Lake Iroquois Association

-Research, Education, and Action for a Healthy Lake-

Lake Iroquois Lake Management Plan

Town
of
Hinesburg, Richmond, St. George, and Williston, Vermont

2020-2025

"A goal without a plan is just a wish".
- Antoinette de Saint-Exupery

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REVISIONS

Date	Revision Number	Name	Remarks
27 April 2021	**1st**	**Shannon Kelly**	**Original First Draft**

ACKNOWLEDGEMENTS

The Lake Iroquois Association (LIA) would like to dedicate the first edition of this Management Plan to over 40 years of dedicated volunteers who have committed themselves to the health and stewardship of Lake Iroquois since 1977. We who presently serve stand on the shoulders of giants.

You will find the information contained in this Plan is a blend of many published and unpublished reports from years of volunteer efforts by people who care about the continued health of the lake. Some sections of this Plan contain paragraphs and information taken directly from our website and the many excellent reports written directly by former and current Lake Iroquois Association members. A particularly noteworthy document is the 2014 *State of the Lake* report, from which a good deal of material for this Plan was derived. *We wish to acknowledge upfront this past literary work and point to this intentional approach to integrate into our Plan as a nod of respect for their authorship.* It is not possible to fully cite the people behind all of the many efforts over the years but we gratefully acknowledge the countless hours contributed by so many who have shared the Lake over the years.

We would also like to thank the generous benefactors who have provided financial support over the years that enabled the organization to grow and fund various initiatives improving watershed management, water quality, and health of the Lake.

LIA would like to thank the Vermont Department of Environmental Conservation and the Vermont Department of Fish and Wildlife, and numerous other agencies that have provided financial and staff contributory support over the years.

We would also like to thank those who reviewed the first draft of this document, Ms. Ann Bove in particular, who graciously provided us with the benefit of her years of experience with the Vermont Department of Environmental Conservation.

Finally, LIA would like to thank the four Towns of Williston, Hinesburg, Richmond, and St. George for the financial and in-kind contributory support over the years that enabled the organization and others who came before us to improve the health of the Lake.

LOCATION

Figure 1. LaPlatte River Watershed Map

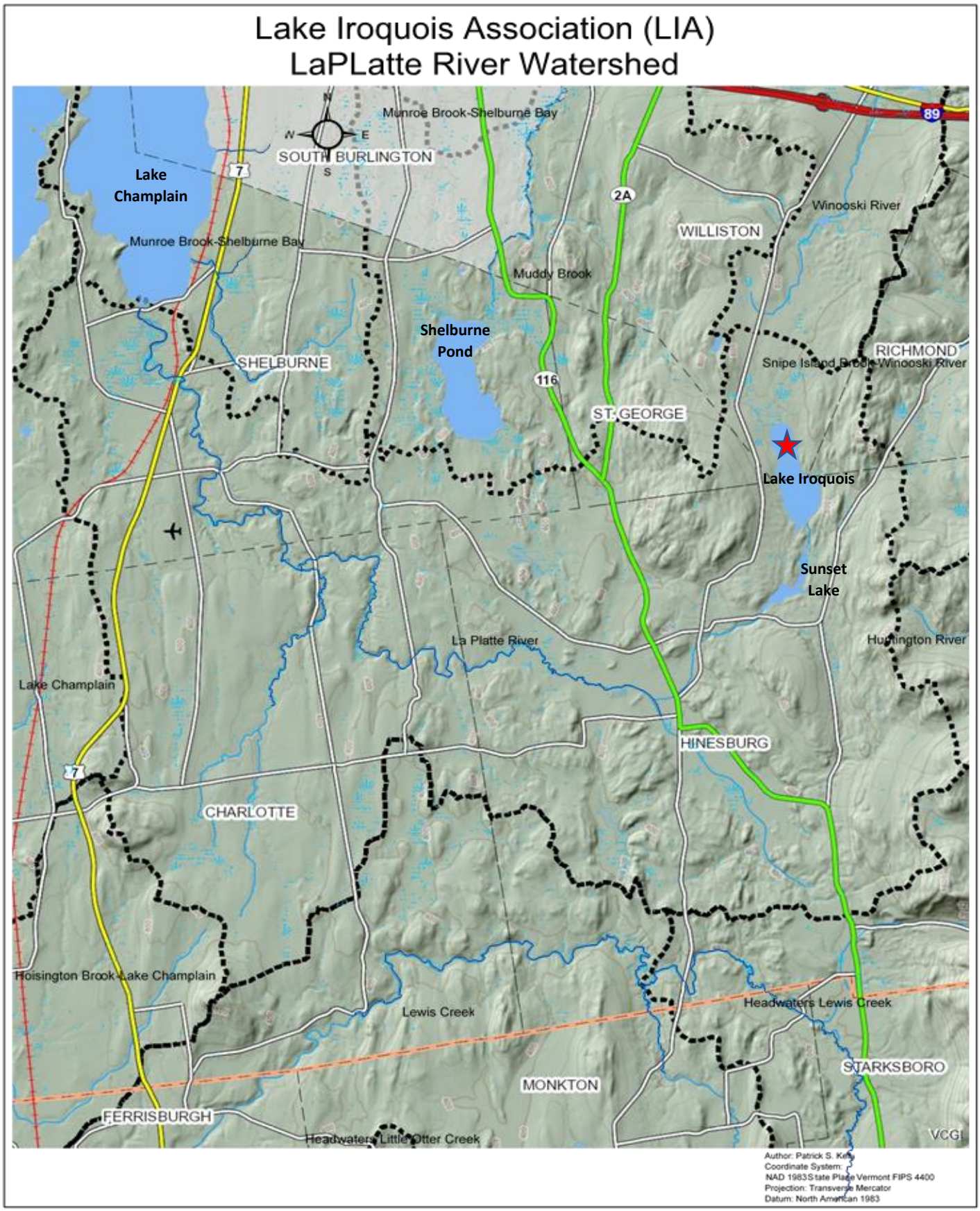


Figure 2. Lake Iroquois Map

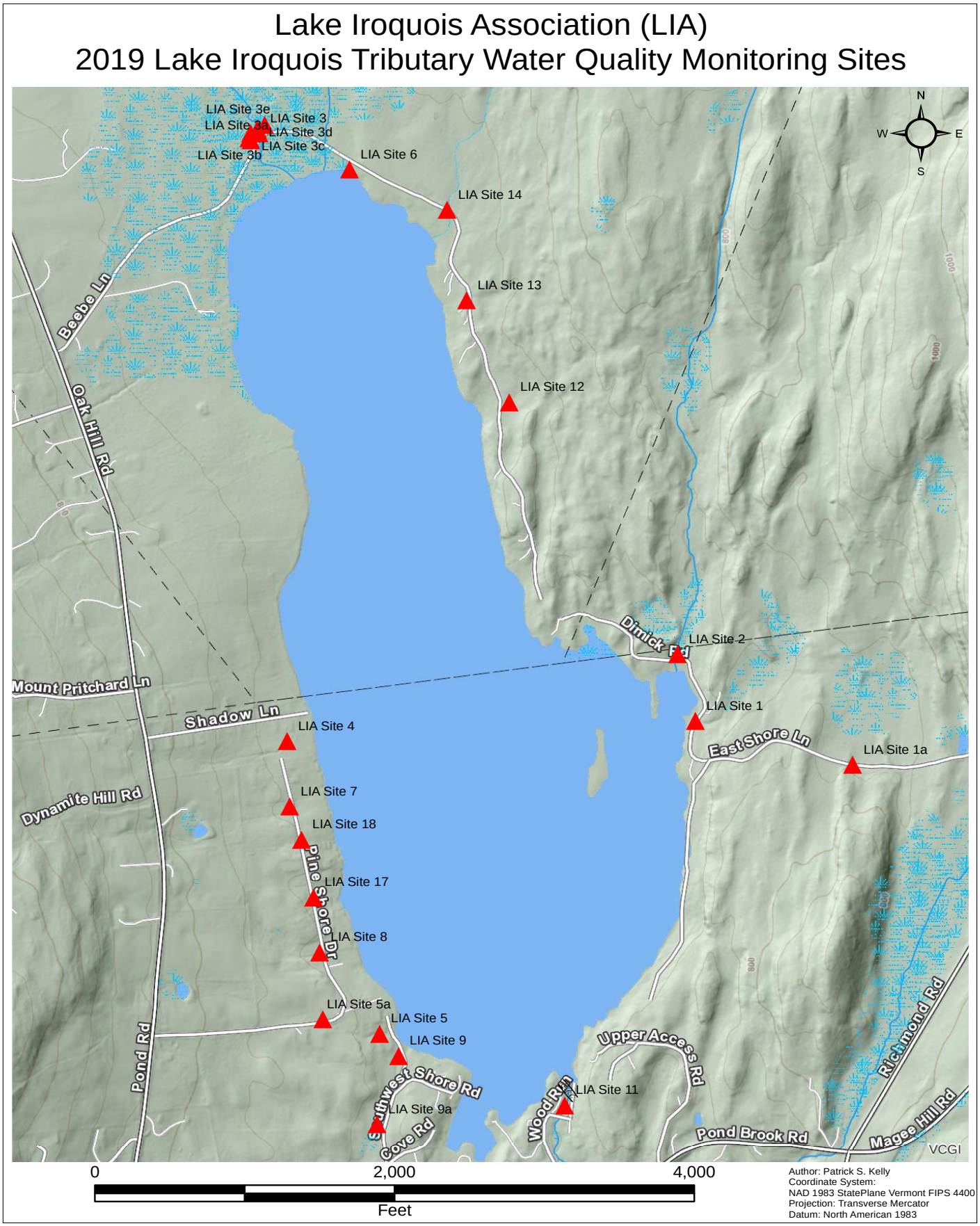
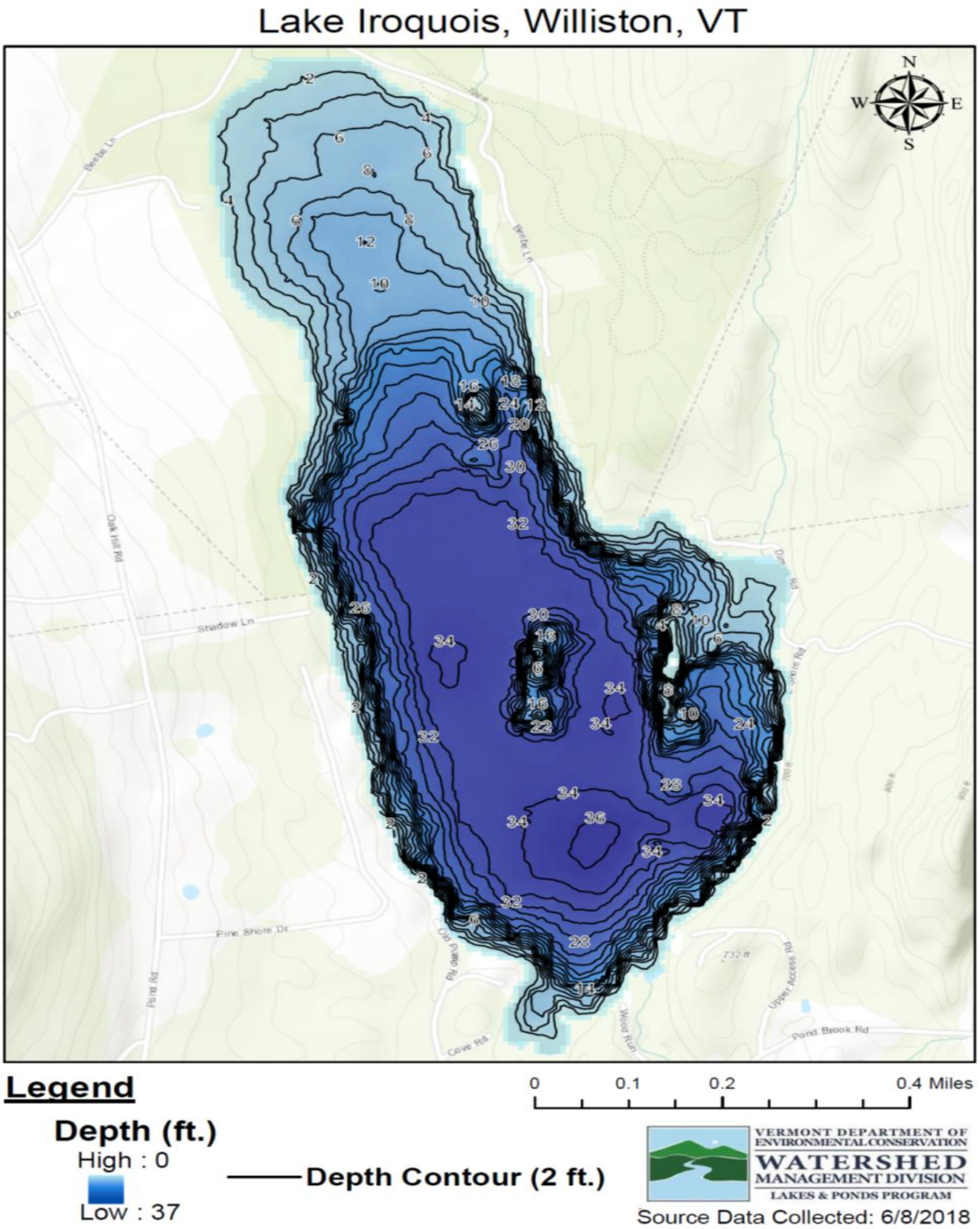


