Final Supplemental Generic Environmental Impact Statement (FSGEIS)

Saratoga Lake Aquatic Invasive Species 2019 Long-Term Management Plan

May 16, 2019

Final Supplemental Generic Environmental Impact Statement

Saratoga Lake Aquatic Invasive Species
2019 Long-Term Management Plan

Proposed Action: Saratoga Lake Invasive Species Long-term Management Plan

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Draft SGEIS Acceptance Date: April 2, 2019

Final SGEIS Acceptance Date: May 16,2019

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TABLE OF CONTENTS

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

ACT	Aquatic Control Technology, Inc.
AE	Adirondack Ecologist
ai	active ingredient
Aquathol K	Dipotassium salt of endothall
Clearcast	Ammonium salt of imazamox
CLP	Curlyleaf Pondweed (*Potamogeton crispus*)
CSLAP	Citizen's Statewide Lake Assessment Program
DEIS	Draft Environmental Impact Statement
DO	Dissolved Oxygen
EWM	Eurasian watermilfoil (*Myriophyllum spicatum*)
HAB	Harmful Algae Bloom
mg/l (mg/L)	milligrams per liter (or parts per million)
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSOPRHP	New York State Office of Parks, Recreation, and Historic Preservation
ppb	Parts per billion
ppm	Parts per million
Renovate® OTF	Renovate® on-target flake (Triclopyr)
Renovate 3	Triclopyr, triethylamine salt
SEQRA	State Environmental Quality Review Act
Sonar® AS	Aqueous Suspension (Fluridone)
Sonar® PR	Precision Release (Fluridone)
Sonar® Q	Quick Release (Fluridone)
Sonar® SRP	Slow Release Pellet (Fluridone)
SLA	Saratoga Lake Association
SLN	Special Local Needs
SLPID	Saratoga Lake Protection and Improvement District
TP	Total Phosphorus
USDA	United States Department of Agriculture
USACOE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
µg/L	micrograms per liter (or parts per billion)
µmhos/cm	micromhos per centimeter (a measure of conductance)

GLOSSARY OF TERMS

Biomass – the mass of living organisms in a given area at a given time.

Hypolimnion - in a thermally stratified lake, the cold, bottom layer of water, which is isolated from wind-mixing and which can become low in oxygen due to microbial decomposition of organic matter.

Epilimnion – in a thermally stratified lake, the uppermost layer, which experiences mixing and aeration due to winds; it also has the greatest growth of algae and macrophytes.

Eutrophic – a nutrient rich or highly productive lake.

Eutrophication – the process of nutrient enrichment and basin filling.

Harmful Algal Blooms - phytoplankton that naturally produce biotoxins that occur when certain types of microscopic algae grow quickly in water, forming visible patches that may harm the health of the environment, plants, or animals.

Herbicide – a chemical compound used to kill undesired rooted aquatic vegetation and restrict further vegetation growth.

Littoral zone – lake shoreline habitat, extending from the water's edge and includes the area of rooted plant occurrence.

Mesotrophic – intermediate nutrient availability in a lake.

Oligotrophic – nutrient poor lake condition.

Thermal stratification – when lakes exhibit a warm layer of water of uniform temperature at the surface, a region of water exhibiting rapid temperature decrease beneath, and a uniformly cold layer of water on the bottom.

Turion – small, bulb-like plant structures that are dispersed for vegetative reproduction.

EXECUTIVE SUMMARY

SLPID was the lead agency for a 2006 Draft Environmental Impact Statement (DEIS) that described the segmented whole-lake treatment that occurred during 2007-2009.This FSGEIS completes the SEQRA process for the long-term management of Saratoga Lake. A permit is required from New York State Department of Environmental Conservation (NYSDEC) for the use of aquatic herbicides (6NYCRR 326) to treat Eurasian watermilfoil (EWM) and other aquatic plants. The DSGEIS presented the past work on Saratoga Lake, proposed future treatments or programs, and described the overall methods and approaches to the management of aquatic invasive species in Saratoga Lake.

EWM entered Saratoga Lake in the mid-1970s and reached nuisance density by the early 1980s. In 1982, a lake management plan was prepared and implemented in 1986 that involved harvesting and annual lake drawdown (Hardt,1983). In 1986, SLPID was formed to carry out the EWM control program on Saratoga Lake as a special tax district under the laws of New York State (NYS) S. 7690-B,A. 9211-B March 4, 1986.

In 2002 a Watershed Management Plan for Saratoga Lake was prepared that identified the need for an aquatic plant management plan. In 2005 a Long-term Aquatic Vegetation Management Plan was prepared and accepted by the SLPID board. This plan identified the need to improve the level of control of EWM and that the methods to gain control would involve large-scale herbicide applications.

Eurasian watermilfoil (EWM) and curly-leaf pondweed (CLP) are the most widespread non-native aquatic invasive plants and have been the primary focus of recent management efforts in Saratoga Lake. Water chestnut (*Trapa natans*) has also been present in varying densities for several years, but most of the growth has been found at the Kayaderosseras Creek outlet and along the Fish Creek shoreline. In 2016, European frogbit *(Hydrocharis morsus-ranae)* was detected and continues to be found occasionally but is most often found near the State Boat Launch. In 2018, a small patch was pulled by hand from the boat launch area.

Lake-wide mechanical harvesting efforts to control EWM and nuisance aquatic plant growth began in 1986. Between 1994 and 2004 it was estimated that the dense beds of EWM had increased from 400 acres to over 700 acres. A DEIS was prepared and accepted by SLPID in 2006 to implement the recommendations of the aquatic plant management plan. In 2007, 2008, and 2009 a sequential whole-lake herbicide treatment program was completed to control the dense beds of EWM. Segmented whole-lake herbicide treatment efforts were found to be successful in controlling EWM. Between 2010 and 2015, annual spot-treatments with herbicides were conducted to prevent EWM from returning to pre-treatment dominance. No herbicide treatments were performed in 2016, but Herbicide applications resumed in 2017 and 2018.SLPID's harvesting program has continued annually, as well as the annual winter draw down.

Small but dense beds of EWM are most noticeable along the northeast shoreline off Franklin's Beach and along the southern shoreline between Brown's Beach and the South Shore Marina. Native plant growth, also extensive in these areas, is dominated by water stargrass (*Zosterella dubia*) in the shallow areas and a variety of pondweed species in deeper water.

The primary herbicide treatments have used Renovate® OTF (triclopyr granular) since it targets EWM and is quickly absorbed by the plant. To reduce the possibility of chemical resistance, other herbicides are used including Navigate (2,4-D granular) and Aquathol K (endothall) as a combined treatment for the control of EWM and CLP. Navigate and Clearcast®(imazamox) have also been used to control Water chestnut. The herbicide ProcellaCOR ® is now registered in NYS and may also be used to control EWM, as well as other plants identified on the label. Herbicide applications will continue to be used to control invasive species.

The annual integrated aquatic plant management process will continue to use the following steps to identify treatments of non-native invasive plants and implement harvesting programs, other mechanical controls and hand harvesting efforts:

Early-season visual inspection to evaluate EWM and CLP distributions and finalize the annual treatment scope.
Post-treatment survey and water quality sampling as required by permit conditions.
Hydro-raking and harvesting assistance to remove water chestnut plants from shallow areas near the mouth of Kayaderosseras Creek and herbicide applications to further control water chestnut.
Update harvesting equipment as necessary and in a timely fashion and continue preventative maintenance work.
Late season visual survey to confirm findings of DFWI survey and to plan future management efforts.
Early evaluation of the need for treatment and discussion of alternatives including no herbicide treatment.
Re-fine the use of a combined herbicide treatment strategy to improve the level of control by better targeting treatment area or by increasing the dose above minimum concentrations.
Integrate new herbicides into the management plan as they become registered including ProcellaCOR® and others.
Continue to employ lake stewards to carry out boat inspections at the State Boat Launch and other lake access points.
Continue the coliform monitoring program that will provide data on the general water quality along the shoreline.
Participate in the New York State Citizen Statewide Lake Assessment Program for water quality and HAB monitoring.
Improve and expand public outreach to better inform SLPID taxpayers of the natural conditions of the lake.
Explore equipment options to clear wind-blown plant debris from lake shores.
Limit interference with boating and recreational access by managing the native plants through harvesting efforts.

Additional long-term invasive management will include hand and mechanical harvesting, by both cutting and removal of plants by hydro-rakes annual drawdown of the lake. Harvesting efforts in the early spring include full-depth cutting since the plants are deeper into the water column and two target species - EWM and CLP - both grow rapidly in the early season.

Harvesting will generally begin during the third or fourth week of May and target EWM and CLP. During the summer months, the focus typically shifts to cutting the upper two feet of the plants. This strategy limits the amount of native plants cut in the harvesting operation permitting these plants to set seeds that aid in the spread of the native plants. The harvesting and lake draw down strategies serve to improve access to the deep-water areas for riparian owners, aid in the re-

establishment of native plant diversity in the lake by eliminating shading previously caused be EWM and protect fisheries habitat by allowing native plant species to become dominant.

Lake stewards will be employed at boat launches to inspect boats as they enter and leave the lake to limit the spread of invasive species.

The annual draw down schedule will continue to accommodate the Head of the Fish Rowing Regatta. The summer target lake level is 202.5-203 feet above mean sea level (MSL). Following the Head of the Fish Rowing Regatta the dam gates are opened to reduce the lake level to 201 feet above MSL. In the future, these elevations will be re-numbered as part of a nationwide program by the United States Geological Survey to adjust the datum due to sea level changes. These changes will not alter the actual level of the lake.

Hand harvesting will be continued on a limited basis to remove Water chestnuts and EWM from areas that are difficult to treat by harvesting or the application of chemicals. Whenever appropriate, hand harvesting of new invasive species by professionals will be a component of the rapid response plan for any new invasive plant species.

The goal of this plan is to continue to manage EWM and improve the control of Water chestnut and CLP plus limit introduction of new invasive species. A combination of detection methods including the use of lake stewards, annual inventory of aquatic plants plus additional scouting will be employed to prevent and detect the introduction of new invasives as early as possible. Monitoring of HAB will continue as available in the Citizen Statewide Lake Assessment Program (CSLAP). If HABs monitoring is not available as a part of CSLAP, SLPID will continue to do HABs sampling provided that an approved laboratory can be found. Should algae blooms become widespread or frequent in certain areas a control plan may be developed to address recurrent blooms. In-lake nutrient inactivation strategies could be considered if the area of deep-water low oxygen levels expand resulting in higher levels of phosphorous in the fall during turn over.

SECTION 1 PROJECT DESCRIPTION

1.1 Project Summary

This Final Supplemental Generic Environmental Impact Statement (FSGEIS) is prepared in accordance with 6NYCRR 617, the procedural rules for the State Environmental Quality Review Act (SEQRA). The lead agency for this action described below is the Saratoga Lake Protection and Improvement District (SLPID).

SLPID will continue to manage non-native aquatic invasive species in Saratoga Lake as set forth in the 1986 Legislative authorization. This SFGEIS will describe the evaluation of the management actions since 2007 and outline the process for continued management of non-native nuisance aquatic plants or animals. The SFGEIS consist of the executive summary, section one that describes the actions to be taken by SLPID, errata, and response to comments. This document will be guide for future in lake management actions. The following are the generic procedures that will be followed annually to manage the non-native aquatic invasive species:

- Complete an annual aquatic plant survey to determine the effectiveness of the management actions;
- Identify the available alternative control methods;
- Determine the permit requirements of the control methods;
- Understand application restrictions of the various herbicides, and water use restrictions;
- Identify whether new herbicides or biological controls are available to address the target species;
- Determine the notice requirements for herbicides used the NYSDEC dilution model;
- Adjust the treatment area to limit the dose while ensuring that enough of the treatment zone will be treated to meet control goal;
- Prepare and submit applications, as necessary, to the NYSDEC;
- Meet with the NYSDEC to review individual projects;
- Complete all required public notices;
- When feasible review the proposed treatment area in the spring in order to refine the treatment area;
- Complete the public notice posting;
- Complete the permitted treatment;
- Complete the required monitoring of herbicide in the treatment area and downstream;
- Map the area in which species were control completed and identify any non-target specie damage;
- Map and describe hand harvesting operations completed during the season.
- Complete the annual lake wide macrophyte monitoring;
- Review the post treatment report;
- Identify treatment options for the following year;
- Manage and complete aquatic plant harvesting program, track progress of harvesting and keep lake community informed on progress;

- Prepare summary of water quality sampling information, plant surveys and coliform sampling;
- Evaluate methods to remove floating debris from shallow water;
- Work as a cooperator with the United State Geological Survey to continue the operation of the lake surface water elevation gauge;
- Participate in the NYS Citizen Lake Assessment Program (CSLAP) to collect water samples that result in building a continuous water quality record;
- Collect harmful algal bloom (HAB) water samples as a part of CSLAP;
- Work cooperatively with lakefront municipalities, Saratoga County and Saratoga County departments or offices including but not limited to Soil and Water Conservation District, Sewer Authority, Water Authority, Planning Department, Sheriff's Department, and Department of Public Works; and
- Work cooperatively with Saratoga County and NYSDEC on further studies related to Saratoga Lake.

This plan builds upon the successful experience gained during the segmented whole lake treatment, treatments from 2007-2009, and subsequent treatments 2010-2018 at Saratoga Lake. New treatments used at other temperate lakes will be considered in the formulation of plans. Treatment of HABs will with copper or peroxided based herbicides will be considered and will not require a new SGEIS.

Combination treatments will continue to be used on Saratoga Lake when past experience indicates that using two herbicides such as 2,4D granular or endothall will better target the aquatics to be controlled. To control the target organism and complete treatment costs most effectively, EWM and other aquatic invasive species must be managed using an integrated approach. At the same time, importation of EWM and CLP along with other aquatic invasive species (AIS) must be prevented. Control methods will include the use of systemic and contact herbicides, mechanical harvesting, hand harvesting and draw down to suppress growth of the target species. SLPID, the Applicant and project sponsor, is proposing to continue an Integrated Pest Management Plan (IPMP) of mechanical harvesting, importation prevention, annual draw down and using registered aquatic herbicides to target Eurasian watermilfoil (EWM), curly leaf pondweed (CLP) and the current water chestnut infestation impacting Saratoga Lake. This same plan will also be the basis of new protocols to address new yet to be discovered aquatic invasive species (AIS). This plan will include components of rapid response protocols for new invasive species. This project is to be known as Saratoga Lake Invasive Species Long-term Management Plan. This plan builds upon the successful experience gained during the segmented whole lake treatment, treatments from 2010-2018 at Saratoga Lake, as well relevant treatments in other temperate lakes. This is a long-term control program that seeks to manage EWM to keep that invasive plant to between 5-30% of the overall lake plant community frequency of occurrence or other biological descriptive measurement .

This is a long-term control program that seeks to manage EWM to keep that invasive plant to between 5-30% frequency of the overall lake plant community or other biological descriptive measurement that may be found to be relevant in the future. The other invasive plants species

found in the lake will be managed to limit areas of infestations and density so that recreation on the lake is not unduly hindered. In the case of water chestnut this plant should be fully eliminated from and lake since it was found only in small areas in 2004 when activity controlled by hand harvesting (Eichler and Boylen 2004).

For both CLP and Water chestnut these plants will be controlled so that neither plan is found in dense or widespread areas, this will reduce the risk of transporting these plants from Saratoga Lake to other regional lakes. The management plan will include continued monitoring of harmful alga blooms (HAB) and treatment if required due to persistent or widespread blooms.

The level of control of under 30% frequency of EWM and at a low density of plants is economically sustainable for the SLPID, providing a high level of boating access for the recreational community, and limiting the amount of decomposing biomass on the lake bottom and shoreline without significantly impacting recreational fisheries. Improving the program to address other invasive species such as CLP will prevent uncontrolled growth of new invasives. The future program will add new chemical controls with different modes of action to avoid herbicide resistance issues. The benefits gained by controlling EWM can only be preserved by controlling other invasive plants at the same time, including CLP and water chestnut.

The management and control of the growth of EWM has historically been identified as a priority to preserve and enhance recreational access to Saratoga Lake. The presence of EWM had created many inaccessible areas of Saratoga Lake, and overburdening of other areas. EWM management will balance the areas that are used for recreation and allow for greater dispersion of users on Saratoga Lake. Improved access, safety, recreational opportunities, and ecological conditions of Saratoga Lake will provide increased opportunity for augmenting the local economies of the towns of Malta, Stillwater, and Saratoga, and City of Saratoga Springs. The New York State Boat Launch on the lake is an asset to lake communities, providing access for residents and visitors. It is the goal of this management plan to ensure the continued use of Saratoga Lake as a place for water based recreational and to sustain the lake ecology and fisheries habitat. A long-term lake management program will enhance and protect the long-term economic importance of Saratoga Lake as a statewide recreational resource. SLPID has used herbicide treatments efficiently and effectively over the many years of lake management. Should new chemicals become available on the market, there will be no need for a new environmental impact statement.

Saratoga Lake is a productive lake that will cause plants both algae, and large plants at time to grow rapidly and at high density. In the case of submersed aquatic plants ,and macro-algae, native species will be controlled by use of harvesting methods. Pesticides will be used to control non-native plants, and animals.

