



# Lake Wentworth and Crescent Lake

Watershed-Based Management Plan Update

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May 2026

Prepared by  
FB Environmental Associates



# LAKE WENTWORTH AND CRESCENT LAKE

## WATERSHED-BASED MANAGEMENT PLAN UPDATE

MAY 2026 | **FINAL**

Prepared by **FB Environmental Associates**  
*in partnership with the Wentworth Watershed Association*



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**For questions, comments, or additional information related to the Lake Wentworth and Crescent Lake Watershed-Based Management Plan, please contact the Wentworth Watershed Association at [info@wentworthwatershed.org](mailto:info@wentworthwatershed.org)**

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# ABBREVIATIONS

ACRONYM	DEFINITION
<b>AIPC</b>	Aquatic Invasive Plant Control, Prevention and Research Grants
<b>ACEP</b>	Agricultural Conservation Easement Program
<b>CAGR</b>	Compound annual growth rate
<b>CCCD</b>	Carroll County Conservation District
<b>CSP</b>	Conservation Stewardship Program
<b>CWSRF</b>	Clean Water State Revolving Fund
<b>DASH</b>	Diver assisted suction harvester
<b>EPA</b>	United States Environmental Protection Agency
<b>EQIP</b>	Environmental Quality Incentives Program
<b>FBE</b>	FB Environmental Associates
<b>kg/yr</b>	Kilograms per year
<b>LCHIP</b>	Land and Community Heritage Investment Program
<b>LLMP</b>	Lakes Lay Monitoring Program
<b>LLRM</b>	Lake Loading Response Model
<b>LWCF</b>	Land and Water Conservation Fund
<b>MS4</b>	Municipal Separate Storm Sewer Systems
<b>NAWCA</b>	North American Wetlands Conservation Act
<b>NEFRF</b>	Northeast Forests and Rivers Fund
<b>NFWF</b>	National Fish and Wildlife Foundation
<b>NHDES</b>	New Hampshire Department of Environmental Services
<b>NRCS</b>	Natural Resources Conservation Service
<b>ppb, ppm</b>	parts per billion, parts per million
<b>RCPP</b>	Regional Conservation Partnership Program
<b>SCCD</b>	Strafford County Conservation District
<b>SCM</b>	Stormwater control measure
<b>UNH</b>	University of New Hampshire
<b>USDA</b>	United States Department of Agriculture
<b>WMP</b>	Watershed-Based Management Plan
<b>WWA</b>	Wentworth Watershed Association
<b>µS/cm</b>	Microsiemens per centimeter

# DEFINITIONS

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**Adaptive management approach** recognizes that the entire watershed cannot be restored with a single restoration action or within a short time frame. The approach provides an iterative process to evaluate restoration successes and challenges to inform the next set of restoration actions.

**Anoxia** is a condition of low dissolved oxygen in water.

**Areal water load** is the total volume of water flowing into a lake per year normalized to the lake surface area and is expressed in units such as feet per year. It can be interpreted as the depth of inflowing water that would cover the lake surface each year.

**Assimilative capacity** is a lake's capacity to receive and process nutrients (phosphorus) without impairing water quality or harming aquatic life.

**Build-out analysis** combines projected population estimates, current zoning restrictions, and a host of additional development constraints (e.g., conservation lands, steep slope and wetland regulations, existing buildings, soils with low development suitability, and unbuildable parcels) to determine the extent of buildable area in the watershed.

**Chlorophyll-*a*** is a measurement of the green pigment found in all plants, including microscopic plants such as algae. Measured in parts per billion or ppb, it is used as an estimate of algal biomass.

**Clean Water Act** was enacted to protect the chemical, physical, and biological integrity of surface waters in the U.S. and requires states to establish water quality standards to ensure that surface waters can support human and ecological uses.

**Cyanobacteria** are photosynthetic bacteria that can grow prolifically as blooms when enough nutrients and light are available. Cyanobacteria can produce cyanotoxins, which can be highly toxic to humans and other life forms.

**Dissolved oxygen** is a measure of the amount of oxygen dissolved in water. Low oxygen can directly kill or stress organisms and stimulate release of phosphorus from bottom sediments.

**Epilimnion** is the top layer of lake water directly affected by seasonal air temperature and wind. This layer is well-oxygenated by wind and wave action.

**Eutrophication** is the process by which lakes become more productive over time (oligotrophic to mesotrophic to eutrophic). Lakes naturally become more productive or "age" over thousands of years. In recent geologic time, however, humans have enhanced the rate of enrichment and lake productivity, speeding up this natural process to tens or hundreds of years.

**Fall turnover** is the process of complete lake mixing when cooling surface waters become denser and sink, especially during high winds, forcing warmer, less-dense water to the surface. This process is critical for the natural exchange of oxygen and nutrients between surface and bottom layers in the lake.

**Flushing rate** (inverse of retention time) is the fraction of the lake volume that is replaced per year. It is calculated by dividing the flow in or out by the volume of the waterbody.

**Full build-out** refers to the time and circumstances in which, based on a set of restrictions (e.g., environmental constraints and current zoning), no more building growth can occur, or the point at which lots have been subdivided into the minimum size allowed.

**Hypolimnion** is the bottom-most layer of the lake that experiences periods of low oxygen during stratification and is typically devoid of sunlight for photosynthesis.

**Impervious surfaces or impervious cover** refer to any surface that will not allow water to soak into the ground. Examples include paved roads, driveways, parking lots, and roofs.

**Internal phosphorus loading** is the release of phosphorus bound to lake sediments into the water column. The phosphorus can be used as fuel for plant and algae growth.

**Low impact development** is an alternative approach to conventional site planning, design, and development that reduces the impacts of stormwater by working with natural hydrology and minimizing land disturbance by treating stormwater close to the source, and preserving natural drainage systems and open space, among other techniques.

**Metalimnion** is the markedly cooler, dynamic middle layer of rapidly changing water temperature. The top of this layer is distinguished by at least a degree Celsius drop per meter of depth, otherwise known as the **thermocline**.

**Nonpoint source pollution** comes from diffuse sources throughout a watershed, such as stormwater runoff, seepage from septic systems, and gravel road erosion. One of the major constituents of nonpoint source pollution is sediment, which contains a mixture of nutrients (like phosphorus) and inorganic and organic material that stimulate plant and algae growth.

**Oligotrophic** lakes are less productive or have fewer nutrients (i.e., low levels of phosphorus and chlorophyll-*a*), deep Secchi disk transparency readings (4.0 meters or greater), and high dissolved oxygen levels throughout the water column. **Eutrophic** lakes have more nutrients and are therefore more productive and exhibit algal blooms more frequently than oligotrophic lakes. **Mesotrophic** lakes fall in-between with an intermediate level of productivity.

**pH** is the standard measure of the acidity or alkalinity of a solution on a scale of 0 (acidic) to 14 (basic).

**Riparian** refers to wildlife habitat found along the banks of a lake, river, or stream. Not only are these areas ecologically diverse, but they are also critical to protecting water quality by preventing erosion and filtering polluted stormwater runoff.

**Secchi disk transparency** is a vertical measure of the transparency of water (ability of light to penetrate water) obtained by lowering a black and white disk into the water until it is no longer visible. It is an indirect measure of algal productivity and is measured in meters.

**Stormwater control measures (SCMs)** are practices designed to minimize discharge of nonpoint source pollution from developed land to lakes and streams. Watershed-based management plans should include both **non-structural** (non-engineered) and **structural** (engineered) SCMs for existing and new

development to ensure long-term restoration success. Best Management Practices (BMPs) is a term used interchangeably with SCMs.

**Thermal stratification** is the process whereby warming surface temperatures in summer create a temperature and density differential that separates the water column into distinct, non-mixable layers.

**Total phosphorus** is one of the major nutrients needed for algae and plant growth. It is generally present in small amounts (measured in parts per billion or ppb) and limits growth in lakes. In general, as the concentration of phosphorus increases, the amount of algae and plant biomass also increases.

**Trophic state** is the degree of eutrophication of a lake and is designated as oligotrophic, mesotrophic, or eutrophic.



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# EXECUTIVE SUMMARY

The challenges facing Lake Wentworth and Crescent Lake and how we can continue to address them together.

Lake Wentworth (3,103 acres) and Crescent Lake (140 acres) flow into Wolfeboro Bay in Lake Winnepesaukee, a natural resource central to the ecological health and economic vitality of the New Hampshire Lakes Region. The 35.4-square-mile Lake Wentworth-Crescent Lake watershed is characterized by forested uplands, extensive wetlands, and a network of fourteen major tributary streams and small ponds that drain to Lake Wentworth and then to Crescent Lake via the Smith River. The lakes' long-term health depends on how communities manage land use, development, and changing environmental condition impacts. Fortunately, the lakes are supported by the Wentworth Watershed Association, which has dedicated staff and an outstanding network of volunteers to lead protection efforts in the watershed.

## THE PROBLEM

Lake Wentworth and Crescent Lake have historically maintained excellent water quality, but recent cyanobacteria blooms signal growing threats. Despite generally low nutrient levels, blooms of potentially toxic taxa (*Dolichospermum*, *Gloeotrichia*) have been observed in multiple years.

Key stressors include:



Phosphorus inputs from stormwater runoff, shoreline erosion, septic failures, roads, fertilizers, and agricultural activities.



Climate variability, with larger storms and longer ice-free periods.

Because phosphorus is the limiting nutrient in these freshwater systems, reducing phosphorus loading remains the central water quality objective for both Lake Wentworth and Crescent Lake.

Surveys identified 90 problem sites and over 200 impacted shorefront properties, with runoff from development contributing 58% and 93% of watershed phosphorus load to Lake Wentworth and Crescent Lake, respectively. Without action, development and climate pressures will accelerate water quality decline.

## THE GOAL

The goal is to protect water quality and recreation in Lake Wentworth and Crescent Lake. The Lake Wentworth and Crescent Lake Watershed-Based Management Plan sets a ten-year goal to meet New Hampshire water quality standards for the designated uses of aquatic life integrity and primary contact recreation and substantially reduce the likelihood of harmful cyanobacteria blooms. This goal can be accomplished through the following objectives:

**OBJECTIVE 1:** Reduce phosphorus loading from existing development by 10% (104 kilograms per year) for Lake Wentworth and 15% (71 kilograms per year) for Crescent Lake.

**OBJECTIVE 2:** Offset phosphorus loading from future development to maintain average summer in-lake total phosphorus concentrations in the next ten years.

## THE SOLUTION

The Wentworth Watershed Association and partners have updated the action plan, which includes:

- **Structural Stormwater Control Measures:** runoff capture, shoreline buffers, erosion stabilization, and septic upgrades.
- **Monitoring:** continuation of long-term lake monitoring with the University of New Hampshire Lakes Lay Monitoring Program.
- **Education and Outreach:** strengthening of community education on septic care, fertilizer use, stormwater, invasive species, and shoreline protection.
- **Policy and Land Use Tools:** promotion of low impact development and resilient development standards through revision of ordinances.

The cost of implementation is estimated at over a million dollars over the next ten years, funded through state and federal grants, municipal commitments, and private support, in addition to the dedication and commitment of volunteer time and support to manage plan implementation. Many costs were unknown or roughly estimated and should be updated as information becomes available. Cost estimates are provided in the Action Plan where possible (Action Plan).

## THE KEY TO SUCCESS

This watershed management plan meets the nine key planning elements required by the United States Environmental Protection Agency. Lake Wentworth and Crescent Lake continue to be eligible for federal watershed assistance grants. The success of this plan will depend on continued strong coordination by the Wentworth Watershed Association, active engagement from shoreline landowners, and sustained financial and volunteer support. Because phosphorus reductions are complex and influenced by both local and region-wide conditions, adaptive management will be essential to track progress and adjust strategies over time. With collaboration, commitment, and long-term investment, the community can protect Lake Wentworth and Crescent Lake and ensure a healthy future for these valuable natural resources.

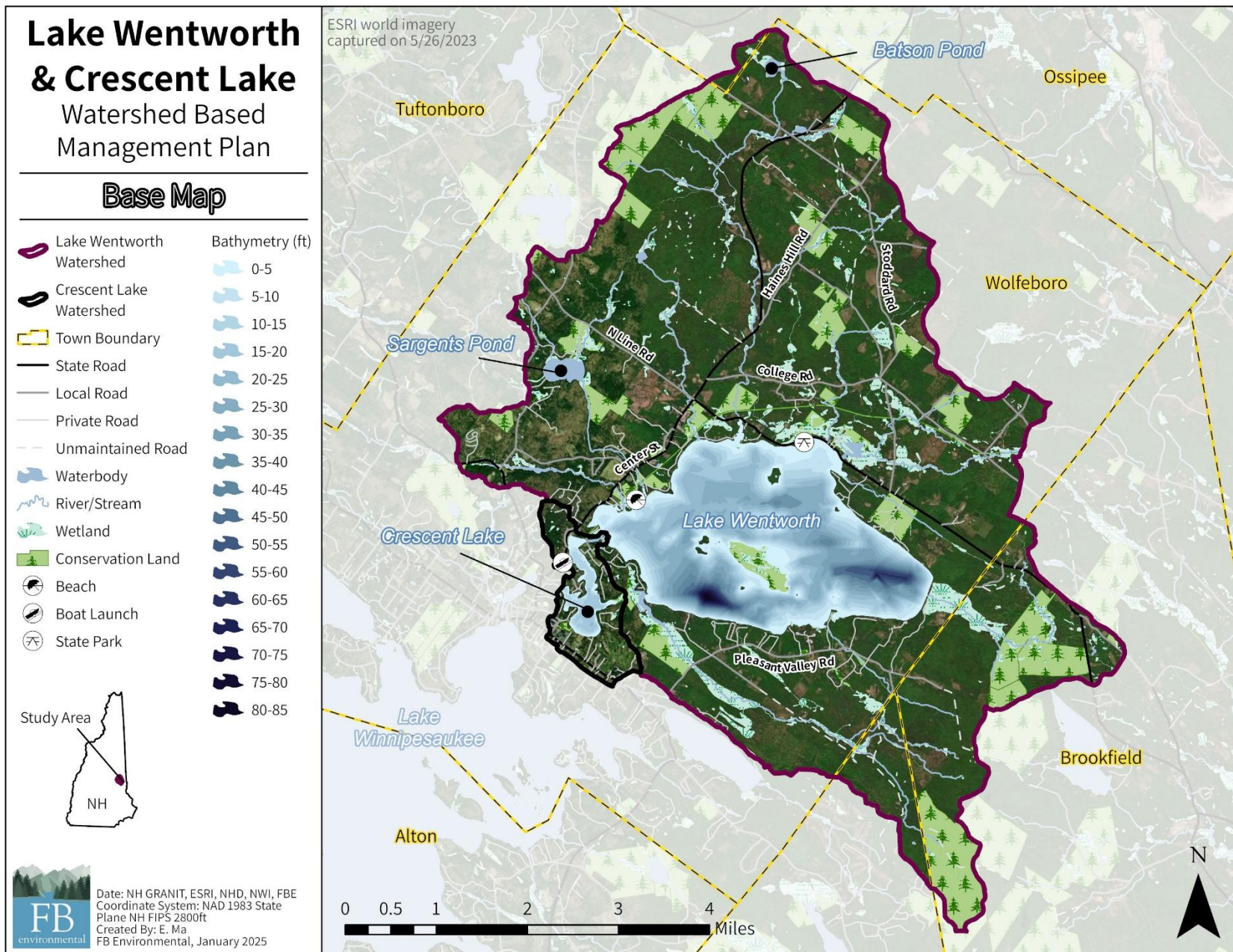


Figure 1. Lake Wentworth-Crescent Lake watershed base map.

# 1 INTRODUCTION

## 1.1 WATERBODY DESCRIPTION AND LOCATION



### Watershed Overview and Hydrology

The Lake Wentworth-Crescent Lake watershed encompasses 35.4 square miles across Wolfeboro (86%), Brookfield (11%), New Durham (2%), and Ossipee (<1%), New Hampshire (Figure 1). The highest elevation in the watershed is Copple Crown Mountain in Brookfield at 1,868 feet above sea level. Lake Wentworth (3,103 acres) and Crescent Lake (140 acres) sit at approximately 534 feet above sea level.

The watershed is characterized by forested uplands, extensive wetlands, and a network of fourteen major tributary streams and small ponds, including Sargent's Pond (62 acres), that drain to Lake Wentworth and then to Crescent Lake via the Smith River. Lake Wentworth contains 20 islands, some inhabited now or historically and some uninhabited, with Stamp Act Island being the largest island. The Cotton Valley Rail-Trail (formerly the Wolfeboro Railroad) cuts off sections of Lake Wentworth and Crescent Lake to form Fernald's Basin and Goodwin's Basin, respectively.

Lake levels are regulated by a dam at the outlet of Crescent Lake, which influences downstream flow to Wolfeboro Bay in Lake Winnepesaukee and the Merrimack River system. Because Crescent Lake receives most of its water and nutrient load from Lake Wentworth, the two lakes function as a connected system.

Wetlands, **riparian** corridors, and forested headwaters play a critical role in moderating runoff, retaining sediment and nutrients, and supporting aquatic and terrestrial habitat throughout the watershed.



### Climate

The watershed experiences a temperate climate with cold winters, warm summers, and seasonally variable precipitation. Average annual precipitation for the last ten years in the area is 46.1 inches. Recent regional trends toward more intense precipitation events and longer summer dry periods have increased the importance of stormwater management and watershed resilience. High-intensity precipitation can accelerate erosion, mobilize nutrient-rich sediments, and overwhelm roadside and shoreline drainage systems, while prolonged warm periods strengthen **thermal stratification**, **hypolimnion** oxygen depletion, and **internal phosphorus loading** in surface waters. These climatic factors heighten the sensitivity of both lakes to land use practices in the watershed.



### Land Cover and Development

Land cover in the watershed is dominated by mixed forest, wetlands, and low-density residential development, with more concentrated development occurring along major road corridors and lake

shorelines. Major road corridors around Lake Wentworth include Route 28 (Center Street) and Route 109 (Governor John Wentworth Highway), along with local roads such as North Line Road, Trotting Track Road, Beach Pond Road, College Road, Haines Hill Road, Cotton Valley Road, Bryant Road, Stoddard Road, and Pleasant Valley Road. Commercial businesses line Route 28 (Center Street) along the northwestern shoreline of Lake Wentworth and Route 28 (South Main Street) along the southern shoreline of Crescent Lake. Agricultural areas are scattered throughout the watershed, particularly along Pleasant Valley Road, Route 109, and Stoddard Road. A golf course drains to the southeastern end of Crescent Lake. Shoreline development, road networks, aging septic systems, and increasing impervious surfaces represent the primary features influencing runoff quantity and quality. Even at relatively low development densities, cumulative impacts from small sources, such as driveways, lawn areas, and unpaved roads can contribute substantial sediment and nutrient loads to surface waters.



## Ecological Value

The watershed's forests comprise a mix of conifers, such as white pine and eastern hemlock, and deciduous species such as beech, red oak, and maple. Major wetlands complexes around Lake Wentworth include Brewster Heath via Heath Brook, which drains to the southwestern portion of the lake; Ryefield Marsh, which drains to the northeastern portion of the lake; and a wetland at the outlet of Warren Brook that drains to the southeastern portion of the lake. These diverse habitats provide critical refuge for a wide range of wildlife. Large mammals such as moose, deer, black bear, coyote, and bobcat roam the upland areas, while smaller species like fox, raccoon, porcupine, fisher cats, mink, and snowshoe hare thrive in mixed habitats. Aquatic environments support otter, muskrat, and beaver populations, and wetlands provide habitat for reptiles and amphibians such as turtles, snakes, frogs, and salamanders.

The watershed also hosts a rich bird community, from common species like wild turkeys, ruffed grouse, and songbirds to key water-associated species such as herons, loons, ducks, geese, cormorants, and bald eagles. Fish and insect populations support both aquatic and terrestrial food webs. Of special note, the Town of Wolfeboro is home to threatened and endangered species, including reproducing populations of common loons. For more information on rare species and exemplary natural communities found in the watershed, see the [2006 Ecological Inventory of Lake Wentworth Foundation Property, Wolfeboro, NH](#) which can be accessed on the Wentworth Watershed Association (WWA) website.



## Human Use and Water Access

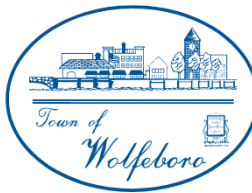
Lake Wentworth and Crescent Lake and the contributing watershed support a wide range of recreational opportunities. The only public boat access to both lakes is located off Route 28 (Center Street) at Mast Landing on Crescent Lake. Boats can pass under the Whitten Neck Road bridge via the Smith River to access Lake Wentworth. There are no marinas or sources of boat gas on either lake. There are two public beaches, Allen Albee Beach on the western shoreline and Clow's Beach within Wentworth State Park on the northern shoreline along Route 109. Wentworth State Park is a 50-acre preserve purchased by the State of New Hampshire in 1932 and constructed by the Civilian Conservation Corps from 1933 to 1942. Two children's camps are also located along the shoreline of Lake Wentworth: Pierce Camp Birchmont is a 247-acre camp established in 1950, and Camp Bernadette is a 23-acre camp established in 1953. Ten preserves and conservation areas totaling 485 acres are owned and maintained by the WWA and provide

opportunities for passive outdoor recreation and scenic enjoyment by the public. The Cotton Valley Rail Trail (former Wolfeboro Railroad) runs through the western part of the watershed.

## 1.2 WATERSHED PROTECTION GROUPS



The [Wentworth Watershed Association](#) (WWA) serves as the non-profit lake association for Lake Wentworth and Crescent Lake with the goal of encouraging the protection and preservation of the lakes and their valuable natural resources. The WWA is made up of residents and landowners in the watershed and is led by paid staff, a volunteer Board of Directors, and several volunteer committees. WWA participates in the University of New Hampshire Lakes Lay Monitoring Program (UNH LLMP) water testing program to monitor the lakes and track long-term protection efforts. WWA developed a [Strategic Plan](#) for 2024-2026 that includes three goals: protect water quality, expand land conservation efforts, and increase watershed stewardship through education and communications.



[Wolfeboro Waters](#) is a standing Town of Wolfeboro committee consisting of volunteers appointed by the Wolfeboro Select Board. The committee was established in response to a local cyanobacteria bloom in Lake Winnepesaukee that lasted for three weeks in August 2018. The committee complements the longer-term protection efforts of the WWA, Rust Pond Association, Mirror Lake Protective Association, and Lake Winnepesaukee Alliance. Wolfeboro Waters focuses on the risk and mitigation of cyanobacteria blooms in local waters.



The [Carroll County Conservation District](#) (CCCD) and [Stafford County Conservation District](#) (SCCD) are two of ten county conservation districts in New Hampshire that operate as resource management agencies and subdivisions of local governments. CCCD focuses on water quality, erosion and sedimentation, wildlife habitat, forest and wetland health, nonpoint source pollution, and stormwater and flooding. These organizations work with farmers, landowners, schools, and municipalities to protect natural resources through projects such as stream restoration, invasive species management, and pollinator plantings.



[Lakes Region Conservation Trust](#) is a non-profit organization “dedicated to the permanent conservation, stewardship, and respectful use of lands that define the character of the Lakes Region and its quality of life.” Their vision is a “future where conserved lands support thriving biodiversity, healthy watersheds, and vibrant human communities.” Lakes Region Conservation Trust has conserved 162 properties totaling over 28,300 acres in the Lakes Region.



The **New Hampshire Association of Conservation Commissions** works to provide educational assistance to conservation commissions throughout New Hampshire (216 in total). As a non-profit organization, the New Hampshire Association of Conservation Commissions' mission is to instill responsible use of the available natural resources by promoting conservation and serving as the communication link between conservation commissions, while providing technical support on the logistics of conservation commission meetings and document language. Conservation commissions in the Lake Wentworth-Crescent Lake watershed largely include those of Wolfeboro and Brookfield.



Covering 31 communities, the **Lakes Region Planning Commission** is a valuable resource to the region. The Commission aids communities with their local planning services in a targeted approach to protect the environment, while supporting local economies and cultural values.



**NH LAKES** is a statewide, publicly-supported, non-profit organization working to restore and preserve the health of New Hampshire's lakes. NH Lakes facilitates the Lake Host and LakeSmart programs along with other outreach and education campaigns and provides funding to towns and watershed associations for lake restoration and protection efforts.



The **New Hampshire Department of Environmental Services** (NHDES) partners with local organizations to improve watershed-level water quality by supporting communities in setting goals, developing management plans, and addressing contamination through financial and technical assistance.



**Moose Mountains Regional Greenways** is a non-profit land trust that works to conserve and connect important natural resource areas across nine communities in the Moose Mountains and Ossipee Mountains region of New Hampshire. The organization partners with landowners, municipalities, and conservation groups to permanently protect forests, farms, wildlife habitat, water resources, and scenic landscapes, while also supporting recreation and community access to open space. In addition to land conservation, they provide technical assistance to towns, offer educational programs, and promote stewardship to help maintain a healthy and resilient regional environment for current and future generations.



The **Society for the Protection of New Hampshire Forests** is a statewide non-profit land conservation organization that works to protect forests, water resources, wildlife habitat, and scenic landscapes across New Hampshire. Through land conservation, sustainable forest management, advocacy, and education, the organization promotes long-term stewardship and public access to the state's natural resources.

## 1.3 PURPOSE AND SCOPE

**The purpose of the Lake Wentworth and Crescent Lake Watershed-Based Management Plan (WMP) Update is to reprioritize implementation efforts over the next ten years (2026-2035) to continue to improve the water quality of Lake Wentworth and Crescent Lake. The plan aims to meet state water quality standards for the designated uses of aquatic life integrity and primary contact recreation for oligotrophic waterbodies and to reduce the likelihood of harmful cyanobacteria blooms in the lakes.**

As part of the update of this plan, a **build-out analysis**, land-use model, water quality and **assimilative capacity** analysis, and shoreline and watershed surveys were updated to better understand changes to the sources of phosphorus and other pollutants to the lakes (Sections 2 and 3). Results from these analyses were used to re-establish the water quality goal and objectives (Section 2.4), reprioritize recommended management strategies for the identified pollutant sources (Section 4), and update estimated pollutant load reductions and costs needed for remediation (Sections 5 and 6). Recommended management strategies involve using a combination of **structural and non-structural stormwater control measures (SCMs)**, as well as an **adaptive management approach** that allows for regular updates to the plan (Section 4). An Action Plan (Section 5) with associated timeframes, responsible parties, and estimated costs was updated in collaboration with the Advisory Committee and public during a community forum (Section 1.4). This plan update meets the nine key planning elements required by the United States Environmental Protection Agency (EPA) so that communities become eligible for federal watershed assistance grants administered by NHDES (Section 1.5).

## 1.4 COMMUNITY INVOLVEMENT AND PLANNING

The plan was updated through collaborative efforts, including several meetings, public presentations, and conference calls. Participants included FB Environmental Associates (FBE) and WWA (see Acknowledgments).

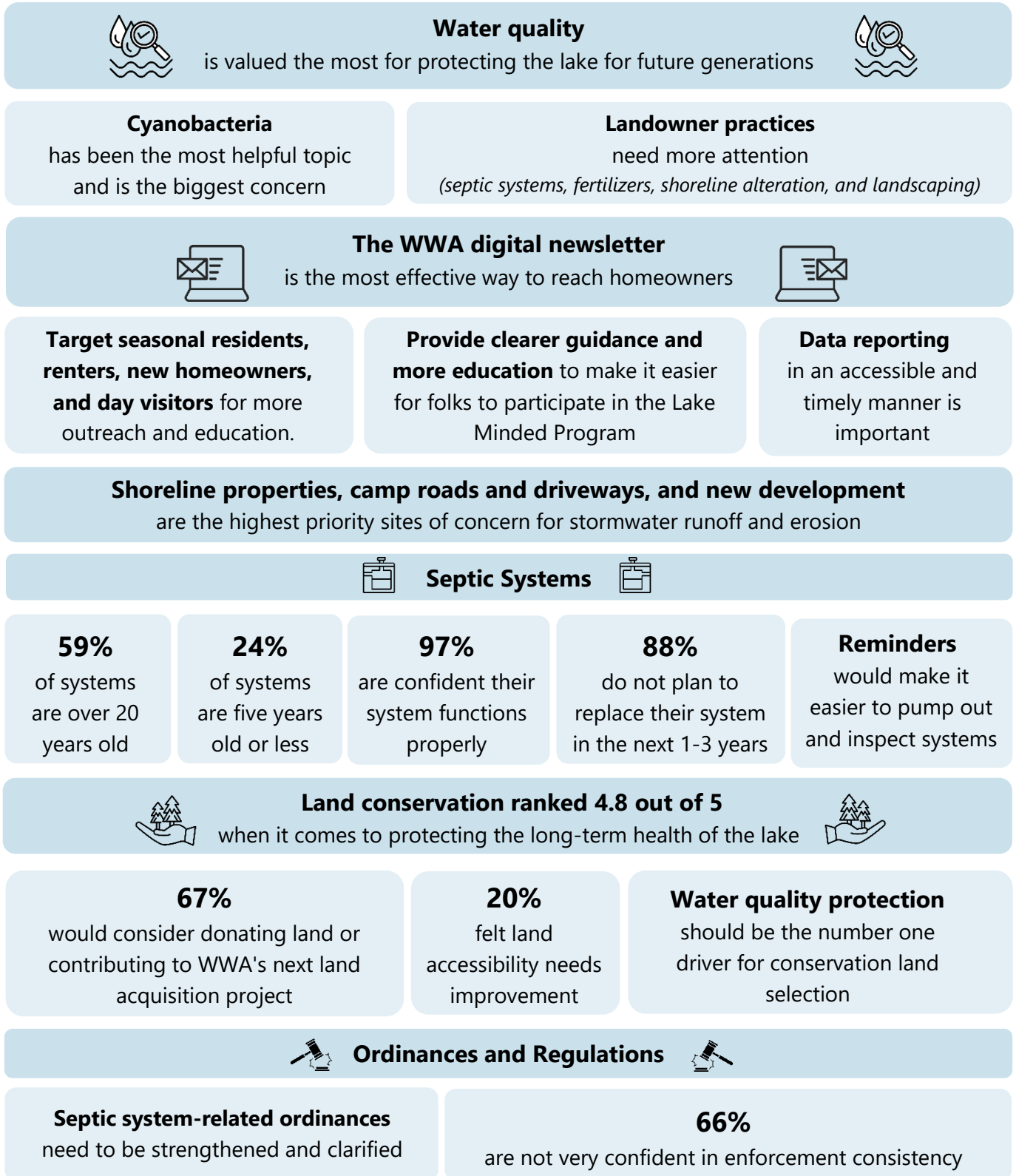
### 1.4.1 Plan Development Meetings

Several meetings were held over the duration of the plan update. The following list does not include routine annual meetings conducted separately by WWA, except as they relate to the plan update.

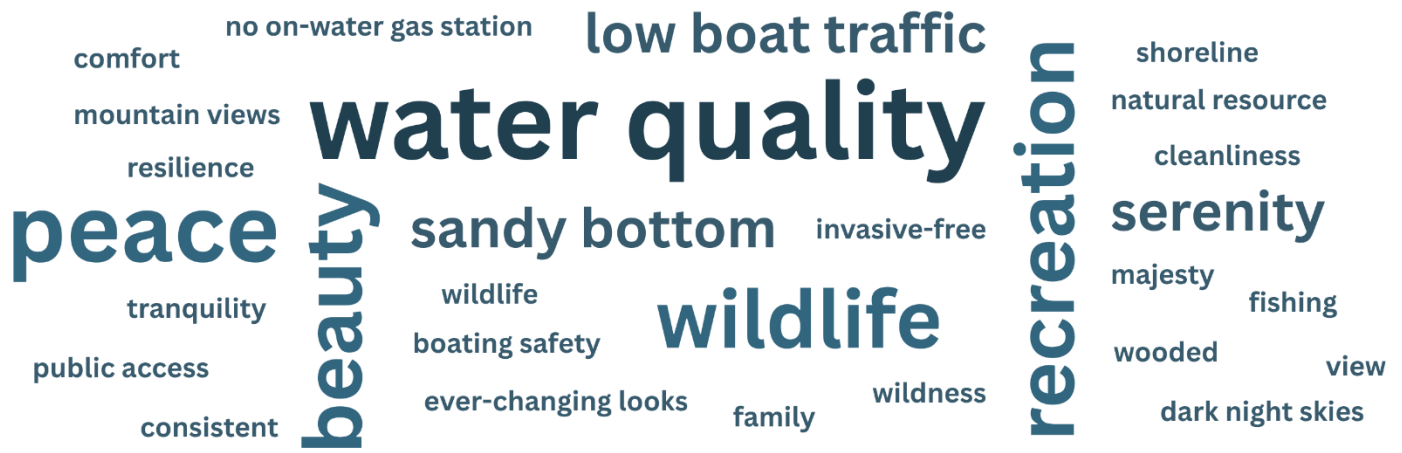
<b>August 3, 2024</b>	FBE presents at the Lake Wentworth annual meeting to introduce the project.
<b>October 23, 2024</b>	WWA and FBE call to review the scope of work and kick-off the project.
<b>July 19, 2025</b>	FBE presents the action plan at a community forum held in the Great Hall, located in the Wolfeboro Town Hall, with over 150 attendees. Community input is gathered through a survey.
<b>December 16, 2025</b>	FBE and WWA call to re-establish a water quality goal.

### 1.4.2 Community Forum

A community forum with 156 participants was held on July 19, 2025 at the Wolfeboro Town Hall. A presentation was accompanied by 37 poll questions to engage participants and collect real-time data. The following is a summary of key poll responses, followed by more details on responses.



The first question asked to participants was “what do you love or value most about your lake that you want to protect for future generations?” The response was overwhelmingly in favor of protecting water quality, followed by the beauty, peace, wildlife, and recreational opportunity that folks can enjoy around the lakes (Figure 2).



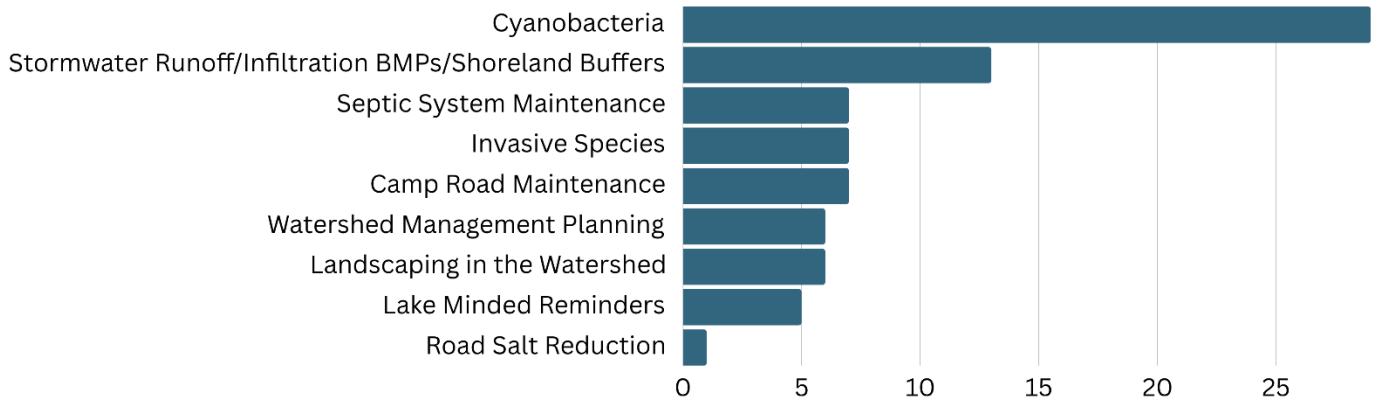
**Figure 2.** Word cloud of poll responses to “What do you love or value most about your lake that you want to protect for future generations?”

***Outreach and Education***

When asked what needs more or continued attention, participants largely felt that addressing topics such as runoff (camp roads, fertilizers), septic systems, and education and outreach are most important to protect water quality. Other topics that were called to attention include milfoil, well fracking, land conservation, gas leakage into the lake, and implementation of rain gardens.

Many poll questions were related to outreach and education. Over 75% of people attended three or more WWA educational events in the past five years, and 50% of people attended events about water quality issues hosted by other groups, including the Town of Wolfeboro Water Department, New Hampshire Lakes Congress, Lakes Environmental Association, Lake Sunapee Protective Association, Lake Winnepesaukee Alliance, and UNH. Some folks have also attended events by out-of-state groups, including New York (Lake George Park Association) and Massachusetts (Bourne Wastewater Department and Barnstable Water Quality Group).

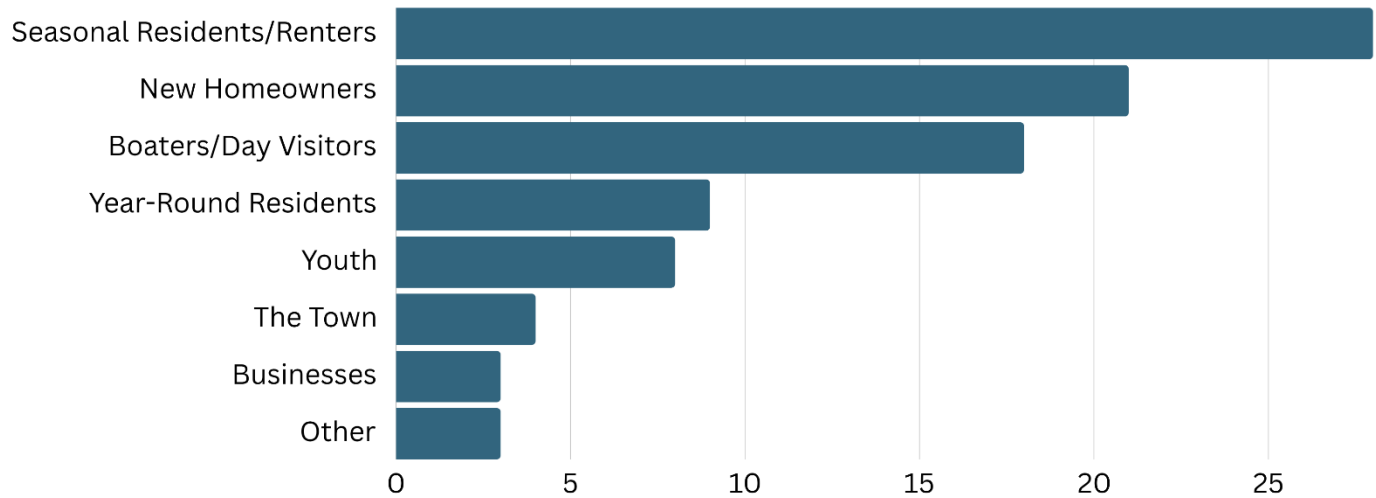
With cyanobacteria being a high priority issue in the Lakes Region, it is no surprise that folks found cyanobacteria the most helpful or memorable outreach topic (Figure 3). Other important topics have included stormwater management along the shoreline, septic system maintenance, invasive species, and camp road maintenance, among others.



**Figure 3.** Poll responses to “What outreach/education topics have been most helpful or memorable to you?”

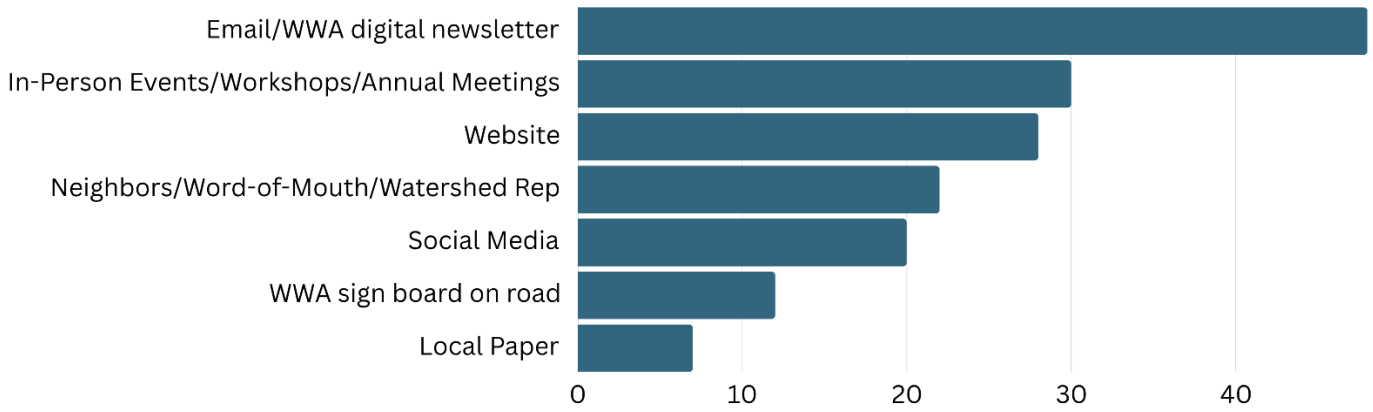
When asked what lake protection topic needs more or continued attention in future outreach, most responses indicated that landowner practices, such as septic system maintenance, fertilizer use, shoreline disturbance/alteration, household hazardous waste disposal, and landscaping are highly important to include in future outreach. Other responses indicated invasive species (milfoil, spiny water flea), road management (camp roads, salting), runoff, general lake health (basics of what impacts lake health), cyanobacteria, land conservation, phosphorus load modeling, and beaver impacts.

Participants mostly want to see seasonal residents, renters, new homeowners, and day visitors targeted for more outreach and education (Figure 4).



**Figure 4.** Poll responses to “Are there certain groups that you would like to see targeted more for future outreach/education?”

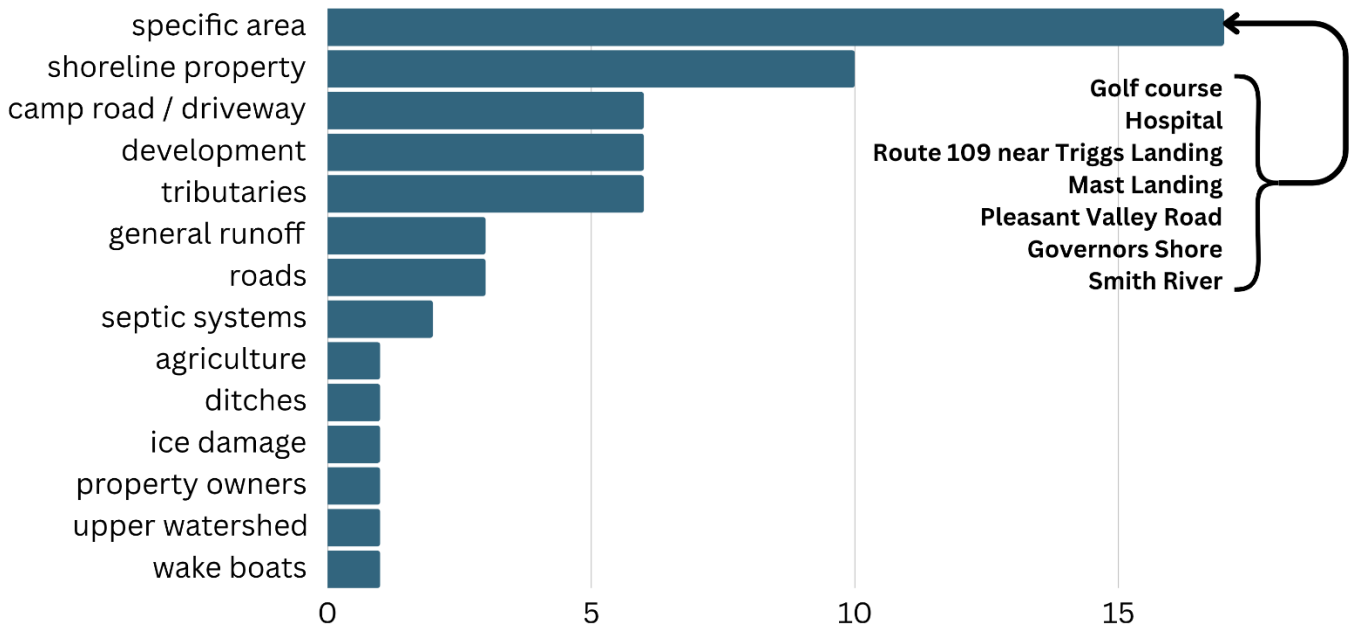
Participants are most effectively reached via email and the WWA digital newsletter (Figure 5). Other effective forms of communication are in-person events and the WWA website. The WWA road sign and the local paper are less effective modes of communication.



**Figure 5.** Poll responses to “What method of outreach/education do you find most effective? How do you usually receive information about lake issues or events?”

**Stormwater Issues**

Participants listed shoreline properties, camp roads and driveways, new development, and tributaries as highest priority general sites of concern for stormwater runoff and erosion to the lake. Some specific areas of concern listed include Route 109, the golf course, the hospital, and others (Figure 6). Subsequently, participants felt that private property owners contribute the most runoff/erosion and need more outreach, and 70% of participants have experienced or heard of poor stormwater or landscaping/hardscaping work near the lake that caused issues. Folks also largely felt that there is not enough accountability for contractors or landscapers working near the lake.



**Figure 6.** Poll responses to “Where or what are the major areas of stormwater runoff and/or erosion to the lake that continue to be an issue?”

When asked about WWA’s Lake Minded Program, 60% of folks have participated in the program, with 25% not having participated, and 15% not having known the program exists. Nearly 80% of people

responded that they would participate, with about 20% of folks saying they are unsure or need more information. Less than 2% responded that they would not participate.

When asked what would make it easier for folks to participate in the Lake Minded Program and take action to prevent runoff/erosion from their property, the most popular responses were clearer guidance and more education. Folks also desire funding, incentives, and assistance in finding contractors. Other mentions include easier permitting, time, tailored assistance (e.g., site walks), enforcement, low-cost options, ordinances, and more active watershed representatives.

Participants ranked the major challenges to addressing runoff and erosion issues:

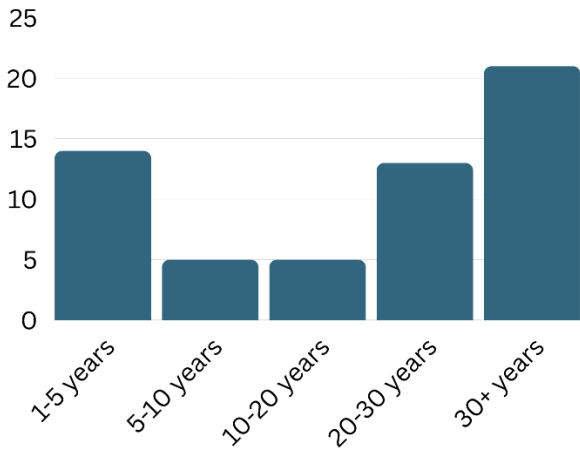
- 1 Lack of Accountability (contractor/landscaper liability, state/local enforcement)
- 2 Lack of Awareness (permitting, best practices)
- 3 Funding Resources
- 4 Inconsistent or Lack of Long-Term Stormwater Control Maintenance
- 5 Other Challenges (not specified in this list)

### **Septic Systems**

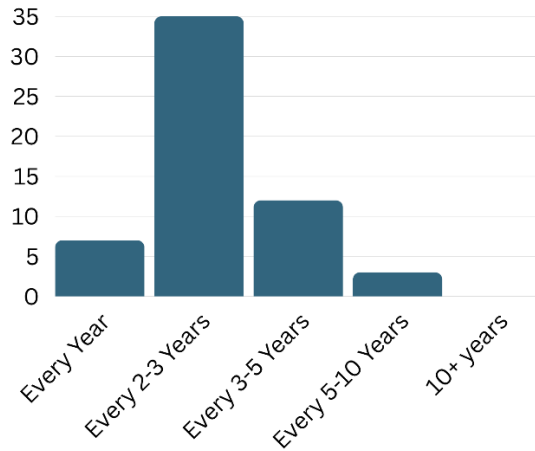
Only two of 58 respondents have participated in or are aware of any neighborhoods coordinating discounted group pump-outs. When it comes to septic system ages, 59% of folks have a system that is over 20 years old and 24% of folks have a fairly new system of five years old or less (Figure 7). Nearly all participants (97%) are confident that their septic system functions properly, and nearly all participants (88%) do not plan to replace their system in the next 1-3 years.

When tested on their knowledge, most participants (98%) understand that systems should be pumped and inspected at least every five years, with 74% understanding that every three years or less is preferred. Most participants (74%) do pump out and/or inspect their system every three years or less (Figure 8).

Participants overwhelmingly feel that reminders would make it easier for them to pump-out and inspect their septic systems. Folks also felt that incentives, contractor recommendations, and funding would help.



**Figure 7.** Poll responses to “How old is your septic system?”



**Figure 8.** Poll responses to “How frequently do you pump-out and/or inspect your septic system?”

**Land Conservation**

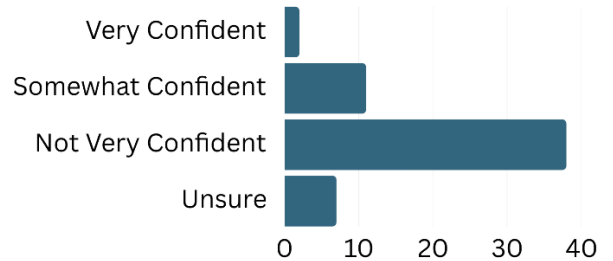
Participants ranked land conservation a 4.8 out of 5 when it comes to the long-term health of the lake, with 67% of folks saying they would consider donating land or contributing to WWA's next land acquisition project. A broader split was seen when asked about the accessibility of conserved land in the watershed. While over half of participants think land is accessible, 20% felt that it needs improvement, and 25% were unsure.

Participants felt that water quality protection should be the number one driver for conservation land selection, followed by overdevelopment prevention and wildlife habitat protection/connectivity. Public access and scenic views were lower on the scale.