Figure 3. Lake Iroquois Bathymetric Map



Source: Vermont Department of Environmental Conservation Watershed Management Division

1 EXECUTIVE SUMMARY

The purpose of this management plan is to bring together a summary of research, advocacy, and volunteer efforts into a consolidated document carried out by volunteers since 1977. The plan's primary focus is on the continued efforts carried out by so many over the years to protect and enhance the health of Lake Iroquois. The plan brings together a brief overview of the cultural, natural, and physical attributes that make Lake Iroquois so special.

The plan also serves as a resource document for those seeking to understand the regulatory framework in place that underpins protection of the lake's shorelines and water body.

The document outlines current management actions and where we are going by identifying future goals of the Association in its efforts to protect the Lake.

Finally, this plan identifies who we are as an organization, formally chartered in 2007, that continues the great work of our volunteer predecessors.

2 INTRODUCTION

2.1 WHO WE ARE

The Lake Iroquois Association (LIA) was founded in 2007 to enhance the water quality of Lake Iroquois and to protect the health of the surrounding ecosystem. The LIA is an all-volunteer membership organization, governed by an elected board of directors. The LIA does much work around the lake including managing the greeter program and boat wash station, overseeing various projects to reduce phosphorus and sediment runoff into the lake, working on controlling the infestation of Eurasian watermilfoil (*Myriophyllum spicatum*) and preventing other invasives from entering the lake, and outreach to all lake users and lake property owners to provide information and education on best practices for maintaining the health of the lake and surrounding ecosystem. Our work is funded through a combination of membership dues, grant funding, allocations from the surrounding towns, and private donations. Most of all this work and the health of this special natural resource relies on the numerous hours and very hard work of many volunteers. If you would like to know how you can help, please contact us.

The Lake Iroquois Association is an IRS 501(c)(3) non-profit organization. All donations are deductible to the fullest extent of the law.

2.2 MISSION STATEMENT

The Lake Iroquois Association (LIA) was formed to maintain and enhance healthy ecosystems and appropriate public uses of Lake Iroquois, and those aspects of its watershed which impact on the health and well-being of the Lake. The Lake Iroquois Association does this through monitoring, prevention and management initiatives, research, education, advocacy and other actions, involving the co-operative efforts of property owners, town, state, and federal officials and other interested parties.

2. 3 BY-LAWS

https://www.lakeiroquois.org/fileadmin/files/Board/Bylaws_of_Lake_Iroquois_Assoc_of_VT_11-16-2017.pdf

2.4 VISION AND OVERARCHING GOALS

The vision of the Lake Iroquois Association is to foster a continuous improvement process that facilitates the continued advocacy, stewardship, and necessary actions required to increase the health of Lake Iroquois.

1) Protect and improve water quality through activities that reduce pollutants entering the Lake.
2) Protect and improve the ecology and natural biological diversity of the lake by preventing aquatic invasives from entering the lake and reducing or eliminating to the extent possible any that do enter the lake.
3) Ensure recreational opportunities remain viable to include boating, swimming, and fishing.
4) Proactively address control of Aquatic Nuisance Species.
5) Continue the in-Lake and tributary monitoring programs to help inform and prioritize efforts to improve the health of the lake and its watershed.
6) Work with property owners to reduce runoff and encourage lake-friendly landscaping with native species to improve water quality.
7) Continue watershed advocacy, outreach and education.

2.5 PLANNING FOR THE LAKE IROQUOIS WATERSHED

2.5.1 Why Plan?

In February 2018, the Vermont Department of Environment Conservation suggested the Lake Iroquois Association (LIA) develop a Lake Iroquois Management Plan (hereafter referred to as the 'Plan') as part of a discussion concerning an Aquatic Nuisance Species permit targeting treatment of Eurasian watermilfoil (*Myriophyllum spicatum*) in Lake Iroquois (hereafter referred to as 'the Lake'). LIA membership had considered development of a comprehensive plan for some time, and this discussion served as a springboard for the formation and completion of this document.

2.5.2 What is a management plan?

It is one that

1) Describes the Lake
2) Outlines management goals and objectives
3) Prioritizes management actions
4) Identifies how the management actions will aid in meeting the management goals and objectives

2.5.3 Purpose of the Lake Iroquois Management Plan

For many years interested and dedicated residents advocated for the health of Lake Iroquois and devoted many volunteer hours towards its stewardship. Since its formation in 2007, the Lake Iroquois Association has been very active in continuing this advocacy and successful in its actions to protect the Lake. This comprehensive plan outlines current activities, establishes a prioritization of future goals, and identifies objectives and management actions that ensure LIA remains focused on achieving continuous improvement in protecting the Lake.

This Plan brings together information about the lake and the quality of its watershed. It is intended to further our education about the lake and what we can do to individually and collectively slow down the eutrophication of the lake we love and improve its water quality for ourselves, our neighbors, visitors, and our children.

2.5.4 How was this plan developed?

A collaborative effort between and among LIA Board members, LIA membership, and other interested organizations provided content for this Plan.

2.6 PROTECTING THE LAKE- REGULATORY FRAMEWORK

2.6.1 Vermont Department of Environmental Conservation (VT DEC) Watershed Management Division Statewide Surface Water Management Strategy

The Lake Iroquois management strategy is supported by VT DEC's surface water management strategy. Of the top 10 major stressors resulting in pollution to surface waters identified by the Strategy, several relate to observed or potential threats to Lake Iroquois. These include tributary channel erosion, encroachment, invasive species, land erosion, nutrient loading, toxic substances (cyanobacteria) and possibly, thermal stress from changes to the ecosystem from climate change.

2.6.2 State of Vermont Shoreline Protection Act

The Vermont Shoreland Protection Act (SPA) was passed by the Vermont legislature July 1, 2015 (https://dec.vermont.gov/watershed/lakes-ponds/permit/shoreland/appresources). The Act is administered by the Vermont Agency of Natural Resources through permitting required by the Vermont Department of Environmental Conservation. The measure regulates activities within 250 feet of the mean water level of lakes

greater than 10 acres in size. The Act ensures that new development or redevelopment within this 250-foot Protected Shoreland Area is conducted according to the standards set forth in the Statute.
Many of the current homes and camps were built very close to the shoreline prior to the SPA. These are grandfathered unless changes in the structures are anticipated.

2.6.3 Local Shoreline and Stream Buffer Zone Zoning

Current state regulations require a 100-foot setback from the Lake with some flexibility for grandfathering of existing structures. A 50-100-foot stream buffer zone is recommended by the state while some municipalities mandate their use and designate differing distances relative to multiple variables. Each Town surrounding Lake Iroquois maintains their respective buffer requirements in accordance with approved planning and zoning regulations and may be found in the respective Town's Planning and Zoning websites:
Town of Hinesburg: https://www.hinesburg.org/planning/zoning-regulation-hinesburg-022620.pdf
Town of Richmond: http://www.richmondvt.gov/wp-content/uploads/2014/03/Richmond-Zoning-Regulations-November-2020-2.pdf
Town of Williston: https://www.town.williston.vt.us/vertical/sites/%7BF506B13C-605B-4878-8062-87E5927E49F0%7D/uploads/Approved_Amended_2016-2024_Comprehensive_Plan_September_1_2020.pdf

2.7 PERMITTED AND RESTRICTED USES

The State holds its waters in trust for the citizens, therefore all may be considered public and the state regulates uses under Vermont Use of Public Waters Rules, Environmental Protection Rule, Chapter 32.

Hinesburg

In 2013, the Hinesburg Planning Commission put forth a Shoreline Zoning Survey to hear from the community prior to updating the Town's shoreline zoning regulations with over 200 responses. The survey included questions asking respondents to comment about their use of the lakes, the challenges they perceive the lakes face, and what types of development should be allowed around the lake. The survey showed that the biggest concerns were around the issues of water quality, invasive species, and sub-par septic systems. The results of this survey are below:
-Over 45 percent of those responding thought special protections for the shoreline should be extended to the greater watershed and 31 percent were unsure.
-Almost 60 percent felt the level of development at that time was about right, over 25 percent stating there was too much, and less than eight percent feel there could be more.
-Almost 75 percent felt expansion to existing non-compliant structures should carry requirements for improvements to aid lake water quality.

Within its boundaries, the Town of Hinesburg instituted a Shoreline District defined as the area around Lake Iroquois and Lake Sunset that is between the lake and a line 600 feet from the mean high-water mark. The stated purpose according to Hinesburg Planning and Zoning regulations was to "…accommodate pre-existing camps around Lake Iroquois and Sunset Lake. All conversions from camps to year-round dwellings and any new development shall be designed to maintain the aesthetic and natural resources of the lakeshores and to protect water quality while ensuring adequate and safe vehicular access, water supply and sewage disposal."

Williston

In line with the passing of the Shoreline Protection Act, the Town of Williston developed and incorporated into their Town Plan a Lake Iroquois Shoreland Protection Area (LISPA) in 2014 which also recognized the issue of nonconforming structures on the Lake. This included all lands within 250 feet of the mean high-water level of the lake and established standards for land clearing, amounts of impervious surface, and building location

consistent with the state standards. All applications for town permits require documentation of compliance with the Vermont Shoreland Protection requirements outlined in 10 V.S.A. 1441-1545.

As part of its policy for the management and maintenance of Williston's recreation and park resources, the Williston Town Plan references as an objective creation of a Lake Iroquois Natural Area. According to the Plan, this objective supports its role as a stakeholder in the Lake Iroquois Recreation District. The Plan also outlines clear objectives calling "for Williston to develop partnerships with other organizations to identify and alleviate problem areas affecting the quality of the lake."

2.7.1 Permitted Uses

The Lake and part of its surrounding area supports diverse recreational pursuits including boating, swimming, fishing, hiking, and birding. During the winter months the lake supports ice fishing, cross-country skiing, skating, and snowmobiling.

A free public boat launch maintained by the Vermont Fish and Wildlife Service and a private beach maintained by the Lake Iroquois Recreation District (LIRD) are provided for anglers, boaters, hunters, trappers, and recreational swimmers. Authorized uses include: angling, launching of boats, hunting and trapping and vehicles associated with those uses; launching of non-motorized vessels; operation of ATVs and snowmobiles ONLY when used in conjunction with ice fishing.