1.2 Project Background

Saratoga Lake is located in central Saratoga County, New York. Its watershed covers a third of the county and includes the Kayaderosseras Creek watershed (Figure 1-1, “Regional Location Map”). The towns of Saratoga, Malta, Stillwater, and the City of Saratoga Springs all have frontage on Saratoga Lake. (See Section 2.1 SDGEIS for a detailed description of Saratoga Lake and Section 2.6.1 SDGEIS for a description of segmented whole lake treatment).

In 1932, an aquatic plant survey conducted by DEC indicated that the lake was essentially free of "weeds" except for a few protected bays primarily along the south and west shores of Saratoga Lake. The first diagnostic feasibility study for the Saratoga County Sewer District was prepared in 1968 that recommended the formation of Sewer District #1 and the building a sewer around the entire lake. A second diagnostic feasibility study was completed that examined the specific changes that occurred in Saratoga Lake following the installation of the Saratoga County Sewer District 1 (Hardt, 1983). This study recommended the formation of a lake management district and the management of aquatic plants by harvesting and annual draw down.

The segmented whole lake treatment covered the lake in a three-year period at a cost of $1,076,836.00, including herbicide applications, permitting, monitoring, and mechanical harvesting. The three herbicide applications cost $761,836 and monitoring was approximately $90,000. See Table 1-1, "Summary of Herbicide Treatment Applications," and Figure 1-2, "Treatment History Map," for a summary and illustration of the application of herbicides between 2007 and 2018.See Figure 1-3, "2019 Proposed Herbicide Treatment Map," for the location for treatment of water chestnut. This is the only area proposed for herbicide treatment in Saratoga Lake for 2019.

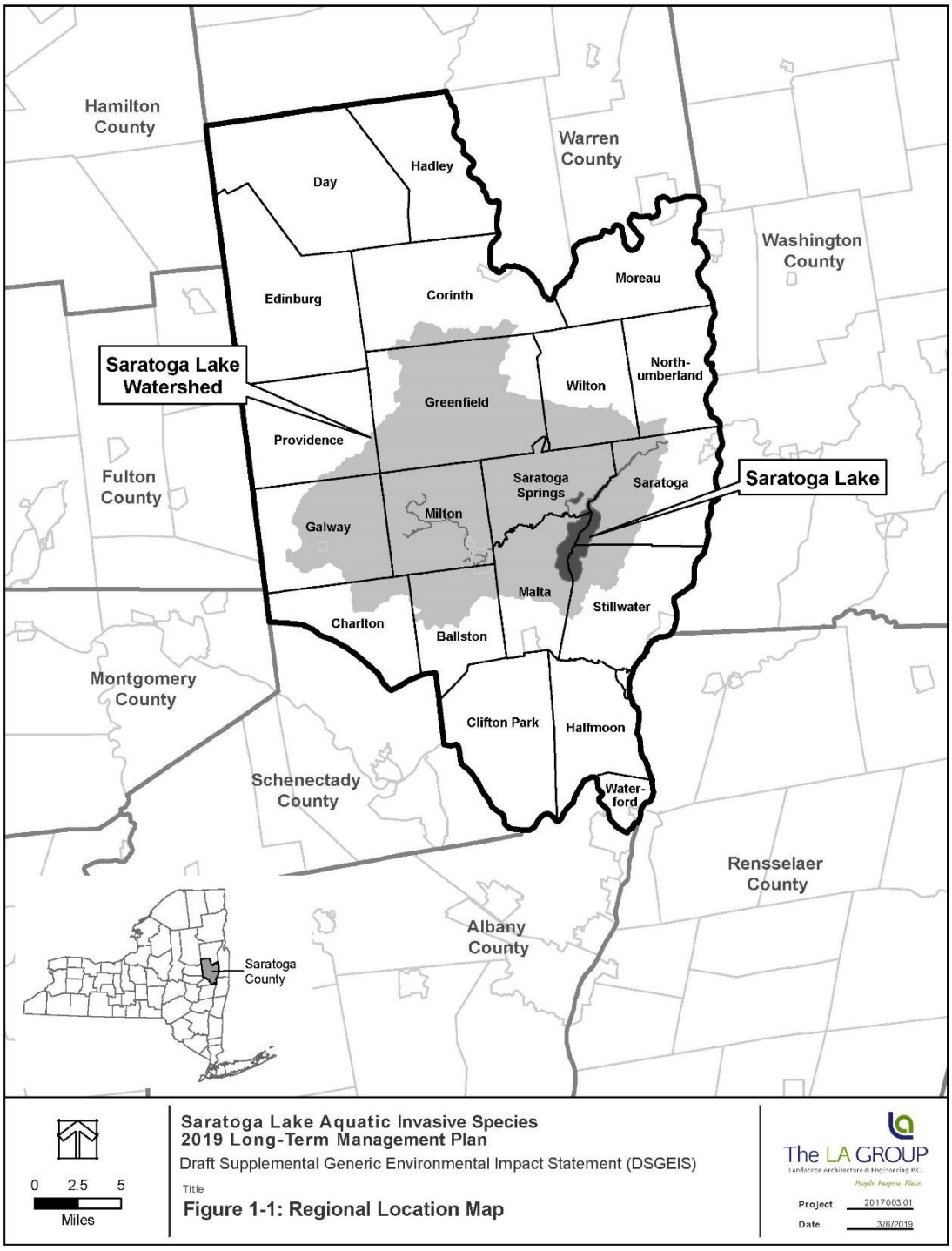
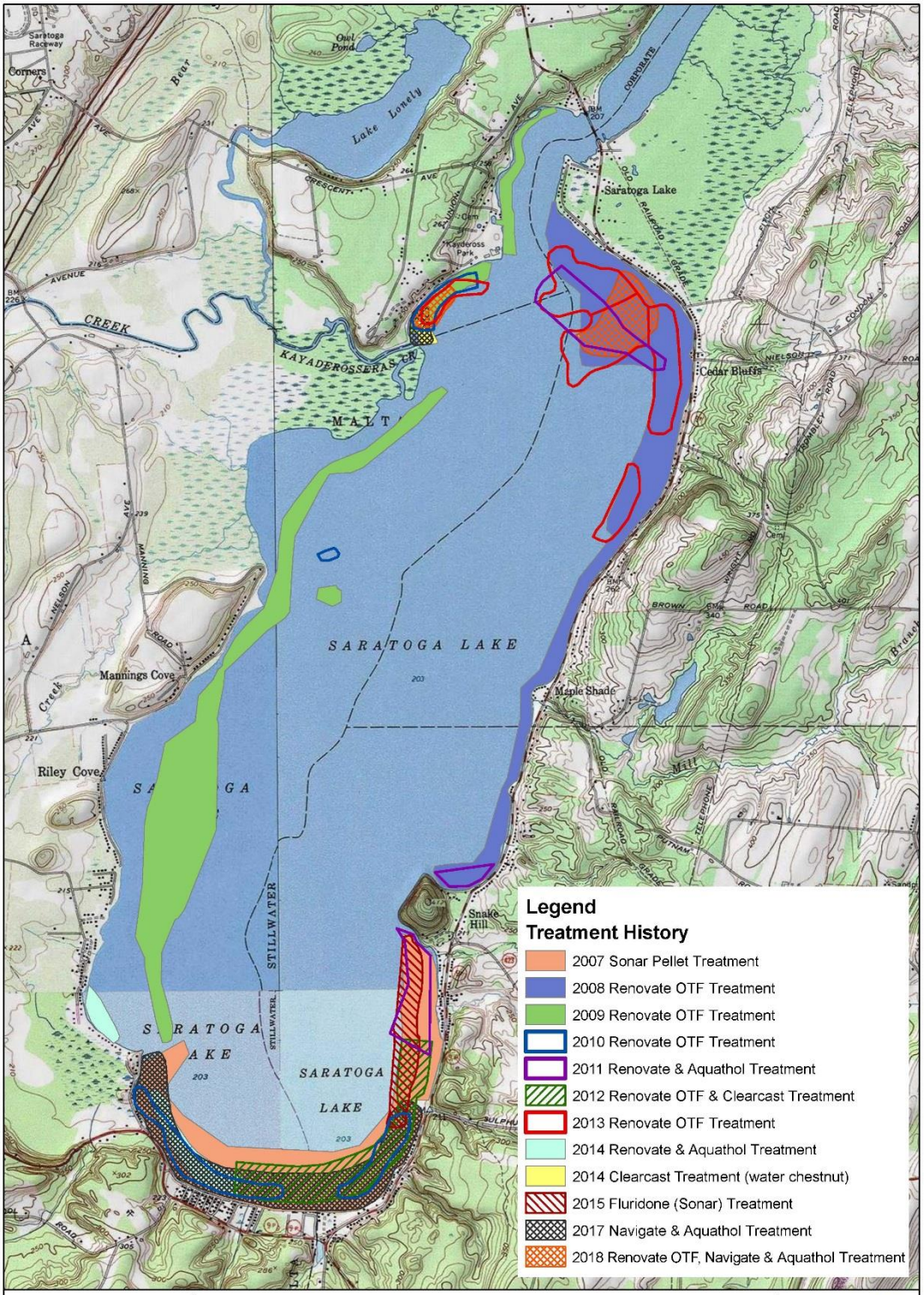

Hamilton County
Warren County
Washington County
Fulton County
Montgomery County
Schenectady County
Rensselaer County
Albany County
Day
Hadley
Edinburg
Corinth
Moreau
Saratoga Lake Watershed
Greenfield
Wilton
North-umberland
Providence
Saratoga Springs
Saratoga
Saratoga Lake
Galway
Milton
Malta
Stillwater
Charlton
Ballston
Clifton Park
Halfmoon
Water-ford
Saratoga County
0 2.5 5
Miles
Saratoga Lake Aquatic Invasive Species
2019 Long-Term Management Plan
Draft Supplemental Generic Environmental Impact Statement (DSGEIS)
Title
Figure 1-1: Regional Location Map
The LA GROUP
Project 2017003.01
Date 3/6/2019

Table 1-1 Summary of Herbicide Treatment Applications

Year	Treatment Area Size & Location	Herbicide Product	Treatment Out-Come
2007	158 acres South End	Sonar® PR & Q (Fluridone pellets)	Very successful for control of EWM; control lasted three years.
2008	292 acres Northeast & East Shore	Renovate® OTF (Triclopyr granular)	Successful very good control of EWM; some drift to the east due to high winds; no non-target damage species.
2009	285 acres Northeast & West Shore	Renovate® OTF	Successful control of EWM in the application area; limited control of EWM on rock bar.
2010	50 acres Spot Treatments	Renovate® OTF	Good control in herbicide application zone; limited fringe area control of EWM.
2011	100 acres Northeast and Southeast Shore	Renovate® 3 (Triclopyr liquid & Aquathol K (Endothall liquid)	Acceptable control of EWM in the NE treatment area except in the deep-water area near channel; good control of EWM in the southeast zones; combined herbicide treatment with Clearcast recommended.
2012	100 acres Southeast Shore	Renovate® OTF & Clearcast® 2.7G (imazamox granular)	Good control of target species; larger treatment area improved control.
2013	172 acres Northeast & Northwest Shore	Renovate® OTF	Acceptable control of EWM in the treatment zone except for deep water area, that has imbedded EWM turion; high rainfall events may have contributed to dilution
2014	48 acres South End & Northwest Shore	Renovate® OTF (Triclopyr granular) & Aquathol K (endothall liquid) & Clearcast® (imazamox liquid)	Acceptable control with Renovate Aquathol combination, but dilution seem to impact the level of control; CLP was controlled with Clearcast.
2015	50 acres South East shoreline	Sonar One	Acceptable control in treatment area; evidence of control in 2016 and 2017.
2016	None	-	Only scattered EWM plants found in 2015 DFWI inventory.
2017	146.1 acres South end	Combined treatment Aquathol & Navigate	No explosive growth of EWM without treatment in 2016; good control of EWM with combined herbicides and large area.
2018	54.5 acres Kayaderosseras Creek outlet & Franklin Beach	Clearcast & Renovate	Good control of CLP; good control of EWM except in the deep-water portion of the treatment zone.
2019	5 acres Kayaderosseras Creek outlet	Clearcast®	Proposed treatment for Water chestnut control is July 2019.


Saratoga Raceway
Corners
Owl Pond
Lake Lonely
Saratoga Lake
Kayderosseras Park
CREEK
KAYADEROSSERAS CR
Cedar Bluffs
SARATOGA LAKE
Mannings Cove
Maple Shade
Riley Cove
STILLWATER
Snake Hill
SARATOGA LAKE
Legend
Treatment History
2007 Sonar Pellet Treatment
2008 Renovate OTF Treatment
2009 Renovate OTF Treatment
2010 Renovate OTF Treatment
2011 Renovate & Aquathol Treatment
2012 Renovate OTF & Clearcast Treatment
2013 Renovate OTF Treatment
2014 Renovate & Aquathol Treatment
2014 Clearcast Treatment (water chestnut)
2015 Fluridone (Sonar) Treatment
2017 Navigate & Aquathol Treatment
2018 Renovate OTF, Navigate & Aquathol Treatment
0 1,000 2,000
Feet
Saratoga Lake Aquatic Invasive Species
2019 Long-Term Management Plan
Draft Supplemental Generic Environmental Impact Statement (DSGEIS)
Title
Figure 1-2: Treatment History Map
The LA GROUP
Project 2017003
Date 3/11/2019


Legend
Potential Treatment Area
(Only 5 acres within Potential Treatment Area will be treated annually)
0 300 600
Feet
Saratoga Lake Aquatic Invasive Species
2019 Long-Term Management Plan
Draft Supplemental Generic Environmental Impact Statement (DSGEIS)
Title
Figure 1-3: 2019 Proposed Herbicide Treatment Map
The LA GROUP
Landscape Architecture & Engineering P.C.
People. Purpose. Place.
Project 2017003.01
Date 3/11/2019

1.3 Purpose and Need

For all the reasons previously cited in the 2006 DEIS, it is necessary and desirable to continue to control invasive species, specifically EWM and CLP, as well as preventing the introduction of new invasive species and control of new invasive species (see DEIS 2006, Section 1.3). The need for the project is well documented in the 2002 "Land to Lake Perspectives – A Watershed Management Plan for Saratoga Lake" and the Long-Term Aquatic Vegetation Management Plan finalized in December 2005. Further, the implementation of that plan has reduced the EWM density and coverage to acceptable levels. Annual treatments over the period 2010-2013 have demonstrated however that constant control is required for a consistent level of management.

Invasive plant species create detrimental impacts to the environment by displacing native species and changing habitats. In lakes and in the littoral zone of lakes dominated by EWM, a decline in native species of invertebrates has been identified (Midwest Aquatic Plant Management Society, 2000). The decline of native plant species has also been associated with EWM (MAPMS 2000; Madsen et al. 1991). In areas of very high infestation, as found on Saratoga Lake, the EWM mats prevent natural light from penetrating down to native plants ultimately resulting in a loss of plant diversity. Since native plants in North American lakes support a greater diversity of fish life than is supported by EWM, the loss of native species results in a decline of fish (MAPMS 2000, Smith and Barko, 1990).

There are also economic impacts related to dominance of EWM. The Final Report of the New York State Invasive Species Task Force states that boating, as an industry, has a total yearly economic impact of $1.8 billion in New York State. In 2001, recreational boating on Saratoga Lake represented a $7 million a year industry for the local economy. The economic impact has increased to an estimated $8.5 million based upon 2006 dollars. This report acknowledges that EWM has a direct and costly impact on recreational boating, swimming and fishing. While these costs are not assessed, the report states that the responses to the damage are very expensive and long-term.

1.4 Permits Required

Annually, SLPID prepares and submits a Joint Application for a Permit and an application for a permit to Use a Pesticide for the Control of an Aquatic Pest (GP-0-16-005) to the NYSDEC's Regional Division of Environmental Permits. A State Pollution Discharge Elimination Permit (SPDES) general permit for use of aquatic herbicides is also be required. Depending on whether an herbicide treatment site is near a wetland, an Article 24 Wetland Permit may also be required.

Saratoga Lake and the land surrounding the lake was transferred from the English King to Colonel Philip Schuyler (1666-1724) in 1689 or 1690 as one of the Dongan Patents. The land around the lake and lake bottom passed from the King to a new landowner, without a descriptive claim to the lake bottom. This resulted in the lake bottom to be considered outside of the jurisdiction of the New York State Office of General Services (NYSOGS). This means that NYSOGS has limited oversight of certain activities involving the lake bottom. The NYSOGS will not issue a lease of land under water at Saratoga Lake for a dock, wharf or other structure since it does not have jurisdiction. This quirk in ownership passage however does not limit the enforcement of navigation rules, or regulations that protect water quality. To further complicate the question of ownership, any land above an elevation of 196 feet msl (mean sea level) was flooded when the

Winnie Reef dam was constructed in 1828 by another Phillip J. Schuyler (1789-1835). It is unknown how much of the land around the lake was retained by the Schuyler descendants in 1828. Some of the land on Saratoga Lake may have been flooded by a dam build in Grangeville by Jesse Toll in 1800.

