System

Long Lake's health is an important factor in the health of Sebago Lake, which is the source of drinking water for 15% of Maine's residents. Portland Water District (PWD) treats and delivers this water and is the largest water utility in Maine. PWD has a vested interest in keeping Sebago Lake clean and supports conservation efforts in the upland areas. The cleanliness and health of Sebago Lake likewise play an important role in the health of Casco Bay, found downstream.

Sebago Lake itself is the second largest lake in Maine. Approximately 361 square miles of land and numerous lakes, ponds, rivers, and streams in 24 towns drain into Sebago Lake. Over 80% of the land that surrounds the Lake is forested. Many partners work together to ensure a clean, healthy Sebago Lake.

Sebago Lake.

Long Lake Score Card.

What does this number mean?

- The total possible score is between 4 and 20.
- Each score is the sum of four equally important parts described on the page to the right. Each part is scored from 1 to 5, with 5 being the best.
- Higher numbers are better. The higher the number, the healthier the lake and surrounding area. The table to the right shows the scoring categories.

Overall Lake Score	Level of Concern
19-20	Lowest
16-18	Moderate-Low
12-15	Moderate
8-11	Moderate-High
4-7	Highest

Land Use

Changes in forested versus developed land over decades determined using satellite imagery.

2

Lake Health Trend

Changes in biological activity over at least ten years.

5

14

Partnerships

Activity of local organizations that protect and use the lake and availability of non point source data.

4

3

Current Lake Clarity

Chrolorophyll-*a,* phosphorus, and clarity measurements that indicate a lake's biological activity and nutrient levels.

Next steps for Long Lake: Focus on mitigating non-point source pollution to improve lake health.

How Healthy is Long Lake?

Soil erosion is a common concern around the region's lakes and ponds. Above, Long Lake Youth Conservation Corps (2007) members install a water diverter to direct water to the side of the pathway instead of carrying soil into the Lake.

A vegetated buffer at the water's edge is beautiful and also helps to keep the lake clean. A swath of plants catches sediment and other pollutants before they enter the lake.

Land Use (scored 2 out of 5)

Most of the land that drains into Long Lake is woods, enabling soil to filter pollution. However, the rate of development in the past quarter century may increase pond pollution from road erosion and runoff, since hard surfaces cannot filter or absorb rainfall or snowmelt.

Partnerships (scored 4 out of 5)

Long Lake has enjoyed an involved citizenry and well-established partners for decades. Community support has enabled collaboration among the town, property owners, and road associations. Together they identified several locations to prevent soil erosion.

Lake Health Trend (scored 5 out of 5)

Biological activity levels indicate that Long Lake has exceptionally clean water and that the lake may be healthier than a decade ago. Community members can be proud of actions to prevent soil erosion, to allow the ground to absorb water, and to reduce chemicals used on their yards.

Current Lake Clarity (scored 3 out of 5)

Long Lake's water clarity represents the middle range for upstream waters of Sebago Lake. Soil erosion and fertilizer washed off of land can decrease clarity, which is related to nutrient levels and biological productivity.

Landowners can implement many simple practices to help keep their lake clean. Providing a clear path to the lakefront can also prevent soil loss.

For More Information

To learn more about your local waterbody, resources for property owners, or the Sebago Lake Watershed Assessment and Prioritization Project:

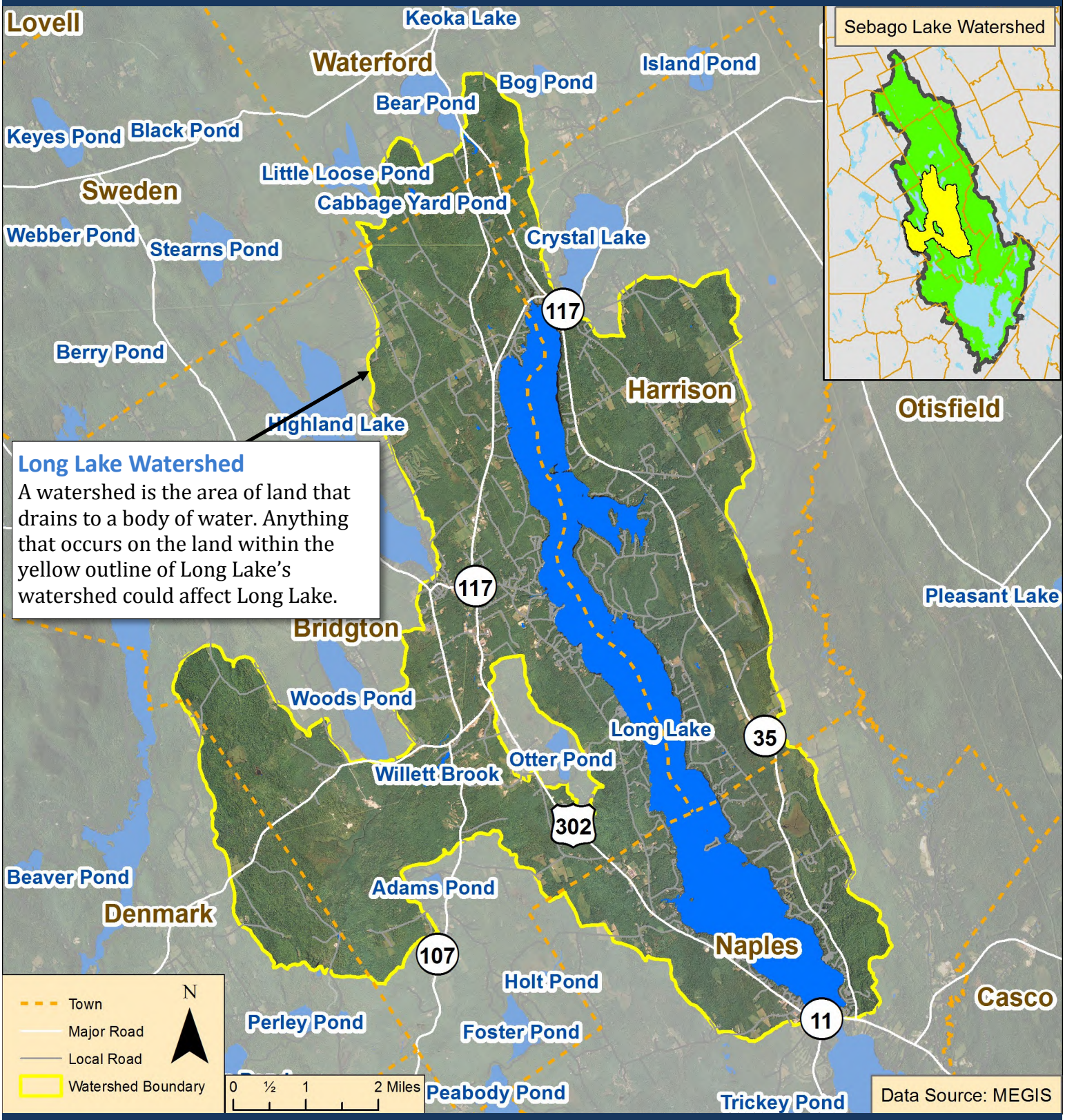
Visit: **www.cumberlandswcd.org**

Call: **Cumberland County Soil & Water Conservation District (207) 892-4700**

Long Lake is enjoyed by youth campers, summer residents, and the local community.

Volunteers and scientists have used Secchi disks (inset) to measure water clarity in lakes and seas since the late 1800s.

Long Lake and Surrounding Area.



Partners

This fact sheet was created under the Sebago Lake Watershed Assessment and Prioritization Project. Funding for this project was provided in part by the U.S. Environmental Protection Agency under Section 604(b) of the Clean Water Act. Section 604(b) grants are administered by the Maine Department of Environmental Protection (Maine DEP) in partnership with EPA. Project partners include Maine DEP, Portland Water District, Cumberland County Soil & Water Conservation District, Lakes Environmental Association, Maine Forest Service, and the Town of Standish.

Cumberland County Soil & Water Conservation District

Cumberland County Soil & Water Conservation District
35 Main Street, Suite 3 | Windham, ME 04062
207.892.4700 | www.cumberlandswcd.org

McWain Pond

Protecting Water Resources Region-Wide.

McWain Pond, Waterford, Maine. *Photo Credit: Colin Holme*

McWain Pond

McWain Pond, previously called Long Pond, is located in Waterford, Maine, south of Route 37. McWain Pond's 3.7-mile shoreline is developed with over 70 year-round and summer residences as well as two youth summer camps. The pond itself is about 2 miles long and a half mile wide. Almost 4 square miles of surrounding land drain into the Pond, much of which is undeveloped woods.

The water in the pond has been monitored since the 1970s. Community concerns about pollution from development prompted a volunteer-led survey of erosion sources surrounding the pond. Subsequently, many hands worked to implement many of the suggested erosion-control practices in the mid-2000's. Overall, McWain Pond enjoys water quality that is, according to the Department of Environmental Protection, "slightly above average" in Maine. This clean water flows out of McWain Pond and into the Crooked River, which winds its way to Sebago Lake.

Part of the Sebago Lake System

McWain Pond's health is an important factor in the health of Sebago Lake, which is the source of drinking water for 15% of Maine's residents. Portland Water District (PWD) treats and delivers this water and is the largest water utility in Maine. PWD has a vested interest in keeping Sebago Lake clean and supports conservation efforts in the upland areas. The cleanliness and health of Sebago Lake likewise play an important role in the health of Casco Bay, found downstream.

Sebago Lake itself is the second largest lake in Maine. Approximately 361 square miles of land and numerous lakes, ponds, rivers, and streams in 24 towns drain into Sebago Lake. Over 80% of the land that surrounds the Lake is forested. Many partners work together to ensure a clean, healthy Sebago Lake.

Sebago Lake.

McWain Pond Score Card.

What does this number mean?

- The total possible score is between 4 and 20.
- Each score is the sum of four equally important parts described on the page to the right. Each part is scored from 1 to 5, with 5 being the best.
- Higher numbers are better. The higher the number, the healthier the lake and surrounding area. The table to the right shows the scoring categories.

Overall Lake Score	Level of Concern
19-20	Lowest
16-18	Moderate-Low
12-15	Moderate
8-11	Moderate-High
4-7	Highest

Land Use

Changes in forested versus developed land over decades determined using satellite imagery.

2

Lake Health Trend

Changes in biological activity over at least ten years.

4

12

Partnerships

Activity of local organizations that protect and use the lake and availability of non point source data.

3

3

Current Lake Clarity

Chrolorophyll-*a,* phosphorus, and clarity measurements that indicate a lake's biological activity and nutrient levels.

Next steps for McWain Pond: Strengthen partnerships, focus on mitigating pollution, and strengthen municipal ordinances.

How Healthy is McWain Pond?

The McWain Pond Watershed Survey, which ended in 2007, reduced soil erosion around the lake. Area volunteers and members of supporting organizations installed improvements like the water diverter shown above.

A vegetated buffer at the water's edge is beautiful and also helps to keep the lake clean. A swath of plants catches sediment and other pollutants before they enter the lake.

Land Use (scored 2 out of 5)

Most of the land that drains into McWain Pond is woods, enabling soil to filter pollution. However, the rate of development in the past quarter century may increase pond pollution from road erosion and runoff, since hard surfaces cannot filter or absorb rainfall or snowmelt.

Partnerships (scored 3 out of 5)

The McWain Pond community has a few active partners who are committed to protecting the lake. External financial support helps facilitate projects. Small areas of erosion and pollution add up to impact on the lake, but the area needs an updated survey on these sites.

Lake Health Trend (scored 4 out of 5)

Biological activity, as monitored over the past decade, indicates that Bear Pond is healthy! The clean water trend has persisted even as many waterbodies in the area suffer from pollution washed off of the land. Residents can anticipate future years of clean water for recreation.

Current Lake Clarity (scored 3 out of 5)

McWain Pond's water clarity represents the middle range for upstream waters of Sebago Lake. Soil erosion and fertilizer washed off of land can decrease clarity, which is related to nutrient levels and biological productivity.

Landowners can implement many simple practices to help keep their lake clean. Providing a clear path to the lakefront can also prevent soil loss.

For More Information

To learn more about your local waterbody, resources for property owners, or the Sebago Lake Watershed Assessment and Prioritization Project:

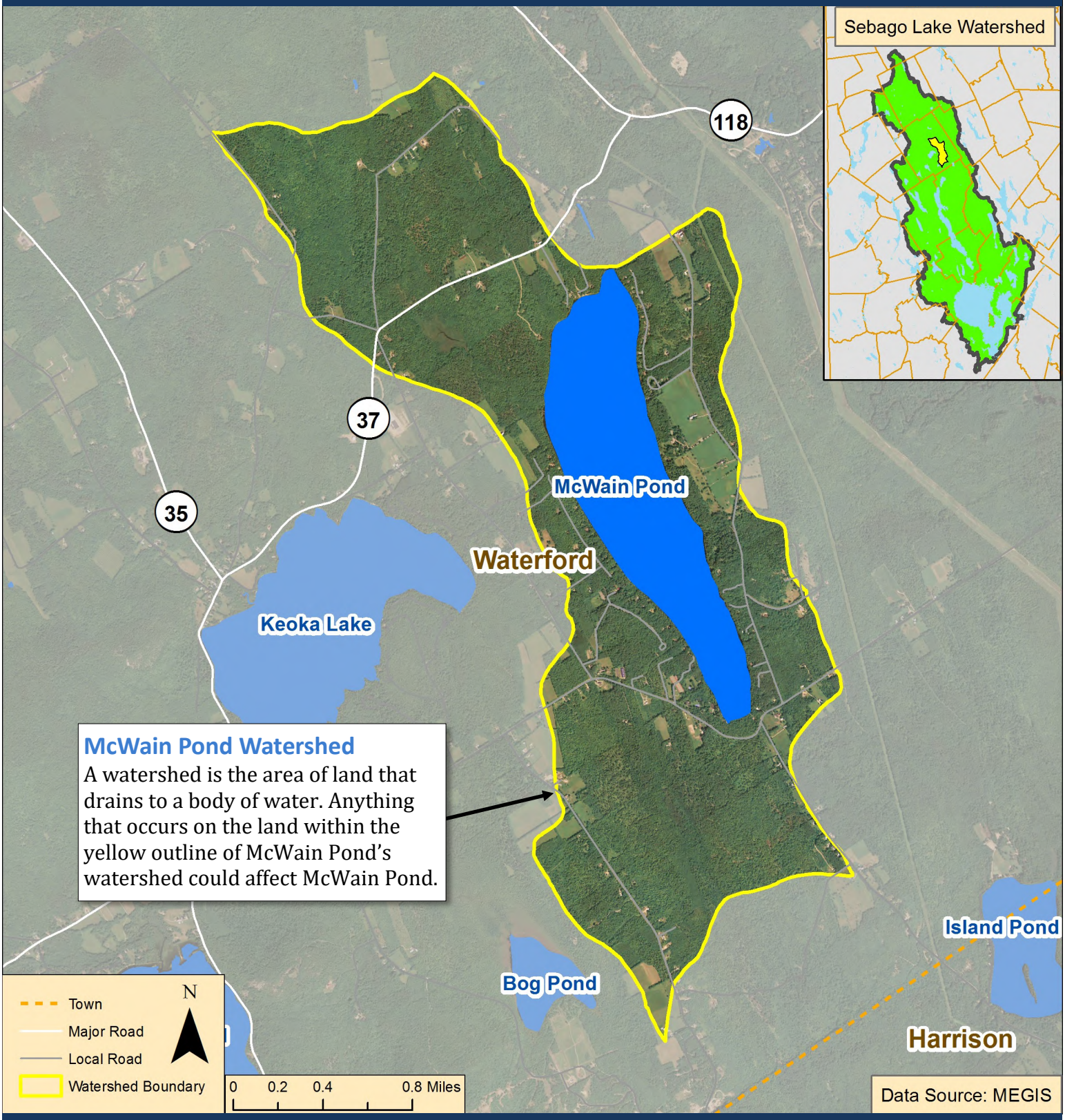
Visit: **www.cumberlandswcd.org**

Call: **Cumberland County Soil & Water Conservation District (207) 892-4700**

McWain Pond is enjoyed by youth campers, summer residents, and the local community from Waterford and beyond.