Hinesburg

From the current revision of the Hinesburg Planning and Zoning regulations Section 3.15.2, the following are permitted uses within the Shoreline District:

(1) One-family separate dwellings, not to exceed one dwelling on each lot.
(2) Commercial agricultural operations and accessories thereto.
(3) Agricultural accessory uses.
(4) Commercial forest management.
(5) Forest management accessory uses.
(6) Buildings, structures, and uses owned and operated by the municipality.
(7) Two-family dwellings, each such structures on a lot which is at least twice the minimum size required for a single-family dwelling.
(8) Planned Unit Developments are permitted in accordance with the conditions set forth in Section 4.5.
(9) Bed & breakfast

Williston

The Town of Williston takes more of a restricted versus permissive use approach in development of its Planning and Zoning regulations, covered in more detail in the next section.

Richmond

The Richmond Town Plan identifies the wetlands, riparian areas, and surface waters of Lake Iroquois among their conservation priorities. The Plan also references the existing key upland natural communities east of Lake Iroquois that consist of northern hardwoods, white pine, and hemlocks in addition to the linkages among the steep slopes for wildlife habitat as refuge from human activity. No additional restricted or permitted uses were identified.

2.7.2 Restricted Uses

Phosphorous

In 2011, the Vermont legislature passed Title 10 Chapter 47 Section 1266b initiated by the Fish and Wildlife Resources Committee that effectively banned phosphorous use on lawns unless shown to be deficient in the previous 18 months or when establishing a new lawn, the first growing season. Excess phosphorous is implicated in the proliferation of toxic blue-green algal blooms in Lake Champlain. Exceptions include land used for agricultural production and private or public golf courses. The latter must submit a nutrient management plan.

Hinesburg Planning and Zoning Regulations

From the current revision of the Hinesburg Planning and Zoning regulations Section 3.15.3, the following are considered conditional uses within the Shoreline District:

(1) Small-scale educational uses.
(2) Outdoor recreational facilities such as public playgrounds, golf clubs, swimming pools, tennis courts, fishing and hunting preserves, and cross-country ski trails.
(3) Without regard to height limitations: railroads, public utility towers, high-voltage transmission lines, substations, radio and television antennae, windmills, and other similar structures.
(4) Campgrounds for temporary accommodation for tourists with tents and/or travel trailers provided, however, that the owner of such established camp site shall provide adequate sewer disposal facilities and potable water supply, and provided further conditions or restrictions as are necessary to insure the proper disposal of sewage and the safe provision of water usage.
(5) Retail sale of substantially unprocessed agricultural products.
(6) Day-care facilities.
(7) Inn.
(8) Dead storage.
(9) Solar installations.

-Additional considerations required within the Shoreline District by the Hinesburg Planning and Zoning regulations include:

Section 2.5.5 Multiple Structures and Uses: It shall be unlawful to locate more than one principal building or principal use on a parcel of land in the Rural Residential 1 and 2, Agricultural and Shoreline districts which is not in separate ownership or which has not received all local subdivision, zoning and /or other permits so that it could be separately owned or leased.

Section 4.5.7 Greenspace: Greenspace within the Agricultural, Rural Residential 1, Rural Residential 2, Shoreline, and Industrial 1 Zoning Districts shall reflect the context of the project by preserving agricultural, recreational or natural resources, or by providing pedestrian amenities, recreational or other community facilities. PUD (Planning Unit Development) greenspace in the Agricultural and Rural Residential 2 districts shall constitute no less than 50% of the parcel area, and no less than 25% in the Rural Residential 1, Shoreline, and Industrial 1 districts, unless the Board determines that the creation of suitable community facilities warrants a lesser area.

Section 5.3.1 Cottage Industries and Larger Home Occupations: The following larger home occupations and cottage industries are permitted only after review and approval by the Development Review Board under the provisions of Section 4.2 (conditional use review), and under the provisions of Section 4.3 (site plan review). The larger home occupations and cottage industries provided in this Section 5.2 shall not be located in the Shoreline District.

Section 5.1.1 Existing Small Lots: Within the Shoreline Zoning District, an existing small lot (wholly or partially in the Shoreline Zoning District) that comes under common ownership with one or more contiguous lots after July 1, 2004, shall be deemed merged with the contiguous lot unless all of the following apply:
a. The lots are conveyed in their preexisting, nonconforming configuration.
b. On the effective date of any bylaw, each lot was developed with a water supply and wastewater disposal system.
c. At the time of transfer, each water supply and wastewater system is functioning in an acceptable manner.
d. The deeds of conveyance create appropriate easements on both lots for replacement of one or more wastewater systems, potable water systems,
Section 5.19.14 Mobile Homes and Mobile Home Parks:
Replacement of an existing mobile home on any lot outside the Shoreline District, and not including mobile home parks, with a larger mobile home which would not meet the setback requirements of the zone in which the lot is located may be allowed under conditional use review by the Development Review Board. In all cases, the following shall be assured:
(1) The existing mobile home is of a size no longer available or not up to present standards for permanent housing.
(2) Replacement of the existing home, to include its appearance and placement on the lot constitutes an improvement in the surrounding neighborhood.
(3) Siting of the new home shall consider existing trees and other significant vegetation on the lot with an interest in preserving natural features
(4) Replacement will not have an undue adverse impact on adjoining properties, the character of the neighborhood or impact any other public interest, which would be protected in maintaining the existing setbacks to adjoining properties and bodies of water.
(5) At the discretion of the Development Review Board, screening, which may include fencing, or plantings may be required.
5.21.6(2) Off-Site and Existing Dwelling Options:
The intent of section 5.21 is to create on-site affordable units that are integrated into projects covered by these provisions. The required affordable units should be provided on-site whenever possible. However, to ensure flexibility for both the Town and the applicant, the DRB, at its sole discretion, may allow the required affordable units to be constructed on an off-site Hinesburg location, subject to all of the following conditions: Off-site locations in other zoning districts are allowed to the extent that residential uses are permitted, but not in the Shoreline District.

Williston Planning and Zoning Regulations

In line with the passing of the Shoreline Protection Act, the Town of Williston developed and incorporated into their Town Plan a Lake Iroquois Shoreland Protection Area (LISPA) in 2014 which also recognized the issue of nonconforming structures on the Lake. This included all lands within 250 feet of the mean high-water level of the lake and established standards for land clearing, amounts of impervious surface, and building location consistent with the state standards. This includes a 100-foot setback for all new structures from the Lake. All applications for town permits require documentation of compliance with the Vermont Shoreland Protection requirements outlined in 10 V.S.A. 1441-1545.

Williston's Town Plan currently requires a 50-foot development buffer from unnamed streams.

Lake Iroquois is located within the Champlain Water District's (CWD) Lake Iroquois Source Protection Area (SPA), and falls under a Source Protection Plan (SPP). The SPP must conform to federal and state rules

governing water supply protection. Williston's Town Plan requires that all development activity is consistent with the SPP and proposals falling within the SPA must be referred to the CWD prior to permit issuance. This includes all development proposing to disturb one acre of more within the Lake Iroquois watershed and those within the lake's 250-foot buffer.

The current regulation sections from the Town of Williston Unified Development Bylaws last updated October 15, 2019:

2.6.4 Can a nonconforming structure be modified? Yes, with some limitations. A nonconforming structure may be modified or expanded as long as there is no change in the nature or extent of any nonconforming use if present, and the degree of the structure's nonconformity is not increased. WDB 31.3.4.4 contains specific restrictions on the expansion of nonconforming structures in the Lake Iroquois Shoreline Protection Area (LISPA).

29.9 Watershed Protection Buffers. This section establishes watershed protection buffers for all streams, ponds, and lakes, and for certain wetlands.
29.9.1 Are buffers required around lakes and ponds? Yes. There shall be a buffer of at least 150 feet above the ordinary high-water mark of all ponds or lakes that have more than a half-acre (21,780 SF) of water surface, except for properties in the Lake Iroquois Shoreland Protection Area defined in WDB 29.9.2;

29.9.2 Lake Iroquois Shoreland Protection Area. The Lake Iroquois Shoreland Protection Area (LISPA) means all land located within 250 of the mean water level of Lake Iroquois. All development within this area must comply with the Vermont Lake Shoreland Protection Standards as provided by 10 V.S.A. § 1441-1454. All applications for an administrative permit will be required to provide documentation that the proposed development will be in conformance with these standards.

29.9.2.1 New structures. New structures in the LISPA must be set back a minimum of 100 feet from the mean water level of Lake Iroquois.

29.9.2.2 Existing structures. Existing, non-conforming structures within the LISPA may be expanded under limited circumstances as provided by WDB 31.3.4.

31.3.1 Is there a maximum building height? Yes. Building height in the ARZD is limited to 36 feet, but be aware that WDB 31.9.8.1 permits the DRB to impose a lower height limit where doing so is necessary to help maintain the visual character of rural Williston. Building height within 250 feet from the mean highwater mark of Lake Iroquois (within the Lake Iroquois Shoreland Protection Area) is limited to 30 feet.

31.3.4 Lake Iroquois Shoreland Protection Area Development Standards. Properties within the Lake Iroquois Shoreland Protection Area (LISPA) as provided by WDB 29.9.2 are subject to the following development standards:

31.3.4.1. State Permits Required. All new development and the expansion of the footprint of any existing structures within the LISPA shall require evidence of a permit or statement of exemption from the Vermont Department of Environmental Conservation demonstrating

compliance with the Vermont Lakeshore Protection standards.

31.3.4.2 New Structures. All new structures must be setback a minimum of 100 feet from the mean water level of the lake.

31.3.4.3 Nonconforming Structures. Nonconforming habitable structures in the LISPA may be expanded or altered under limited conditions. Expansions of nonconforming habitable structures must demonstrate compliance with the Vermont Lakeshore Protection standards.

31.3.4.4 Limitation of Expansion. Expansions of nonconforming habitable structures is limited to increasing the footprint of the existing habitable structure by no greater than 20% of the existing structure over a five-year period of time. Expansion of the footprint of nonconforming habitable structures may only take place on the side of the structure away from the lakeshore.

31.3.4.5 Septic Systems. Expansions of nonconforming habitable structures, either by increasing the floor area of the structure or by increasing the number of bedrooms must demonstrate compliance with the state's current wastewater regulations (septic regulations).

31.3.4.6 Nonconforming Structures. Nonconforming structures may be moved but only to the extent that the existing structure is made less nonconforming by moving the footprint of the structure away

Boating on Lake Iroquois

The waters of Lake Iroquois, as is the case for nearly all the waters in the state of Vermont, are public. The rules and regulations for activities in and on the public waters of the state are set by state government and Vermont law. Before coming to any lake in the state it is important to be familiar with the laws and regulations governing that particular lake as not all activities are allowed on all lakes.

Many Vermont lakes have a public fishing and boat access. Some are also staffed by greeters who will inspect and clean boats and trailers to ensure that no invasives are carried into or out of the lake. The LIA operates a greeter program at the Department of Fish and Wildlife public access on Lake Iroquois throughout the summer season.

Vermont law requires all motorized boat and PWC (Private Watercraft) operators born after January 1, 1974, to pass a boater safety course and to carry a boater education card. The Vermont State Police administer the boating safety and certification course. For visiting boaters from out of state, Vermont will recognize boating education cards that meet NASBLA requirements and Canadian Pleasure Craft Operator Cards that meet Transport Canada's requirements.

In an effort to prevent the spread of invasive species between lakes, Vermont law prohibits the "Transport of aquatic nuisance species; prohibition. A person shall not transport an aquatic plant, aquatic plant part, or aquatic nuisance species to or from any Vermont water."

