

# 1. INTRODUCTION

## 1.1 BACKGROUND AND PURPOSE

The Lake Sunapee Watershed covers approximately 46.6 square miles or 29,832 acres, spans Merrimack and Sullivan Counties, and covers portions of the towns of Newbury, Springfield, Sunapee, New London, Sutton and Goshen (Appendix A, Watershed Towns Map 1). The Lake Sunapee Watershed is defined as the area of land and complex of wetlands, ponds, and tributaries which drain to Lake Sunapee (Appendix A, Watershed Relief Map 2). This area includes 13 named lakes and ponds throughout the watershed and 19 major tributary streams that drain directly into Lake Sunapee. There are also numerous smaller streams and brooks further upstream in the watershed. Most of the lakes, ponds and tributaries are explicitly covered in the modeling and recommendations associated with this plan.

Water quality in the open waters of Lake Sunapee is generally good and is representative of a low nutrient, low productivity (oligotrophic) system. However, water quality in lakes and ponds in the watershed and increasingly in embayments of Lake Sunapee show evidence of increased nutrient concentrations and associated increases in productivity. Specifically, the cyanobacteria, *Gloeotrichia echinulata* has been observed more frequently and in greater density in recent years. While the mechanism for increased prevalence of this species even in very low nutrient systems is currently being evaluated regionally, it is likely that increased phosphorus concentrations in the water column or in the sediments are at least a contributing factor (Cottingham et al. 2015). Changes in land use throughout the watershed are likely contributors to increased phosphorus loading to Lake Sunapee and upstream waterbodies. These include but are not limited to logging activity, development of residential housing, road maintenance, residential building and expansion, commercial development and development or redevelopment of lakefront properties. Water quality, particularly phosphorus concentrations and related cyanobacterial, algal and plant growth are elevated, at times, in many locations throughout streams, lakes and ponds in the Lake Sunapee Watershed and in Lake Sunapee itself. These factors support the need for a watershed assessment and management plan for the Lake Sunapee watershed to preserve water quality for the future.

The purpose of this plan is to support the preservation of Lake Sunapee water quality by identifying potential restoration measures to address identified watershed problems, encourage land use guidance to minimize or avoid future problems and educate stakeholders and landowners on ways to minimize the phosphorus footprint of individual parcels throughout the watershed. This document develops, assesses and prioritizes options to protect and improve water quality. It assembles new and existing watershed information, presents restoration plan options, and provides a “roadmap” for the Lake Sunapee Watershed. This plan is designed to be *dynamic* and *adaptive*. As new information is gained, the plan will be updated as needed.

This plan also provides a framework to leverage existing information and data sources. These resources include, but are not limited to, the following:

- LSPA water quality data and reports
- Volunteer Lake Assessment Program (VLAP) water quality data
- 2008 Lake Sunapee Watershed Plan
- NHDES guidance and fact sheets
- Town planning and zoning documents
- New Hampshire Department of Transportation (NHDOT) planning documents
- Regional planning documents
- Non-governmental organization (NGO) plans for conservation activities
- Lake and watershed associations throughout the watershed

All of this information is incorporated into this plan either explicitly or by reference. As related programs evolve or new programs with a shared mission to this watershed plan emerge, this plan should be modified to incorporate this information.

Specifically, this plan:

- quantifies primary sources of phosphorus loading using existing data and a watershed and lake response model;
- uses a buildout analysis approach to predict future phosphorus sources and loading rates;
- documents the development of a stakeholder derived water quality goal;
- prioritizes sources and makes recommendations for actions to reduce phosphorus loading to Lake Sunapee;
- includes an outreach program for residents and lake users about the sources and consequences of non-point source pollution and;
- includes Best Management Practice (BMP) designs to address sources.

This Plan is an update of the 2008 Management Plan for the Lake Sunapee Watershed (Sunapee Area Watershed Coalition and Granite State Rural Water Association 2008).

## **1.2 STATEMENT OF GOAL**

This plan's goal of reducing non-point source pollutants that reach Lake Sunapee is in line with LSPA's mission of preserving and enhancing the special environment of the Lake Sunapee Region through education, research and collaborative action. The stakeholders have set an ambitious goal of reducing the amount of phosphorus loading over a ten-year period by 100 kg which is a 7.5% reduction in the current estimated amount entering the lake. If successful, this will improve the water quality of Lake Sunapee in the face of certain change due to developmental pressures and climate change.

### 1.3 INCORPORATING EPA'S NINE ELEMENTS

This section provides a roadmap to the nine elements required for watershed plans developed under USEPA guidance. The nine elements and section references are provided below.