Volunteers and scientists have used Secchi disks (inset) to measure water clarity in lakes and seas since the late 1800s.

McWain Pond and Surrounding Area.



Partners

This fact sheet was created under the Sebago Lake Watershed Assessment and Prioritization Project. Funding for this project was provided in part by the U.S. Environmental Protection Agency under Section 604(b) of the Clean Water Act. Section 604(b) grants are administered by the Maine Department of Environmental Protection (Maine DEP) in partnership with EPA. Project partners include Maine DEP, Portland Water District, Cumberland County Soil & Water Conservation District, Lakes Environmental Association, Maine Forest Service, and the Town of Standish.

Cumberland County Soil & Water Conservation District

Cumberland County Soil & Water Conservation District
35 Main Street, Suite 3 | Windham, ME 04062
207.892.4700 | www.cumberlandswcd.org

Otter Pond

September 2015

Protecting Water Resources Region-Wide.

Otter Pond, Bridgton, Maine. *Photo Credit: Colin Holme*

Otter Pond

Otter Pond is located in Bridgton, Maine, just east of Rote 302 and between the road and Long Lake. Otter Pond's 1.9-mile shoreline is lightly developed with camps, though it is a popular summer destination. Much of the land surrounding the Pond is undeveloped woods, allowing the soil to absorb surface flow and filter pollution.

Recent development along and around the pond have affected the clarity of the pond water. The community has monitored the Pond since the late 1980s, gathering basic chemical data as well as Secchi disk depths as a measure of pond clarity. The data gathered is helpful in identifying how to maintain a healthy Otter Pond, which is described as being at some risk of an algal blooms due to pollution entering the pond. Otter Pond's water flows downstream into Long Lake and eventually into Sebago Lake.

Part of the Sebago Lake System

Otter Pond's health is an important factor in the health of Sebago Lake, which is the source of drinking water for 15% of Maine's residents. Portland Water District (PWD) treats and delivers this water and is the largest water utility in Maine. PWD has a vested interest in keeping Sebago Lake clean and supports conservation efforts in the upland areas. The cleanliness and health of Sebago Lake likewise play an important role in the health of Casco Bay, found downstream.

Sebago Lake itself is the second largest lake in Maine. Approximately 361 square miles of land and numerous lakes, ponds, rivers, and streams in 24 towns drain into Sebago Lake. Over 80% of the land that surrounds the Lake is forested. Many partners work together to ensure a clean, healthy Sebago Lake.

Sebago Lake.

Otter Pond Score Card.

What does this number mean?

- The total possible score is between 4 and 20.
- Each score is the sum of four equally important parts described on the page to the right. Each part is scored from 1 to 5, with 5 being the best.
- Higher numbers are better. The higher the number, the healthier the lake and surrounding area. The table to the right shows the scoring categories.

Overall Lake Score	Level of Concern
19-20	Lowest
16-18	Moderate-Low
12-15	Moderate
8-11	Moderate-High
4-7	Highest

Land Use

Changes in forested versus developed land over decades determined using satellite imagery.

1

Lake Health Trend

Changes in biological activity over at least ten years.

5

9

Partnerships

Activity of local organizations that protect and use the lake and availability of non point source data.

2

1

Current Lake Clarity

Chrolorophyll-*a,* phosphorus, and clarity measurements that indicate a lake's biological activity and nutrient levels.

Next steps for Otter Pond: Strengthen partnerships and municipal ordinances to maintain a healthy pond.

How Healthy is Otter Pond?

To counteract the pollution entering the pond from development, landowners can employ many simple practices on their property. Shown above is a group spreading mulch and planting perennials to hold soil in place.

A vegetated buffer at the water's edge is beautiful and also helps to keep the lake clean. A swath of plants catches sediment and other pollutants before they enter the lake.

Land Use (scored 1 out of 5)

Most of the land that drains into Otter Pond is woods, enabling soil to filter pollution. However, the high rate of development in the past quarter century may increase pond pollution from road erosion and runoff, since hard surfaces cannot filter or absorb rainfall or snowmelt.

Partnerships (scored 2 out of 5)

For this score, the presence and involvement of community groups and the possibility for fixing pollution problems were assessed. Otter Pond did not have obvious opportunities to build partnerships. There are many smaller areas of erosion that, with an updated survey, could be addressed.

Lake Health Trend (scored 5 out of 5)

Biological activity levels indicate that Otter Pond has exceptionally clean water and that the lake may be healthier than a decade ago. Community members can be proud of actions to prevent soil erosion, to allow the ground to absorb water, and to reduce chemicals used on their yards.

Current Lake Clarity (scored 1 out of 5)

Otter Pond is susceptible to algal blooms, low oxygen, and a stressful environment for aquatic species. Low water clarity is often due to soil erosion and fertilizer washed off of land, both linked to development. Clarity is related to nutrient levels and biological productivity.

Landowners can implement many simple practices to help keep their lake clean. Providing a clear path to the lakefront can also prevent soil loss.

For More Information

To learn more about your local waterbody, resources for property owners, or the Sebago Lake Watershed Assessment and Prioritization Project:

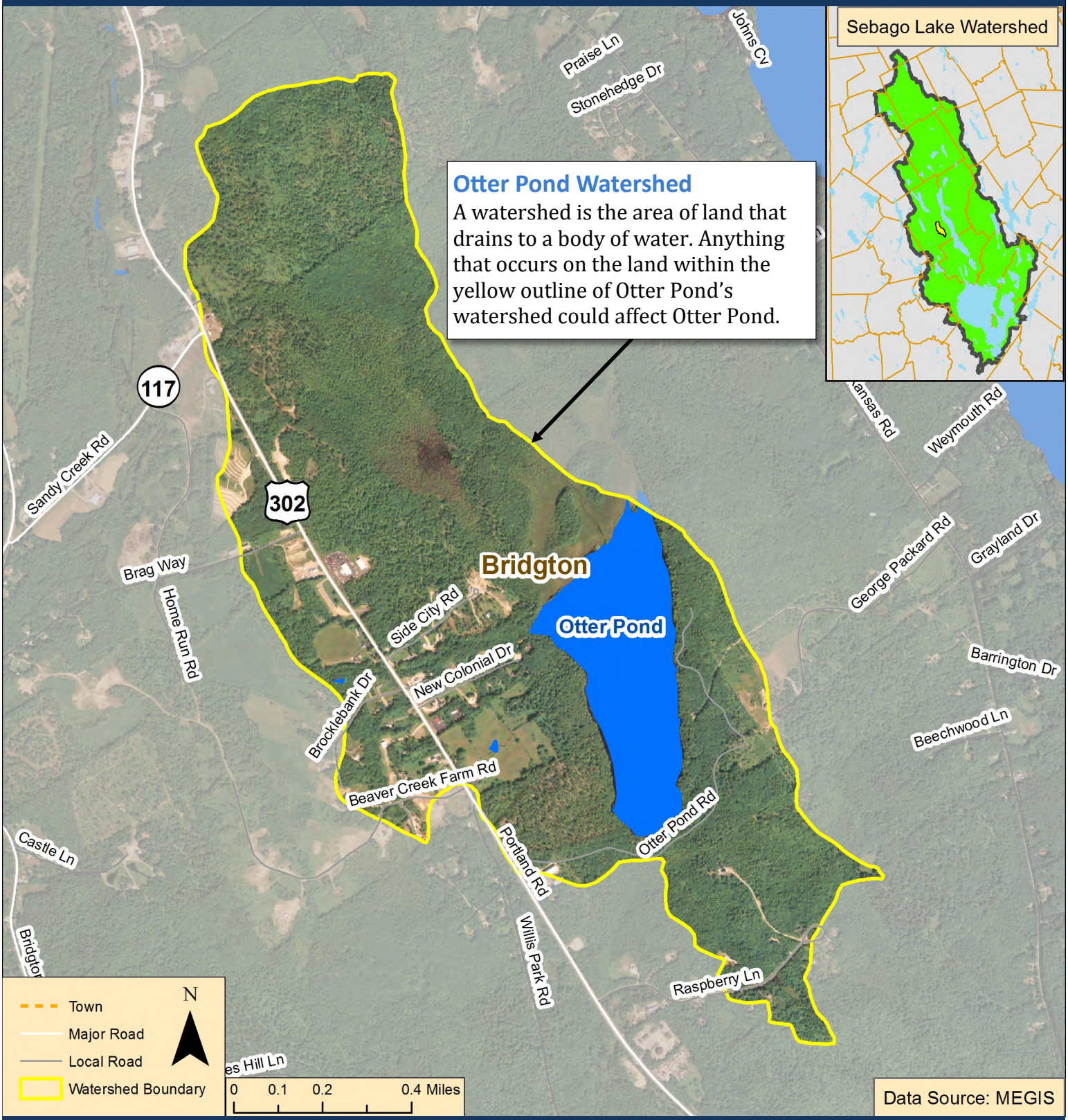
Visit: **www.cumberlandswcd.org**

Call: **Cumberland County Soil & Water Conservation District (207) 892-4700**

Otter Pond is enjoyed by youth campers, summer residents, and the local community from Bridgton and beyond.

Volunteers and scientists have used Secchi disks (inset) to measure water clarity in lakes and seas since the late 1800s.

Otter Pond and Surrounding Area.



Partners

This fact sheet was created under the Sebago Lake Watershed Assessment and Prioritization Project. Funding for this project was provided in part by the U.S. Environmental Protection Agency under Section 604(b) of the Clean Water Act. Section 604(b) grants are administered by the Maine Department of Environmental Protection (Maine DEP) in partnership with EPA. Project partners include Maine DEP, Portland Water District, Cumberland County Soil & Water Conservation District, Lakes Environmental Association, Maine Forest Service, and the Town of Standish.

Cumberland County Soil & Water Conservation District

Cumberland County Soil & Water Conservation District
35 Main Street, Suite 3 | Windham, ME 04062
207.892.4700 | www.cumberlandswcd.org

Panther Pond

Protecting Water Resources Region-Wide.

September 2015

Panther Pond, Raymond, Maine.

Panther Pond

Panther Pond is located in Raymond, Maine, between Routes 121 and 85. Panther Pond's 14-mile shoreline is developed with more than 300 seasonal and year-round residences and four youth summer camps that are connected by an extensive network of unpaved roads. Much of the land surrounding the Pond is undeveloped woods, and many feeder streams flow through these woods into Panther Pond.

The Panther Pond community has demonstrated a strong and ongoing commitment to protecting and improving Panther Pond. The community has monitored the Pond since the 1970s, and they completed two Watershed Surveys (2004 and 2014) to identify pollution sources that could be addressed. Overall, Panther Pond enjoys water quality that is, according to the Department of Environmental Protection, "above average" in Maine. This clean water flows out of Panther Pond and into Sebago Lake, accounting for one fifth of Sebago Lake's natural inflow.

Part of the Sebago Lake System

Panther Pond's health is an important factor in the health of Sebago Lake, which is the source of drinking water for 15% of Maine's residents. Portland Water District (PWD) treats and delivers this water and is the largest water utility in Maine. PWD has a vested interest in keeping Sebago Lake clean and supports conservation efforts in the upland areas. The cleanliness and health of Sebago Lake likewise play an important role in the health of Casco Bay, found downstream.

Sebago Lake itself is the second largest lake in Maine. Approximately 361 square miles of land and numerous lakes, ponds, rivers, and streams in 24 towns drain into Sebago Lake. Over 80% of the land that surrounds the Lake is forested. Many partners work together to ensure a clean, healthy Sebago Lake.

Sebago Lake.

Panther Pond Score Card.

What does this number mean?

- The total possible score is between 4 and 20.
- Each score is the sum of four equally important parts described on the page to the right. Each part is scored from 1 to 5, with 5 being the best.
- Higher numbers are better. The higher the number, the healthier the lake and surrounding area. The table to the right shows the scoring categories.

Overall Lake Score	Level of Concern
19-20	Lowest
16-18	Moderate-Low
12-15	Moderate
8-11	Moderate-High
4-7	Highest

Land Use

Changes in forested versus developed land over decades determined using satellite imagery.

3

Lake Health Trend

Changes in lake clarity over at least ten years.

4

17

Partnerships

Activity of local organizations that protect and use the lake and availability of non point source data.

5

5

Current Lake Clarity

Chrolorophyll-*a,* phosphorus, and clarity measurements that indicate a lake's biological activity and nutrient levels.

Next steps for Panther Pond: Support existing partnerships to ensure that the lake remains healthy and clean.

How Healthy is Panther Pond?

The Panther Pond Conservation Project enlisted volunteers between 2009-2012 to install measures to reduce soil erosion. Measures included water diverters and planting shrubs and perennials to hold soil in place.

A vegetated buffer at the water's edge is beautiful and also helps to keep the lake clean. A swath of plants catches sediment and other pollutants before they enter the lake.

Land Use (scored 3 out of 5)

Most of the land that drains into Panther Pond is woods, enabling soil to filter pollution. This 90% of has not changed much over the past quarter century. The shoreline, however, has continued to develop. Road erosion and yard care chemicals are common pollution sources in the region.

Partnerships (scored 5 out of 5)

Panther Pond has enjoyed an involved citizenry and outdoor enthusiasts for decades. Community support has enabled various improvement projects over the years, including recent work to prevent soil erosion from polluting the Pond and preventing algal blooms.

Lake Health Trend (scored 4 out of 5)

Lake clarity, measured by Secchi depths over the past decade, indicates that Panther Pond is healthy! The clean water trend has persisted even as many waterbodies in the area suffer from pollution washed off of the land. Residents can anticipate future years of clean water for recreation.

Current Lake Clarity (scored 5 out of 5)

Clean, clear water is found in Panther Pond year-round. Aquatic plants and animals are able to thrive and local residents are able to benefit from the seemingly limitless recreation opportunities. The currently clear conditions indicate minimal polluted runoff from the surrounding land.

Landowners can implement many simple practices to help keep their lake clean. Providing a clear path to the lakefront can also prevent soil loss.