Loon Nesting Sites

Between May 1 and July 31 all persons and vessels are prohibited from approaching within 300 feet of any loon nesting site. The loon nesting site on Lake Iroquois is clearly marked with signs and buoys

No-Wake Zone
Speed limits: boats may not travel at speeds greater than 5 mph within 200 feet of shore, a person in the water, other vessels, docks, or a divers-down flag. There are some 200-foot buoys placed around the lake by individuals to aid in judging the distance.

Skiing and Wakeboarding
Skiers and wakeboarders must wear approved flotation devices and there must be an observer in the boat who is 12 years or older in addition to the driver.

Use of Personal Watercraft
Use of personal watercraft on Lake Iroquois is prohibited in accordance with Vermont Use of Public Waters Rules, Environmental Protection Rule Chapter 32, Section 3.3 effective November 1, 2016:

3.3 Use of Personal Watercraft
(a) The use of personal watercraft is prohibited on lakes, ponds, and reservoirs:
(1) that have a surface area less than 300 acres (Lake Iroquois is 244 acres), or
(2) that as of May 1, 1995, had a maximum speed limit of five m.p.h. or less, or
(3) on which the use of internal combustion motors to power vessels is prohibited.
(b) The above prohibition on personal watercraft may be modified on a case-by-case basis in response to petitions filed pursuant to 10 V.S.A. § 1424.

Public Fishing Access & Boat Ramp
There are a number of activities that are not permitted at Vermont Department of Fish and Wildlife public access areas. Among these are camping, picnicking, discarding garbage of any sort, washing or cleaning of fish or wildlife, water skiing, swimming, or use of ATVs or snowmobiles except for those being utilized solely for ice fishing.

To lessen the risk of transport of invasive fish species and fish diseases such as hemorrhagic septicemia, Vermont also requires live bait to be purchased only from licensed sources, and prohibits transport of bait into another lake.

2.8 WATER DATA AND TRENDS

2.8.1 Use and Water Quality Criteria
The effects of our activity on the landscape since settlement have not been well understood. Land use changes such as deforestation, the building of roads and homes, and over-fertilization of crops, lawns, and gardens have had a great impact on the lake, resulting in the nutrient enrichment of the lake. We have learned a lot in recent years. LIA has many programs and projects aimed at enhancing the water quality of Lake Iroquois, preventing further invasives from entering the lake, reducing and controlling the existing invasive, Eurasian watermilfoil (EWM), preventing sediment from entering the lake, and reducing nutrient levels in the lake which feed EWM.

However, just about everything people do on the land can affect water resources meaning best management practices on the land around the lake is a necessary part of maintaining the health of the lake and the surrounding ecosystem. More recently, residents have recognized the impact these activities can have on water quality and have worked to implement better management practices. Prior to the formation of LIA in

2007, lake residents began to adopt Best Management Practices (BMPs) on their lakeside properties in the effort to improve water quality.

A lake will naturally become more enriched with nutrients over time, typically thousands of years, in a process called eutrophication. This aging process is divided into three trophic states: oligotrophic, mesotrophic, and eutrophic (Table 2.). The rate at which lakes pass through these states depends on the size and shape of the lake, as well as characteristics of the watershed. Oligotrophic lakes are unproductive, with low nutrient levels and cold, clear water. Mesotrophic lakes have moderate amounts of productivity and nutrients. Eutrophic lakes tend to be relatively shallow, with high nutrient levels and warm, turbid (low clarity) water. Eutrophic lakes typically experience excessive algae growth, contain high levels of decomposing organic matter, and low levels of dissolved oxygen. Trophic state is often defined using Secchi water clarity, chlorophyll-a concentration, and total phosphorus concentration.

The ranges for these parameters are shown below.

Table 1. Three Trophic States

	Average Secchi Clarity (m)	Average Chl-a (ug/L)	Average TP (ug/L)
Oligotrophic	> 5.5	< 3.5	< 7.0
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14.0
Eutrophic	< 3.0	> 7.0	> 14.0

Source: Lake Iroquois Diagnostic-Feasibility Study Final Report 1982-1985

Human activity in the watershed can cause cultural or anthropogenic eutrophication, which accelerates this aging process. Lake Iroquois is a prime example of a lake that is experiencing anthropogenic eutrophication. The water quality of Lake Iroquois has been statistically highly variable over the last forty years.

2.8.2 Lake Iroquois Score Card

The Vermont Watershed Management Division's Lakes and Ponds Management and Protection Program developed a Lake Score Card system to standardize the way people view overall quality of lakes and to summarize water quality trends. Each lake is scored by four different categories: water quality, shoreland and lake habitat, invasive species atmospheric pollution.

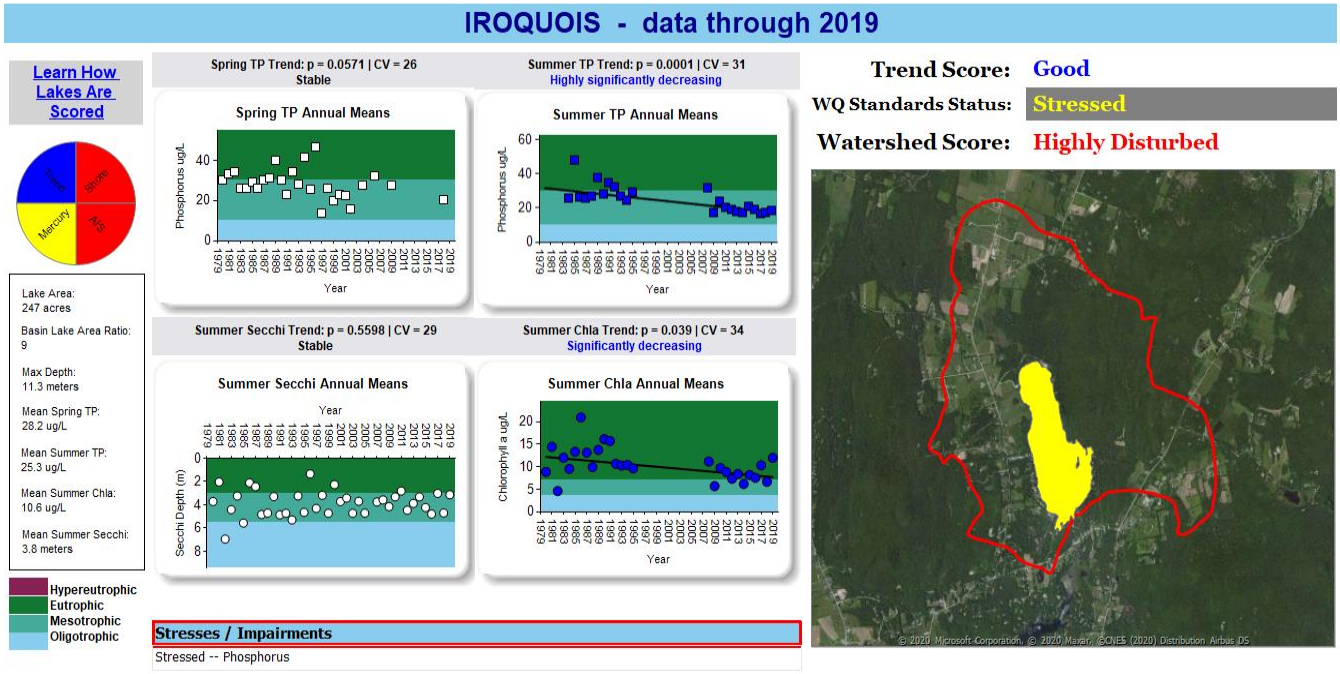
The Lake Iroquois Score Card through 2020 reports these trends (Figure 4):
-Nutrient Trends-Blue-Highly Significantly Decreasing
-Shoreland and Lake Habitat Trends-Red or poor
-Invasive Species-Red or poor
-Mercury Pollution-Yellow or fair

Please reference the most recent Vermont Department of Environmental Conservation Lake Score Card Data in the following location:

https://anrweb.vt.gov/DEC/IWIS/ReportViewer3.aspx?Report=LakeScoreCard_Current_TrendsAndStatus&ViewParms=True&LakeID=IROQUOIS

Lake Iroquois was given an overall "good" score on water quality with nutrient trends as 'Highly Significantly Decreasing'. While the Lake Score Card shows nutrient trends decreasing, this is based generally on the absence of regular occurrences of algae blooms, E. coli. or other toxic contamination. Interestingly, despite the decreasing levels of in-Lake phosphorus concentrations, many tributary monitoring locations around the Lake continue to show elevated levels of phosphorous. The results of in-Lake Lay Monitoring and tributary monitoring are discussed in more detail in the sections below.

Figure 4. Lake Iroquois Score Card



Source: Vermont Agency of Natural Resources Report Viewer

The Lake also does not score well on shoreland, lake habitat, or on invasive species. The low invasive species score and score of 'fair' on shoreland and lake habitat reflect conditions that lead directly to lower water quality. Concerns about water quality in Lake Iroquois are centered mostly around nutrient level inputs and the growing potential of algae blooms and proliferation of EWM growth.

EWM is presently a significant and pervasive problem in most of the littoral (near shore) portions of Lake Iroquois. This aquatic invasive' s proliferation has led to a decline in native aquatic species from 45 identified in 1984 to between 19 and 23 since completion of the 2019 survey (https://www.lakeiroquois.org/water/plant-surveys).

Cyanobacteria blooms were first reported in 2011 and have been reported annually through 2020. The Lake Champlain Committee (LCC) held a monitor training program at Lake Iroquois in 2015, and since then monitors have attended training sessions by the LCC annually. Monitors report to the LCC and VT Department of Health weekly throughout the summer and fall.

2.8.3 Sampling and Monitoring

Volunteers have been collecting and compiling data on the health of the lake for well over 40 years. In recent years, the LIA has added a tributary sampling program to the in-lake sampling and data collection. All of our projects and programs are based on the data and evidence collected by these volunteer efforts.

The data we have collected has enabled us to pinpoint problem streams that contribute to sediment and nutrient loading in the lake. Based on this data we have undertaken a number of projects to remediate these problem streams and as a result we have begun to see drops in nutrient levels, especially Phosphorus, in the lake. While this is good news, there is much work remaining. There are still areas where runoff is a problem and/or erosion is a problem. We continue to work on identifying problem areas and grant funding sources for remediation.

2.8.4 Lay Monitoring Program In-Lake Measurements

The Vermont Lay Monitoring Program (LMP) is a partnership program consisting of a group of volunteer citizen scientists, or Lay Monitors, trained by the Vermont Department of Environmental Conservation, who have been collecting water quality data on over 100 lakes in Vermont since 1979.

The intent of Lay Monitoring is to measure water clarity and nutrient levels in order to track nutrient enrichment in Vermont lakes. Lay Monitors specifically sample for total phosphorus, chlorophyll-a, and determine Secchi water clarity weekly from Memorial Day to Labor Day. From these results, summer annual means for each of these parameters are calculated, which can help define the lake's trophic status.

Secchi disk readings measure the clarity of lake water. Clarity is directly related to the amount of algae, pollen, silt and other materials suspended in the water. Secchi depth is recorded in the deepest part of the lake on an approximately following a weekly schedule during the weeks from Memorial Day to Labor Day. The measurement given for the year is the average of the weekly measurements. The red line indicates a depth of 3.0 meters. A higher bar indicates clearer water. The LMP classifies lakes with average Secchi clarity depths with values <3.0 meters to be eutrophic (See Table 2 above). This measurement shows the concentrations of algae present in lake waters. Sampling is done at the same time Secchi depth readings are taken, and the measurements represent the average for each year.

Lake Iroquois has participated in the LMP since its inception and monitoring records are available as far back as 1979 (https://anrweb.vt.gov/DEC/IWIS/ReportViewer.aspx?Report=LayMonLakeReport&ViewParms=True&LayMonID=IROQU. The data collected contribute to elements of the Lake Score Card.