The Long-Term Invasive Management Plan is a Type I Action under SEQRA, since the earlier segmented whole lake treatment project was subject to a DEIS. In order to receive most NYS permits and/or grants, it is necessary to complete SEQRA. Based upon the fact that SLPID approved, funded, and undertook the former project, and will complete the future project described in this FSGEIS, it has principal environmental review responsibility for this action and will be the lead agency for this FSGEIS. NYSDEC continues to be an involved agency. Lead Agency coordination was completed in April 2019.

A part of a generic impact statement is to identify the threshold of future actions that would require and update to the SGEIS. Integration of newly registered herbicides will not require an update of the of the SGEIS.

A program to control Zebra mussels would require careful planning and would be covered in an updated SGEIS. In lake nutrient controls by various chemical precipitants, or oxidation chemical will require a revised SGEIS. Biological manipulations to improve possible use of EWM herbivores, or widespread use of biological controls would require a revised SGEIS.

1.5 Description of Preferred Alternative

1.5.1 Target Species

The target species are non-native invasive aquatic species that are judged to present a risk to Saratoga Lake ecosystem. This judgement will be based on an assessment of conditions in Saratoga Lake and an evaluation of the NYS Invasive Species Council. The species that are being managed currently are EWM, CLP, Water chestnut, and European frogbit. Spiny water flea is assumed to be in Saratoga Lake, but is not being managed at this time. Zebra mussels *(Dressena polymorha) and* Chinese mystery snails *Cipangopaludina chinensis malleatus*) have been found in Saratoga Lake, while Quagga (*Dreissena rostriformis bugensis*) has not been found. No control measures are proposed for the mussels or snail other than hand harvesting of the snails.

Species contributing to harmful algae blooms (HABs) appear to be present and are actively being monitored. *Hydrilla verticillata* (Hydrilla) is a plant that warrants special attention since it tends to grow rapidly in lakes in New York and neighboring states that have a similar profile to Saratoga Lake. Monitoring of this plant will be part of the ongoing effort to identify invasive aquatic plants.

1.5.1.a. Impacts of Target Species

The target species of aquatic vegetation for control is EWM and its hybrids. EWM is native to Europe, Asia, and northern Africa. It was accidentally introduced into the United States sometime between the late 1800s and 1940s. According to the USEPA, EWM is a submersed aquatic plant that invades lakes, ponds, and other aquatic environments throughout the United States. Plants are rooted but the stems grow to the water surface, usually 3 to 10 feet, but can be as much as 30 feet in length. EWM is recognized by the dense mats formed from the bright green, finely dissected, whorled leaves. Once introduced, the plant spreads by fragmentation and by clonal expansion by stolons (similar to strawberry runners) (Madsen and Smith 1997). The highly divided leaflets give this plant a feathery appearance. EWM invades ponds, lakes, and pools that range from deep to very shallow. It requires stagnant to slow moving water and can tolerate brackish conditions. Once established, it can form dense mats of leaves which restrict light availability to the water environment, leading to a decline in the diversity and abundance of native macrophytes. In addition, it displaces the and reduces fish spawning and feeding habitats (Barko, Smith and Clesceri, 1986, Smith and Barko, 1990).

Eurasian watermilfoil

The pattern of EWM growth in Saratoga Lake has changed over the last 32 years due to the management of EWM and the introduction of zebra mussels. Since 1986, winter drawdown of the lake has been utilized to control EWM in the shallow water zone of one meter or less. Drawing the lake down to the elevation of 201 feet above mean sea level (msl) depth for the winter months allows a combination of freeze-thaw and ice scour processes to destroy EWM plants and root stock.

The introduction of zebra mussels has resulted in the lake water being clearer which allows light to penetrate to deeper depths. This has allowed the outside edge of EWM to move out to depths as great as 5.5 meters. As a result of the drawdown and the zebra mussels, the bands of EWM have become common between depths of 2 and 5.5 meters. At depths of over 2 meters, it is difficult to harvest EWM since the reach of the harvester cutting head is to a depth of 2.5 meters. Therefore, in deeper waters where plants grow from the bottom of the lake to the surface (in this case 5.5 meters), the harvester only cuts 2.5 meters off of the top, leaving the roots and 3 meters of the plant to regrow.

EWM forms dense bands of plants which interfere with boating and recreation on the lake. These bands of EWM cannot be effectively harvested, therefore a different approach is necessary. Herbicides are ideally suited to controlling EWM at the depths found in Saratoga Lake.

Two other exotics, CLP *(Potamogeton crispus)* and water chestnut (*Trapa natans*) are also present in Saratoga Lake. Found in 46 of the 50 states, CLP is typically widely distributed at low densities in the lake, whereas water chestnut tends to be more scattered. A unique attribute of the plant is that it grows well in low light conditions including under the ice. Growing well in low light conditions causes the plant to be taller and more noticeable than other water plants in the spring, since it has been actively growing for many months (https://nas. Er. Usgs. Gov/queries/factsheet. Aspx?SpeciesID=1134).

Curlyleaf Pondweed

CLP reproduces by rhizomes (runners) and by turions (vegetative propagules produced by an individual plant). The turions are produced in late spring or early summer, just prior to the plants dying back. The turions will be dormant until the water cools off in the fall when they start growing to produce new plants (Sastroutomo, 1981).

CLP has been in Saratoga Lake since at least 1932. In the past, CLP would grow rapidly in the early spring, top out in the water column, and die back by late June or early July. During the last 3-5 years, this pattern has changed, and now CLP tends to grow until mid-summer or even into August. As a large leafy plant, it is easy for this plant to reach nuisance density and interfere with boating.

The life cycle of this plant is long and its ability to commonly reach nuisance density warrants a management plan and program to treat it. CLP can be controlled by Sonar®, Aquathol K, Reward®, and Navigate, but not Renovate®. Sonar®, Aquathol K, Reward®, and Navigate are all broad-spectrum herbicides that can cause damage to non-target species unless precautions are taken.

Water chestnut is found in the lake and has been expanding during recent years. Water chestnut has been a long term invasive in NYS and the original introduction site in NYS may have been Collins Lake in Schenectady. In the early 1970's there was a large-scale control program on the Erie Canal system and in rivers the NY using 2,4-D. This program ended and the water chestnut continued to spread and is the focus of a large harvesting programs on Lake Champlain and control efforts at other locations.

Water Chestnut

During the late 1990's to 2005, there was a well-organized effort by volunteers to hand harvest the water chestnut on an annual basis. The hand harvesting program achieved a high level of control, so that program was terminated. Water chestnut returned in 2013 and approximately 5 acres of Clearcast® was applied near the mouth of the Kayaderosseras Creek to gain back control of the invasive.

Chestnut Removal near Kayaderosseras Creek

Lake level drawdown, mechanical harvesting and hand harvesting of water chestnut were the exclusive management efforts up until 2011 when a chemical application Navigate was planned. But never carried out. In 2013 water chestnut was observed to cover large areas near the delta of the Kayaderosseras Creek. Following herbicide treatments in 2014 a reduced area of coverage remained which persisted in 2015 and 2016. Several chestnut plants have been observed in the area of the Fish Creek boat launch ramp annually since 2010. These plants have been successfully hand-harvested. In 2018, a Clearcast® application occurred on the north side of the Kayaderosseras Creek outlet, and it is anticipated that there will application the south bank of the Kayaderosseras Creek outlet in 2019.Following these treatments, there will be a need for hand harvesting and hydro-raking for the coming years to remove the seed/nuts found in the sediment. These actions will control water chestnut at the Kayaderosseras Creek outlet. Annual surveys, hand pulling, and possible herbicide applications will be needed to control water chestnut elsewhere on the lake.

European frogbit (*Hydrocharis morsus-ranae)* has been found in Saratoga Lake over the last three years. To date the control has been hand harvesting , and this will continue to be the control method. When hand harvesting is completed the site will be recorded with GPS , sediment conditions will be described, and other aquatic plants in the area will be identified. The site will be reported to SLPID and SŌLitude. Plant debris will be disposed as solid waste. If chemical control should be necessary, Renovate® and Clearcast® are labeled for control of this species.

1.5.1.b. Target Densities

Saratoga Lake was created by a dam (see Section 2.2 Hydrology), therefore there are extensive flood lands that provides good habitat for aquatic macrophytes.

The target density of the invasive species is difficult to state as an easily understood description or rating. Looking at plants in a lake can be described by various numeric indices that are related to the number of times the plant is found in the lake, approximations of the density of the plants by either using estimates of the mass plants as kg/ sq m, or numerical rating, and floristic rating.

In 1998 and 2004 and in the years 2007-2018 there have been annual surveys of the aquatic plants in Saratoga Lake using nearly the same method of plant inventories that is based on point intercept sampling (Madsen, 1999). Between 280-328 discrete samples were taken to inventory macrophytes on Saratoga Lake. In each year the percent frequency was determined for the roughly 25 species of plants found in the lake. The percent frequency is a measure of how often a plant is found in a water body.

Figure 1-4, “Biovolume Map,” indicates the plant density in Saratoga Lake in 2016. This estimate of biovolume was developed by using wide scan bathymetric mapping and computerized estimate of bio-volume. This figure shows the extend of aquatic plants in Saratoga Lake.

In 2011, Darrin FWI started reporting the rake toss macrophyte survey data with the estimate plant mass ratings of sparse, moderate and dense (Madsen, 1999). Annually approximately 325 rake-toss samples are taken to describe amount and distribution of aquatic plants (Eichler 2011, 2012, 2013, 2014, 2015, 2016, 2017 and 2018). The rake-toss method using the plant weight rating provides information that can be expressed as kg/sq m, Using the kg/sq m it must be treated as a relative approximation of the weight of the plants rather than an absolute measurement of the weight of plants found in the sample.

To simplify, the graphs below illustrate the Illinois pondweed, Richardson pondweed and flat stem pondweed ,and large leaf pondweed lumped together as pondweeds. These three pond weeds have had a percent frequency above 5% from 2011-2018.The graphs also show the plants that have been above 10% frequency rather than illustrate all plants found in the lake. This focuses on the most common plants seen in the lake and represent the largest amount of biomass. The next show the variation in the biomass of plants and percent frequency for the given years. Figure 1-4a, “Estimated Plant Bio-mass Base on Rake Toss Samples,” illustrates the changes in the biomass estimates of aquatic plants in Saratoga lake. The 2004 estimated was completed by actual collection of the individual species and drying the species samples. The 2011-2018 biomass estimate was completed using rake toss estimate. The graph shows that the amount of the target species has been reduced while non target native species have increased. The graphs also show that in a given year different native species were dominate. Figure 1-4b, “Percent Frequency of Selected Plants,” is a graph of percent frequency shows that EWM has varied from 21.3 %-54.3% from 2044, 2011-2018. The other important period to examine is between 2015-2017.The percent frequency in 2015 was 26.9%, 26.0% in 2016, and 29.4% in 2017.In 2016, no herbicide was applied to control EWM yet there was only a 2.5% increase during the two-year period from 2015-2017.This change is less than the variation found between the years of 2013-2014 and 2016-2017 when herbicides were applied to control EWM. The percent frequency of EWM was below 30% in most years, except 2014 when all plants were found in more individual samples. Year 2014 seems to have been a good year for plant growth, yet the lake was not dominated by EWM (in 2016 the Vallisneria data was lost). Also, the graphs show that there is a strong mix of aquatic plants in Saratoga Lake even after herbicide treatment. The gradual improvement of pondweeds as a part of the aquatic plant community from under 10% frequency in 2011 and 2012 and increasing to 40% frequency by 2013 is a benefit of the on-going management plan. The annual reports of Darrin Freshwater Institute are found on the SLPID web site which contain details of the annual sampling.

Figure 1-4a Estimated Plant Biomass Base on Rake Toss Samples

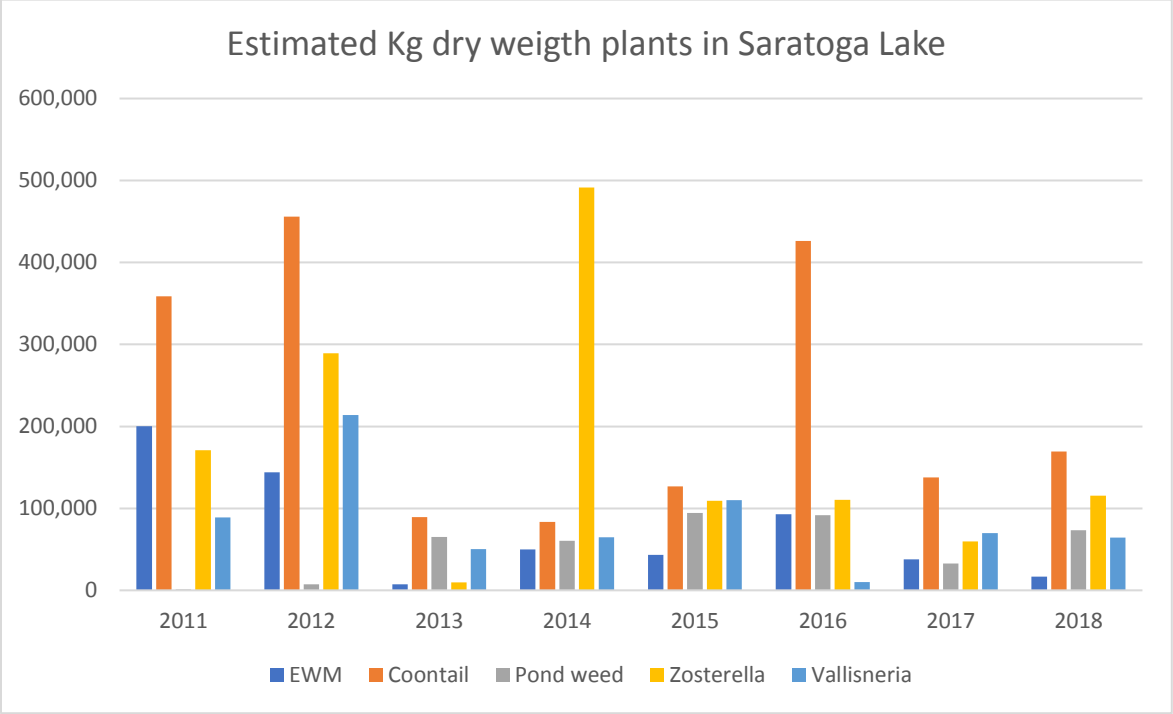


Figure 1-4b Percent Frequency of Selected Plants

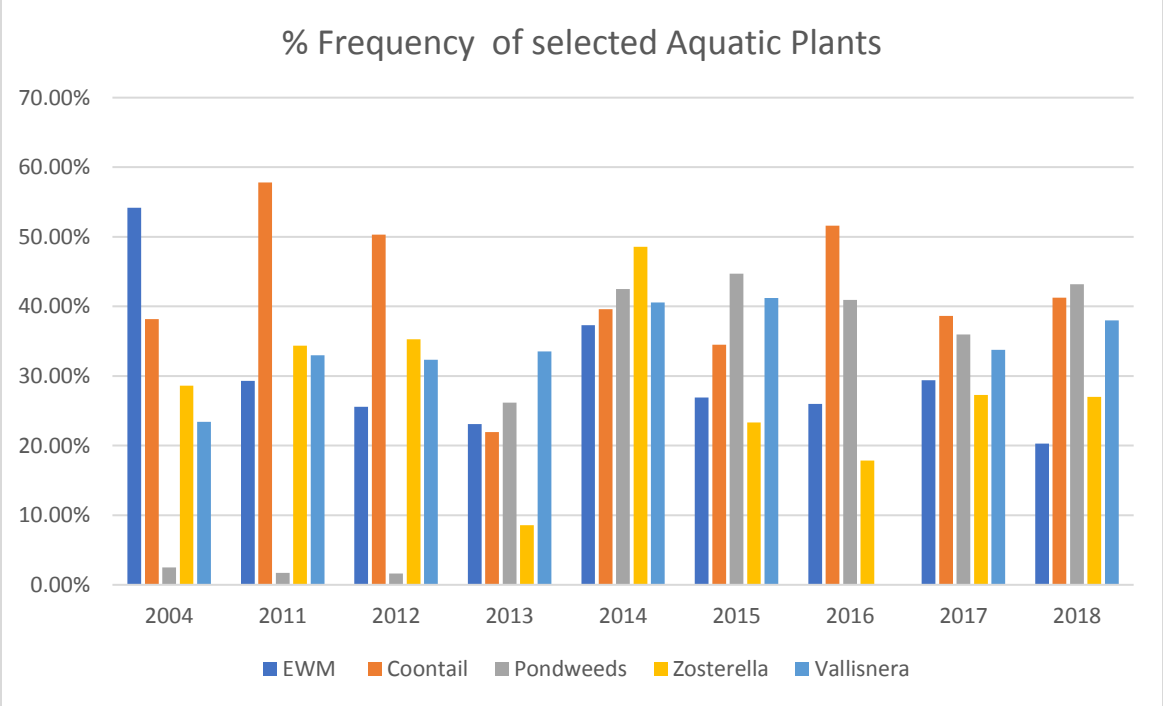


Figure 1-5, “Transect Map,” illustrates the location of the plant transects that have been used to characterize the submerged aquatic plants community. Figure 1-6,” Plant distribution by Transect,” are individual pie charts of percent frequency of the submerged aquatic plants in 2018. The individual pies diagrams are based on the rake toss inventories taken by DFWI . Each rake toss sample is located by a latitude and longitude. There are over 300 rake samples taken in 2018. Samples between transect one and two are averaged to create a single value shown as transect 2. This process was repeated for all lake samples. EWM varied from 0-20% frequency. Comparing each of the region transect summary locations there is the expected variation in the communities. EWM is most often a small component of the plant community except at transect 1 and 7. Transect 1 is in the Franklin Beach area that has been difficult to treat due to the depth of the EWM plants and transect 7 includes the rock bars another area that is difficult to treat. . The pie diagrams of the submerse aquatic plant community are consistent with the 2018 EWM distribution map Figure 1-8.