For More Information

To learn more about your local waterbody, resources for property owners, or the Sebago Lake Watershed Assessment and Prioritization Project:

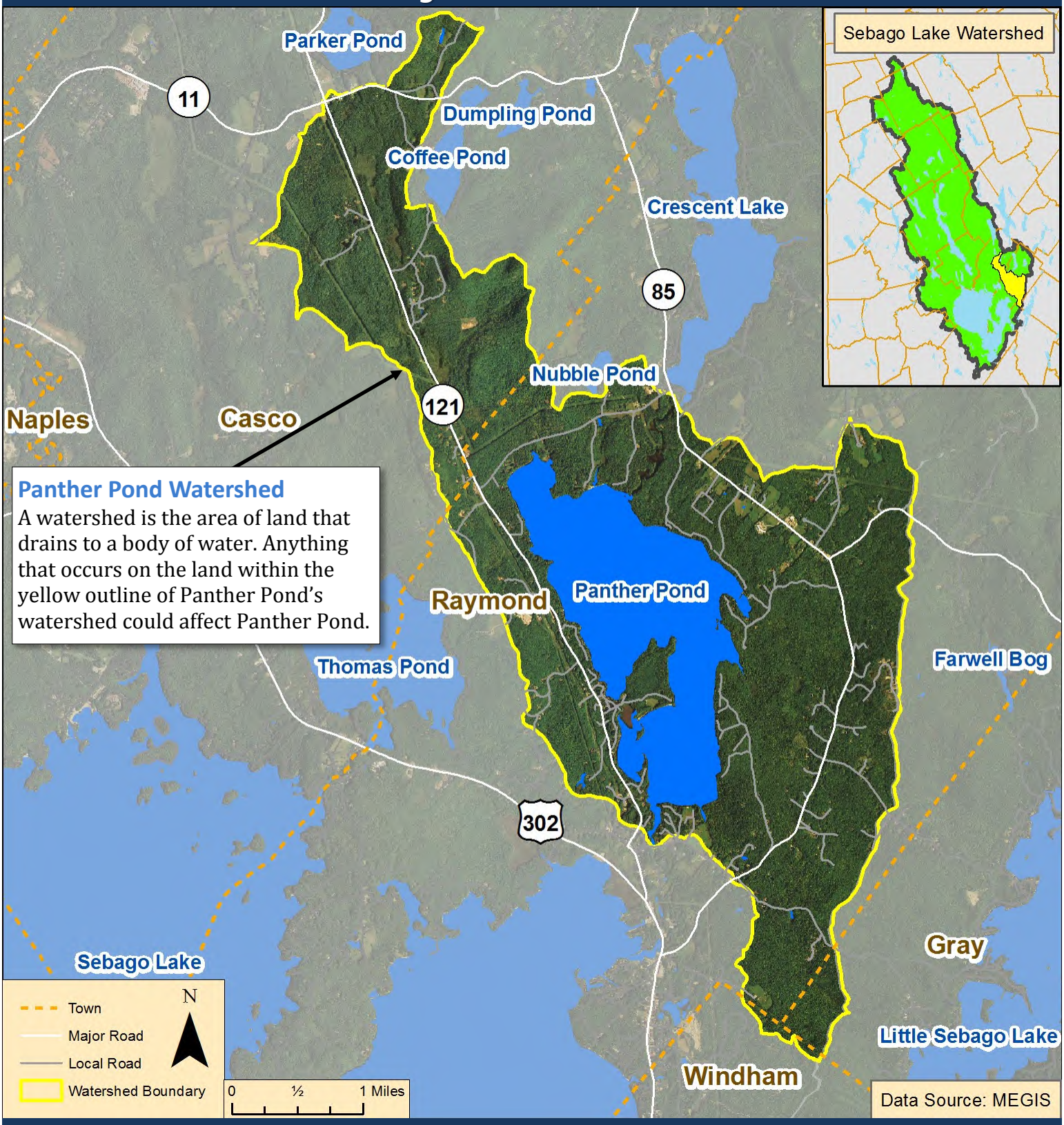
Visit: **www.cumberlandswcd.org**

Call: **Cumberland County Soil & Water Conservation District (207) 892-4700**

Panther Pond is enjoyed by youth campers, summer residents, and the local community from Raymond and beyond.

Volunteers and scientists have used Secchi disks (inset) to measure water clarity in lakes and seas since the late 1800s.

Panther Pond and Surrounding Area.



Partners

This fact sheet was created under the Sebago Lake Watershed Assessment and Prioritization Project. Funding for this project was provided in part by the U.S. Environmental Protection Agency under Section 604(b) of the Clean Water Act. Section 604(b) grants are administered by the Maine Department of Environmental Protection (Maine DEP) in partnership with EPA. Project partners include Maine DEP, Portland Water District, Cumberland County Soil & Water Conservation District, Lakes Environmental Association, Maine Forest Service, and the Town of Standish.

Cumberland County Soil & Water Conservation District

Cumberland County Soil & Water Conservation District
35 Main Street, Suite 3 | Windham, ME 04062
207.892.4700 | www.cumberlandswcd.org

Papoose Pond

Protecting Water Resources Region-Wide.

Papoose Pond, Waterford, Maine. *Photo Credit: Colin Holme*

Papoose Pond

Papoose Pond is located in the northeast corner of Waterford, Maine, just north of Route 118. Papoose Pond's 2-mile shoreline is moderately developed with residences and a campground on the southeast corner. Much of the land surrounding the Pond is undeveloped woods, through which rainfall and snowmelt travel to fill the pond.

Basic water chemistry data has been collected on Papoose Pond since the 1980s. The Pond did experience algal blooms in the 1990s. When combined with the data collected, indeed the pond is relatively biologically productive and as such could experience more blooms. Preventing further pollution from entering the lake can reduce this risk. Several fish species can be found in the Pond. Papoose Pond is seasonally connected to its outlet, the Crooked River, which itself flows downstream into Sebago Lake.

Part of the Sebago Lake System

Papoose Pond's health is an important factor in the health of Sebago Lake, which is the source of drinking water for 15% of Maine's residents. Portland Water District (PWD) treats and delivers this water and is the largest water utility in Maine. PWD has a vested interest in keeping Sebago Lake clean and supports conservation efforts in the upland areas. The cleanliness and health of Sebago Lake likewise play an important role in the health of Casco Bay, found downstream.

Sebago Lake itself is the second largest lake in Maine. Approximately 361 square miles of land and numerous lakes, ponds, rivers, and streams in 24 towns drain into Sebago Lake. Over 80% of the land that surrounds the Lake is forested. Many partners work together to ensure a clean, healthy Sebago Lake.

Sebago Lake.

Papoose Pond Score Card.

What does this number mean?

- The total possible score is between 4 and 20.
- Each score is the sum of four equally important parts described on the page to the right. Each part is scored from 1 to 5, with 5 being the best.
- Higher numbers are better. The higher the number, the healthier the lake and surrounding area. The table to the right shows the scoring categories.

Overall Lake Score	Level of Concern
19-20	Lowest
16-18	Moderate-Low
12-15	Moderate
8-11	Moderate-High
4-7	Highest

Land Use

Changes in forested versus developed land over decades determined using satellite imagery.

4

Lake Health Trend

Changes in biological activity over at least ten years.

4

12

Partnerships

Activity of local organizations that protect and use the lake and availability of non point source data.

3

1

Current Lake Clarity

Chrolorophyll-*a,* phosphorus, and clarity measurements that indicate a lake's biological activity and nutrient levels.

Next steps for Papoose Pond: Strengthen partnerships, focus on mitigating pollution, and strengthen municipal ordinances.

How Healthy is Papoose Pond?

To counteract the pollution entering the pond from development, landowners can employ many simple practices on their property. Shown above is a group spreading mulch and planting perennials to hold soil in place.

A vegetated buffer at the water's edge is beautiful and also helps to keep the lake clean. A swath of plants catches sediment and other pollutants before they enter the lake.

Land Use (scored 4 out of 5)

Most of the land that drains into Papoose Pond is woods, enabling soil to filter pollution. Today, slightly more land is covered with woods and vegetation than a quarter of a century ago. Regional pollution concerns include erosion from unpaved roads and chemicals from yardcare.

Partnerships (scored 3 out of 5)

Papoose Pond has enjoyed an involved citizenry and well-established partners for years. Community support has enabled collaboration among them. There are several small erosion and pollution sites that should be addressed. The area would also benefit from an updated survey.

Lake Health Trend (scored 4 out of 5)

Biological activity, as monitored over the past decade, indicates that Papoose Pond is healthy! The clean water trend has persisted even as many waterbodies in the area suffer from pollution washed off of the land. Residents can anticipate future years of clean water for recreation.

Current Lake Clarity (scored 1 out of 5)

Papoose Pond is susceptible to algal blooms, low oxygen levels, and a stressful environment for aquatic species. Low water clarity is often due to soil erosion and fertilizer washed off of land. Clarity is related to nutrient levels and biological productivity.

Landowners can implement many simple practices to help keep their lake clean. Providing a clear path to the lakefront can also prevent soil loss.

For More Information

To learn more about your local waterbody, resources for property owners, or the Sebago Lake Watershed Assessment and Prioritization Project:

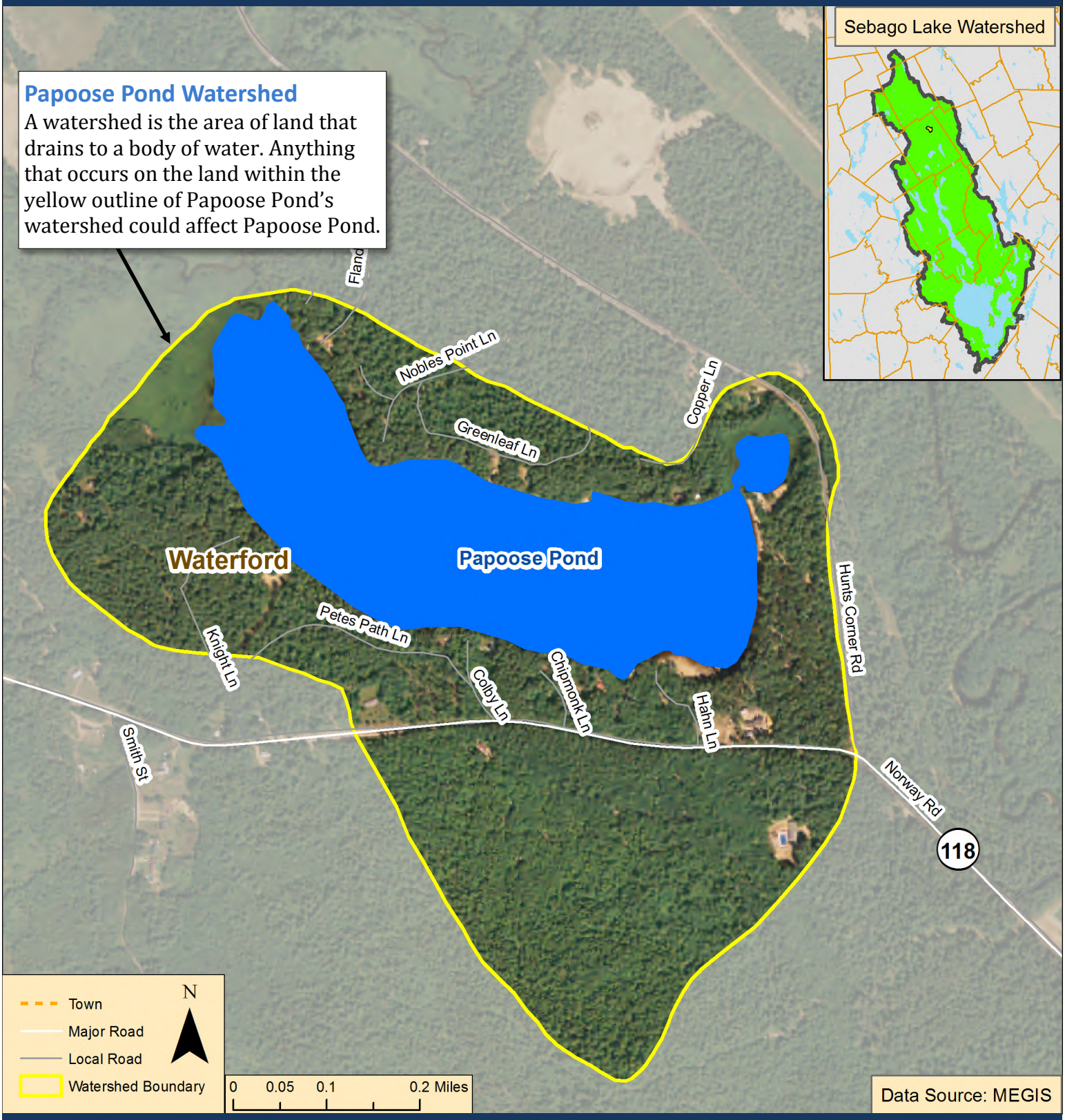
Visit: **www.cumberlandswcd.org**

Call: **Cumberland County Soil & Water Conservation District (207) 892-4700**

Papoose Pond is enjoyed by youth campers, summer residents, and the local community.

Volunteers and scientists have used Secchi disks (inset) to measure water clarity in lakes and seas since the late 1800s.

Papoose Pond and Surrounding Area.



Partners

This fact sheet was created under the Sebago Lake Watershed Assessment and Prioritization Project. Funding for this project was provided in part by the U.S. Environmental Protection Agency under Section 604(b) of the Clean Water Act. Section 604(b) grants are administered by the Maine Department of Environmental Protection (Maine DEP) in partnership with EPA. Project partners include Maine DEP, Portland Water District, Cumberland County Soil & Water Conservation District, Lakes Environmental Association, Maine Forest Service, and the Town of Standish.