The data has been statistically highly variable from year to year, which makes the water quality consistently unpredictable from one year to the next. However, even with annual variations, the lake continuously shows high nutrient enrichment levels that categorize it as eutrophic.

2.8.5 Tributary Monitoring

The LIA Tributary Monitoring Program is supported by a grant from VT DEC's LaRosa Volunteer Water Quality Monitoring Analytical Services Partnerships (LaRosa Partnership Program) to cover the cost of chemical analysis at the state's LaRosa Lab. The LIA began participation in this program in 2010. In that year 21 tributaries were inventoried surrounding the Lake to determine potential sources of nutrients entering the lake. In 2011, ten tributaries were selected for volunteer sampling of nutrients, turbidity, and chlorides. After a two-year hiatus in 2015 and 2016 to analyze results and consider mitigation projects, the LIA renewed its tributary sampling effort in 2017. Five tributary sites were added in 2018 and the LIA expanded its reach within the watershed to eight sites on Patrick Brook to determine nutrient influence downstream from the Lake. In 2019, the LIA coordinated with the Lewis Creek Association for its larger group of volunteers to take over sampling Patrick Brook while the LIA continued to sample the tributaries around Lake Iroquois. Sampling was halted in 2020 due to the COVID-19 pandemic, which required the state to cut funding across multiple programs in an effort to reduce the financial impacts to the state's economy. Sampling resumed in 2021.

The data collected from tributary monitoring helps guide decision-making for where to address problem areas and which projects to undertake that improve lake water quality. The data has the additional capacity to identify trends and measure success of implemented projects.

Figure 5. shows the tributary monitoring sites across Lake Iroquois. Table 2. below reflects phosphorous trends for each site since the first sampling year in 2011. Links to each year's report may be found on our website in the following location: https://www.lakeiroquois.org/water/sampling-monitoring-programs.

2.8.6 Williston Public Works Department Monitoring

The Williston Public Works Department performs weekly, seasonal monitoring from Memorial Day to Labor Day for *E. coli* bacteria at the designated swimming area at the Lake Iroquois Recreation District public beach. Historical results are below state and federal regulatory standards.

2.9 PHYSICAL FEATURES

2.9.1 Physical Description

Lake Iroquois, is a 244-acre kettle pond formed following the receding of the last ice coverage in Vermont about 15,000 years ago (Figures 1 & 2). Over the years, the Lake has naturally become more eutrophic, and has been the site of significant human development and use in the last 150 years.

The Lake is situated in a valley bracketed by Dow and Magee Hills to the east and Mount Prichard on the west. The Lake lies about 15 miles from Vermont's principal urban area of Burlington and is the largest water body and principal contributor to the LaPlatte River watershed, which ultimately drains to Lake Champlain.

The Lake is bracketed by densely wooded forest to the north and east, a mix of Lake homes and dense forest to the south, and a mixture of fields, forest, and more dense development to the west.

Watershed Acreage: 2,418 acres
Lake Surface Area: 247 acres
Lake Volume: 4,693 acre feet
Maximum Depth: 37 ft.
Average Depth: 19 ft.
Elevation: 685 ft.
*Flushing Rate: 0.78

* The number of times a lake flushes (i.e., a volume of water equal to the lake's volume passes through the lake) in one year, expressed as times/year. In other words, it would take ~1.3 years for the volume of water in Iroquois to pass through the lake.

Approximately 32 tributaries of various size and flow rates feed the lake from all sides. The largest tributary flows in from the northwest section, crossing beneath Beebe Lane. There are also several streams that bubble up from the lake bottom. The outflow of the lake is over the dam in the south end.

2.9.2 Land Cover

From the Lake Iroquois Diagnostic-Feasibility Study conducted in 1985 by the Vermont Department of Water Resources and Environmental Engineering:

The table and figure below depict land use types and distribution in the Lake Iroquois watershed. The eastern half of the watershed is predominantly woodland interspersed with northern hardwoods such as maple, beech, red oak, and softwoods such as hemlock, white and red pine. The western half is characterized by more densely diversified residential use with some open field and agricultural land use. A fairly sizable wetland complex dominates the northern tier of Lake Iroquois while the southern edge is a mix of dense residential development, mixed hard and softwoods, and small pockets of wetland interspersed with small drainages and tributaries. Land use breakdowns for individual sub-basins are shown in Table 1.

Table 2. Mean Total Phosphorus (µg/L) in Lake Iroquois Tributaries

LAKE IROQUOIS TRIBUTARIES								
Sites	**2011**	**2012**	**2013**	**2014**	**2017**	**2018**	**2019**	**Multi-Year Avg**
1	18.7	22.9	15.8	14.7	15.0	17.67	11.8	**16.7**
1a	-	-	-	-	-	-	7.8	-
2	20.2	17.2	13.1	14	12	19.84	10.8	**15.3**
3	70.7	44.2	41.7	20.6	20.6	62.84	28.7	**41.3**
3a	-	-	-	-	-	-	**32.1**	-
3b	-	-	-	-	-	-	**36.3**	-
3c	-	-	-	-	-	-	**48.2**	-
3d	-	-	-	-	-	-	**42.0**	-
3e	-	-	-	-	-	-	9.2	-
4	46.8	12.1	15.2	11.5	19.3	29.9	15.0	**21.4**
5	34.3	19.9	30.4	25.4	73.1	15.1	11.8	**30.0**
5a	-	-	-	-	-	-	13.6	-
6	-	25.4	23.5	13.6	-	19.9	36.3	**23.7**
7	-	12.9	11.6	15.2	8.68	15.9	48.2	**18.7**
8	-	19.1	24.3	29.8	21.1	20.9	42	**26.2**
9	-	23.7	15.5	13.3	33	12.4	9.2	**17.9**
9a							10.5	-
10	-	44.1	25.1	56	25.15	29.5	21.2	**33.5**
11	21*	18*	17*	14.3	15.7	16.0	14.7	*15.2
12	-	-	-	-	-	52.0	**37.6**	**32.8**
13	-	-	-	-	-	50.8	23.3	**37.8**
14	-	-	-	-	-	51.3	**25.4**	**29.3**
17	-	-	-	-	-	-	13.2	-
18	-	-	-	-	-	-	14.0	-
*** LMP in-lake readings / *Average reflects stream samples only / Red text denotes exceedance**								

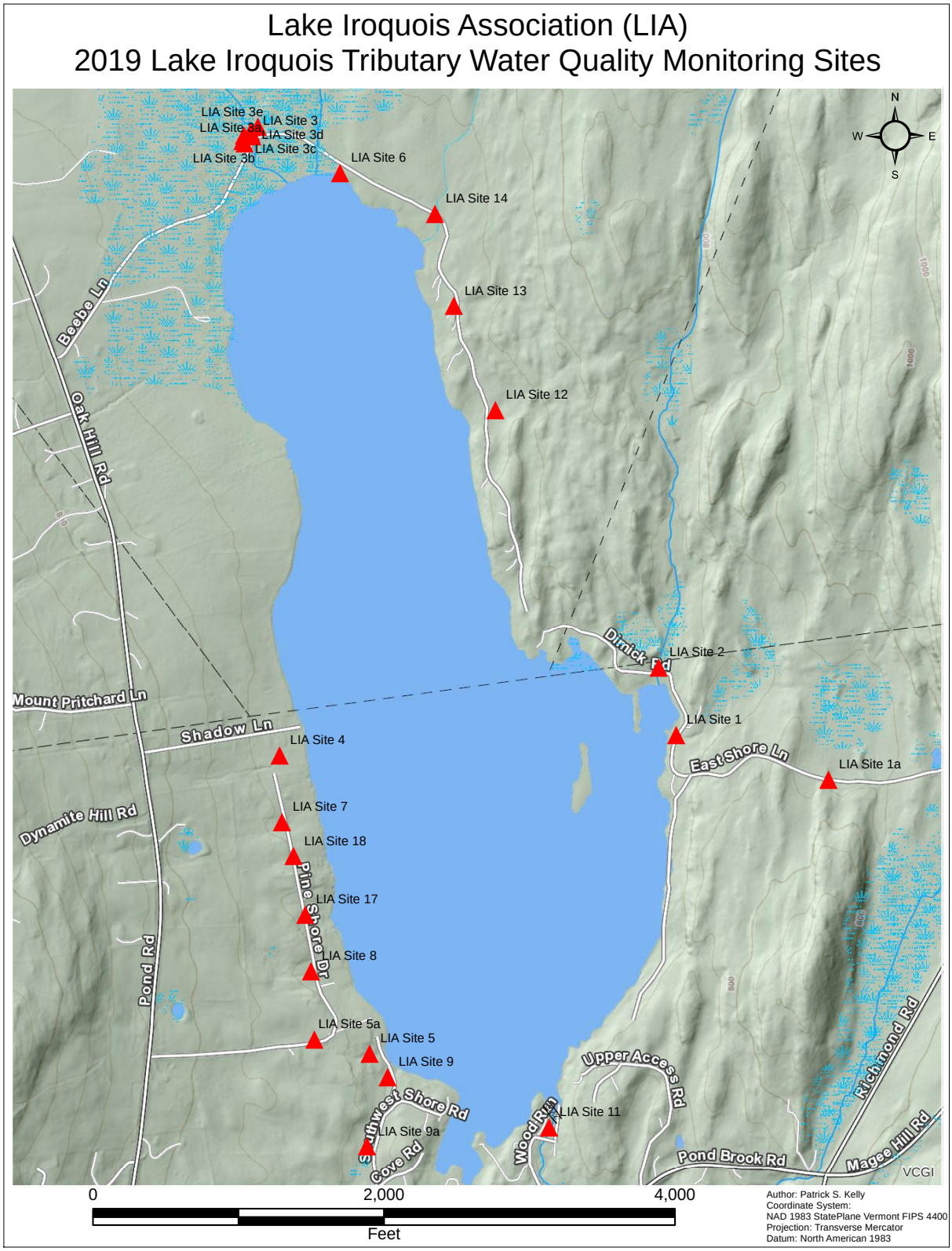
Source: 2019 Lake Iroquois Association Tributary Monitoring Report

Table 3. Lake Iroquois Watershed Land Use-Land Cover

Land Use	% of Watershed
Woodland	53.4
Hayfield	11.6
Water	10.0
Pasture	9.7
Idle grassland	8.5
Residential	5.1
Wetland	0.9
Row crops	0.8

Source: Lake Iroquois Diagnostic-Feasibility Study Final Report 1982-1985

Figure 5. Lake Iroquois Association (LIA) Tributary Water Quality Monitoring Sites



NOTE: These percentages have likely changed incrementally from that shown in Figure 6 but still function to provide a general sense of the land use and realistic description and illustration of present conditions.

2.9.3 Water Chemistry

Lake Iroquois is a soft water lake with total hardness values in the vicinity of 45-52 mg/l (as $CaC0_3$). The lake has a high total alkalinity (40 mg/l as $CaC0_3$) which makes it relatively insensitive to acidic deposition. pH values normally range between 7.4 and 8.5, although during the summer the hypolimnetic layer tends to drop below 7.0.

2.9.4 Geology

From the Lake Iroquois Diagnostic-Feasibility Study conducted in 1985 by the Vermont Department of Water Resources and Environmental Engineering:

"The surficial material of the watershed is largely till deposited during the Wisconsin glacial stage, about 13,000 years ago. The till blanket is generally less than 10 feet thick on the uplands, with greater thicknesses found in low-lying areas (Stewart, 1973). Till depths up to 62 feet are documented by domestic well drilling records. The high sand content of most tills in this region increases the permeability above that which is normally characteristic of till material. However, subsoil layers are frequently cemented or contain higher percentages of clay which reduces their permeability.