- 1 Water quality protection
- 2 Overdevelopment prevention
- 3 Wildlife habitat protection / connectivity
- 4 Public access increase / connectivity
- 5 Scenic view protection

**Ordinances and Enforcement**

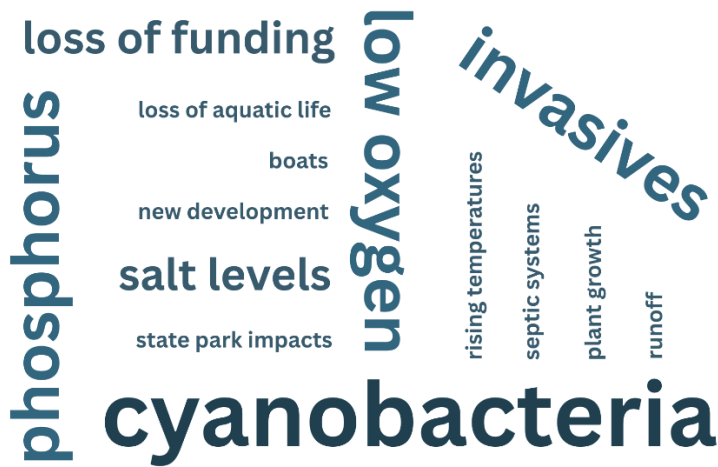
Generally, confidence is low for consistency of enforcement of existing town and state ordinances, with 66% of participants not very confident and only less than 4% of participants very confident (Figure 9). Folks felt that enforcement is lacking fairly evenly among all categories: septic system maintenance, stormwater runoff, shoreland development, erosion and sediment control, and tree and vegetation clearing.



**Figure 9.** Poll responses to “How confident are you that existing town and state ordinances or regulations are being consistently enforced?”

Participants anticipate that the biggest barriers to enforcement are lack of staff and time as well as difficulty in monitoring violations. Some also felt that lack of awareness among property owners and lack of fines or consequences are barriers.

When asked about areas where existing ordinances need to be strengthened or clarified, septic system maintenance (including inspections, pumping, monitoring, and replacement) had the most votes by far. Many also felt that shoreline landscaping (e.g., buffers, fertilizers, and vegetation removal) are important aspects to strengthen. Folks highlighted the need for enforcement and education of existing ordinances. The top choices which folks felt would help improve compliance with lake-friendly ordinances and regulations were more visible enforcement presence and better signage or guidance for property owners. The remaining votes were split fairly evenly between easier online permitting info or frequently asked questions, anonymous reporting of violations, and workshops for contractors and landscapers, though the latter was the least popular choice.

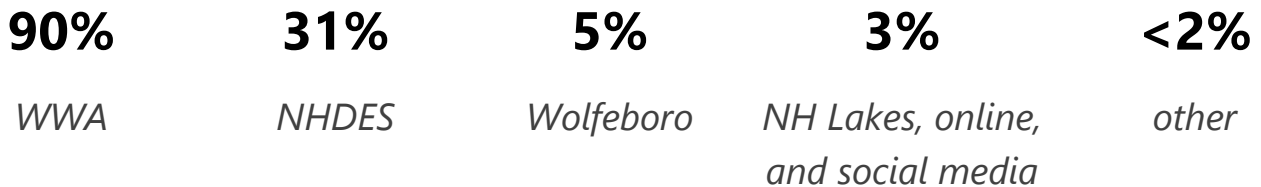


**Figure 10.** Word cloud of poll responses to “What are your biggest concerns for water quality in the lake?”

Participants cited cyanobacteria as their biggest concern for water quality in the lake, followed by invasives, then phosphorus, then low oxygen in the water. Some were also concerned about loss of funding at both the federal and state level, as well as salt levels in the water, among various other concerns (Figure 10).

Most participants (97%) felt at least somewhat well informed about the state of water quality in the lake, relying on various entities for information, with WWA at the top of the list, followed by NHDES, the Town of Wolfeboro, and various other entities.

**Where participants get water quality updates:**



When it comes to improvements with lake data collection and communication, participants felt that data reporting was most important. This includes sharing the data that is collected in an easy to understand, accessible manner, at a greater frequency, and closer to when it is collected. Dissemination also proved to be an important factor, with folks suggesting dissemination through newsletters, text alerts, social media posts, WWA email, and public areas to all residents and visitors, not just WWA members. Some also noted that it would be helpful to connect water quality data to next steps that individuals can take. Several folks were interested in learning how to volunteer to help with collection.

## 1.5 INCORPORATING EPA'S NINE ELEMENTS

EPA guidance lists nine key planning elements that highlight important steps in restoring and protecting water quality for any waterbody affected by nonpoint source pollution. The nine key planning elements found within this plan are as follows:

### **A. IDENTIFICATION OF THE CAUSES AND SOURCES OF NONPOINT SOURCE POLLUTION**

Sections 2 and 3 highlight known sources of nonpoint source pollution to Lake Wentworth and Crescent Lake and describe the updated results of the watershed survey and other assessments. These sources of pollutants must be controlled to achieve the load reductions re-estimated in this plan, as discussed in item (B) below.

### **B. ESTIMATION OF POLLUTANT LOADING AND LOAD REDUCTIONS EXPECTED FROM MANAGEMENT MEASURES**

Sections 2 and 5 describe the calculation of pollutant loading to Lake Wentworth and Crescent Lake and the amount of reduction needed to meet the water quality goal, respectively.

### **C. DESCRIPTION OF NONPOINT SOURCE MANAGEMENT MEASURES**

Sections 4 and 5 identify ways to achieve the estimated phosphorus load reduction and reach water quality targets. The Action Plan focuses on several major topic areas categorizing action items that address nonpoint source pollution.

### **D. ESTIMATION OF TECHNICAL AND FINANCIAL ASSISTANCE**

Sections 5 and 6 include a description of the associated costs, sources of funding, and primary authorities responsible for implementation. Funding sources should be diverse, including local, state, and federal grants, local organizations, private donations, and landowner contributions to support Action Plan implementation.

### **E. DEVELOPMENT OF EDUCATION AND OUTREACH COMPONENT**

Section 4 describes how the educational component of the plan is already being or will be implemented.

### **F. SCHEDULE FOR IMPLEMENTING THE NONPOINT SOURCE MANAGEMENT MEASURES**

Section 5 provides a list of action items and recommendations to reduce the phosphorus load to Lake Wentworth and Crescent Lake. Each item has a set schedule that defines when the action should begin and/or end or run through if an ongoing activity. The schedule should be adjusted by WWA regularly (see Section 4.4 on Adaptive Management and Section 6.1 on Plan Oversight). While phosphorus is the primary nutrient driving this plan, WWA and municipalities should also consider reductions in sediment, nitrogen, and bacteria, where applicable, to support overall water quality improvements and align with broader reporting expectations.

**G. DESCRIPTION OF INTERIM MEASURABLE MILESTONES FOR MEASURING PROGRESS**

Section 6 outlines indicators along with milestones for implementation success that should be tracked annually.

**H. SET OF CRITERIA**

Sections 2 and 6 can be used to determine whether phosphorus loading reductions are being achieved over time and whether progress meets water quality targets. If targets are not met, these sections provide criteria to determine whether the plan should be revised.

**I. DEVELOPMENT OF MONITORING COMPONENT**

Section 6 describes the long-term water quality monitoring strategy for Lake Wentworth and Crescent Lake, which allows for evaluation of implementation effectiveness over time against the criteria in (H) above. The success of this plan cannot be evaluated without ongoing monitoring and assessment and careful tracking of load reductions following implementation of action items.

# 2 WATER QUALITY ASSESSMENT

This section provides an overview of the past, current, and predicted future state of water quality based on water quality assessment and watershed modeling. These analyses identified pollutants of concern and helped provide the basis to set updated water quality goals and objectives for Lake Wentworth and Crescent Lake.

## 2.1 WATER QUALITY SUMMARY

Water quality assessment can be complex. Here are the key points to know about each lake:

- 🍃 **Lake Wentworth and Crescent Lake are known for their excellent water quality.**

Lake Wentworth is legislatively classified as Class A, which represents waters that are of the highest quality and are protected for uses like drinking water (with treatment). Crescent Lake is legislatively classified as Class B, which represents waters that are still considered good quality and are the most common, intended to be suitable for swimming, fishing, and supporting aquatic life. Both lakes are oligotrophic because water quality has consistently met the standards for the healthiest type of lake.

- 🍃 **The water quality of both lakes is threatened by enhanced nutrient loading from human activities and extreme weather events.**

Lake Wentworth experiences anoxia (low dissolved oxygen) at the lake bottom during the summer and shows decreasing water transparency at the Governor's deep spot station. Crescent Lake has generally higher nutrient concentrations, higher algal biomass, and shallower transparency compared to Lake Wentworth. Cyanobacteria blooms have emerged as a concern in recent years for both lakes.

- 🍃 **Beaches along Lake Wentworth have elevated fecal bacteria that threaten public health.**

Allen Albee Beach and Clow's Beach at Wentworth State Park are assessed as impaired for recreation due to elevated levels of fecal bacteria in the wadable swimming zone. The source of fecal bacteria could be from humans or wildlife or a combination of both.

- 🍃 **Both Lake Wentworth and Crescent Lake are well managed for invasive aquatic species.**

Both lakes have been infested with invasive aquatic species, namely variable milfoil. Diligent, volunteer-based Weed Watcher and Lake Host programs have kept these invaders at bay.

## 2.1.1 Water Quality Standards and Impairment Status

### 2.1.1.1 Designated Uses and Water Quality Criteria

The federal **Clean Water Act** requires states to determine designated uses for all surface waters within their jurisdiction, develop water quality criteria to protect those designated uses, and establish antidegradation provisions (Env-Wq 1708) that set limits on impacts to water quality from development.

Designated uses define activities and services that surface waters should support. For surface waters in New Hampshire, the six designated uses are as follows, and those applicable to this plan are **bolded**:

- **Aquatic life integrity** (i.e., supporting a balanced, integrated, and adaptive community of organisms having species composition, diversity, and functional organization comparable to similar natural habitats)
- **Primary contact recreation** (i.e., swimming)
- Secondary contact recreation (i.e., boating, fishing)
- Fish consumption
- Shellfish consumption
- Potential drinking water supply

In New Hampshire, all surface waters are legislatively classified as either Class A or Class B, most of which are Class B (Env-Wq 1700). Class A waters are the highest quality and are protected for designated uses like drinking water (with treatment). Class B waters are still considered good quality and are the most common, intended to be suitable for swimming, fishing, and supporting aquatic life. Lake Wentworth is Class A and Crescent Lake is Class B.

NHDES biologists survey New Hampshire lakes to determine their **trophic state** – a way of describing overall lake health based on water clarity, nutrients, and plant and algae growth. Lakes are placed into one of three categories:

**Oligotrophic** *low nutrients and algae biomass, good clarity, and healthy habitat for cold water fish*

**Mesotrophic** *moderate nutrients and algae biomass, still good for recreation and aquatic life*

**Eutrophic** *higher nutrients and algae biomass, reduced water clarity, limited uses*

Lake Wentworth was determined to be oligotrophic in surveys conducted in 1975, 1988, and 2006, and Crescent Lake was also determined to be oligotrophic in surveys conducted in 1984 and 2002. This means the water quality in each lake consistently meets the standards for the healthiest type of lake.

Water quality criteria serve as a “yardstick” for measuring whether a lake is healthy enough to support its designated uses (like swimming or aquatic life) based on whether it is Class A or B or oligotrophic, mesotrophic, or eutrophic. These criteria include parameters such as nutrient levels (e.g., phosphorus), algae levels (**chlorophyll-a** and prevalence of cyanobacteria), dissolved oxygen, and pH. If water quality measurements do not meet the criteria for designated uses according to the NHDES Consolidated

Assessment and Listing Methodology, the lake is assessed as impaired. Water quality criteria for each classification and designated use in New Hampshire are legislatively enabled in RSA 485 A:8, IV and detailed in administrative rules Env-Wq 1700.

Every other year to meet requirements under the Clean Water Act, state agencies such as NHDES produce an Integrated Report that assesses the quality of surface waters across the state. This Integrated Report combines the 305(b) Surface Water Quality Report that provides a general overview of state surface water quality and the 303(d) List of Impaired Waters that identifies surface waters not supporting one or more designated uses and requiring a Total Maximum Daily Load. A Total Maximum Daily Load is a limit on how much pollution a waterbody (like a river, lake, or stream) can safely handle while still supporting its designated uses.

The Lake Wentworth-Crescent Lake watershed contains three lake/pond assessment units, all of which are formally assessed as impaired for at least one designated use on the 303(d) List of Impaired Waters for the 2024 reporting cycle (NHDES, 2024) (Table 1; Figure 11). NHDES' rating of water quality, presented in Table 1, is based on the most severe impairment of any parameter for which the assessment unit was evaluated. A waterbody may receive a "severe" or "poor" rating due to the potential impact of low dissolved oxygen or pH on aquatic life yet still have excellent water quality with regard to parameters related to lake trophic status, cyanobacteria growth, and/or recreational uses.

- Lake Wentworth is assessed as impaired for aquatic life integrity, with a "severe" rating for both low dissolved oxygen and pH and a "poor" rating for dissolved oxygen saturation and non-native aquatic plants. The limited available data for cyanobacteria hepatotoxic microcystin for Lake Wentworth is rated "likely bad" for primary contact recreation, meaning the available data suggest the parameter is "Potentially Not Supporting" the designated use, though there are not enough data to confirm. Cyanobacteria blooms have emerged as a concern for Lake Wentworth.
- Crescent Lake is assessed by NHDES as impaired for aquatic life integrity for the presence of non-native aquatic plants and has experienced cyanobacteria blooms in recent years.
- Sargent's Pond, which feeds into Hersey (Tyler) Brook, a tributary to Lake Wentworth, is assessed as impaired for aquatic life integrity due to low pH.
- Two out of five of the assessed beaches, Allen Albee Beach and Wentworth State Park Beach, are assessed as impaired for primary contact recreation due to high levels of *E. coli*. Two other beaches, Camp Bernadette Beach and Lake Wentworth Public Beach, do not have enough current data to assess. One beach, Pierce Camp Birchmont Beach, is "likely good" for primary contact recreation due to low *E. coli* levels.
- Of the twelve major tributaries to Lake Wentworth that are sampled routinely, one tributary, Willey Brook, is assessed as impaired for aquatic life integrity due to elevated aluminum and low pH.

**Table 1.** NHDES assessment units covering lakes/ponds in the Lake Wentworth-Crescent Lake watershed and their associated water quality rating as reported on the NHDES 2024 Watershed Report Cards.

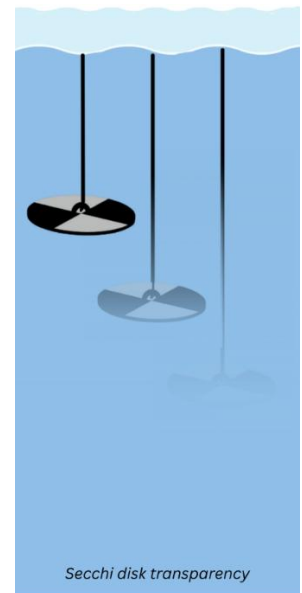
Assessment Unit Name	AUID	Area (acres)	Water Quality
Lake Wentworth	NHLAK700020101-05-01	3,088.86	Severe
Crescent Lake	NHLAK700020101-04	146.44	Poor
Sargent’s Pond	NHLAK700020101-02	62.23	Poor
Lake Wentworth – Allen Albee Beach	NHLAK700020101-05-02	0.15	Poor
Lake Wentworth - Wentworth State Park Beach	NHLAK700020101-05-03	2.21	Severe
Lake Wentworth – Public Beach	NHLAK700020101-05-04	0.53	No Current Data
Lake Wentworth - Camp Bernadette Beach	NHLAK700020101-05-05	1.38	No Current Data
Lake Wentworth - Pierce Camp Birchmont Beach	NHLAK700020101-05-07	1.38	Likely Good

**2.1.2 Trophic State Indicators**

Total phosphorus, chlorophyll-*a*, and Secchi disk transparency are trophic state indicators, reflecting biological productivity in lake ecosystems. The combination of these parameters helps determine the extent of **eutrophication** in lakes and helps signal changes in lake water quality over time. For example, if the water becomes less clear (lower Secchi disk transparency), it may be because more algae are growing – often fueled by higher phosphorus levels – or because other materials are suspended in the water. These changes usually point to impacts from human activity or other disturbances in the surrounding watershed.

According to the UNH LLMP 2024 Sampling Highlights for all three deep spots in Lake Wentworth (Fuller’s, Governor’s, and Trigg’s), key water quality parameters such as Secchi disk transparency, total phosphorus, and chlorophyll-*a* show stable trends and reflect high water quality except for dissolved oxygen, which becomes critically low at 2 parts per million (ppm) or less at lake bottom in summer.

At all three deep spots of Lake Wentworth from 2015-2024, slightly higher total phosphorus concentrations were measured in the metalimnion and hypolimnion compared to the epilimnion, indicating minor internal phosphorus loading is occurring (Figure 12). In Crescent Lake from 2015-2024, there appears to be minimal differences between upper and lower water column total phosphorus, likely due to Crescent Lake’s shallow maximum depth and the frequent mixing and flushing from the high water load coming from Lake Wentworth through the Smith River. It is important to note that some

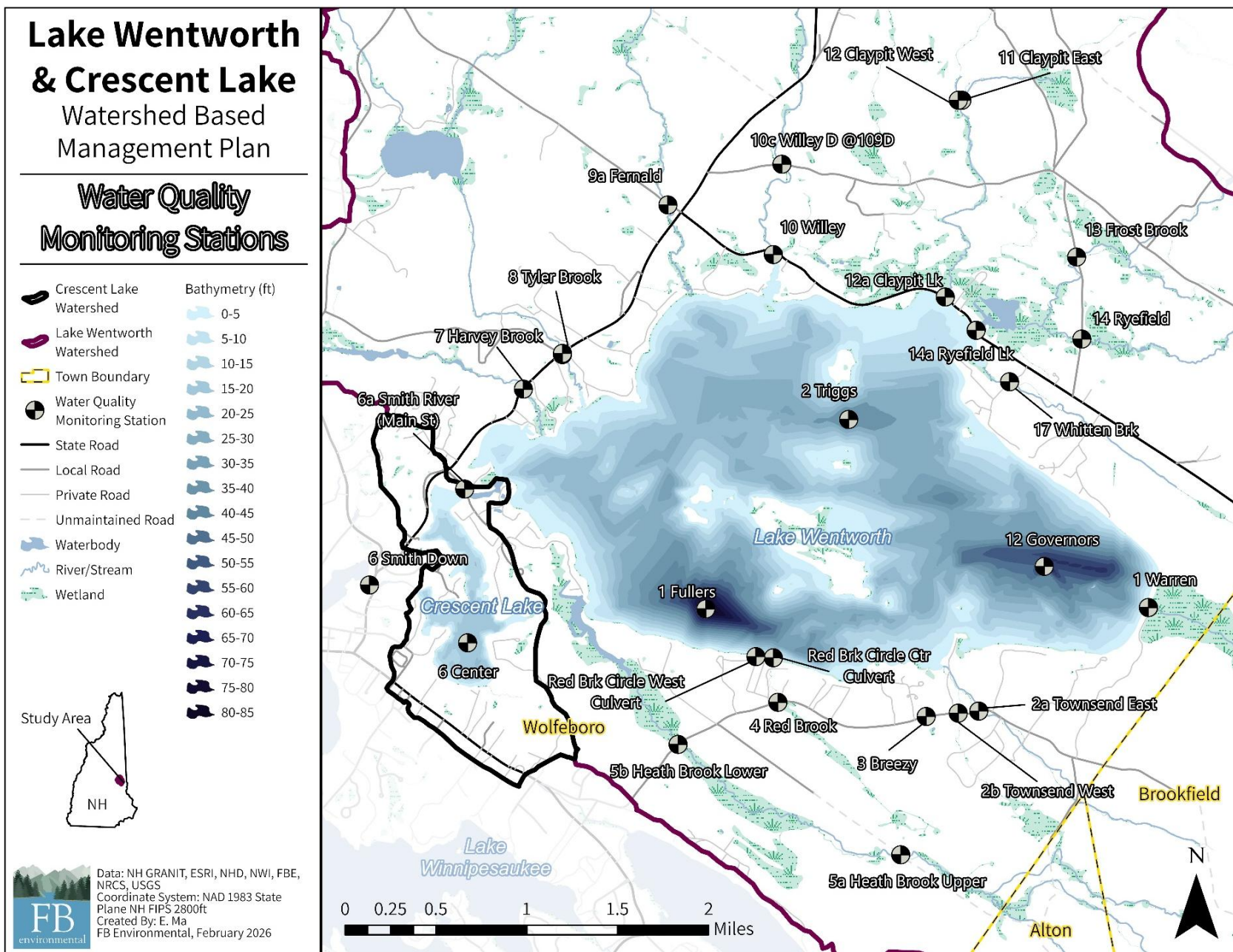


internal loading may still be occurring in Crescent Lake in the absence of extended periods of anoxia due to other sources such as bioturbation or other disturbance.

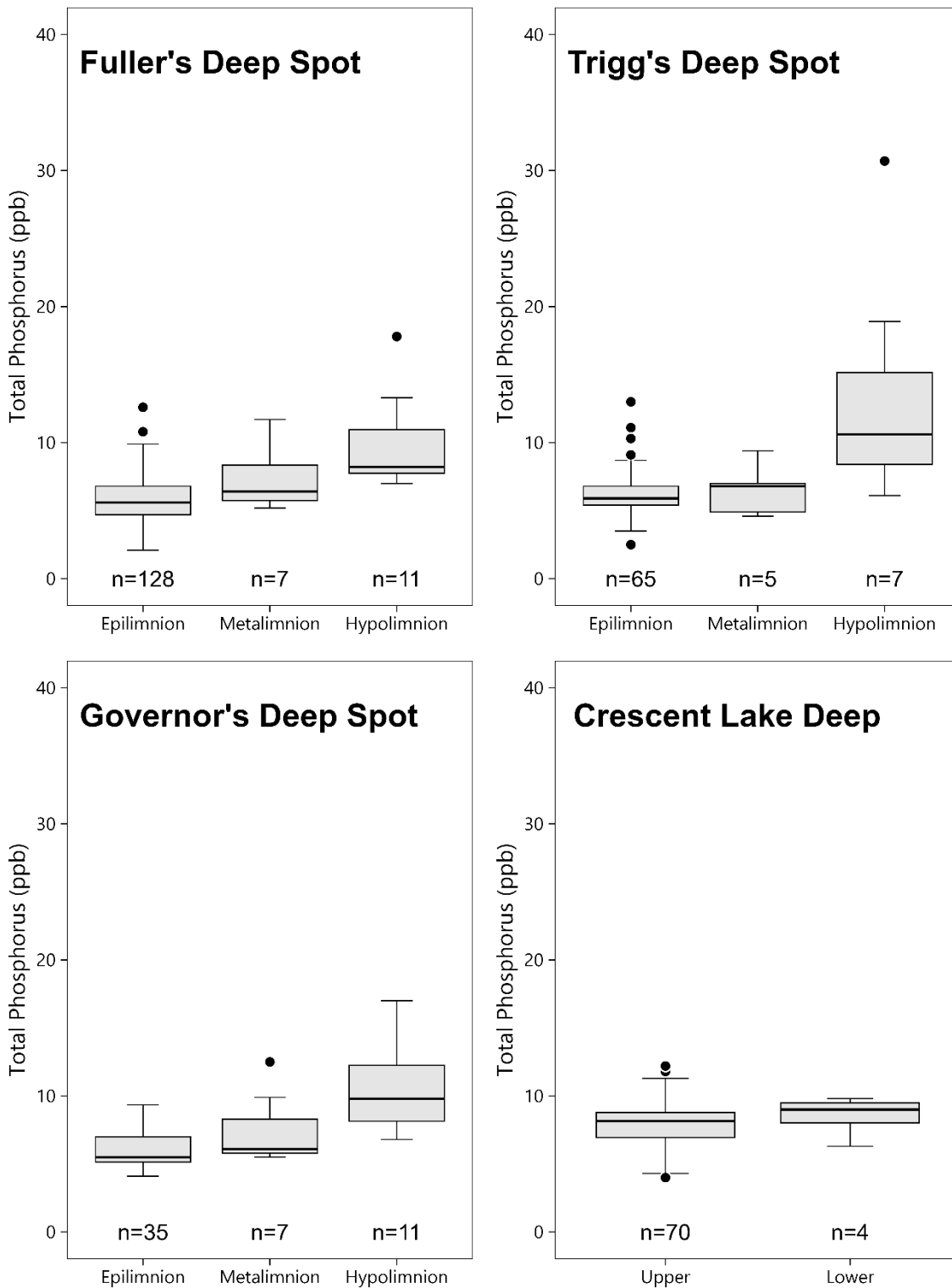
For the available time periods (1974-2024 for Fuller's, 1985-2024 for Trigg's), no statistically significant trends were found for median epilimnetic total phosphorus, chlorophyll-*a*, or Secchi disk transparency (Figure 13) at the Fuller's and Trigg's deep spots of Lake Wentworth. At the Governor's deep spot, a statistically significant decreasing (worsening) trend was found for Secchi disk transparency across the available time period of 1978-2024 (Figure 14). Observed values for trophic state indicators for all deep spots of Lake Wentworth tend to be within oligotrophic ranges.

No statistically significant trends were found for the three trophic state indicators for the Crescent Lake deep spot across the available time period of 1985-2024 (Figure 14). Total phosphorus concentrations in Crescent Lake tend to be slightly higher than those in Lake Wentworth, though chlorophyll-*a* values are comparable across waterbodies.

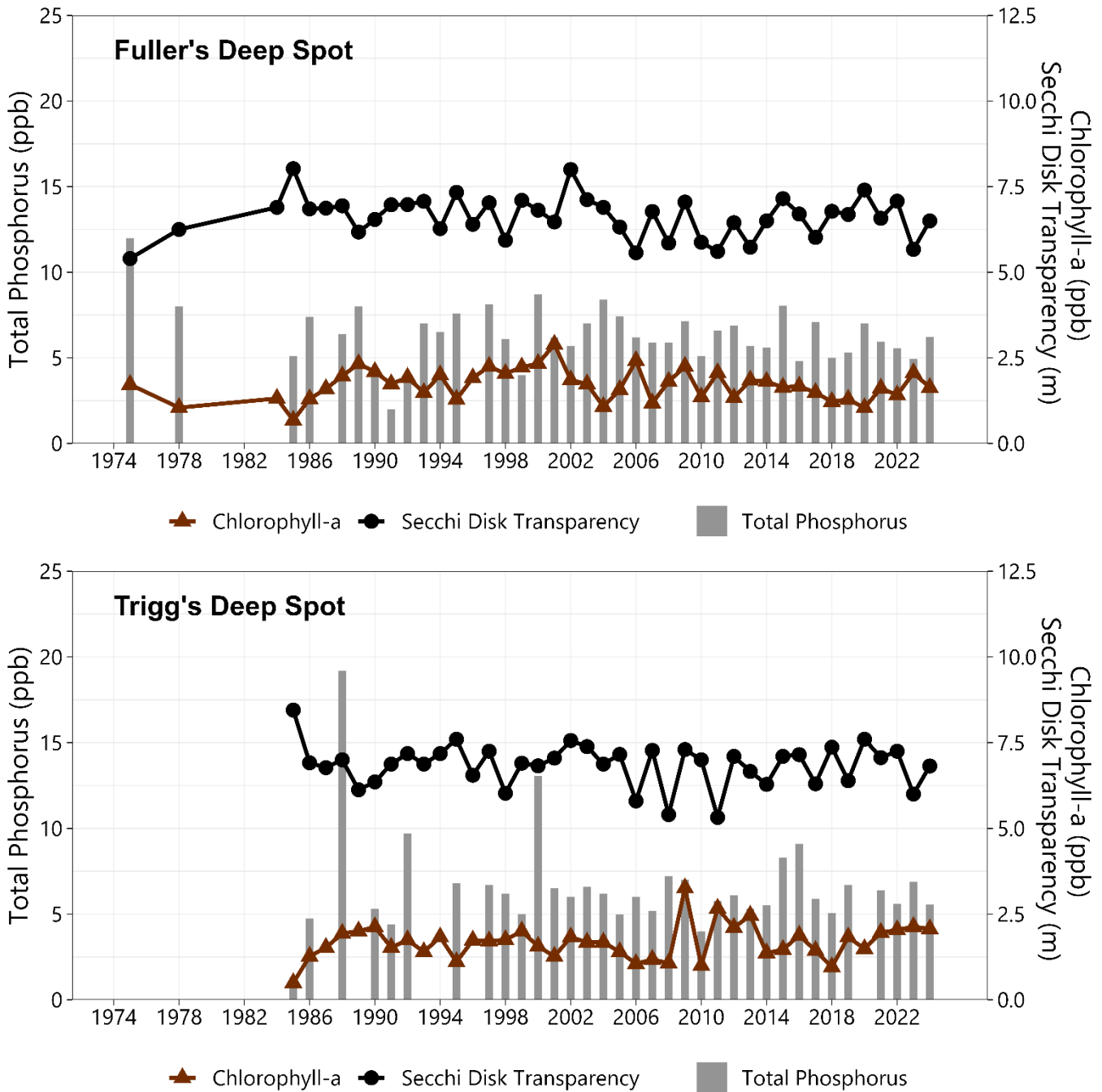




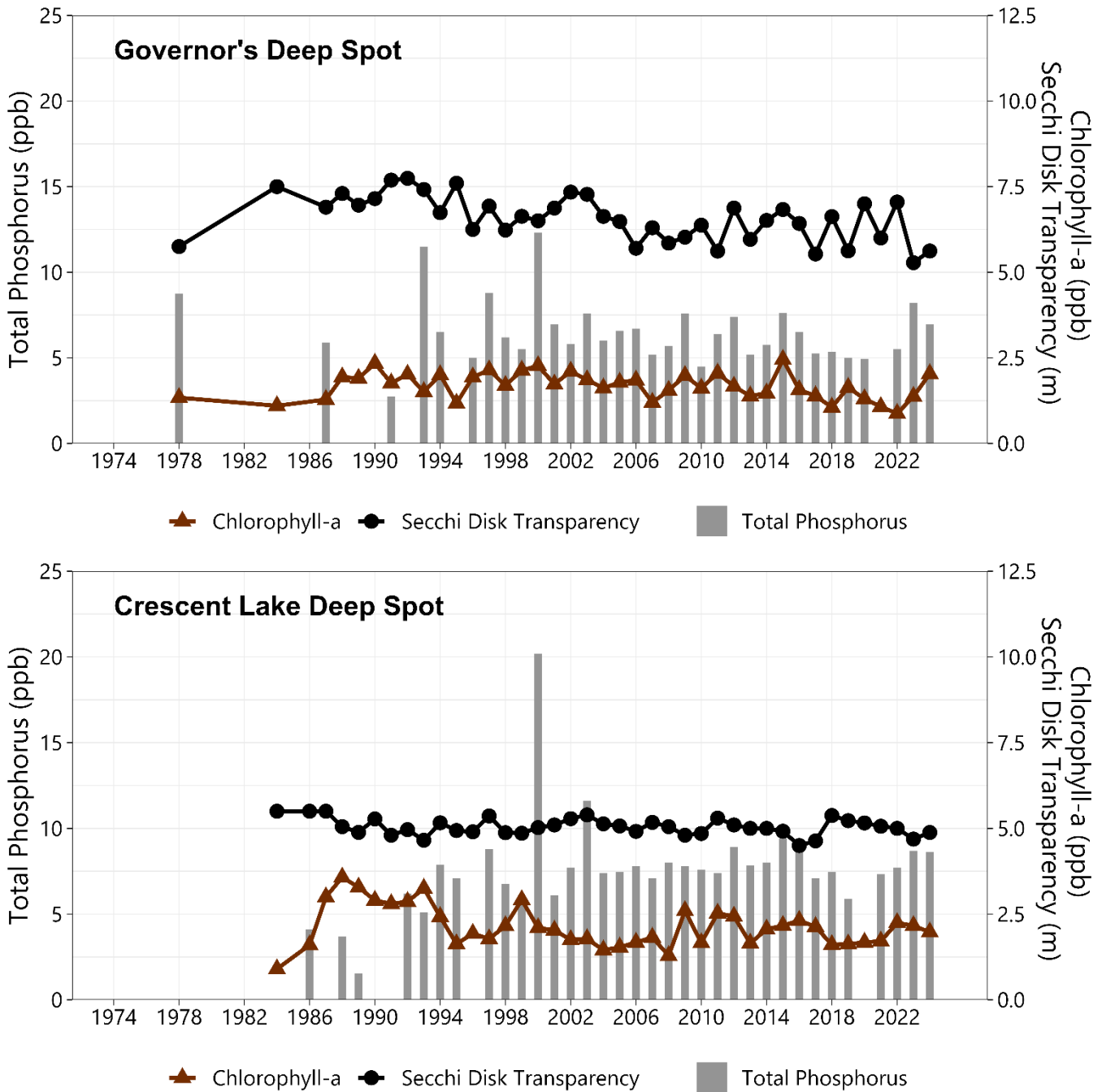
**Figure 11.** Select water quality sampling sites in the Lake Wentworth-Crescent Lake watershed with lake bathymetry. Tyler = Hersey.



**Figure 12.** Boxplots showing median total phosphorus concentration in the epilimnion, metalimnion, and hypolimnion of the Fuller’s deep spot (top left), Trigg’s deep spot (top right), and Governor’s deep spot (bottom left) of Lake Wentworth and the deep spot of Crescent Lake (bottom right) from the past ten years, 2015-2024. The boxes show the 25th, 50th (median), and 75th percentiles of the data. The whiskers show 1.5 times the interquartile range (or the range from the 25th to 75th percentiles). Points are outlier observations.



**Figure 13.** Median epilimnion grab/composite samples (0-8 meters) total phosphorus, median composite epilimnion (0-8 meters) chlorophyll-*a*, and median water clarity (Secchi disk depth for scope and no scope methods) measured at the Fuller’s deep spot (top) and Trigg’s deep spot, largely in June-September from 1975-2024 (Fuller’s) and 1985-2024 (Trigg’s). No statistically significant trends were detected from the Mann-Kendall nonparametric trend test using *rkt* package in R Studio. ppb = parts per billion. m = meters.



**Figure 14.** Median epilimnion grab/composite samples (0-8 meters) total phosphorus, median composite epilimnion (0-8 meters) chlorophyll-*a*, and median water clarity (Secchi disk depth for scope and no scope methods) measured at the Governor’s deep spot of Lake Wentworth (top) and the Crescent Lake deep spot, largely in June-September from 1978-2024 (Governor’s) and 1985-2024 (Crescent). A statistically significant decreasing (worsening) trend was detected for Secchi disk transparency at the Governor’s deep spot from the Mann-Kendall nonparametric trend test using *rkt* package in R Studio. ppb = parts per billion. m = meters.

### 2.1.3 Dissolved Oxygen and Water Temperature

A common occurrence in lakes is the depletion of dissolved oxygen in the deepest waters throughout the summer months. This occurs when thermal stratification (the separation of distinct temperature layers) prevents warmer, less dense, oxygen-rich surface waters from mixing with cooler, denser, oxygen-depleted bottom waters in the lake. As summer progresses, chemical and biological activity in the bottom layer consumes oxygen, but that oxygen cannot be replenished because mixing with the surface is blocked by stratification.

Dissolved oxygen levels below 5 ppm and water temperature above 24 degrees Celsius can stress and reduce habitat for cold water fish and other sensitive aquatic organisms. In addition, very low dissolved oxygen (called anoxia) at the lake bottom can result in the release of sediment-bound phosphorus, a process known as internal phosphorus loading. This phosphorus then becomes available to fuel algae and cyanobacteria growth.

Thermal stratification and depletion of oxygen in bottom waters is a natural phenomenon in lakes like Lake Wentworth because the lake is dimictic, meaning it mixes fully in the spring and fall and stratifies in the summer. However, tracking oxygen and temperature over time is important to detect whether conditions are worsening due to human impacts, such as excess phosphorus entering from the watershed.

Figure 15 and Figure 16 show temperature and dissolved oxygen profiles for the deep spots of Lake Wentworth and Crescent Lake averaged across sampling dates in the past ten years (2015-2024) largely in summer between spring and fall turnover. The change in temperature, seen most dramatically between 5 and 14 meters for the Fuller's and Governor's deep spots or 5 and 9 meters for the Trigg's deep spot, indicates thermal stratification in the water column. The average dissolved oxygen of less than 2 ppm beginning at a minimum depth of 12 meters in Lake Wentworth indicates the possibility of internal phosphorus loading under anoxic conditions. Slight differences in anoxia between the three deep spots in Lake Wentworth are likely a result of the distinct morphometries of the three deep spots. For example, the Trigg's deep spot is shallower and has a smaller hypolimnion volume than the other deep spots; therefore, anoxia appears to extend further upward in the water column (<5 ppm as shallow as 7 meters compared to around 9 meters for the other deep spots). The water column in Lake Wentworth is typically well-oxygenated at all three deep spots throughout much of the year except for when anoxia begins to develop at the deepest depths in August. Anoxia extending as shallow as 12 meters is typically only present in September.

#### **Lake Stratification and Mixing**

Lake Wentworth is a **dimictic** lake, undergoing two cycles of stratification and mixing annually.

Stratification takes place during summer, as surface waters warm, forming a thermal barrier due to differences in water densities.

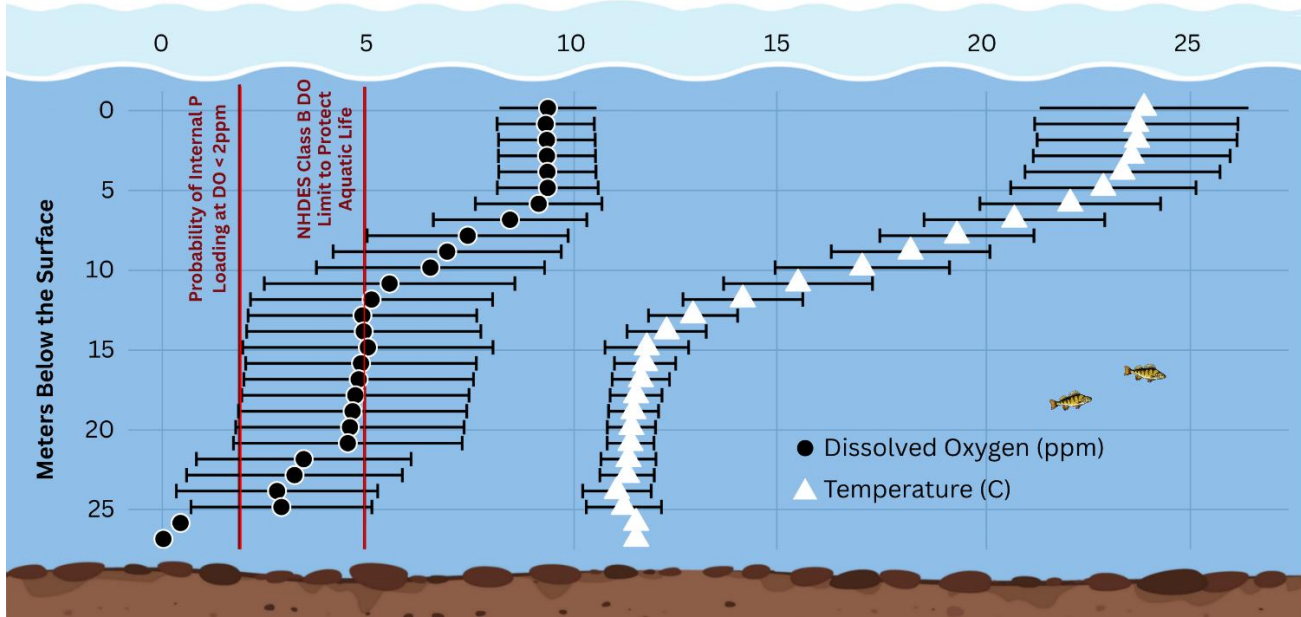
Additionally, winter months see stratification when the lake freezes over, with colder surface waters sitting atop warmer bottom waters.

Dimictic lakes undergo both "fall turnover" and "spring turnover," characterized by the loss of these temperature gradients which enable water mixing once again.

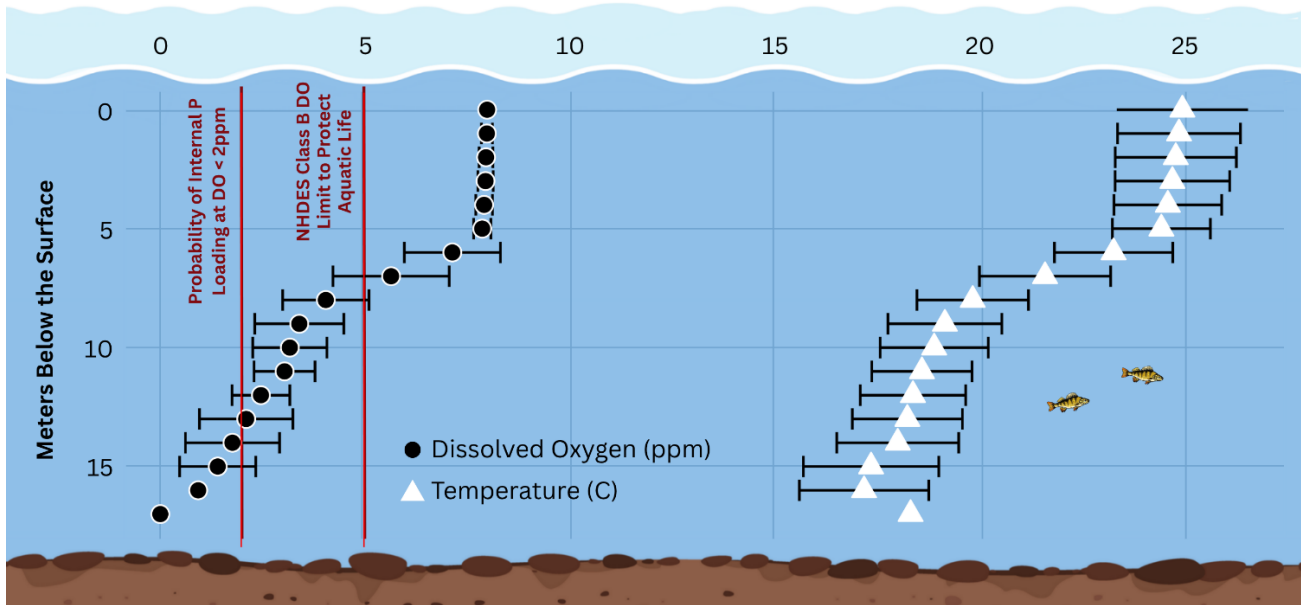
Crescent Lake is a **polymictic**, shallow lake, mixing multiple times throughout the year. Thermal layers may form ephemerally during particularly calm weather periods that allow for weak stratification.

Crescent Lake is a well-mixed system with a high flushing rate from the upstream Lake Wentworth. In calm, dry periods, the lake can ephemerally or weakly stratify, and low oxygen conditions can establish at the deep spot (5-6 meters). Due to how frequently the lake mixes and flushes, it is unlikely that anoxia poses a major internal loading risk or threat to aquatic life integrity.

**Dissolved Oxygen (ppm) and Temperature (C) in Fuller’s Deep Spot**

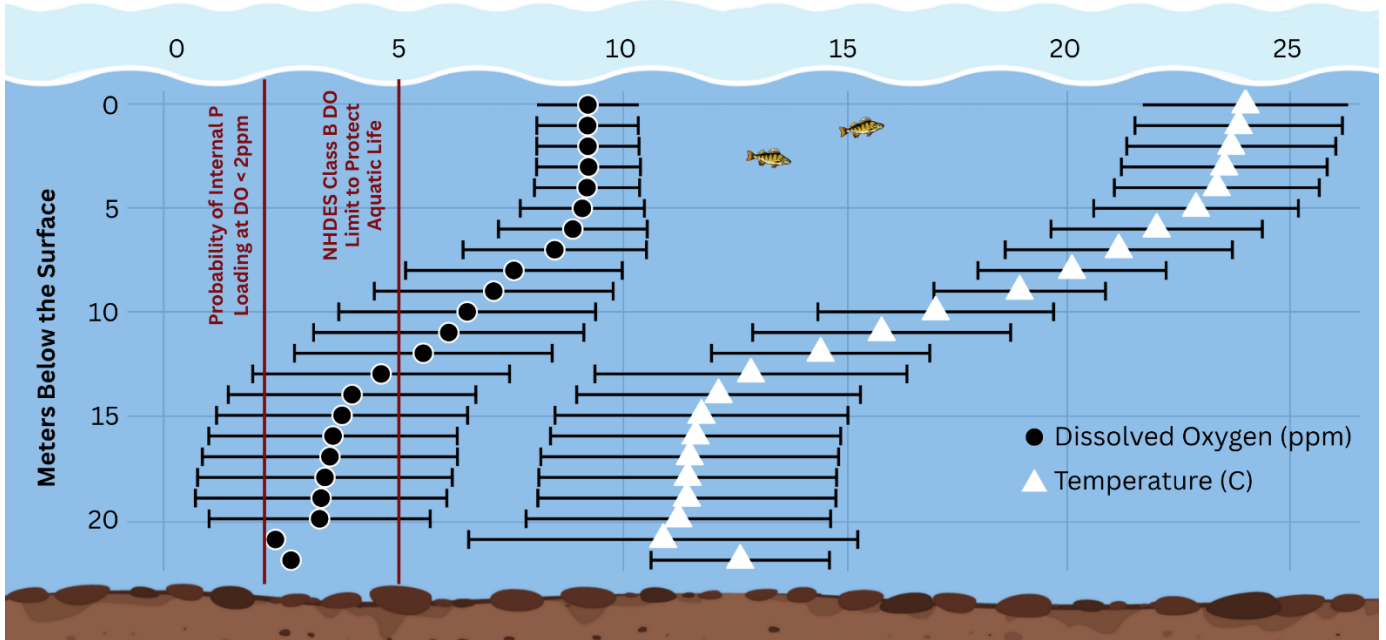


**Dissolved Oxygen (ppm) and Temperature (C) in Trigg’s Deep Spot**

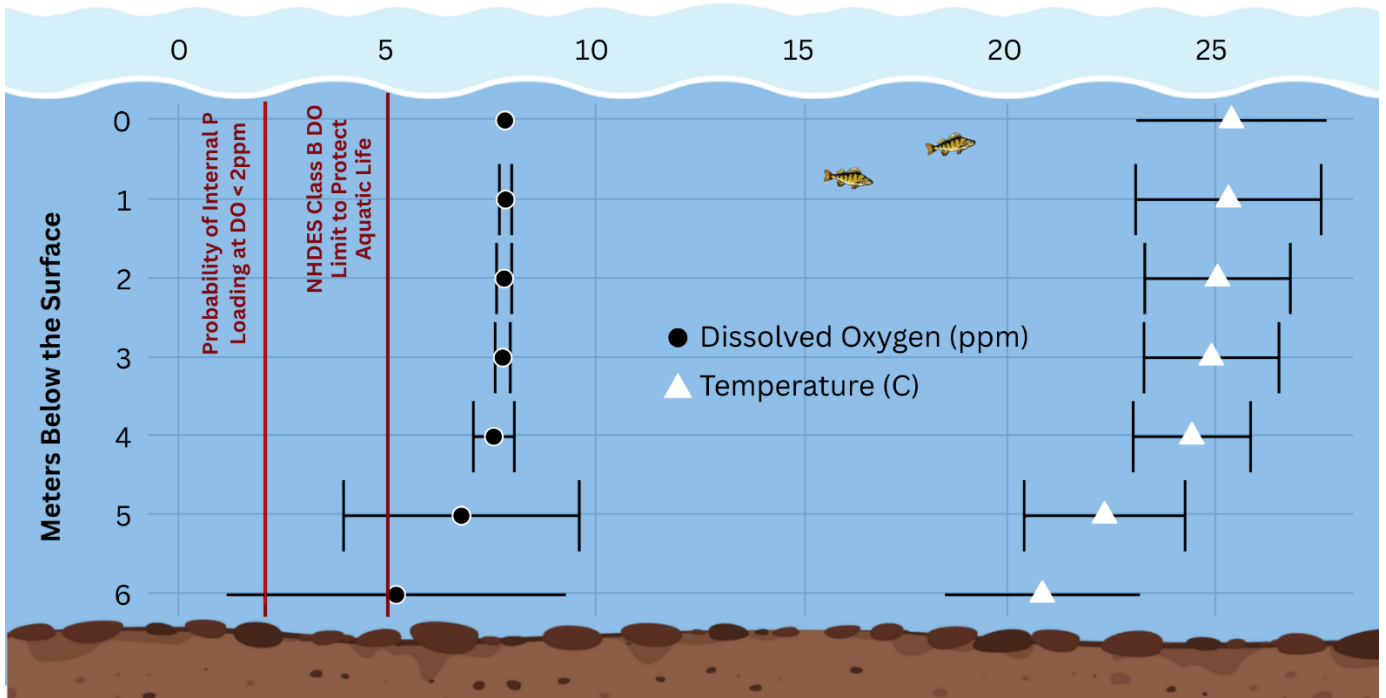


**Figure 15.** Average dissolved oxygen (black circles) in parts per million (ppm) and water temperature (white triangles) in degrees Celsius (C) by depth in meters below the surface for the Fuller’s deep spot (top) and Trigg’s deep spot (bottom) of Lake Wentworth. Error bars represent one standard deviation. Data represents profiles collected from 2015-2024 (n=21 for Fuller’s and n=6 for Trigg’s). Red lines at 5 ppm and 2 ppm represent thresholds for aquatic life integrity and internal phosphorus loading risk, respectively, due to low dissolved oxygen.