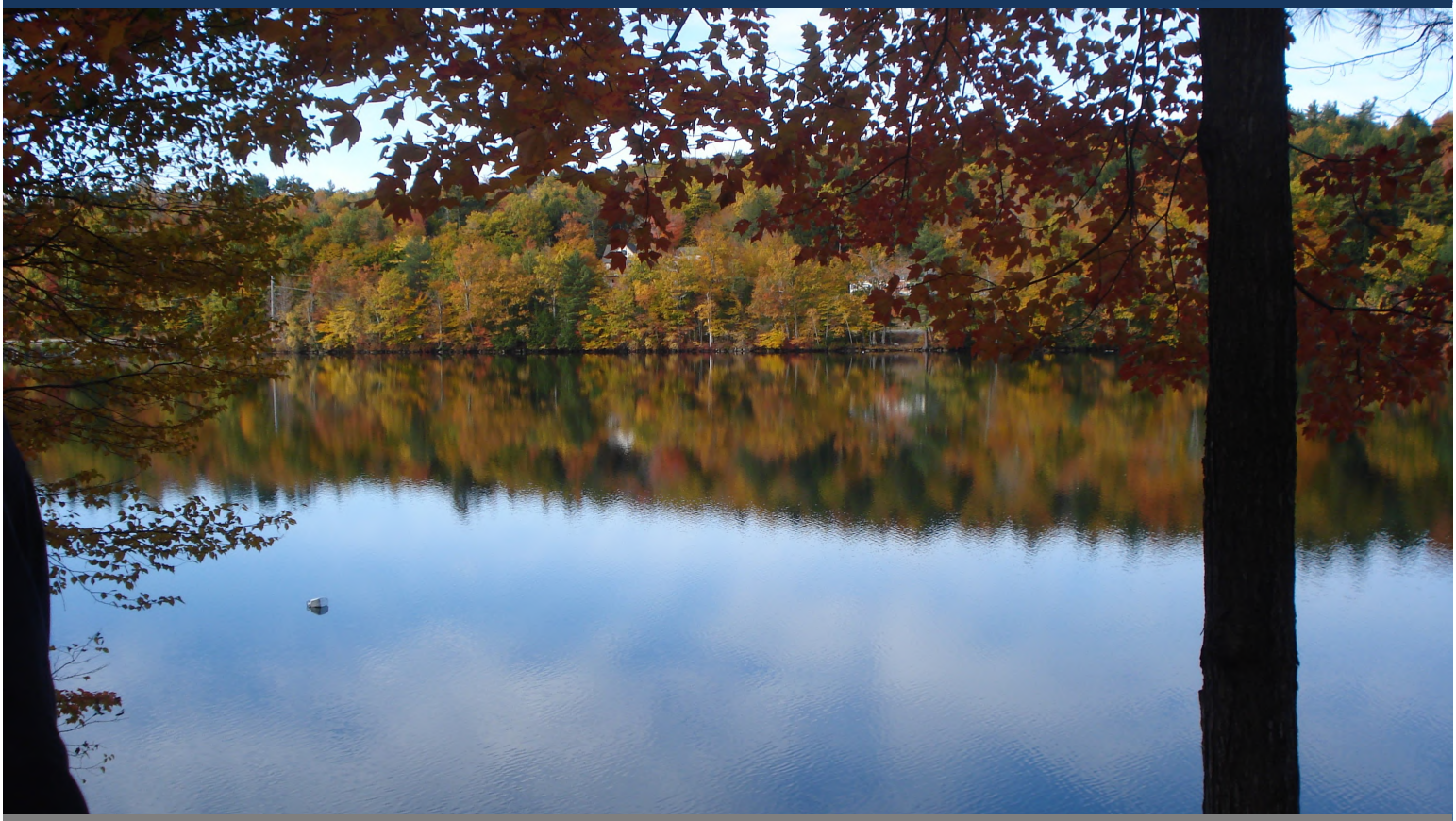
Cumberland County Soil & Water Conservation District

Cumberland County Soil & Water Conservation District
35 Main Street, Suite 3 | Windham, ME 04062
207.892.4700 | www.cumberlandswcd.org

Parker Pond

September 2015

Protecting Water Resources Region-Wide.



Casco, Maine.

Parker Pond

Parker Pond is located in Casco, Maine, east of Route 121, with it's northern end in town center. Parker Pond has a 3.7-mile shoreline, some of which directly abuts shoreline roads. The Pond itself is 167 acres and is relatively shallow, with an average depth of 10 feet and a maximum depth of 19 feet. Much of the land surrounding the Pond is undeveloped woods through which feeder streams flow. Parker Pond is connected to Pleasant Lake, found to the north on the other side of Mayberry Hill Road, which is stocked with salmon and lake trout.

Water chemistry data and algal bloom monitoring has occurred on the Pond since the 1970s. The Parker Pond and Pleasant Lake community has demonstrated a strong and ongoing commitment to protecting and improving the health of the lakes, actively participating in surveys and efforts to identify and mitigate pollution sources (2007, 2011). Parker Pond is more susceptible than other Maine lakes to pollution entering the lake, as pollutants may remain in the lake for up to five times longer than in other Maine lakes. Overall, Parker Pond is a clean lake that is enjoyed by many in the area. Parker Pond water exits at the north end as it enters Pleasant Lake, eventually flowing downstream to Sebago Lake.

Part of the Sebago Lake System

Parker Pond's health is an important factor in the health of Sebago Lake, which is the source of drinking water for 15% of Maine's residents. Portland Water District (PWD) treats and delivers this water and is the largest water utility in Maine. PWD has a vested interest in keeping Sebago Lake clean and supports conservation efforts in the upland areas. The cleanliness and health of Sebago Lake likewise play an important role in the health of Casco Bay, found downstream.

Sebago Lake itself is the second largest lake in Maine. Approximately 361 square miles of land and numerous lakes, ponds, rivers, and streams in 24 towns drain into Sebago Lake. Over 80% of the land that surrounds the Lake is forested. Many partners work together to ensure a clean, healthy Sebago Lake.

Sebago Lake.

Parker Pond Score Card.

What does this number mean?

- The total possible score is between 4 and 20.
- Each score is the sum of four equally important parts described on the page to the right. Each part is scored from 1 to 5, with 5 being the best.
- Higher numbers are better. The higher the number, the healthier the lake and surrounding area. The table to the right shows the scoring categories.

Overall Lake Score	Level of Concern
19-20	Lowest
16-18	Moderate-Low
12-15	Moderate
8-11	Moderate-High
4-7	Highest

Land Use

Changes in forested versus developed land over decades determined using satellite imagery.

3

Lake Health Trend

Changes in lake clarity over at least ten years.

4

12

Partnerships

Activity of local organizations that protect and use the lake and availability of non point source data.

3

2

Current Lake Clarity

Chrolorophyll-*a,* phosphorus, and clarity measurements that indicate a lake's biological activity and nutrient levels.

Next steps for Parker Pond: Strengthen partnerships, focus on mitigating pollution, and strengthen municipal ordinances.

How Healthy is Parker Pond?

The Pleasant Lake/Parker Pond Conservation Project aimed to significantly reduce erosion and the export of sediment and phosphorus into the waters. Above, a site needing stabilization and improvement is documented.

A vegetated buffer at the water's edge is beautiful and also helps to keep the lake clean. A swath of plants catches sediment and other pollutants before they enter the lake.

Land Use (scored 3 out of 5)

Most of the land that drains into Parker Pond is woods, enabling soil to filter pollution. The overall % of woods and vegetated land has not changed much over the past quarter century. However, road erosion and yard care chemicals are common pollution sources in the region.

Partnerships (scored 3 out of 5)

The Parker Pond community has a few active partners who are committed to protecting the lake. Though partners can provide in-kind support, external financial support would help facilitate projects. An updated land survey would be needed to apply for federal funding.

Lake Health Trend (scored 4 out of 5)

Lake clarity, measured by Secchi depths over the past decade, indicates that Parker Pond is healthy! The clean water trend has persisted even as many waterbodies in the area suffer from pollution washed off of the land. Residents can anticipate future years of clean water for recreation.

Current Lake Clarity (scored 2 out of 5)

Parker Pond might be susceptible to algal blooms, low oxygen levels, and a stressful environment for aquatic species. Lower water clarity is often due to soil erosion and fertilizer washed off of land. Clarity is related to nutrient levels and biological productivity.

Landowners can implement many simple practices to help keep their lake clean. Providing a clear path to the lakefront can also prevent soil loss.

For More Information

To learn more about your local waterbody, resources for property owners, or the Sebago Lake Watershed Assessment and Prioritization Project:

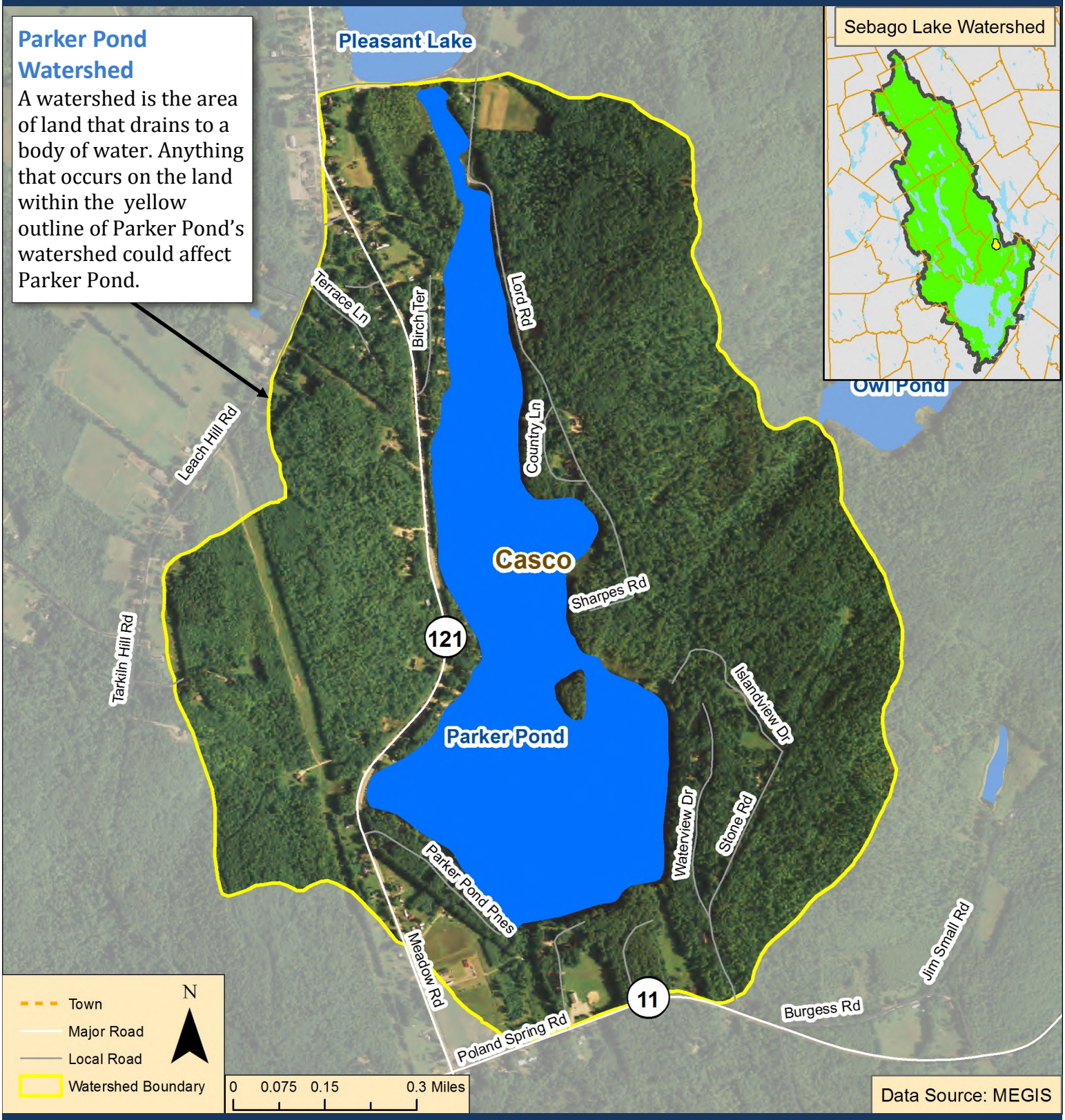
Visit: **www.cumberlandswcd.org**

Call: **Cumberland County Soil & Water Conservation District (207) 892-4700**

Parker Pond is enjoyed by youth campers, summer residents, and the local community from Casco and beyond.

Volunteers and scientists have used Secchi disks (inset) to measure water clarity in lakes and seas since the late 1800s.

Parker Pond and Surrounding Area.



Partners

This fact sheet was created under the Sebago Lake Watershed Assessment and Prioritization Project. Funding for this project was provided in part by the U.S. Environmental Protection Agency under Section 604(b) of the Clean Water Act. Section 604(b) grants are administered by the Maine Department of Environmental Protection (Maine DEP) in partnership with EPA. Project partners include Maine DEP, Portland Water District, Cumberland County Soil & Water Conservation District, Lakes Environmental Association, Maine Forest Service, and the Town of Standish.

Cumberland County Soil & Water Conservation District

Cumberland County Soil & Water Conservation District
35 Main Street, Suite 3 | Windham, ME 04062
207.892.4700 | www.cumberlandswcd.org

Peabody Pond

Protecting Water Resources Region-Wide.

Peabody Pond, Bridgton, Naples, and Sebago, Maine. *Photo Credit: Colin Holme*

Peabody Pond

Peabody Pond is located in Bridgton, Naples, and Sebago, Maine, between Routes 107 and 302. Peabody Pond's 8.2-mile shoreline is developed with a variety of residences and a boat launch in the south. Peabody Pond is also home to both coldwater and warmwater fisheries. A deep section in the middle of the lake combined with rocky shores provide ample habitat. However, oxygen depletion in late summer, possibly related to pollution, does affect the fish. Much of the land surrounding the Pond is undeveloped woods, and many feeder streams flow through these woods into Peabody Pond.

The Peabody Pond community has demonstrated commitment to protecting and improving the Pond. The Pond has been monitored since the 1970s. Overall, Peabody Pond enjoys water quality that is, according to the Maine Department of Environmental Protection, "excellent." Peabody Pond's water leaves from its southern end, flowing into the Northwest River, which eventually leads to Sebago Lake.

Part of the Sebago Lake System

Peabody Pond's health is an important factor in the health of Sebago Lake, which is the source of drinking water for 15% of Maine's residents. Portland Water District (PWD) treats and delivers this water and is the largest water utility in Maine. PWD has a vested interest in keeping Sebago Lake clean and supports conservation efforts in the upland areas. The cleanliness and health of Sebago Lake likewise play an important role in the health of Casco Bay, found downstream.

Sebago Lake itself is the second largest lake in Maine. Approximately 361 square miles of land and numerous lakes, ponds, rivers, and streams in 24 towns drain into Sebago Lake. Over 80% of the land that surrounds the Lake is forested. Many partners work together to ensure a clean, healthy Sebago Lake.

Sebago Lake.

Peabody Pond Score Card.

What does this number mean?

- The total possible score is between 4 and 20.
- Each score is the sum of four equally important parts described on the page to the right. Each part is scored from 1 to 5, with 5 being the best.
- Higher numbers are better. The higher the number, the healthier the lake and surrounding area. The table to the right shows the scoring categories.

Overall Lake Score	Level of Concern
19-20	Lowest
16-18	Moderate-Low
12-15	Moderate
8-11	Moderate-High
4-7	Highest

Land Use

Changes in forested versus developed land over decades determined using satellite imagery.

3

Lake Health Trend

Changes in biological activity over at least ten years.

4

14

Partnerships

Activity of local organizations that protect and use the lake and availability of non point source data.

3

4

Current Lake Clarity

Chrolorophyll-*a,* phosphorus, and clarity measurements that indicate a lake's biological activity and nutrient levels.

Next steps for Peabody Pond: Support existing partnerships to ensure that the lake remains healthy and clean.

How Healthy is Peabody Pond?

As a property owner, you can help keep the pond clean by keeping soil in place. Spreading mulch (shown above), installing water diverters, and planting shrubs and perennials helps to prevent erosion.

A vegetated buffer at the water's edge is beautiful and also helps to keep the lake clean. A swath of plants catches sediment and other pollutants before they enter the lake.

Land Use (scored 3 out of 5)

Most of the land that drains into Peabody Pond is woods, enabling soil to filter pollution. The overall % of woods and vegetated land has not changed much over the past quarter century. However, road erosion and yard care chemicals are common pollution sources in the region.

Partnerships (scored 3 out of 5)

The Peabody Pond community has a few active partners who are committed to protecting the lake. Though partners can provide in-kind support, external financial support would help facilitate projects. An updated land survey would be needed to apply for federal funding.

Lake Health Trend (scored 4 out of 5)

Biological activity, as monitored over the past decade, indicates that Peabody Pond is healthy! The clean water trend has persisted even as many waterbodies in the area suffer from pollution washed off of the land. Residents can anticipate future years of clean water for recreation.