A deposit of lacustrine sand and gravel is located at the north end of the lake. Well drilling records from sites near the margin of this deposit indicate a thick cemented layer of sandy and gravelly material.

Two bedrock formations underlie the watershed (Figure 6). The north-south band on the east side of the lake is a segment of the Pinnacle formation. This is a schistose greywacke, a highly metamorphosed rock in which quartz, alibite, serecite, biotite, and chlorite are the dominant minerals. The remainder of the area is underlain by the Underhill formation, a greenish quartzitic schist (quartz-serecite-albite-chlorite-biotite) with serecite-quartz-chlorite phyllite common in the lower part (Doll et al., 1961)."

From the Lake Iroquois Diagnostic-Feasibility Study conducted in 1985 by the Vermont Department of Water Resources and Environmental Engineering:

Soils in the Lake Iroquois watershed are predominantly stony loams, with slopes ranging from 0-60%. Surface permeabilities are moderate. The dominant soils present all have fragipans at 1-3 feet, or bedrock at 1-1.5 feet (Lyman rocky loam). Fragipan permeabilities are generally an order of magnitude less than surface permeabilities, resulting in lateral drainage above the fragipan, and an increased potential for surface runoff, since the surface soil layers can be more easily saturated.

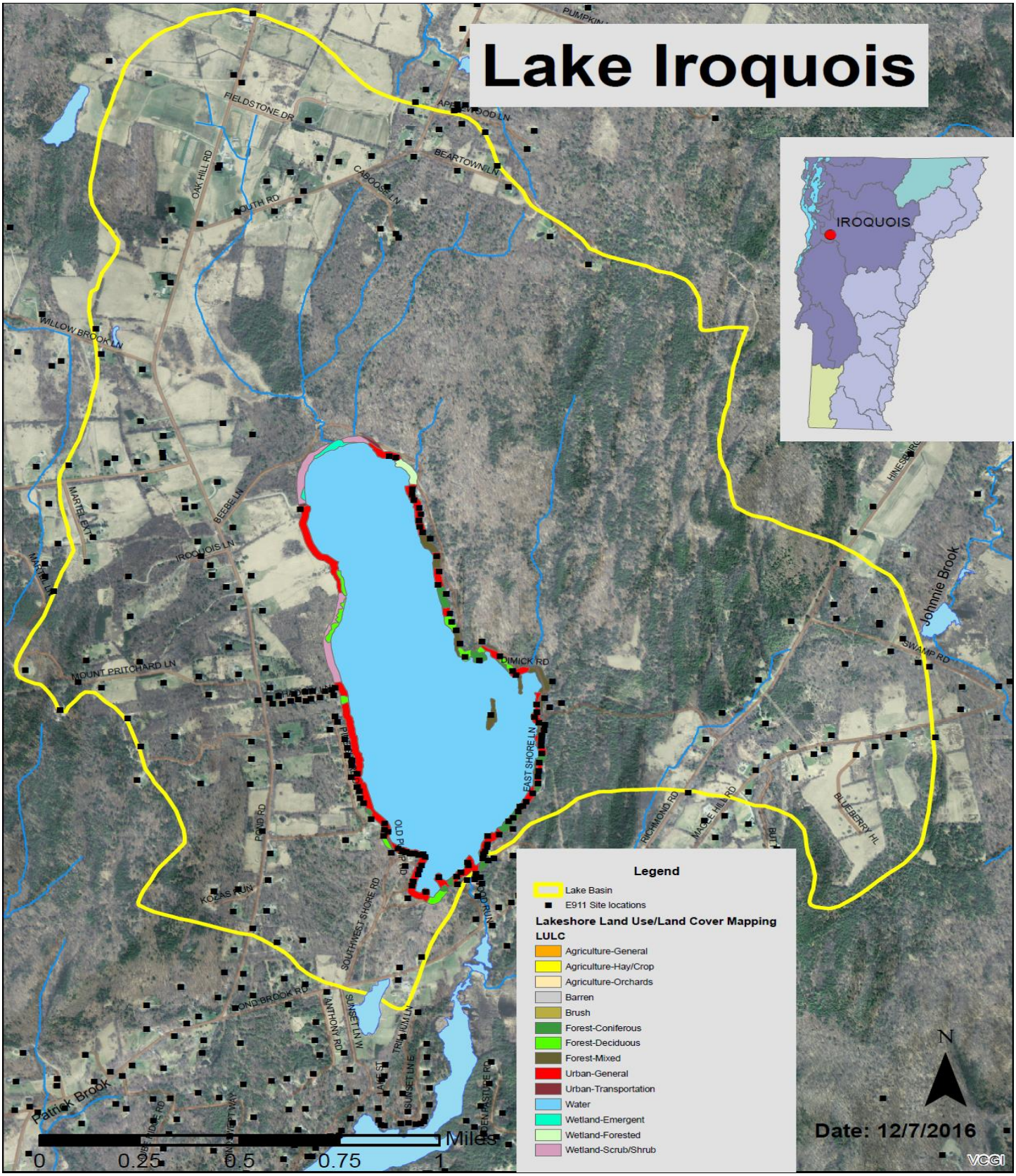
2.9.5 Soils

Soils belonging to the Lyman-Marlow association comprise 40% of the watershed land area. In most areas, the Lyman and Marlow soils are not separately delineated, but are mapped as a complex (Figure 7 and Table 9).

The Lyman soils are somewhat excessively drained and shallow to bedrock. They are rocky or very rocky in most places and are the steepest soils in the association. The Marlow soils are well drained, loamy, and stony. They have a slowly permeable fragipan within 30 inches of the surface. These soils are moderately steep or steep.

Peru soils occupy 27% of the land area. These soils are moderately well drained and loamy and have a slowly permeable fragipan that is less than 34 inches from the surface. Peru soils are mainly gently sloping to sloping. Cabot soils, which comprise 26% of the land area, are similar to the Peru soils in texture and also have a fragipan, but Cabot soils have a higher water table than Peru soils and are less sloping. The fragipan of Cabot

Figure 6. Lake Iroquois Watershed Land Use-Land Cover (2016)



Source: Vermont Center for Geographic Information
https://dec.vermont.gov/sites/dec/files/wsm/lakes/docs/Iroquois.pdf

soils is within 24 inches of the surface. Cabot soils occupy lower positions than Peru soils and are mainly level to gently sloping.
Miscellaneous soil types account for the remaining 7% of the land area. These soils have generally formed in low-lying or wet areas, or in exposed sand and gravel deposits.

The shoreline soils around Lake Iroquois all have severe limitation ratings for septic tank disposal fields (Table 10). Limitations include high water table, slow permeability, slopes, and shallowness to bedrock.

2.10 BIOLOGICAL FEATURES

2.10.1. Forests
The eastern half of the watershed is predominantly woodland with important natural communities of hardwoods and softwoods identified by the state. These natural communities include hemlock-northern hardwood (maple, beech, etc.), dry red oak-white pine, and red pine forests.

2.10.2 Fish
Lake Iroquois possesses a diverse fishery that includes the following species:

Table 4. Lake Iroquois Fish Species

		Rare, Threatened Endangered Info			
Common Name	**Scientific Name**	**State Rank**	**Global Rank**	**State Status**	**Federal Status**
American eel	*Anguilla rostrata*	S2 (Rare)	G4 (Common)	SC (Special Concern)	
Brown bullhead	*Ameiurus nebulosus*				
Chain pickerel	*Esox niger*				
Golden shiner	*Notemigonus crysoleucas*				
Largemouth bass	*Micropterus salmoides*				
Pumpkinseed	*Lepomis gibbosus*				
Rock bass	*Ambloplites rupestris*				
Smallmouth bass	*Micropterus dolomieu*				
White sucker	*Catostomus commersoni*				
Yellow perch	*Perca flavescens*				
Crappie (white)	*Pomoxis annularis*				
Crappie (black)	*Pomoxis nigromaculatus*				

2.10.3 Wildlife
Many species of migratory birds are found around the Lake, including songbirds, birds of prey, shorebirds, and waterfowl, which include belted kingfishers (*Megaceryle alcyon*), great blue herons (*Ardea Herodias*), spotted sandpipers (*Actitis macularius*), and ring-billed gulls (*Larus delawarensis*). Transients include bald eagles (*Haliaeetus leucocephalus*) and ducks.

Of particular note is the successful nesting of Common Loons (*Gavia immer*) on the Lake. After nests failed on the island and in the wetland at the north end of the lake, volunteers worked with Eric Hanson, loon biologist with Vermont Center for Ecostudies, to construct and place a nest raft in 2018. Thus far, the effort has

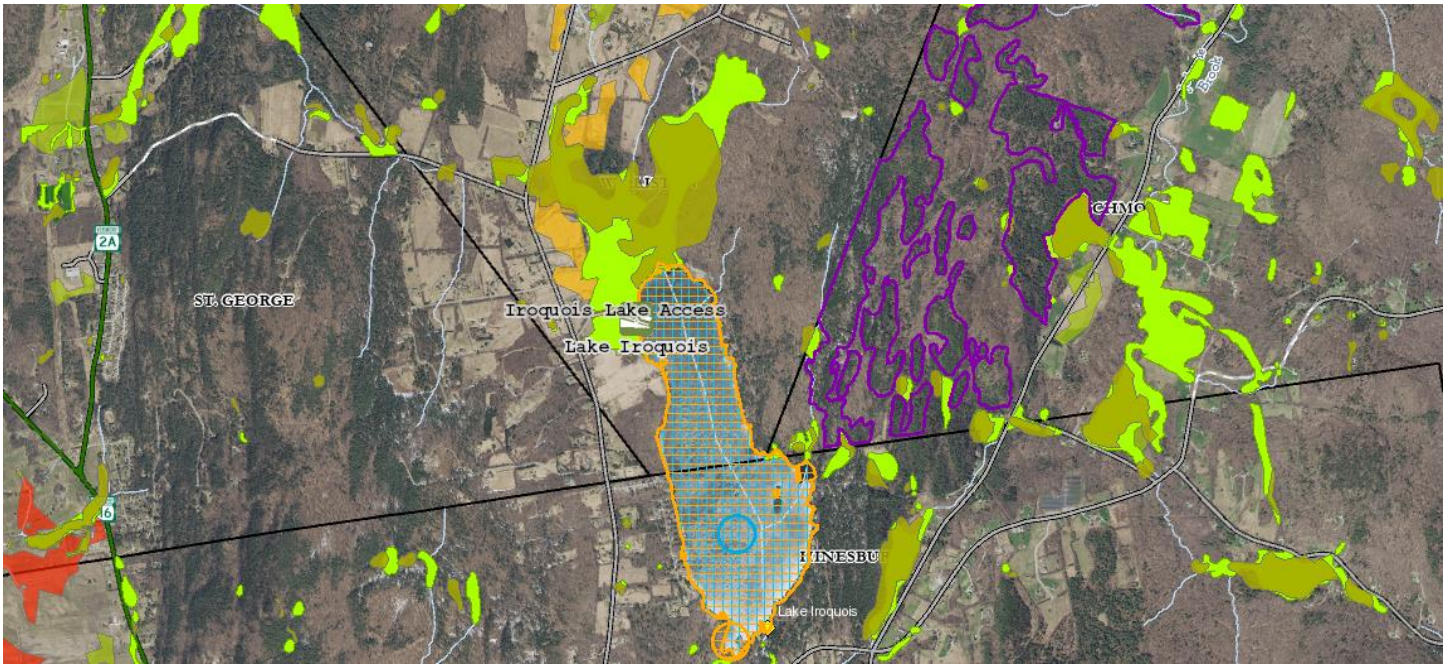
contributed to the nesting success of 1-2 loon pairs each year. Two chicks hatched successfully in 2019 and 2020, and were enjoyed by all until their departure in the fall.