**Dissolved Oxygen (ppm) and Temperature (C) in Governor’s Deep Spot**



**Dissolved Oxygen (ppm) and Temperature (C) in Crescent Lake Deep Spot**



**Figure 16.** Average dissolved oxygen (black circles) in parts per million (ppm) and water temperature (white triangles) in degrees Celsius (C) by depth in meters below the surface for the Governor’s deep spot of Lake Wentworth (top) and Crescent Lake deep spot (bottom). Error bars represent one standard deviation. Data represents profiles collected from 2015-2024 (n=19 for Governor’s and n=7 for Crescent Lake). Red lines at 5 ppm and 2 ppm represent thresholds for aquatic life integrity and internal phosphorus loading risk, respectively, due to low dissolved oxygen.

## 2.1.4 Phytoplankton (Cyanobacteria) and Zooplankton

Algae and cyanobacteria naturally occur in the environment and are essential for lake health. Algae and cyanobacteria biomass are primarily regulated by nutrient inputs and lake mixing processes, although other factors such as light availability and temperature also influence their growth. Human disturbances, such as erosion, overapplied fertilizers, polluted stormwater, excess animal waste, and inadequately treated wastewater can increase nutrient inputs to lakes and tributaries. Excess nonpoint source pollution in the form of nutrient loading in human-impacted lakes, combined with rising air temperatures, has increased the prevalence of harmful algal (cyanobacteria) blooms in lakes across the U.S.

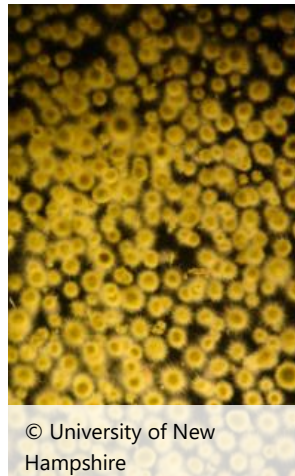
Cyanobacteria are single-celled bacteria that can photosynthesize. They often grow in colonies and, under bloom conditions, can sometimes produce dangerous toxins such as microcystins. These toxins may cause a wide range of health effects in humans, pets, livestock, and wildlife, including neurological, liver, kidney, and reproductive organ damage, gastrointestinal pain or illness, vomiting, eye, ear, and skin irritation, mouth blistering, tumor growth, seizure, or, in rare cases, death. Blooms can form dense mats or surface scum that can occur within the water column, attached to bottom sediments, or along the shoreline.

There are several common cyanobacteria in New Hampshire lakes, such as:



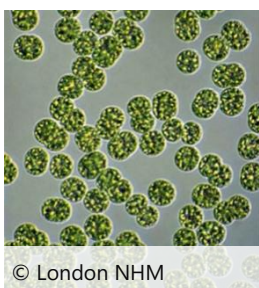
### ***Dolichospermum***

Formally *Anabaena*, typically observed as filaments, can produce microcystin, anatoxins, saxitoxin, and cylindrospermopsin.



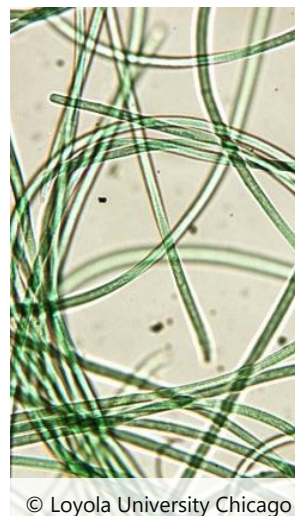
### ***Gloeotrichia***

Typically observed as radiating colonies forming spherical aggregates, can produce microcystin and cylindrospermopsin, and can regulate buoyancy to access nutrients from sediments before rising to the surface to form blooms.



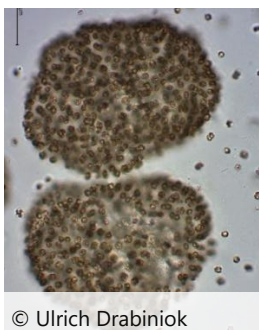
### ***Microcystis***

Typically observed as variations of small-celled colonies, can produce microcystin and anatoxin.



### ***Planktothrix***

Formally *Oscillatoria*, typically observed as filaments, can produce microcystin and cylindrospermopsin, can maintain high growth rate at relatively low light intensities when it forms blooms deeper in the water column (NHDES, 2020).



### ***Woronichinia***

Typically forms dense colonies, can produce microcystin.

Cyanobacteria are becoming more common even in low-nutrient lakes, likely because of a warming climate. Warmer water, longer periods of stratification, greater water column stability, less mixing, and reduced flushing during low-flow periods all create conditions that allow cyanobacteria to thrive and outcompete other phytoplankton species (Przytulska, Bartosiewicz, & Vincent, 2017; Paerl, 2018; Favot, et al., 2019). Many cyanobacteria can regulate their buoyancy and move up and down in the water column to capture sunlight near the surface and access phosphorus near the bottom, even during stratification or under low oxygen conditions. Some cyanobacteria can become dormant in sediment and jump-start cell reproduction once conditions are favorable (i.e., warm water temperatures and plenty of sunlight and nutrients). Some species can also obtain atmospheric nitrogen when sufficient light and nutrients such as phosphorus, iron, and molybdenum (a mineral that is essential for life in small amounts and is found in soils and water) are available. Others can store excess nitrogen and phosphorus within their cells for later use when conditions improve.

Because of these traits, and with climate warming favoring their dominance, cyanobacteria play a central role in reinforcing lake eutrophication. They can accelerate nutrient enrichment in low-nutrient systems and hinder the recovery of lakes already in a eutrophic state (Dolman, et al., 2012; Cottingham, Ewing, Greer, Carey, & Weathers, 2015). Understanding these feedbacks will be critical for developing more effective lake management and restoration strategies.

It is impossible to fully eradicate cyanobacteria in lakes as they are naturally occurring bacteria that have been on the planet for millennia and are resilient to environmental changes. It is likely that the prevalence of cyanobacteria will increase and possibly accelerate in lakes affected by extreme weather changes, though year-to-year variability in weather may determine the timing, extent, and severity of cyanobacteria blooms in any given year. However, conditions favorable for cyanobacteria blooms can be substantially minimized by reducing nutrient-rich runoff from the landscape. Water level and flow influence bloom dynamics by either flushing cyanobacteria and nutrients downstream during high-flow events or, conversely, by limiting upstream nutrient inputs during lower-flow conditions, which can reduce the nutrient availability needed to sustain bloom growth.

### **Cyanobacteria Bloom History**

Through 2024, NHDES issued a warning when cyanobacteria densities exceeded 70,000 cells/mL, advising people, pets, and livestock to avoid contact with potentially toxic waters. Watches were issued when blooms might pose a risk or were approaching that threshold and remained active for up to one week. Watches were also issued when a bloom occurred outside the reporting season (May-October) or when a bloom was identified via photograph and not officially enumerated from a sample. NHDES' system for issuing warnings and watches changed in 2025. NHDES now issues a warning if cyanobacteria cell counts exceed 70,000 cells per milliliter at multiple locations, indicating that the bloom is a more widespread, lake-wide concern. Otherwise, NHDES issues a watch if reports are only for one location or for shoreline accumulations. More detailed information on the [NHDES Cyanobacteria Harmful Algal Bloom Program](#) can be found online.

NHDES issued two cyanobacteria warnings for Lake Wentworth, one in 2023 and one in 2024, though multiple other blooms have been observed and recorded as cyanobacteria watches. The June 2023 warning lasted for seven days and was dominated by *Dolichospermum*, with a cell count of 86,300 cells per milliliter. The second warning was issued in August 2024 and was dominated by *Gloeoetrichia* with a

cell count of 120,000 cells per milliliter. Seven cyanobacteria watches were issued between 2021-2024, mostly dominated by *Gloeotrichia*, though one cyanobacteria watch issued on 9/16/2024 had a diverse mix of *Dolichospermum*, *Woronichinia*, and *Gloeotrichia*. *Dolichospermum* and *Gloeotrichia* are potentially toxin producing taxa; both taxa can outcompete other phytoplankton by fixing atmospheric nitrogen into a usable form and regulating their buoyancy in the water column to access nutrients in deeper thermal layers and avoid harsh light conditions at the surface.

NHDES issued one cyanobacteria warning for Crescent Lake for six days in June 2023 for *Dolichospermum* and *Woronichinia* counts of 219,333 cells per milliliter.

### **Dominant Phytoplankton and Zooplankton**

Phytoplankton and zooplankton samples were collected and analyzed during the 1975, 1988, and 2006 NHDES trophic surveys for Lake Wentworth and the 1984 and 2002 NHDES trophic surveys for Crescent Lake.

The dominant phytoplankton species in Lake Wentworth were *Asterionella* (diatom), *Tabellaria* (diatom), *Uroglenopsis* (golden-brown), *Anacystis* (cyanobacteria), *Rhizosolenia* (diatom), *Synura* (golden-brown), *Stephanodiscus* (diatom), *Dinobryon* (golden-brown), and *Microcystis* (cyanobacteria). The dominant phytoplankton species in Crescent Lake were *Asterionella* (diatom), *Dinobryon* (golden-brown), *Chryso-sphaerella* (golden-brown), *Stephanodiscus* (diatom), and *Uroglenopsis* (golden-brown).

The dominant zooplankton species in Lake Wentworth were *Nauplius* larvae (copepod), *Kellicottia* (rotifer), *Keratella* (rotifer), *Polyarthra* (rotifer), *Vorticella* (rotifer), *Gastropus* (rotifer), *Asplanchna* (rotifer), and *Calanoid* (copepod). The dominant zooplankton species in Crescent Lake were *Nauplius* larvae (copepod), *Kellicottia* (rotifer), *Vorticella* (rotifer), *Keratella* (rotifer), ciliates, and *Calanoid* (copepod).

#### **Rotifers**

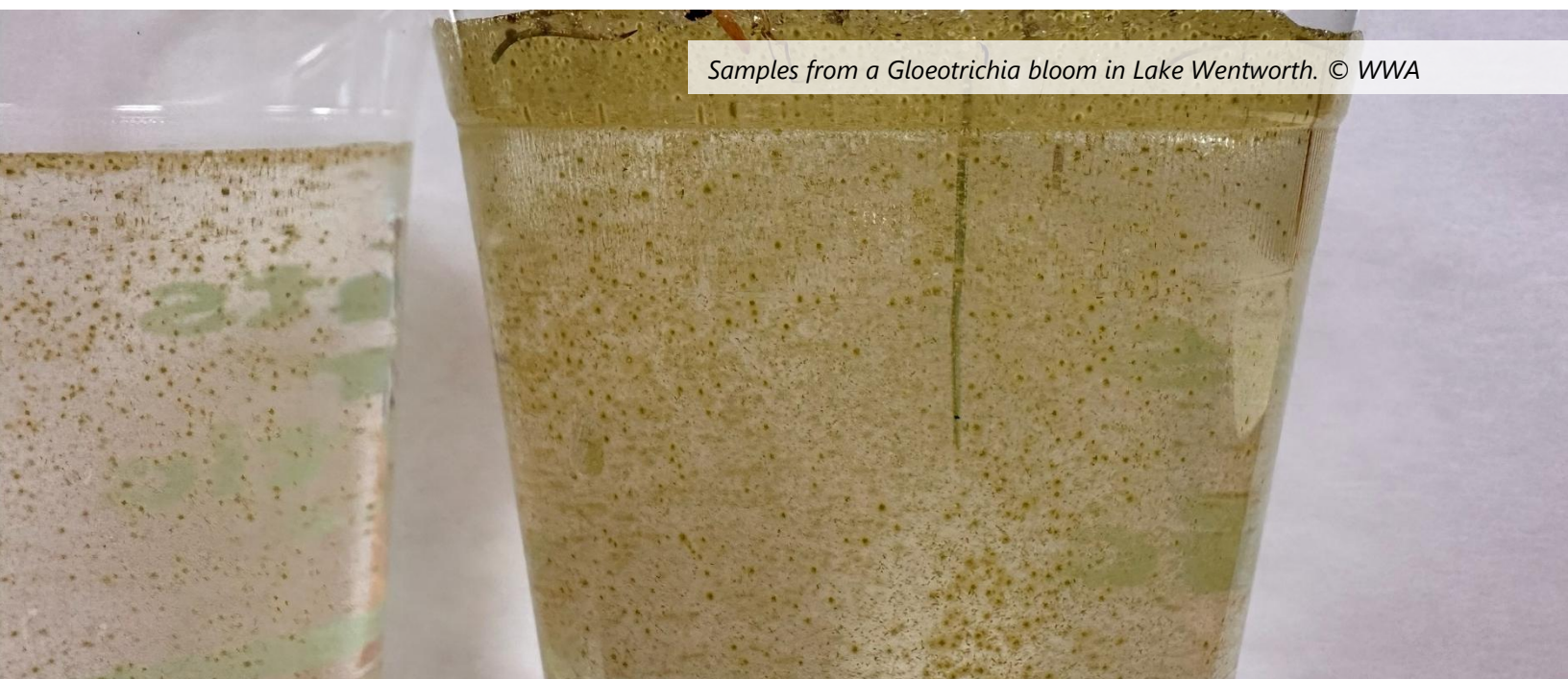
*small zooplankton whose population can respond quickly to environmental changes*

#### **Copepods**

*small crustaceans that eat phytoplankton and provide an important food source to fish*

#### **Cladocerans**

*include Daphnia, which are among the most efficient grazers of phytoplankton*



Samples from a *Gloeotrichia* bloom in Lake Wentworth. © WWA

### 2.1.5 Chloride and Specific Conductivity

Chloride pollution can cause harm to aquatic organisms and disrupt internal mixing processes when chloride concentrations reach toxic levels. The State of New Hampshire sets a chronic water quality threshold of 230 ppm for chloride (which roughly equates to 835 microsiemens per centimeter ( $\mu\text{S}/\text{cm}$ ) for specific conductivity). Chloride concentrations in Lake Wentworth and Crescent Lake are well below the chronic threshold, with both chloride and specific conductivity low (10 ppm and 61  $\mu\text{S}/\text{cm}$ , respectively), which is typical for a high-quality lake (most New Hampshire lakes are around 4 ppm or 40  $\mu\text{S}/\text{cm}$ ). Data are scarce for chloride and specific conductivity for all four deep spot stations on the two lakes, with only two sample dates (8/3/2023 and 8/16/2024). In Lake Wentworth, the chloride and specific conductivity levels were measured at approximately 14 ppm and 63  $\mu\text{S}/\text{cm}$ , respectively, across sample dates and sites. Crescent Lake had slightly higher concentrations on those two dates, with chloride and specific conductivity levels of approximately 18 ppm and 84  $\mu\text{S}/\text{cm}$ , respectively. Higher levels in Crescent Lake may be explained by more intense urban development within the Crescent Lake watershed, which may require heavier winter salting.

Salt application in the watershed comes from multiple sources, largely from the salting of local, state, and privately-owned paved roads. In addition, residential practices may also contribute to salt loading, as homeowners around the lake are likely using de-icing agents on driveways and walkways. Other potential contributors to high chloride and specific conductivity include wastewater inputs from failing or underperforming septic systems, leaky sewer lines, and greywater inputs from water softeners.

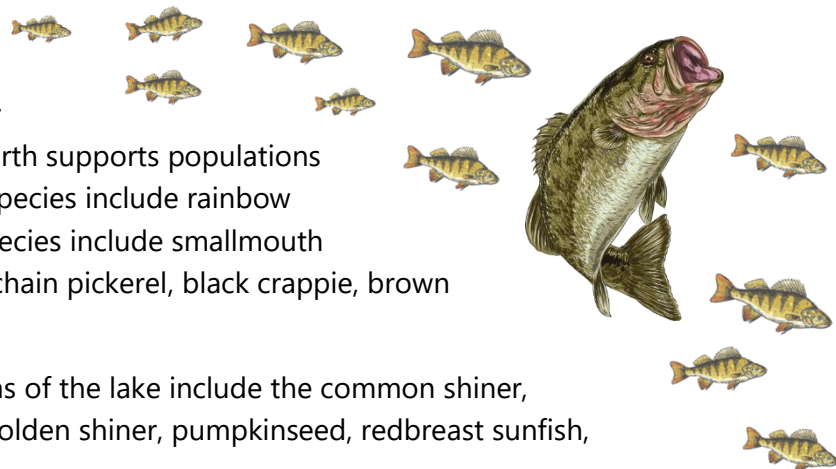
The chloride concentration in Lake Wentworth and Crescent Lake may be a concern for the health of the lake and may be impacting zooplankton populations that would otherwise help control the growth of cyanobacteria and other phytoplankton. A proactive reduction in salt use in the watershed is needed. Note that deicing salt can enter groundwater and cause high salinity in lakes and tributary streams throughout the year. Chloride concentrations in surface waters are often highest during the summer months, when lower water levels reduce dilution and concentrate existing salts.

Encouraging commercial salt applicators to obtain NH Green SnowPro certification could help ensure that professional de-icing is applied efficiently, while outreach to homeowners with guidance on proper salt use could reduce over-application and limit unnecessary salt input to the lake. Collectively, these applications may be significant contributors of salt runoff to the lake.

### 2.1.6 Fish

Fish are important in ecosystem food webs and for providing recreational opportunities. Lake Wentworth supports populations of both warm and cold water species. Cold water species include rainbow trout, cusk, and rainbow smelt. Warm water fish species include smallmouth bass, largemouth bass, white perch, yellow perch, chain pickerel, black crappie, brown bullhead, and bluegill.

Additionally, warm water species in the littoral areas of the lake include the common shiner, common white sucker, creek chubsucker, fallfish, golden shiner, pumpkinseed, redbreast sunfish,



hornpout, and slimy sculpin. The American eel has also been identified in Lake Wentworth. Crescent lake primarily has warm water fish with similar species to those found in Lake Wentworth.

Smallmouth bass were introduced in 1878 and were restocked annually from 1938 to 1949 and from 1951 to 1954. Golden shiners were restocked in 1941 and 1942. Introductions of lake trout in 1928 and land-locked salmon in 1879 were unsuccessful. Rainbow trout were introduced in 1991 and are stocked annually.

### 2.1.7 Invasive Species



The introduction of non-indigenous invasive aquatic plant species to New Hampshire’s waterbodies has been on the rise. These invasive aquatic plants are responsible for habitat disruption, loss of native plant and animal communities, reduced property values, impaired fishing and degraded recreational experiences, and high removal costs. Once established, invasive species are difficult and costly to remove. There are multiple programs that help prevent the introduction of invasive species and monitor the lakes, including the Lake Host Program and the Weed Watcher Program.

Variable milfoil (*Myriophyllum heterophyllum*) arrived in Lake Winnepesaukee in 1979 and found its way to Mast Landing at Crescent Lake the following year. A Weed Watch Committee was formed in 1983 in response to this unwanted aquatic invader. The State of New Hampshire helped the Town of Wolfeboro and the Lake Wentworth Association (later succeeded by the WWA) pay for placement of chemically treated mats in an attempt to eliminate the milfoil. In 1991, 1995, 1999, and 2003, large areas of Crescent Lake were treated with Diquat, a contact herbicide. In 1991, milfoil was discovered between Allen Albee Beach and Hersey (Tyler) Brook in Lake Wentworth. Mats were laid out immediately, which seemed to stem the spread of milfoil. NHDES introduced new treatment procedures in 1994 to include chemical treatments, manual weed pulling, chemical mats, and plant surveys. A NHDES plant survey in 2006 found milfoil common in Heath Brook, Hersey (Tyler) Brook, and Willey Brook tributary coves in Lake Wentworth. These infestations were managed by chemical treatment with 2, 4 D, a systemic herbicide, and by hand-pulling by divers. Over the years, the weed watchers and volunteer dive team have located and targeted several areas in Crescent Lake and Lake Wentworth. These localized infestations have been managed by hand-pulling by volunteer divers, use of diver assisted suction harvester (DASH) boats, chemical treatment with 2, 4 D and ProcellaCOR, a foliar herbicide, in 2020 in Goodwin’s Basin.

Weed watchers patrol the lakes and ponds throughout the summer in areas they use and report sightings to the program coordinator who sends out the dive team to verify and schedule treatment. The dive team typically hand pulls milfoil every Saturday throughout the summer. Volunteer and paid Lake Hosts at the Mast Landing boat launch provide voluntary boat and trailer inspections and inform the public about invasive species. WWA coordinates these Lake Hosts with grant support from NH Lakes. Continuing to monitor and control variable milfoil and other invasive species will help preserve the water quality of Lake Wentworth and Crescent Lake for the future.

### 2.1.8 Tributaries

The water quality of tributaries to Lake Wentworth can reveal areas throughout the watershed that are contributing disproportionate quantities of certain pollutants. Stream health is also critical because tributaries often abut wetlands and serve as the home to various aquatic biota and macroinvertebrates that can be sensitive to water quality degradation. Excess phosphorus loading in streams can lead to eutrophication in downstream lakes and increase the risk of potentially toxic cyanobacteria blooms. Phosphorus can enter streams from watershed sources such as soil erosion, agriculture, and other human disturbances. There is extensive stream data for nearly every stream within the Lake Wentworth watershed. A summary of total phosphorus data for these stream sites is available in Figure 17, Figure 18, Figure 19, Figure 20, and Table 2.

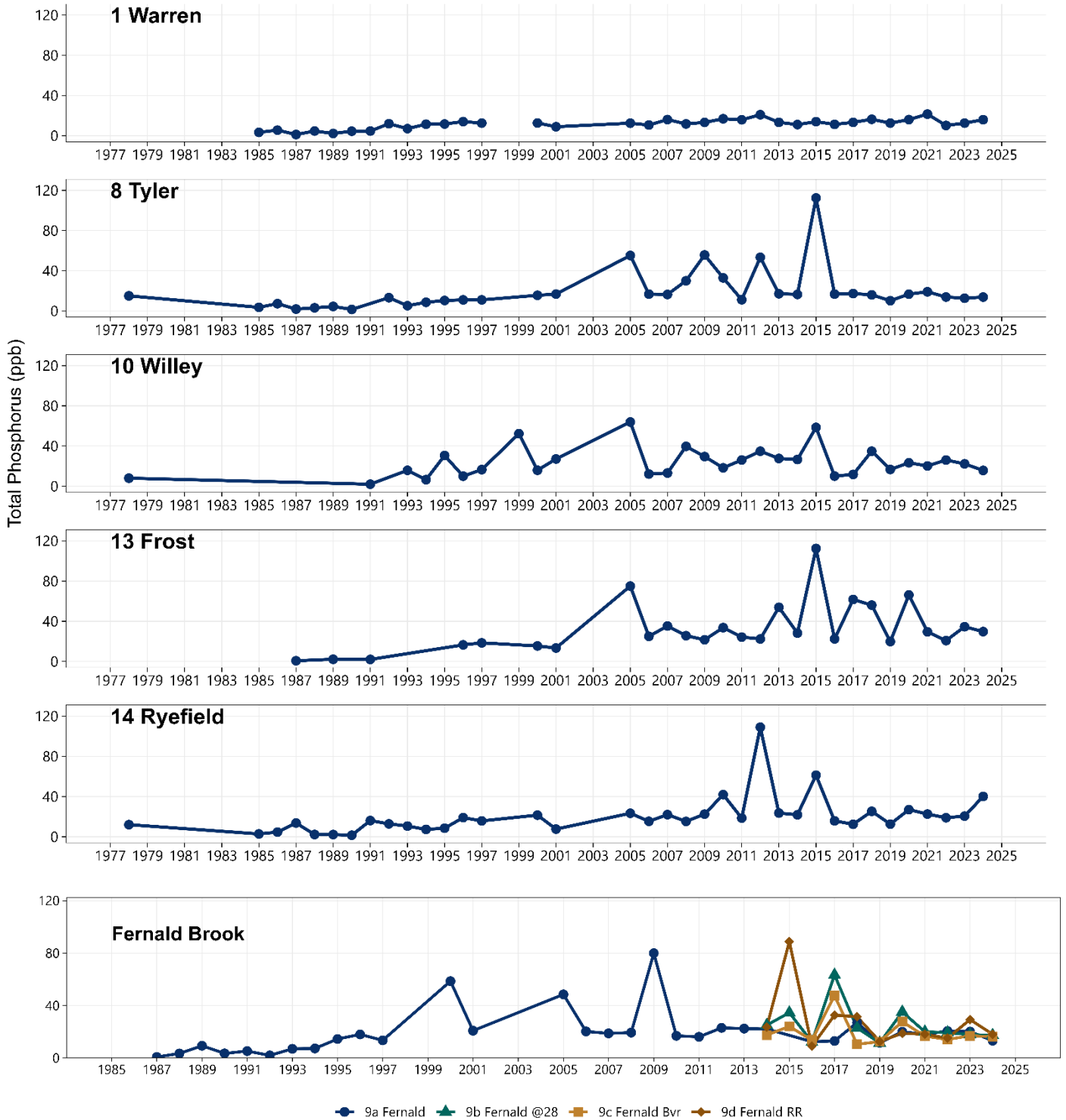
Warren Brook, Hersey (Tyler) Brook, Willey Brook, Frost Brook, and Ryefield Brook have the most available data, with consistent data beginning as early as 1985 (Figure 17). Many of these streams have low total phosphorus concentrations, though statistically significant increasing trends were found for Warren Brook, Ryefield Brook, Hersey (Tyler) Brook, and Frost Brook, indicating that changes within each sub-watershed have led to worsening water quality in each of these streams since the onset of data collection (Table 2).

Breezy Brook, Hersey (Tyler) Brook, Harvey Brook, and Townsend Brook are the highest phosphorus loading sub-watersheds in the Lake Wentworth watershed. Total phosphorus concentrations in Breezy Brook appear to have increased nearly ten-fold since the 1990s (Figure 18), though no statistical trends were detected using the Mann-Kendall non-parametric test. Breezy Brook has the highest total phosphorus concentration of any tributary to Lake Wentworth (Table 2). Breezy Brook is a small sub-watershed with relatively low flow, likely contributing to these high concentrations. A statistically significant increasing trend was found in Hersey (Tyler) Brook for the available time frame (2013-2024) (Figure 18). Both sites in Townsend Brook appear to mirror each other and have similar total phosphorus concentrations across years (Figure 19); no statistical trends were detected for Townsend Brook or Harvey Brook. Despite being identified as the highest phosphorus loading normalized by sub-watershed area, Hersey (Tyler) Brook and Harvey Brook had relatively lower total phosphorus concentrations when compared to the other streams.

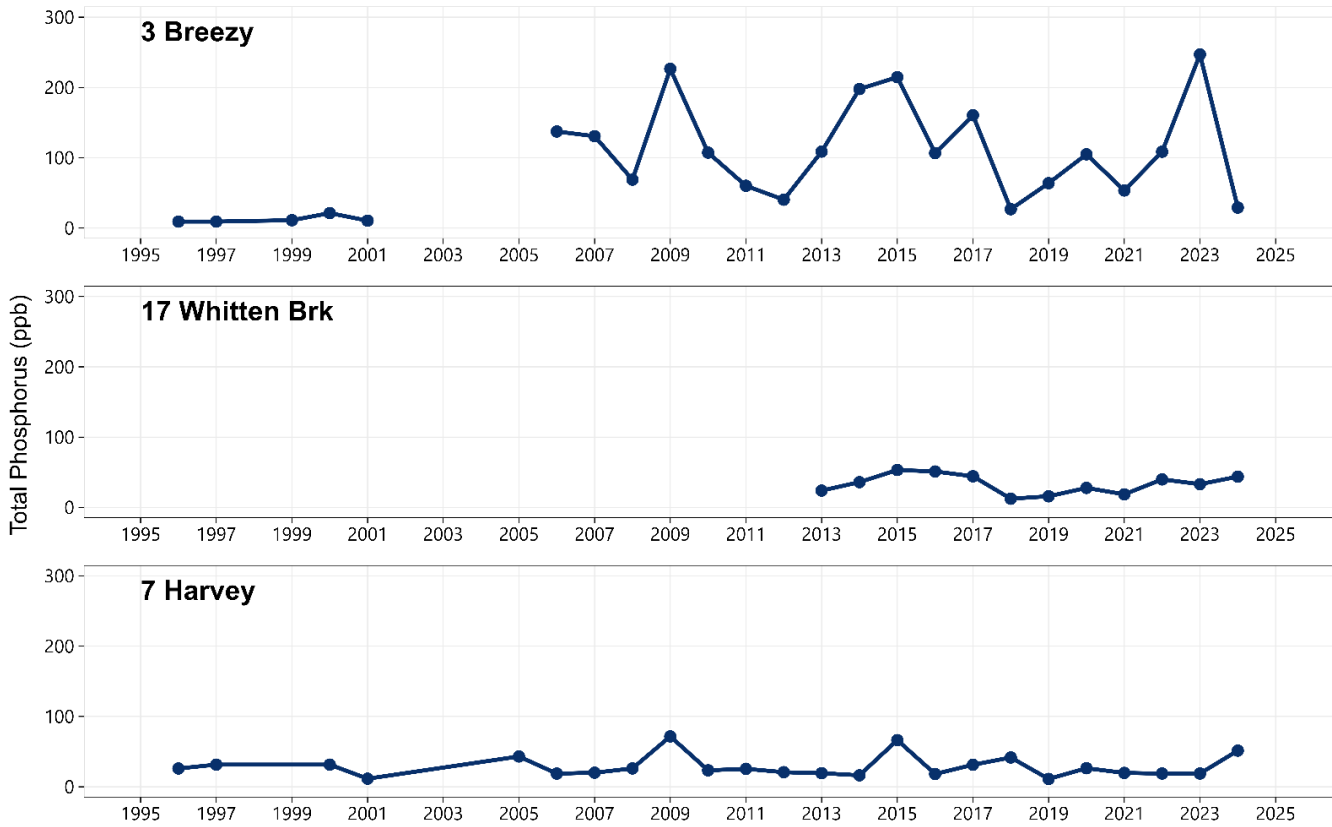
Other tributary sites include Red Brook, Claypit Brook, and Heath Brook. These streams contain multiple sites per tributary which may capture varying stream reaches (Figure 20). All monitoring sites in Claypit Brook had consistent total phosphorus concentrations below 50 parts per billion (ppb). There appears to be a small spike in total phosphorus concentrations across multiple sites in 2015 (Figure 17, Figure 18, Figure 19, Figure 20), which is likely the result of weather conditions.

Throughout the watershed, Warren Brook, Hersey (Tyler) Brook, Fernald Brook, Ryefield Brook, and Willey Brook were observed to have the lowest total phosphorus concentrations (Table 2). Total phosphorus tends to be elevated above natural levels in all streams. NHDES sets a non-numeric guideline for total phosphorus in streams, stating that streams "shall not contain phosphorus or nitrogen in such concentrations that would impair any existing or designated uses, unless naturally occurring." The EPA's Ambient Water Quality Criteria Recommendations for Rivers and Streams in Nutrient Ecoregion VIII reports a reference condition of 10 ppb for total phosphorus. For the sub-ecoregion containing New Hampshire, the reference value is 5 ppb. Because the median total phosphorus concentrations for all

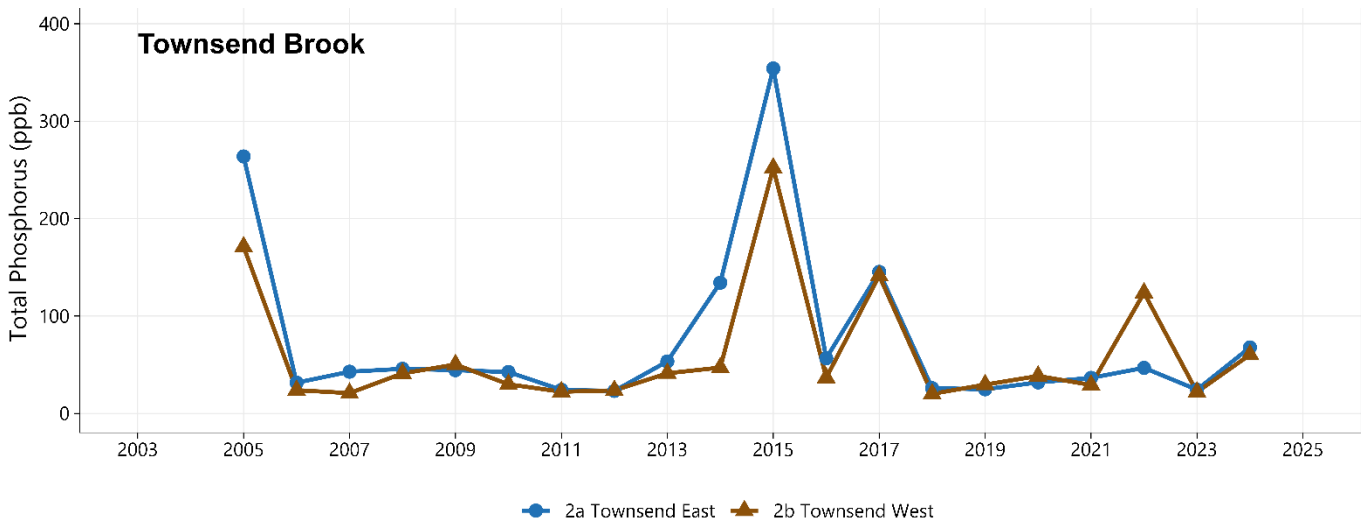
streams exceed the EPA reference value for Ecoregion VIII, it is likely that all streams are impacted by development occurring within their watersheds (i.e., phosphorus levels are elevated above natural conditions, but do not necessarily indicate impairment).



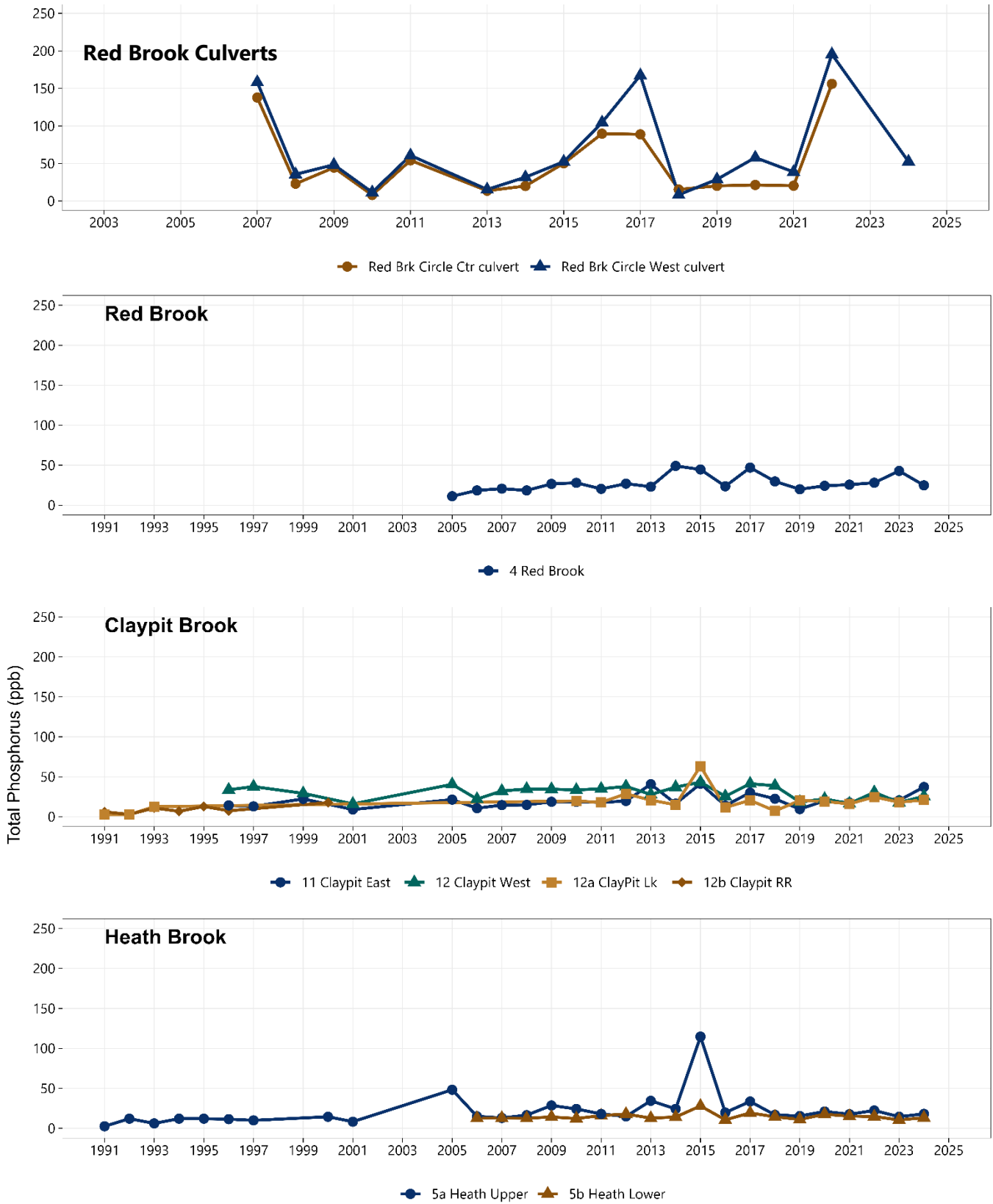
**Figure 17.** Median yearly total phosphorus for long-term tributary stations with the most available data [1 Warren, 8 Tyler, 10 Willey, 13 Frost, 14 Ryefield, and Fernald Brook]. Existing water quality data are summarized by day, then month, then all years using the median statistic. ppb = parts per billion.



**Figure 18.** Median yearly total phosphorus concentration for the highest phosphorus loading sub-watersheds (normalized by sub-watershed area) [3 Breezy, 17 Whitten Brk, and 7 Harvey] based on previous modeling work for Lake Wentworth. Existing water quality data are summarized by day, then month, then all years using the median statistic. ppb = parts per billion.



**Figure 19.** Median yearly total phosphorus for two sites on Townsend Brook [2a Townsend East, 2b Townsend West] in the Lake Wentworth watershed. Existing water quality data are summarized by day, then month, then all years using the median statistic. ppb = parts per billion.



**Figure 20.** Median yearly total phosphorus for additional stream sites [Red Brook, Claypit Brook, and Heath Brook] in the Lake Wentworth watershed. Existing water quality data are summarized by day, then month, then all years using the median statistic. ppb = parts per billion. Red Brook Culverts includes high phosphorus measurements (1,200-1,600 ppb) collected in 2020 during a storm.

**Table 2.** Median total phosphorus (TP) for stream monitoring stations within the Lake Wentworth-Crescent Lake watershed. Existing water quality data are summarized by day, then month, then all years using the median statistic to create a recent data summary (2015-2024), historical data summary (1978-2014), and all data summary (1978-2024). \*Indicates a statistically significant increasing relationship across the available time period detected using the Mann-Kendall non-parametric test.

Site Type	Site Name	Waterbody	Historical Median TP (ppb)	Recent 10 Year Median TP (ppb)	All Data Median TP (ppb)	Data Range	Years of Consistent Data
Established Lakes Lay Monitoring Program Sites	1 Warren*	Wentworth	11.7	13.0	12.0	1985-2024	40
	2 Townsend Confluence	Wentworth	9.5	no data	no data	1986-2001, 2005	no data
	2a Townsend East	Wentworth	34.8	36.8	36.3	2005-24	20
	2b Townsend West	Wentworth	29.0	37.5	36.3	2005-24	20
	3 Breezy	Wentworth	25.8	84.5	34.4	1996-2001, 2005-24	20
	4 Red Brook*	Wentworth	22.4	26.6	24.5	2005-24	20
	5a Heath Upper*	Wentworth	13.0	21.1	15.6	1991-97, 2000-01, 2005-24	20
	5b Heath Lower	Wentworth	11.5	13.3	13.2	1978, 2006-24	19
	6 Smith Down	Wentworth	8.8	9.1	9.0	1978, 1994, 1997-98, 2000-01, 2015-24	10
	6a Smith (Main St)	Wentworth	9.8	no data	no data	2005-14	no data
	7 Harvey	Wentworth	20.8	26.5	23.5	1996-97, 2000-01, 2005-24	20
	8 Tyler*	Wentworth	11.5	15.7	12.1	1978, 1985-2024	40
	9a Fernald*	Wentworth	14.5	15.8	15.1	1987-97, 2000-24	25
	9b Fernald @28	Wentworth	25.1	22.9	23	2014-24	11
	9c Fernald Bvr	Wentworth	17.5	17.6	17.5	2014-24	11
	9d Fernald RR	Wentworth	23.6	18.1	18.5	2014-24	11
	10 Willey	Wentworth	15.6	20.6	16.2	1978, 1991-2024	34
	10a Willey @ Col	Wentworth	no data	no data	no data	2011	no data
10b Willey C @ Hain	Wentworth	no data	no data	no data	2006	no data	

<b>Site Type</b>	<b>Site Name</b>	<b>Waterbody</b>	<b>Historical Median TP (ppb)</b>	<b>Recent 10 Year Median TP (ppb)</b>	<b>All Data Median TP (ppb)</b>	<b>Data Range</b>	<b>Years of Consistent Data</b>
	10c Willey D @109D	Wentworth	no data	no data	no data	2006	no data
	10d Willey at Shore	Wentworth	15.1	no data	15.1	1985-90, 1995	no data
	11 Claypit East*	Wentworth	15.8	24.7	17.7	1996, 1997, 1999, 2001, 2005-24	20
	12 Claypit West	Wentworth	32.0	24.6	28.2	1996, 1997, 1999, 2001, 2005-24	20
	12a ClayPit LK*	Wentworth	5.0	20.6	15.5	1987-93, 2010-24	15
	12b Claypit RR	Wentworth	7.5	no data	no data	1991-96, 2000	no data
	13 Frost*	Wentworth	19.1	30.1	23.5	1987, 1989, 1991, 1996-97, 2000-01, 2005-24	20
	14 Ryefield*	Wentworth	14.0	22.8	15.6	1978, 1985-2024	40
	14a Ryefield Lk	Wentworth	15.3	12.1	14.2	2010-24	15
	16 Smith Whitten Neck	Wentworth	6.3	6.3	6.3	2005-24	20
	17 Whitten Brk	Wentworth	29.3	27.8	27.8	2013-24	12
	<b>Other Sites</b>	Heath Shore	Wentworth	3.2	no data	no data	1986-90
King Acre 3A2		Crescent	no data	32.4	no data	2022-24	3
Kingswood Out		Crescent	no data	52.8	no data	2021	no data
Peterson 3B		Crescent	no data	30.1	no data	2021-24	4
Pt. Breeze East		Wentworth	91.4	no data	no data	2000-01	no data
Pt. Breeze West		Wentworth	45.0	no data	no data	2000	no data
Red Brk Circle Ctr Culvert		Wentworth	25.6	23.9	23.9	2007-24	18
Red Brk Circle West Culvert		Wentworth	33.4	43.3	37.9	2007-24	18
Trites (Multiple Sites)		Wentworth	no data	no data	no data	2016	no data

## 2.2 ASSIMILATIVE CAPACITY

The assimilative capacity of a lake describes the amount of a pollutant that can be added to a waterbody without causing a violation of the anti-degradation tiers based on a lake’s trophic designation as detailed in the NHDES Consolidated Assessment and Listing Methodology. The three tiers include: Tier 2, high quality waters where water quality is better than 10% of the difference between the best possible water quality (next lower trophic condition) and the criteria; Tier 1, where water quality is within 10% of the difference between the best possible water quality (next lower trophic condition) and the criteria; and Impaired, where water quality exceeds the criteria. Support determinations are based on the nutrient stressor (total phosphorus) and response indicator (chlorophyll-*a*), with chlorophyll-*a* dictating the assessment if both chlorophyll-*a* and total phosphorus data are available and the assessments differ.

For oligotrophic lakes such as Lake Wentworth and Crescent Lake, water quality criteria are set at 8 ppb for total phosphorus and 3.3 ppb for chlorophyll-*a* (Table 3; Table 4). Assessment results show that Lake Wentworth meets the Tier 2 High Quality Water threshold for both phosphorus and chlorophyll-*a* at all sites, and Crescent Lake meets the Tier 2 High Quality Water threshold for chlorophyll-*a* but not for phosphorus (Table 5). For Crescent Lake, reductions in phosphorus inputs will be necessary to lower total phosphorus below 7.2 ppb and decrease the risk of cyanobacteria blooms.

**Table 3.** Aquatic life integrity designated use nutrient criteria ranges by trophic state in New Hampshire. Chlorophyll-*a* is a surrogate measure for algae.

<b>Trophic State</b>	<b>Total Phosphorus (ppb)</b>	<b>Chlorophyll-<i>a</i> (ppb)</b>
Oligotrophic	< 8.0	< 3.3
Mesotrophic	> 8.0 - 12.0	> 3.3 - 5.0
Eutrophic	> 12.0 - 28.0	> 5.0 - 11.0

**Table 4.** Decision matrix for aquatic life integrity designated use assessment in New Hampshire. Chlorophyll-*a* is a surrogate measure for algae.

<b>Nutrient Assessments</b>	<b>Total phosphorus criterion exceeded</b>	<b>Total phosphorus criterion NOT exceeded</b>	<b>Insufficient info for total phosphorus</b>
<b>Chlorophyll-<i>a</i> criterion exceeded</b>	Impaired	Impaired	Impaired
<b>Chlorophyll-<i>a</i> criterion NOT exceeded</b>	Potential non-support (Tier 2)	Fully supporting (Tier 2)	Potential support (Tier 2)
<b>Insufficient info for chlorophyll-<i>a</i></b>	Insufficient info	Insufficient info	Insufficient info

**Table 5.** Assimilative capacity analysis results for Lake Wentworth and Crescent Lake using oligotrophic water quality criteria. Chlorophyll-*a* dictates the assessment results. ppb = parts per billion.

Site	Parameter	Tier 2 Threshold (ppb)	Existing Median Water Quality* (ppb)	Remaining Assimilative Capacity (ppb)	Assessment Results
<b>Fuller’s deep spot [1 Fuller’s]</b>	Total phosphorus	7.2	5.7	1.5	Tier 2: High Water Quality
	Chlorophyll- <i>a</i>	3.0	1.6	1.4	
<b>Trigg’s deep spot [2 Trigg’s]</b>	Total phosphorus	7.2	6.3	0.9	Tier 2: High Water Quality
	Chlorophyll- <i>a</i>	3.0	1.8	1.2	
<b>Governor’s deep spot [12 Governor’s]</b>	Total phosphorus	7.2	6.0	1.2	Tier 2: High Water Quality
	Chlorophyll- <i>a</i>	3.0	1.4	1.6	
<b>Crescent Lake deep spot [6 Crescent]</b>	Total phosphorus	7.2	8.3	-1.1	Tier 2: High Water Quality
	Chlorophyll- <i>a</i>	3.0	2.0	1.0	

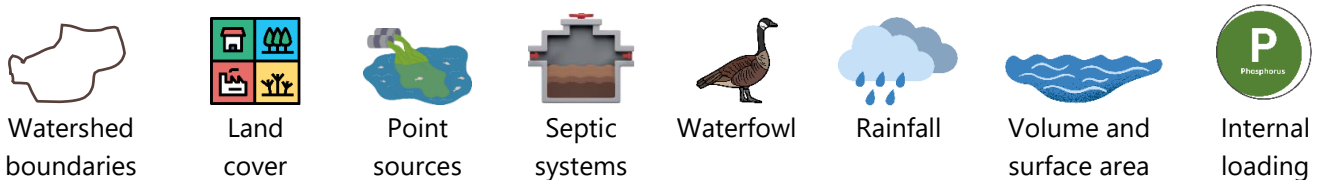
\* Existing water quality data truncated to May 24-September 15 in the previous 10 years (2015-2024) for composite, epilimnion, or upper samples (in order of priority on a given day). Data were summarized by day, then month, then all years using median statistics.

## 2.3 WATERSHED MODELING

### 2.3.1 Lake Loading Response Model

Environmental modeling is the process of using mathematics to represent the natural world. Models can help explain how a system works, study cause and effect, or predict future conditions. Environmental models range from simple equations that can be solved with pen and paper, to complex computer programs requiring teams of people to operate.

For lakes, one common tool is the Lake Loading Response Model (LLRM). This model can make predictions about phosphorus concentrations, chlorophyll-*a* concentrations, and water clarity under different pollutant loading scenarios. These types of models play a key role in the watershed planning process, as pollutant load estimates are a required component of EPA’s nine key planning elements. The LLRM is an Excel-based model that uses environmental data to develop a water and phosphorus loading budget for lakes and their tributaries (AECOM, 2009). Water and phosphorus loads (in the form of mass and concentration) are traced from various sources in the watershed through tributary basins and into the lake. The model incorporates the following data:



These data are combined with coefficients that quantify nutrient inputs from different sources, attenuation factors that account for nutrient loss, and equations from scientific literature on lakes, rivers, and nutrient cycles to generate annual average predictions of total phosphorus, chlorophyll-*a*, Secchi disk transparency, and algal bloom probability. The model can be used to identify current and future pollutant sources, estimate pollutant limits and establish water quality goals, and guide watershed improvement projects. A detailed description of the methodology employed for the Lake Wentworth and Crescent Lake LLRM is provided in the *Wolfeboro Bay Lake Loading Response Model Report* (FBE, 2024a).

### 2.3.1.1 Lake Morphology and Flow Characteristics

The morphology (shape) and bathymetry (depth) of lakes and ponds are considered reliable predictors of water clarity and lake ecology. Large, deep lakes are typically clearer than small, shallow lakes as the differences in lake area, number and volume of upstream lakes, and flushing rate affect lake function and health. The **areal water load** is the depth of all inflowing water that would cover the entire lake surface area. The flushing rate is the number of times that the lake’s volume is replaced per year.