Current Lake Clarity (scored 4 out of 5)

Clean, clear water is found in Peabody Pond. Aquatic plants and animals are able to thrive and local residents benefit from clear swimming water and healthy fish populations. The current clear conditions could change if there are increases in area soil erosion or polluted surface runoff.

Landowners can implement many simple practices to help keep their lake clean. Providing a clear path to the lakefront can also prevent soil loss.

For More Information

To learn more about your local waterbody, resources for property owners, or the Sebago Lake Watershed Assessment and Prioritization Project:

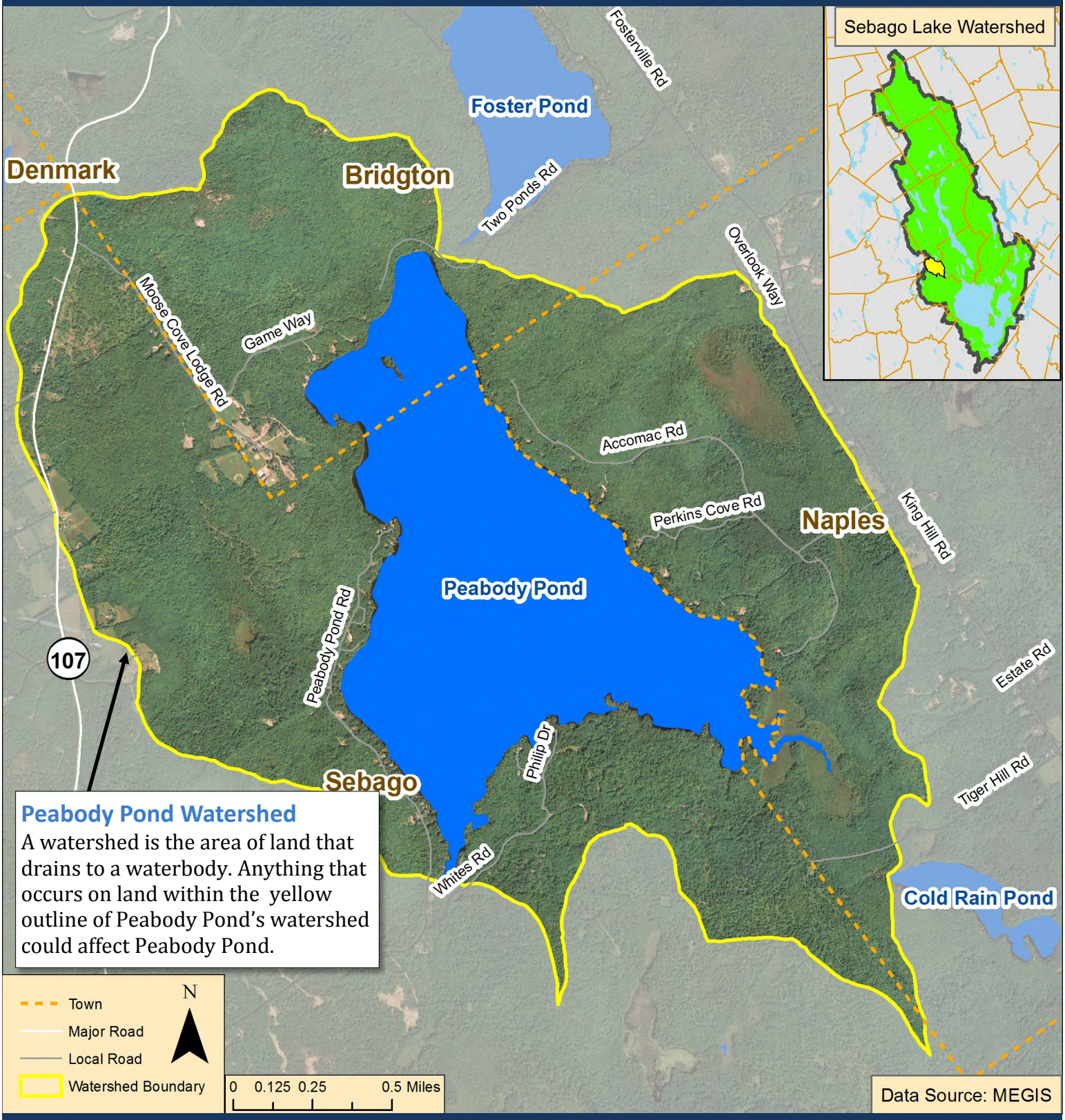
Visit: **www.cumberlandswcd.org**

Call: **Cumberland County Soil & Water Conservation District (207) 892-4700**

Peabody Pond is enjoyed by youth, summer residents, anglers, and the local community from surrounding towns and beyond.

Volunteers and scientists have used Secchi disks (inset) to measure water clarity in lakes and seas since the late 1800s.

Peabody Pond and Surrounding Area.



Partners

This fact sheet was created under the Sebago Lake Watershed Assessment and Prioritization Project. Funding for this project was provided in part by the U.S. Environmental Protection Agency under Section 604(b) of the Clean Water Act. Section 604(b) grants are administered by the Maine Department of Environmental Protection (Maine DEP) in partnership with EPA. Project partners include Maine DEP, Portland Water District, Cumberland County Soil & Water Conservation District, Lakes Environmental Association, Maine Forest Service, and the Town of Standish.

Cumberland County Soil & Water Conservation District

Cumberland County Soil & Water Conservation District
35 Main Street, Suite 3 | Windham, ME 04062
207.892.4700 | www.cumberlandswcd.org

September 2015

Pleasant Lake

Protecting Water Resources Region-Wide.

Pleasant Lake, Casco and Otisfield, Maine.

Pleasant Lake

Pleasant Lake is located in Casco and Otisfield, Maine. The southern end is in Casco town center. Route 121 runs parallel to the lake. Pleasant Lake has a 9-mile shoreline which is developed with year-round and seasonal homes, a town beach at either end, two public boat launches, and three youth summer camps. The Lake is stocked with salmon and lake trout. Pleasant Lake is connected to Parker Pond, found to its south on the other side of Mayberry Hill Road.

Water chemistry data and algal bloom monitoring has occurred on the Pond since the 1970s. The Pleasant Lake and Parker Pond community has demonstrated a strong and ongoing commitment to protecting and improving the health of the lakes, actively participating in surveys and efforts to identify and mitigate pollution sources (2007, 2011). Pleasant Lake is more susceptible than other Maine lakes to pollution entering the lake, as pollutants may remain in the lake for up to five times longer than in other Maine lakes. Overall, Pleasant Lake enjoys water quality that is, according to the Maine Department of Environmental Protection, "excellent." The Pleasant River outlet is Mill Brook, which eventually leads to Sebago Lake.

Part of the Sebago Lake System

Pleasant Lake's health is an important factor in the health of Sebago Lake, which is the source of drinking water for 15% of Maine's residents. Portland Water District (PWD) treats and delivers this water and is the largest water utility in Maine. PWD has a vested interest in keeping Sebago Lake clean and supports conservation efforts in the upland areas. The cleanliness and health of Sebago Lake likewise play an important role in the health of Casco Bay, found downstream.

Sebago Lake itself is the second largest lake in Maine. Approximately 361 square miles of land and numerous lakes, ponds, rivers, and streams in 24 towns drain into Sebago Lake. Over 80% of the land that surrounds the Lake is forested. Many partners work together to ensure a clean, healthy Sebago Lake.

Sebago Lake.

Pleasant Lake Score Card.

What does this number mean?

- The total possible score is between 4 and 20.
- Each score is the sum of four equally important parts described on the page to the right. Each part is scored from 1 to 5, with 5 being the best.
- Higher numbers are better. The higher the number, the healthier the lake and surrounding area. The table to the right shows the scoring categories.

Overall Lake Score	Level of Concern
19-20	Lowest
16-18	Moderate-Low
12-15	Moderate
8-11	Moderate-High
4-7	Highest

Land Use

Changes in forested versus developed land over decades determined using satellite imagery.

2

Lake Health Trend

Changes in lake clarity over at least ten years.

4

14

Partnerships

Activity of local organizations that protect and use the lake and availability of non point source data.

3

5

Current Lake Clarity

Chrolorophyll-*a,* phosphorus, and clarity measurements that indicate a lake's biological activity and nutrient levels.

Next steps for Pleasant Lake: Strengthen partnerships to ensure that the lake remains healthy and clean.

How Healthy is Pleasant Lake?

The Pleasant Lake/Parker Pond Conservation Project aimed to significantly reduce erosion and the export of sediment and phosphorus into the waters. Above, a site needing stabilization and improvement is documented.

A vegetated buffer at the water's edge is beautiful and also helps to keep the lake clean. A swath of plants catches sediment and other pollutants before they enter the lake.

Land Use (scored 2 out of 5)

Most of the land that drains into Pleasant Lake is woods, enabling soil to filter pollution. However, the rate of development in the past quarter century may increase pond pollution from road erosion and runoff, since hard surfaces cannot filter or absorb rainfall or snowmelt.

Partnerships (scored 3 out of 5)

The Pleasant Lake community has a few active partners who are committed to protecting the lake. Though partners can provide in-kind support, external financial support would help facilitate projects. An updated land survey would be needed to apply for federal funding.

Lake Health Trend (scored 4 out of 5)

Biological activity, as monitored over the past decade, indicates that Pleasant Lake is healthy! The clean water trend has persisted even as many waterbodies in the area suffer from pollution washed off of the land. Residents can anticipate future years of clean water for recreation.

Current Lake Clarity (scored 5 out of 5)

Clean, clear water is found in Pleasant Lake year-round. Aquatic plants and animals are able to thrive and local residents are able to benefit from the seemingly limitless recreation opportunities. The currently clear conditions indicate minimal polluted runoff from the surrounding land.

Landowners can implement many simple practices to help keep their lake clean. Providing a clear path to the lakefront can also prevent soil loss.

For More Information

To learn more about your local waterbody, resources for property owners, or the Sebago Lake Watershed Assessment and Prioritization Project:

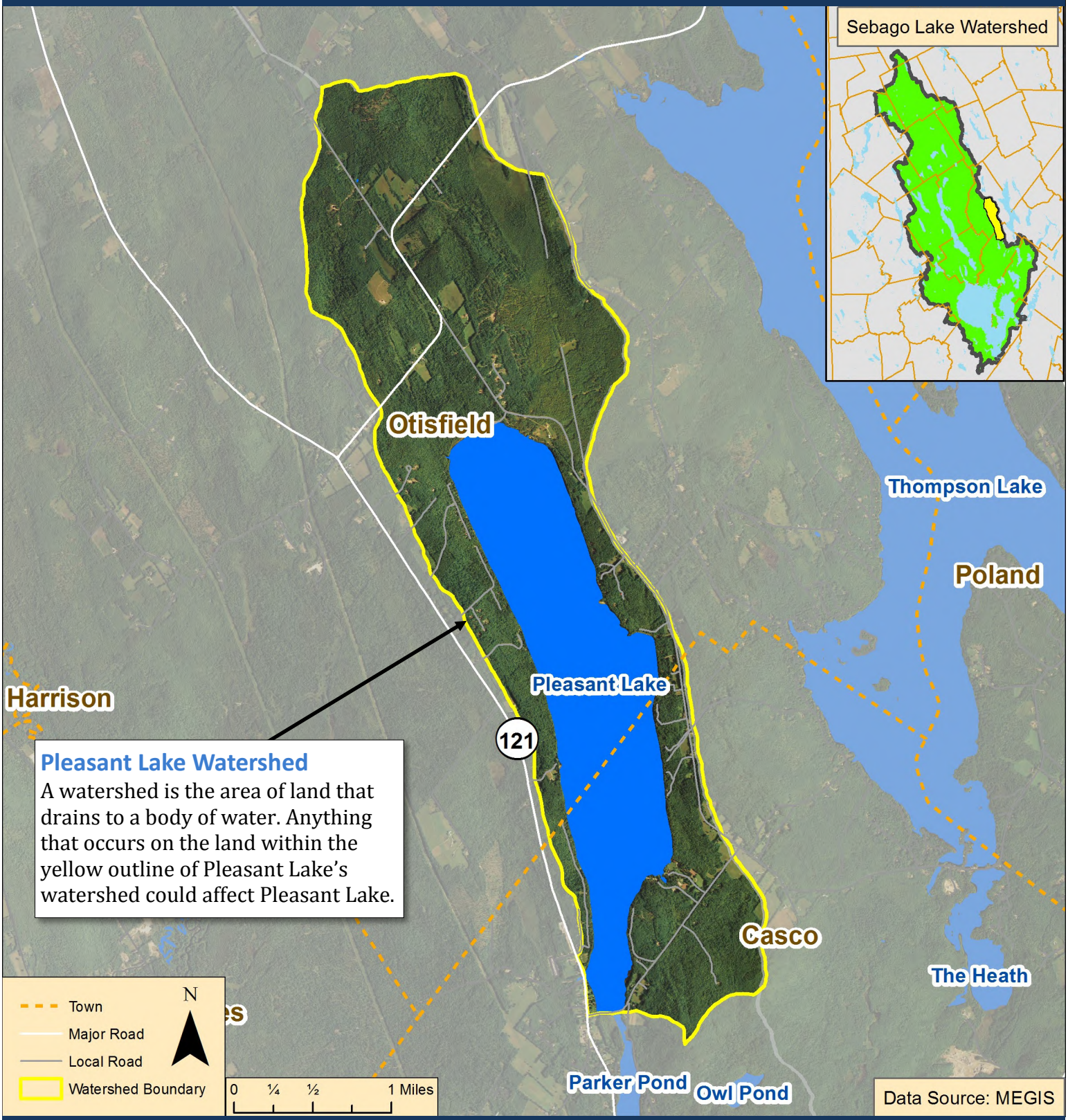
Visit: **www.cumberlandswcd.org**

Call: **Cumberland County Soil & Water Conservation District (207) 892-4700**

Pleasant Lake is enjoyed by youth campers, summer residents, and the local community from Casco, Otisfield, and beyond.

Volunteers and scientists have used Secchi disks (inset) to measure water clarity in lakes and seas since the late 1800s.

Pleasant Lake and Surrounding Area.



Partners

This fact sheet was created under the Sebago Lake Watershed Assessment and Prioritization Project. Funding for this project was provided in part by the U.S. Environmental Protection Agency under Section 604(b) of the Clean Water Act. Section 604(b) grants are administered by the Maine Department of Environmental Protection (Maine DEP) in partnership with EPA. Project partners include Maine DEP, Portland Water District, Cumberland County Soil & Water Conservation District, Lakes Environmental Association, Maine Forest Service, and the Town of Standish.

Cumberland County Soil & Water Conservation District

Cumberland County Soil & Water Conservation District
35 Main Street, Suite 3 | Windham, ME 04062
207.892.4700 | www.cumberlandswcd.org

Raymond Pond *Protecting Water Resources Region-Wide.*

Raymond Pond, Raymond, Maine. *Photo Credit: Raymond Waterways*

Raymond Pond

Raymond Pond is located in Raymond, Maine, between Routes 85 and North Raymond Road. Raymond Pond's 4.8-mile shoreline is dotted with seasonal and year-round residences accessed by roads all around the pond. There is a prominent peninsula on the west side of the otherwise quite oval pond which fills a basin surrounded by hills. There are also a few small islands in the Pond. Much of the land surrounding the Pond is undeveloped woods, and many feeder streams flow through these woods into Raymond Pond.