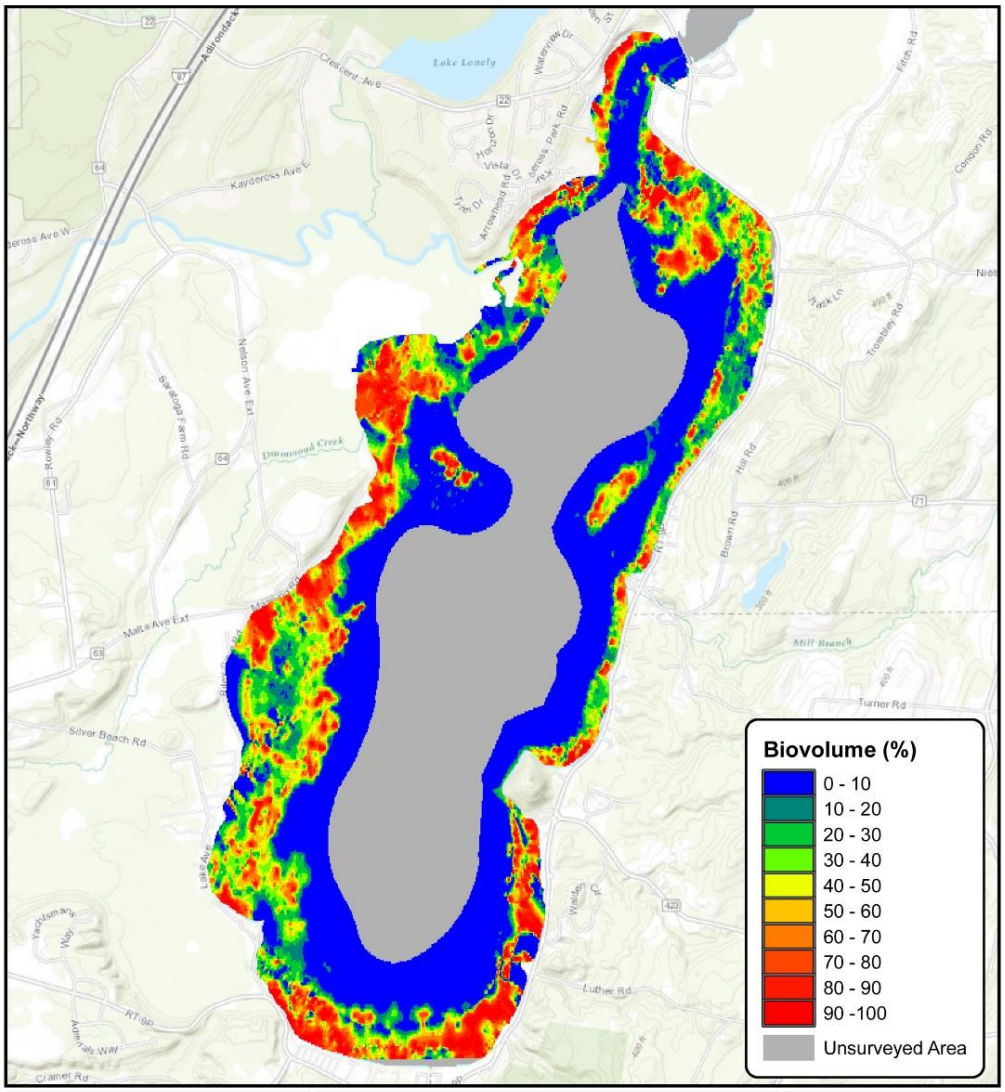
The other important period to examine is between 2015-2017.The percent frequency in 2015 was 26.9%, 26.0% in 2016, and 29.4% in 2017 .In 2016, no herbicide was applied to control EWM yet there was only a 2.5% increase during the two-year period from 2015-2017.This change is less than the variation found between the years of 2013-2014 and 2016-2017 when herbicides were applied to control EWM.

In 2013, the percent frequency of EWM was 23.1% and in 2014 it was 37.3 %. In 2013 Renovate® was applied to 172 acres in the northeast area of the lake around Franklin Beach. Control was acceptable, but it appeared that large rainfall following treatment reduced the effectiveness.

In the above illustrations it is clear that the frequency of occurrence and the relative weight of EWM has changed since 2011 (see Figures 1-4a,b). This has been the trend since 2007 while at the same time the *Potamogeton sp.* have increased.

Transect 4,5,6 (see Figure 1-6) have the lowest percent frequency of M. spicatum (EWM) while having the higher per cent frequencies of Rchardson’s pondweed and V. americana. Figure 1-6 shows that the plant community is consistent in the lake.

During the treatment years 2010-2019 the central lesson has been to reduce the per cent frequency in a give area treatment needs to be focus on a location with moderate density EWM. In 2016 no treatment for EWM was completed and there was not a wide increase in density of EWM, and the other native plants continued to be widespread and seemed to suppress the rapid regrowth of EWM. Both water chestnut and CLP will require further treatment and a continued focus effort along with EWM.



Saratoga Lake Aquatic Invasive Species
2019 Long-Term Management Plan

Draft Supplemental Generic Environmental Impact Statement (DSGEIS)

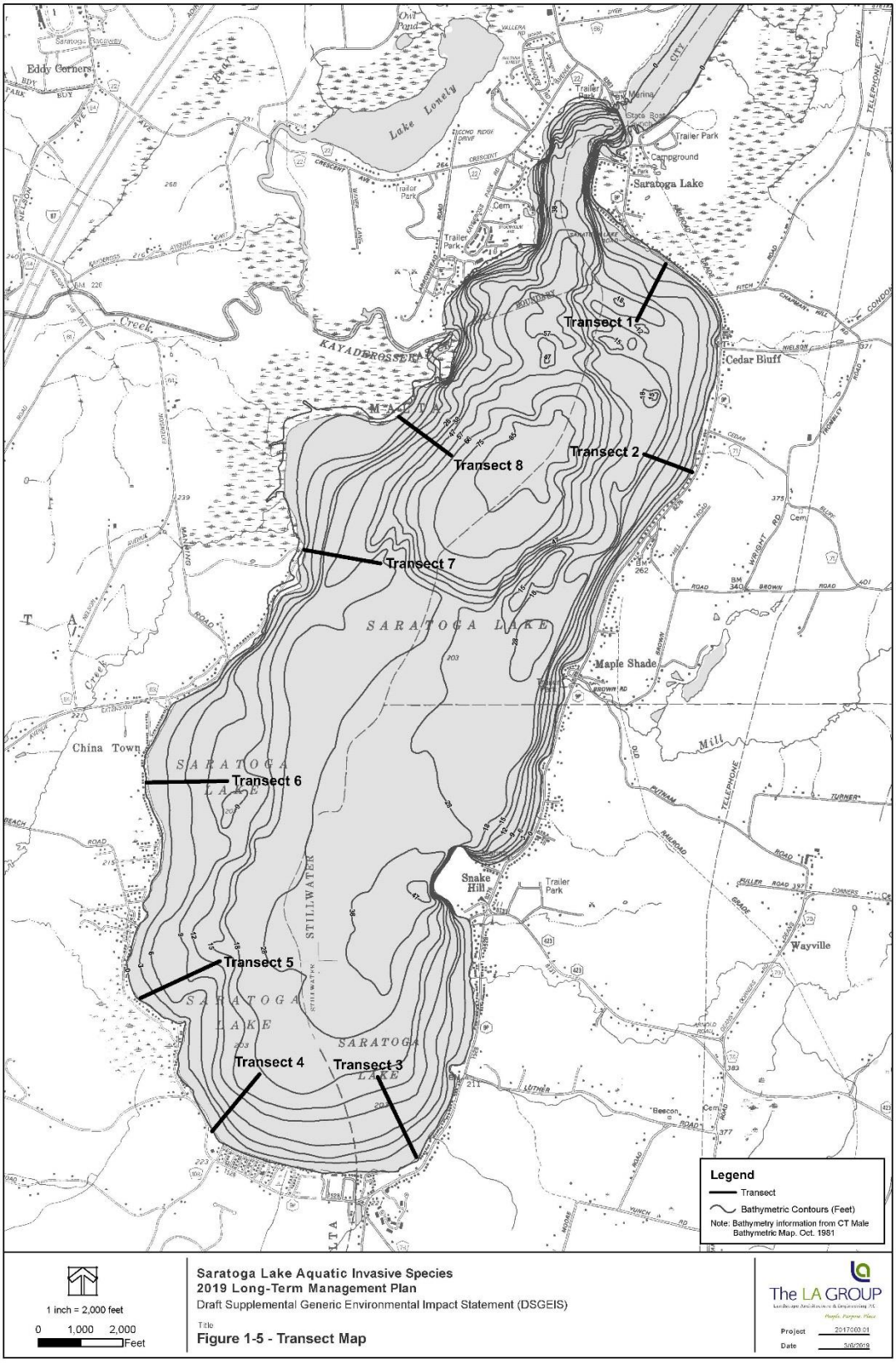
Title

Figure 1-4 - Biovolume Map

The LA GROUP
Landscape Architecture & Engineering P.C.
People. Purpose. Place.

Project 2017003.01

Date 3/6/2019


Transect 1
Transect 2
Transect 3
Transect 4
Transect 5
Transect 6
Transect 7
Transect 8
Saratoga Lake
Lake Lonely
Eddy Corners
Cedar Bluff
Maple Shade
China Town
Snake Hill
Wayville
Beecon
SARATOGA LAKE
STILLWATER
KAYADEROSSERAS
Legend
Transect
Bathymetric Contours (Feet)
Note: Bathymetry information from CT Male Bathymetric Map. Oct. 1981
1 inch = 2,000 feet
0 1,000 2,000 Feet
Saratoga Lake Aquatic Invasive Species
2019 Long-Term Management Plan
Draft Supplemental Generic Environmental Impact Statement (DSGEIS)
Title
Figure 1-5 - Transect Map
The LA GROUP
Project 2017000.01
Date 5/6/2019

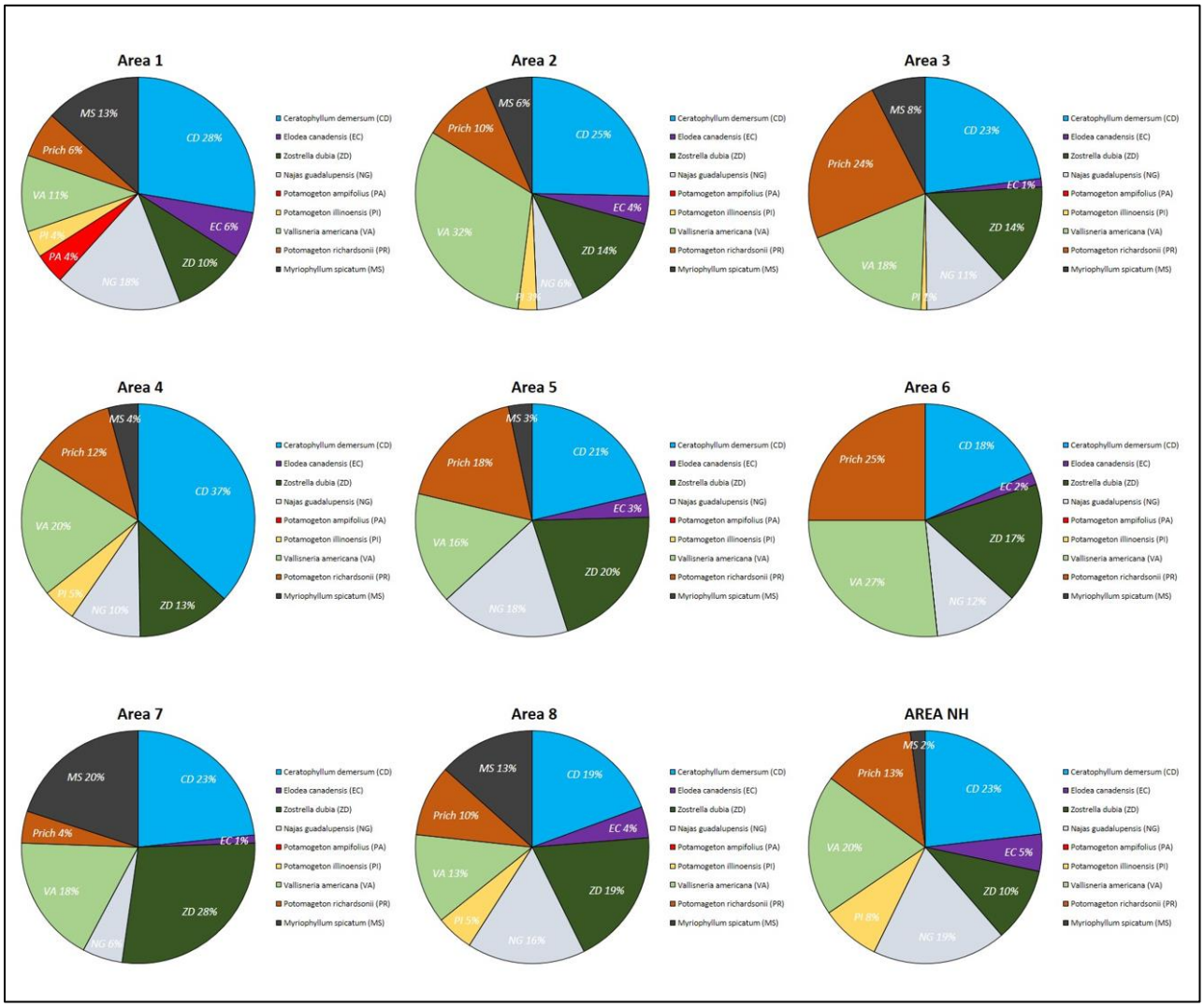


Figure 1-6 Plant Distribution by Transect

1.5.1.c. Minimization of Future Introductions

A boat launch steward program has been in place on Saratoga Lake since 2009 with full-time stewards at the state boat launch since 2010. This program has successfully intercepted numerous invasive species that would have entered the lake. There are invasive species in the region that need to be on a watch list including *Cabomba caroliniana* (Carolina fanwort) which is found in Hunt, Jenny and Efner lakes in Saratoga County. *C. caroliniana* has been in these three northern Saratoga County lakes for over 20 years without significant spread detected. *Egeria densa* (Brazilian water weed) is found in ponds at Five Rivers Nature Center and in lakes in Westchester County.

Hydrilla verticillata (hydrilla) is found in Broome, Cayuga, Erie, Kings, Monroe, Nassau, Niagara, Orange, Suffolk, Tioga, Tompkins, and Westchester counties. The lake steward program needs to focus avoiding the introduction of hydrilla and introduction of invasive mollusks. One or more new invasive species will enter the lake at some point in the future, especially given that some of the life stages are microscopic or will otherwise avoid detection.