#### ***Stats for Lake Wentworth***

<b>Surface area</b>	=	3,103 acres
<b>Shoreline</b>	=	19.8 miles
<b>Max depth</b>	=	86 feet (26.2 meters)
<b>Volume</b>	=	73,742,342 cubic meters
<b>Areal water load</b>	=	15.8 feet per year (4.811 meters per year)
<b>Flushing rate</b>	=	0.819 times per year

#### ***Stats for Crescent Lake***

<b>Surface area</b>	=	140 acres
<b>Shoreline</b>	=	4.9 miles
<b>Max depth</b>	=	15.1 feet (4.6 meters)
<b>Volume</b>	=	2,513,093 cubic meters
<b>Areal water load</b>	=	325.7 feet per year (99.286 meters per year)
<b>Flushing rate</b>	=	22.4 times per year

There are ten identified dams in the watershed historically or currently controlling water flow (NHDES, 2022d). Flow between the lakes via the Smith River and out of Crescent Lake is controlled by the largest of those ten dams in the watershed: the Crescent Lake dam (refer to Section 3.1.3.3). While Crescent Lake flushes 22.4 times per year, flushing is not consistent throughout the year, and it may flush less frequently in the dry, summer months when there are low water levels from limited rainfall and high evaporation. Changes in flushing rate throughout the year and from year to year can impact lake water quality response.

### 2.3.1.2 Land Cover

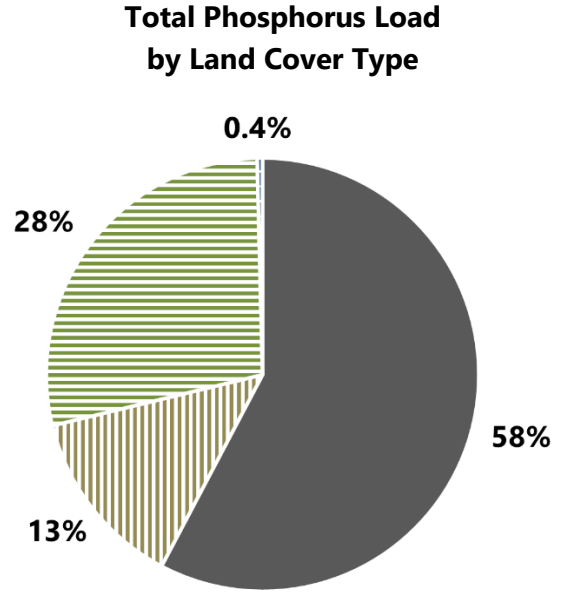
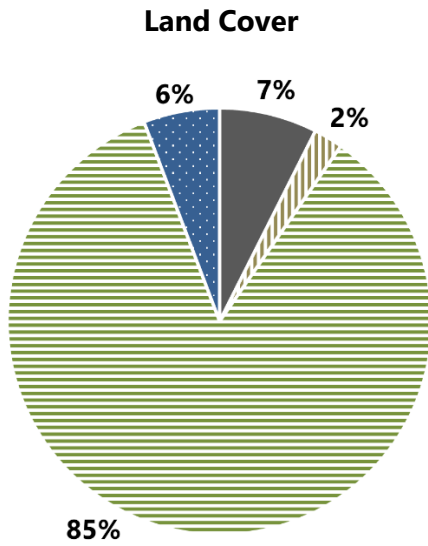
Characterizing land cover within a watershed on a spatial scale can highlight potential sources of nonpoint source pollution that would otherwise go unnoticed in a field survey of the watershed. For instance, a watershed with large areas of developed land (i.e., impervious cover) and minimal forestland will likely be more at risk for nonpoint source pollution than a watershed with well-managed development and large tracts of undisturbed forest and/or protected forest, particularly along headwater streams. Land cover is also the essential element in determining how much phosphorus is contributed to surface water via stormwater runoff and baseflow.

Current land cover in the Lake Wentworth-Crescent Lake watershed was determined by FBE using NH Geographically Referenced Analysis and Information Transfer System datasets, Environmental Systems Research Institute World Imagery, and Google Earth imagery. See *Wolfeboro Bay Lake Loading Response Model Report* for more details on methodology. The Lake Wentworth watershed is 85% forested/natural (15,894 acres); 7% developed (1,401 acres); 2% agricultural (415 acres); and 6% wetlands/open water (1,090 acres, excluding the lake). The Crescent Lake watershed is 53% forested/natural (325 acres); 45% developed (271 acres); 0% agricultural (0 acres); and 2% wetlands/open water (11 acres, excluding the lake).

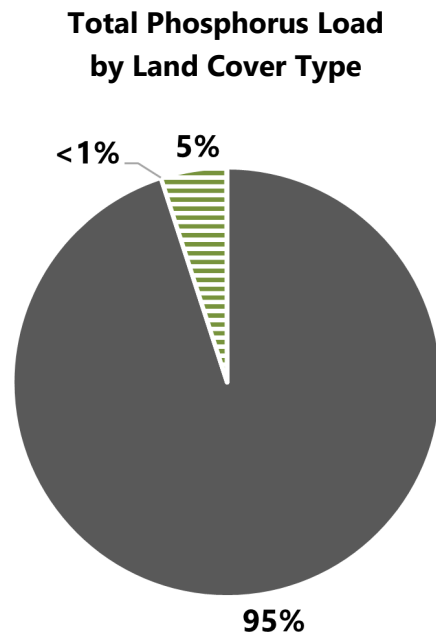
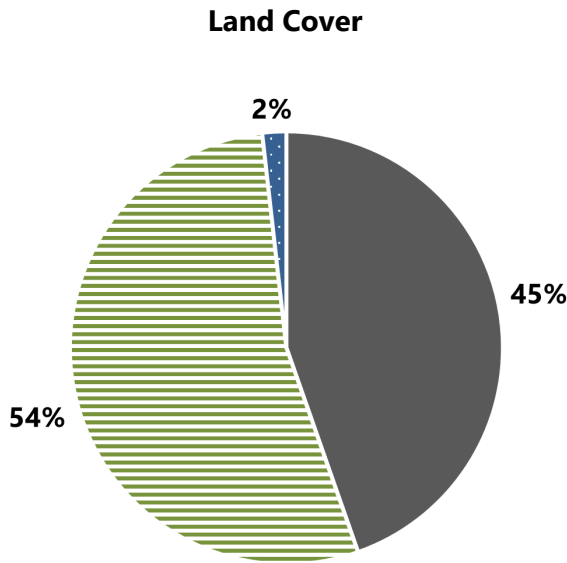
Figure 21 shows the breakdown of land cover by major category and the corresponding total phosphorus load. Although developed areas for Lake Wentworth and Crescent Lake make up only 7% and 45% of the watershed, respectively, developed areas contribute 58% and 95% of the total phosphorus load, respectively. These areas are characterized by impervious surfaces (asphalt, concrete, rooftops, and compacted gravel) that prevent infiltration and channel stormwater which may lead directly to the lake. Runoff from these surfaces carries sediments, nutrients, pathogens, pesticides, hydrocarbons, and metals that can harm aquatic life. See Figure 22 for a map of land cover in the watershed.



**Lake Wentworth**

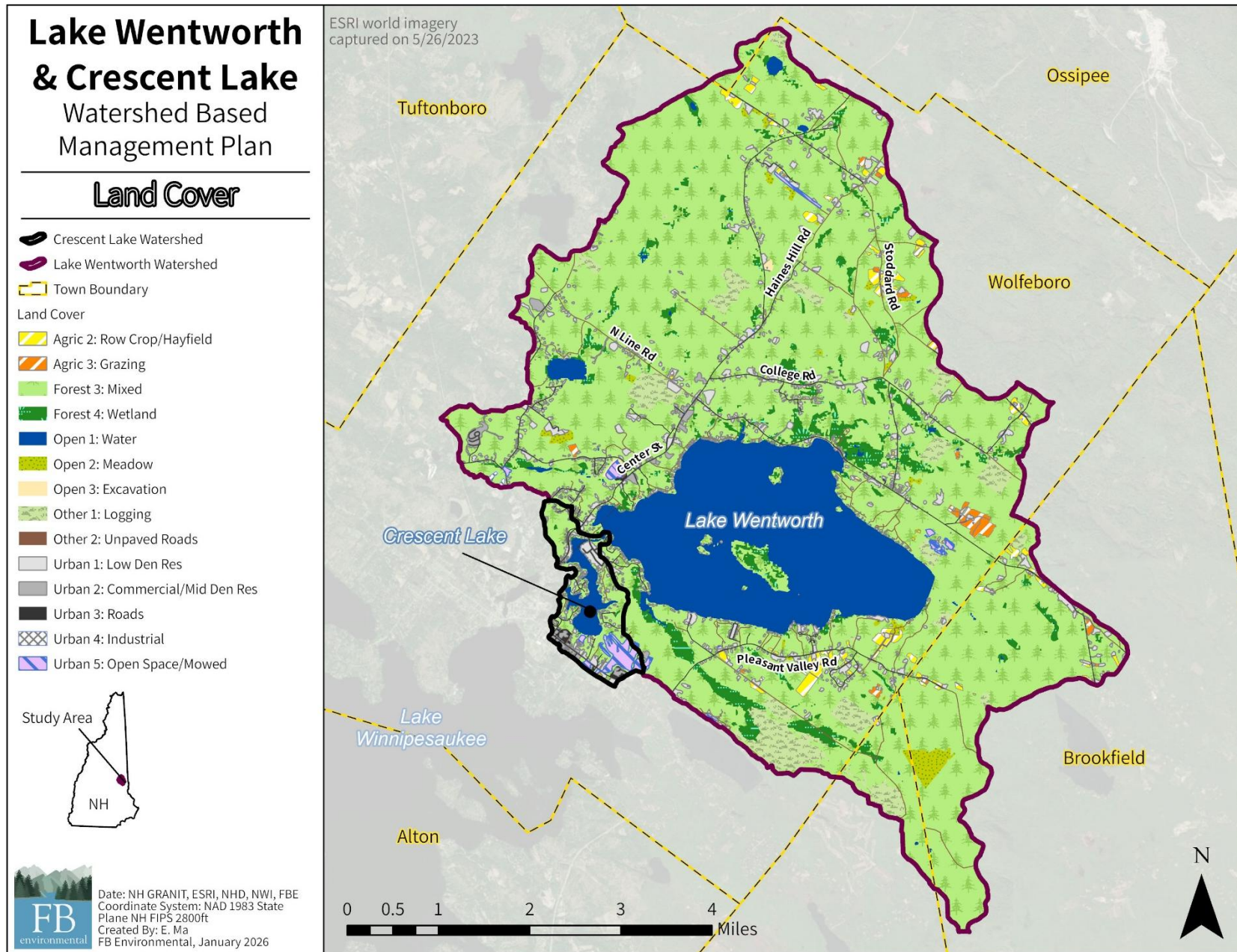


**Crescent Lake**



Forest
  Agriculture
  Water/Wetlands
  Developed

**Figure 21.** Land cover area by major category (left) and total phosphorus watershed load by major land cover category (right) for Lake Wentworth (top) and Crescent Lake (bottom). The water/wetlands category does not include the lake areas.



**Figure 22.** Land cover in the Lake Wentworth-Crescent Lake watershed.

### 2.3.1.3 Internal Phosphorus Loading

Phosphorus that enters the lake and settles to the bottom can be re-released from sediment when chemical bonds between iron and phosphorus are broken under anoxic conditions, thus providing a nutrient source for algae, cyanobacteria, and plants. Internal phosphorus loading can also result from wind-driven wave action or physical disturbance of the sediment (boat propellers, aquatic macrophyte management activities). Residents noted significantly higher turbidity in Crescent Lake after high boating on weekends, indicating that phosphorus loading comes partly from internal sources.

Internal loading estimates were derived from a combination of data collected at the deep spots of the lakes. Dissolved oxygen and temperature profiles taken at the deep spots of each waterbody were used to determine average annual duration and depth of anoxia, defined as less than 2 ppm of dissolved oxygen. Total phosphorus data taken at the deep spots of each waterbody, along with anoxic volume and area, were used to determine the rate of release and mass of the annual internal phosphorus load. The internal load estimate in any given year is highly variable and warrants further investigation.

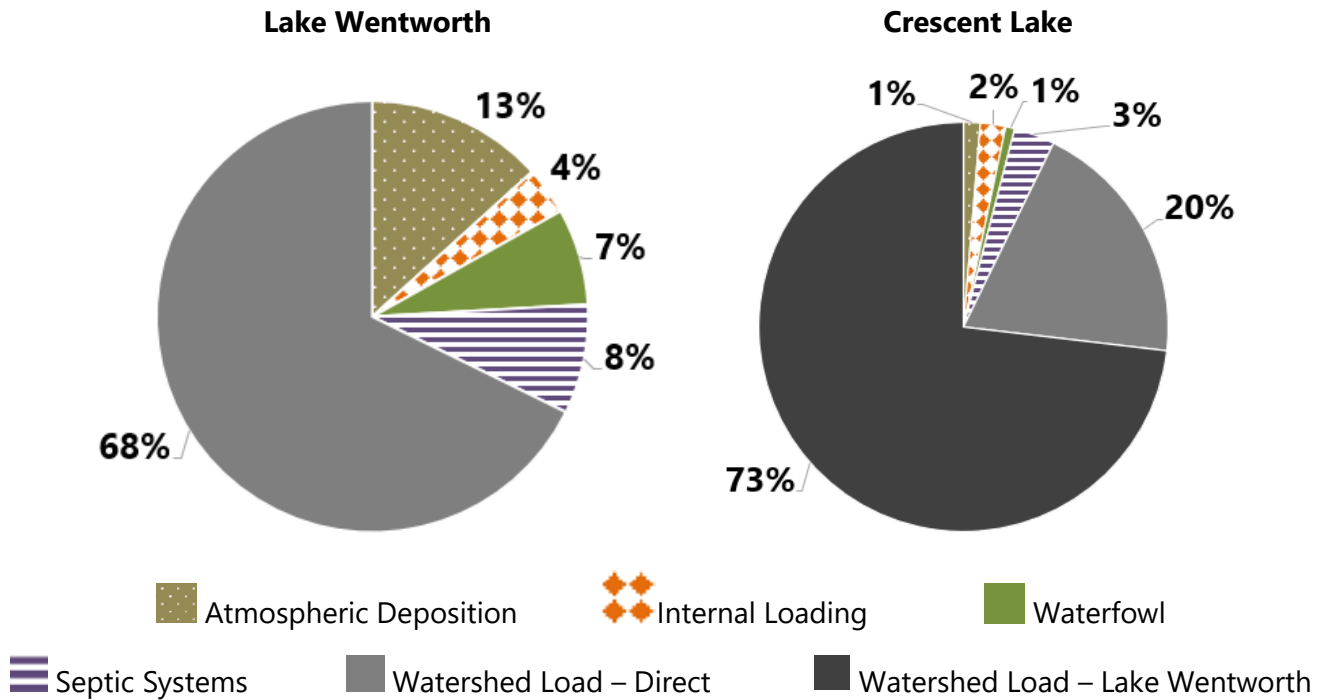
Based on current data, internal loading represents 4% and 2% of the total phosphorus load to Lake Wentworth and Crescent Lake, respectively, indicating that it is a minor source at an annual scale. It may be functionally more relevant at critical times of year during the peak growing and recreational season.

### 2.3.1.4 Lake Loading Response Model Results

Overall, model predictions for Lake Wentworth and Crescent Lake were in good agreement with observed data for total phosphorus (6% and 8% difference, respectively) (Table 6). The Crescent Lake model predictions matched observed data for chlorophyll-*a* (0% difference) and were well aligned for Secchi disk transparency (4% difference). The Lake Wentworth model predictions were in fair agreement with observed data for chlorophyll-*a* (12% difference) and Secchi disk transparency (19% difference). It is important to note that the LLRM does not capture all biogeochemical processes affecting water quality and is less accurate for predicting chlorophyll-*a* and Secchi disk transparency. For example, chlorophyll-*a* estimates are based solely on nutrient loading, while algae growth is also influenced by sediment resuspension, zooplankton grazing, heterotrophic algae, light limitation, and flushing from high flows. Limited data prevented evaluation of these additional factors. The model predicted no cyanobacteria bloom days for both lakes. Although both lakes have received bloom warnings for multiple days in recent summers, these blooms were generally in isolated areas or presented as shoreline accumulations and not representative of epilimnion water column cell densities that the model predicts.

Watershed runoff combined with baseflow (68%) was the largest phosphorus loading contribution across all sources to Lake Wentworth (Figure 23). Atmospheric deposition (13%), septic systems (8%), waterfowl (7%), and internal loading (4%) were relatively minor sources to Lake Wentworth but may be seasonally important during low flow summer conditions. For Crescent Lake, the model predicted 93% of the total phosphorus load originates from watershed sources, with septic systems (3%), internal loading (2%), atmospheric deposition (1%), and waterfowl (1%) making up the remaining phosphorus load. The watershed load (93%) to Crescent Lake includes the total phosphorus load from Lake Wentworth (73%) and the direct watershed to Crescent Lake (20%) (Table 7). Note that 1) the septic system load estimate applies only to systems located directly along the shoreline, which have the potential to short-circuit

minimally treated effluent to the lake; and 2) contributions from septic systems elsewhere in the watershed are accounted for in the coefficients used to calculate the watershed load.



**Figure 23.** Summary of total phosphorus loading by major source for Lake Wentworth and Crescent Lake.

Normalizing phosphorus export by sub-watershed area highlights areas with elevated per-area loading (greater than 0.20 kilograms per hectare per year), which generally correspond to higher development or agricultural intensity, particularly along direct shoreline areas and inflows (Table 8; Figure 24). Even agricultural areas distant from the lake can contribute to phosphorus export due to fertilizer use, soil disturbance, animal waste, and landscape alterations.

Once the model was calibrated for current in-lake phosphorus concentration, we manipulated land cover and other factor loadings to estimate pre-development loading scenarios (e.g., what in-lake phosphorus concentration was prior to human development or the best possible water quality for the lakes). Pre-development loading estimation showed that total phosphorus loading to Lake Wentworth increased by 177% from 376 kilograms per year (kg/yr) prior to development to 1,040 kg/yr under current conditions (Table 7). Pre-development loading estimation showed that total phosphorus loading to Crescent Lake (including Lake Wentworth as an input source) increased by 237% from 140 kilograms per year (kg/yr) prior to development to 472 kg/yr under current conditions (Table 7). These additional phosphorus sources are coming from development in the watershed, septic systems, atmospheric dust, and internal loading. Water quality prior to development is estimated to have been excellent with extremely low phosphorus and chlorophyll-a concentrations and high water clarity (Table 6).

We also manipulated land cover and other factors to estimate future loading scenarios (e.g., what in-lake phosphorus concentration might be at full build-out under current zoning or the worst possible water quality for the lake). Refer to the *Wolfeboro Bay Build-Out Analysis Report* (FBE, 2024b) for details on

methodology. Though not accounted for in the future model, projected increases in the frequency and intensity of storms and runoff events, along with longer dry periods and warming trends, may exacerbate erosion of phosphorus-laden sediment to surface waters and increase in-lake phosphorus concentrations (despite dilution and flushing assumed by the model). Future loading estimation showed that total phosphorus loading to Lake Wentworth may increase by 89% from 1,040 kg/yr to 1,965 kg/yr at full build-out (2094) under current zoning (Table 7). Future loading estimation showed that total phosphorus loading to Crescent Lake (including Lake Wentworth as an input source) may increase by 87% from 472 kg/yr to 882 kg/yr at full build-out (2061) under current zoning (Table 7). Additional phosphorus will be generated from more development in the watershed, greater atmospheric dust, more septic systems, and enhanced internal loading. The Lake Wentworth model predicted higher (worse) phosphorus (12.1 micrograms per liter), higher (worse) chlorophyll-a (4.0 micrograms per liter) with 19 bloom days, and lower (worse) water clarity (3.4 meters) compared to current conditions (Table 6). The Crescent Lake model predicted higher (worse) phosphorus (13.1 micrograms per liter), higher (worse) chlorophyll-a (4.5 micrograms per liter) with 28 bloom days, and lower (worse) water clarity (3.2 meters) compared to current conditions (Table 6).

**Table 6.** In-lake water quality predictions for Lake Wentworth and Crescent Lake. TP = total phosphorus. Chl-*a* = chlorophyll-*a*. SDT = Secchi disk transparency. Bloom Days represents average annual probability of chlorophyll-*a* exceeding 8 ppb.

Parameter/ Model Scenario	Lake Wentworth (pre-development)	Crescent Lake (pre-development)	Lake Wentworth (2024)	Crescent Lake (2024)	Lake Wentworth (2094)	Crescent Lake (2061)
Median total phosphorus (ppb)	no data	no data	6.0*	7.6*	no data	no data
Predicted Median total phosphorus (ppb)	2.3	2.1	6.4	7.0	12.1	13.1
Mean chlorophyll- <i>a</i> (ppb)	no data	no data	1.5	2.0	no data	no data
Predicted mean chlorophyll- <i>a</i> (ppb)	0.3	0.2	1.7	2.0	4.0	4.5
Mean Secchi disk transparency (meters)	no data	no data	6.8	5.0	no data	no data
Predicted mean Secchi disk transparency (meters)	12.1	13.1**	5.6	5.2	3.4	3.2
Bloom days	0	0	0	0	19	28

\*Represents estimate of average annual total phosphorus concentration; this is different from the existing median total phosphorus concentration from summer epilimnion data used for the assimilative capacity analysis.

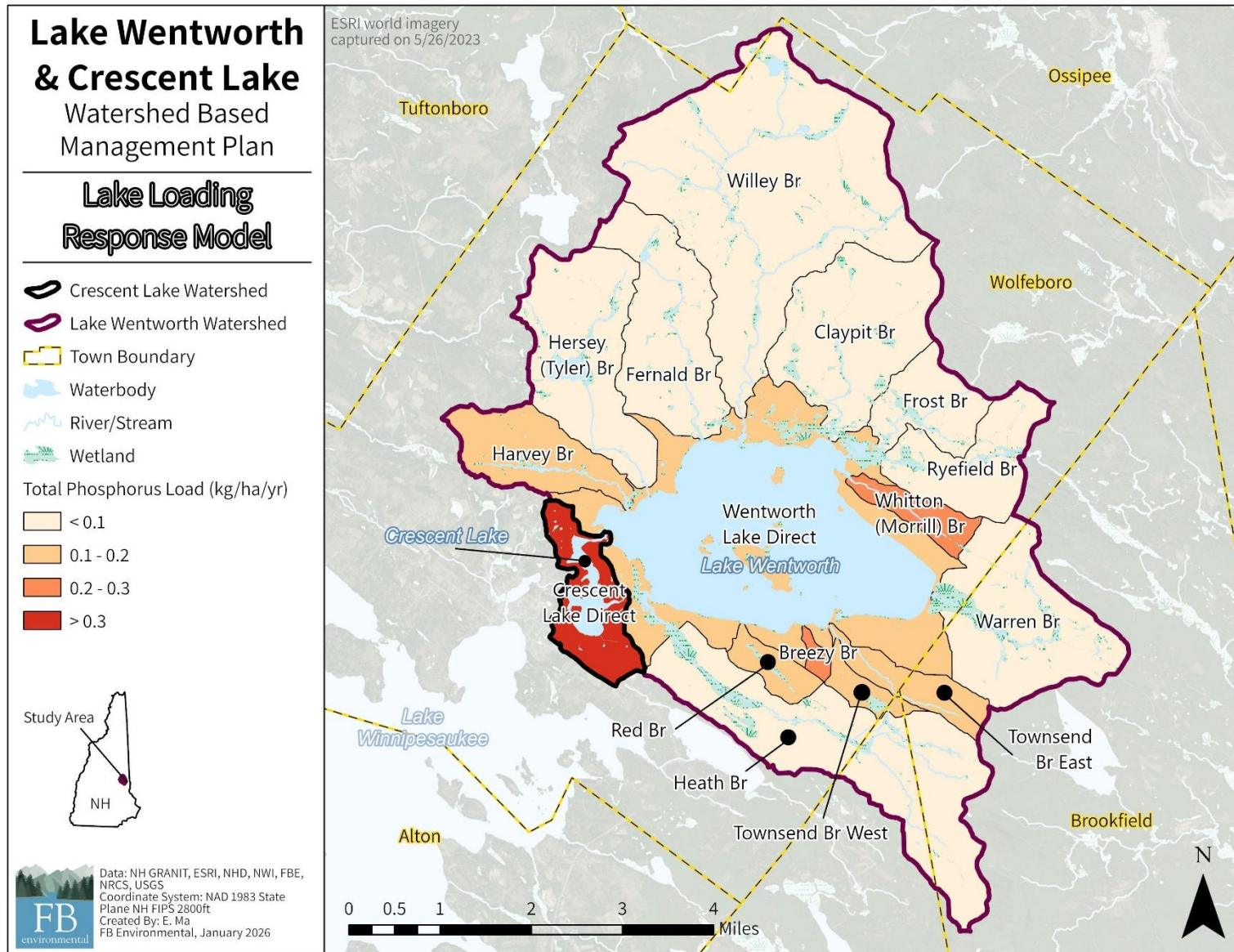
\*\*Max depth for Crescent Lake is about 6.0 meters.

**Table 7.** Total phosphorus (TP) and water loading summary by source for Lake Wentworth and Crescent Lake. kg/yr = kilograms per year.

Lake	Measurement	Atmospheric	Internal	Waterfowl	Septic System	Watershed Load	Total Load To Lake
<b>Lake Wentworth</b> <i>(pre-development)</i>	TP (kg/yr)	87.9	0.0	75.3	0.0	212.3	<b>375.5</b>
	Percent	23	0	20	0	57	<b>100</b>
	Water (cubic meters per year)	14,697,823	0	0	0	45,813,033	<b>60,510,857</b>
<b>Crescent Lake</b> <i>(pre-development)</i>	TP (kg/yr)	4.0	0.0	3.4	0.0	132.7	<b>140.0</b>
	Percent	3	0	2	0	95	<b>100</b>
	Water (cubic meters per year)	663,630	0	0	0	55,769,464	<b>56,433,094</b>
<b>Lake Wentworth</b> <i>(2024)</i>	TP (kg/yr)	138.1	37.2	75.3	85.3	704.2	<b>1,040.2</b>
	Percent	13	4	7	8	68	<b>100</b>
	Water (cubic meters per year)	14,697,823	0	0	72,559	45,644,863	<b>60,415,245</b>
<b>Crescent Lake</b> <i>(2024)</i>	TP (kg/yr)	6.2	9.4	3.4	15.2	437.9	<b>472.1</b>
	Percent	1	2	1	3	93	<b>100</b>
	Water (cubic meters per year)	663,630	0	0	12,015	55,616,462	<b>56,292,107</b>
<b>Lake Wentworth</b> <i>(2094)</i>	TP (kg/yr)	313.9	70.3	75.3	103.9	1,401.2	<b>1,964.7</b>
	Percent	16	4	4	5	71	<b>100</b>
	Water (cubic meters per year)	14,697,823	0	0	95,828	45,354,460	<b>60,148,111</b>
<b>Crescent Lake</b> <i>(2061)</i>	TP (kg/yr)	14.2	17.6	3.4	19.2	827.4	<b>881.8</b>
	Percent	2	2	<1	2	94	<b>100</b>
	Water (cubic meters per year)	663,630	0	0	17,052	55,291,264	<b>55,971,946</b>

**Table 8.** Summary of current land area, water flow, and total phosphorus concentration and loading by sub-watershed for Lake Wentworth and Crescent Lake. Land area does not include the area of the lakes.

<b>Sub-Watershed</b>	<b>Land Area (hectares)</b>	<b>Water Flow (cubic meters per year)</b>	<b>Calculated Phosphorus Concentration (parts per million)</b>	<b>Measured Phosphorus Concentration (parts per million)</b>	<b>Phosphorus Mass (kilograms per year)</b>	<b>Phosphorus Mass by Area (kilograms per hectare per year)</b>
Breezy Br	27.5	180,949	0.044	0.083	8.0	0.29
Claypit Br	654.7	4,050,520	0.014	0.015	54.6	0.08
Fernald Br	579.1	3,615,930	0.013	0.034	46.0	0.08
Frost Br	248.5	1,362,079	0.015	0.032	20.5	0.08
Harvey Br	332.2	2,050,365	0.026	0.033	53.0	0.16
Heath Br	1,025.1	5,647,106	0.010	0.016	53.4	0.05
Hersey (Tyler) Br	632.6	3,480,742	0.015	0.028	50.6	0.08
Red Br	102.4	668,421	0.019	0.032	12.9	0.13
Ryefield Br	364.2	2,000,283	0.018	0.023	34.9	0.10
Townsend Br East	167.2	1,106,429	0.020	0.072	21.9	0.13
Townsend Br West	78.3	514,719	0.027	0.072	14.0	0.18
Warren Br	679.4	3,784,162	0.014	0.018	53.1	0.08
Wentworth Lake Direct	845.6	5,450,902	0.021	no data	115.8	0.14
Whitten (Morrill) Br	121.4	800,257	0.032	0.035	26.0	0.21
Willey Br	1,749.6	10,931,997	0.013	0.024	139.5	0.08
Crescent Lake Direct	245.6	55,616,462	0.008	no data	437.9	1.78



**Figure 24.** Map of current total phosphorus load per unit area (kilograms per hectare per year = kg/ha/yr) for each sub-watershed in the Lake Wentworth-Crescent Lake watershed. Higher phosphorus loads per unit area are concentrated in the more developed direct shoreline areas.

### 2.3.2 Build-out Analysis

A full build-out analysis was completed for the Lake Wentworth-Crescent Lake watershed as part of the Wolfeboro Bay Build-Out Analysis Report (FBE, 2024b). A build-out analysis identifies areas with development potential and projects future development based on a set of conditions (e.g., zoning regulations, environmental constraints) and assumptions (e.g., population growth rate). A build-out analysis shows what land is available for development, how much development can occur, and at what densities. **“Full build-out”** is a theoretical condition representing the moment in time when all available land suitable for residential, commercial, and industrial uses has been developed to the maximum capacity permitted by local ordinances and zoning standards. Local ordinances and zoning standards are subject to change, and the analysis requires simplifying assumptions; therefore, the results of the build-out analysis should be viewed as planning-level estimates only for potential future outcomes from development trends.



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**FULL BUILD-OUT** is a theoretical condition representing the moment in time when all available land suitable for residential, commercial, and industrial uses has been developed to the maximum capacity permitted by current local ordinances and current zoning standards.

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To determine where development may occur within the study area, the build-out analysis first subtracts land unavailable for development due to physical constraints, including environmental restrictions (e.g., wetlands, conserved lands, hydric soils), zoning restrictions (e.g., shoreland zoning, street right-of-ways, and building setbacks), and practical design considerations (e.g., lot layout inefficiencies) (Figure 25). Existing buildings also reduce the capacity for new development.

The build-out analysis showed that 55% (10,168 acres) of the Lake Wentworth watershed and 69% (396 acres) of the Crescent Lake watershed are still considered buildable under current zoning regulations (Table 9; Table 10; Figure 26). FBE identified 1,155 and 256 existing principal buildings within the Lake Wentworth and Crescent Lake watersheds, respectively, and the build-out analysis projected that an additional 2,116 and 255 buildings could be constructed in the future, resulting in a total of 3,271 and 511 buildings in the two watersheds (**Table 11; Table 12**; Figure 27).

A watershed-wide build-out analysis was completed for the Lake Wentworth and Crescent Lake portion of the watershed in 2012 (only included Wolfeboro and Brookfield) and was compared with the updated build-out analysis to evaluate how development patterns or pressures have changed since the 2012 build-out. Results of this build-out showed an increase in the number of existing buildings coupled with a decrease in buildable area and projected buildings from 2012 to 2023. Brookfield also amended their town zoning to increase the lot size in the Rural Residential/Agricultural zone from 1 acre to 5 acres, which decreases the number of projected buildings in Brookfield when comparing these analyses.

**Table 9.** Amount of buildable land by town and zone in the Lake Wentworth watershed in Wolfeboro, New Durham, Brookfield, and Ossipee, NH.

<b>Town/Zone</b>	<b>Total Area (acres)</b>	<b>Buildable Area (acres)</b>	<b>Percent Buildable Area</b>
<b>Wolfeboro</b>	<b>15,202</b>	<b>8,847</b>	<b>58%</b>
Bay Street Limited Business District	3	<1	0%
General Residential District	1,323	809	61%
Center Street/Rte. 28 Mixed-Use Business District	92	42	45%
Municipal Watershed	30	28	94%
Pine Hill Road Development District	19	13	65%
Residential District	685	465	68%
Residential/Agricultural District	8,956	5,425	61%
Rural Residential District	3,276	1,778	54%
Shore Front Residential District	799	270	34%
Village Residential District	18	18	100%
<b>New Durham</b>	<b>524</b>	<b>344</b>	<b>66%</b>
Residential/Agricultural	524	344	66%
<b>Brookfield</b>	<b>2,548</b>	<b>923</b>	<b>36%</b>
Rural Residential/Agricultural	1,804	634	35%
Workforce Housing	744	288	39%
<b>Ossipee</b>	<b>62</b>	<b>54</b>	<b>88%</b>
Rural	62	54	88%
<b>Total</b>	<b>18,336</b>	<b>10,168</b>	<b>55%</b>

**Table 10.** Amount of buildable land by town and zone in the Crescent Lake watershed in Wolfeboro, NH.

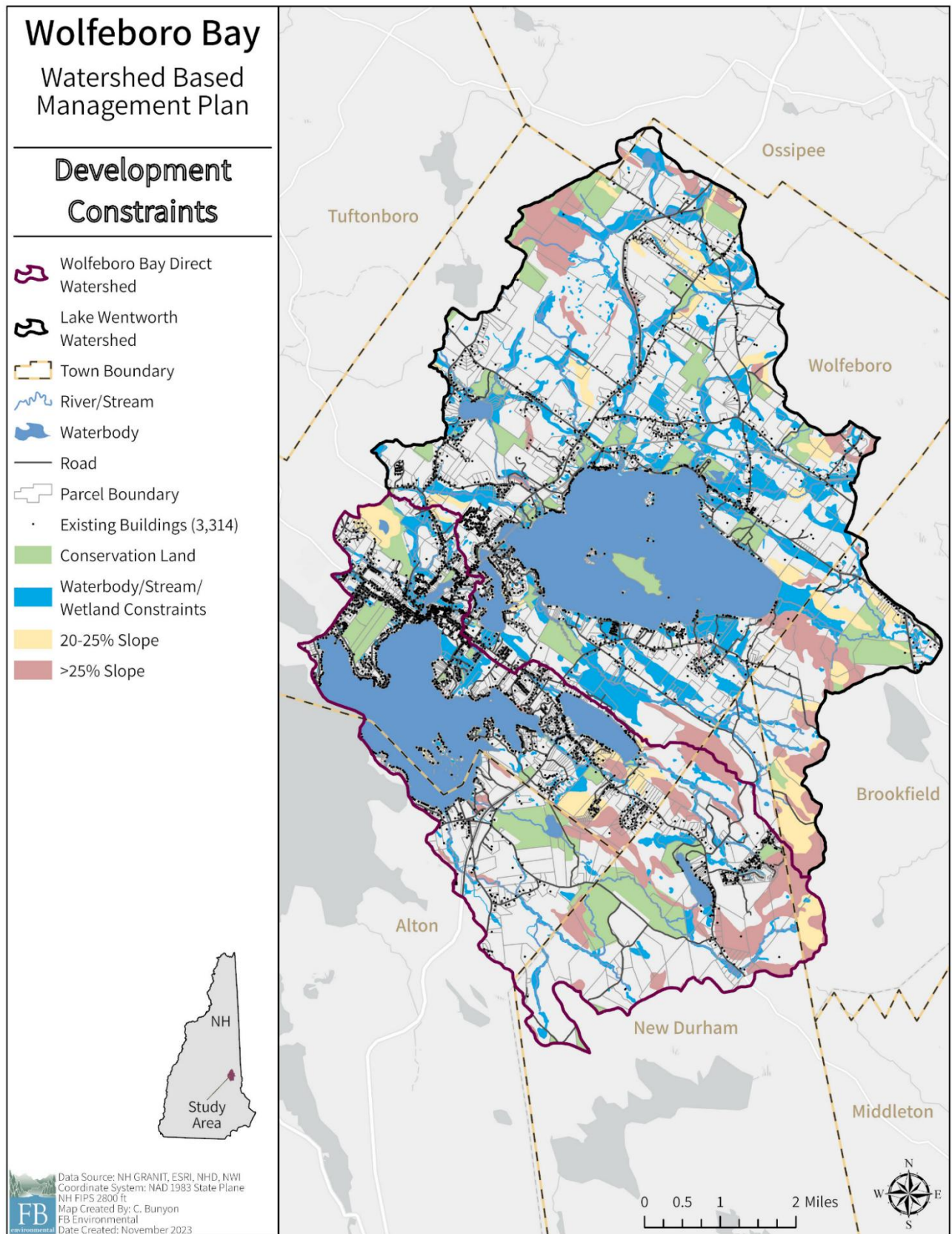
<b>Town/Zone</b>	<b>Total Area (acres)</b>	<b>Buildable Area (acres)</b>	<b>Percent Buildable Area</b>
<b>Wolfeboro</b>	<b>574</b>	<b>396</b>	<b>69%</b>
General Residential District	68	51	75%
Residential District	200	150	75%
Shore Front Residential District	151	94	62%
Village Residential District	155	101	65%
<b>Total</b>	<b>574</b>	<b>396</b>	<b>69%</b>

**Table 11.** Number of existing and projected buildings by town and zone in the Lake Wentworth watershed in Wolfeboro, New Durham, Brookfield, and Ossipee, NH.

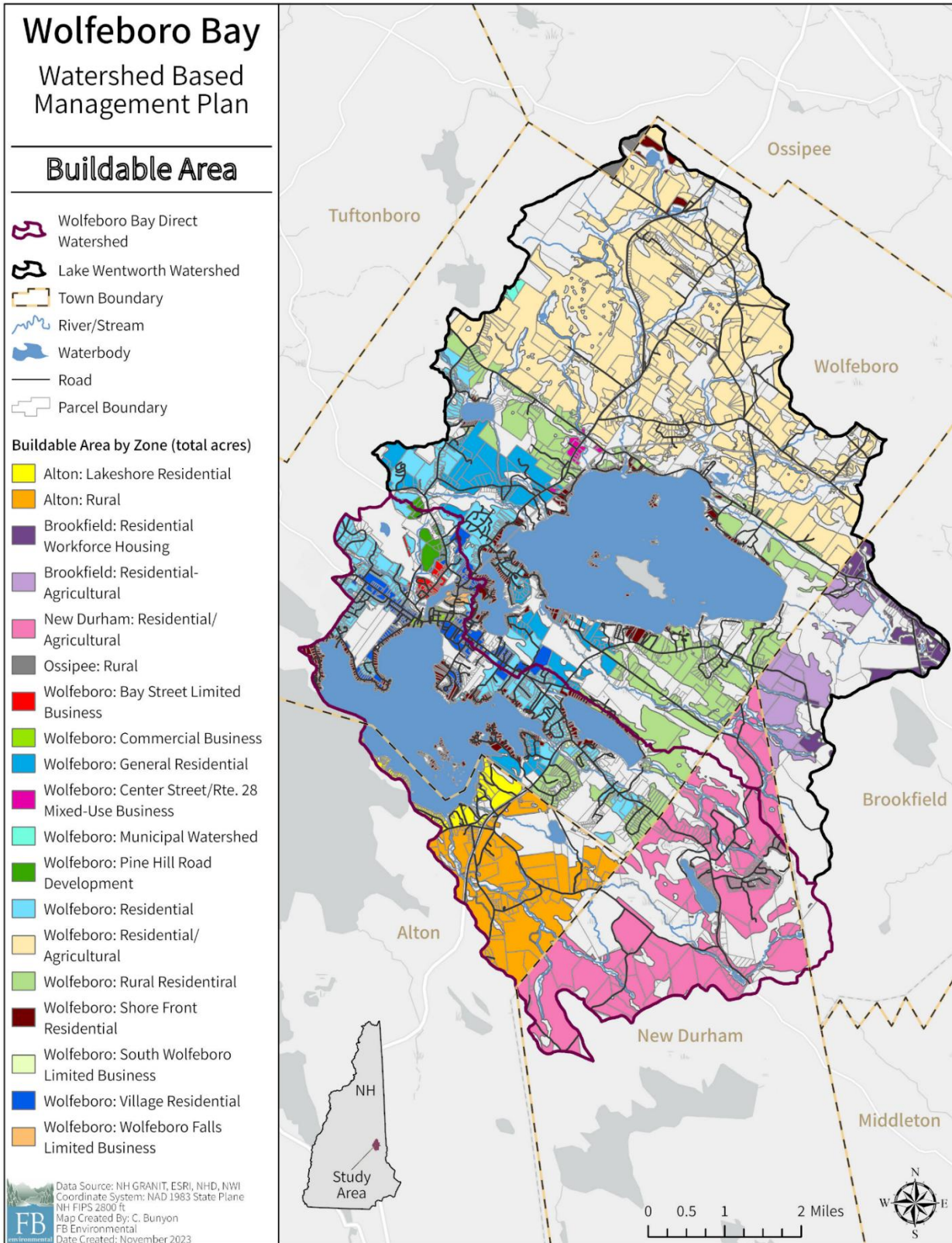
<b>Town/Zone</b>	<b>No. Existing Buildings</b>	<b>No. Projected Buildings</b>	<b>Total No. Buildings</b>
<b>Wolfeboro</b>	<b>1,112</b>	<b>1,695</b>	<b>2,807</b>
Bay Street Limited Business District	0	0	0
General Residential District	113	200	313
Center St/Rte. 28 Mixed-Use Business District	22	0	22
Municipal Watershed	3	5	8
Pine Hill Road Development District	2	13	15
Residential District	187	396	583
Residential/Agricultural District	282	584	866
Rural Residential District	257	311	568
Shore Front Residential District	245	155	400
Village Residential District	1	31	32
<b>New Durham</b>	<b>1</b>	<b>161</b>	<b>162</b>
Residential/Agricultural	1	161	162
<b>Brookfield</b>	<b>42</b>	<b>225</b>	<b>267</b>
Rural Residential/Agricultural	6	194	200
Workforce Housing	36	31	67
<b>Ossipee</b>	<b>0</b>	<b>35</b>	<b>35</b>
Rural	0	35	35
<b>Total</b>	<b>1,155</b>	<b>2,116</b>	<b>3,271</b>

**Table 12.** Number of existing and projected buildings by town and zone in the Crescent Lake watershed in Wolfeboro, NH.

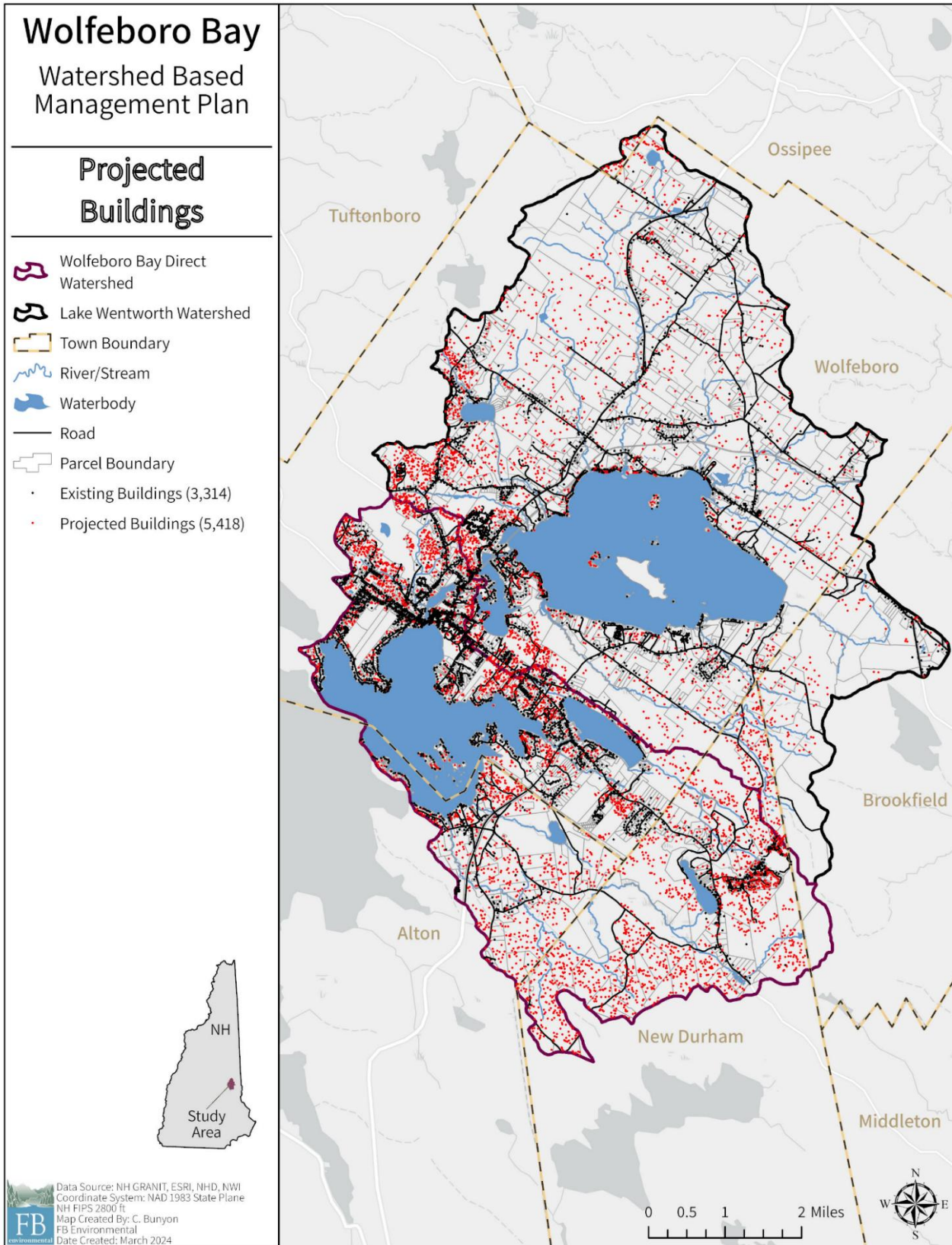
<b>Town/Zone</b>	<b>No. Existing Buildings</b>	<b>No. Projected Buildings</b>	<b>Total No. Buildings</b>
<b>Wolfeboro</b>	<b>256</b>	<b>255</b>	<b>511</b>
General Residential District (GR)	14	13	27
Residential District (R)	52	151	203
Shore Front Residential District (SFR)	114	26	140
Village Residential District (VR)	76	65	141
<b>Total</b>	<b>256</b>	<b>255</b>	<b>511</b>



**Figure 25.** Development constraints in the Wolfeboro Bay watershed in Wolfeboro, Alton, New Durham, Brookfield, and Ossipee, NH which covers the Lake Wentworth-Crescent Lake watershed. Developed as part of the *Wolfeboro Bay Build-Out Analysis Report*.



**Figure 26.** Buildable area by municipal zone in the Wolfeboro Bay watershed in Wolfeboro, Alton, New Durham, Brookfield, and Ossipee, NH which covers the Lake Wentworth-Crescent Lake watershed. Developed as part of the *Wolfeboro Bay Build-Out Analysis Report*.



**Figure 27.** Projected buildings in the Wolfeboro Bay watershed in Wolfeboro, Alton, New Durham, Brookfield, and Ossipee, NH which covers the Lake Wentworth-Crescent Lake watershed. Developed as part of the *Wolfeboro Bay Build-Out Analysis Report*.

A TimeScope Analysis applies historical compound annual growth rates (CAGR) to the number of projected buildings to project the rate of new development into the future. The TimeScope Analysis presented here projects three different growth rates for the watershed towns, representing the past 20 years, 30 years, and 50 years of decadal census data (from 2000-2020, 1990-2020, and 1970-2020) (Table 13). It is important to note that future growth rates may vary from historical growth rates.

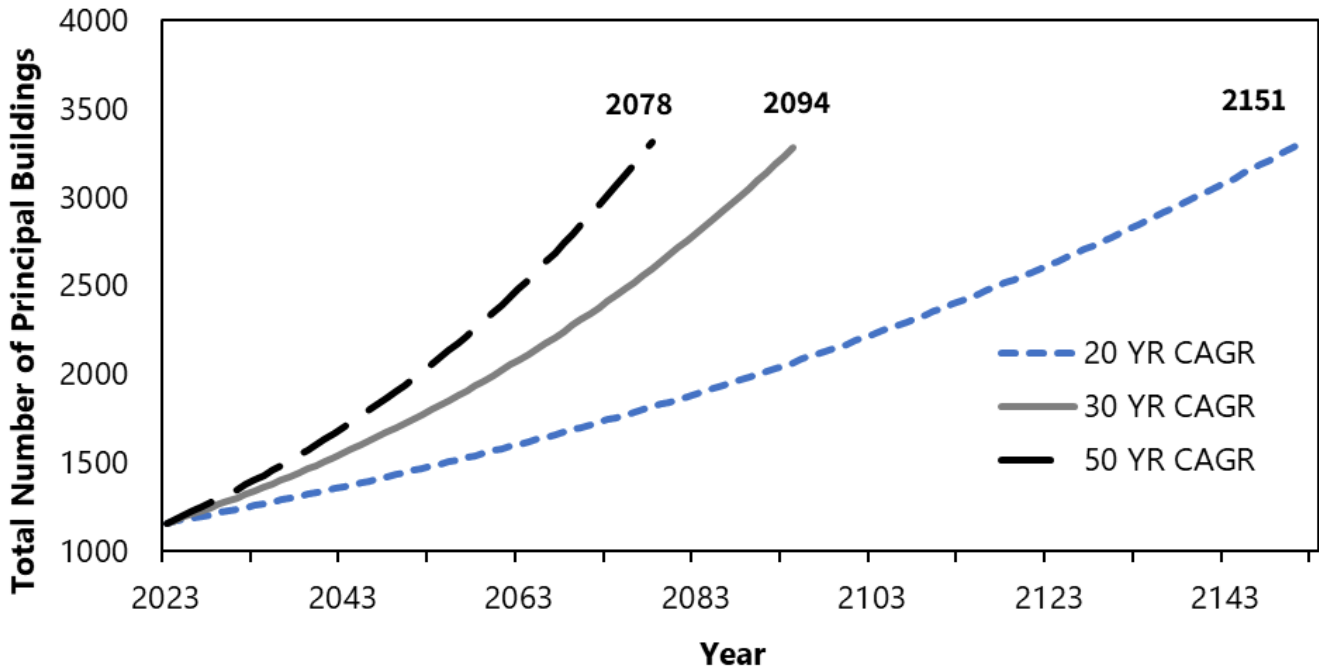
**Table 13.** Compound annual growth rates (CAGR) for the towns in the Lake Wentworth-Crescent Lake watershed, used for the TimeScope Analysis. Data from the U.S. Census Bureau.