At about one mile long by a half mile wide, Raymond Pond is largely enjoyed by kayakers, canoers, and other small watercraft operators. The community enjoys year-round recreation on the pond. Raymond Pond is currently managed for warm water fish only, though it once supported cold water fisheries as well. Overall, Raymond Pond enjoys water quality that is, according to the Department of Environmental Protection, "slightly above average" in Maine. This water flows out of Raymond Pond and into Crescent Lake, which is part of the Sebago Lake system.

Part of the Sebago Lake System

Raymond Pond's health is an important factor in the health of Sebago Lake, which is the source of drinking water for 15% of Maine's residents. Portland Water District (PWD) treats and delivers this water and is the largest water utility in Maine. PWD has a vested interest in keeping Sebago Lake clean and supports conservation efforts in the upland areas. The cleanliness and health of Sebago Lake likewise play an important role in the health of Casco Bay, found downstream.

Sebago Lake itself is the second largest lake in Maine. Approximately 361 square miles of land and numerous lakes, ponds, rivers, and streams in 24 towns drain into Sebago Lake. Over 80% of the land that surrounds the Lake is forested. Many partners work together to ensure a clean, healthy Sebago Lake.

Sebago Lake.

Raymond Pond Score Card.

What does this number mean?

- The total possible score is between 4 and 20.
- Each score is the sum of four equally important parts described on the page to the right. Each part is scored from 1 to 5, with 5 being the best.
- Higher numbers are better. The higher the number, the healthier the lake and surrounding area. The table to the right shows the scoring categories.

Overall Lake Score	Level of Concern
19-20	Lowest
16-18	Moderate-Low
12-15	Moderate
8-11	Moderate-High
4-7	Highest

Land Use

Changes in forested versus developed land over decades determined using satellite imagery.

3

Lake Health Trend

Changes in lake clarity over at least ten years.

4

13

Partnerships

Activity of local organizations that protect and use the lake and availability of non point source data.

3

3

Current Lake Clarity

Chrolorophyll-*a,* phosphorus, and clarity measurements that indicate a lake's biological activity and nutrient levels.

Next steps for Raymond Pond: Strengthen partnerships, focus on mitigating pollution, and strengthen municipal ordinances.

How Healthy is Raymond Pond?

Property owners can reduce pollution entering the Pond. Pollution includes soil eroding from bare ground or unpaved roads. Installing water diverters and planting shrubs and perennials to hold soil in place all preserve Pond health.

A vegetated buffer at the water's edge is beautiful and also helps to keep the lake clean. A swath of plants catches sediment and other pollutants before they enter the lake.

Land Use (scored 3 out of 5)

Most of the land that drains into Raymond Pond is woods, enabling soil to filter pollution. The overall % of woods and vegetated land has not changed much over the past quarter century. However, road erosion and yard care chemicals are common pollution sources in the region.

Partnerships (scored 3 out of 5)

The Raymond Pond community has a few active partners who are committed to protecting the lake. Though partners can provide in-kind support, external financial support would help facilitate projects. An updated land survey would be needed to apply for federal funding.

Lake Health Trend (scored 4 out of 5)

Lake clarity, measured by Secchi depths over the past decade, indicates that Raymond Pond is healthy! The clean water trend has persisted even as many waterbodies in the area suffer from pollution washed off of the land. Residents can anticipate future years of clean water for recreation.

Current Lake Clarity (scored 3 out of 5)

Raymond Pond's water clarity represents the middle range for upstream waters of Sebago Lake. Soil erosion and fertilizer washed off of land can decrease clarity, which is related to nutrient levels and biological productivity.

Landowners can implement many simple practices to help keep their lake clean. Providing a clear path to the lakefront can also prevent soil loss.

For More Information

To learn more about your local waterbody, resources for property owners, or the Sebago Lake Watershed Assessment and Prioritization Project:

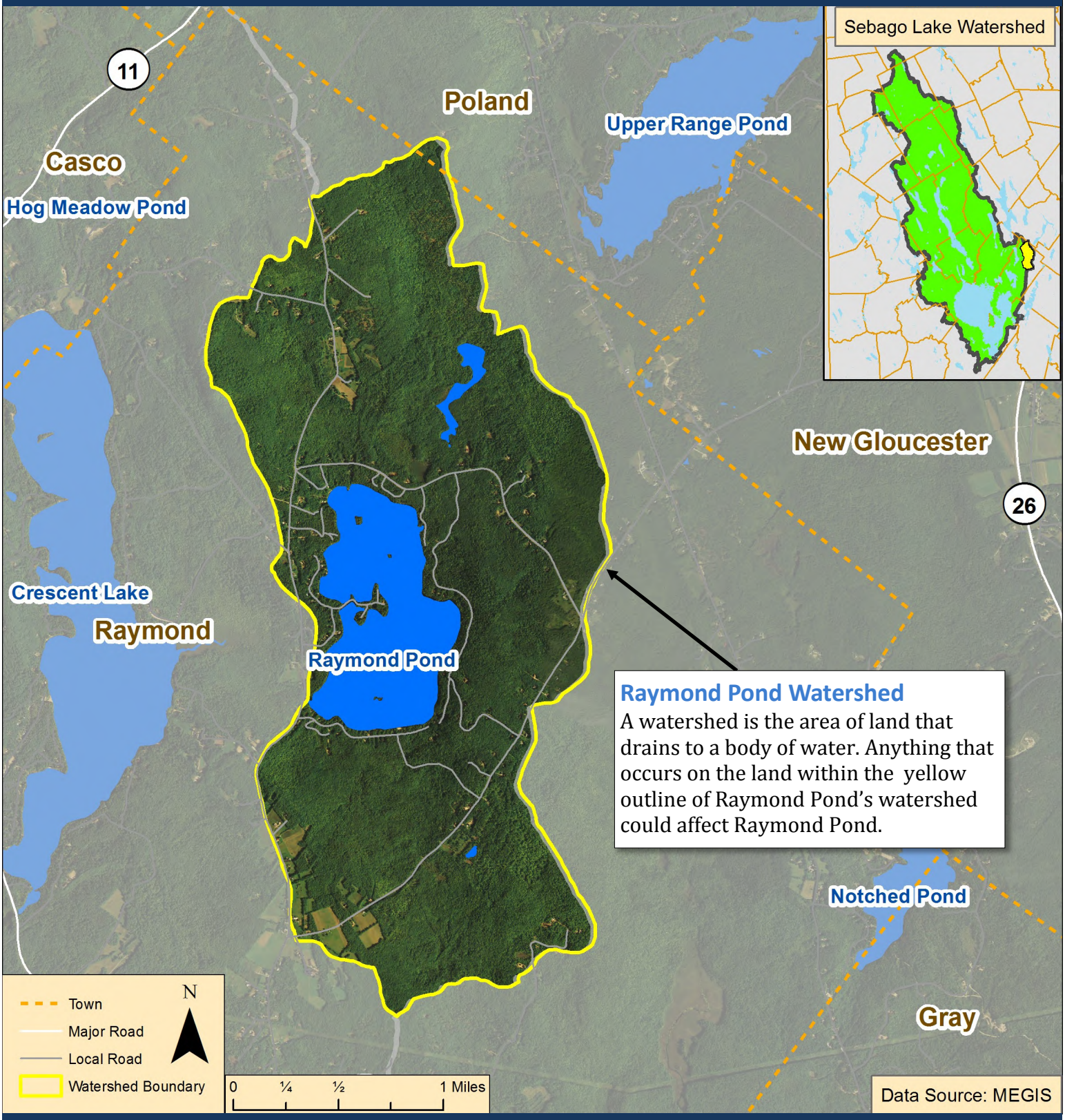
Visit: **www.cumberlandswcd.org**

Call: **Cumberland County Soil & Water Conservation District (207) 892-4700**

Raymond Pond is enjoyed by youth campers, summer residents, and the local community from Raymond and beyond.

Volunteers and scientists have used Secchi disks (inset) to measure water clarity in lakes and seas since the late 1800s.

Raymond Pond and Surrounding Area.



Partners

This fact sheet was created under the Sebago Lake Watershed Assessment and Prioritization Project. Funding for this project was provided in part by the U.S. Environmental Protection Agency under Section 604(b) of the Clean Water Act. Section 604(b) grants are administered by the Maine Department of Environmental Protection (Maine DEP) in partnership with EPA. Project partners include Maine DEP, Portland Water District, Cumberland County Soil & Water Conservation District, Lakes Environmental Association, Maine Forest Service, and the Town of Standish.

Cumberland County Soil & Water Conservation District

Cumberland County Soil & Water Conservation District
35 Main Street, Suite 3 | Windham, ME 04062
207.892.4700 | www.cumberlandswcd.org

Stearns Pond

September 2015

Protecting Water Resources Region-Wide.

Stearns Pond, Sweden, Maine. *Photo Credit: Colin Holme*

Stearns Pond

Stearns Pond is located in Sweden, Maine, to the east of Route 93. Stearns Pond's 3.1-mile shoreline is developed with a variety of residences. The Pond supports summer and winter fishing of brown trout (stocked), smallmouth and largemouth bass, perch, smelts, pickerel, and eels, among others. Much of the land surrounding the Pond is undeveloped woods, and many feeder streams, including Duck Pond Brook, flow through these woods into Stearns Pond.

The water in Steans Pond is naturally colored due to organic matter, but the pond is quite healthy. The land surrounding the Pond has not been subject to significant development like many area waterbodies have, and as such it may have avoided receiving much polluted surface runoff. However, the Pond is still susceptible to regional pollution concerns, especially due to the absence of an active community working together to ensure that the pond stays healthy. Water flows out of Stearns Pond through a canal into Highland Lake, which eventually flows to Sebago Lake.

Part of the Sebago Lake System

Stearns Pond's health is an important factor in the health of Sebago Lake, which is the source of drinking water for 15% of Maine's residents. Portland Water District (PWD) treats and delivers this water and is the largest water utility in Maine. PWD has a vested interest in keeping Sebago Lake clean and supports conservation efforts in the upland areas. The cleanliness and health of Sebago Lake likewise play an important role in the health of Casco Bay, found downstream.

Sebago Lake itself is the second largest lake in Maine. Approximately 361 square miles of land and numerous lakes, ponds, rivers, and streams in 24 towns drain into Sebago Lake. Over 80% of the land that surrounds the Lake is forested. Many partners work together to ensure a clean, healthy Sebago Lake.

Sebago Lake.

Stearns Pond Score Card.

What does this number mean?

- The total possible score is between 4 and 20.
- Each score is the sum of four equally important parts described on the page to the right. Each part is scored from 1 to 5, with 5 being the best.
- Higher numbers are better. The higher the number, the healthier the lake and surrounding area. The table to the right shows the scoring categories.

Overall Lake Score	Level of Concern
19-20	Lowest
16-18	Moderate-Low
12-15	Moderate
8-11	Moderate-High
4-7	Highest

Land Use

Changes in forested versus developed land over decades determined using satellite imagery.

4

Lake Health Trend

Changes in biological activity over at least ten years.

4

11

Partnerships

Activity of local organizations that protect and use the lake and availability of non point source data.

1

2

Current Lake Clarity

Chrolorophyll-*a,* phosphorus, and clarity measurements that indicate a lake's biological activity and nutrient levels.

Next steps for Stearns Pond: Strengthen partnerships, focus on mitigating pollution, and strengthen municipal ordinances.

How Healthy is Stearns Pond?

Installation of water diverters, like shown above, significantly reduces soil erosion and transport of sediment into the water. By diverting water towards the vegetated sides, the soil stays in place.

A vegetated buffer at the water's edge is beautiful and also helps to keep the lake clean. A swath of plants catches sediment and other pollutants before they enter the lake.

Land Use (scored 4 out of 5)

Most of the land that drains into Stearns Pond is woods, enabling soil to filter pollution. Today, slightly more land is wooded and vegetated than a quarter of a century ago. Regional pollution concerns include erosion from unpaved roads and runoff from chemically treated yards.

Partnerships (scored 1 out of 5)

For this score, the presence and involvement of community groups and the possibility for fixing pollution problems were assessed. Stearns Pond did not have obvious opportunities to build partnerships and there also has not also not been a recent survey throughout the pond's land area.

Lake Health Trend (scored 4 out of 5)

Biological activity, as monitored over the past decade, indicates that Stearns Pond is healthy! The clean water trend has persisted even as many waterbodies in the area suffer from pollution washed off of the land. Residents can anticipate future years of clean water for recreation.

Current Lake Clarity (scored 2 out of 5)

Stearns Pond might be susceptible to algal blooms, low oxygen levels, and a stressful environment for aquatic species. Lower water clarity is often due to soil erosion and fertilizer washed off of land. Clarity is related to nutrient levels and biological productivity.

Landowners can implement many simple practices to help keep their lake clean. Providing a clear path to the lakefront can also prevent soil loss.

For More Information

To learn more about your local waterbody, resources for property owners, or the Sebago Lake Watershed Assessment and Prioritization Project:

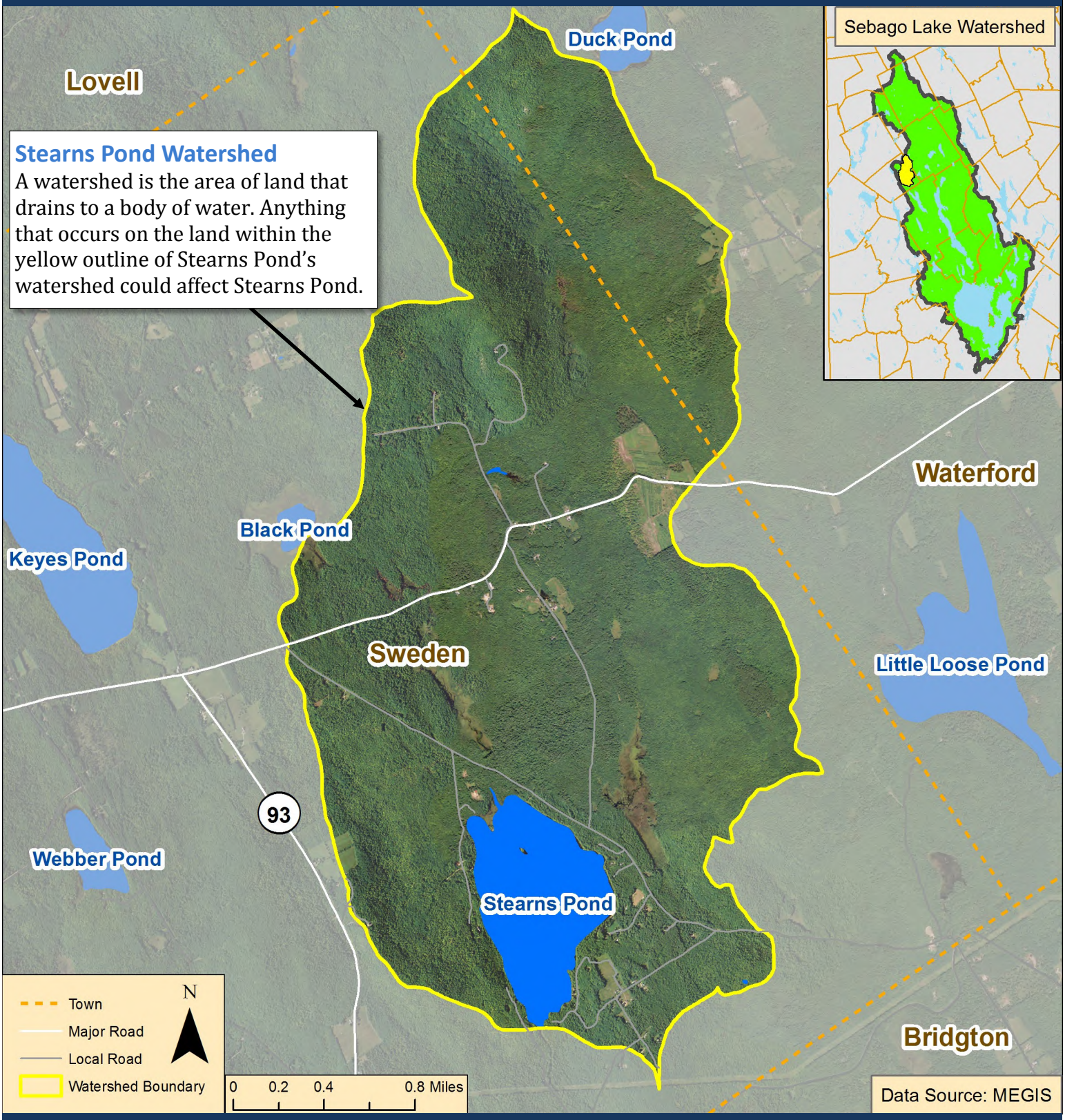
Visit: **www.cumberlandswcd.org**

Call: **Cumberland County Soil & Water Conservation District (207) 892-4700**

Stearns Pond is enjoyed by youth, summer residents, and the local community from Sweden and beyond.