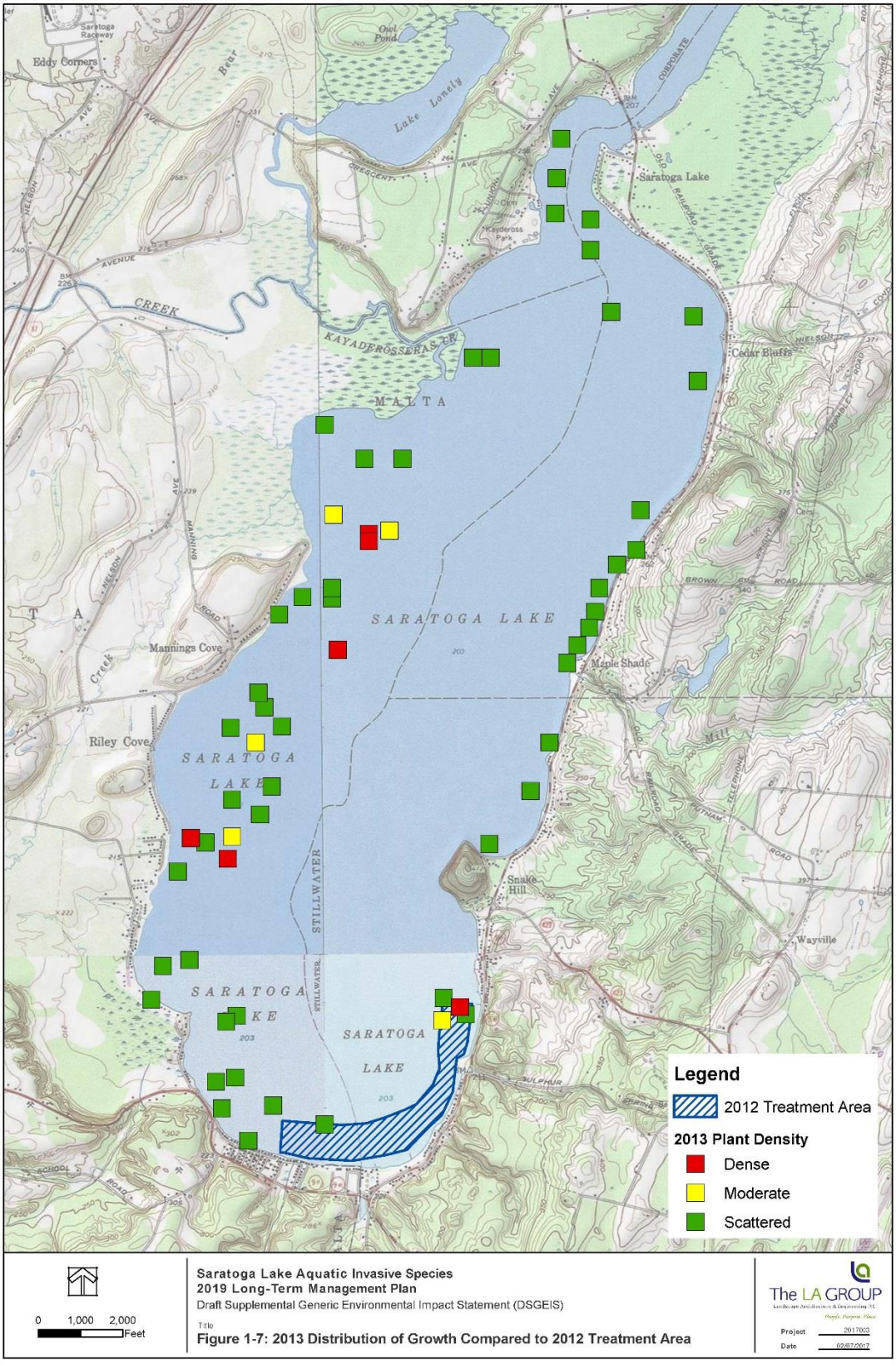
1.5.2 Areas of Coverage

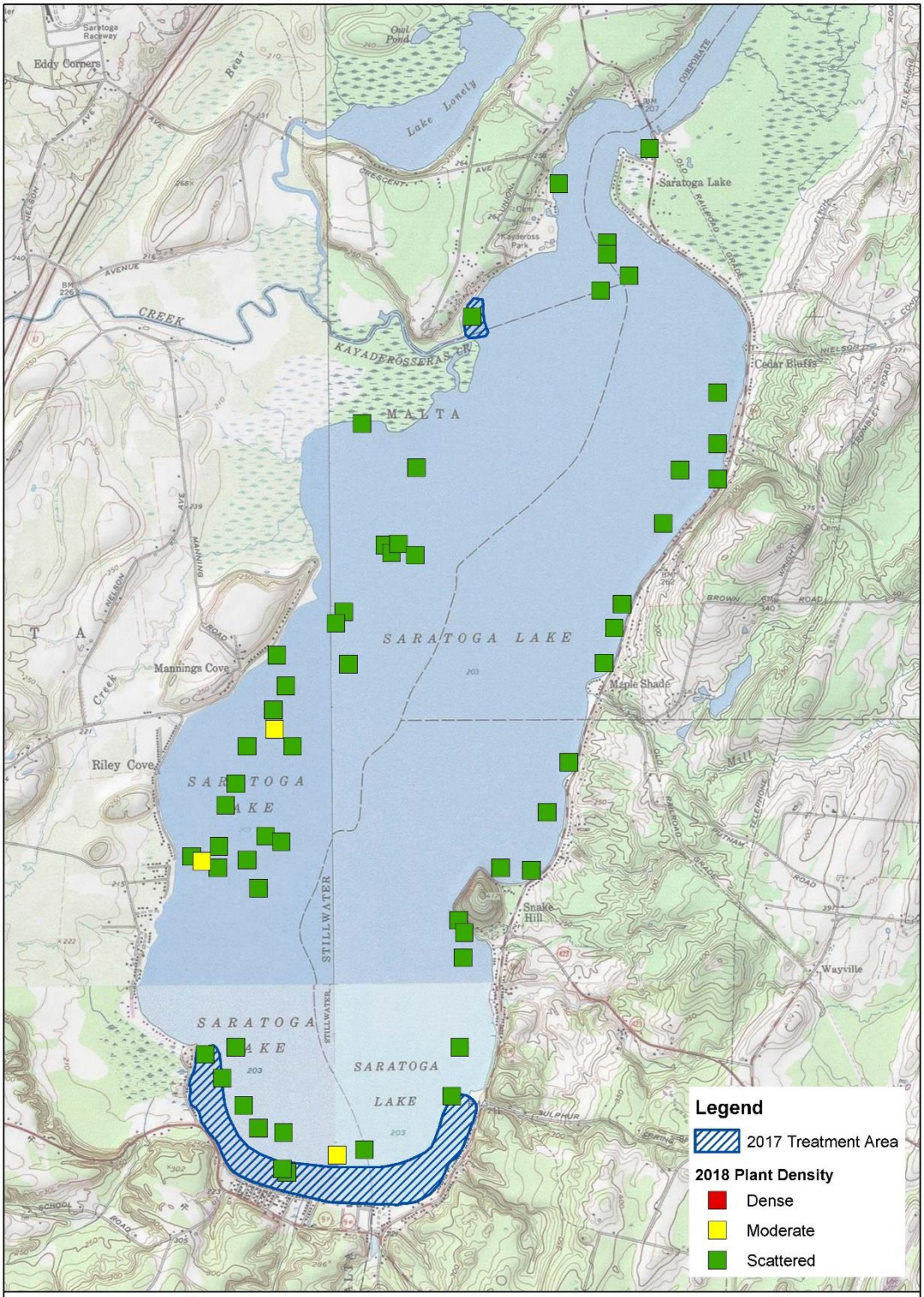
The segmented whole lake treatment reduced the extent of EWM, decreasing percent frequency among point intercept samples from 54.2% in 2004 to 6.8% in 2009, to 22.1% in 2010, and 20. 3% in 2018 (Eichler 2009; Eichler and Boylen, 2010; Eichler, 2018).

The overall distribution is shown on the percent frequency and area of coverage of the lake by EWM has been reduced by the segmented whole lake treatment in 2007-2009, and follow up treatments annually 2010-2015, 2017, and 2018.

It is expected that future herbicide treatments will continue to consist of large separated treatment areas to maintain the frequency of EWM below 30%. CLP is generally distributed in compact strips that form locally dense bands. These bands tend to be narrow but will top out at the surface of the lake. The frequency of CLP in point intercept samples was 1.2% in 2004 and was measured at 9.4% in 2010 (Eichler and Boylen 2008, 2010).

To understand the shift in the invasive species problem, estimated EWM plant distribution maps from various DFWI reports have been compiled. The overall distribution is shown on Figure 1-7, "Distribution of Growth and Comparison of EWM in Saratoga Lake 2012-2013," and Figure 1-8, "Distribution of Growth and Comparison of EWM in Saratoga Lake 2017-2018." The percent frequency and area of coverage of the lake by EWM has been reduced by the segmented whole lake treatment in 2007-2009, and follow up treatments annually 2010-2015, 2017,and 2018.These maps show the successful reclamation of the lake and indicate that integrated approach of mechanical harvesting, hand pulling and use of herbicides have been successful.


Saratoga Raceway
Eddy Corners
Owl Pond
Lake Lonely
Bear
Saratoga Lake
Kayaderosseras Cr
Cedar Bluffs
M A L T A
Mannings Cove
Maple Shade
S A R A T O G A L A K E
Riley Cove
Snake Hill
Wayville
STILLWATER
Legend
2012 Treatment Area
2013 Plant Density
Dense
Moderate
Scattered
0 1,000 2,000 Feet
Saratoga Lake Aquatic Invasive Species
2019 Long-Term Management Plan
Draft Supplemental Generic Environmental Impact Statement (DSGEIS)
Title
Figure 1-7: 2013 Distribution of Growth Compared to 2012 Treatment Area
The LA GROUP
Project 2017003
Date 02/07/2017


Saratoga Raceway
Eddy Corners
Owl Pond
Lake Lonely
Saratoga Lake
Kayaderosseras Cr
Cedar Bluffs
MALTA
SARATOGA LAKE
Mannings Cove
Maple Shade
Riley Cove
Snake Hill
Wayville
STILLWATER
SARATOGA LAKE
Legend
2017 Treatment Area
2018 Plant Density
Dense
Moderate
Scattered
0 1,000 2,000 Feet
Saratoga Lake Aquatic Invasive Species
2019 Long-Term Management Plan
Draft Supplemental Generic Environmental Impact Statement (DSGEIS)
Title
Figure 1-8: 2018 Distribution of Growth Compared to 2017 Treatment Area
The LA GROUP
Project 2017003
Date 05/18/2019

1.5.3 Integrated Aquatic Plant Control (IAPC)

1.5.3.a. Integrated Practice Management

To direct the activity of mechanical harvesting, hand harvesting, and chemical controls of invasive species, a higher level of oversight needs to be implemented. This oversight will primarily be in the form of a greater level of data collection on the distribution and density of the target species which is the current practice. The lake has seven harvesting zones which are cut in a clockwise rotation. Herbicide treatment areas are not cut until late July since applications normally occur in mid-May to the first week of June.

Collection of more information on plant coverage will also be used to plan harvesting depth. In the early spring, full depth harvesting of 3 feet or more is the normal practice. Shallow harvesting is done in July and August unless macrophytes are very dense, then full depth harvesting is necessary. Additional information on depth and distribution and species composition will allow more precise assessment of the benefits of the harvesting program. At the same time, areas to be hand harvested in the fall or the following year can be selected.

This data will not replace the information collected by DFWI but may be useful to SLPID and their consultants in planning the next seasons treatment operations.

SLPID will continue to use Integrated Aquatic Plant Control over the next several years to manage nuisance and invasive plant species in Saratoga Lake. This IAPC plan will include use of herbicides, mechanical harvesting, and hand harvesting and winter drawdown.

In the spring, at the start of harvesting, areas to be harvested will be selected based on the height and number of target plants found and whether the area will be subject to an herbicide application. Areas to be controlled by herbicides will not harvested. This will ensure that large plants are present in order to uptake the maximum amounts of herbicides. The observation of the plant growth in the lake will be the basis for planning the areas to be harvested. The observation will also be used to finalize herbicide treatment areas if an application is being done in a year. The aquatic plant data will support the rotational harvesting

1.5.3.b. Management Plan and Herbicide Decision Making

This management plan targets EWM, CLP, water chestnut and other non-native invasive species as may be necessary. The current distribution and density of water chestnut warrants continued use of herbicide to reduce the standing crop of water chestnut and hand harvesting to reduce the number of the seed nuts found within the plant beds. The hand harvesting may be completed by volunteers or by professional employed on a contract basis by SLPID in cooperation with the SLA. CLP and EWM as well as other non-native invasive species will be managed by use of herbicides in accordance with the various labels.

Starting in 2011, applications of a mixture of Renovate® and endothall were used to control both EWM and CLP (Madsen et al. 2010), and in 2012 Renovate and Clearcast were used to control EWM and CLP based on methods used by the ACOE. Along with the above mixture, Renovate®, Clearcast®, or Sonar®, individually, may be used to control EWM. Sonar® and Clearcast® will also control CLP. Another possible herbicide is Galleon® SP, an herbicide manufactured by SePRO. Galleon® SP has the active ingredient penoxsulam, but currently does not have a label for use in New York State. Galleon® may also be mixed with Renovate. *ProcellaCOR*® is a new herbicide that is very effective for the control of EWM and has been formulated to have a high affinity for this plant. It now has a label for use in New York State and may be an option for treatment in the future. As new products are registered for use in NYS they will be considered regarding their ability to control the target non-native species. Using herbicides register in NYS will not require an update of this FSGEIS.

Using Sonar® and endothall does create the potential for non-target species damage, therefore, early season treatment beginning the first week in May is necessary. The potential for causing damage to native species is minimized by using Sonar® and Renovate®/ Aquathol or Renovate/ Clearcast in the early spring prior to the start of rapid plant growth of the non-target native species. Renovate can be used in late May to mid-June since it is more selective.

A method to improve the effectiveness of herbicides is to use two herbicides to target either multiple target species or to target a single specie (combined treatment). Using combined treatment allows use of two herbicides to be used that have different modes of action to disrupt plant growth. Using Triclopyr and endothall provides for control of both EWM and CLP as will Triclopyr and imazamox (Madsen et. al. 2010). At times, combined treatments will be less expensive since smaller doses may be used (Heilman 2013). Some of the combined treatment will reduce the notice requirement. A combination treatment with 2,4-D granular (Navigate) and endothall (Aquathol K) herbicides to treat 100-150 acres of growth at the southern end of the lake requires less notice downstream of the lake and fewer days of post application monitoring. Treatment would begin in mid to late May period. This combination treatment has been used extensively to manage EWM and CLP infestations in the Midwest and at Cossayuna Lake and Glen Lake in New York. The additive effect of using the two herbicides enhances the systemic control of 2,4-D to provide extended control of EWM and control of CLP.

In the coming years there needs to be an effort to use herbicides with different modes of action. Changing the herbicides to ones with different modes of actions will prevent the naturally resistant plants from becoming dominant. Naturally resistant plants are always found in the environment. Repeated use of the same herbicide with the same mode of action will cause the susceptible plants to be killed off leaving the resistant plant to become the more frequent plant in the community. Using different herbicides with different mode of action will prevent this from occurring. The SONAR mode of action is to disrupt the production of carotenes which causes the chlorophyll to be destroyed.

Renovate is an auxin inhibitor which causes the plant to grow excessively. Endothall disrupt cell membranes by speeding up the plant respiration. Adding Galleon® or Tradewind® or *ProcellaCOR*® will need to be done in years to come to prevent herbicide resistance.

Over the years there has been a general set concepts that guide chemical treatment applications:

- Renovate® applications need to be a minimum of 40 acres, unless the area is subject to wind driven dilution, primarily at north or south shorelines;
- Franklin beach area is difficult to treat due to wind, possibly currents, depth of the EWM and a dense mat of EWM turions;
- Renovate ®Clearcast® mix has worked better than Renovate® Aquathol®;
- In areas with wind driven current higher doses are needed;
- Split applications of the dose have worked well;
- Clearcast has worked well in controlling water chestnut; and
- ProcellaCOR® seems as if it might be very effective for control EWM at Franklin Beach.

Several tables were developed to illustrate the application process and outcome of chemical treatments. Table 1-2, "Planning and Application Schedule for Herbicide Use at Saratoga Lake," shows the application and monitoring process for each of the chemicals utilized. Table 1-3, "Summary of Treatment Efficacy," provides a detailed summary of treatment areas, selected treatments, and treatment results from 2010-2018.

Table 1-2 Planning and Application Schedule for Herbicide Use at Saratoga Lake

Endothall/Renovate®, Sonar®, Clearcast®, Navigate ®	**Renovate® , ProcellaCOR®**
Post application final inspection: Sept. or Oct.	Post application final inspection: Sept. or Oct.
Submit application to NYSDEC: end of Feb.	Submit application to NYSDEC: end of Feb.
Lake inspection: early April	Lake inspection: early April
Treatment application: first 2 weeks of May or later for water chestnut treatments	Treatment application: end of May or early June
Post application sampling: 2-4 weeks after treatment	Post application sampling: 2-4 weeks after treatment
Effectiveness review: post treatment	Effectiveness review: post treatment
Post application sampling: six weeks after treatment	Post application sampling six weeks after treatment
Comprehensive plant inventory: August	Comprehensive plant inventory: August

Table 1-3 Summary of Treatment Efficacy

Year	Application Area Acreage Treated	Product Concentration	Results
2010	1: 32 ac 2: 8 ac 7: 2.5 ac 8: 11.5 ac	Renovate® OFT: 5-8 ppb	Area 7: 25% control Areas 1,2,8: 80-90% control. Note: Area 7 was offshore
2011	A: 55 ac C: 10ac D: 35 ac franklin Beach, north Browns B.	Aquathol: Renovate, a 1.750. 75ppm;c,2.5ppm,1.25;d,1.75 ppm,0. 75 a, 1.75,0. 75ppm c,2.5,1.25 ppm d,1.75,0. 75ppm	Area a,70%,Area, a, c, d 99% Area,a70% Franklin Beach,
2012	100 ac. Southeast shore	Renovate: 5 ppb Clearcast: 50 ppb	90% reduction target species
2013	172 ac Franklin Beach	Renovate: 1.3-1.5ppm	Frequency of occurrence reduced from 42% to 9%
2014	A, 31 ac. B 11ac. D 5 ac.	Renovate, Aquathol: 0. 5,1.0ppm Aquathol: 3 ppm Clearcast two treatments	Treatment effects seem to be diminished by dilution scattered EWM remained
2015	48 ac.	Sonar: Three doses at 20ppb, one at 15 ppb	Small reduction in EWM no moderate density found in August survey. Sonar works better in larger treatment areas.
2016	-0-	No herbicide treatment	-
2017	A, 66.8 ac B,22.3 ac C,14 ac D, 28.4 E, 11.3 F, 7.5	Aquathol K 1.5ppm Navigate 2.0 ppm	Good control of target species
2018	A, 43.1 ac D 5 ac	Renovate Clearcast water chestnut	Decrease density of EWM, good control of water chestnut. Note: Franklin beach is difficult to treat due depth and wind

1.5.3.c. Chemical Treatments

Renovate®/Aquathol

The combination of Renovate®/Aquathol or Renovate/ Clearcast will control both EWM and CLP. Renovate® has demonstrated an excellent level of control of EWM on Saratoga Lake. Using endothall will control CLP at low concentrations when water temperatures are low. In a study completed by the ACOE, the combination of endothall at 1.0 mg ae/l (milligram acid equivalent/liter) and Renovate® at 0. 5 mg ae/l obtained 100% control of EWM in four weeks (Madsen et al. 2010).