<b>Town Populations</b>	<b>50 Year CAGR (1970-2020)</b>	<b>30 Year CAGR (1990-2020)</b>	<b>20 Year CAGR (2000-2020)</b>
<i>New Hampshire (for reference)</i>	1.26%	0.72%	0.54%
Wolfeboro	1.51%	0.97%	0.27%
New Durham	3.11%	1.04%	0.97%
Brookfield	2.71%	1.26%	1.12%
Ossipee	1.97%	0.93%	0.19%
<b>Towns Combined - Lake Wentworth</b>	<b>1.93%</b>	<b>1.48%</b>	<b>0.82%</b>
<b>Towns Combined - Crescent Lake</b>	<b>1.51%</b>	<b>1.45%</b>	<b>0.53%</b>

For the Lake Wentworth watershed, full build-out is projected to occur in 2151 at the 20-year CAGR, 2094 at the 30-year CAGR, and 2078 for the 50-year CAGR for the Lake Wentworth watershed towns (Figure 28). For the Crescent Lake watershed, full build-out is projected to occur in 2075 at the 20-year CAGR, 2061 at the 30-year CAGR, and 2057 for the 50-year CAGR for the Crescent Lake watershed town (Figure 31). This analysis showed that if the towns within the watershed continue to grow at the rates identified, and current zoning and other development constraints remain the same, full build-out could occur within this century for both lakes.

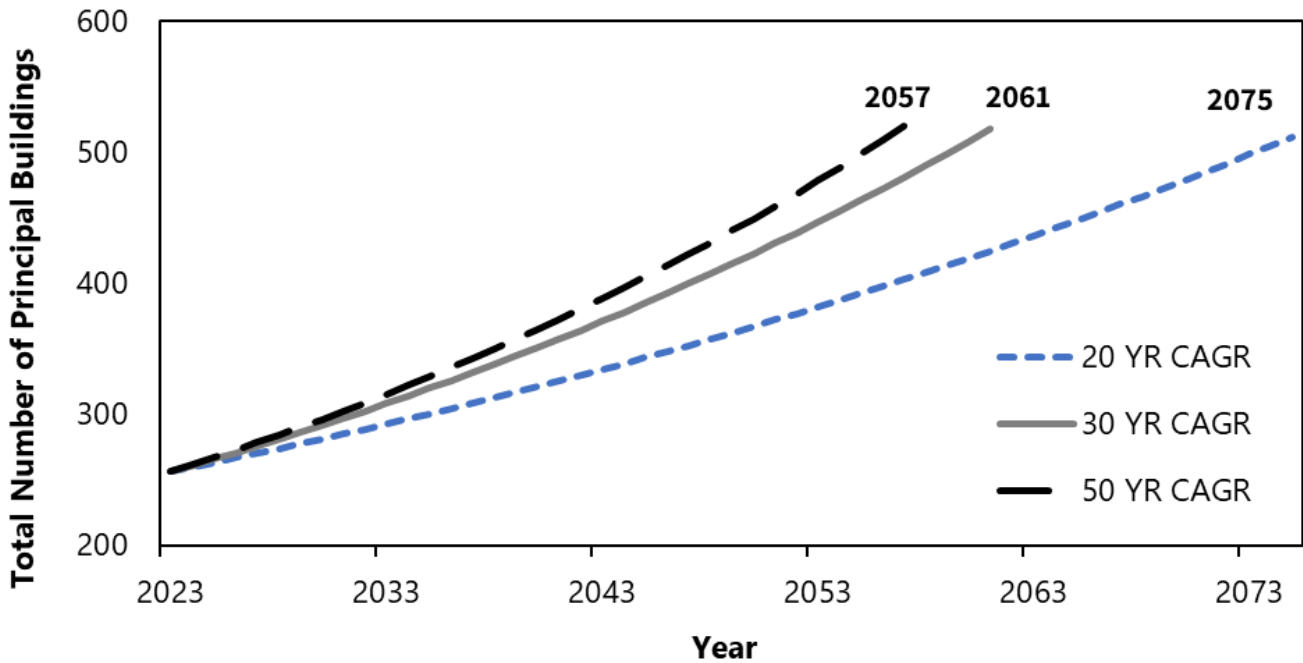
Note that the growth rates used in the TimeScope Analysis are based on town-wide census statistics but have been applied here to a portion of the towns. If areas closer to the lakes within each town develop faster than more upland areas, watershed full build-out conditions may occur sooner. Also note that the population growth rate in these towns is decreasing, so the 20- or 30-year estimates are likely more accurate than the 50-year estimate. Using census data to project population increase and/or development has inherent limitations. For instance, the building rate may increase at a different rate than population, due to factors such as commercial versus residential development and number of people per household. As such, the TimeScope Analysis might over or underestimate the time required for the study area to reach full build-out. Numerous social and economic factors influence population change and development rates, including policies adopted by federal, state, and local governments. The relationships among the various factors may be complex and therefore difficult to model.

### Lake Wentworth Watershed TimeScope Analysis



**Figure 28.** Full build-out projections for the Lake Wentworth watershed (based on compound annual growth rates; CAGR).

### Crescent Lake Watershed TimeScope Analysis



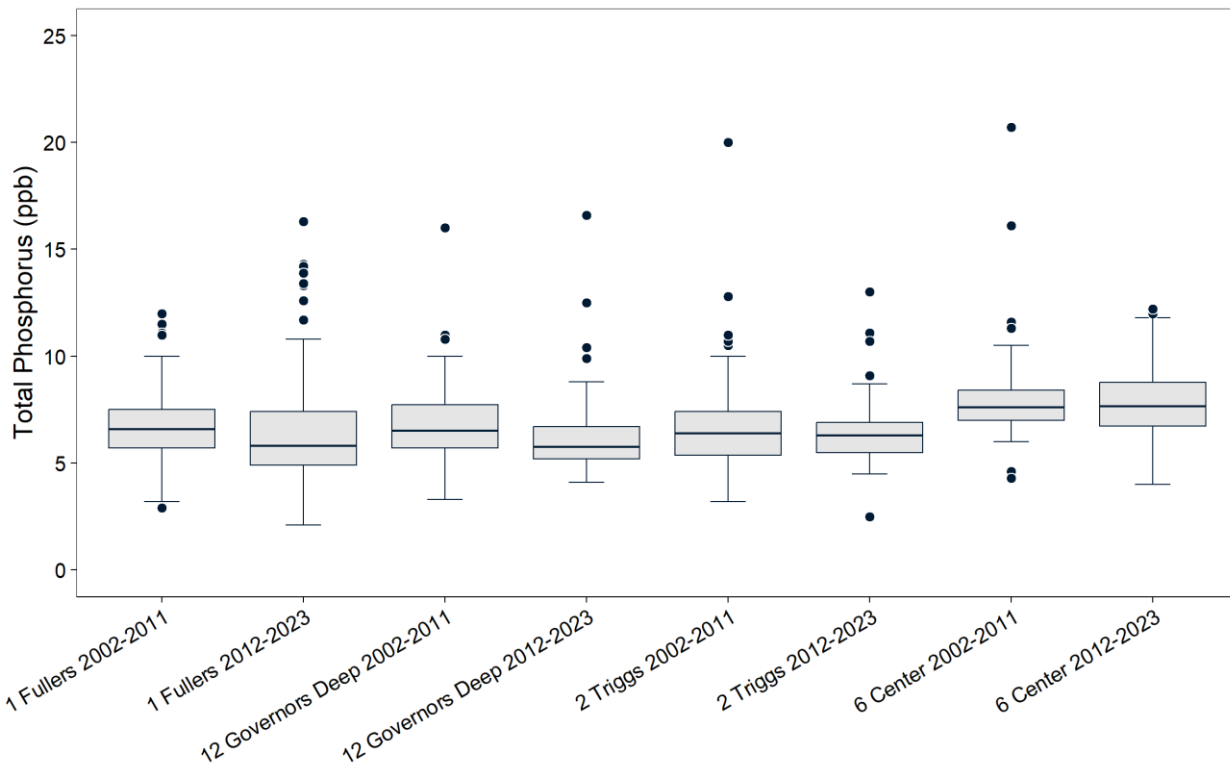
**Figure 29.** Full build-out projections for the Crescent Lake watershed (based on compound annual growth rates; CAGR).

## 2.4 WATER QUALITY GOAL AND OBJECTIVES

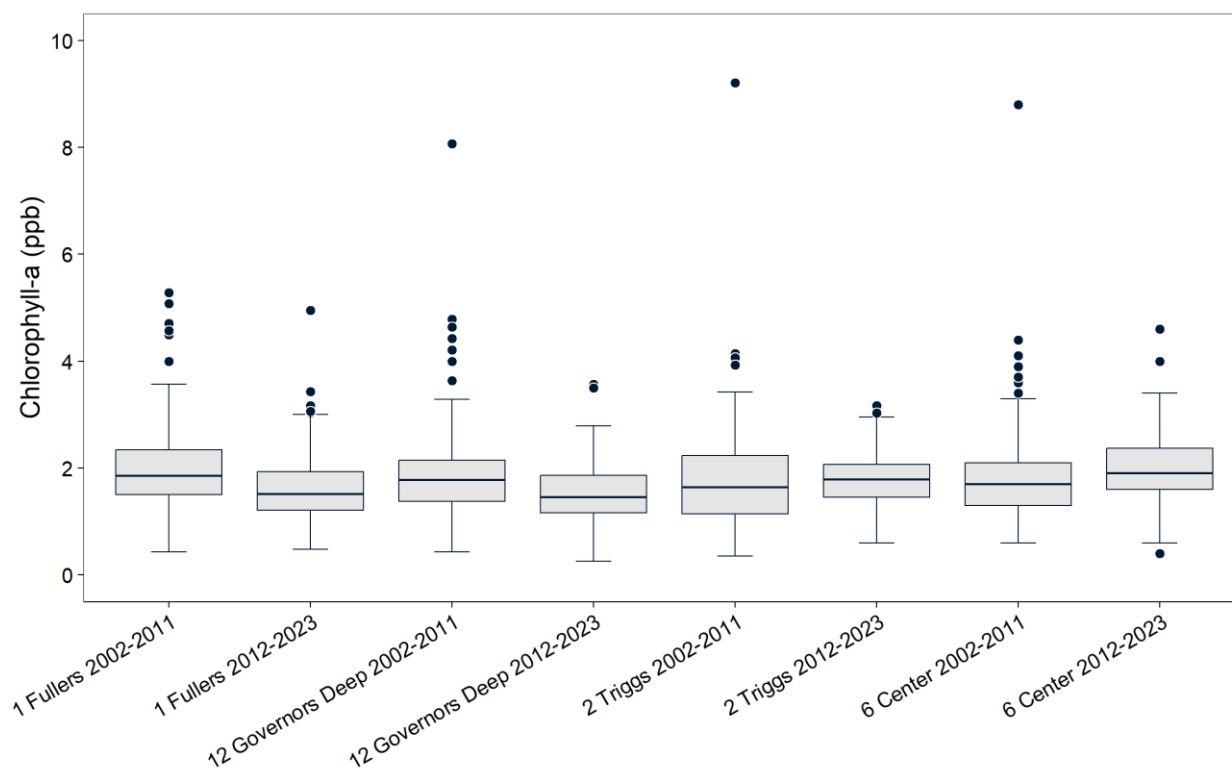
### 2.4.1 Original Water Quality Goal

The 2012 Lake Wentworth and Crescent Lake WMP set a water quality goal to reduce the in-lake total phosphorus concentration by 15% for both lakes, achieving 5.7 micrograms per liter for Lake Wentworth [1 Fuller’s] and 6.7 micrograms per liter for Crescent Lake [6 Center] by 2023. Through the hard work and dedication of WWA and its community, water quality data collected since the original WMP show that Lake Wentworth has successfully met this goal, while Crescent Lake has not met this goal and has instead increased by 0.4 micrograms per liter or 5%.

To further explore this apparent improvement, we ran a Wilcoxon rank sum test to determine statistically significant differences ( $p < 0.05$ ) between the time periods of 2002-2011 (original WMP) and 2012-2023 (updated WMP) for total phosphorus and chlorophyll-*a* collected at three deep spot stations on Lake Wentworth and one deep spot station on Crescent Lake (Figure 30; Figure 31). Both Fuller’s and Governor’s deep spots show statistically significant improvement in median total phosphorus and chlorophyll-*a*. Trigg’s deep spot shows no statistically significant difference in either total phosphorus or chlorophyll-*a*. Crescent deep spot shows no statistically significant difference in total phosphorus but degradation in chlorophyll-*a*.



**Figure 30.** Boxplots showing total phosphorus concentration distribution for deep spot stations on Lake Wentworth (1 Fuller’s, 12 Governor’s, 2 Trigg’s) and Crescent Lake (6 Crescent) for the time periods of 2002-2011 (original WMP) and 2012-2023 (updated WMP). The boxes show the 25th, 50th (median), and 75th percentile of the data. The whiskers show 1.5 times the interquartile range (range from the 25th to 75th percentiles). Points are outlier observations that are outside the whiskers. ppb = parts per billion.



**Figure 31.** Boxplots showing chlorophyll-*a* concentration distribution for deep spot stations on Lake Wentworth (1 Fuller’s, 12 Governor’s, 2 Trigg’s) and Crescent Lake (6 Crescent) for the time periods of 2002-2011 (original WMP) and 2012-2023 (updated WMP). The boxes show the 25th, 50th (median), and 75th percentile of the data. The whiskers show 1.5 times the interquartile range (range from the 25th to 75th percentiles). Points are outlier observations that are outside the whiskers. ppb = parts per billion.

#### 2.4.2 Updated Water Quality Goal

A water quality goal was updated based on the data and modeling described in previous sections. The model estimated changes in total phosphorus loading and in-lake total phosphorus concentrations from pre-development through future conditions. Results show that in-lake concentrations have already more than doubled under current development and are projected to exceed the NHDES oligotrophic reserve capacity threshold if “business-as-usual” development continues, placing the long-term water quality of Lake Wentworth and Crescent Lake at risk. Additionally, the increasing prevalence of cyanobacteria blooms indicates that there may not be reserve capacity for these lakes to assimilate additional nutrients.

Reducing sources of phosphorus throughout the watershed will be necessary to protect water quality in the long-term by preventing the accumulation of phosphorus that can feed cyanobacteria blooms. Given that both lakes are experiencing cyanobacteria blooms and are threatened by new development, it is highly recommended that strong objectives be established to protect the water quality of the lakes.

Based on discussions with the Advisory Committee, the following water quality goal and objectives were set for the updated Lake Wentworth and Crescent Lake WMP. It is important to note that meeting this goal for both lakes may not be enough to prevent cyanobacteria blooms caused by other stressors such as a longer growing season and warming lake water. More data and evaluation of changes in both lakes’ water quality response to these stressors would be needed to adjust the goal.

**The goal of the Lake Wentworth and Crescent Lake WMP is to improve the water quality of Lake Wentworth and Crescent Lake such that state water quality standards are met for the protection of aquatic life integrity and primary contact recreation designated uses and the likelihood of harmful cyanobacteria blooms is substantially reduced.** This goal will be achieved by accomplishing the following objectives, with specific action items outlined in the Action Plan (Section 5).

***Objective 1***

Reduce phosphorus loading from existing development by 10% (104 kg/yr) to Lake Wentworth and 15% (71 kg/yr) to Crescent Lake to reduce average in-lake summer total phosphorus concentration to 5.0 ppb in Lake Wentworth and 7.2 ppb in Crescent Lake.

***Objective 2***

Mitigate (prevent or offset) phosphorus loading from future development by 133 kg/yr to Lake Wentworth and 111 kg/yr to Crescent Lake to maintain average summer in-lake total phosphorus concentrations in the next ten years.

The interim benchmarks for each water quality objective allow flexibility in reassessing objectives following more data collection and expected increases in phosphorus loading from future development in the watershed over the next ten or more years (Table 14). Comparing observed water quality changes to predicted water quality changes with no action can help guide adaptive changes to interim benchmarks (e.g., actions are meeting objectives or actions are falling short of objectives). If the benchmarks are not met due to lack of funding or other resources for implementation projects rather than due to increases in phosphorus loading from new development outpacing reductions in phosphorus loading from improvements to existing development, then this creates different conditions from which to adjust interim benchmarks. For each interim benchmark year, stakeholders should review water quality data, then assess why benchmarks are or are not being met. Stakeholders can then decide on how to adjust the next interim benchmarks to better reflect water quality conditions and any practical limitations to implementation.

**Table 14.** Summary of interim benchmarks for tracking progress towards achieving the water quality objectives for Lake Wentworth and Crescent Lake. Interim benchmarks are cumulative. kg/yr = kilograms per year. ppb = parts per billion.

Interim Goals / Benchmarks	Lake	2028	2030	2035
<p><b>Objective 1</b> Reduce phosphorus loading from existing development by 10% (104 kg/yr) to Lake Wentworth and 15% (71 kg/yr) to Crescent Lake to reduce average in-lake summer total phosphorus concentration to 5.0 ppb in Lake Wentworth and 7.2 ppb in Crescent Lake.</p>	<b>Wentworth</b>	Achieve <b>2%</b> (21 kg/yr) reduction in total phosphorus loading.	Achieve <b>5%</b> (52 kg/yr) reduction in total phosphorus loading; re-evaluate water quality and track progress.	Achieve <b>10%</b> (104 kg/yr) reduction in total phosphorus loading; re-evaluate water quality and track progress.
	<b>Crescent</b>	Achieve <b>5%</b> (24 kg/yr) reduction in total phosphorus loading.	Achieve <b>10%</b> (47 kg/yr) reduction in total phosphorus loading; re-evaluate water quality and track progress.	Achieve <b>15%</b> (71 kg/yr) reduction in total phosphorus loading; re-evaluate water quality and track progress.
<p><b>Objective 2</b> Mitigate (prevent or offset) phosphorus loading from future development by 133 kg/yr to Lake Wentworth and 111 kg/yr to Crescent Lake to maintain average summer in-lake total phosphorus concentrations in the next ten years.</p>	<b>Wentworth</b>	Prevent or offset <b>33 kg/yr</b> in total phosphorus loading from future development.	Prevent or offset <b>66 kg/yr</b> in total phosphorus loading from future development; re-evaluate water quality and track progress.	Prevent or offset <b>133 kg/yr</b> in total phosphorus loading from future development; re-evaluate water quality and track progress.
	<b>Crescent</b>	Prevent or offset <b>28 kg/yr</b> in total phosphorus loading from future development.	Prevent or offset <b>55 kg/yr</b> in total phosphorus loading from future development; re-evaluate water quality and track progress.	Prevent or offset <b>111 kg/yr</b> in total phosphorus loading from future development; re-evaluate water quality and track progress.

# 3 POLLUTANT SOURCE IDENTIFICATION

This section describes sources of excess phosphorus to Lake Wentworth and Crescent Lake. Sources of phosphorus to lakes include stormwater runoff, shoreline erosion, construction activities, illicit connections such as sanitary pipes and sump pumps, failed or improperly functioning septic systems, leaky sewer lines, boat discharges, fabric softeners and detergents in greywater, fertilizers, and pet, livestock, and wildlife waste. These external sources of phosphorus to lakes can then circulate within them and settle on lake bottoms, contributing to internal phosphorus loads over time. Additional phosphorus sources can enter the lake from atmospheric deposition but are not addressed here because of limited local management options. Wildlife is mentioned as a potential source but largely for nuisance waterfowl such as geese or ducks that may be congregating in large groups because of human-related actions such as feeding or having easy shoreline access (i.e., lawns). More frequent and intense rainfall events with associated peaks in stormwater runoff is also not a direct source but can exacerbate the impact of the other phosphorus sources identified in this section and should be considered when striving to achieve the water quality objectives.

## 3.1 WATERSHED DEVELOPMENT

Nonpoint source pollution comes from many diffuse sources on the landscape and is more difficult to identify and control than point source pollution. Nonpoint source pollution can result from contaminants transported by overland runoff (e.g., runoff from suburban and rural areas and agricultural runoff), groundwater flow, or direct deposition of pollutants to receiving waters. Examples of nonpoint source pollution that can contribute nutrients to surface waters via runoff, groundwater, and direct deposition include erosion from disturbed ground or along roads, stormwater runoff from developed areas, malfunctioning septic systems, excessive fertilizer application, unmitigated agricultural activities, washing vehicles on driveways, pet waste, and wildlife waste.

### 3.1.1 Watershed Survey

#### **Overview**

A watershed survey was conducted in 2011 by FBE and more than 21 volunteers to identify areas contributing to polluted runoff to the lakes. A total of 108 problem sites were identified, primarily involving road and driveway runoff, ditch erosion, artificially created beaches, and buffer clearing. A ranking system was applied that identified the top 30 sites for remediation. Of those 30 sites, four were selected for development of conceptual design and cost estimates. The four sites included Wentworth State Park, South Main Street Drainage, Governor Wentworth Highway, and Camp Bernadette.

Since then, 24 sites have been completed with SCMs installed, 17 sites have SCM concepts designed, and 73 sites have not been addressed, for a total of 114 problem sites (Figure 32). In 2022, the 90 remaining problem sites were revisited and reranked, and in 2025, FBE estimated pollutant load reductions for all problem sites (refer to Appendix A: SCM Matrix; Figure 33). From the 24 completed sites, an estimated 16 kg/yr of phosphorus, 40 kg/yr of nitrogen, and 5 kg/yr of total suspended solids have been removed from the watershed. If the 17 SCM concepts designed are implemented, an estimated 42 kg/yr of phosphorus, 42 kg/yr of nitrogen, and 3 kg/yr of total suspended solids will be removed from the watershed. The remaining 73 sites have the potential to remove an estimated 66 kg/yr of phosphorus, 156 kg/yr of nitrogen, and 23 kg/yr of total suspended solids.

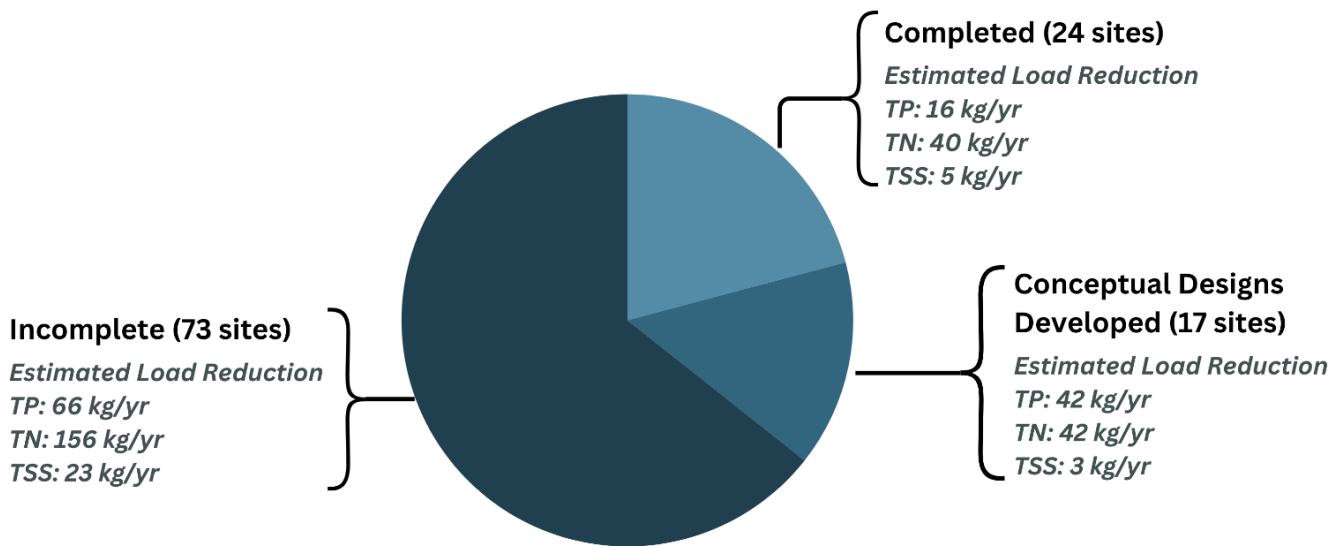
WWA secured Clean Water Act Section 319 Watershed Assistant Grant funding to support the remediation of several sites, including Autocare Plus, Mast Landing, and Gene’s Beach in Phase II; Camp Bernadette (pictured below) in Phase III; and Fern Avenue and Pierce Camp Birchmont (pictured below) in Phase IV.



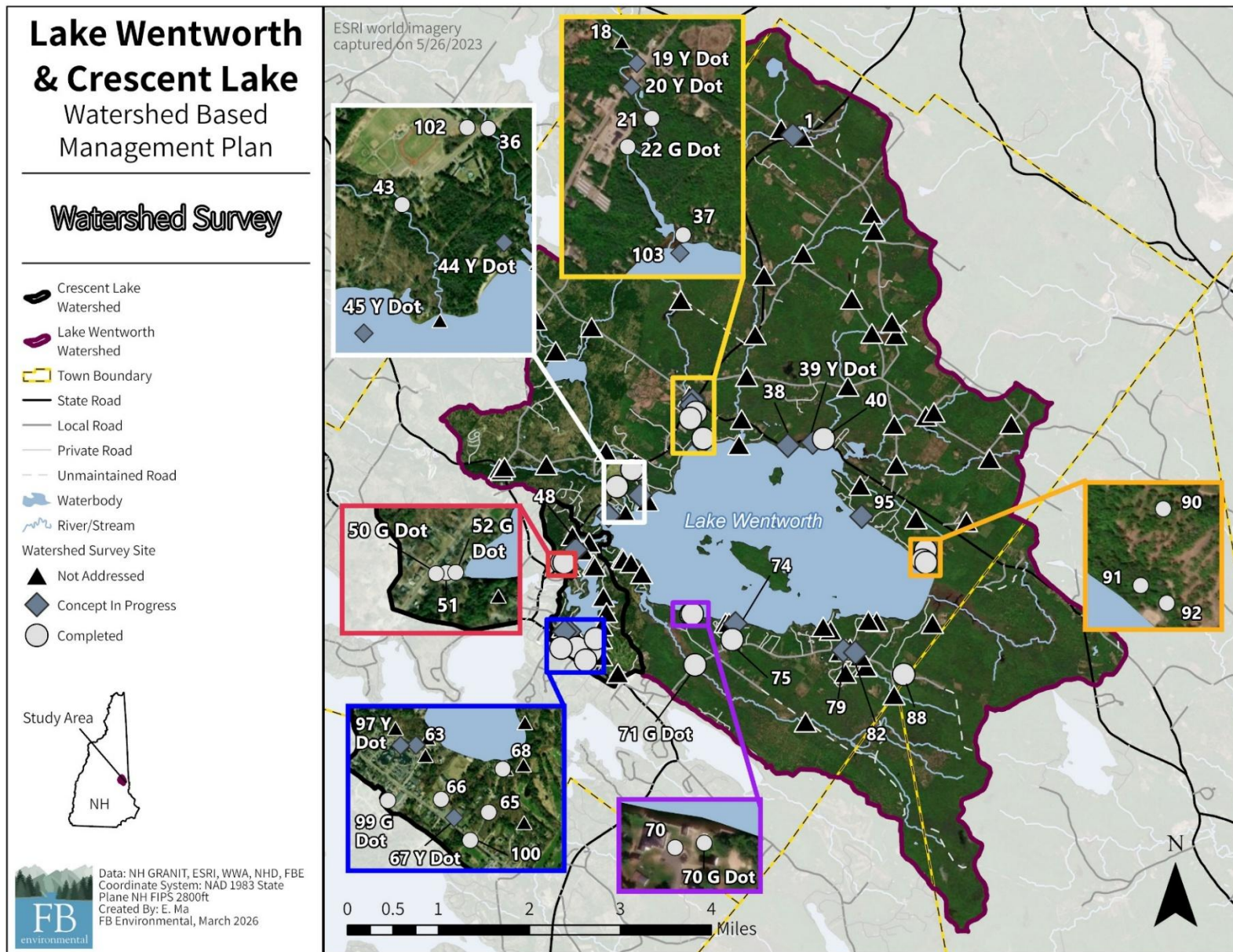
**Pierce Camp Birchmont Waterfront,  
Lake Wentworth**



**Camp Bernadette,  
Lake Wentworth**



**Figure 32.** Watershed survey sites status. TP = total phosphorus; TN = total nitrogen; TSS = total suspended solids. kg/yr = kilograms per year.



**Figure 33.** Location of identified nonpoint source pollution sites in the Lake Wentworth-Crescent Lake watershed. Only sites that have been completed or have an in-progress concept design are labeled.

During the 2025 community forum, residents identified shoreline properties, camp roads and driveways, new development, and tributaries as highest priority general sites of concern for stormwater runoff and erosion to the lake. Residents identified specific areas of concern, including Route 109, the golf course, the hospital, and others that may or may not overlap with the 115 documented watershed survey sites (refer to Section 1.4.2 for more details).



*Google aerial imagery of the Fernald Brook sediment delta in Lake Wentworth.*

The original WMP identified the formation of sediment deltas at major tributary outlets to Lake Wentworth as a concern, which continues today. Build-up of excess sediment at the mouths of major tributaries to Lake Wentworth, including Fernald Brook, has resulted in the formation of deltas that are visible in aerial photographs. The Fernald Brook delta extends 350-400 feet into the lake. From the mouth of the brook, it extends approximately 300 feet east and 200 feet west. Water depth 400 feet from the shore is estimated to have decreased from approximately four feet to two feet in the past 50-60 years. The deltas are considered a navigational hazard, since many recreationists water ski 300 feet offshore and often churn up sand from the delta. This is especially true later in the summer as the lake often drops almost a foot in elevation. In late

summer, residents can have difficulty powering their boats to and from their docks. Willey Brook has a similar sediment delta in the lake. Refer to sites 103-107 in Appendix A: SCM Matrix.

### **3.1.2 Shoreline Survey**

In 2025, FAA-certified volunteer drone pilots captured footage of the entire shorelines of Lake Wentworth and Crescent Lake. FBE technical staff used the drone footage to document the condition of the shoreline for each parcel using a rapid scoring method which assessed each parcel with lake frontage for vegetated buffer, bare soil, shoreline erosion, slope, and distance of structures from the lake. Scores were combined into a Shoreline Disturbance Score and a Shoreline Vulnerability Score, with higher values indicating poorer or more vulnerable shoreline conditions. Screenshots were taken at each parcel and were cataloged by tax map-lot number. A mid-summer survey every five years is recommended to monitor evolving conditions.

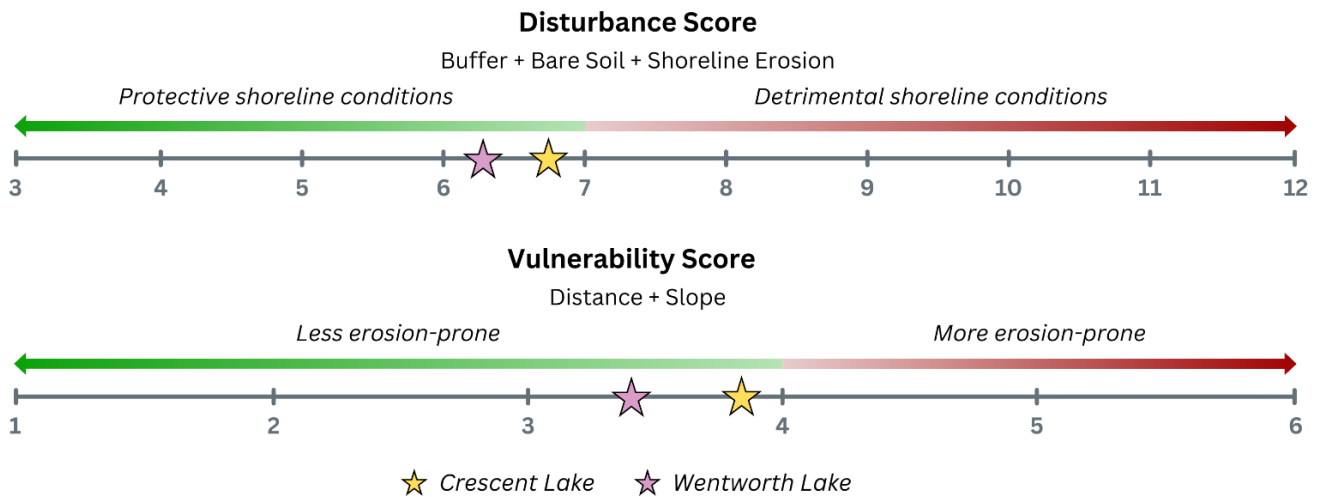
A total of 342 parcels were evaluated along the shoreline of Lake Wentworth in Wolfeboro, NH. The average Shoreline Disturbance Score for the lake is 6.3, with 45% of parcels (153) scoring 7 or higher, indicating potentially detrimental shoreline conditions such as inadequate buffers, exposed soil, and erosion. The average Shoreline Vulnerability Score was 3.4, with 64% of parcels (219) scoring 4 or higher, indicating most homes were built within 150 feet of the shoreline on moderate to steep slopes, which are more prone to erosion regardless of buffer quality (Table 15; Figure 34).

A total of 129 parcels were evaluated along the shoreline of Crescent Lake in Wolfeboro, NH. The average Shoreline Disturbance Score for the lake is 6.8, with 62% of parcels (80) scoring 7 or higher, indicating

potentially detrimental shoreline conditions such as inadequate buffers, exposed soil, and erosion. The average Shoreline Vulnerability Score was 3.8, with 69% of parcels (89) scoring 4 or higher, indicating most homes were built within 150 ft of the shoreline on moderate to steep slopes, which are more prone to erosion regardless of buffer quality (Table 15; Figure 34).

**Table 15.** Average scores for each evaluated condition criterion and the average Shoreline Disturbance Score and average Shoreline Vulnerability Score for Lake Wentworth and Crescent Lake. Lower values indicate shoreline conditions that are effective at reducing erosion and keeping excess nutrients out of the lake.

Lake	Evaluated Condition	Average Score
Wentworth	Buffer (1-5)	2.5
	Bare Soil (1-4)	2.2
	Shoreline Erosion (1-3)	1.5
	<b>Shoreline Disturbance Score (3-12)</b>	<b>6.3</b>
	Distance (0-3)	2.2
	Slope (1-3)	1.2
	<b>Shoreline Vulnerability Score (1-6)</b>	<b>3.4</b>
Crescent	Buffer (1-5)	2.7
	Bare Soil (1-4)	2.5
	Shoreline Erosion (1-3)	1.6
	<b>Shoreline Disturbance Score (3-12)</b>	<b>6.8</b>
	Distance (0-3)	1.9
	Slope (1-3)	1.8
	<b>Shoreline Vulnerability Score (1-6)</b>	<b>3.8</b>




**Figure 34.** Lake Wentworth and Crescent Lake shoreline survey disturbance and vulnerability scores. Averages are indicated by a purple star for Lake Wentworth and a yellow star for Crescent Lake.

Pollutant loading estimates are based on Shoreline Disturbance Scores. For Lake Wentworth, the 153 parcels with scores 7-11 contribute an estimated 59 kilograms of phosphorus annually. Implementing SCMs at 50% efficiency on these properties could reduce phosphorus by 29 kilograms per year. For Crescent Lake, the 80 parcels with scores 7-10 contribute an estimated 28 kilograms of phosphorus annually. Implementing SCMs at 50% efficiency on these properties could reduce phosphorus by 14 kilograms per year.

Some site characteristics, such as slope, naturally increase erosion risk, while others, such as the distance of structures from the lake, reflect historic development and are difficult to change. Shoreline buffers and exposed soil are more easily modified to improve shoreline resilience.

Overall, the lakes' shoreline conditions are good (average disturbance score of less than 7). However, 62% of parcels (80) and 45% of parcels (153) need runoff and erosion management along Crescent Lake and Lake Wentworth, respectively. Many homes are close to shore on moderate to steep slopes, increasing erosion potential. Scores should guide remediation priorities, with recommendations focusing on establishing or maintaining vegetated buffers to reduce erosion and phosphorus and sediment inputs to the lake.

### 3.1.3 Soil and Shoreline Erosion



Erosion can occur when the ground or shoreline is disturbed by digging, construction, plowing, foot or vehicle traffic, or wildlife. Rain and associated runoff are the primary pathways by which eroded soil reaches lakes and streams. Once in surface waters, nutrients are released from the soil particles into the water column, causing excess nutrient loading to surface waters. This is termed cultural eutrophication, where accelerated lake aging is caused by human activities and stressors in the watershed. Since development demand near lakes is high, construction activities in lake watersheds can be a large source of nutrients. Unpaved roads and trails used by motorized vehicles near lakes and streams are especially vulnerable to erosion. Stream bank erosion can also have a rapid and severe effect on lake water quality and can be triggered or worsened by upstream impervious surfaces like buildings, parking lots, and roads which send large amounts of high velocity runoff to surface waters. Maintaining natural vegetative buffers around lakes and streams and employing strict erosion and sedimentation controls for construction can minimize these effects.

#### 3.1.3.1 Surficial Geology

The soils and rocks in the area tell a story millions of years in the making. Between 300–400 million years ago, the northeastern U.S. was covered by a shallow sea, leaving sedimentary layers of shale, sandstone, and limestone (Goldthwait, Goldthwait, & Goldthwait, 1951). Over time, the Earth's crust folded under high heat and pressure to change the sedimentary rocks into metamorphic rocks (quartzite, schist, and gneiss parent material). This metamorphic parent material has since been modified by bursts of molten material intrusions to form igneous rock, including granite for which New Hampshire is famous (Goldthwait, Goldthwait, & Goldthwait, 1951). Erosion has further modified and shaped this parent material over the last 200 million years.

The current landscape formed 12,000 years ago at the end of the Great Ice Age, as the mile-thick glacier over half of North America melted and retreated, scouring bedrock and depositing glacial till to create the deeply scoured basin of the region's lakes. The retreating action also eroded mountains and left behind remnants of drumlins and eskers from ancient stream deposits. The glacier deposited a layer of glacial till more than three feet deep. Glacial till is composed of unsorted material, with particle sizes ranging from loose and sandy to compact silts and gravels. This material laid the foundation for vegetation and streams as the depression basins throughout the region began to fill with water (Goldthwait, Goldthwait, & Goldthwait, 1951).

According to the USGS Statewide Aquifer Transmissivity data layer provided through the NH Geographically Referenced Analysis and Information Transfer System, 3,206 acres (17%) of the Lake Wentworth watershed is mapped as having high-yielding aquifers. This area covers much of the northern shoreline of Lake Wentworth, the main stems of Willey Brook, Ryefield Brook, Harvey Brook, Warren Brook, Breezy Brook, Townsend Brook, and Heath Brook, and the area north of Sargent's Pond. There are no high-yielding aquifers beneath the land surface of the Crescent Lake watershed.

### 3.1.3.2 Soils and Erosion Hazard

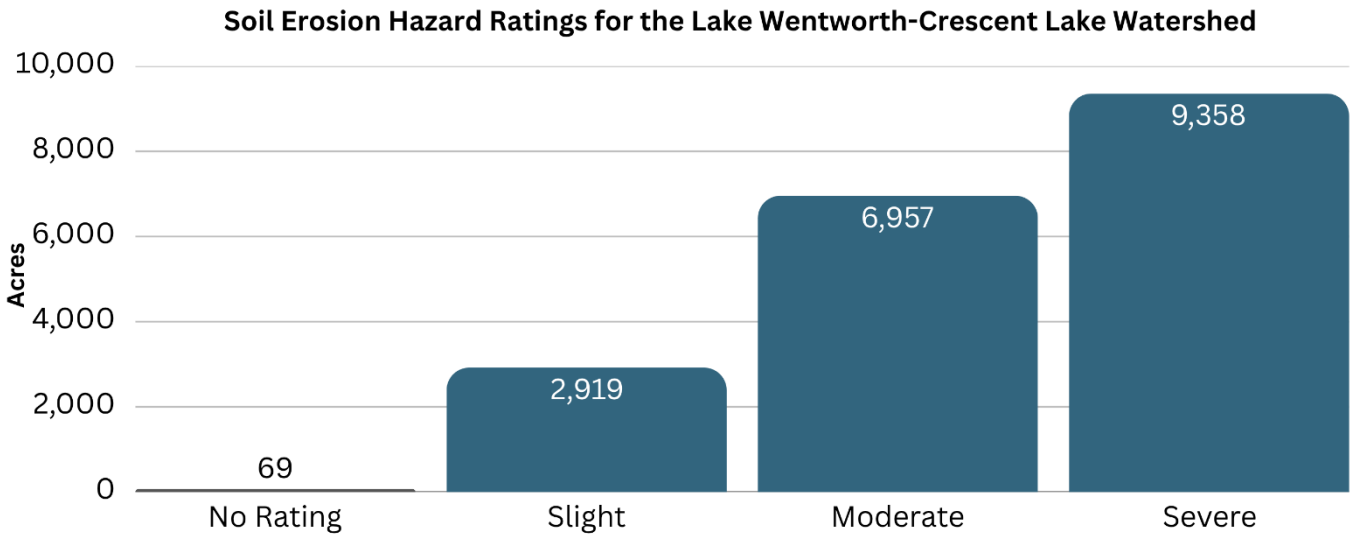
The Lake Wentworth-Crescent Lake watershed is composed of 35 different soil series (excluding soils beneath waterbodies), with the four most prevalent being the following:

- 1** Paxton fine sandy loam (12% of watershed area) – this is a well-drained soil formed from till that generates small amounts of runoff.
- 2** Henniker-Gloucester fine sandy loams (11%) – this is well-drained soil that formed over till and are very deep to bedrock. Soil permeability is moderate and depth to a semi-restrictive layer (till) is often shallow, leading to moderate runoff potential on steep slopes.
- 3** Metacomet fine sandy loam (10%) – this is moderately well-drained soil that formed over till with a shallow depth to a semi-restrictive layer (till) that can often lead to a perched water table.
- 4** Woodstock-Bice rock outcrop complex (10%) – this soil is deep and excessively well-drained, but has shallow bedrock (schist), which means runoff potential can be high during large storms (NRCS, 2024).

All other soil series each compose less than 9% of the watershed area. Shallow to bedrock soils are scattered throughout the watershed and mucky soils tend to be located in and around wetlands (Figure 36).

Soil erosion hazard is dependent on a combination of factors, including land slope, weather, soil texture, soil composition, permeability, and soil structure (O'Geen, Elkins, & Lewis, 2006). Soil erosion hazard should be a primary factor in determining the rate and placement of development within a watershed. Soils with negligible soil erosion hazard are primarily low-lying wetland areas near abutting streams. By contrast, steeper slopes tend to have a higher proclivity to erosion. Soil erosion hazard is identified by four ratings within United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) soils data: slight (erosion unlikely to occur under standard conditions), moderate (some erosion likely and erosion-control measures may be required), severe (erosion very likely and erosion-control measures and revegetation efforts are crucial), and very severe (significant erosion is likely and control measures may be costly). Erosion hazard throughout the watershed is 15% slight, 36% moderate,

and 48% severe. The remaining 1% is not rated, and there are no areas of very severe erosion hazard (Figure 35; Figure 37; Figure 38).



**Figure 35.** Soil erosion hazard ratings for the Lake Wentworth-Crescent Lake watershed based on Natural Resources Conservation Service soil maps.

Development should be restricted in areas with severe and very severe erosion hazards due to their inherent tendency to erode at a greater rate than what is considered tolerable soil loss. Since a highly erodible soil can have a greater negative impact on water quality, more effort and investment are required to maintain its stability and function within the landscape, particularly with SCMs that protect steep slopes from development and prevent stormwater runoff from reaching water resources.

### 3.1.3.3 Shoreline Erosion

Lake levels naturally fluctuate over both short and long timescales due to environmental changes, precipitation patterns, and human activity. Rapid or repeated changes in water level can physically erode shorelines, wash away vegetation, and release nutrients like phosphorus from inundated soils, which can fuel algal blooms and reduce water clarity (Leira & Cantonati, 2008; Zohary & Ostrovsky, 2011). These fluctuations also impact habitat availability for fish, amphibians, and other wildlife, alter nesting locations, and change the distribution of food sources.

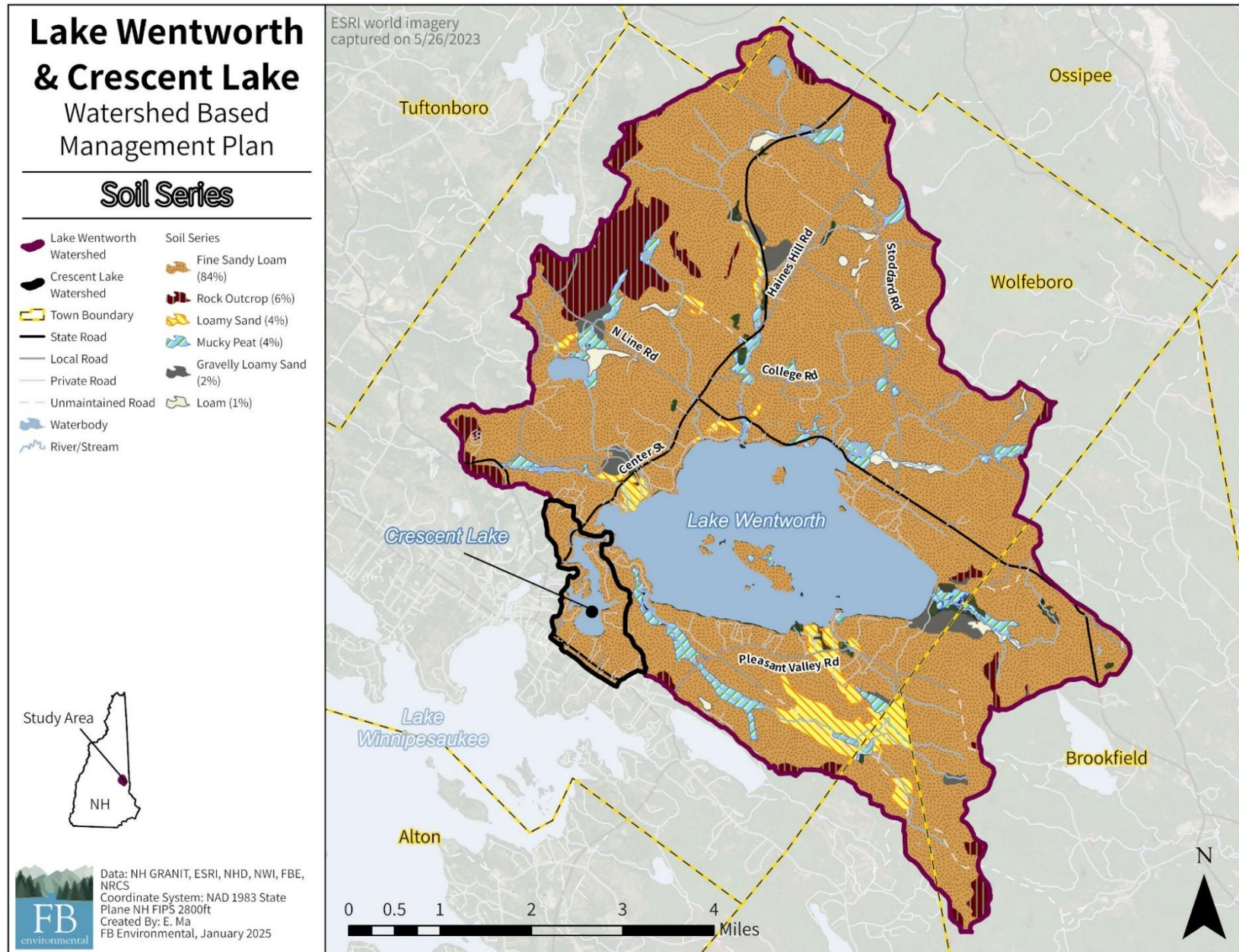
Lake Wentworth and Crescent Lake are particularly vulnerable to shoreline erosion because many homes are close to the water’s edge and sit on moderate to steep slopes. The impacts are compounded by human activity such as wake boating, shoreline modification, and storms or droughts that alter water levels rapidly. WWA tracks lake water level from gauge readings at the Crescent Lake dam, which was built in 1855 by the Lake Company and is regulated by a 4-foot-tall sluice gate. The dam was originally built to control water flow to Wolfeboro Falls mills and, eventually, Lake Winnepesaukee and the Merrimack River. The NHDES Dam Bureau sets the dam operation schedule, and the Town of Wolfeboro is responsible for carrying out the schedule. Generally, water level is maintained at 534.2 feet above sea level during the summer from June 15 to Labor Day and drawn down to 533.2 feet above sea level by Columbus Day and then to 532.2 feet above sea level by December 15. Water level is maintained at 532.2

feet above sea level through the winter until April 15, after which water level is gradually increased to the summertime level of 534.2 feet above sea level by June 15.