Volunteers and scientists have used Secchi disks (inset) to measure water clarity in lakes and seas since the late 1800s.

Stearns Pond and Surrounding Area.



Partners

This fact sheet was created under the Sebago Lake Watershed Assessment and Prioritization Project. Funding for this project was provided in part by the U.S. Environmental Protection Agency under Section 604(b) of the Clean Water Act. Section 604(b) grants are administered by the Maine Department of Environmental Protection (Maine DEP) in partnership with EPA. Project partners include Maine DEP, Portland Water District, Cumberland County Soil & Water Conservation District, Lakes Environmental Association, Maine Forest Service, and the Town of Standish.

Cumberland County Soil & Water Conservation District

Cumberland County Soil & Water Conservation District
35 Main Street, Suite 3 | Windham, ME 04062
207.892.4700 | www.cumberlandswcd.org

Thomas Pond

Protecting Water Resources Region-Wide.

September 2015

Thomas Pond, Casco and Raymond, Maine.

Thomas Pond

Thomas Pond is located just off Route 302 in Casco and Raymond, Maine. The 7.4-mile shoreline is developed with a variety of summer and year round homes, many of which are set back from the water. A public boat launch allows easy access for fishing and other small boats. The pond itself is about a mile long and a mile wide. Much of the land surrounding the Pond is undeveloped woods, and many feeder streams, including Rolfe Brook and May-Dana Brook, flow through these woods into Thomas Pond.

The Thomas Pond community has demonstrated ongoing commitment to protecting and improving the Pond. A Watershed Survey (2000) identified 125 existing sites of polluted runoff, many showing erosion from unpaved roads and driveways. The community followed this up with Conservation Projects (2005, 2009) to install measures to minimize erosion. Overall, Thomas Pond enjoys water quality that is, according to the Department of Environmental Protection, "average" in Maine. The pond's outlet begins at the Thomas Pond Dam, from where Dingley Brook flows into Sebago Lake.

Part of the Sebago Lake System

Thomas Pond's health is an important factor in the health of Sebago Lake, which is the source of drinking water for 15% of Maine's residents. Portland Water District (PWD) treats and delivers this water and is the largest water utility in Maine. PWD has a vested interest in keeping Sebago Lake clean and supports conservation efforts in the upland areas. The cleanliness and health of Sebago Lake likewise play an important role in the health of Casco Bay, found downstream.

Sebago Lake itself is the second largest lake in Maine. Approximately 361 square miles of land and numerous lakes, ponds, rivers, and streams in 24 towns drain into Sebago Lake. Over 80% of the land that surrounds the Lake is forested. Many partners work together to ensure a clean, healthy Sebago Lake.

Sebago Lake.

Thomas Pond Score Card.

What does this number mean?

- The total possible score is between 4 and 20.
- Each score is the sum of four equally important parts described on the page to the right. Each part is scored from 1 to 5, with 5 being the best.
- Higher numbers are better. The higher the number, the healthier the lake and surrounding area. The table to the right shows the scoring categories.

Overall Lake Score	Level of Concern
19-20	Lowest
16-18	Moderate-Low
12-15	Moderate
8-11	Moderate-High
4-7	Highest

Land Use

Changes in forested versus developed land over decades determined using satellite imagery.

1

Lake Health Trend

Changes in lake clarity over at least ten years.

4

13

Partnerships

Activity of local organizations that protect and use the lake and availability of non point source data.

4

4

Current Lake Clarity

Chrolorophyll-*a,* phosphorus, and clarity measurements that indicate a lake's biological activity and nutrient levels.

Next steps for Thomas Pond: Support existing partnerships and evaluate municipal ordinances to ensure a healthy pond.

How Healthy is Thomas Pond?

Volunteers on a Thomas Pond property plant a buffer zone to stabilize landscaping , the slope, and soil.

A vegetated buffer at the water's edge is beautiful and also helps to keep the lake clean. A swath of plants catches sediment and other pollutants before they enter the lake.

Land Use (scored 1 out of 5)

Most of the land that drains into Thomas Pond is woods, enabling soil to filter pollution. However, the high rate of development in the past quarter century may increase pond pollution from road erosion and runoff, since hard surfaces cannot filter or absorb rainfall or snowmelt.

Partnerships (scored 4 out of 5)

Thomas Pond has enjoyed an involved citizenry and well-established partners for decades. Community support has enabled collaboration among the town, property owners, and road associations. Together they identified several locations to prevent soil erosion.

Lake Health Trend (scored 4 out of 5)

Lake clarity, measured by Secchi depths over the past decade, indicates that Thomas Pond is healthy! The clean water trend has persisted even as many waterbodies in the area suffer from pollution washed off of the land. Residents can anticipate future years of clean water for recreation.

Current Lake Clarity (scored 4 out of 5)

Clean, clear water is found in Thomas Pond. Aquatic plants and animals thrive and local residents benefit from clear swimming water and healthy fish populations. The currently clear conditions could change if there are increases in area soil erosion or polluted surface runoff.

Landowners can implement many simple practices to help keep their lake clean. Providing a clear path to the lakefront can also prevent soil loss.

For More Information

To learn more about your local waterbody, resources for property owners, or the Sebago Lake Watershed Assessment and Prioritization Project:

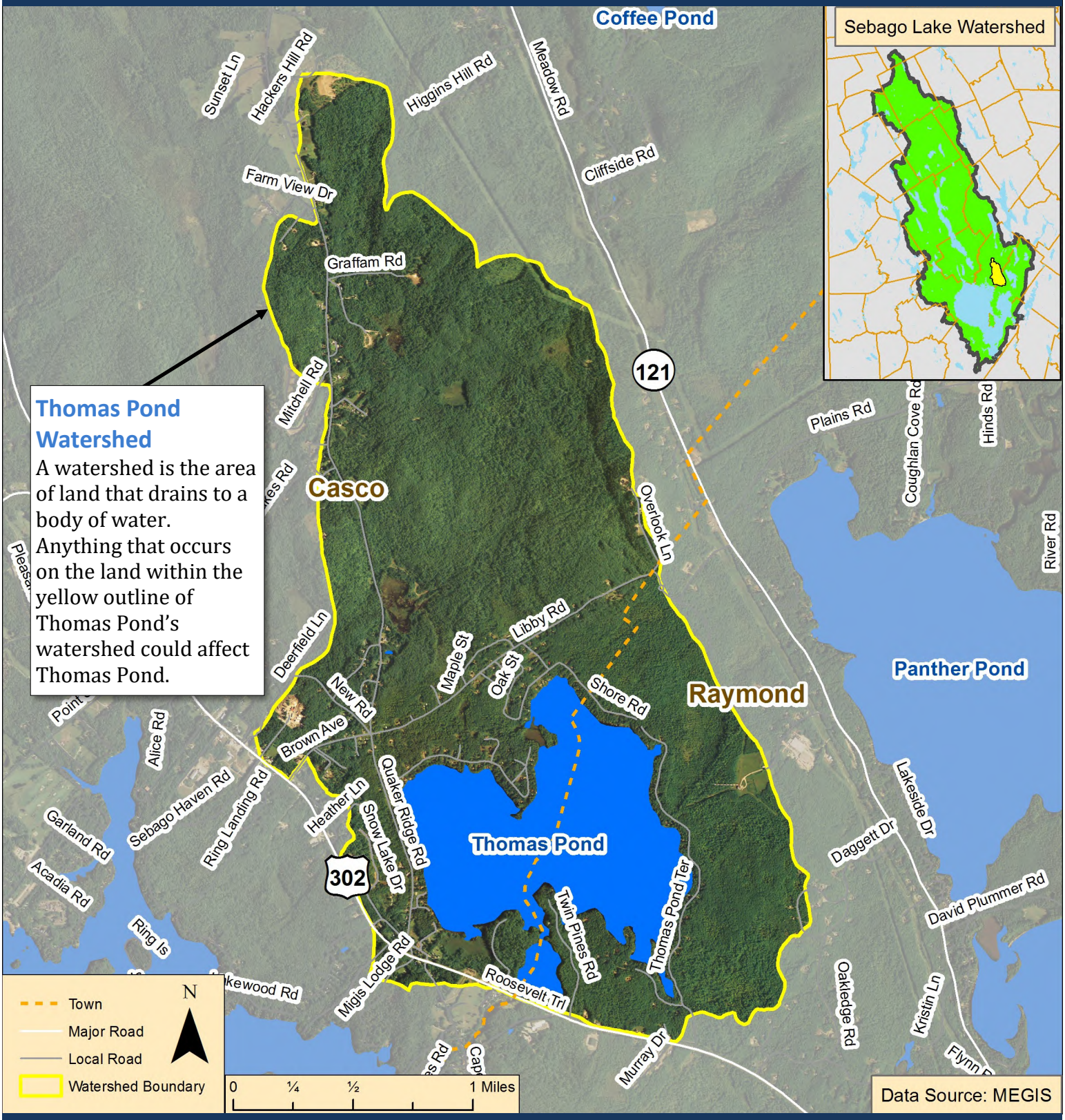
Visit: **www.cumberlandswcd.org**

Call: **Cumberland County Soil & Water Conservation District (207) 892-4700**

Thomas Pond is enjoyed by youth campers, summer residents, and the local community from Casco, Raymond, and beyond.

Volunteers and scientists have used Secchi disks (inset) to measure water clarity in lakes and seas since the late 1800s.

Thomas Pond and Surrounding Area.



Partners

This fact sheet was created under the Sebago Lake Watershed Assessment and Prioritization Project. Funding for this project was provided in part by the U.S. Environmental Protection Agency under Section 604(b) of the Clean Water Act. Section 604(b) grants are administered by the Maine Department of Environmental Protection (Maine DEP) in partnership with EPA. Project partners include Maine DEP, Portland Water District, Cumberland County Soil & Water Conservation District, Lakes Environmental Association, Maine Forest Service, and the Town of Standish.

Cumberland County Soil & Water Conservation District

Cumberland County Soil & Water Conservation District
35 Main Street, Suite 3 | Windham, ME 04062
207.892.4700 | www.cumberlandswcd.org
CCSWCD is an equal opportunity provider and employer.

Trickey Pond

September 2015

Protecting Water Resources Region-Wide.

Trickey Pond, Naples, Maine. *Photo Credit: Lakes Environmental Association*

Trickey Pond

Trickey Pond is located in Naples, Maine, to the north and east of Routes 114 & 11. Trickey Pond's 4.8-mile shoreline is developed with summer and year-round homes, two campgrounds, and one summer youth camp. The Pond covers 315 acres, and drains only about as much surrounding land. Of the surrounding land, much is still woods, though the rate of development has increased. Water may travel through feeder streams in these woods to fill Trickey Pond, but the Pond is largely fed by underground springs.

Partially since it is filled mostly by groundwater, the water in Trickey Pond is exceptionally clear. By traveling underground, water gets filtered and pollutants and sediment are removed. This is not the case for many regional lakes and ponds that fill from water that has travelled across surfaces and picked up soil, yard chemicals, and pollution along the way. Overall, Trickey Pond enjoys water quality that is, according to the Department of Environmental Protection, "excellent" in Maine. This clean water flows out of Trickey Pond at its northern end and directly into Sebago Lake.

Part of the Sebago Lake System

Trickey Pond's health is an important factor in the health of Sebago Lake, which is the source of drinking water for 15% of Maine's residents. Portland Water District (PWD) treats and delivers this water and is the largest water utility in Maine. PWD has a vested interest in keeping Sebago Lake clean and supports conservation efforts in the upland areas. The cleanliness and health of Sebago Lake likewise play an important role in the health of Casco Bay, found downstream.

Sebago Lake itself is the second largest lake in Maine. Approximately 361 square miles of land and numerous lakes, ponds, rivers, and streams in 24 towns drain into Sebago Lake. Over 80% of the land that surrounds the Lake is forested. Many partners work together to ensure a clean, healthy Sebago Lake.

Sebago Lake.

Trickey Pond Score Card.

What does this number mean?

- The total possible score is between 4 and 20.
- Each score is the sum of four equally important parts described on the page to the right. Each part is scored from 1 to 5, with 5 being the best.
- Higher numbers are better. The higher the number, the healthier the lake and surrounding area. The table to the right shows the scoring categories.

Overall Lake Score	Level of Concern
19-20	Lowest
16-18	Moderate-Low
12-15	Moderate
8-11	Moderate-High
4-7	Highest

Land Use

Changes in forested versus developed land over decades determined using satellite imagery.

1

Lake Health Trend

Changes in biological activity over at least ten years.

1

10

Partnerships

Activity of local organizations that protect and use the lake and availability of non point source data.

3

5

Current Lake Clarity

Chrolorophyll-*a,* phosphorus, and clarity measurements that indicate a lake's biological activity and nutrient levels.

Next steps for Trickey Pond: Strengthen partnerships, including with the town, to address the decline in pond health.

How Healthy is Trickey Pond?

Installation of water diverters, like shown above, significantly reduces soil erosion and transport of sediment into the water. By diverting water towards the vegetated sides, soil stays in place.

A vegetated buffer at the water's edge is beautiful and also helps to keep the lake clean. A swath of plants catches sediment and other pollutants before they enter the lake.

Land Use (scored 1 out of 5)

Most of the land that drains into Trickey Pond is woods, enabling soil to filter pollution. However, the high rate of development in the past quarter century may increase pond pollution from road erosion and runoff, since hard surfaces cannot filter or absorb rainfall or snowmelt.

Partnerships (scored 3 out of 5)

Trickey Pond has enjoyed an involved citizenry and well-established partners for years. Community support has enabled collaboration among them. There are several small erosion and pollution sites that should be addressed. The area would also benefit from an updated survey.