Normally, CLP is controlled by Aquathol K at a concentration of 0. 5-1.5 ppm. Overall, this approach lowers the herbicides needed to achieve control and provides enhanced safety since lesser amounts of active ingredients are used. To avoid non-target species damage, it is necessary to Renovate®/Aquathol K in early to mid-May. To complete this type of application, work would have to be completed in early May, which is the typical time period when using Sonar®.

Endothall will also control coontail (*Ceratophyllum demersum)*, *Chara* spp., *Nitella* spp., elodea*,* naiad, yellow pondweed, white pond lilly, *Sparganium* spp., *Zannichellia palustris,* water stargrass*,* and other species of milfoil. This could lead to non-target damage however an early season application will minimize this threat.

The schedule for application of the selected product is found in Table 1-2.To implement endothall/Renovate® treatment, the program requires early spring inspection of the lake to finalize the areas of application.

If the treatment dose used is 1.0 mg/l ae of endothall and 0. 5 mg/l ae of Triclopyr, as used by Madsen et al. (2010), the application rate for endothall (Aquathol® K) would be 1.3 gallons per acre-foot and for Triclopyr (Renovate® 3) it would be 0. 45 gal. /acre-ft. If the average depth of the area being treated is 5 feet, then the application rate for Aquathol® K would be 6.5 gal/acre, and for Renovate® 3 it would be 2.25 gal/acre. This combination has rapid uptake characteristics therefore, long contact time with target species at the effective dose occurs in three to five days.

Renovate® Single Product Application

Renovate® OTF or Renovate® 3 will be used in accordance with the label instructions. The target dose is 0. 75-2.5 ppm acid equivalent and normally 72 hours contact time is necessary to gain a high level of control. If the average water depth is 5 feet, the application rate would be 100 to 335 pounds per acre of Renovate® OTF or approximately 3.4 to 11.3 gallons per acre of Renovate® 3.Application will be done at the end of May or early June when the plants are growing rapidly. Later season applications of Renovate® can be used due to the highly selective nature of the herbicide (Triclopyr) against EWM. Very early season applications are not necessary. The cost of Renovate® application is $1,070 per acre, which is lower than Sonar® ($1,200/acre), but more costly than the Renovate®/endothall application ($770/acre). The later season application provides for more precise targeting of dense EWM since it is more easily observed in late May or early June than in early May. Later season application will cause larger accumulation of biomass, however, creating a potential for depression of dissolved oxygen when the plants are killed and decomposing.

This has not occurred during the large scale or spot treatment using Renovate® on Saratoga Lake (ACT 2007, 2008, 2009, 2010, 2011 and 2012). EWM die-back following the Renovate® application occurs over

a period of weeks and even the largest treatment zones were less than 5% of the lake's surface. Renovate may also be applied as a split dose using half of the label amount in each dose. A split dose prolongs the contact with the herbicide and the target plants, which should improve the level of control. Renovate® does not control CLP or water chestnut.

Sonar® Single Product Application

In 2007, Sonar® Precision Release (PR) was successfully used on the south end of Saratoga Lake to treat 158 acres of EWM. This treatment had carried over control for two or more seasons with limited regrowth. Spot treatments of approximately 26 acres were necessary in 2010.

The active ingredient, Fluridone, inhibits the formation of carotene in plant cells, leading to the destruction of chlorophyll by light. The major challenge of using Sonar® is keeping the concentration of Fluridone at the effective dose level of 7-30 ppb for 28 days, and avoiding dilution by excess rain and high winds, which causes drift. The Precision Release Product Sonar® PR will continue to be used as the primary formulation. The normal application rate for Sonar® PR is 1.9-8.1 pounds per acre, assuming an average water depth of 5 feet. Sonar® AS liquid formulation may also be used to boost the concentration.

Galleon® Single or Mix Product Application

Galleon® (penoxsulam) has not yet been registered for use in New York State. It has a number of characteristics, including low toxicity to animals, and consequently few restrictions on the use of water treated with it (see Table A-2), which may make it a good candidate for use in Saratoga Lake. It is also relatively selective, and will control EWM, but not CLP. The native species of *Potamogeton* are rated as being tolerant or having an intermediate tolerance of penoxsulam, which would lead to some non-target plant impacts. To minimize non-target impacts, this product would be used in the early spring. The dosage for EWM control is 30-75 ppb, which can be achieved by application of Galleon® at a rate of 65 fl. oz. per acre, assuming an average water depth of 5 feet. Once registered, this product should be used on Saratoga Lake since it has a different mode of action.

The label for Galleon® SC (see Appendix C) provides instructions for use of a combination of this herbicide with the dipotassium salt of endothall (e. g. , Aquathol® K). For best results, it recommends a concentration of Galleon® SC of 5 to 40 ppb in combination with an endothall concentration of 0. 5 to 2.0 ppm a. i. To achieve these doses, assuming an average water depth of 5 feet, would require 4.5 to 35 fl. oz. per acre of Galleon® SC and 0. 75 to 6.5 gallons per acre of Aquathol® K. This fast-acting mixture collapses and kills susceptible plants within 2 to 4 weeks after treatment.

Clearcast® Single or Mix Product Application

Clearcast® (imazamox) is a systemic herbicide which is effective against EWM and CLP. Its mode of action is to disrupt protein synthesis and thereby cell growth, by inhibiting the enzyme acetohydroxyacid synthase (AHAS). Concentrations of imazamox in the range of 50 to 200 ppb have been found to control submersed aquatic macrophytes (BASF 2008). To achieve concentrations in this range requires application of 0. 7 to 2.7 gallons of Clearcast® per acre, for an average water depth of 5 feet. This is a broad-spectrum herbicide that will impact native pondweeds (*Potamogeton* spp.) and other native species in Saratoga Lake. To minimize non-target species impacts it is necessary to apply it in the early portion of the growing season if the target species is EWM. Foliar application of a 2-5% solution of Clearcast® can also be used for spot treatment of water chestnut. Clearcast®® has been successfully used on Saratoga Lake to control water chestnut at Kayaderosseras Creek outlet in 2018.

Clearcast® may also be used in combination with Aquathol®. As in the mixtures of Aquathol® with Renovate® or with Galleon®, this is the combination of a contact herbicide (endothall) with a systemic herbicide (imazamox, Triclopyr, or penoxsulam). A recent patent application for this combination (Koschnick and Tarver, 2009) suggests a typical endothall concentration in the range of 0. 35 to 1.0 ppm a. e. with imazamox concentration of 25 to 75 ppb. Product doses, assuming an average water depth of 5 feet, would require application of 1 to 3 gal. /acre of Aquathol® K and 43 to 130 fl. oz. /acre of Clearcast® to achieve the desired application rate. Using a combination of herbicide lowers the concentration of product necessary to control the target species and provides control of multiple target species.

ProcellaCOR ®

ProcellaCOR ® is a new product by SePro that has been registered by the USEPA, and recently accepted for registration in NYS. The active ingredient of ProcellaCOR ® is florpyrauxifen-benzyl a new active ingredient. The product has low solubility in water of 15 µg a. i. , and photolysis in clear water breaks down the parent product in four to six days. The break down products are less toxic than the parent chemical. In sediments, the photolysis process takes longer approximately two to six weeks. The florpyrauxifen-benzyl is not acutely or immediately toxic to fish or invertebrates at the maximin dose of 150 ppb. Chronic toxicity or long-term toxicity does not occur at the maximum solubility level of 40µg a. i. /l (active ingredient). To reach a concentration of 40µg a. i. /l, a co-solvent is required. The toxicity levels found on the label are estimates since the solubility of Florpyrauxifen-benzyl in water is limited to approximately 15 µg a. i. /l. (EPA-HQ-OPP-2016-0560-0011 pages1-133-6-133, 75-133). The mode of action is as an auxin that promotes growth elongation similar to endojen auxin. As the plant elongates it weakens and can't support its weight in water, therefore the plant falls out of the water column and dies.

ProcellaCOR® will control EWM and its hybrids along with Hydrilla. As a part of the registration process, tests were completed using ProcellaCOR® in 6,700-liter test tanks. These tanks contained hybrid milfoil, vallisneria, elodea, star grass, Illinois pondweed and American pondweed. The tested doses were 3 ppb, 9 ppb and 27 ppb for six and 24 hours of contact time. The hybrid milfoil was controlled when concentrations were above 6 ppb and contact time was over three hours. Elodea was showing some suppression at 9 ppb and 24-hour contact and stargrass was suppressed at concentration of 27 ppb. This indicates that low dose 3-9 ppb short term exposure application seem feasible, however the future label and additional reports on the herbicide will need to be considered (Netherland M. , 2017).

Using the USEPA label, a description of a treatment of 43 acres in the north end of Saratoga Lake a location that was treated in 2018 with Renovate. The treatment zone contains 215-acre feet of water. Table 5 indicates that for EWM a 4 prescriptive dose unit (PDU) is the dose for EWM. The amount of product required is 21 gallons.

Lawn irrigation following treatment with ProcellaCOR® is not restricted. Tables 1 and 2 of the USEPA label has a 0. 5-day irrigation restriction (12 hours) or when test results show that concentration in water is under 1 ppb. Dilution model by the NYSDEC may also be used to estimate the dilution and possible restriction on use of treated water for irrigation of crops, or livestock watering (NYS Restricted use herbicide label February 22,2019).

1.5.3.d. Mechanical Harvesting

SLPID has completed mechanical harvesting of aquatic plants since 1986.Aquatic plant harvesting was the recommended method to improve lake access in the 1983 plan (Hardt , 1983). Along with mechanical

harvesting, the lake is drawn down in October to control growth of aquatic plants in water below roughly a meter deep or three feet deep.

In 1982, there were 13 submersed invasive species identified in Saratoga Lake, up slightly from 11 in 1969.By 1994, the number of submersed species had increased to 19.Harvesting, which began in 1986, cropped off the tops of EWM between 1986-1999, which resulted in an increase in the number of plant species found in the lake due to the reduction in shading (Boylen and Eichler 2004). Aquatic plant harvesting is a good method to reduce the biomass of EWM and improve recreational access to the water body. Harvesting has improved species diversity which creates a better mix of native plants that are more compatible with native species of fish found in the lake. Ecologically, a reduction of the dense EWM beds has provided an opportunity for a diversity of native plants to emerge. This reduction in dense EWM and expansion of native plant diversity and coverage will help to restore the predator-prey relationships by allowing larger fish into the currently dense weed beds (Newroth, 1985).

SLPID operates two aquatic vegetation harvesters from mid-May to the first week of October. One harvester is a FX-11 with a 11-foot-wide cutter head and the second harvester is a 2004 model with a ten-foot cutter head. When the harvesters are empty, approximately 1.0- 1.5 feet of water is needed to float the craft. When the harvester is loaded, this increases to two- three feet or more. The harvesters have the capacity to cut to a depth of five feet or more. The harvesters discharge the cut weeds from the stern to the shore conveyor which lift the aquatic plants into the truck. They are equipped with spud poles that are hydraulically pushed downward to anchor the harvester in shallow water during off loading or anchoring at night. Due to the size (46 feet length) and depth of water needed to float the harvesters, the equipment cannot not operate in the area between docks. A three-person crew operates the harvesters and hauls the plant material to local orchards, vegetable farms, and other farms near the lake for disposal as compost material.

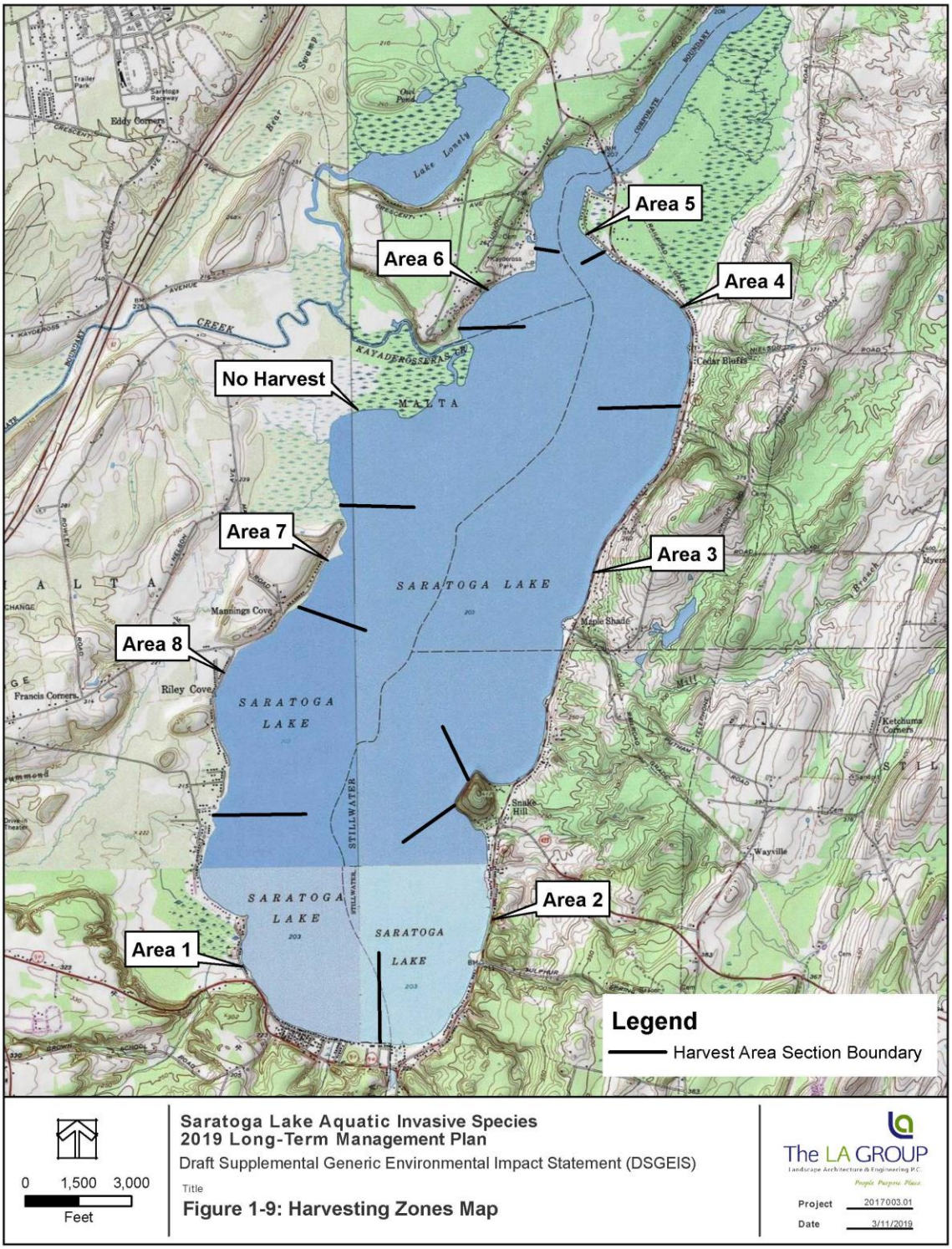
Aquatic plant harvesting used to start in first weeks of May, but the schedule has been adjusted to start in the week prior to Memorial Day. Also, aquatic plant harvesting in May and the first weeks of June is limited to water depths of 5-6 feet or at end of the docks. The harvesting head is operated at three to four feet for plants to be removed. This harvesting in water depths of 5-6 feet reduces possible damage to bass reeds or nests that are normally found in shallower water. This change in the schedule was requested by NYSDEC and it does not interfere with the aquatic plant harvesting.