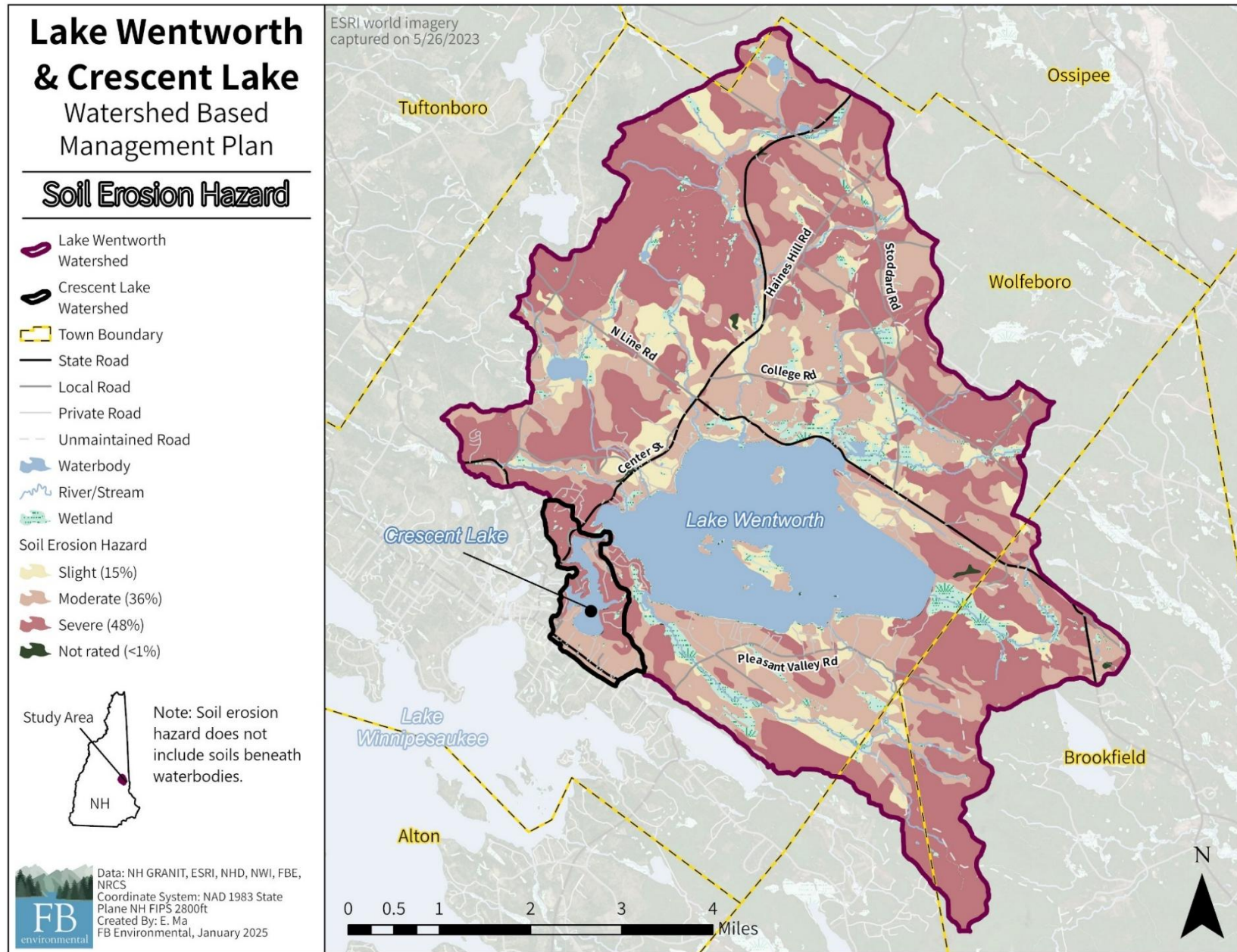
Frequent shoreline disturbance can create a cycle of erosion, where exposed soil leads to more sediment runoff during storms, which then further destabilizes the shoreline. Maintaining or restoring vegetated buffers is critical, as plants stabilize soil, absorb runoff, and trap sediment before it reaches the lake. Other management strategies include minimizing impervious surfaces near the shoreline, constructing stabilized access points for boats, and implementing green infrastructure measures such as swales or rain gardens to capture and slow runoff before it reaches the water. Together, these measures help protect water quality, preserve habitat, and maintain recreational opportunities on the lakes.



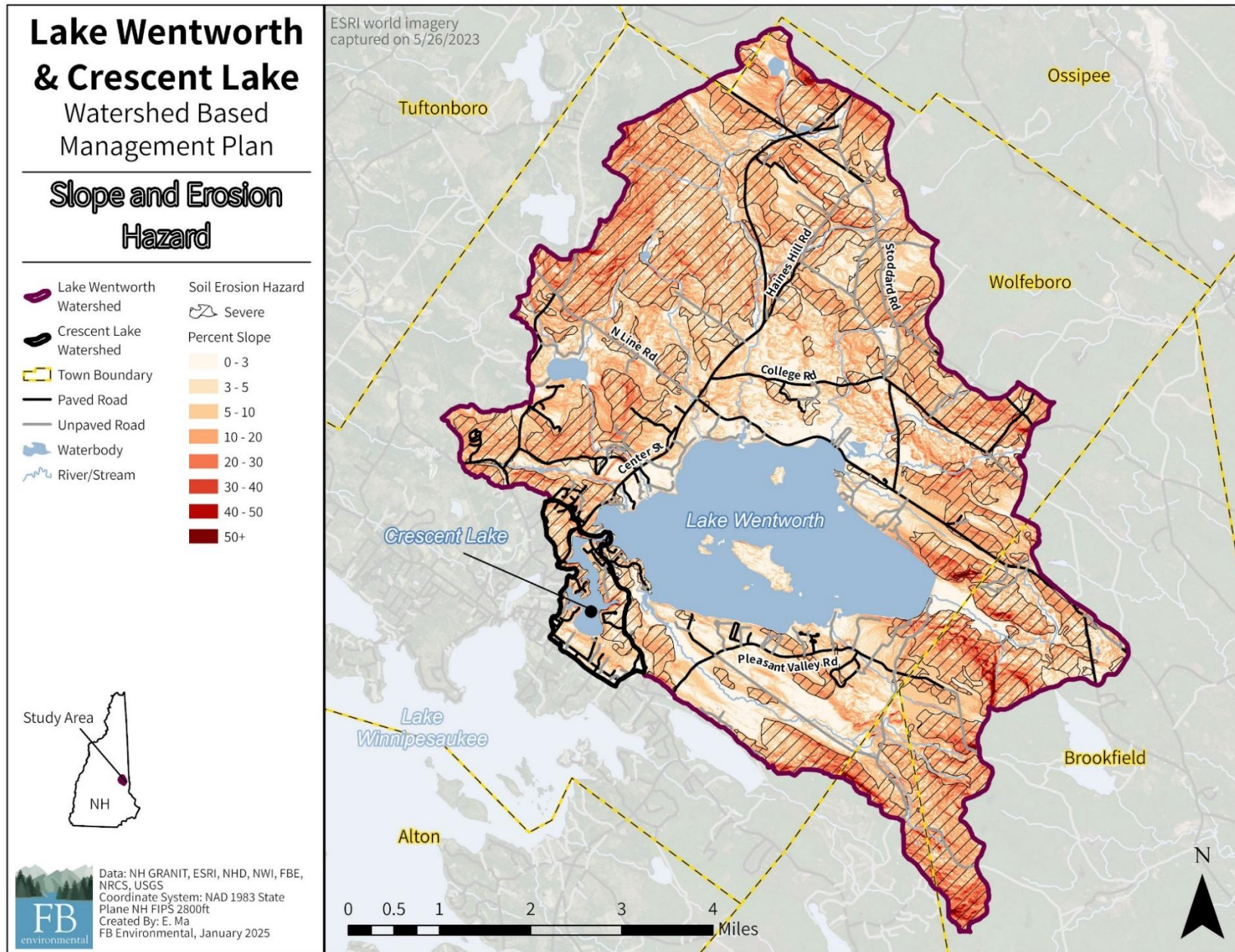
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**Figure 36.** Soil series as mapped by Natural Resources Conservation Service for the Lake Wentworth-Crescent Lake watershed.



**Figure 37.** Soil erosion hazard in the Lake Wentworth-Crescent Lake watershed.

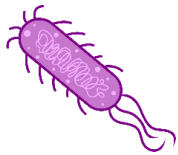


**Figure 38.** Terrain slope in the Lake Wentworth-Crescent Lake watershed.

### 3.1.4 Wastewater

#### 3.1.4.1 Septic Systems

All houses in the Lake Wentworth watershed treat wastewater with septic systems. Homes in the southern portion of the Crescent Lake watershed, including the southern shoreline are serviced by sewer. Other homes in the northern, eastern, and western shorelines use septic systems. Septic systems take wastewater from the house, filter out the solids in the septic tank, then discharge the effluent through the leachfield for natural filtration of pollutants such as pathogens, nitrogen, and phosphorus in the soil. When properly designed, installed, operated, and maintained, septic systems reduce pollutants to varying degrees of effectiveness.



**Pathogens** in wastewater include bacteria, viruses, protozoa, and parasites. Their presence is most often determined by measuring fecal indicator bacteria (*Enterococcus* or *E. coli*), though viruses and other types of bacteria can persist for longer in soil. Pathogens are treated in the leachfield primarily through adsorption to soil particles; poor pathogen treatment can occur in systems which are shallow to groundwater or coarse soils with preferential flow pathways such as macropores or fractured bedrock.



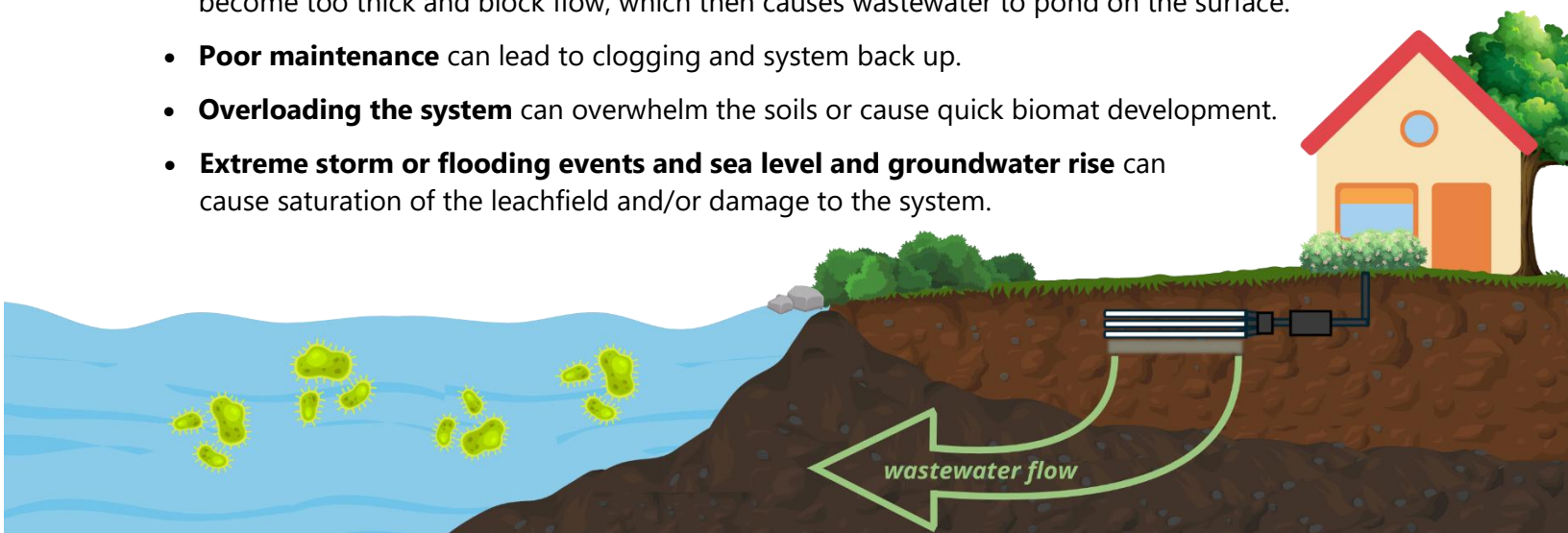
**Nitrogen** in wastewater can be removed into gaseous form through denitrification. Native soils beneath the leachfield are not effective at removing nitrogen (typically <40% removal), though additional denitrification can occur in groundwater, especially if anoxic conditions exist. Advanced septic systems technologies exist to remove nitrogen before wastewater enters the leachfield.



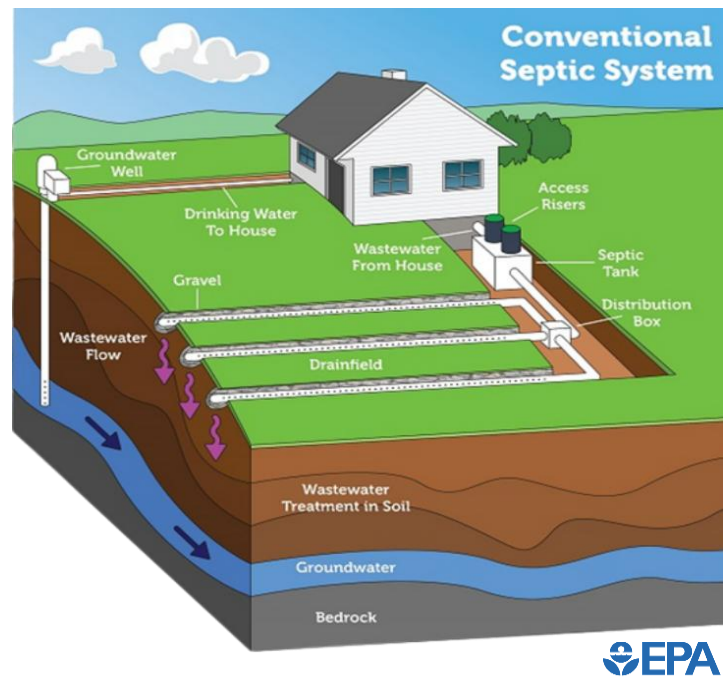
**Phosphorus** in wastewater can be almost entirely retained (>90% removal) in suitable soil conditions by adsorbing to soil particles or forming solid compounds with iron, aluminum, and calcium. Retention can be poor in systems shallow to groundwater or bedrock, soils with preferential flow pathways such as fractured bedrock, and high alkalinity soils low in iron and aluminum.

**Failing or malfunctioning septic systems can release pollutants directly into surface waters.** When a septic system fails, it may break out onto the leachfield surface (ponding), which can run off the property via a flow channel or during storms. Septic system failure can occur in several ways.

- **Old age** can cause the biomat, a layer of organic material that forms beneath the leach field, to become too thick and block flow, which then causes wastewater to pond on the surface.
- **Poor maintenance** can lead to clogging and system back up.
- **Overloading the system** can overwhelm the soils or cause quick biomat development.
- **Extreme storm or flooding events and sea level and groundwater rise** can cause saturation of the leachfield and/or damage to the system.



Regular septic tank pumping is essential for maintaining system functionality and protecting the surrounding environment. Components like distribution boxes and lateral lines should also be regularly inspected and maintained as needed. Over time, solid waste accumulates, increasing the risk of blockages, backups, and system failure. Sludge and scum buildup can hinder waste breakdown, leading to odors and potential contamination of soil and groundwater. Distribution boxes may clog or become unlevel, causing localized overloading of the leach field. Routine maintenance helps prevent costly repairs, extends system lifespan, and ensures effective wastewater management while safeguarding public health and the environment.



*Diagram of a septic system and the wastewater flow through the ground to reach surface waters.*

In 2024, [RSA 485 A:39](#) was updated to change the requirements for septic systems assessments during real estate transactions of waterfront properties. This change went into effect on September 1, 2024, and shifts the responsibility of septic inspection from the sellers to the buyers. If any part of the septic system lies within 250 feet of lakes, ponds greater than ten acres, coastal waters, or major rivers, the buyer must ensure a septic system inspection is complete prior to property transfer. The change was introduced in response to increasing cyanobacteria outbreaks in the state, with the goal of reducing phosphorus runoff from failing systems. If a septic system is deemed to be failing, it must be repaired or replaced within 180 days of the property transfer, with costs negotiated between the buyer and seller.

In Wolfeboro, septic systems must be inspected following installation, and, within 250 feet of shorelines, a site assessment must occur when a property is sold. Septic systems must have a 100-foot setback from prime wetlands and waterbodies, and these systems are regulated based on the soil type beneath the leachfield. For more information, see Section 4.2.2, Table 16. During development of the original plan in 2011, information on septic system practices was gathered from 625 properties within 250 feet of the shorelines of Lake Wentworth and Crescent Lake and major tributaries during a door-to-door survey campaign. The questionnaire included information about type of system, age of system, pumping frequency, property use (year-round or seasonal), number of occupants, distance to the waterbody, and types of water-using machines in use. Of the 552 properties with septic systems, 296 septic surveys were completed, resulting in a 54% survey success rate. Results indicated that there are a number of septic systems in the watershed that need attention and, unknowingly, may be contributing excess phosphorus to a nearby stream or lake (e.g., 21% were older than 25 years). FBE conducted an update of the 2011 septic system survey by using the NHDES Subsurface Applications Status Query to identify septic systems that had been replaced or newly constructed since the original watershed management plan was written. Since 2011, 110 septic systems have been replaced or newly constructed within the shoreland zone.

### 3.1.5 Fertilizers

When lawn and garden fertilizers are applied in excessive amounts, in the wrong season, or just before heavy precipitation, they can be transported by rain or snowmelt runoff to lakes and other surface waters where they can promote cultural eutrophication and impair the recreational and aquatic life uses of the waterbody. Many states and local communities are beginning to set restrictions on the use of fertilizers by prohibiting their use altogether or requiring soil tests to demonstrate a need for any phosphate application to lawns.

### 3.1.6 Pets

Fecal matter from pets can be a significant contributor of bacteria and nutrients to surface waters.



**Dogs** are estimated to produce 200 grams of feces per day each, which contain concentrated amounts of bacteria estimated at 4.6 billion fecal coliform bacteria (Van der Wel, 1995). Phosphorus comprises an estimated 3.2% of dog waste by weight.



**Cats** can also contaminate surface waters. A 2007 study detected cat-sourced *E. coli* in stormwater (Ram, et al., 2007). Phosphorus comprises an estimated 2.0% of cat waste by weight.

If pet feces are not properly disposed of (e.g., dog waste left outside or cat litter dumped outside), these bacteria and nutrients can be washed off the land and transported to surface waters by stormwater runoff. Pet feces can also enter surface waters by direct deposition of fecal matter from pets standing or swimming in surface waters.

### 3.1.7 Agriculture



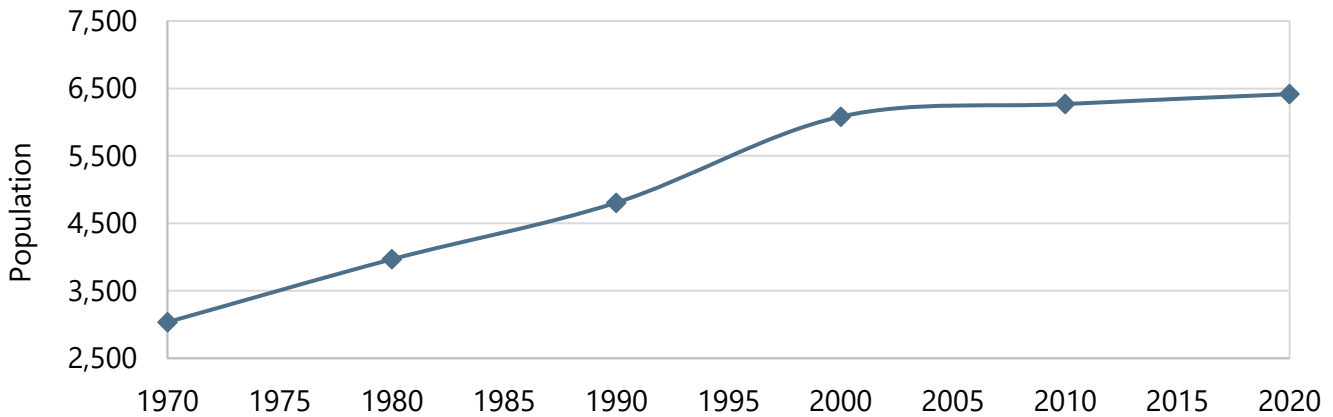
Stormwater runoff can pick up farm animal waste from sources such as manure and silage storage facilities and livestock grazing and barnyard areas and carry bacteria and nutrients to waterways. Farm activities like plowing, livestock grazing, vegetation clearing, and vehicle traffic can also result in soil erosion and associated nutrient pollution through direct or indirect contact with surface waters.

Excessive or ill-timed fertilizer application or poor storage increases the potential for these nutrients and bacteria to wash away with precipitation, reducing both water quality and crop benefits. The key to fertilizer application is to apply the right type and amount at the right time. When used appropriately, synthetic fertilizers or animal manure can fertilize crops, restore nutrients to the land, and minimize pollution. When improperly managed, pollutants can easily enter waterways. See Section 4.2.7 for management strategies.

Agriculture in the Lake Wentworth-Crescent Lake watershed primarily includes cropland, hayfields, and grazing areas. The LLRM results showed that agriculture covers 2% of the Lake Wentworth watershed and contributes 14% of the total phosphorus load to Lake Wentworth (Figure 21).

**3.1.8 Future Development**

Understanding population growth, and ultimately development patterns, provides critical insight into watershed management, particularly as it pertains to lake water quality. The population in Wolfeboro has increased by an estimated 3,380 residents from 1970 to 2020 (Figure 39). It is important to note that much of the population is seasonal and the turnover rate of seasonal and rental homes is high.



**Figure 39.** Population of Wolfeboro, NH. Data from the U.S. Census Bureau.

The Wolfeboro area has long been treasured as a recreational haven for both summer vacationers and year-round residents. The Winnepesaukee Region is among the oldest summer vacation spots in New Hampshire and offers fishing, hiking, boating, sailing, canoeing, kayaking, and swimming in the summer, and ice fishing, cross-country skiing, snowshoeing, and snowmobiling in the winter. The desirability of Wolfeboro and the greater Lake Winnepesaukee area as a recreational destination will likely stimulate continued population growth in the future. Growth figures and estimates suggest that towns should continue to consider the effects of current municipal land-use regulations, particularly impervious cover limits, on local water resources. As the region’s watersheds are developed, erosion from disturbed areas and runoff from impervious surfaces increases the potential for water quality decline.

**3.2 POTENTIAL CONTAMINATION SOURCES**

Point source pollution can be traced back to a specific source such as a discharge pipe from an industrial facility, municipal wastewater treatment plant, or a permitted stormwater outfall, making this type of pollution relatively easy to identify. Section 402 of the Clean Water Act requires all such discharges to be regulated under the National Pollutant Discharge Elimination System program to control the type and quantity of pollutants discharged. National Pollutant Discharge Elimination System is the national program for regulating point sources through issuance of permit limitations specifying monitoring, reporting, and other requirements under Sections 307, 318, 402, and 405 of the Clean Water Act.

NHDES operates and maintains the OneStop database and data mapper, which house data on potential contamination sources within the State of New Hampshire. Identifying the types and locations of potential contamination sources within the watershed may help identify sources of pollution and areas to target for restoration efforts.

Based on this database, potential point sources in the watershed include above and underground storage tanks, solid waste facilities, hazardous waste sites, local potential contamination sources, air facilities, and remediation sites (Figure 40).

### **3.2.1 Above and Underground Storage Tanks**

Above and underground storage tanks include permitted containers with oil and hazardous substances such as motor fuels, heating oils, lubricating oils, and other petroleum and petroleum-contaminated liquids. There is one aboveground storage tank within the Lake Wentworth watershed and none in the Crescent Lake watershed. The one tank is part of the Wolfeboro Water Treatment Plant. There are 11 underground storage tanks within the Lake Wentworth watershed and seven within the Crescent Lake watershed. In the Crescent Lake watershed, most are clustered near downtown Wolfeboro, associated with multiple schools and Huggins Hospital. In the Lake Wentworth watershed, tanks are scattered throughout the watershed and are mostly owned for commercial purposes such as gas stations. Ownership of these tanks includes commercial industries, gas stations, hospitals, schools, local government, and residential.

### **3.2.2 Solid Waste Facilities**

There are two solid waste facilities within the Lake Wentworth watershed, which are located across the street from one another. The Wolfeboro Transfer Station on Beech Pond Road is currently under operation for collection, storage, and transfer of waste. The former Wolfeboro Municipal Landfill is not operating but is unlined.

### **3.2.3 Hazardous Waste Sites**

Hazardous waste generating facilities are identified through the EPA's Resource Conservation and Recovery Act and require federal or state regulation. Only four of the ten hazardous waste generating facilities within the Lake Wentworth-Crescent Lake watershed are listed as active; the remaining facilities are classified as either inactive (four), declassified (one), or no data (one).

### **3.2.4 Local Potential Contamination Sources**

Local potential contamination sources are sites that may represent a hazard to drinking water quality supplies due to the use, handling, or storage of hazardous substances. There may be overlap between local potential contamination sources and other potential contamination sources identified in this section. Of the four local potential contamination sources within the Lake Wentworth-Crescent Lake watershed, all can be found along Route 28 (Center Street).

### **3.2.5 Air Facilities**

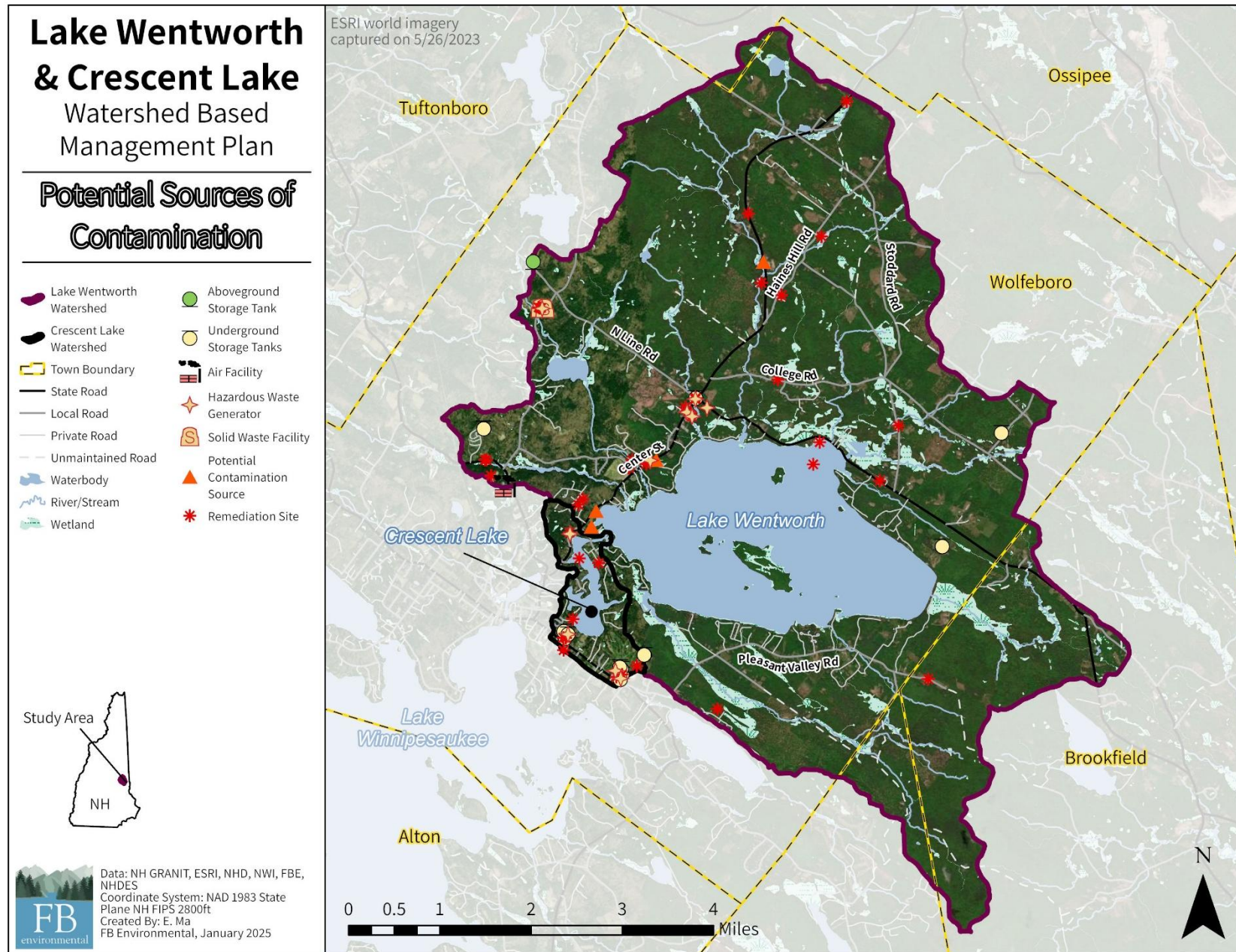
There is one air facility at the edge of the Lake Wentworth watershed. Air facilities can contribute to local air pollution, which can then settle on the land surface and enter the lakes through runoff or directly

influence the lake through atmospheric deposition. The air facility is located off Pine Hill Road and has a permit to operate.

### **3.2.6 Remediation Sites**

The 46 remediation sites present within the Lake Wentworth-Crescent Lake watershed include formerly leaking storage facilities that contain fuel or oil, sites with chlorinated solvents and other non-petroleum products, non-hazardous and non-sanitary holding tanks, initial spill response sites, historical dump sites, formerly leaking residential or commercial oil tanks for heating or motor oil tanks, underground injection control of wastewaters not requiring a groundwater discharge permit, unlined wastewater lagoons, or truck/snowmobile accidents that may have led to environmental pollution.





**Figure 40.** Potential contamination sources in the Lake Wentworth-Crescent Lake watershed.

### 3.3 WILDLIFE

Fecal matter from wildlife such as geese, gulls, ducks, and beaver may be a significant source of nutrients in some watersheds. This is particularly true when human activities, including the direct and indirect feeding of wildlife and habitat modification, result in the congregation of wildlife (CWP, 1999).



Geese, gulls, and ducks are of particular concern because they often deposit feces near or directly into surface waters. High-risk areas include large, mowed fields and parking lots adjacent to lakes and streams, as well as the undersides of bridges with pipes or joists that attract pigeons and other birds.

Studies show that geese inhabiting riparian areas increase soil nitrogen availability (Choi, et al., 2020). When submerged in water, the droppings from geese and gulls quickly release nitrogen and phosphorus into the water column, contributing to eutrophication in freshwater ecosystems (Mariash, Rautio, Mallory, & Smith, 2019).

Similarly, beaver impoundments can increase concentrations of nitrogen, ammonia, and dissolved organic carbon downstream compared to streams without beaver activity in New England (Bledzki, Bubier, Moulton, & Kyker-Snowman, 2010). The LLRM estimates that waterfowl are likely contributing 75.3 kg/yr or 7% of the total phosphorus load to Lake Wentworth and 3.4 kg/yr or 1% of the total phosphorus load to Crescent Lake.



### 3.4 EXTREME WEATHER

In the last century, New England has experienced significant changes in stream flow and air temperature. Out of 28 rural stream flow stations throughout New England, 25 showed increased flows over the period of record. The rise in streamflow is likely due to the increase in total annual precipitation in the region that is in part driven by an increase in the frequency of extreme precipitation. In 79 years of recorded flooding in the Oyster River in Durham, NH, three of the four highest floods occurred within ten years of the publication (Ballestero, Houle, Puls, & Barbu, 2017). Average annual air temperature in New England has risen by 1 to 2.3 degrees Celsius since 1895 with greater increases in winter air temperature (IPCC, 2013). Lake ice-out dates are occurring earlier as warmer winter air temperature melts the snowpack and lake ice. Earlier ice-out allows a longer growing season and increases the duration of anoxia in bottom waters. Increasing storm frequencies will flush more nutrients to surface waters for algae to feed on and flourish under warmer air temperatures. These trends will continue to impact both water quality and quantity. Future environmental condition models predict a 10-40% increase in stormwater runoff by 2050, particularly in winter and spring and an increase in both flood and drought periods as seasonal precipitation patterns shift. Adding to this stress is population growth and corresponding development in New Hampshire.



# 4 MANAGEMENT STRATEGIES

The following section details management strategies for achieving the water quality goal and objectives using a combination of structural and non-structural restoration techniques, as well as outreach and education and an adaptive management approach. A key component of these strategies is the idea that existing and future development can be remediated or conducted in a manner that sustains environmental values. All stakeholder groups have the capacity to be responsible watershed stewards, including citizens, businesses, the government, and others. Specific action items are provided in the Action Plan (Section 5).

## 4.1 STRUCTURAL NONPOINT SOURCE RESTORATION

Structural nonpoint source restoration techniques are engineered infrastructure designed to intercept stormwater runoff, often allowing it to soak into the ground, be taken up by plants, harvested for reuse, or released slowly over time to minimize flooding and downstream erosion. These SCMs often incorporate some mechanism for pollutant removal, such as sediment settling basins, oil separators, filtration, or microbial breakdown. They can also consist of removing or disconnecting impervious surfaces, which in turn reduces the volume of polluted runoff generated, minimizing adverse impacts to receiving waters.

### 4.1.1 Watershed and Shoreline Stormwater Control Measures

A total of 90 sites remain to be addressed from the 2012 and 2022 watershed surveys, and 18 (Crescent Lake) and 46 (Lake Wentworth) high/medium impact rated shoreline properties from the 2025 shoreline survey were documented to have some impact on water quality through the delivery of phosphorus-laden sediment (refer to Section 3.1.1-3.1.2). As such, structural SCMs to reduce the external watershed phosphorus load are a necessary and important component for the protection of water quality in the watershed.

The following series of SCM implementation action items are recommended for achieving Objective 1:

- Implement SCMs for the 17 sites for which SCM concepts are designed, as identified during the 2012 and 2022 watershed surveys. These SCM sites have the potential to reduce total phosphorus load to the lakes by 30 kg/yr (Lake Wentworth) and 12 kg/yr (Crescent Lake).
- Provide technical assistance and/or implementation cost sharing to two high impact shoreline properties identified during the 2025 shoreline survey on Lake Wentworth. Encourage landowners

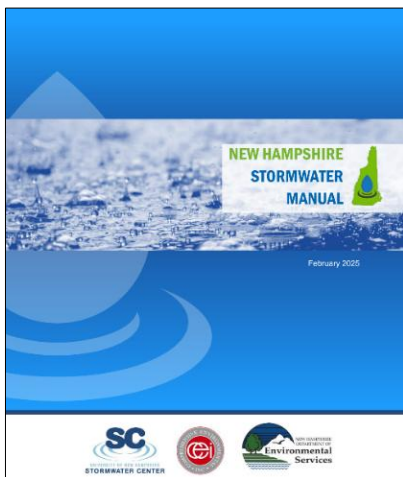
to implement SCMs on the 18 (Crescent Lake) and 44 (Lake Wentworth) medium impact shoreline properties identified during the 2025 shoreline survey. Workshops and tours of demonstration sites can help encourage landowners to utilize SCMs on their own property. Conduct regular shoreline surveys to continue prioritizing properties for technical follow-up.

For the proper installation of structural SCMs in the watershed, WWA and other stakeholders should work with experienced professionals on sites that require a high level of technical knowledge (engineering). Whenever possible, pollutant load reductions should be estimated for each SCM installed. More specific and additional recommendations are included in Section 5. For helpful tips on implementing SCMs, see Additional Resources.

## 4.2 NON-STRUCTURAL NONPOINT SOURCE RESTORATION

Non-structural nonpoint source restoration techniques refer to a broad range of behavioral practices, activities, and operational measures that contribute to pollutant prevention and reduction. The following section highlights important restoration techniques for several key areas, including pollutant reduction best practices, zoning and ordinance updates, land conservation, septic system regulation, sanitary sewer system inspections, fertilizer use prohibition, agricultural practices, pet waste management, and nuisance wildlife controls.

### 4.2.1 Pollutant Reduction Best Practices



Pollutant reduction best practices include recommendations and strategies for improving road management and municipal operations for the protection of water quality. Following standard best practices for road maintenance and drainage management protects both infrastructure and water quality through the reduction of sediment and other pollutant transport. Refer to the [New Hampshire Stormwater Manual](#) (UNH Stormwater Center, Comprehensive Environmental Inc., & NH Department of Environmental Services, 2025) for standard road design and maintenance best practices.

Even though none of the watershed towns are required to comply with the six minimum control measures under the New Hampshire Small Municipal Separate Storm Sewer Systems (MS4) General Permit, each town could consider instituting the permit's key measures, such as street sweeping, catch basin cleaning, and road/ditch maintenance, if not already in place. Research and recommendations on street sweeping to reduce water pollution have been recently developed for New Hampshire (PREP & UNHSC, 2022). The MS4 permit also covers illicit discharge detection and elimination plans (and ordinance inclusion), source control and pollution/spill prevention protocols, and education/outreach and training for residents, municipal staff, and stormwater operators, all of which are aimed at minimizing polluted runoff to surface waters.



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#### **4.2.2 Zoning and Ordinance Updates**

Regulations through municipal zoning and ordinances such as low impact development strategies that prevent polluted runoff associated with new and re-development projects in the watershed are equally important as implementing structural SCMs on existing development. In fact, local land use planning and zoning ordinances can be the most critical components of watershed protection. FBE completed a preliminary ordinance review of natural resource protections for the municipalities of Wolfeboro and Brookfield (Table 16). These municipalities were prioritized because they comprise the majority of the Lake Wentworth-Crescent Lake watershed and therefore play a critical role in influencing land use, shoreline development, and water quality conditions within the lakes. These municipalities have incorporated several important regulations into their local ordinances, including wetlands protections, floodplain regulations, setback requirements, and SCMs, though the level of detail, consistency, and enforcement mechanisms vary between the communities. A more robust review of these ordinances is encouraged to develop more specific recommendations for improving regulations related to natural resource protection. In addition, the municipalities should also consider the staffing capacity and administrative support necessary to effectively enforce both existing and proposed regulations.

Since the original plan, the Town of Wolfeboro has created or revised several ordinances, including stormwater regulations adopted in 2014 and revised in 2022, conservation subdivision regulations updated in 2024, shorefront zoning regulations revised in 2024, and septic system ordinance in progress.

**Table 16.** Ordinance review of regulatory and non-regulatory tools for natural resource protection in Wolfeboro and Brookfield, which comprise the majority of the Lake Wentworth-Crescent Lake watershed and the entire lake shorelines.

Strategy	Wolfeboro	Brookfield
Shoreland zoning.	"Shorefront Residential District" [Chapter 175 Article IX, effective 2010] regulates building dimensions and setbacks within the 250-foot protected shoreland. There is a minimum setback from the shore of 50 feet. It addresses impervious surfaces, stormwater management, and natural woodland buffers within 250 feet of waterbodies in order to "maintain the integrity and exceptional quality of the waters."	No shoreland zoning. Article II establishes a minimum setback of 75 feet from any pond, lake, stream, marsh, or seasonally wet area; setback may be larger for different zoning districts.
Cluster development and/or open space provisions for subdivisions.	"Conservation Subdivision" [Chapter 175 Article XXIV, effective 2001] encourages environmentally sound development of land and preservation of open space. Seeks to conserve both forested land and agricultural land. Requires buffer areas where 50% of land area shall be permanently dedicated as limited use open space. A minimum of 50% of the total area (excluding roads or easements) is required to be open space.	Subdivision Regulations Article XI requires at least 5% open space for all subdivisions where four or more lots are created in a five-year period and 50% of those lots are less than five acres.
Septic pump-out ordinance or regulation of septic and sewer systems.	Septic systems must be inspected after installation [Chapter 126]. Within 250 feet of shorelines, site assessment must occur when a property is sold [Chapter 175 Article IX]. Septic systems must have a 100-foot setback from prime wetlands [Chapter 175 Article II, effective 2001]. Septic system setbacks from waterbodies are regulated based on the soil type beneath the leachfield [Chapter 175 Article VI, Section 175-50]. Where soil types downgradient of leachfield is sand and gravel with fast percolation rate, there must be a setback of 125 feet. Where a restrictive layer is within 18 inches of the soil surface, the required setback is 100 feet. For all other soil characteristics, the minimum setback is 75 feet.	None identified.

Strategy	Wolfeboro	Brookfield
<p>Zoning districts address environmental protection.</p>	<p>"Wetlands Conservation Overlay District," "Shorefront Residential District," "Groundwater Protection Overlay District," "Steep Slope Protection Conservation District," "Municipal Watershed District," "Conservation Subdivision" [Chapter 175].</p>	<p>None identified. But there is a "Floodplain Development and Management Ordinance". "The regulations in this ordinance shall overlay and supplement the regulations in the Town of Brookfield Zoning Ordinance and shall be considered part of the zoning ordinance for purposes of administration and appeals under state law. If any provision of this ordinance differs from or appears to conflict with any provision of the zoning ordinance or other ordinance or regulation, the provision imposing the greater restriction or more stringent standard shall be controlling."</p>
<p>Zoning overlay districts that address wetland conservation.</p>	<p>"Wetlands Conservation Overlay District" [Chapter 175 Article II] applicable to all wetlands, with increased diligence around "prime wetlands," which are identified in the ordinance. Requires a 100-foot buffer around prime wetland and a 25-foot buffer around other wetlands or poorly drained soils. Permitted uses include natural resource management, passive recreation, and scientific research. Single family homes and other types of dwellings are only allowed through special use permits. Conditional uses are only allowed if the use is consistent with SCMs.</p>	<p>No wetland overlay district or ordinance. Article II establishes 75-foot minimum setback from all marshes and seasonally wet areas; setback may be larger for different zoning districts. Wetlands are excluded from buildable area.</p>

Strategy	Wolfeboro	Brookfield
Zoning overlay districts that protect groundwater.	"Groundwater Protection Overlay District" [Chapter 175 Article IV, effective 2008] establishes a groundwater protection overlay district with the goal of preventing the contamination of groundwater and protecting surface waters that are fed by the groundwater. It requires a stormwater management plan if impervious cover exceeds 15% of any lot and regulates land use to ensure proper groundwater recharge. Provides standards for animal manure, fertilizer, waste disposal, and other contaminants.	No groundwater protection ordinance. RA-1 and REC-1 zoning districts are designed to protect the aquifer [Appendix C].
Protection of steep slopes.	"Steep Slope Protection" [Chapter 175 Article IVB, effective 2012] applies to areas where the proposed site disturbance of slopes 15% or greater is greater than 20,000 square feet. Requires an engineering plan that shows how soil erosion, soil loss, and stormwater runoff will be controlled during and after construction. Also requires hydrology, drainage, and flooding analysis. Encourages preserving natural features such as vegetation.	No steep slope overlay. Article II excludes slopes of over 25% from buildable area and requires differing amounts of buildable area depending upon the slope.
Nutrient loading analysis required for fresh waterbodies.	None identified.	None identified.
Low impact development requirements and standards.	Site Plan Review stormwater regulations [Chapter 173 Article IX, Section 173-21, effective 2022] apply to any new or redevelopment project that disturbs more than 10,000 square feet, or when a new road is created. Low impact development "must be used to the maximum extent practicable to reduce stormwater runoff volumes, protect water quality, and maintain predevelopment site hydrology". Requires on-site treatment of stormwater, plantings of native vegetation, the use of SCMs to treat suspended solids, nitrogen, and phosphorus in stormwater. Requires that measures are taken to ensure that post-development peak runoff does not exceed predevelopment runoff via drainage analysis. Other erosion and sediment control measures are required.	None identified.

Strategy	Wolfeboro	Brookfield
Fertilizer and/or pesticide ordinances.	None identified. Fertilizer storage is regulated in the Zoning Ordinance [Chapter 175], and fertilizer is prohibited in the Wetlands Conservation Overlay District [Chapter 175 Article II].	None identified.
Implement and enforce a Stormwater Management Plan.	Site Plan review stormwater regulations [Chapter 173 Article IX, Section 173-21D] require a stormwater management plan with all applications where the proposed disturbance is greater than 10,000 square feet. Requires SCMs, infiltration practices, and other measures of managing stormwater. Applies only to commercial development and residential subdivisions.	Subdivision Regulations Article VII.A requires a Storm Water Drainage and Erosion and Sediment Control Plan for all developments where the disturbed area is greater than 20,000 square feet, it involves the construction of a road is a major subdivision, or disturbs steep slopes, wetlands, or floodplains.
Development transfer overlay district.	None identified.	None identified.
Conservation impact fees.	No conservation impact fee. "Impact Fees" [Chapter 175 Article XXVIA] allows the town to assess impact fees for new development due to the increased demand on the school district. The Master Plan [2022] discusses possible impact fees for water and sewer service.	None identified.
Wetland mitigation funds.	None identified.	None identified.
Fee in lieu of land dedication.	None identified.	None identified.
Stormwater utility district.	None identified.	None identified.
Open space or non-lapsing conservation fund.	None identified.	None identified.
Has a Land Use Change Tax per RSA 79-A:25.	Master Plan (2019) discusses encouraging landowners to keep large tracts of land unfragmented through the state's "Current Use" program.	None identified. Current Use forms are accessible on town website.

Strategy	Wolfeboro	Brookfield
Participate or collaborate with a local watershed association.	Lake Winnepesaukee Alliance, Wolfeboro Waters, Wentworth Watershed Association, Lakes Region Planning Commission, possibly Mirror Lake Protective Association.	None identified.
Participate or collaborate with a local land trust.	Lakes Region Conservation Trust, Moose Mountains Regional Greenways.	Moose Mountain Regional Greenways, Society for the Protection of New Hampshire Forests.
Open space plan.	No open space plan identified. Within Chapter 6 (Land Use) of the 2019 Master Plan, there are Open Space Protection recommendations.	None identified.
Master plan addresses natural resources and environmental protection.	Yes [2019]. Chapter 7 (Natural Resources) discusses salt use on roads, SCMs for agricultural and timber harvests, protecting the watershed to the drinking water supply through land conservation, and protecting the aquifer. Chapter 6 (Land Use) also involves many recommendations centered on water resources, watershed protection, septic systems, and stormwater management.	Yes [2006, new master plan in development]. Natural Resources/Conservation and Preservation [Section 2.02] discusses protecting wetlands, bedrock aquifer, water resources. Land Use [Section 2.05] mentions water quality protection and supports the preservation of forests, trail networks, and native wildlife.
Conduct a town-wide natural resources inventory.	Yes, completed in 2011. The Wolfeboro Conservation Commission is currently nearing acceptance of an updated natural resources inventory.	Yes, completed in 2008.
Incentive-based programs for voluntary low impact development implementation.	None identified.	None identified.
Incentive-based programs for stormwater reduction efforts.	None identified.	None identified.

Strategy	Wolfeboro	Brookfield
Have established conservation commission.	Yes.	Yes.
Incentivize and/or encourage property owners to implement low impact development stormwater practices.	None identified.	None identified.
Encourage property owners to put land into farmland/tree growth programs.	None identified.	None identified.



Local land use planning and zoning ordinances should consider incorporating resiliency strategies for protecting water quality and improving infrastructure based on temperature, precipitation, water levels, wind loads, storm surges, soil moisture, and groundwater levels (Ballestero, Houle, Puls, & Barbu, 2017). There are nine strategies which can aid in minimizing the adverse effects associated with environmental stressors, including the following (McCormick & Dorworth, 2019), several of which are partially addressed within the current ordinances of the watershed municipalities but could be further strengthened and expanded. More details on ordinance recommendations and suggestions can be found in Table 16.

☛ ***Installing Green Infrastructure and Nature-Based Solutions***

Planning for greener infrastructure requires creating a network of interconnected natural areas and open spaces for groundwater recharge, pollution mitigation, reduced runoff and erosion, and improved air quality. Examples of green infrastructure and nature-based solutions include forest, wetlands, natural areas, riparian (banks of a water course) buffers, and floodplains; all of which already exist to various extents in the watershed and have minimized the damage created by intense storms. Other examples of engineered green infrastructure that apply concepts from nature to treat stormwater include Regenerative Stormwater Conveyance, bioswales, and infiltration tree trenches. As future development occurs, these natural barriers must be maintained or even increased to reduce runoff of pollutants into freshwater. See also Section 4.2.3: Land Conservation.

☛ ***Using Low Impact Development Strategies***

Replacing traditional approaches to stormwater management such as curbs, pipes, storm drains, gutters, and retention ponds with innovative approaches such as bioretention, vegetated swales, and permeable paving.

☛ ***Minimizing Impervious Surfaces***

Impervious surfaces such as roads, buildings, and parking lots should be minimized by creating new ordinances and building construction design requirements which reduce the imperviousness of new development. Property owners can increase the permeability of their lots by incorporating permeable driveways and walkways. In some cases, reducing mandatory minimum parking spaces for development may help achieve this goal.

☛ ***Encouraging Riparian Buffers and Maintaining Floodplains***

Municipal ordinances should forbid construction in floodplains, and in some instances, floodplains should be expanded to increase land area to accommodate larger rainfall events. Riparian buffers and filter strips along waterways should be preserved or created to slow runoff and filter pollutants.

☛ ***Protecting and Re-establishing Wetlands***

Wetlands are vital for preservation because wetlands hold water, reduce flooding, recharge groundwater, and mitigate water pollution.