Lake Health Trend (scored 1 out of 5)

Biological activity, as monitored over the past decade, indicates that Trickey Pond has become much less healthy for pond life. Surface runoff from surrounding land often contains soil and excess nutrients, leading to too much algal growth and lower oxygen levels in the water.

Current Lake Clarity (scored 5 out of 5)

Clean, clear water is found in Trickey Pond year-round. Aquatic plants and animals are able to thrive and local residents are able to benefit from the seemingly limitless recreation opportunities. The currently clear conditions indicate minimal polluted runoff from the surrounding land.

Landowners can implement many simple practices to help keep their lake clean. Providing a clear path to the lakefront can also prevent soil loss.

For More Information

To learn more about your local waterbody, resources for property owners, or the Sebago Lake Watershed Assessment and Prioritization Project:

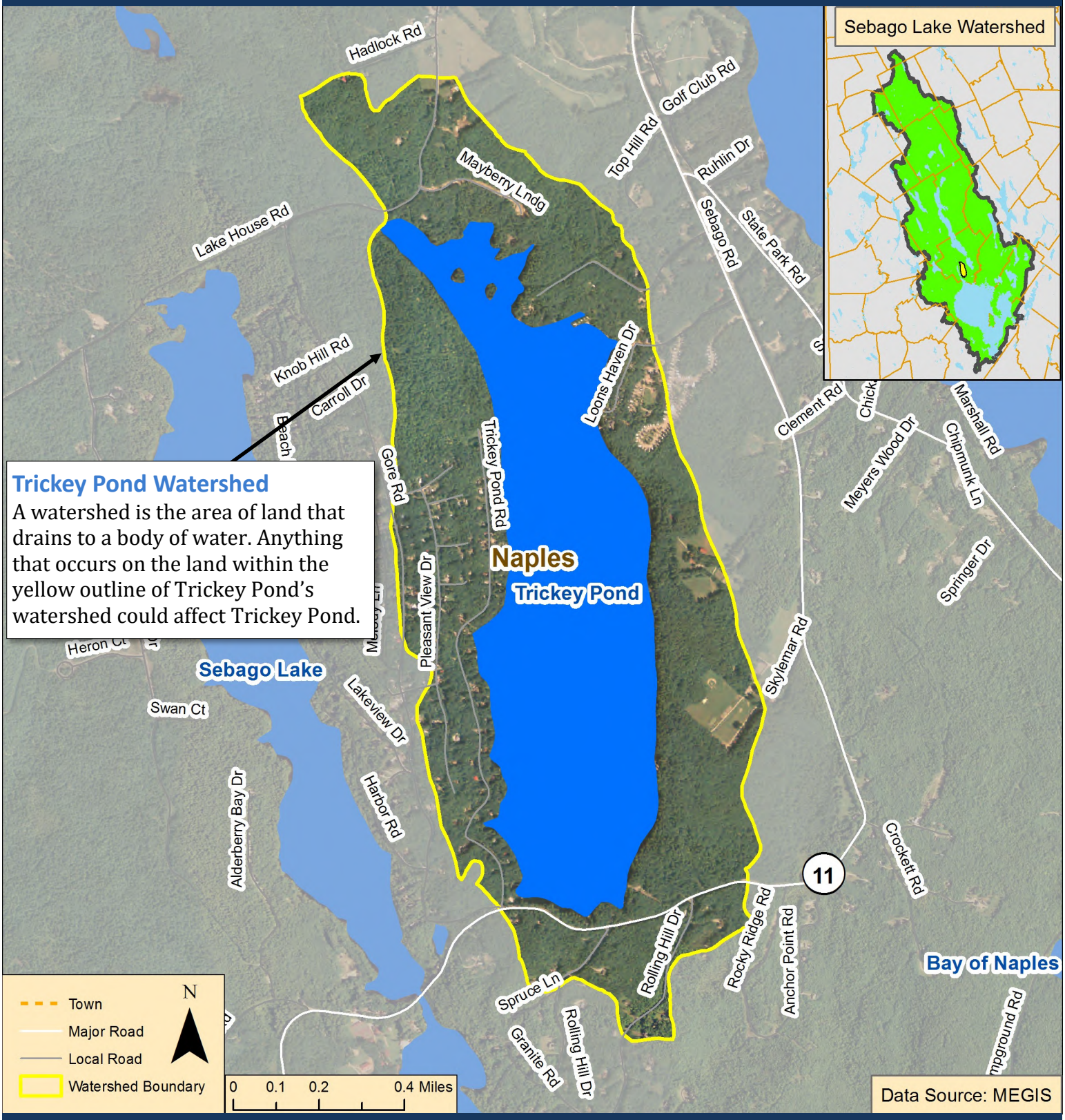
Visit: **www.cumberlandswcd.org**

Call: **Cumberland County Soil & Water Conservation District (207) 892-4700**

Trickey Pond is enjoyed by youth campers, summer residents, and the local community from Naples and beyond.

Volunteers and scientists have used Secchi disks (inset) to measure water clarity in lakes and seas since the late 1800s.

Trickey Pond and Surrounding Area.



Partners

This fact sheet was created under the Sebago Lake Watershed Assessment and Prioritization Project. Funding for this project was provided in part by the U.S. Environmental Protection Agency under Section 604(b) of the Clean Water Act. Section 604(b) grants are administered by the Maine Department of Environmental Protection (Maine DEP) in partnership with EPA. Project partners include Maine DEP, Portland Water District, Cumberland County Soil & Water Conservation District, Lakes Environmental Association, Maine Forest Service, and the Town of Standish.

Cumberland County Soil & Water Conservation District

Cumberland County Soil & Water Conservation District
35 Main Street, Suite 3 | Windham, ME 04062
207.892.4700 | www.cumberlandswcd.org

Woods Pond

September 2015

Protecting Water Resources Region-Wide.

Woods Pond, Bridgton, Maine. *Photo Credit: Colin Holme*

Woods Pond

Woods Pond is located in Bridgton, Maine, north of Route 117 and west of Bridgton town center. Woods Pond's 4.8-mile shoreline is developed with more than 130 seasonal and year-round residences and two summer camps. There is a popular town beach and boat ramp at the outlet end of the pond. Much of the land surrounding the Pond is undeveloped woods, and many feeder streams flow through these woods into Woods Pond.

The Woods Pond community has demonstrated a strong and ongoing commitment to protecting and improving Woods Pond. A Woods Pond Watershed Survey (2013) found that most of the pollution sources were due to unpaved roads; fittingly, almost all of the private roads have associations that raise funds to conduct some road maintenance. A Watershed-Based Protection Plan was submitted (2013) and work is underway to minimize pollution that enters the Pond. A boat washing station was installed to prevent the introduction of invasive aquatic plants. Overall, Woods Pond enjoys water quality that is, according to the Department of Environmental Protection, "average" in Maine. Woods Pond feeds into Willett Brook and eventually into Sebago Lake.

Part of the Sebago Lake System

Woods Pond's health is an important factor in the health of Sebago Lake, which is the source of drinking water for 15% of Maine's residents. Portland Water District (PWD) treats and delivers this water and is the largest water utility in Maine. PWD has a vested interest in keeping Sebago Lake clean and supports conservation efforts in the upland areas. The cleanliness and health of Sebago Lake likewise play an important role in the health of Casco Bay, found downstream.

Sebago Lake itself is the second largest lake in Maine. Approximately 361 square miles of land and numerous lakes, ponds, rivers, and streams in 24 towns drain into Sebago Lake. Over 80% of the land that surrounds the Lake is forested. Many partners work together to ensure a clean, healthy Sebago Lake.

Sebago Lake.

Woods Pond Score Card.

What does this number mean?

- The total possible score is between 4 and 20.
- Each score is the sum of four equally important parts described on the page to the right. Each part is scored from 1 to 5, with 5 being the best.
- Higher numbers are better. The higher the number, the healthier the lake and surrounding area. The table to the right shows the scoring categories.

Overall Lake Score	Level of Concern
19-20	Lowest
16-18	Moderate-Low
12-15	Moderate
8-11	Moderate-High
4-7	Highest

Land Use

Changes in forested versus developed land over decades determined using satellite imagery.

1

Lake Health Trend

Changes in biological activity over at least ten years.

4

11

Partnerships

Activity of local organizations that protect and use the lake and availability of non point source data.

4

2

Current Lake Clarity

Chrolorophyll-*a,* phosphorus, and clarity measurements that indicate a lake's biological activity and nutrient levels.

Next steps for Woods Pond: Focus on mitigating non-point source pollution to improve pond health and work with the town.

How Healthy is Woods Pond?

Installation of water diverters, like shown above, prevents runoff from carrying soil into the water. The Woods Pond Project is working to install various measures to keep the Pond clean, many of which address erosion.

A vegetated buffer at the water's edge is beautiful and also helps to keep the lake clean. A swath of plants catches sediment and other pollutants before they enter the lake.

Land Use (scored 1 out of 5)

Most of the land that drains into Woods Pond is indeed woods, enabling soil to filter pollution. However, the high rate of development in the past quarter century may increase pond pollution from road erosion and runoff, since hard surfaces cannot filter or absorb rainfall or snowmelt.

Partnerships (scored 4 out of 5)

Woods Pond has enjoyed an involved citizenry and well-established partners for decades. Community support has enabled collaboration among the town, property owners, and road associations. Together they identified several locations to prevent soil erosion.

Lake Health Trend (scored 4 out of 5)

Biological activity, as monitored over the past decade, indicates that Woods Pond is healthy! The clean water trend has persisted even as many waterbodies in the area suffer from pollution washed off of the land. Residents can anticipate future years of clean water for recreation.

Current Lake Clarity (scored 2 out of 5)

Woods Pond might be susceptible to algal blooms, low oxygen levels, and a stressful environment for aquatic species. Lower water clarity is often due to soil erosion and fertilizer washed off of land. Clarity is related to nutrient levels and biological productivity.

Landowners can implement many simple practices to help keep their lake clean. Providing a clear path to the lakefront can also prevent soil loss.

For More Information

To learn more about your local waterbody, resources for property owners, or the Sebago Lake Watershed Assessment and Prioritization Project:

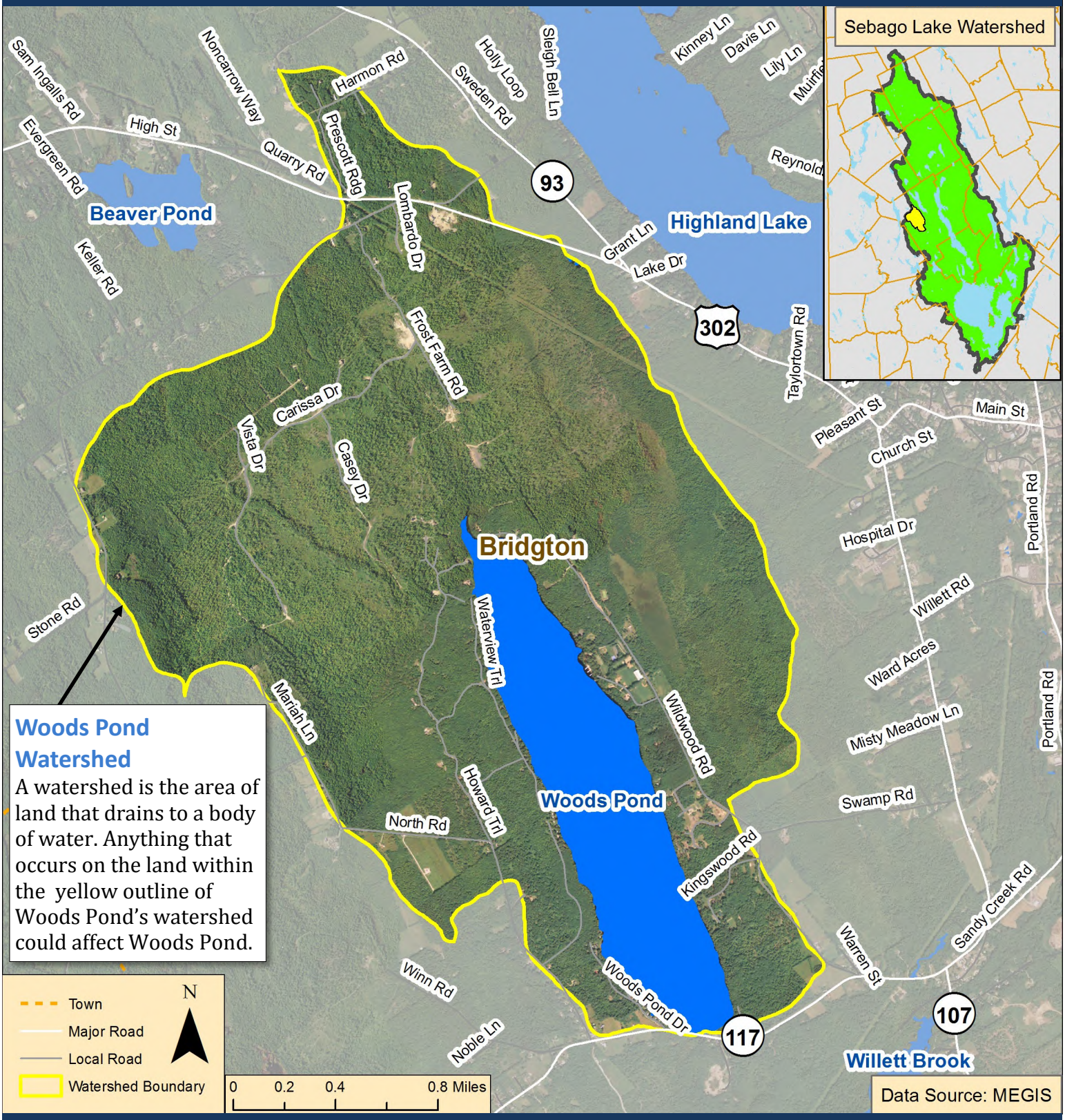
Visit: **www.cumberlandswcd.org**

Call: **Cumberland County Soil & Water Conservation District (207) 892-4700**

Woods Pond is enjoyed by youth campers, summer residents, and the local community from Bridgton and beyond.

Volunteers and scientists have used Secchi disks (inset) to measure water clarity in lakes and seas since the late 1800s.

Woods Pond and Surrounding Area.



Woods Pond Watershed

A watershed is the area of land that drains to a body of water. Anything that occurs on the land within the yellow outline of Woods Pond's watershed could affect Woods Pond.

Partners

This fact sheet was created under the Sebago Lake Watershed Assessment and Prioritization Project. Funding for this project was provided in part by the U.S. Environmental Protection Agency under Section 604(b) of the Clean Water Act. Section 604(b) grants are administered by the Maine Department of Environmental Protection (Maine DEP) in partnership with EPA. Project partners include Maine DEP, Portland Water District, Cumberland County Soil & Water Conservation District, Lakes Environmental Association, Maine Forest Service, and the Town of Standish.

Cumberland County Soil & Water Conservation District

Cumberland County Soil & Water Conservation District
35 Main Street, Suite 3 | Windham, ME 04062
207.892.4700 | www.cumberlandswcd.org

Cumberland County Soil & Water
Conservation District

35 Main Street, Suite 3
Windham, ME 04062
207.892.4700
www.cumberlandswcd.org