Reptiles and amphibians include painted turtles (*Chrysemys picta*), snapping turtles (*Chelydra serpentina*), American bullfrogs (*Lithobates catesbeianus*), green frogs (*Rana clamitans*), and toads (*Bufo bufo*).

2.10.4 Wetlands

A significant wetland complex of approximately 53 acres exists north of Lake Iroquois (olive and light green shading). The Williston Town Plan identifies protection of these existing wetlands and the riparian corridor as a conservation priority. Smaller, near-shore pockets of wetland also exist on the central western and southern side of the lake.

Figure 7. Lake Iroquois Wetlands



Source: *VCGI | VTANR | VTANRGIS | VTANR GIS | VCGI, USDA FSA, GeoEye, Maxar*

2.10.5 Aquatic Plant Life

The earliest previously known aquatic plant survey was completed in 1984. In 2012, a survey by VT DEC found several new listed species but did not quantify them. Among the most prevalent plant life are the 14 species of native pondweeds (*Potamogeton spp*.), including big-leaf, flat stem, and clasping leaf pondweed, along with common elodea (*Elodea canadensis*, responsive to high phosphorus levels), coontail (*Ceratophyllum demersum*), water smartweed (*Persicaria amphibia*), and the more obvious species of water lily (*Nymphaeaceae*).

Beginning in 2014, the LIA began to contract with independent scientific organizations to conduct aquatic plant surveys on Lake Iroquois. The purpose was to study the effects of the aquatic invasive Eurasian watermilfoil on the native species in the lake and to determine the extent of the infestation. Each survey includes species rosters. While there is some variation in numbers of native aquatic plant species found in the

various surveys, it is clear the number and variety of native aquatic plants has decreased since the infestation of EWM. In 1984, 45 native species were found in the lake. The surveys completed since 2014 have shown a decrease to between 19 and 23 native species with the most dominant aquatic plants found being invasive EWM.

The LIA continues its efforts to reduce and control the invasive EWM and will continue to carry out regular plant surveys to track progress in this regard.

We have a complete species roster that lists the earliest records as well as the most recent record. The independent contractor aquatic plant survey reports are found in the following location on the LIA website: https://www.lakeiroquois.org/water/plant-surveys.

2.11 CULTURAL HISTORY

2.11.1 Historical Uses

Lake Iroquois (formerly Hinesburg Pond) currently traces its history to installation of a low head dam in the mid-1800s currently owned by Iroquois Manufacturing. This action formed the Lake in its current form around 1861. The first small dam was constructed in 1816 for flow regulation of a downstream grist mill. In 1822 a sawmill was built at the dam site. It is unclear when the present dam was constructed although sediment records suggest it was probably built around 1900-1905 (Lake Iroquois Diagnostic-Feasibility Study 1985). The dam led the spring-fed body of water to rise above the existing banks and ensured consistent water supply to mills downstream in Hinesburg. These mills are no longer operational.

Around the 1960s, the dam was intentionally cemented into its top position, retaining the Lake at an artificially high level throughout the year. The dam outlet forms Patrick Brook (formerly Pond Brook), which flows in a southwesterly direction to Sunset Lake (formerly Lower Pond). Patrick Brook becomes a stream again below the outlet of Sunset Lake, itself formed by a low head dam. Patrick Brook encounters another significant dam adjacent to Iroquois Manufacturing below Richmond Road, and flows through one more remnant, smaller dam before its channel splits to additionally form Patrick Brook Canal. From there it flows through Hinesburg before ultimately discharging to the LaPlatte River west of the town. The LaPlatte River eventually empties into Lake Champlain via Shelburne Bay in Shelburne, Vermont. (Town of Williston website accessed November 10th, 2019 https://www.town.williston.vt.us/index.asp?SEC=862668AC-7CE1-4629-BA5E-ECC60DAA18A3&DE=EBE9DCC2-8D80-4313-B335-242BBF57D523).

By 1900, settlers had cleared most of the pond's watershed for farming and began to build seasonal camps on its shores. A hundred years later, much of the watershed is reforested but a significant portion of the shoreline has been developed with many summer camps and year-round homes. The Lake is bordered by the towns of Hinesburg, Williston, and Richmond. The town of St. George also lies within the Lake's watershed.

2.11.2 Present Use

Land use changes such as deforestation, the building of roads and homes, and over-fertilization of crops, lawns, and gardens have had a great impact on the lake, resulting in the nutrient enrichment of the lake.

The Lake has over 90 residences with the first seasonal homes established around 1890. A number of residents continue to use the Lake for a water supply. Permitted and Restricted uses are covered in more detail in Section 2.11.

2.12 RECREATIONAL IMPORTANCE

2.12.1 Lake Iroquois Recreation District (LIRD)

In 1991, the four towns in the watershed formed the 157-acre Lake Iroquois Recreation District (LIRD), which is a municipal district governed by representatives of the four towns: Williston, Hinesburg, Richmond, and St George. LIRD operates the pubic beach, maintains a single 1.8-mile hiking trail used year-round, the road (Beebe Lane) as part of the common land on the north end of the lake.

The lake is used extensively throughout the year by residents and visitors accessing the lake via the Lake Iroquois Recreation District public beach. Many people use the Lake for boating, paddling, waterskiing, sailing, wind surfing, fishing, and swimming. During the winter months people enjoy ice fishing ice skating, snowmobiling, and cross-country skiing.

Of note, a petition process exists by which the State of Vermont may set regulations governing water levels and thus prohibit excessive lake drainage that would be detrimental to recreational use (Lake Iroquois Diagnostic-Feasibility Study 1985).

The Williston Public Works Department performs seasonal monitoring for E. coli at the designated swimming area at the Lake Iroquois Recreation District public beach. Historical results are below state and federal regulatory standards.

2.12.2 Public Fishing Access and Boat Ramp on Lake Iroquois

The Vermont Department of Fish and Wildlife maintains more than 190 developed fishing access areas, providing public access for shore fishing opportunities and launching of watercraft. The public access for fishing and boating on Lake Iroquois is located in the northwestern part of the lake. The fishing access is used by anglers and recreational boaters. A waterski slalom course has been installed and maintained by private individuals. The access additionally includes a dock which is usually in from mid-May to the middle of the fall. Exact dates depend on weather conditions.

3 CURRENT MANAGEMENT ACTIONS

3.1 ADVOCACY

Goal(s): Advocate for continuous improvement in lake health through engagement with state and local partners.

Objectives:
1. Maintain membership and attendance at state-sponsored lake management organizations.
2. Annually present to the Hinesburg, Richmond, and Williston Select Boards on the state of the Lake, current year's efforts, and budget request for support of the organization's efforts.

Actions
The LIA is a member of the Federation of Vermont Lakes and Ponds (FOVLAP), the statewide umbrella organization for lake associations. FOVLAP in collaboration with VT DEC organizes the annual Lake Seminar, and FOVLAP has its annual meeting in the fall. FOVLAP advocates at the state level for water quality and lake and watershed protection with the state legislature, with state agencies and other groups.

LIA works with the town Selectboards and Conservation Commissions to keep them informed of water quality and watershed health issues and to advocate for their help and support with the various projects undertaken

3.2 EDUCATION AND OUTREACH

Goals:
1. Provide educational information to the entire lake and watershed community about best practices to protect and enhance the health of the lake and the surrounding watershed via our website, newsletter, publications, news articles and email updates.
2. Continue to hold the LIA annual meeting each summer and concurrently schedule capstone events such as the Lakewise program, Septic Socials, and stormwater education.
3. Participate in seminars and other educational opportunities to further individual and collective knowledge.

Objectives:
1. Maintain currency with the Lake Iroquois Association website, Lake Management Plan, Lakeshore Property Owner's Manual, LIA Newsletter, and e-mail distribution lists.
2. Publish news articles and updates in local news media outlets and sites such as Front Porch Forum
3. Publish the annual report with the Lake Iroquois Towns of Hinesburg, Richmond, and Williston.

Actions:

3.2.1 LIA Website (https://www.lakeiroquois.org/)
The website is a clearinghouse of information that includes current notices about the lake and information and links to information about lake health, safety, water quality, prevention of invasive species, as well as information about the association.

3.2.2 Lake Iroquois Management Plan
The Plan is generally intended to be a guidance document for current management actions and future goals of the organization, in addition to an alternate clearinghouse for the information contained on the LIA website.

3.2.4 Lakeshore Property Owner's Manual (4th Edition-2020)
This manual offers simple steps that can be done to help preserve the lake. It provides property owners with information about state and local regulations and guidelines as they relate to their property, and to the shoreline, boating, and the lake in general. The LIA has published several editions of this manual and continues to regularly update and make it available to lakeshore property owners and lake visitors both in print and on our website found in the following location: https://www.lakeiroquois.org/water/shoreline-health.

3.2.3 LIA E-mail Distribution List
Functions to widely disseminate information and updates on LIA activities. Those interested in updates can subscribe to our email list to get the latest news from LIA delivered periodically to their inbox.

3.2.5 Biannual Newsletter – The Lake Iroquois Monitor
Our periodic newsletter covering research, education and action for a healthy lake.

3.2.6 The LIA Annual Report
The LIA annual report is sent to each Town summarizing the year's activities where it is published in each towns' Town Meeting report which is distributed to all residents of the towns.

3.2.2 Social Media

Facebook (https://www.facebook.com/lakeiroquois/) The LIA Facebook page has been active for several years. News updates, happenings around the lake, wildlife spotting, along with comments and pictures can be found here.

3.3 FUNDRAISING

Goals: Pursue a diverse array of funding mechanisms to support advancement of initiatives, educational programs, and projects.

Objectives:
1. Continue to annually appeal for membership and support of the Lake Iroquois Association's efforts.
2. Annually request financial support allocations from the Towns of Hinesburg, Richmond, and Williston.
3. Apply for grants in support of projects that support corrective action of identified issues and educational outreach programs.
4. Build upon the annual Ice-Out challenge fundraising effort by possible expansion into other type contests.
5. Continue to sponsor other fundraising, and educational, events such as the Hinesburgh Public House community dinners, lake shore garden tours, native plant sales, and wildlife walks.

Actions:
-Secure Annual memberships & donations
-Appeal for annual allocations from each of the three Towns
-Research and apply for grants. Many of the LIA projects are underwritten by grants from the state and/or local organizations. In addition, grants often include a match of volunteer hours, usually in-kind from other collaborators, such as one of the towns or another organization, i.e., Lake Iroquois Recreation District or a Lake Road Association.

-Continue occasional special fundraising for specific projects (e.g., milfoil project) through special fundraising events, such as Public House community dinners, beer for buffers, Ice-Out challenge etc.

3.4 RESEARCH

Goal: To gather data, information and research related to lake issues, water quality and watershed health in order to base its actions and projects on current science and ensure that all activities are evidence based and scientifically sound.

Objectives:
1. Gather information from a variety of sources: state, regional, national organizations concerned with lake, watershed, and water quality issues.
2. Continue to attend relevant meetings and seminars, such as the FOVLAP-VT DEC Annual Lake Seminar.
3. Share this information widely with all lake stakeholders.

Actions:
Continue working with federal, state, and local partners to increase our knowledge of existing conditions and means to improve Lake health.

3.5 WATER QUALITY
The effects of our activity on the landscape since settlement have not been well understood but collectively, we have learned a lot over the years. More recently, residents have recognized the impact these activities can have on water quality and have worked to implement better management practices.

Goals: The Lake Iroquois Association in conjunction with the Vermont Department of Environmental Conservation, the Vermont Department of Health, the Lake Champlain Committee, the Lake Champlain Basin Program, the Federation of Vermont Lakes and Ponds, the Lewis Creek Association, and the surrounding municipalities, strives to implement a number of programs and projects that enhance and protect the health of Lake Iroquois and the surrounding ecosystem.