☛ ***Encouraging Tree Planting***

Trees help manage stormwater by reducing runoff and mitigating erosion when adjacent to surface waters. Trees also provide critical shading and cooling to streams, lake shorelines, and land surfaces.

☛ **Promoting Sustainable Landscaping Using Native Vegetation**

Landowners should promote the use of native vegetation in landscaping, and landscapers should become familiar with techniques which minimize runoff and the discharge of nutrients into waterbodies (Chase-Rowell, Davis, Hartnett, & Wyzga, 2012).

☛ **Slowing Down the Flow of Stormwater**

To slow and infiltrate stormwater runoff, roadside ditches can be armored or vegetated and equipped with turnouts, settling basins, check dams, or infiltration catch basins. Rain gardens can retain stormwater, while water bars can divert water into vegetated areas for infiltration. Water running off roofs can be channeled into infiltration fields and drainage trenches.

☛ **Coordinating Infrastructure, Housing, and Transportation Planning**

Coordinate planning for infrastructure, housing, and transportation to minimize impacts on natural resources. Critical resources, including groundwater, must be conserved and remain free of pollutants especially as future droughts may deplete groundwater supplies.

### 4.2.3 Land Conservation

Land conservation is essential to the health of a region, particularly for the protection of water resources, enhancement of recreation opportunities, vitality of local economies, and preservation of wildlife habitat. Land conservation is one of many tools for protecting water quality for current and future generations. For the Lake Wentworth-Crescent Lake watershed, 13% (2,556 acres) of the watershed's area (not including Lake Wentworth and Crescent Lake) has been classified as conservation land (Figure 41). Major conserved areas include the Copple Crown Conservation Area, Warren Brook Conservation Easement, Edna C. Cann Revocable Trust, and the Moody Mountain Forest. Many of the conservation areas border parts of waterbodies or riverways in the watershed.

WWA owns or holds conservation easements on 485 acres of land in the watershed, up from 175 acres since the original plan. The Lakes Region Conservation Trust protects another 37 acres, and the Forest Society protects another 300 acres. WWA maintains an extensive volunteer stewardship team that monitors many properties throughout the watershed. They maintain trails and engage with youth programs and schools. WWA is in the process of developing a strategic plan, including prioritizing parcels based on conservation value.

As land conservation is essential to the future of this region, local groups should continue to pursue opportunities for land conservation in the Lake Wentworth-Crescent Lake watershed based on the highest valued habitat identified by the New Hampshire Fish and Game Department. The NH Fish and Game Department ranks habitat based on value to the State, biological region (areas with similar climate, geology, and other factors that influence biology), and supporting landscape. These habitat rankings are published in the State's 2025 Wildlife Action Plan, which serves as a blueprint for prioritizing conservation actions to protect Species of Greatest Conservation Need in New Hampshire (NHFG, 2025). The Lake Wentworth-Crescent Lake watershed is located in the Sebago-Ossipee Hills and Plains ecological region (NHFG, 2025). Approximately 7,716 acres (35%) of the Lake Wentworth-Crescent Lake watershed are considered Highest Ranked Habitat in New Hampshire, and 2,183 acres (10%) is classified as the highest ranked habitat in the biological region (Figure 42).

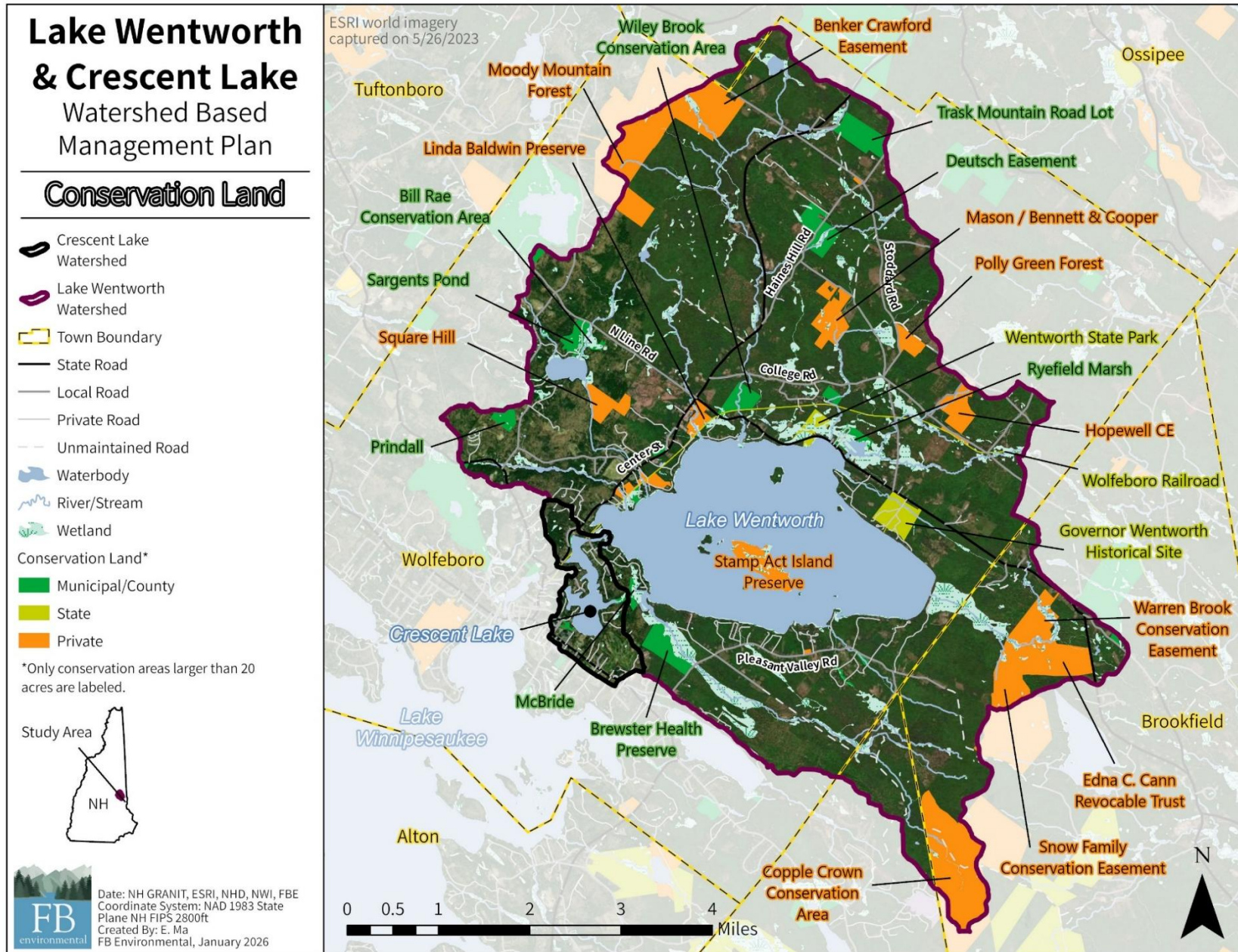
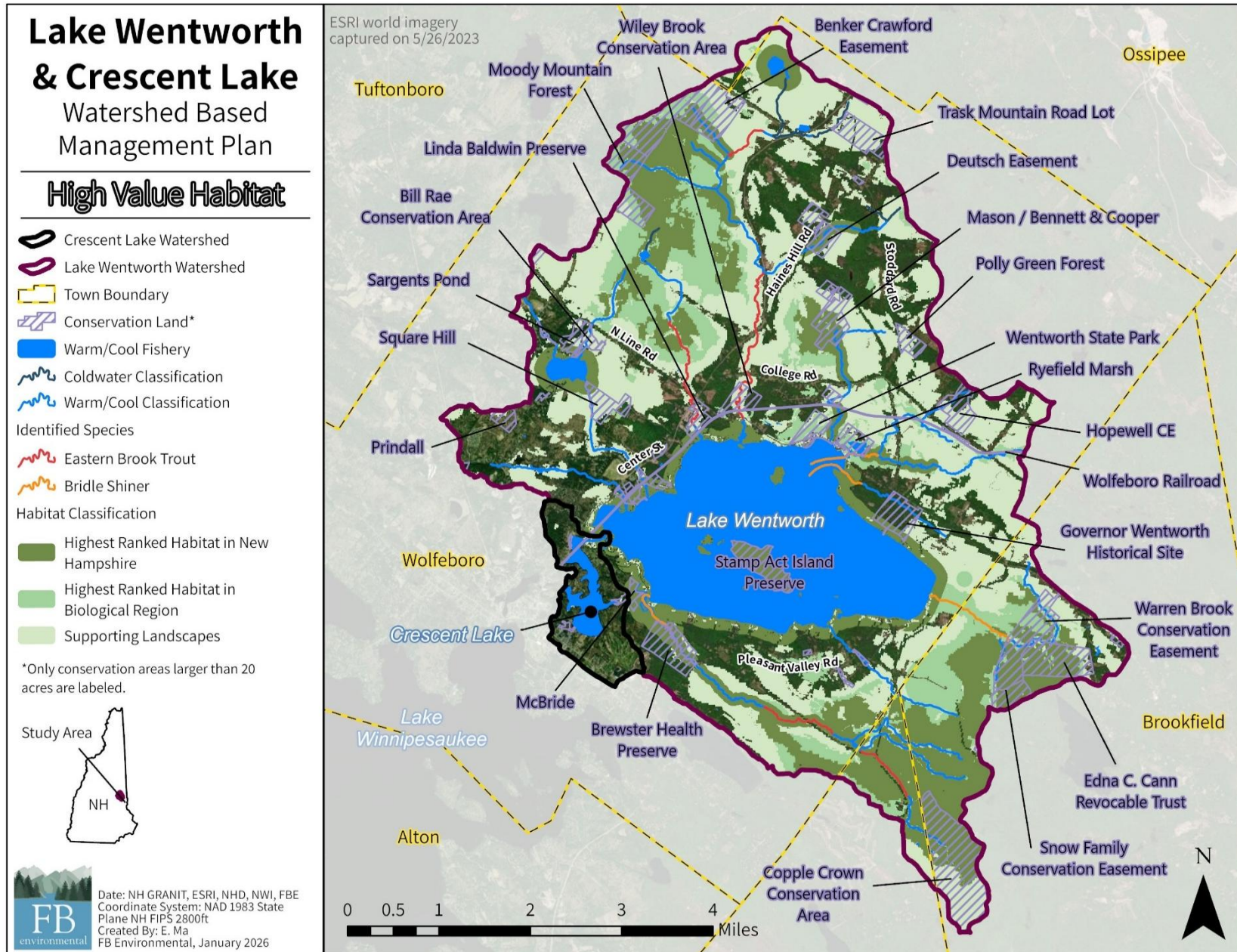


Figure 41. Conserved land by owner type in the Lake Wentworth-Crescent Lake watershed.



**Figure 42.** High value habitat in the Lake Wentworth-Crescent Lake watershed according to the 2025 NH Wildlife Action Plan.

#### 4.2.4 Septic System Regulation

When properly designed, installed, operated, and maintained, septic systems can treat residential wastewater and reduce the impact of excess pollutants in ground and surface waters. It is important to note, however, that traditional septic systems are designed for pathogen removal from wastewater and not specifically for other pollutants such as nutrients. The phosphorus in wastewater is “removed” only by binding with soil particles or being recycled through plant growth but is not removed entirely from the watershed system. Achieving nutrient removal may require advanced or alternative septic systems, which are more expensive than conventional systems. These systems can reduce nitrogen and phosphorus inputs to surface waters significantly, but cost considerations should be factored into any overlay district requirements or incentive programs. Proper design, installation, operation, maintenance, and replacement considerations include the following:

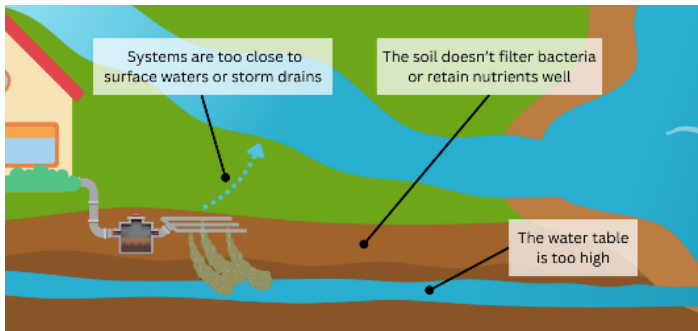
- A. Proper **design** includes adequate evaluation of soil conditions, seasonal high groundwater or impermeable materials, proximity of sensitive resources (e.g., drinking water wells, surface waters, wetlands, etc.).
- B. Proper siting and **installation** mean that the system is installed in conformance with the approved design and siting requirements (e.g., setbacks from waterways).
- C. Proper **operation** includes how the property owner uses the system. While most systems excel at treating normal domestic sewage, disposing of some materials, such as toxic chemicals, paints, personal hygiene products, oils and grease in large volumes, and garbage, can adversely affect the function and design life of the system, resulting in treatment failure and potential health threats; proper operation also includes how the property owner protects the system. For example, allowing vegetation with extensive roots to grow above the system can result in clogs, and driving large vehicles over the system may crush or compact piping or leaching structures.
- D. Proper **maintenance** means having the septic tank pumped at regular intervals to eliminate accumulations of solids and grease in the tank. It may also mean regular cleaning of effluent filters, if installed. The frequency of septic pumping depends on the use and total volume entering the system. A typical three-bedroom, 1,000-gallon tank should be pumped every three to four years.
- E. Proper **replacement** of failed systems may include programs or regulations to encourage upgrades of conventional systems (or cesspools and holding tanks) to more innovative alternative technologies.

Management strategies for reducing water quality impacts from septic systems (as well as cesspools and holding tanks) start with education and outreach to property owners so that they are better informed and able to properly operate and maintain their systems. Other management strategies include setting local regulations to enforce proper maintenance and inspection of septic systems and establishing funding mechanisms to support replacement of failing systems (with priority for cesspools and holding tanks).

As an alternative to individual onsite systems, community septic systems have been implemented in other lakefront settings to reduce nutrient loading and improve long-term maintenance reliability. Under

this approach, multiple homes are served by a shared treatment and leachfield system rather than individual septic systems. A key advantage is that system operation and maintenance are managed by a

**Reasons that septic systems fail**



designated entity, such as a homeowner's association or municipal body, reducing the risk of system neglect or failure by individual property owners. If properly designed, sited, and maintained, community septic systems can improve treatment performance and reduce phosphorus loading to surface waters. However, siting considerations remain critical and should ensure adequate phosphorus attenuation by maximizing separation from

the shoreline, prioritizing soils with strong structure and higher iron and aluminum content, and potentially incorporating raised or engineered soil treatment areas.

**4.2.5 Sanitary Sewer System Inspections**

Because a portion of the watershed also relies on a municipal sewer system, it is important for municipalities with sewer such as Wolfeboro to develop a program to inspect and evaluate their sanitary sewer system and reduce identified leaks and overflows, especially in areas near waterbodies such as Crescent Lake. At the time of this report, there are no known municipal programs specific to routine inspection and condition assessment of the entire sewer system. Wolfeboro addresses sewer infrastructure issues as they arise.

**4.2.6 Fertilizer Use Prohibition**

Management strategies for reducing water quality impacts from residential, commercial, and municipal fertilizer application start with education and outreach to property owners. New Hampshire law prohibits the use of fertilizers within 25 feet of a surface water. Outside of 25 feet, property owners can have their soil tested before considering application of fertilizers to their lawns and gardens to determine whether nutrients are needed and if so in what quantity or ratio. A soil test kit can be obtained through the [UNH Cooperative Extension](#). Many state and local governments are beginning to set restrictions on the use of fertilizers by prohibiting their use altogether or requiring soil tests to demonstrate a need for any phosphate application to lawns. The watershed municipalities could consider a similar prohibition, at the very least within a watershed zoning overlay for major lakes and ponds. In 2024, HB1293 was passed by the legislature to prohibit the sale of fertilizer with a phosphate content level greater than 0.67%.



**4.2.7 Agricultural Practices**

Manure and fertilizer management and planning are the primary tools for controlling nutrient runoff from agricultural areas. Direct outreach and education should be conducted for small farms and any

larger-scale operations in the watershed. Agricultural best practices aim to reduce nutrient, sediment, and bacteria load into waterbodies while ensuring agricultural productivity; however, the selection of practices should consider local conditions – such as climate, soil type, hydrology, land use, funding, and other factors – to maximize effectiveness (EPA, 2004).

NRCS is a key resource for farmers and landowners in developing and implementing agricultural practices to improve water quality. Through various programs, the NRCS provides both financial and technical assistance for projects aimed at reducing runoff and improving soil health (Levy, 2023). In New Hampshire, the most implemented practices (by acre application) between 2005 and 2023 were cover cropping (31.8%) and conservation crop rotation (29%), which continue to be the two most popular practices to date (USDA, 2023a). Larger-scale agricultural operations can work with the NRCS to complete a Comprehensive Nutrient Management Plan. These plans address soil erosion and water quality concerns of agricultural operations through setting proper nutrient budgets, identifying the types and amount of nutrients necessary for crop production, and ensuring the appropriate storage and handling of manure. Manure should be stored or applied to fields properly to limit runoff of solids containing high concentrations of nutrients. Manure and fertilizer management involve managing the source, rate, form, timing, and placement of nutrients. Writing a Comprehensive Nutrient Management Plan is an ongoing process because it is a working document that changes over time. The Environmental Quality Incentives Programs (EQIP) through NRCS is one of their flagship programs with the highest rates of implementation in 2023 (64%). Other notable programs include the Conservation Program and Conservation Technical Assistance (USDA, 2023b).

These programs offered by the NRCS can serve as an essential resource for farmers, particularly in addressing environmental concerns in agricultural watersheds (USDA NRCS, 2024). Through continued collaboration with the NRCS and other stakeholders, farmers in the Lake Wentworth-Crescent Lake watershed can play a pivotal role in enhancing water quality while maintaining agricultural productivity, thus supporting two essential natural resources for community well-being in the region.

### **NRCS**

#### **Carroll County Office**

73 Main Street, PO Box 533

Conway, NH 03818

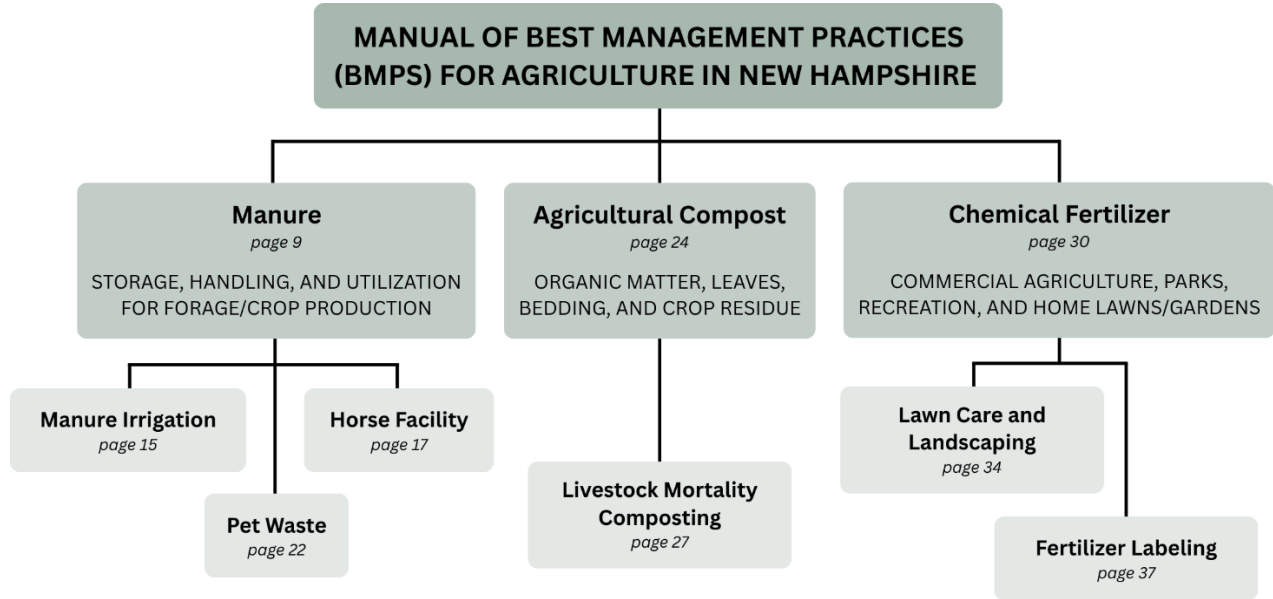
[\(603\) 447-2771](tel:6034472771)

[conway.nrcs.nh@usda.gov](mailto:conway.nrcs.nh@usda.gov)

To access the technical and financial support offered through these programs, it is recommended that farmers and landowners contact their local NRCS office. Information on agricultural best practices have been published in section 1 of the NRCS [Field Office Technical Guide](#) for New Hampshire, under the “NH Ag BMPs” section. In this document, agricultural practices are sorted into three main sections: manure, agricultural compost, and chemical fertilizer (Figure 43). These classifications support the initial identification of appropriate practices for each farm, field, or site, depending on local needs. Once the relevant practices are identified, producers can better understand which NRCS practices will support best practices implementation. A full list of NRCS practices are available in Section 4 of the [Field Office Technical Guide](#), with practices relevant to water quality highlighted in Table 17.

Many of the programs offered by the NRCS are implemented confidentially on private lands, and no public information was available regarding practices within the Lake Wentworth-Crescent Lake

watershed. Because of this confidentiality, there may be established agricultural best practices and/or current projects underway within the region. Nutrient load reductions from agricultural best practices were not calculated as part of the watershed survey and therefore not factored into the loads needed to reach the water quality goal. Any load reductions made on agricultural lands will therefore be a bonus to help the community reach their water quality goal.



**Figure 43.** Overview of the major topics covered in the *Manual of BMPs for Agriculture in New Hampshire*, to orient producers to relevant sections. Relevant page numbers from the document are listed in each box.

**Table 17.** Conservation Practices covered by the Natural Resources Conservation Service (NRCS). Adapted from the *USDA Conservation Choices; Water Quality Practices*. The table is adjusted to meet current NH NRCS practices (USDA NRCS, 2022). A “Y” indicates that the conservation practice is effective in addressing the pollutant or resource concern; “n” indicates it is not. N = nitrogen. P = phosphorus. Sed = sediment.

Conservation Practice	Descriptions	N	P	Sed	NRCS Practice #
<b>Cover Crop</b>	Crops, including grasses and legumes for seasonal cover, conservation, and soil health.	Y	Y	Y	340, 328
<b>Drainage Water Management</b>	Water control structure to keep water in the root zone to support excess nutrient uptake before draining.	Y	Y	Y	587
<b>Filter Strip</b>	Strip of vegetation near water to remove pollutants from runoff and wastewater.	Y	Y	Y	393, 327, 386, 390
<b>Manure Management</b>	Manure storage until conditions are appropriate for field application.	Y	Y	n	318, 313

Conservation Practice	Descriptions	N	P	Sed	NRCS Practice #
<b>No-Till/Strip-Till</b>	Reducing soil tillage to support soil health.	Y	Y	Y	329, 345, 346
<b>Nutrient Management</b>	Managing the amount, source, placement, and timing of plant nutrients and soil amendments.	Y	Y	n	590
<b>Prescribed Grazing</b>	Managing the harvest of vegetation by rotating grazing animals.	Y	Y	Y	528
<b>Riparian Forest Buffer</b>	Vegetation planted along streams or rivers to reduce nutrients and other pollutants in surface runoff.	Y	Y	Y	342, 391, 612
<b>Wetlands</b>	Marshy area with saturated soils to filter out nutrients, sediments, and other pollutants.	Y	Y	Y	659, 657



#### 4.2.8 Pet Waste Management

Pet waste collection as a pollutant source control involves a combination of educational outreach and enforcement to encourage residents to clean up after their pets. Public education programs for pet waste management are often incorporated into a larger message of reducing pollutants to improve water quality. Signs, posters, brochures, and newsletters describing the proper techniques to dispose of pet waste can be used to educate the public and create a cause-and-effect link between pet waste and water quality (EPA, 2005). Adopting simple habits, such as carrying a plastic bag on walks and properly disposing of pet waste in dumpsters or other refuse containers, can make a difference. It is recommended that pet owners do not put dog and cat feces in a compost pile because it may contain parasites, bacteria, pathogens, and viruses that are harmful to humans and may or may not be destroyed by composting. “Pooper-scooper” ordinances are often used to regulate pet waste disposal. These ordinances generally require the removal of pet waste from public areas, other people’s properties, and occasionally from personal property, before leaving the area. Fines are typically the enforcement method used to encourage compliance with these ordinances.



#### 4.2.9 Nuisance Wildlife Controls

Human development has altered the natural habitat of many wildlife species, restricting wildlife access to surface waters in some areas and promoting access in others. Minimizing the impact of wildlife on water quality generally requires either reducing the concentration of wildlife in an area or reducing their proximity to a waterbody. There are a couple of options for combatting this:

**Prohibit Feeding** – Leverage educational outreach to discourage feeding of waterfowl or other wildlife. Consider developing an ordinance that prohibits the feeding of these animals.

**Wildlife Repellent** – Use scarecrows, kites, a daily human presence, or modification of habitat through plantings to reduce attractiveness of an at-risk area. Providing closed trash cans near waterbodies, as well as discouraging wildlife from entering surface waters by installing fences, pruning trees, or making other changes to landscaping, can reduce water quality impacts.

## 4.3 OUTREACH AND EDUCATION

Awareness through education and outreach is a critical tool for protecting and restoring water quality. Most people want to be responsible watershed stewards and not cause harm to water quality, but many are unaware of best practices to reduce or eliminate contaminants from entering surface waters.

WWA is the primary local entity for education and outreach campaigns in the watershed and for development and implementation of the plan. WWA has incredible local capacity to carry out protection efforts with three paid staff members, 16 board members, six committees, 45 watershed representatives, 150 volunteers, and 951 members.

WWA should continue all aspects of their outstanding and robust education and outreach strategies, including clean-up days, bird walks, workshops, derbies, parades, paddles, picnics, and summits, and should consider developing new ones or improving existing ones to reach more watershed residents (refer to Section 5: Action Plan). Examples include providing educational materials to existing and new property owners, as well as renters, by distributing them at various locations and through a variety of means, such as websites, newsletters, social media, community events, or community gathering locations. Additionally, WWA should continue to engage with local stakeholders such as conservation commissions, land trusts, municipalities, businesses, and landowners. Educational campaigns should include raising awareness of water quality, septic system maintenance, fertilizer and pesticide use, pet waste disposal, waterfowl feeding, invasive aquatic species, boat pollution, shoreline buffer improvements, gravel road maintenance, and stormwater runoff controls. Educational tools such as interactive story maps, QR-code enabled signs, youth programs, and the development of watershed boundary signs on roads entering the watershed can aim to deepen public understanding of watershed issues. WWA should collaborate with other local lake and watershed groups, such as the Lake Winnepesaukee Alliance, NH Lakes, and others to combine forces on outreach and education initiatives. See below for photos at outreach events by WWA.



## 4.4 ADAPTIVE MANAGEMENT APPROACH

**Continuing formal WWA subcommittees to coordinate an adaptive management approach is strongly recommended.** This approach enables stakeholders to implement restoration actions in phases, using the best available information. Ongoing watershed and water quality monitoring help assess effectiveness of actions, allowing for strategy adjustments before the next restoration phase. Adaptive management ensures efficient resource use through SCM performance testing and monitoring while maintaining a continuous program with adequate funding, stakeholder guidance, and coordination to track long-term restoration progress. The adaptive management components for implementation efforts should include:



### **Maintaining an Organizational Structure**

A diverse stakeholder group, including agencies, municipalities, businesses, and landowners, should coordinate watershed management actions, with a formal structure and clear communication.

*Refer to Section 6.1 for more information on plan oversight.*



### **Establishing a Funding Mechanism**

A mix of grants, private donations, and municipal funding should be used to support implementation and management actions.

*Refer to Section 6.3 for a list of potential funding sources.*



### **Determining Management Actions**

This plan provides a menu of restoration options which serve as a foundation for grant proposals. Once a funding mechanism is established, priority restoration projects can be designed and scheduled for implementation.

*Refer to Section 5 for detailed management actions.*



### **Continuing and Expanding the Community Participation Process**

Plan development has actively involved a diverse group of stakeholders, and successful implementation will require their continued participation, along with expanded support, gathered through ongoing public awareness campaigns.

*Refer to Section 4.3 for outreach recommendations.*



### **Continuing the Long-Term Monitoring Program**

A water quality monitoring program is necessary to track water quality and measure effectiveness of management practices.

*Refer to Section 6.4 for monitoring options.*



### **Establishing Measurable Milestones**

A restoration schedule with milestones for actions and monitoring is essential for the plan's success. Environmental, social, and programmatic indicators have also been identified to track progress.

*Refer to Sections 2.4 for the water quality goal and 6.5 for measurable milestones.*

# 5 ACTION PLAN

## 5.1 2012 ACTION PLAN STATUS

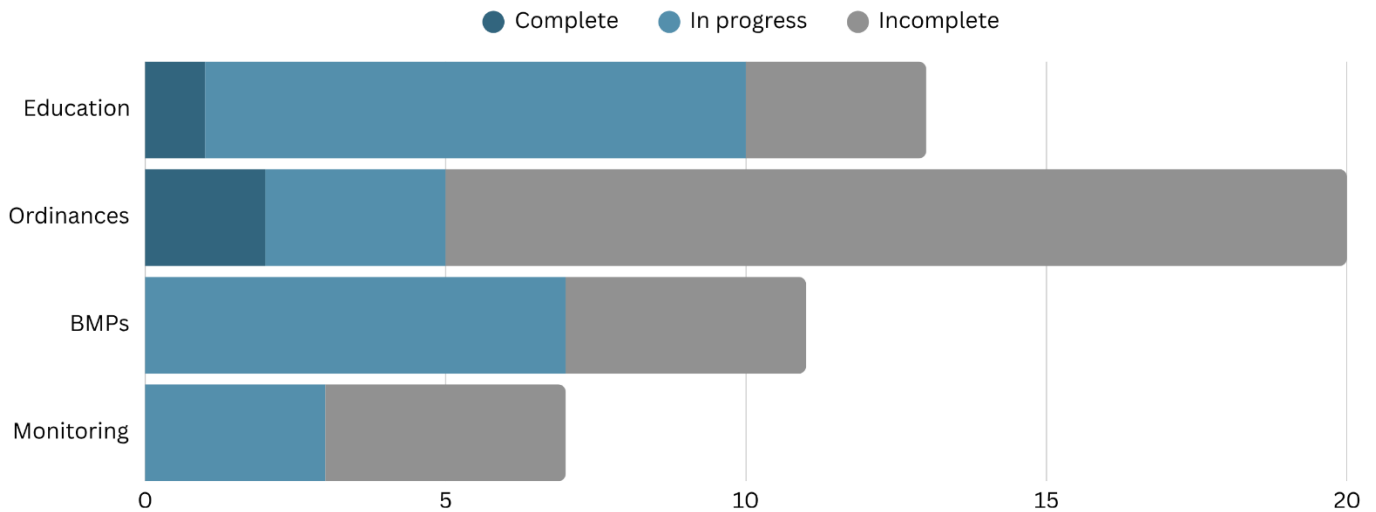
Since the development of the [2012 Lake Wentworth and Crescent Lake WMP](#), WWA and the Town of Wolfeboro have worked to implement Action Plan items listed in the original document. A review of this work was completed as a first step to updating this plan. The following contains a summary of the status of action items in each category. Note that not every individual action item was listed.

Most **education and outreach** items are ongoing initiatives, thus there are fourteen in progress or ongoing, while two are complete and three are incomplete or infeasible (Figure 44). WWA has achieved numerous education and outreach initiatives. Ongoing initiatives include workshops, annual meetings, collaboration among other watershed associations, creation of various brochures, neighborhood SCM showcases and site walks, development of the Lake Minded Program, the Wolfeboro Waters Committee, and the road agents' group, periodic press releases and blogs, and maintenance of an engaging website. Outreach initiatives have been largely successful, reaching several hundred residents over the years. Of note, WWA had difficulty engaging contractors; however, they have been engaging with road agents who work directly with these contractors on camp road maintenance. WWA was also unable to host a crew from the Youth Conservation Corps Program to help with SCM implementation and outreach activities due to the associated costs of housing and managing Corps members.

Two **ordinances** items are complete, with one in progress and fourteen incomplete (Figure 44). Ordinances are often the most challenging to complete because developing new language or revising existing code requires significant time, multiple legal steps, and formal reviews before adoption.

One **SCMs and septic systems** item is complete, with five in progress and seven incomplete (Figure 44). Multiple recommendations for SCMs are in progress with great success, including 24 watershed survey site improvements complete with 17 in progress, 485 acres of land conserved, and encouragement of SCM implementation through road agents and road associations as well as the numerous outreach initiatives described above. Work has not been done yet to identify and map septic systems and non-compliant stream crossings.

Three **monitoring** items are ongoing (Figure 44). Robust monitoring programs, including LLMP, Weed Watchers, and Lake Host, are well established with dedicated volunteers.















**Figure 44.** Summary of status of Action Items from the 2012 Lake Wentworth and Crescent Lake WMP.

**KEY:** Complete Partially completed or ongoing Incomplete or infeasible







### Education and Outreach

- Several brochures created, including [Landscaping and Gardening brochures](#), [Watch Your Wake brochure](#), and [Stormwater brochures](#).
- Several SCM site walks (Camp Bernedette, Fern Ave, Pierce Camp Birchmont) reached 300+ members. Annual WWA dinner held at Camp Bernadette allows members to view this project annually.
- Neighborhood showcases of residential SCMs (revegetation and infiltration) have reached approximately 45 people. Other efforts were showcased during Water Summits.
- WWA annually hosts watershed representatives from all shores to train them on best lake-living practices.
- WWA hosts an annual Water Summit with themes including watershed management planning, infiltration SCM examples, cyanobacteria, septic system maintenance and design, camp road maintenance, and best practices. Attendance is typically 100-200 audience members.
- WWA has hosted workshops for camp road maintenance, septic system practices, and invasive species management.
- Under the Lake Minded Program, volunteers and staff have visited 35 properties, working with homeowners to develop specialized SCM ideas for the property. Homeowners are also provided with a preferred contractor list if they are interested.

-  Special group of "road agents" share best practices and helpful hints to each other to prevent road erosion.
-  The Select Board established the Wolfeboro Waters Committee to advise it on issues impacting water quality, including road maintenance, regulation updates, and construction projects.
-  Press releases are used to publicize events and lake quality updates (e.g., [2025 press releases](#)) and through their newsletter, the Zephyr (e.g., [2024 Zephyr](#)).
-  The [WWA website](#) is kept current, and WWA collaborates with the Lake Winnepesaukee Alliance, Mirror Lake Association, Rust Pond Association, and others to ensure shared knowledge throughout Wolfeboro and the Lakes Region.
-  Publicize events and lake quality updates through local newspapers and newsletters. Anyone can sign up to receive WWA's newsletter, the Zephyr, for important updates. Respondents at the 2025 community forum indicated that the Zephyr was the most effective way to reach people.
-  WWA continues to encourage and provide guidance to property owners to address stormwater runoff and other environmental issues on their own property.
-  Property owners are consistently reminded about proper septic system maintenance through WWA publications, watershed representatives, Water Summits, the Zephyr, online articles, social media, and septic system workshops.
-  Contractors and landowners have been educated on camp road maintenance through dedicated group of road agents. Town staff and officials have not been targeted yet.
-  The annual LLMP water quality report is dispersed during the annual WWA meeting and presented in the WWA annual report.
-  Host an annual crew from the Youth Conservation Corps Program to help with SCM implementation and outreach activities around the watershed. This project was not feasible due to costs of housing and managing Corps members.
-  Conduct brief surveys of resident values to better target interest groups in future outreach campaigns. Responses from the 2025 community forum were a great start.
-  Make shoreland zoning more user-friendly and explain the rules to owners in advance of projects. Distribute NHDES shoreland zoning manual at outreach events.



**Ordinances**










-  Stormwater management ordinance was created in 2014 and revised in 2022.
-  Performance-based good behavior incentives for developers to meet density/lot size and green space standards in multiple ways was included in the Conservation Subdivision Ordinance.
-  Currently developing a septic system management plan.
-  Require stormwater SCMs in the shoreland zone for permits and property transfers. Integrate with Town's Master Plan.

- ❌ Improve compliance with existing ordinances by increasing the working hours of the Code Enforcement Officer.
- ❌ Mandate 75-foot setbacks from lakes and ponds for primary structures, buffers between development and waterbodies, and impervious cover restrictions of 20% maximum per lot.
- ❌ Institute a maximum percent impervious cover per lot with mandatory low impact development implementation on lots with more than 20% impervious cover.
- ❌ Consider extending the wetlands setback to 100' for very poorly drained soils and 50' for poorly drained soils.
- ❌ Ensure compliance with the new Steep Slope Ordinance. Consider requiring pre and post-construction SCMs within the steep slope overlay district (> 15% slope), and reduction of disturbance sites from 20,000 to 10,000 square feet.
- ❌ Develop a road ordinance for all new roads requiring drainage standards and ongoing SCMs.
- ❌ Address fertilizer use, pesticide use, and animal waste in regard to water quality protection.
- ❌ Adopt benchmark SCM standards within existing ordinances for site plan review and land subdivision. Language should also require SCM installation for runoff control and development of a sediment control plan for disturbances on slopes > 15%.
- ❌ Clearly define Riparian Buffer, and increase the mandatory buffer width for perennial streams, rivers, lakes, and ponds with slope consideration.
- ❌ Consider increasing the mandatory open spaces for conservation subdivisions above 50%.
- ❌ Require driveway SCMs, septic system upgrades, etc. for all new permits and property transfers. Must be integrated with the Master Plan.
- ❌ Require certified contractors for all permit work. These contractors will have adequate training in the installation and maintenance of low impact development and SCMs.
- ❌ Develop language within the Shorefront Residential District and Wetland Conservation Overlay District that requires low impact development techniques in new construction projects.






### **Stormwater Control Measures and Septic Systems**

- ✅ Resurvey documented nonpoint source sites identified in this plan for SCM implementation, and develop a tracking system to document long-term functionality.
- 🔄 Of the 114 total survey sites identified through the 2012 and 2022 surveys, the WWA, Town, State, and property owners have completed 24 of the high impact sites and developed design concepts for an additional 17.
- 🔄 SCM sites continue to be tracked, and statuses are updated in the nonpoint source site tracker.
- 🔄 Road associations are encouraged to work together with preferred pumpers to get on regular pumping schedules for cost-sharing.

-  WWA has directly conserved 485 acres of land in the watershed. A watch list of properties is maintained, and WWA continues to work with landowners to protect land through conservation easements, fee simple, or land donation.
-  Individual road agents and residents are responsible for upgrading private roads annually using recommended SCMs from watershed survey and resources posted on WWA website.
-  Require NHDES certified contractors for all permit work. These contractors will have adequate low impact development and SCM use ethics.
-  Upgrade public roads annually using recommended SCMs from watershed survey.
-  Extensive outreach has been completed regarding reduction of winter sand and salt use, but a winter sanding management plan has not been developed.
-  Compile survey and GPS information on septic systems in shoreland area. Update annually with required pump-outs and inspections.
-  Identify stream crossings that do not meet specifications according to the NH Stream Crossings Guidelines and replace non-conforming stream crossings.
-  Document and assess baseline standards for land use practices around the shoreline using modern GPS technology.
-  Determine pollutant reduction goals based on land-use types and incorporate into future development.



### **Monitoring**

-  LLMP partnership is in place to sample throughout the summer at three in-lake locations on Lake Wentworth and one on Crescent Lake, as well as 28+ streams during heavy storms. Sargent's Pond is also sampled one to two times per year. The first winter sampling was completed in 2025.
-  Weed Watchers program is in place to patrol the lake for invasives throughout the summer. Divers and DASH boats used to remove variable milfoil. A successful chemical treatment was deployed in Fernald's Basin in 2018. A Lake Host program is maintained at Mast Landing boat launch to prevent invasives entry.
-  Train volunteers to sample during storm events at road crossings and culverts near the shorelines. Use information to identify problem areas and recommend solutions. Partially covered by the LLMP tributary sampling.

## 5.2 ACTION PLAN

The Action Plan (Table 18) outlines responsible parties, approximate costs<sup>1</sup>, an implementation schedule, and potential funding sources for each recommendation within the following major categories: (1) Watershed and Shoreline SCMs; (2) Road and Driveway Management; (3) Other Municipal Operations; (4) Municipal Land Use Planning and Zoning; (5) Land Conservation; (6) Septic System Management; (7) Monitoring; and (8) Education and Outreach. The plan is designed to be implemented from 2026-2035 and is flexible enough to allow for new priorities throughout the ten-year implementation period as additional data are acquired.

**Table 18.** Action Plan for the Lake Wentworth-Crescent Lake watershed.



### Action Item 1: Watershed and Shoreline SCMs

#	Sub-Item Description	Responsible Party	Estimated Cost / Schedule	Potential Funding Sources
1a	Implement SCMs for the 17 sites for which SCM concepts are designed, as identified during the 2012 and 2022 watershed surveys. <b>Achieves 29% (30 kg/yr of 104 kg/yr) of Objective 1 for Lake Wentworth (13 sites) and 17% (12 kg/yr of 71 kg/yr) of Objective 1 for Crescent Lake (4 sites). See Appendix A.</b>	WWA, municipalities, private landowners	TBD 2026-2030	Grants (319, Moose Plate, NFWF 5-Star, ILFP, CWSRF), municipalities, private landowners
1b	Complete design and construction of SCMs at the remaining 73 sites identified during the 2012 and 2022 watershed surveys based on the ranking and as opportunities arise. <b>Achieves 61% (63 kg/yr of 104 kg/yr) of Objective 1 for Lake Wentworth (57 sites) and 4% (3 kg/yr of 71 kg/yr) of Objective 1 for Crescent Lake (16 sites). See Appendix A.</b>	WWA, municipalities, private landowners	TBD 2026-2035	Grants (319, Moose Plate, NFWF 5-Star, ILFP, CWSRF), municipalities, private landowners

<sup>1</sup> Cost estimates for each recommendation will need to be adjusted based on further research and site design considerations.

#	Sub-Item Description	Responsible Party	Estimated Cost / Schedule	Potential Funding Sources
1c	Promote evaluations and certifications through WWA's Lake Minded Program to educate property owners about lake-friendly practices such as revegetating shoreline buffers with native plants, eliminating or minimizing large grassy areas, and increasing mower blade heights to 4 inches. Cost assumes coordination and materials for up to 10 workshops.	WWA	\$5,000 2026-2035	Grants (319, Moose plate, CWSRF), municipalities, NH Lakes
1d	Provide technical assistance and/or implementation cost sharing to watershed/shoreline property owners to install SCMs such as rain gardens and buffer plantings. Prioritize high impact properties identified during the shoreline survey. Cost assumes technical assistance and implementation cost sharing provided to the two high impact shoreline properties, as identified in the shoreline survey memo (FBE, 2025). <b>Achieves 1% (1 kg/yr of 104 kg/yr) of Objective 1 for Lake Wentworth.</b>	WWA, CCCD, SCCD, municipalities, private landowners	\$20,000 2026-2028	Grants (319, Moose plate, CWSRF), municipalities, private landowners
1e	Provide technical assistance and/or implementation cost sharing to watershed/shoreline property owners to install SCMs such as rain gardens and buffer plantings. Prioritize medium/low impact properties identified during the shoreline survey. Cost assumes landowner implementation costs (budget: \$3,000 each) for the 44 medium impact and 107 low impact shoreline properties, as identified in the shoreline survey memo (FBE, 2025). <b>Achieves 27% (28 kg/yr of 104 kg/yr) of Objective 1 for Lake Wentworth.</b>	WWA, municipalities, private landowners	\$453,000 2026-2035	Municipalities, private landowners
1f	Provide technical assistance and/or implementation cost sharing to watershed/shoreline property owners to install SCMs such as rain gardens and buffer plantings. Prioritize medium/low impact properties identified during the shoreline survey. Cost assumes landowner implementation costs (budget: \$3,000 each) for the 18 medium impact and 62 low impact shoreline properties, as identified in the shoreline survey memo (FBE, 2025). <b>Achieves 20% (14 kg/yr of 71 kg/yr) of Objective 1 for Crescent Lake.</b>	WWA, municipalities, private landowners	\$240,000 2026-2035	Municipalities, private landowners

#	Sub-Item Description	Responsible Party	Estimated Cost / Schedule	Potential Funding Sources
1g	Repeat the shoreline surveys in 10 years when updating the WMP. Use the results to target education and technical assistance for high/medium impact sites. Cost assumes hired consultant for survey and summation of shoreline survey results.	WWA, municipalities	\$10,000 2035	Grants (Moose plate, CWSRF), municipalities
1h	Complete a geomorphic study of Fernald Brook and Willey Brook to identify opportunities for sediment load reduction, given the large sediment deltas formed at their outlets to Lake Wentworth.	WWA	\$60,000 2026-2035	Grants (319, Moose plate, CWSRF), municipalities, private landowners



## Action Item 2: Road and Driveway Management

#	Sub-Item Description	Responsible Party	Estimated Cost / Schedule	Potential Funding Sources
2a	Review practices for road and drainage maintenance currently used by municipalities and private entities/groups (road agents) and determine areas for improvement.	Municipalities, WWA, CCCD, SCCD	\$3,000 2026	Grants (Moose Plate, NFWF 5-Star, CWSRF), municipalities
2b	Continue providing education and training to contractors and municipal staff on protocols for road maintenance best practices. Assumes one workshop. Consider holding joint workshop with other municipalities or lake associations (or other wider service area) for cost sharing savings.	Municipalities, WWA, CCCD, SCCD	\$10,000 2027	Grants (Moose Plate, NFWF 5-Star, CWSRF), municipalities
2c	Develop and/or update a written protocol for road maintenance best practices.	Municipalities, WWA, CCCD, SCCD	\$20,000 2027	Grants (Moose Plate, NFWF 5-Star, CWSRF), municipalities

#	Sub-Item Description	Responsible Party	Estimated Cost / Schedule	Potential Funding Sources
2d	Facilitate annual or bi-annual meetings with road agents to discuss road maintenance and challenges and to share information and lessons learned.	Municipalities, WWA, CCCD, SCCD	N/A 2026-2035	Municipalities
2e	Identify stream crossings that do not meet specifications according to the NH Stream Crossings Guidelines and replace non-conforming stream crossings.	Municipalities, private landowners	TBD 2027-2035	Municipalities, private landowners
2f	Hold informational workshops on proper road/driveway management and winter maintenance and provide educational materials for homeowners about winter maintenance and sand/salt application for driveways and walkways. Cost assumes up to four workshops.	WWA, CCCD, SCCD, municipalities, private landowners	\$5,000-\$10,000 2027, 2029, 2031, 2033	Grants (Moose Plate, NFWF 5-Star, CWSRF), municipalities, private landowners
2g	Have DPW staff or representative participate in Green SnowPro training to become Green SnowPro certified. Road agents should encourage contractors to be Green SnowPro certified. Continue practicing low salt application practices in the watershed.	Municipalities (Public Works/Highway)	\$350/person 2026-2035	Municipalities
2h	Contact the NH Department of Transportation regarding decreasing their road salt usage on state roads within the watershed due to current trends in water quality and discuss reduced salt areas and low-salt approaches.	Municipalities, NH Dept of Transportation	N/A 2026-2028	Municipalities



### Action Item 3: Other Municipal Operations

#	Sub-Item Description	Responsible Party	Estimated Cost / Schedule	Potential Funding Sources
3a	Review and optimize MS4 compliance for municipalities (regardless of MS4 designation), including infrastructure mapping, erosion and sediment controls, illicit discharge programs, and good housekeeping practices such as regular catch basin cleaning.	Municipalities (Public Works/Highway)	TBD 2026-2035	Municipalities
3b	Develop best practice design standards for SCMs, including deep sump catch basins.	Municipalities (Public Works/Highway)	N/A 2026-2029	Municipalities



### Action Item 4: Municipal Land Use Planning and Zoning

#	Sub-Item Description	Responsible Party	Estimated Cost / Schedule	Potential Funding Sources
4a	Present WMP recommendations to Select Boards and Planning Boards and discuss the connection between municipal land use planning and water quality.	WWA, Conservation Commissions	N/A 2026	WWA, conservation commissions
4b	Meet with municipal staff to review recommendations to improve or develop ordinances addressing setbacks, buffers, lot coverage, low impact development, and open space. Cost assumes consultant assistance.	WWA, municipalities	\$10,000 2026-2028	Grants (319, CWSRF), municipalities
4c	Incorporate WMP recommendations into municipal master plans and encourage regular review of the WMP action plan.	WWA, municipalities	N/A 2026-2029	Municipalities