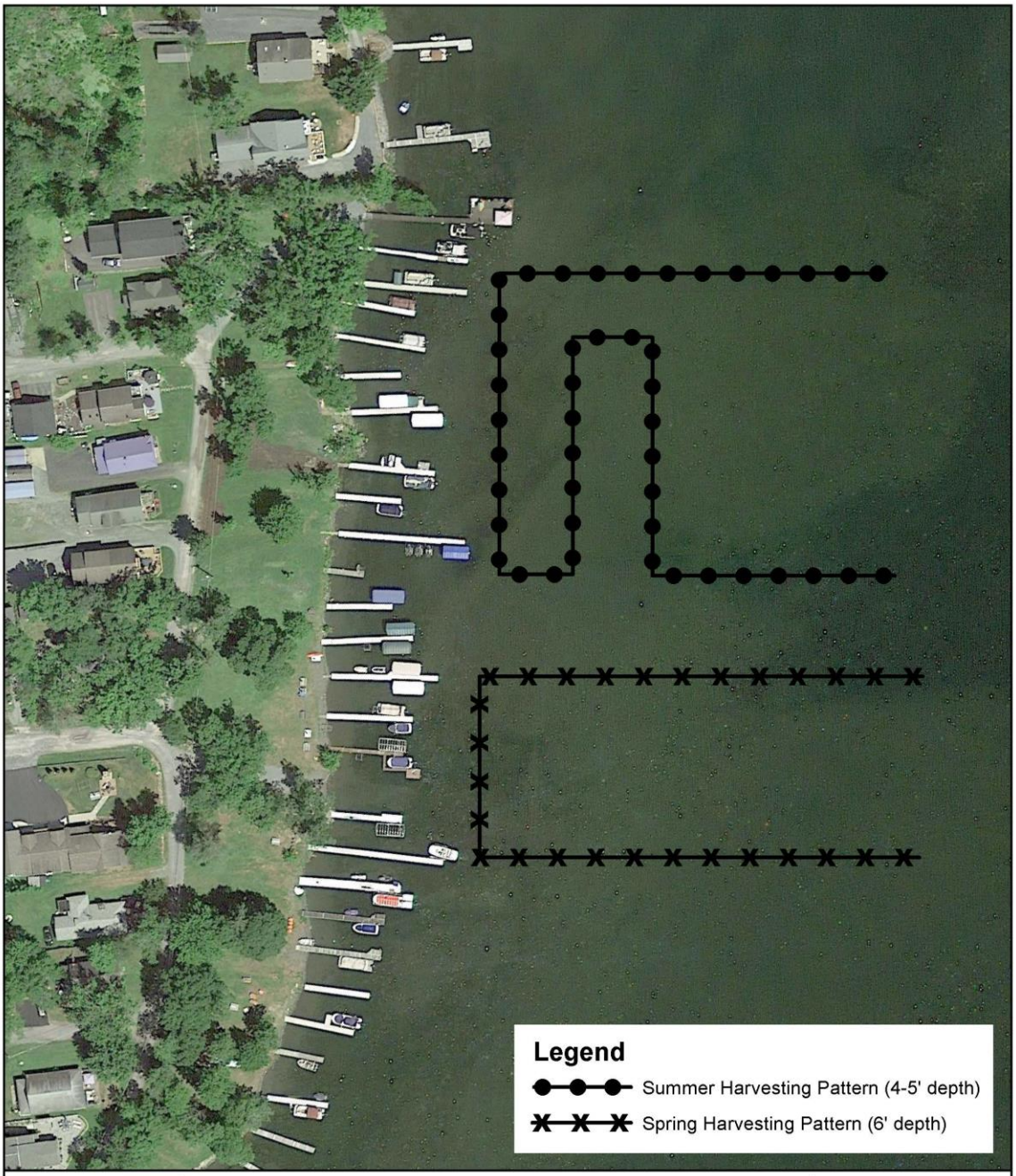
As illustrated in Figure 1-9, “Harvesting Zones Map,” harvesting on Saratoga Lake takes place in eight designated harvesting zones around the lake. Harvesting is completed in a continuous cycle moving from one area to the next adjacent area, except that areas treated with herbicides are not cut until late summer. Depending on the density of plant material, each area is cut three or four times between May and August. The harvesting in September continues in the same pattern and is done to provide access for boating and to gather rafts of aquatic plant fragments. Both EWM and eel grass (*Vallisneria americana L.*) break apart in the late summer and accumulate as a floating raft of material. EWM auto fragments as a method of vegetative reproduction, and eel grass has a weak root that will not hold the plant when it reaches a length of six feet or more by the end of the summer. Also, most aquatics die back in the fall and break apart therefore harvesting continues until October. Harvesting is normally suspended or delayed in areas that are treated by herbicide.
The harvesters are removed from the lake prior to mid-October and are stored in a large garage built by SLPID on leased land at the Town of Saratoga Highway Department facility. This garage was constructed in 2015 to house the harvesting equipment and trucks during the winter. Prior to construction of the garage, the harvesters were stored on trailer or blocks at local marinas and trucks were parked at Malta

Town garage. The Town of Saratoga garage site was selected since it had adequate space available for an additional garage. SLPID had completed a search of possible properties near Saratoga Lake but many were unsuitable, expensive, local zoning did not allow municipal use or garages as primary structures and all would have taken land from local tax rolls.

Over the years of successful treatment of EWM there has been increase in the amount of native aquatic plants found in many areas of the lake. In shallow water the native plants can quickly reach nuisance density and interfere with boat use and swimming off docks. The harvesters operated by SLPID need approximately two to three feet of water to maneuver and float. This limits the possibility of harvesting in close proximity of docks. To the extent possible, SLPID harvesting operations works near docks to improve access but will limit work near docks to avoid damage to docks and equipment. SLPID will continue to look at equipment options to gather aquatic plant debris in shallow water while considering overall cost and efficiency of new efforts. Figure 1-10, "Typical Harvesting Patterns for Nearshore Areas", illustrates the cutting pattern that the weed harvester follows in near shore areas during the spring and summer seasons.

On occasion SLPID has successfully used mechanical hydro rakes to remove water chestnut and this method will be possibly used in the future. Hydro rakes can also be used for shoreline cleanup of plants.


Area 5
Area 6
Area 4
No Harvest
Area 7
Area 3
Area 8
Area 2
Area 1
SARATOGA LAKE
MALTA
Legend
Harvest Area Section Boundary
0 1,500 3,000
Feet
Saratoga Lake Aquatic Invasive Species
2019 Long-Term Management Plan
Draft Supplemental Generic Environmental Impact Statement (DSGEIS)
Title
Figure 1-9: Harvesting Zones Map
The LA GROUP
Landscape Architecture & Engineering P.C.
People Purpose Place.
Project 2017003.01
Date 3/11/2019


Legend
Summer Harvesting Pattern (4-5' depth)
Spring Harvesting Pattern (6' depth)
0
50
100
Feet
Saratoga Lake Aquatic Invasive Species
2019 Long-Term Management Plan
Draft Supplemental Generic Environmental Impact Statement (DSGEIS)
Title
Figure 1-10: Typical Harvesting Pattern for Near Shore Areas
The LA GROUP
Landscape Architecture & Engineering P.C.
People Purpose Place.
Project 2017003.01
Date 3/11/2019

1.5.3.e. Hand Harvesting

The success of the chemical control of EWM has created the opportunity to use hand harvesting as a remedial method to further reduce EWM and other target species coverage in the lake. Hand harvesting is an alternative in areas that were not adequately controlled by herbicide application or in areas where chemical application is difficult.

The target species for hand harvesting will be EWM and water chestnut and perhaps a method to address other AIS as a part of a rapid response effort.

A 3-5-acre area of limited EWM on a rock bar or sunken island approximately 1,400 feet east of the west shore was hand harvested in 2011.This area was treated with Renovate® in 2009 and spot treated in 2010. The 2010 treatment resulted in a 25% level of control in that area, which was described as dense by DFWI (Eichler and Boylen, 2010).

To hand harvest this area, Aquatic Invasive Management, LLC (AIM) was retained to complete the work. The divers utilize a surface airline supply (Hookah) and diving apparatus. An air compressor pumps air to the diver which allows the diver to work for prolonged periods underwater. Divers gather plants into mesh bags while personnel on the support boat gather bags, and nets capture the fragments. Divers can be somewhat selective and target EWM if sediments are heavy (sandy) and do not re-suspend when disturbed. The professional divers have developed the necessary skill to remove most of the plants including roots during the initial pass. Repeat harvesting is necessary to gather the target species.

Along with hand harvesting small areas of EWM, in the future there is the opportunity to have contractors work on Water chestnut patrol. A contractor crew would go to the areas previously controlled by herbicides or mechanical removal and remove the Water chestnut. The past areas for Water chestnut control by hand harvesting have been the ditches south of the Kayaderosseras Creek and along shoreline areas near marinas and the northwest shoreline north of the Kayaderosseras.

The Saratoga Lake Association for many years successfully completed annual hand harvesting of Water chestnut. In 2012 SLPID hand harvested Water chestnuts at the mouth of the Kayaderosseras Creek and removed 0. 25-. 5 acres. Based on these observation SLPID started contracting with ACT and then SŌLitude for harvesting with a hydro rake, which is a small hydraulic backhoe that rakes or pull aquatic weeds with limited disturbance of the sediment. This mechanical harvesting effort reduced the amount of Water Chestnut at the mouth of the Kayaderosseras Creek.

1.5.4 Aquatic Plant Monitoring

The goal of an aquatic plant monitoring program is to meet the evolving needs of an integrated plant management program. Monitoring data needs to consider the expansion of the program to include all the aquatic plant goals including:

- Continue control of EWM;
- Improved control of CLP, and Water chestnut;
- Early detection of new invasive;
- Evaluation of the overall effectiveness of harvesting, herbicide, drawdown, control techniques; and
- Use floristic indexes to describe the harvesting, herbicide application areas to determine if it is a useful measure.

In addition to the herbicide treatment, we recommend the following monitoring efforts to assess the treatment effectiveness:

- Early-season visual inspection to evaluate EWM and CLP distribution, and finalize the 2019 treatment scope;
- Post-treatment survey and water quality sampling required by permit conditions;
- Hydro-raking assistance to remove Water chestnut plants or other plants removed by mechanical methods from shallow areas near the mouth of Kayaderosseras Creek; and
- Late season survey to validate findings of DFWI survey and to plan future management efforts.

To improve quantification of the coverage and the amount of CLP, it is necessary to take plant samples in late June or early July. Currently the macrophytes inventory occurs in August in order to allow assessment of the maximum number of species. The areas that are hand harvested need to be accurately mapped annually. Zebra mussels and other invasive mollusks populations needs to be included in the annual inventory effort.

1.5.5 Adaptive Management and Rapid Response

Saratoga Lake has an adaptive management process in place to annually evaluate data and make decision based on input from consultants, lake manager and scientists. Integrated aquatic plant requires that each method being employed is well understood by the management group and that enough high-quality data is available in a timely fashion to make decisions. Table 1-2 shows the timeline of decision making on an annual basis. To make the decision on a course of action, water quality and aquatic plant information is collected each year. These data are evaluated by Solitude or a consultant to SLPID and discussed with DFWI, with recommendation for the following season made by November. This refines the draft budget that was previously presented to the SLPID taxpayers during the summer this document further formalizes the adaptive management practices and provides the background for future decision making.

SLPID will be the Project Lead for a rapid response situation involving in lake invasive species, in lake or shoreline threat to water quality caused by a bank or shoreline collapse or spill. For emergency water quality threat in the watershed, such as a large-scale stream bank collapse or road collapse in a stream corridor, or damage from a large storm, SLPID will assist Saratoga County or towns in rapid response procedures but may not act as the Project Lead for Rapid Response and often is used to address the introduction of a new invasive species.

For Rapid Response involving Saratoga Lake there are a limited number of municipal offices, and agencies that may be involved in responding to a lake specific environmental threat. At Saratoga the there is a County Planning Office that addresses issues of county wide concern. The County Soil and Water Conservation district addresses issue related to agriculture, and environmental quality, while County Cooperative Extension houses the office of the County Stormwater Coordinator. Geographic information system capabilities are shared by Planning, County Real Property and Soil and Water Conservation District and the Stormwater Coordinator. Saratoga County does not have an independent environmental health department. Depending on the issues County Department of Public works or Saratoga County Sewer District could be involved with remedial action. The LA Group P. C. has the GIS mapping and background reports produced for SLPID that would be needed to prepare plans to address a new invasive species.

It will be important to keep the local communities informed and involved so that Rapid Response effort is maximized especially since the Town Supervisors also represent the local municipalities at Saratoga County. The Saratoga Lake Association (SLA) has an extensive network of members and active newsletter along with email contact with its membership. This type of outreach is critical to informing the public of issues related to the new invasive species and early steps in the assessment of the problem. Being able to mobilize a large group of volunteers can aid in the early assessment of the extent of the invasion. The NYSDEC will also have a role in addressing any environmental threat that may occur in the lake or the watershed.

To address a newly discovered invasive species in the lake, the first step is to verify the species and determine whether newly species represents a threat. Once determining a threat, the ecology of the organism will be considered to determine if immediate action is feasible, or timing causes delay. Determining the extent of the new invasive is a critical step in future planning efforts to address the invasive. Mapping the extent of a new invasive needs to be carefully completed so that the species is accurately identified and mapped.

An action always to be considered is quarantine which involves isolating the organism to prevent spread. The second common method of early control is hand harvesting. SLPID does carry budget reserves to address repairs or replacement of equipment and unforeseen lake consultant fees that could be allocated to support Rapid Response work. Much of the planning for control actions can be completed by the lake management consultant and contractors already in place.

A part of adaptive management is keeping the district and the public informed on the condition of the lake. SLPID prepares one or more electronic newsletters each year describing on-going activities. SLPID is funding lake classroom experiences that are provided by Paul Smith's College and are given to the various community summer camps around the lake. A similar lake ecology classroom lessons are also made available to local schools and funded by SLPID. Various outreach programs will continue to be provided by SLPID.

1.5.6 Monitoring of Harmful Algae Blooms

Harmful algae blooms (HABs) are not new and, prior to the lakewide sewer district, there were both green algae and blue green algae blooms occurring in Saratoga Lake. A common cyanobacteria – *Anabaena* - was identified in the 1969 lake inventory. The cyanobacteria (blue-green algae) that make up these blooms may produce toxins that pose health risks to humans, pets, livestock, and wildlife that come in contact with the water. More information on these organisms and their toxins is presented in Section 2.9.

The New York State Department of Health, in collaboration with NYSDEC and CSLAP, has analyzed samples from a number of lakes, including Saratoga Lake, for levels of microcystin, a toxin produced by cyanobacteria. This is part of a 5-year agreement between NYSDOH and the Centers for Disease Control with the aim of documenting HAB occurrence and any potentially related illnesses, improving the ability of NYSDOH to analyze cyanobacterial toxins and ultimately to reduce exposure to HABs.

As part of the CSLAP, a pre-screening testing for plant pigments related to HAB has been completed over the last six years. The toxin levels in the three samples from Saratoga Lake that were analyzed were not high enough to cause concern. However, there can be interplay between HABs and aquatic herbicide treatments in that exposure to some herbicides can be lethal to cyanobacteria, leading to release of toxins into the water. Given that Saratoga Lake is popular for water-contact recreation, monitoring for HABs and

their toxins may be advisable. Microcystin monitoring can be completed by immunoassay and it may be feasible to have test kits available to test algae blooms when they are found. Therefore, SLPID will in cooperation with existing HAB sampling by NYSDEC and NYSDOH, continue to participate in those sampling efforts. If HAB conditions occur with greater frequency or as more public beaches are developed, more HAB sampling may be warranted. Such a plan may incorporate nearshore and offshore HAB testing, organized surveillance, and additional water quality testing.

1.5.7 Zebra Mussels

Zebra Mussels (*Dreissena polymorpha)* entered the lake sometime prior to 1997 when the water clarity of the lake suddenly increased. It is estimated that Zebra Mussels enter the lake sometime between 1990-1993.Currently, there are not control methods for Zebra Mussels applicable to natural water systems. Controlling Zebra Mussels would be complex and result in numerous changes in the lake including decreased water clarity, possible shifts in the phytoplankton community and changes lake water chemistry.

1.6 Project Funding

The project to date has been funded through a mix of SLPID's special tax assessments, un-appropriated fund balances, private donations and state grants. Future lake management will be funded annually through funds collected from the SLPID special tax assessment district and potential grants. Grants supported a portion of the segmented whole lake treatment. A grant for milfoil eradication was obtained along with two grants from a local senator. A total of $155,000 was obtained to support the project. However, the vast majority of project funding has been allocated by the tax district. The special tax district is illustrated in Figure 1-6, "SLPID Boundary Map".