A) Identify causes and sources of pollution

This element is satisfied in this report through work that spans several sections. The sources of phosphorus are identified in Section 3.4: Watershed Septic System Survey Assessment, Section 3.5: Water Quality Model and Section 3.6 Watershed Stormwater Survey Assessment.

B) Estimate load reductions needed

The loading model (Section 3.5) was used to evaluate the in-lake implications of the load reduction goal of 100 kg. This plan lays out proposed watershed actions (Section 5.3) that are needed to meet the goal.

C) Describe management measures and targeted critical areas

Plan Implementation (Section 5) provides guidance on education and outreach, research, further evaluation, monitoring and assessment, land conservation, land use regulation, zoning and ordinances, as well as, specific BMPs to address identified sources of phosphorus. These all will help LSPA meet the goal set out in Section 1.2.

A comprehensive list of structural BMPs was developed to address specific stormwater problem areas identified during the watershed surveys. These structural BMPs have been coupled with institutional controls and nonstructural BMPs to develop a suite of measures designed to mitigate phosphorus loadings to Lake Sunapee, over the life of this plan. The identification of stormwater problem areas and development of structural BMPs is explained further in Sections 4.2 and 5.3.7, while institutional and nonstructural controls are discussed in Section 4.2.2.

D) Estimate technical and financial assistance needed

LSPA will serve as lead in implementation of the action plan (Section 5.3) and seek technical assistance as needed such as engineering services and permitting guidance from local, state and federal authorities. Section 5.6 provides cost estimates for implementation of the plan including proposed BMP projects. These cost estimates will facilitate planning over the lifespan of this plan.

- E) Develop an information and education program

LSPA currently has a comprehensive education and outreach program. For more details on the Education and Outreach Plan see Section 5.3.1.

- F) Develop a project schedule

A schedule developed with input from stakeholders and LSPA is described in Section 5.5.

- G) Describe interim measurable milestones

Milestones tied back to the water quality goal for plan implementation are discussed in Section 5.4, Indicators to Measure Progress

- H) Identify indicators to measure progress

The monitoring plan described in Section 5.7 builds on the current LSPA monitoring program and provides data to describe the total phosphorus (TP), chlorophyll-*a* and transparency improvement in-lake as well as specific measures to evaluate effectiveness of BMPs and non-structural programs.

- I) Develop a monitoring component

The existing monitoring program described in Section 5.7 is sufficient to establish baseline water quality and predict future trends for planning purposes on Lake Sunapee. To improve this program, project specific monitoring of plan elements was proposed to evaluate some BMP projects or critical subwatersheds with limited data in the current program. Areas where reallocation of monitoring resources would be beneficial was also suggested.

#### **1.4 PLAN DEVELOPMENT AND COMMUNITY PARTICIPATION PROCESS**

Water quality has been a keystone issue for the Lake Sunapee community since the 1950's. Beginning in the 1980's, LSPA has taken a lead role in education, water quality monitoring, watershed management and advocacy for Lake Sunapee. A historical timeline of the organization can be found in Appendix B. This watershed plan update represents an important step forward in the preservation of Lake Sunapee for the future.

LSPA was awarded a \$50,000 grant under Section 319 of the federal Clean Water Act administered by NHDES. The grant partially funds the effort to update the 2008 existing watershed management plan so it satisfies all nine elements required by the EPA for watershed plans. A Request for Qualifications (RFQ) was developed and DK Water Resource Consulting, LLC was selected as the Principal Consultant/Technical Project Manager and Stone Environmental as the Engineering Task Manager. Throughout this document, the consultants in conjunction with the LSPA are referred to as the project team. Below is a timeline of events following the initiation of the grant:

April 12, 2018	First public meeting to inform stakeholders about the grant
June 2018	Grant Watershed Committee created to review recommended actions, water quality goal, and the overall plan
August 2018	Site Specific Project Plan (SSPP) completed First Watershed Committee meeting held at LSPA
October 2018	Watershed survey began
November 2018	FAQ document created about 2020 plan and posted on LSPA website
March 2019	Created brochure with an update on the WMP to be sent to everyone in the watershed
April 2019	Article published in local newspapers about the 2020 WMP (this led to an in-person interview with New Hampshire Public Radio)
May 2019	“Lake Sunapee Watershed Management Plan Update” brochure mailed to all residents in the watershed
Summer/Fall 2019	Water quality goal determined by Water Advisory Group Buildout analysis completed Articles in LSPA’s newsletter, <i>the Beacon</i> , and e-newsletter the “ <i>Flash of the Beacon</i> ” with updates on the plan
September 2019	Septic system survey completed for all properties within 250 feet of a waterbody in the watershed
January 2020	Plan sent to Grant Watershed Committee to review Public meeting with presentation on final summary of plan
February 2020	Plan sent to NHDES for review