	<p>Adopt/strengthen zoning ordinance provisions and enforcement mechanisms:</p>			
	<ol style="list-style-type: none"> <li>1. Require stormwater BMPs in the Shoreland Zone for permits and property transfers. Must be integrated with Town's Master Plan.</li> </ol>			
	<ol style="list-style-type: none"> <li>2. Mandate 75-foot setbacks from lakes and ponds for primary structures, buffers between development and waterbodies, and impervious cover restrictions of 20% maximum per lot.</li> </ol>			
	<ol style="list-style-type: none"> <li>3. Institute mandatory low impact development implementation on lots with more than 20% impervious cover. Consider including mandatory septic system setbacks and stormwater pollutant reduction goals.</li> </ol>			
	<ol style="list-style-type: none"> <li>4. Extend the wetlands setback to 100 feet for very poorly drained soils and 50 feet for poorly drained soils.</li> </ol>			
	<ol style="list-style-type: none"> <li>5. Develop a Road Ordinance for all new roads requiring drainage standards and ongoing erosion control.</li> </ol>			
<p><b>4d</b></p>	<ol style="list-style-type: none"> <li>6. Address fertilizer use, pesticide use, and animal waste for water quality protection.</li> </ol>	<p>Municipalities</p>	<p>N/A 2026-2035</p>	<p>Municipalities</p>
	<ol style="list-style-type: none"> <li>7. Adopt benchmark erosion control standards within existing ordinances for site plan review and land subdivision. Language should also require BMP installation for runoff control and development of a sediment control plan for disturbances on slopes greater than 15%.</li> </ol>			
	<ol style="list-style-type: none"> <li>8. Clearly define riparian buffer and increase the mandatory buffer width for perennial streams, rivers, lakes, and ponds, with wider buffers required on steeper slopes.</li> </ol>			
	<ol style="list-style-type: none"> <li>9. Consider increasing the mandatory open spaces for conservation subdivisions above 50%.</li> </ol>			
	<ol style="list-style-type: none"> <li>10. Require driveway BMPs, septic system upgrades, etc. for all new permits and property transfers. Must be integrated with the Master Plan.</li> </ol>			
	<ol style="list-style-type: none"> <li>11. Develop language within the Shorefront Residential District and Wetland Conservation Overlay District that requires low impact development techniques in new construction projects.</li> </ol>			

#	Sub-Item Description	Responsible Party	Estimated Cost / Schedule	Potential Funding Sources
4e	Require that all contractors used by municipalities are NHDES-certified so they have adequate low impact development and SCM use ethics.	Municipalities	N/A 2028-2031	Municipalities
4f	Increase municipal staff capacity through code enforcers/building inspectors for inspections and enforcement of regulations on public and private lands. Develop a manageable system for enforcement of septic system maintenance, stormwater runoff, shoreland development, erosion and sediment control, and tree and vegetation clearing. Consider working with WWA, the watershed representatives, and the road agents to complete regular checks. Ensure compliance with new ordinances, including the steep slope ordinance, stormwater management ordinance, and septic system management plan.	Municipalities	TBD 2026-2035	Municipalities



### Action Item 5: Land Conservation

#	Sub-Item Description	Responsible Party	Estimated Cost / Schedule	Potential Funding Sources
5a	Complete the natural resources inventory that is currently underway for the Town of Wolfeboro. Town of Alton recently completed a natural resources inventory in 2022.	Town of Wolfeboro, Wolfeboro Conservation Commission, WWA	\$25,000 2026-2029	Grants (NFWF NEFRF, CWSRF), municipalities

#	Sub-Item Description	Responsible Party	Estimated Cost / Schedule	Potential Funding Sources
5b	Create a priority list of watershed areas that need protection based on natural resources inventories or other resources. Refer to Section 4.2.3 to understand current conservation lands and valuable habitats and wildlife in the watershed that can be used to help identify potential areas to target for conservation. WWA is in the process of developing a strategic plan, including prioritizing parcels based on conservation value.	WWA, municipalities, Conservation Commissions, Lakes Region Land Trust or other local land trusts	\$4,000-\$8,000 2026-2029	Grants (NFWF NEFRF, NAWCA, CWSRF), municipalities
5c	Identify potential conservation buyers and property owners interested in easements within the watershed. Use available funding mechanisms, such as the Regional Conservation Partnership Program (RCPP) and the Land and Community Heritage Investment Program (LCHIP), to provide conservation assistance to landowners.	WWA, municipalities, Conservation Commissions, Lakes Region Land Trust or other local land trusts	N/A 2029-2033	Grants (Moose Plate, LCHIP, RCPP, NAWCA, LWCF, ACEP, CSP, EQIP)
5d	Continue to provide opportunity for residents to donate money or contribute land to land conservation projects. WWA currently advertises this on their website.	WWA	N/A 2026-2035	WWA

#	Sub-Item Description	Responsible Party	Estimated Cost / Schedule	Potential Funding Sources
5e	Enhance community education regarding private land conservation easements. Host workshops educating landowners on the benefits. Also enhance advertisement of available public lands so folks are aware of what is available to them. Query about land accessibility at workshops to understand how land accessibility can be improved.	WWA, Conservation Commissions	N/A 2026-2029	Grants (Moose Plate, LCHIP, RCPP, NAWCA, LWCF, ACEP, CSP, EQIP, NFWF NEFRF), municipalities, private landowners
5f	Prioritize conserving land around "prime wetlands" as identified in Wolfeboro town code (§175-6 B).	Municipalities, Lakes Region Land Trust, Conservation Commissions	TBD 2027-2029	Municipalities
5g	Continue to maintain and update the watch list by WWA which contains potential parcels for conservation. Prioritize the protection of water quality when conserving land.	WWA	N/A 2026-2035	WWA



### Action Item 6: Septic System Management

#	Sub-Item Description	Responsible Party	Estimated Cost / Schedule	Potential Funding Sources
6a	Distribute educational materials to property owners about septic system function and maintenance and complying with local ordinances.	Municipalities, WWA	\$3,000 2026, 2029, 2032	Grants (319, CWSRF), municipalities

#	Sub-Item Description	Responsible Party	Estimated Cost / Schedule	Potential Funding Sources
6b	Work with watershed representatives and road agents to facilitate scheduled pump-outs and inspections. Develop a list of preferred contractors and coordinate potential group rates.	WWA	N/A 2026-2035	WWA
6c	Compile survey and GPS information of septic systems in shoreland area to facilitate code enforcement of septic system ordinances. Consider expanding to watershed-wide. Update annually with required pump-outs and inspections. Evaluate locations of older and/or noncompliant septic systems (including cesspools or holding tanks) to identify clusters where conversion to community septic systems might be desirable.	WWA, municipalities	TBD 2026-2028	Grants (CWSRF), municipalities
6d	Enforce the recommended minimum pump-out/inspection interval for shorefront septic systems (e.g., once every 3 years). Pump-outs (~\$250 per system) are the responsibility of the owner.	Municipalities	N/A 2026-2035	Municipalities
6e	Conduct a septic system risk assessment to identify areas which may be more susceptible to septic system malfunction due to high groundwaters, soil filtering capacity, risk of flooding, age of infrastructure.	Municipalities	\$30,000 2027-2030	Municipalities



### Action Item 7: Monitoring

#	Sub-Item Description	Responsible Party	Estimated Cost / Schedule	Potential Funding Sources
7a	Continue the current LLMP monitoring, Weed Watchers, and Lake Host programs to track water quality and invasive species.	WWA	TBD 2026-2035	Grants (NHDES AIPC), WWA

#	Sub-Item Description	Responsible Party	Estimated Cost / Schedule	Potential Funding Sources
7b	Consider expanding routine monitoring if resources are available. See Section 6.4: Monitoring Plan.	WWA	TBD 2026-2035	WWA, volunteers
7c	Expand on water quality data reporting to make information more accessible and known (see Item 8k).	WWA	TBD 2026-2035	WWA



### Action Item 8: Education and Outreach

#	Sub-Item Description	Responsible Party	Estimated Cost / Schedule	Potential Funding Sources
8a	Continue to keep the WWA website updated with new resources, notifications of upcoming events, ways to get involved, etc. Ensure the website is easy to navigate and engaging. Consider posting upcoming events by organizations other than WWA so residents have ample opportunity for education.	WWA	TBD 2026-2035	Grants, donations
8b	Continue current outreach events, including: <ol style="list-style-type: none"> <li>1. Neighborhood showcases and site walks when new BMP projects are installed (private and public).</li> <li>2. Workshops for camp road maintenance, septic system practices, and invasive species management (at least two per year). Landowner practices is a priority topic.</li> <li>3. Annual WWA Water Summit.</li> </ol>	WWA, conservation commissions	TBD 2026-2035	Grants, donations, municipalities
8c	Develop outreach plans for watershed representatives and road agents to ensure they are engaging with all residents in their area.	WWA	\$10,000 2026-2035	Grants, donations

#	Sub-Item Description	Responsible Party	Estimated Cost / Schedule	Potential Funding Sources
8d	Continue to publicize events, water quality updates, and WMP implementation progress. WWA newsletter and website were identified as the best mode of communication to residents.	WWA	TBD 2026-2035	Grants, donations
8e	Disperse the survey from the community forum to all watershed residents. Consider resurveying every 5 years to understand changes in community dynamics and to reflect implementation progress.	WWA	\$5,000 2026, 2031, 2035	Grants, donations
8f	Encourage private property and road owners to hire Green SnowPro certified commercial salt applicators.	WWA, municipalities	N/A 2026-2035	Grants, municipalities
8g	Educate private property owners on questions to ask hired landscaping companies to ensure they are complying with shoreland protection regulations.	WWA	N/A 2026-2035	WWA
8h	Educate contractors and municipal staff about erosion and sediment control practices required on plans. Work with municipalities to ensure that there are sufficient resources to enforce permitting conditions.	Municipalities, WWA, CCCD, SCCD	\$6,000 2026-2035	Grants (319, CWSRF), municipalities
8i	Consider creating a "watershed homeowner" packet that covers topics such as stormwater controls, road maintenance, buffer improvements, fertilizer and pesticide use, pet waste disposal, boat pollution, invasive aquatic species, waterfowl feeding, and septic system maintenance to distribute (mailed separately or in tax bills or posted at community gathering locations or events) to existing and new property owners, as well as renters. Consider reaching out to local real estate companies to collaborate.	Municipalities, WWA	\$20,000- \$60,000 2026-2035	Grants (319, CWSRF), municipalities
8j	Provide clearer guidance and more education to make it easier for folks to participate in the Lake Minded Program. Consider new ways to publicize the program, particularly the private site visits. Include education on the program in workshops and at the Water Summit and publicize through the "watershed homeowner" packet (item 8i).	WWA	TBD 2026-2035	Grants, donations

#	Sub-Item Description	Responsible Party	Estimated Cost / Schedule	Potential Funding Sources
8k	Report water quality data to the public once available from the LLMP and in a summary report at the end of each sampling season. Disseminate through the WWA newsletter and on the website. Ensure that the information is clear and accessible to all audiences (NHDES recommends an eighth grade reading level for accessibility).	WWA, LLMP	N/A 2026-2035	WWA
8l	Provide a list of trusted contractors that residents can use for projects that require stormwater management and for camp road and driveway upgrades. Prioritize DES-certified contractors. Work with the watershed representatives and road agents to disseminate lists and keep them up to date.	WWA	N/A 2026-2035	WWA
8m	Add a workshop topic that focuses on the regulations / ordinances that relate to watershed health (e.g., shoreland ordinance, tree-cutting rules, permitting requirements, etc.). Include hand-outs that provide clear guidance/FAQ on regulations / ordinances and permitting requirements that is also made available on the WWA website.	WWA	\$1,000 2026-2035	Grants, donations
8n	Target seasonal residents / renters, new homeowners, and day visitors for more outreach and education. This can be done through rental properties, boat launches, popular public areas (e.g., stores downtown), and other areas where visitors are known to gather.	WWA, NH Lakes	TBD 2026-2035	Grants, donations

## 5.3 POLLUTANT LOAD REDUCTIONS

To meet the Objective 1 water quality goal for Lake Wentworth, set a target phosphorus load reduction of 104 kg/yr to achieve an in-lake total phosphorus concentration of 5.0 ppb, which meets state water quality standards for oligotrophic waterbodies and is anticipated to substantially reduce the likelihood of cyanobacteria blooms in Lake Wentworth. To meet the Objective 1 water quality goal for Crescent Lake, set a target phosphorus load reduction of 71 kg/yr to achieve an in-lake total phosphorus concentration of 7.2 ppb, which meets state water quality standards for oligotrophic waterbodies and is anticipated to substantially reduce the likelihood of cyanobacteria blooms in Crescent Lake. The following opportunities for phosphorus load reductions to achieve Objective 1 were identified in the watershed based on field and desktop analyses:

- 1** Remediating the 90 remaining watershed survey sites could prevent up to **93 kg/yr** of phosphorus load from entering Lake Wentworth and **15 kg/yr** from entering Crescent Lake.
- 2** Treating shoreline sites could reduce the phosphorus load to Lake Wentworth by **1 kg/yr** for the two high impact sites (disturbance score 11+), **13 kg/yr** for the 44 medium impact sites (disturbance score between 9-10), and **15 kg/yr** for the 107 low impact sites (disturbance score between 7-8) identified from the shoreline survey. Treating shoreline sites could reduce the phosphorus load to Crescent Lake by **5 kg/yr** for the 18 medium impact sites (disturbance score between 9-10), and **9 kg/yr** for the 62 low impact sites (disturbance score between 7-8) identified from the shoreline survey.
- 3** Upgrading the 300 shorefront septic systems older than 25 years is estimated to reduce the phosphorus load by **24 kg/yr** (240 systems) for Lake Wentworth and by **6 kg/yr** (60 systems) for Crescent Lake.
- 4** Achieving the phosphorus load reductions for Lake Wentworth could reduce the total phosphorus load to Crescent Lake by **38 kg/yr**.

**Total potential load reduction for Lake Wentworth = 146 kg/yr**

*(meets 140% of reductions needed to achieve Objective 1 for Lake Wentworth; Table 19)*

**Total potential load reduction for Crescent Lake = 73 kg/yr**

*(meets 103% of reductions needed to achieve Objective 1 for Crescent Lake; Table 19)*

Non-structural SCMs such as educating homeowners about septic system maintenance, fertilizer use, and residential stormwater management may also contribute to reducing phosphorus loading to Lake Wentworth and Crescent Lake beyond what has been identified through field surveys and desktop analyses (watershed survey, shoreline survey, and septic system inventory) to meet the water quality goal. Preventing septic system failures, reducing residential lawn fertilizer use, and improving stormwater management at the property scale were not included in the goal attainment reality check above.

Objective 2 (preventing or offsetting additional phosphorus loading from anticipated new development) can be met through ordinance revisions that implement low impact development strategies and encourage cluster development with open space protection and through conservation of key parcels of forested and open land.

It is important to note that, while the focus of the objectives for this plan is phosphorus, the treatment of stormwater and sediment erosion will result in the reduction of many other kinds of pollutants that may impact water quality. These pollutants would likely include:



**Other nutrients**  
*(e.g., nitrogen)*



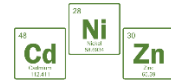
**Petroleum**  
*products*



**Bacteria**



**Road salt/sand**



**Heavy metals**  
*(cadmium, nickel, zinc, etc.)*

Without a monitoring program in place to measure these other pollutants, it will be difficult to track the success of efforts that reduce these other pollutants. However, there are various spreadsheet models available that can estimate reductions in these pollutants depending on the types of SCMs installed. These reductions can be tracked to assess long-term response. If additional monitoring funds are available, chloride (road salt), bacteria, and nitrogen sampling would be useful additions.

**Table 19.** Breakdown of phosphorus load sources and modeled water quality for current and target conditions that meet the water quality goal (Objective 1) and that reflect all field identified reduction opportunities in the watershed. Reduction percentages are based out of the current condition value for each parameter. kg/yr = kilograms per year. ppb = parts per billion.

Lake	Parameter	Unit	Current Condition	Target Condition	Reduction (unit, % change)
Wentworth	Total phosphorus load (all sources) <sup>3</sup>	kg/yr	1,040.2	936.2	-104.0 (10%)
	(A) Background phosphorus load <sup>1</sup>	kg/yr	425.7	425.7	0.0 (0%)
	(B) Disturbed (human) phosphorus load <sup>2</sup>	kg/yr	614.5	510.5	-104.0 (17%)
	(C) Developed land use phosphorus load	kg/yr	492.0	390.0	-102.0 (21%)
	(D) Septic system phosphorus load	kg/yr	85.3	83.3	-2.0 (2%)
	(E) Internal phosphorus load	kg/yr	37.2	37.2	0.0 (0%)
	In-lake total phosphorus*	ppb	6.4	5.7	-0.7 (11%)
	In-lake chlorophyll- <i>a</i> *	ppb	1.7	1.5	-0.2 (12%)
	In-lake Secchi disk transparency*	meters	5.6	6.0	0.4 (7%)
	In-lake bloom probability*	days	0	0	0 (0%)
Crescent	Total phosphorus load (all sources) <sup>3</sup>	kg/yr	472.1	401.1	-71.0 ( 15%)
	(A) Background phosphorus load <sup>1</sup>	kg/yr	142.3	142.3	0.0 (0%)
	(B) Disturbed (human) phosphorus load <sup>2</sup>	kg/yr	329.8	258.8	-71.0 (22%)
	(C) Developed land use phosphorus load	kg/yr	305.2	233.2	-72.0 (24%)
	(D) Septic system phosphorus load	kg/yr	15.2	16.2	1.0 (-7%)
	(E) Internal phosphorus load	kg/yr	9.4	9.4	0.0 (0%)
	In-lake total phosphorus*	ppb	7.0	5.4	-1.6 (23%)
	In-lake chlorophyll- <i>a</i> *	ppb	2.0	1.4	-0.6 (30%)
	In-lake Secchi disk transparency*	meters	5.2	6.3	1.1 (-21%)
	In-lake bloom probability*	days	0	0	0.0 (0%)

<sup>1</sup> Sum of forested/water/natural land use load, waterfowl load, and atmospheric load

<sup>2</sup> Sum of developed land use load, shorefront septic system load, and internal load (B = C+D+E)

<sup>3</sup> Total phosphorus load (all sources) = A + B

\* Water quality parameters were sourced from the model and represent average annual (not summer) conditions.

# 6 IMPLEMENTATION AND EVALUATION

The following section outlines the oversight structure, estimated implementation costs, and funding strategy for the recommended action items in the Action Plan (Section 5), along with the monitoring plan and performance indicators to track progress over time.

## 6.1 PLAN OVERSIGHT

Successful implementation of this plan will depend on the continued strong coordination led by WWA and supported by a diverse group of partners including municipal boards, conservation commissions, state and federal agencies, non-profits, land trusts, schools, businesses, and local landowners. Regular meetings and collaboration across these groups will be essential to fund, implement, and track progress on management actions. The Action Plan (Section 5) identifies the stakeholder groups responsible for each action. It should be updated every 2, 5, and 10 years to track measurable milestones such as SCM installations, volunteer engagement, and funding secured.

### Roles and Responsibilities

<b>WWA</b>	Continue to lead plan oversight, water quality monitoring, outreach, and fundraising for stewardship and restoration projects. Provide administrative and grant support for SCM implementation and education/outreach efforts.
<b>Municipalities</b>	Continue to address nonpoint source pollution, maintain roads using best practices, and consider adopting ordinances that protect water quality. Includes the town-appointed Wolfeboro Waters Committee.
<b>Conservation Commissions</b>	Continue to collaborate with municipal staff to help implement recommended actions.
<b>NHDES</b>	Offer technical assistance, permit approval, and the opportunity for financial assistance through EPA Section 319 of the Clean Water Act that supports the NHDES Watershed Assistance Grant Program and other funding programs.
<b>Private Landowners</b>	Increase awareness and adopt land management practices that minimize pollutant runoff.

Reducing nutrient loading across the watershed will require a sustained, community-wide effort. Because phosphorus inputs come from many diffuse sources, such as development, roads, and septic systems,

continued collaboration, adaptability, and commitment will be key to long-term water quality improvement.

## 6.2 ESTIMATED COSTS

Achieving the water quality goals and objectives outlined in Section 2.4 will depend on available funding and labor resources. The strategy focuses on reducing phosphorus loading through a combination of targeted actions, including phosphorus source control, continued water quality monitoring, and expanded education and outreach. Additional measures, though harder to quantify, such as revising local ordinances to require low impact development practices for new development, identifying and replacing failing septic systems, maintaining roads properly, and improving agricultural practices, will also be critical (see Section 5: Action Plan for details).

With a dedicated stakeholder group in place and with the help of grant or local funding, it is possible to achieve the target phosphorus reductions and meet the established water quality goal for Lake Wentworth and Crescent Lake in the next ten years. **Successful implementation is estimated to cost over a million dollars over the next ten or more years** (Table 20). These estimates will need to be refined as new information becomes available and do not include costs borne by private landowners, such as septic upgrades or private road maintenance.

**Table 20.** Estimated total phosphorus load reduction and total and annual costs for implementation of the Action Plan. Actions 1, 4, and 6 are necessary to achieve the water quality goal. Other actions are important, but it is difficult to quantify their total phosphorus reduction and costs. kg/yr = kilograms per year.

Planning Action	Total Phosphorus Reduction (kg/yr)	Estimated Total Cost	Estimated Annual Cost
1. Watershed & Shoreline BMPs	151	\$788,000**	\$78,800**
2. Road Management	TBD	\$59,050 - \$105,100	\$5,905 - \$10,510
3. Municipal Operations	TBD	TBD	TBD
4. Municipal Land Use Planning & Zoning	(243)*	\$10,000	\$1,000
5. Land Conservation	<i>Included in land use planning and zoning</i>	\$29,000 - \$33,000	\$2,900 - \$3,300
6. Septic System Management	30	\$33,000	\$3,300
7. Monitoring	TBD	TBD	TBD
8. Education & Outreach	TBD	\$42,000 - \$82,000	\$4,200-\$8,200
<b>Total</b>	<b>181</b>	<b>\$961,050 - \$1,051,100</b>	<b>\$96,105-\$105,110</b>

\*Estimated increase in phosphorus load from future development in the next ten years. Not included in total.

\*\*Cost does not include the 90 problem sites identified during the watershed surveys.

## 6.3 FUNDING STRATEGY

It is important that WWA develop a strategy to collect the funds necessary to implement the recommendations listed in the Action Plan (Section 5). Funding to cover ordinance revisions and third-party review could be supported by municipalities through tax collection (as approved by majority vote by town residents). Monitoring and assessment funding could come from a variety of sources, including state and federal grants, municipalities, or donations. Funding to improve septic systems, roads, and shoreland zone buffers would likely come from private landowners. As the plan evolves into the future, the establishment of a funding subcommittee will be a key part in how funds are raised, tracked, and spent to implement and support the plan. Listed below are state and federal funding sources that could assist WWA with future water quality and watershed work for Lake Wentworth and Crescent Lake.

### Funding Options



#### Water Quality and Wastewater Infrastructure

- **[EPA Clean Water Act Section 319 Grants \(NHDES Watershed Assistance Grants\)](#)**  
\$50,000–\$150,000 for two-year projects to reduce nonpoint source pollution and restore impaired waters. Restoration priorities are identified in the NH Nonpoint Source Management Program Plan (NHDES, 2024). These grants are only available for the implementation of WMPs.
- **[NHDES Cyanobacteria Mitigation Fund](#)**  
The Cyanobacteria Mitigation Fund was established by the New Hampshire legislature in 2023 to help defray the costs of implementing nutrient control practices aimed at reducing chronic and extended cyanobacteria blooms. Municipalities, community water systems, and non-profit lake and river watershed associations are eligible to apply for Cyanobacteria Mitigation Fund assistance. Funding supports projects that implement strategies outlined in watershed management or lake protection plans, with the goal of improving water quality and mitigating harmful algal blooms. Applicants should refer to Administrative Rule Env-Wq 2300 for eligibility requirements and application procedures.
- **[Clean Water State Revolving Fund \(CWSRF\)](#)**  
Low-interest loans for wastewater system upgrades and stormwater improvements for nonpoint source pollution prevention and watershed protection and restoration. While CWSRF implementation loans are available, they are more limited in scope. Interested parties should consult with NHDES staff to explore potential opportunities.
- **[National Fish and Wildlife Foundation Five Star and Urban Waters Restoration Grants \(NFWF 5-Star\)](#)**

Funds for wetland, riparian, in-stream and/or coastal habitat restoration; design and construction of green infrastructure SCMs; water quality monitoring/assessment; outreach and education which address water quality issues in priority watersheds, such as erosion due to unstable streambanks, pollution from stormwater runoff, and degraded shorelines caused by development.

- **USDA Water and Waste Disposal Loan and Grant Program**  
Supports drinking water, stormwater, and sewage systems in rural towns of less than 10,000 residents.
- **EPA Sewer Overflow and Stormwater Reuse Municipal Grants**  
Funds sewer and stormwater infrastructure upgrades, including inspection technologies.
- **Aquatic Invasive Plant Control, Prevention and Research Grants (NHDES AIPC)**  
Funds are available each year for projects that prevent new infestations of exotic plants, including outreach, education, Lake Host Programs, and other activities.



## Land Conservation and Habitat Protection

- **Land and Community Heritage Investment Program (LCHIP)**  
Matching funds for preserving natural, historical, and cultural resources.
- **Aquatic Resource Mitigation Fund**  
Compensatory mitigation funding for wetland and stream restoration/enhancement.
- **North American Wetlands Conservation Act (NAWCA) Grants**  
Matching funds for wetland and upland habitat conservation benefiting migratory birds.
- **National Park Service Land and Water Conservation Fund Grant Program (LWCF)**  
Funds for acquisition of parkland or conservation land; creation of new parks; renovations to existing parks; and development of trails.
- **National Fish and Wildlife Foundation Northeast Forest and River Fund (NFWF NEFRF)**  
\$50,000-\$200,000 for projects that restore and sustain healthy forests and rivers through habitat restoration, fish barrier removal, and stream connectivity such as culvert upgrades.



## Agriculture, Forestry, and Land Stewardship

- **US Department of Agriculture Conservation Stewardship Program (CSP)**  
Supports conservation activities on working agricultural and forest lands.
- **US Department of Agriculture Environmental Quality Incentives Program (EQIP)**

Technical and financial support for agriculture and non-industrial forestry projects that improve environmental health.

- **Agricultural Conservation Easement Program (ACEP)**  
Protects farmland, restores wetlands, and maintains grazing land conservation values.
- **Nutrient Management Loan Program**  
Assists farms with projects like composting, irrigation, and treatment facilities.
- **Regional Conservation Partnership Program (RCPP)**  
Funds collaborative land management, restoration, and conservation projects on agricultural land or non-industrial private forest land to achieve conservation benefits and address natural resource challenges.



### **SCMs, Planning, and Flood Resilience**

- **New Hampshire State Conservation Committee Moose Plate Grants**  
Up to \$40,000 for projects including SCMs, flood resilience, water quality, conservation planning, and land conservation.

## **6.4 MONITORING PLAN**

A long-term water quality monitoring plan is critical to evaluate the effectiveness of implementation efforts over time. Given the available historic data, the following monitoring efforts are recommended to be conducted by WWA as feasible.

- A. Continue current routine monitoring at all long-term lake and stream monitoring locations.
- B. Collect Secchi disk transparency readings and dissolved oxygen/temperature profiles biweekly at the three Lake Wentworth deep spots and the Crescent Lake deep spot from May 15 to September 30 between the hours of 10 am and 2 pm each year. Profiles should measure dissolved oxygen and temperature at each meter in the lake profile.

If additional funding is available, we also recommend the following to better characterize the contribution of phosphorus from internal loading:

- Collect discrete grab samples for total phosphorus every three meters from the surface to one meter from the bottom at the Fuller's (26 meters), Governor's (22 meters), and Trigg's (17 meters) deep spots of Lake Wentworth monthly from May through October.
- Collect sediment samples (top 4 inches) from all four deep spots to analyze elemental ratios of phosphorus, aluminum, and iron and characterize fractions of phosphorus that are easily released and can fuel algal blooms (otherwise known as "biologically labile").

- Conduct flow monitoring in select tributary sites to characterize pollutant loading from streams under various weather conditions. We recommend tributaries with the highest water/pollutant loads such as Willey Brook, Heath Brook, Warren Brook, Claypit Brook, and/or Fernald Brook (highest water loads), or Breezy Brook, Whitten Brook, both sites on Townsend Brook, and/or Harvey Brook (highest phosphorus load per sub-watershed area).

## 6.5 INDICATORS TO MEASURE PROGRESS

The following **environmental**, **programmatic**, and **social** indicators and associated milestones will help to track progress toward meeting the water quality goal and objectives (Table 21). Milestones are set for short-term (2028), mid-term (2030), and long-term (2035) intervals, based on actions identified in the Action Plan (Section 5). These milestones support periodic plan updates, ensure ongoing relevance, and help WWA determine whether adjustments are needed if targets are not being met.

- Environmental indicators** directly measure conditions in the watershed and reflect the relationship between pollutant sources and water quality. They assume implementation of recommended actions from the Action Plan.
- Programmatic indicators** track watershed protection and restoration activities that help to achieve the water quality goal.
- Social indicators** measure shifts in community practices and behaviors that support management measures and water quality improvement.

**Table 21.** Environmental, programmatic, and social indicators for the Lake Wentworth–Crescent Lake WMP Update. Milestones are cumulative, starting at year 1, 2026. ppb = parts per billion.



### Environmental Indicators

Milestone	2028	2030	2035
Achieve an average summer deep spot epilimnion total phosphorus concentration of 5.0 ppb at the deep spot station in Lake Wentworth [1 Fuller’s].	<6.0 ppb	<5.5 ppb	<5.0 ppb
Achieve an average summer deep spot epilimnion total phosphorus concentration of 7.2 ppb at the deep spot site at Crescent Lake [6 Center].	<7.6 ppb	<7.4 ppb	<7.2 ppb
Achieve an average summer deep spot epilimnion chlorophyll- <i>a</i> concentration of less than 1.5 ppb at the deep spot station in Lake Wentworth [1 Fuller’s].	<1.7 ppb	<1.6 ppb	<1.5 ppb

Achieve an average summer deep spot epilimnion chlorophyll- <i>a</i> concentration of less than 1.4 ppb at the deep spot station in Crescent Lake [6 Center].	<2.0 ppb	<1.7 ppb	<1.4 ppb
Eliminate the occurrence of cyanobacteria or algal blooms in Lake Wentworth (milestones based on NHDES-issued cyanobacteria warnings from 2023/2024).	12 days per year	6 days per year	0 days per year
Eliminate the occurrence of cyanobacteria or algal blooms in Crescent Lake (milestones based on NHDES-issued cyanobacteria warnings from 2023/2024).	3 days per year	2 days per year	0 days per year
Achieve an average summer water clarity of 6.0 meters or deeper at the deep spot station in Lake Wentworth [1 Fuller’s] (based on modeled results).	5.6 meters+	5.8 meters+	6.0 meters+
Achieve an average summer water clarity of 6.3 meters or deeper at the deep spot station in Crescent Lake [6 Center] (based on modeled results).	5.2 meters+	5.7 meters+	6.3 meters or bottom
Prevent and/or control the introduction and/or proliferation of invasive aquatic species all waterbodies.	Minimal invasives	Minimal invasives	Absence of invasives



### Programmatic Indicators

Milestone	2028	2030	2035
Amount of funding secured from municipal/private work, fundraisers, donations, and grants.	\$200,000	\$625,000	\$1,000,000
Number of nonpoint source sites remediated for Lake Wentworth.	2	5	13
Number of nonpoint source sites remediated for Crescent Lake.	1	2	4
Percentage of shorefront properties with LakeSmart certification.	25%	50%	75%
Number of watershed/shoreline properties receiving technical assistance for implementation cost sharing on Lake Wentworth.	5	24	46
Number of watershed/shoreline properties receiving technical assistance for implementation cost sharing on Crescent Lake.	4	9	18
Number of workshops and trainings for stormwater improvements to residential properties (e.g., NH Lakes).	1	2	5
Number of updated or new ordinances that target water quality protection.	1	2	3
Number of new municipal staff for inspections and enforcement of regulations.	1	1	2
Number of voluntary or required septic system inspections (seasonal conversion and property transfer).	2	10	25

Number of septic system upgrades.	2	10	25
Number of informational workshops and/or trainings for landowners, municipal staff, and/or developers/landscapers on local ordinances, watershed goals, and/or best practices for road management and winter maintenance.	1	5	10
Number of parcels with new conservation easements or number of parcels put into permanent conservation.	1	2	5
Number of watershed-based educational materials distributed or articles published.	200	500	1,000
Number of new best practices for road management and winter maintenance implemented on public and private roads by the municipalities.	2	5	10
Number of municipalities fully implementing key aspects of the MS4 program (regardless of being required to do so).	1	1	2
Number of meetings and/or presentations to municipal staff and/or boards related to the WMP.	2	5	10
Number of Comprehensive Nutrient Management Plans completed or NRCS technical assistance provided for farms in the watershed.	1	2	3



## Social Indicators

Milestone	2028	2030	2035
Number of new association members.	5	10	25
Number of volunteers participating in educational campaigns.	75	150	250
Number of people participating in informational meetings, workshops, trainings, SCM demonstrations, or group septic system pumping.	250	350	500
Number of watershed residents installing conservation practices on their property and/or participating in LakeSmart.	25	100	200
Number of municipal Public Works staff receiving Green SnowPro training.	1	3	5
Number of groups or individuals contributing funds for plan implementation.	25	50	100
Number of newly trained water quality and invasive species monitors.	2	4	6
Percentage of residents making voluntary upgrades or maintenance to their septic systems (with or without free technical assistance), particularly those identified as needing upgrades or maintenance.	10%	25%	50%
Number of farmers working with NRCS or CCCD.	1	2	3
Number of weekly visitors to the WWA website.	25	50	100

# ADDITIONAL RESOURCES

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[Buffers for wetlands and surface waters: a guidebook for New Hampshire municipalities.](#) Chase, et al. 1997. NH Audubon Society.

[Commercial Green SnowPro Certification.](#) New Hampshire Department of Environmental Services.

[Conserving your land: options for New Hampshire landowners.](#) Lind, B. 2005. Center for Land Conservation Assistance / Society for the Protection of New Hampshire Forests.

[Environmental Fact Sheet: Erosion Control for Construction within the Protected Shoreland.](#) New Hampshire Department of Environmental Services, SP-1, 2020.

[Gravel road maintenance manual: a guide for landowners on camp and other gravel roads.](#) Maine Department of Environmental Protection, Bureau of Land and Water Quality. April 2010.

[Gravel roads: maintenance and design manual.](#) U.S. Department of Transportation, Federal Highway Program. November 2000. South Dakota Local Transportation Assistance Program (SD LTAP).

[Innovative land use techniques handbook.](#) New Hampshire Department of Environmental Services. 2008.

[Landscaping at the water's edge: an ecological approach.](#) University of New Hampshire, Cooperative Extension. 2007.

[Municipal Green SnowPro Certification.](#) New Hampshire Department of Environmental Services.

[New Hampshire Homeowner's Guide to Stormwater Management: Do-It-Yourself Stormwater Solutions for Your Home.](#) New Hampshire Department of Environmental Services, Soak Up the Rain New Hampshire. Revised November 2019.

[New Hampshire Stormwater Manual.](#) University of New Hampshire Stormwater Center, Comprehensive Environmental, Inc., New Hampshire Department of Environmental Services. 2025.

[NHDES Fact Sheets on Watersheds, Low Impact Development, Snow and Ice, and Salt Reduction.](#) New Hampshire Department of Environmental Services.

[NHDES Road Salt Reduction.](#) New Hampshire Department of Environmental Services.

NRCS [Field Office Technical Guide \(FOTG\)](#) for New Hampshire to provide information regarding agricultural BMPs.

[Protecting water resources and managing stormwater.](#) University of New Hampshire, Cooperative Extension and Stormwater Center. March 2010.

## **NHDES Fact Sheets**

[Cyanobacteria in New Hampshire Waters.](#) WD-WMB-10, 2023.

[Erosion Control for Construction within the Protected Shoreland.](#) SP-1, 2020.

[Lake Eutrophication.](#) WD-BB-3, 2019.

[Lawn Care within the Protected Shoreland.](#) SP-2, 2020.

[New Hampshire Fish Consumption Guidelines.](#) ARD-EHP-25, 2021.

[New Hampshire Volunteer Lake Assessment Program \(VLAP\).](#) WB-BB-26, 2019.

[Phosphorus: Too much of a good thing.](#) WD-BB-20, 2019.

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# APPENDIX A: SCM MATRIX

**Table A-1.** Site ID, priority rank, location description, latitude, longitude, and estimated pollutant load reductions following Stormwater Control Measure (SCM) implementation for the 114 nonpoint source sites identified in the Lake Wentworth-Crescent Lake watershed. Sites are grouped by lake and status (completed, designed, or not addressed). Pollutant load reduction estimates are preliminary and are for planning purposes only. TP = total phosphorus. TN = total nitrogen. TSS = total suspended solids. kg/yr = kilograms per year. Details on recommended SCMs by site are available in a separate Microsoft Excel® document.

Lake	Status	Site ID	Rank	Description	Latitude	Longitude	TP removal (kg/yr)	TN removal (kg/yr)	TSS removal (tons per year)
Crescent	Not Addressed	98	4	Christian Ridge Road - Wetlands	43.5828	-71.1988	0.04	4.37	0.33
		96 R dot	7	Crescent Lake Avenue - Old Failed Level Lip Spreader	43.5833	-71.2009	1.27	none	none
		122	15	Treadwell Lane	43.5788	-71.1925	0.00	0.00	0.00
		123	16	Golf Course	43.5813	-71.1937	0.02	0.00	0.00
		46	22	Center Street at Evans Brothers	43.5979	-71.1988	0.03	2.16	0.16
		55	23	41 Crystal Shore Lane	43.5930	-71.1939	0.09	10.17	0.82
		61	27	242 McMamus Road	43.5856	-71.1914	0.05	1.20	0.07
		49	28	8 Zephyr Lane	43.5955	-71.1965	0.08	7.05	0.62
		62	29	204 McMamus Road	43.5835	-71.1924	0.10	2.22	0.16
		54	35	33 Crystal Shore Lane	43.5933	-71.1942	0.04	3.34	0.29
		60	54	59 Kings Pine Road	43.5881	-71.1921	0.01	0.22	0.01
		47	56	Whitten Neck & Lake Wentworth at Crescent Lake	43.5968	-71.1952	0.02	2.34	0.16
		64	57	Christian Ridge Road	43.5820	-71.1990	0.01	1.22	0.19
		69	58	Kingswood Regional High School	43.5760	-71.1890	0.82	64.44	4.65
		53	72	37 Blackberry Lane	43.5930	-71.1994	0.00	0.00	0.00
108	75	Kingswood Golf Club	43.5815	-71.1925	0.15	0.00	0.00		

Lake	Status	Site ID	Rank	Description	Latitude	Longitude	TP removal (kg/yr)	TN removal (kg/yr)	TSS removal (tons per year)
Crescent	Designed	67 Y dot	6	Next to the Lake Motel - South Main Street Drainage Outlet	43.5790	-71.1971	10.68	none	none
		48	18	Cotton Valley Rail Trails - Crescent Lake	43.5955	-71.1981	0.26	none	none
		63	41	Huggins Hospital - Back Parking Area	43.5824	-71.1996	0.85	none	none
		97 Y dot	42	Huggins Hospital - Old Storm Water Detention Pond	43.5824	-71.2006	0.27	40.08	2.85
Wentworth	Completed	99 G dot	52	Fire Station	43.5798	-71.2014	0.07	7.93	0.51
		71 G dot	61	Pleasant Valley Road at Heath Brook	43.5770	-71.1721	0.00	0.00	0.00
		52 G dot	88	Crescent Lake Boat Launch and Lower Parking Area	43.5934	-71.2006	0.01	1.11	0.05
		22 G dot	89	Trite Enterprise - South	43.6162	-71.1727	2.41	none	none
		50 G dot	90	Silver Street at Crescent Lake Boat Launch	43.5934	-71.2011	0.06	6.62	0.43
		68	91	Kingswood Condos - Lower Condos and Lake Access	43.5813	-71.1939	1.98	none	none
		36	92	Center Street and Trotting Track Road at Hersey (Tyler) Brook	43.6082	-71.1846	0.13	none	none
		102	93	Trotting Track Road Drainage Swale	43.6082	-71.1857	0.00	0.00	1.29
		40 a	94	Governor Wentworth Highway at Clay Pit Brook	43.6128	-71.1436	2.15	none	none
		51	95	Crescent Lake Boat Launch - Upper Parking Area	43.5934	-71.2009	0.00	0.01	0.00
		40 b	96	Governor Wentworth Highway Pull Off #2	43.6128	-71.1436	Included in site 40a	none	none
		65	97	Kingswood Condos - Upper Area and Gravel Access	43.5792	-71.1948	0.43	none	none
		43	98	Center Street at Harvey Brook	43.6054	-71.1889	0.18	14.22	1.08
		70	99	Camp Bernadette Beach Area and Access	43.5851	-71.1730	1.79	none	none
		70 G dot	100	Camp Bernadette Paved Drainage Areas	43.5851	-71.1726	0.02	1.31	0.16
21	102	Trite Enterprise - North	43.6172	-71.1715	1.69	none	none		

Lake	Status	Site ID	Rank	Description	Latitude	Longitude	TP removal (kg/yr)	TN removal (kg/yr)	TSS removal (tons per year)
Wentworth	Completed	37	103	Fern Avenue Beach	43.6130	-71.1700	0.37	none	none
		90	104	Birchmont Camp - Steep Access Road	43.5949	-71.1214	0.07	none	none
		100	105	South Main Street and Coves End Road	43.5779	-71.1960	0.10	none	none
		92	106	Birchmont Camp - Beach parking area	43.5931	-71.1213	1.21	none	none
		91	107	Birchmont Camp - Outside of the beach	43.5934	-71.1220	0.11	0.86	0.08
		66	108	Lake Motel - South Main Street between motel and the lake	43.5798	-71.1979	2.46	none	none
		75	109	Red Brook Circle / Wentworth Estates - Upper Drainage	43.5810	-71.1639	0.03	0.14	0.02
		88	101	Pleasant Valley Road at 3 Lot Subdivision	43.5753	-71.1264	0.37	7.72	0.91
	Not Addressed	104	2	Willey Brook Sediment Delta	43.6122	-71.1622	57.33	none	none
		24	5	Bryant Road at Frost Brook	43.6152	-71.1281	0.07	1.88	0.12
		72	8	88 Churchill Road	43.5839	-71.1654	0.01	0.18	0.01
		73	9	96 Churchill Road	43.5839	-71.1646	0.01	0.23	0.02
		35	10	Center Street at Albee Contractors	43.6092	-71.1850	0.00	0.00	0.03
		89	11	Warren Sands Road at Warren Brook (Gravel Pit)	43.5835	-71.1200	0.02	0.26	0.01
		86	12	Pleasant Valley Road - Residential Site	43.5796	-71.1381	0.05	2.02	0.15
		93	13	Martin Hill Road	43.5997	-71.1124	0.14	4.57	0.56
		12	14	Stoddard Rd @ Willey Brook (North)	43.6488	-71.1328	3.47	6.94	9.00
		26	15	Jeness Farm Road at Frost Brook	43.6172	-71.1194	0.03	0.45	0.03
		34	16	Trotting Track Road & Private Road at Hersey (Tyler) Brook	43.6113	-71.1913	0.00	0.00	0.09
		84	20	120 Townsend Shore Road	43.5839	-71.1323	0.43	none	none
120	21	Stoddard Road at Claypit Brook Tributary	43.6295	-71.1276	0.00	0.00	0.00		
56	24	4 Shady Lane	43.5943	-71.1879	0.01	0.16	0.01		
57	25	6 Shady Lane	43.5940	-71.1876	0.00	0.05	0.00		

Lake	Status	Site ID	Rank	Description	Latitude	Longitude	TP removal (kg/yr)	TN removal (kg/yr)	TSS removal (tons per year)
Wentworth	Not Addressed	58	26	60 Holden Shore Road	43.5935	-71.1860	0.01	0.21	0.01
		87	30	Brackett Corner Road at Townsend Brook	43.5722	-71.1285	0.00	0.00	0.00
		77	31	Point O Pines at Townsend Brook	43.5826	-71.1423	0.00	0.00	0.00
		80	32	Pleasant Valley Road at Townsend Brook (East)	43.5792	-71.1402	0.00	0.00	0.42
		85	33	100 Townsend Shore Road	43.5841	-71.1341	0.02	0.06	0.02
		121	34	Chick Road at Claypit Brook	43.6352	-71.1373	0.07	0.15	0.19
		18	44	North Line Road at Fernald Brook	43.6200	-71.1730	0.02	0.27	0.01
		59	45	92 Holden Shore Road	43.5918	-71.1837	0.00	0.16	0.01
		30	46	Middle Road at Harvey Brook	43.6086	-71.2147	0.02	1.52	0.11
		32	48	Beach Pond Road at Harvey Brook	43.6089	-71.2136	0.01	0.61	0.04
		78	50	Pleasant Valley Road at Townsend Brook (West)	43.5795	-71.1391	0.00	0.47	0.03
		14	53	Center Street at Willey Brook (South)	43.6297	-71.1585	0.21	20.67	1.42
		33	55	Trotting Track Road (East) at Harvey Brook	43.6092	-71.2044	0.01	0.75	0.05
		101	59	Townsend Brook Streambank Erosion	43.5784	-71.1358	0.18	0.37	0.48
		16	60	College Road at Willey Brook	43.6231	-71.1604	0.00	0.00	0.12
		107	62	Townsend Brook Sediment Delta	43.5832	-71.1440	0.08	0.00	0.00
		10	63	Center Street at Willey Brook (North)	43.6391	-71.1565	0.09	7.93	0.51
		41	64	Bryant Road at Ryefield Brook	43.6089	-71.1277	0.02	0.69	0.04
		76	65	New Garden Road at Heath Brook	43.5680	-71.1480	0.00	0.00	0.01
		83	66	Stoneyfield Farm Road at Townsend Brook	43.5768	-71.1346	0.00	0.00	0.00
23	67	Governor Wentworth Highway at Willey Brook	43.6162	-71.1616	0.06	<i>none</i>	<i>none</i>		
106	68	Harvey Brook Sediment Delta	43.6013	-71.1871	0.06	0.00	0.00		
17	69	College Road at Clay Pit Brook	43.6214	-71.1382	0.00	0.00	0.23		

Lake	Status	Site ID	Rank	Description	Latitude	Longitude	TP removal (kg/yr)	TN removal (kg/yr)	TSS removal (tons per year)	
Wentworth	Not Addressed	25	70	Cotton Valley Road at Frost Brook	43.6166	-71.1212	0.01	0.33	0.05	
		29	71	Cotton Valley Road at Ryefield Brook	43.6097	-71.1073	0.00	0.00	0.02	
		94	73	Wentworth Farm Road at Morrill Brook	43.6002	-71.1235	0.37	5.00	0.52	
		105	74	Hersey (Tyler) Brook Sediment Delta	43.6033	-71.1823	0.23	0.00	0.00	
		1	76	Pork Hill Road at Batson Pond & Willey Brook	43.6624	-71.1525	0.04	0.99	0.05	
		3	77	Center Street by Johnson Road at Unnamed Pond	43.6611	-71.1479	0.00	0.10	0.01	
		11	78	Haines Hill at Willey Brook	43.6425	-71.1479	0.00	0.00	0.04	
		31	79	Middle Road and Beach Pond Road at Harvey Brook	43.6084	-71.2142	0.00	0.12	0.02	
		7	80	Sargents Pond Road at Sargents Pond	43.6273	-71.2022	0.00	0.00	0.01	
		42	81	Turtle Island Road at Morrill Brook	43.6056	-71.1357	0.00	0.00	0.00	
		8	82	North Line Road at Sargents Pond	43.6310	-71.1943	0.00	0.04	0.00	
		81	83	Orchard Drive #41 & #59	43.5758	-71.1391	0.00	0.00	0.15	
		13	84	Stoddard Road at Willey Brook (South)	43.6461	-71.1322	0.09	0.15	0.20	
		28	85	Cotton Mountain Road at Ryefield Brook Tributary	43.6152	-71.1025	0.00	0.00	0.22	
		6	86	Beach Pond Road at Sargents Pond	43.6322	-71.2065	0.01	0.16	0.01	
		15	87	Bickford at Clay Pit Brook	43.6298	-71.1329	0.00	0.00	0.03	
		124 R dot	110	Kingswood Condos - Lower Condos & Lake Access - Beach	43.5813	-71.1939	<i>Included in site 68</i>		<i>none</i>	<i>none</i>
		9 R dot	111	Tribbets Road at Fernald Book	43.6353	-71.1747	0.00	0.00	0.00	
		125	no rank	Claypit Brook at Stoddard Road	43.6315	-71.1285	0.00	0.00	0.00	
	Designed	103	1	Fernald Brook Sediment Delta	43.6124	-71.1702	20.00	<i>none</i>	<i>none</i>	
74		3	Red Brook Circle at Lake Wentworth - Culvert / Outfall & Lake Access	43.5835	-71.1632	2.77	<i>none</i>	<i>none</i>		

Lake	Status	Site ID	Rank	Description	Latitude	Longitude	TP removal (kg/yr)	TN removal (kg/yr)	TSS removal (tons per year)
Wentworth	Designed	45 Y dot	17	Cotton Valley Rail Trails - Lake Wentworth	43.6008	-71.1908	0.19	none	none
		79	19	Pleasant Valley Road at DeVyler Farm	43.5792	-71.1395	2.27	none	none
		39 Y dot a	36	Wentworth State Park - Beach Area	43.6123	-71.1460	1.29	none	none
		39 Y dot b	37	Wentworth State Park - Park Area	43.6123	-71.1460	Included in site 39 Y dot a	none	none
		38	38	Governor Wentworth Highway Pull Off #1 at Trigg's Landing	43.6118	-71.1515	1.24	none	none
		82	39	Orchard Drive and Pleasant Valley Road at Townsend Brook	43.5788	-71.1369	0.05	none	none
		44 Y dot	40	Albee Beach	43.6041	-71.1839	0.30	none	none
		2	43	Pork Hill Road at Unnamed Pond and Willey Brook	43.6612	-71.1499	0.01	1.76	0.11
		19 Y dot	47	7-11 Store Parking Lot	43.6192	-71.1723	0.47	none	none
		20 Y dot	49	Center Street at Fernald Brook	43.6183	-71.1725	0.09	none	none
		95	112	125 Turtle Island Road	43.6005	-71.1354	0.82	none	none