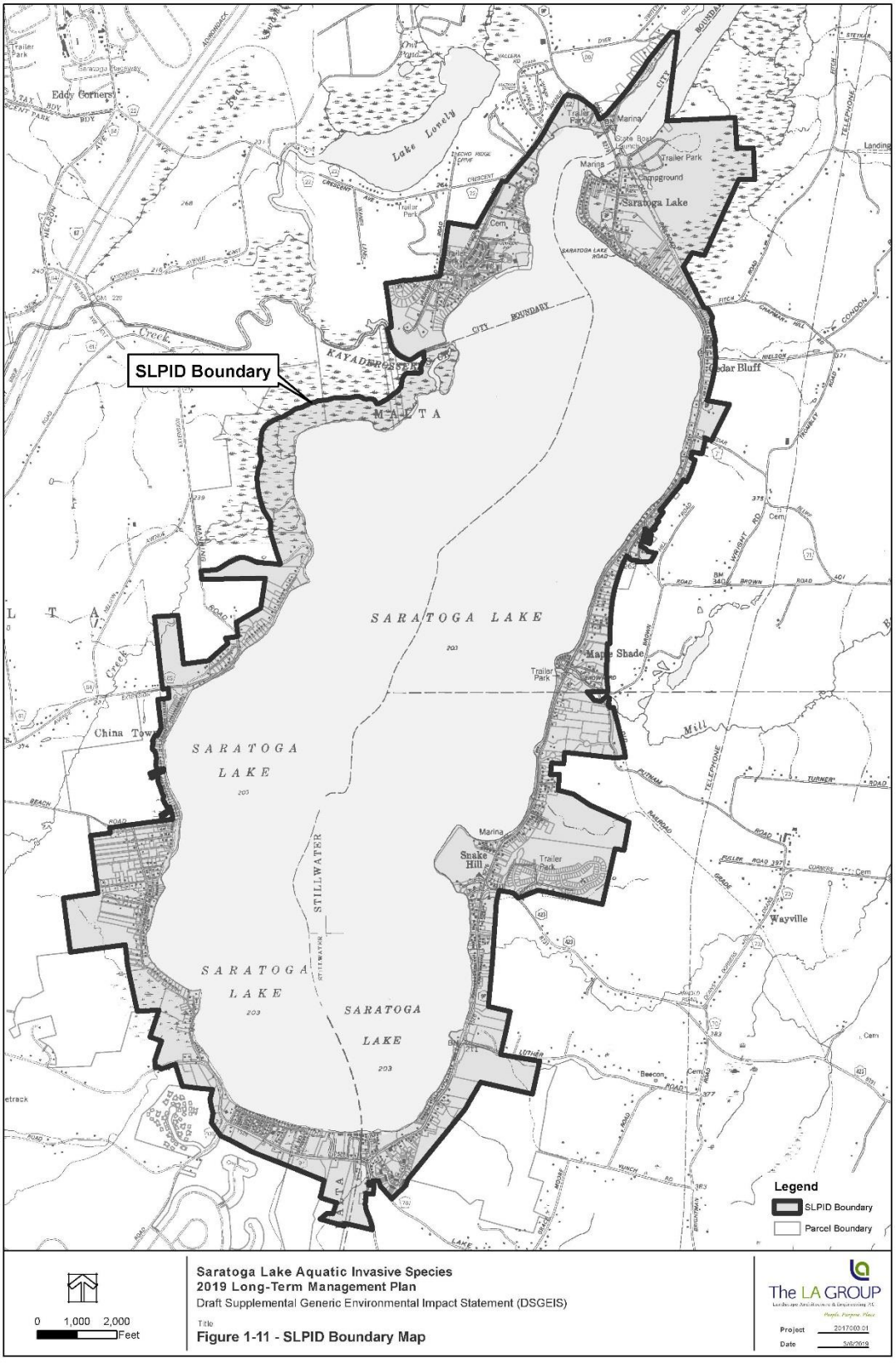
The tax district was formed in 1986 by the NYS Legislature. The legislation includes a maximum tax rate of $1.30 per $1000 of assessed valuation. The annual budget is prepared by June and is presented to the district membership in the summer. A final budget is submitted to the county in October. The allocation of funds is illustrated by Table 1- 4, "Budgeted Costs for Lake Management 2007-2018."

Table 1-4 Budgeted Costs for Lake Management 2007-2019

Year	Chemical Treatments*	Harvesting*	Monitoring	Totals
2007	$196,000	$ 76,000	$ 25,000	$297,000
2008	$238,000	$ 75,000	$ 25,000	$338,000
2009	$282,000	$ 76,000	$ 34,000	$392,000
2010	$ 54,000	$ 82,000	$ 15,000	$151,000
2011	$ 75,000	$ 80,000	$ 20,000	$175,000
2012	$122,490	$ 80,000	$ 20,000	$222,490
2013	$137,930	$ 80,000	$ 20,000	$237,930
2014	$ 83,000	$ 83,000	$ 15,500	$181,500
2015	$ 99,618	$ 91,500	$ 30,000	$221,118
2016	-0-	$111,500	$ 30,000	$141,500
2017	$113,694	$111,500	$ 30,000	$255,194
2018	$ 65,490	$ 94,500	$ 40,000	$199,990
2019	$ 13,275	$111,750	$ 40,000	$165,025

*Does not include equipment replacement (labor, supplies, insurance, fuel, repairs)

** Does includes Lake Steward Labor


SLPID Boundary
Saratoga Lake Aquatic Invasive Species
2019 Long-Term Management Plan
Draft Supplemental Generic Environmental Impact Statement (DSGEIS)
Title
Figure 1-11 - SLPID Boundary Map
0 1,000 2,000
Feet
Legend
SLPID Boundary
Parcel Boundary
The LA GROUP
Project 2017000.01
Date 5/8/2019

SECTION 2.0 ERRATA

Page 1-2 Section 1.1 Project Summary, first paragraph revised:
Combination treatments will continue to be used on Saratoga Lake when past experience indicates that using two herbicides such as 2,4D granular or endothall will better target the aquatics to be controlled. To control the target organism and be complete treatment cost effectively EWM and other aquatic invasive species must be managed using an integrated approach. At the same time, importation of EWM and CLP along with other aquatic invasive species (AIS) must be prevented. Control methods will include the use of systemic and contact herbicides, mechanical harvesting, hand harvesting and drawdown to suppress growth of the target species. SLPID, the Applicant and project sponsor, is proposing to continue an Integrated Pest Management Plan (IPMP) of mechanical harvesting, importation prevention, annual draw down and using registered aquatic herbicides to target Eurasian watermilfoil (EWM), curly leaf pondweed (CLP) and the current water chestnut infestation impacting Saratoga Lake. This same plan will also be the basis of new protocols to address new yet to be discovered aquatic invasive species (AIS). This plan will include components of rapid response protocols for new invasive species. This project is to be known as Saratoga Lake Invasive Species Long-term Management Plan. This plan builds upon the successful experience gained during the segmented whole lake treatment, treatments from 2010-2018 at Saratoga Lake, as well relevant treatments in other temperate lakes. This is a long-term control program that seeks to manage EWM to keep that invasive plant to between 5-30% of the overall lake plant community frequency of occurrence or other biological descriptive measurement .

Page 1-9 Section 1.5.1 Target Species, seventh sentence:
Correct spelling of hydrilla H*ydrilla verticillate to hydrilla verticillate.*

Page 1-13 Section 1.5.1.b Target Densities, text revised as follows:
Figure 1-4, "Biovolume Map," indicates the plant density in Saratoga Lake in 2016. This estimate of biovolume was developed by using wide scan bathymetric mapping and computerized estimate of bio-volume. This figure shows the extend of aquatic plants in Saratoga Lake

In 2011, Darrin FWI started reporting the rake toss macrophyte survey data with the estimate plant mass ratings of sparse, moderate and dense (Madsen, 1999). Annually approximately 325 rake-toss samples are taken to describe amount and distribution of aquatic plants (Eichler 2011, 2012, 2013, 2014, 2015, 2016, 2017 and 2018). The rake-toss method using the plant weight rating provides information that can be expressed as kg/sq m, Using the kg/sq m it must be treated as a relative approximation of the weight of the plants rather than an absolute measurement of the weight of plants found in the sample.

To simplify, the graphs below illustrate the Illinois pondweed, Richardson pondweed and flat stem pondweed ,and large leaf pondweed lumped together as pondweeds. These three pond weeds have had a percent frequency above 5% from 2011-2018.The graphs also show the plants that have been above 10% frequency rather than illustrate all plants found in the lake. This focuses on the most common plants seen in the lake and represent the largest amount of biomass. The next show the variation in the biomass of plants and percent frequency for the given years. Figure 1-4a Estimated plant bio-mass base on rake toss samples illustrates the changes in the biomass estimates of aquatic plants in Saratoga lake. The 2004 estimated was completed by actual collection of the individual species and drying the species samples. The 2011-2018 biomass estimate was completed using rake toss estimate. The graph shows that the

amount of the target species has been reduced while non target native species have increased. The graphs also show that in a given year different native species were dominate. Figure 1-4b Percent frequency of selected plants is a graph of percent frequency shows that EWM has varied from 21.3 %-54.3% from 2044, 2011-2018. The other important period to examine is between 2015-2017.The percent frequency in 2015 was 26.9%, 26.0% in 2016, and 29.4% in 2017.In 2016, no herbicide was applied to control EWM yet there was only a 2.5% increase during the two-year period from 2015-2017.This change is less than the variation found between the years of 2013-2014 and 2016-2017 when herbicides were applied to control EWM. The percent frequency of EWM was below 30% in most years, except 2014 when all plants were found in more individual samples. Year 2014 seems to have been a good year for plant growth, yet the lake was not dominated by EWM (in 2016 the Vallisneria data was lost) . Also, the graphs show that there is a strong mix of aquatic plants in Saratoga Lake even after herbicide treatment. The gradual improvement of pondweeds as a part of the aquatic plant community from under 10% frequency in 2011 and 2012 and increasing to 40% frequency by 2013 is a benefit of the on-going management plan. The annual reports of Darrin Freshwater Institute are found on the SLPID web site which contain details of the annual sampling.

Figure 1-4a Estimated Plant Bio-mass Base on Rake Toss Samples

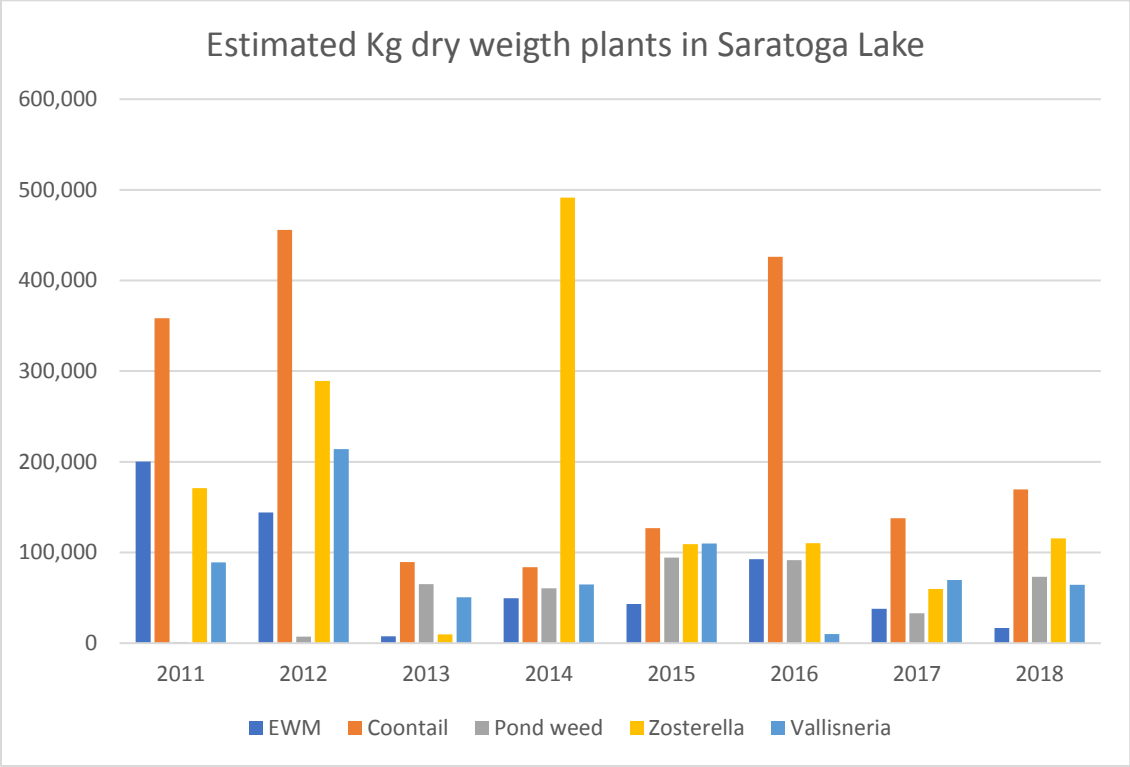


Figure 1-4 b Percent Frequency of Selected Plants

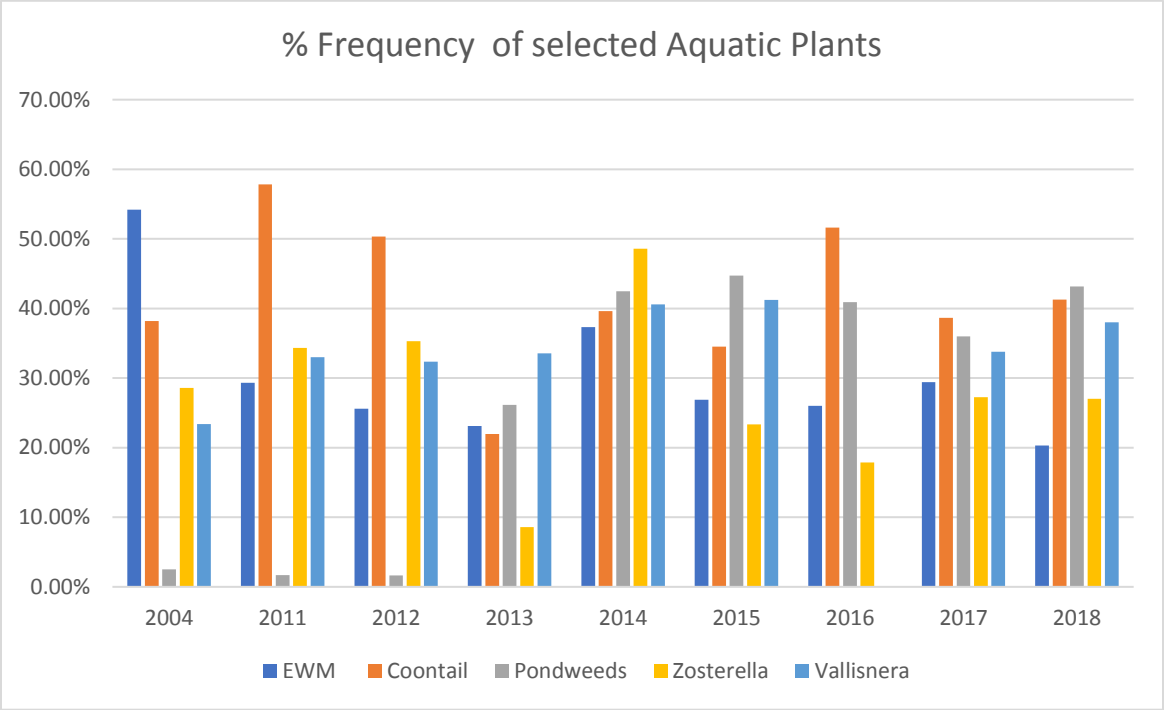


Figure 1-5, "Transect Map," illustrates the location of the historic plant transects and the generalized harvesting map. Using the transect locations a third set of illustrations were developed to show if plant communities were different on either side of the lake or along the shoreline in 2018.

Page 1-20 Section 1.5.3a Integrated Practice Management:
The last paragraph repeats the information found in the first paragraph. Delete the last paragraph.

Page 1-25 Section 1.5.3c Chemical Treatment Clearcast®
Clearcast® is also effective in controlling Water chestnut.

SECTION 3.0 RESPONSE TO COMMENTS

Comment submitted by Jim DeMasi:
I had the opportunity to read the Long-Term Management Plan and will be presenting it at the upcoming SLA meeting. It would appear that the task at hand is to control growth as it does not seem that complete eradication is likely. To achieve this goal, I would add one more management strategy. That would be to minimize the source of nutrients. SLA may be of assistance in that pursuit. Perhaps by implementing many of your group's previous suggestions from the "Land to Lake Perspectives"(2002). We are currently striving to find the best way to work with the various communities toward responsible development, another area of discussion has been looking into the possibility of minimizing road salt, just to name a few. The Board has been newly re-vamped and is wide open to suggestion.

Response:
The SDGEIS was prepared to review the progress of in lake management of invasive species and set out future actions to manage aquatic invasive species. Management of aquatic invasive species is clearly with the authority of SLPID as described in the authorizing legislation section 7.

The SDGEIS describes two areas that need to be further investigated and discussion with the communities. Section 2.10 Recreation and Section 2.11 Land use and Development provide new information on the number of watercraft around the lake and increase in development in the watershed. The number of watercraft may be near carrying capacity of the lake, however conflicts in the lake are minimized since many boats seem to anchor for a pro-long period of time. This is clearly a topic to be explored with the Saratoga Lake Association.

Land use is complex and as was the case when the “Land to Lake Perspectives” 2002 was a document that SLPID and Saratoga County Water Quality Committee prepared to support storm water rules and wetland protection. SLPID will explore land use issues within the watershed and lakefront communities when the planning efforts are being made in those locations.

A growth issue that may be explored with SLA is the appropriate level of re-development on the lake shoreline.