Objectives:
1. Increase protection of shorelines and stream buffers.
2. Identify and address corrective action for existing sediment and nutrient input, principally roads and streams.
3. Communicate with local farmers about agricultural influence on the Lake.
4. Communicate importance of functioning septic systems to property owners around the Lake.
5. Advocate for continuation current in-Lake and Tributary water quality sampling and monitoring programs.
6. Complete a watershed assessment and action plan.
7. Advocate for continued Cyanobacteria monitoring across the Lake.

Actions:
1. Increase protection of shorelines and stream buffers
2. Pursue grants that address corrective action for existing sediment and nutrient input, principally roads and streams.
3. Take steps to communicate with local farmers about agricultural influence on the Lake.
4. Take steps to communicate importance of functioning septic systems to property owners around the Lake.
5. Continue current in-Lake and Tributary water quality sampling and monitoring programs.

6. Continue to track volunteer Cyanobacteria monitoring efforts on the Lake.

3.5.1 Protecting the Lake

The Lake Iroquois Association has many programs and projects aimed at enhancing the water quality of Lake Iroquois, preventing further invasives from entering the lake, reducing and controlling the existing invasive Eurasian watermilfoil population, preventing sediment from entering the lake, and reducing nutrient levels in the lake which feed the invasive EWM. However, just about everything people do on the land can affect water resources meaning best management practices on the land around the lake is a necessary part of maintaining the health of the lake and the surrounding ecosystem.

Volunteers have been collecting and compiling data on the health of the lake for well over 40 years. In recent years, the LIA has added a tributary sampling program to the in-lake sampling and data collection. All of our projects and programs are based on the data and evidence collected by these volunteer efforts.

The data we have collected has enabled us to pinpoint problem streams that contribute to sediment and nutrient loading in the lake. Based on this data we have undertaken a number of projects to remediate these problem streams and as a result we have begun to see drops in nutrient levels, especially Phosphorus, in the lake. While this is good news, there is much work remaining. There are still areas where runoff is a problem and/or erosion is a problem. We continue to work on developing plans for remediation and to find funding for this work.

LIA volunteers also provide educational information and help to shoreline property owners to help them develop best management practices, including developing shoreline buffers and planting native plants that will help reduce runoff from lawns.

There are several possible Best Management Practices (BMPs) that could have meaningful positive impacts on water quality. One such measure is the use of riparian lakeshore and stream buffers. Protection of these transitional zones can have a significant impact to water quality and are discussed below.

3.5.2 Shoreline & Tributary Protection

Riparian buffer zones may be understood as intersections or transitional areas between terrestrial and aquatic ecosystems. These zones may reflect subtle or dramatic changes in geology, soil type, vegetation, and wildlife.

These are strips of vegetation separating streams and lakes from human activity, such as roads, farms, gardens, lawns, and buildings. The buffers intercept sediment and nutrients from surface water runoff as well as reduce nutrients in subsurface water flow. Other best management practices, such as using non-phosphate detergent, “no phosphorus” fertilization programs, and building site restrictions, are all helpful in the overall reduction of nutrient-loading into Lake Iroquois.

Lake-friendly land management protects a lake from:

Nutrient enrichment

In particular, accumulation of the nutrient phosphorus in lakes can encourage invasive plants, such Eurasian Watermilfoil, and cause cyanobacteria (blue-green algae) blooms.

Sedimentation

Soil eroding from shorelines where native vegetation has been removed is carried with runoff from roads and surrounding properties and deposits nutrients, especially phosphorus into the lake. Sediment from erosion also fills in coves and shallow areas, disrupting fish and amphibian habitat.

Lake-friendly land management focuses on:
-Reducing nutrient runoff into lakes through preventing soil erosion, not using fertilizer on lawns or gardens, and proper installation and maintenance of septic systems.
-Preventing soil erosion through maintenance or reestablishment of naturally vegetated lakeshores, lake friendly landscaping, and use of erosion control measures during construction.
-Preventing runoff that can carry sediment and nutrients into the lake from roads, driveways, and lawns by reducing mown lawn areas (mown grass does not soak up runoff), using rain barrels, and replacing impervious surfaces with pervious surfaces wherever possible.
-Maintenance of vegetated buffers using native plants along lakeshores, creating no mow zones near lakeshores, and conserving undeveloped shores wherever possible.
-Ensuring that Best Management Practices are followed along the shoreline.
-Joining the Vermont LakeWise program and creating "lake friendly" shorelines.
-Following the provisions of the Vermont Shoreland Protection Act.

Prior to the formation of LIA in 2007, lake residents began to use best management practices (BMP) on their lakeside properties in the effort to improve water quality. The LIA collaborated with FOVLAP to provide blueberry plants to many homes and camps on the lake, and helped with the plantings as necessary. Education was provided about the importance of shoreline plantings at the time of distribution.

3.5.3 Runoff Mitigation and Stream Remediation
Since 2010, the LIA has worked to mitigate runoff and reduce sediment flowing into the lake. From 2010 to 2012, LIA received grants from Vermont Clean & Clear and Vermont Better Backroads to design and implement catchment basins for several of the streams on the west shore of the lake identified as contributing large amounts of sediment into the lake.

This work continued in 2013-2014 with the Pine Shore Rain Garden Project which was built to catch and absorb runoff from the stream running parallel to Pine Shore Drive.

In 2016 the LIA in collaboration with the Town of Hinesburg, and the Pine Shore Road Association received an Ecosystem Restoration Program (ERP) Grant to further remediate this stream below the rain garden by restoring its natural flood plan, replanting the stream banks with native species to prevent further erosion, and removing culverts and obstacles that had contributed to scouring and erosion. This project was successfully completed in 2018. See the project reports linked below.

From 2012 to 2015, LIA in collaboration with the Lake Iroquois Recreation District, received grant support to design and implement a beach erosion project which included development of a rain garden and stream bank remediation to prevent the runoff which had been causing considerable erosion of the beach sand into the lake. This erosion was causing considerable nutrient laden sediment to enter the lake.

The tributary passing beneath Beebe Lane at the northern edge of the Lake is a contributor of sediment and has shown the highest average level of nutrient input into the Lake since LaRosa Partnership Program monitoring began in 2011.

With aid from the Chittenden County Regional Planning Commission, the Beebe Lane Drainage Improvements final design was completed in 2019 with funding from a Mount Ascutney Regional Planning Commission (MARPC) Block Grant.

In 2020, the Chittenden County Regional Planning Commission supported advancement of a block grant proposal to fund the implementation of a portion of the 2019 proposed stormwater Best Management Practices design on Beebe Lane. We are hopeful block grant funding will be available in 2021 to finish this project.

The success of these efforts shows in the reduction of nutrient loading in the lake. In 2018 and again in 2019, we see significant decreases in Phosphorus levels in Lake Iroquois reflected in the state's lake scorecard.

3.5.4 Roads

The Vermont Agency of Natural Resources (VTANR) and other organizations can provide technical and, in some cases, financial assistance (e.g., Vermont Municipal General Road Permit). Vermont's strategy is to promote the use of erosion control and maintenance techniques that save money and prevent road erosion while protecting and enhancing Vermont's lakes and streams.

Roads can be a significant phosphorus source depending on how the roads are maintained and upgraded. Roads effectively become part of the stream network during a rainstorm or spring melt, with many roadside ditches discharging directly into streams, lakes or wetlands. Eroded road material contains significant amounts of phosphorus and thus, as with all eroded soil, is a source of phosphorus to Lake.

The first step is to perform a road assessment and inventory of conditions, identification of problem areas such as erosion, and corrective action to realign the road conditions with applicable standards. An operation and maintenance plan must be put into place to ensures the road is kept to standard. The LIA is applying for a grant to perform this assessment in 2021-2022.

Private roads on Lake Iroquois are the responsibility of landowners. There are multiple independent road associations on Lake Iroquois whose primary purpose is to maintain the roads and common property serving their respective areas. Some road associations have coordinated with LIA to identify and correct problem areas with the best example being the Pine Shore Road Association, Southwest Shore Association, and the residents living on Beebe Lane.

Please see the Runoff Mitigation and Stream Remediation section above for a detailed discussion of these efforts to implement or seek corrective action.

3.5.5 Agricultural Influence

In 2017, the State of Vermont enacted legislation leading to the development of Required Agricultural Practices (RAPs) as part of the Agricultural Nonpoint Source Pollution Control Program. The intent was to address excess nutrient loading from unchecked runoff going into Lake Champlain through implementation of practices that conserved soil and retained manure.

While there are no farms directly adjacent to Lake Iroquois, two farms sit directly north of the Lake at the head of the watershed. Personal communications with some also suggest there were hill farms raising sheep above the eastern flank of the Lake. Although not conclusive, higher than expected phosphorous levels from

tributary sampling on this portion of the Lake suggests that legacy nutrients exist within the soil from historic agriculture.

3.5.6 Septic

A survey of VT DEC's permit database shows that of 92 residences plus the Lake Iroquois Recreation District facilities, approximately a third have experienced modernization and replacement of their septic systems.

At its annual meeting in 2018, the Lake Iroquois Association hosted, and the Winooski Natural Resources District facilitated, a Septic Social to educate residents and members of the public on the importance of fully functioning septic systems and associated maintenance.

As older, seasonal camps are upgraded, Vermont regulatory standards will require replacement of existing septic systems. The Lake Iroquois Association will continue to educate and inform residents of the increased benefit to water quality from proper maintenance on existing septic systems and installation of new septic systems.

3.5.7 Sampling and Monitoring

All of the mitigation and remediation work noted above depends on data to determine sources of nutrient and sediment problems. The LIA sampling and monitoring programs have been ongoing for many years. The data collected by volunteers has been an important part of determining where work needs to be done and in tracking the success of the projects. Please refer to Section 2.5 for in-depth discussion about the Lay Monitoring and Tributary Monitoring Programs.

3.5.8 Cyanobacteria Monitoring

Cyanobacteria (blue-green algae) are a normal part of Lake Iroquois, and are common in Vermont lakes. Excess nutrients, especially phosphorus, combined with warm calm water can increase cyanobacteria density, resulting in a "bloom." Cyanobacteria blooms can produce harmful toxins causing stomach or skin problems and other symptoms. If you suspect a bloom: keep children and pets away from water in the area of the bloom. Swimming or boating in an algae bloom should be avoided. If you live on or near the lake, contact any one of the LIA Board members about the suspected bloom or take a sample in a bottle or a photo. If the condition warrants, the Vermont Department of Health is to be contacted and a sample of the bloom can be analyzed. Identifying and documenting toxic blooms is helpful in monitoring the efforts to improve water quality. In the event of illness after exposure to an algae bloom, see your doctor. While some of the toxin - producing cyanobacteria are present in Vermont, the risk of illness from these toxins is minimal, especially if you are mindful of an algae bloom and keep out of the water affected by a bloom. It is difficult to contain or control a cyanobacteria bloom while it is occurring. In most cases, a bloom only lasts a day or two. The best approach to reducing the number and intensity of blooms is to reduce the phosphorus found in the water.

The LIA, in conjunction with the Lake Champlain Committee, has sponsored training for lake residents to identify cyanobacteria blooms. The Lake Champlain Committee issues a weekly mailing during the summer season that includes all reports from volunteer monitors throughout the Lake Champlain basin.

Several trained volunteers weekly assess the lake visually, on the same day of the week between 10:00 AM and 3:00 PM (when cyanobacteria are most likely to rise to the surface). Photographs are taken if a bloom is seen. They may also check other areas outside these times if anyone around the lake reports something suspicious. Reports are emailed to the Lake Champlain Committee and the Vermont Department of Health

and posted on the Cyanobacteria Tracker (https://www.healthvermont.gov/tracking/cyanobacteria-tracker). The Lake Champlain Committee issues a weekly mailing during the summer season that includes all reports from volunteer monitors throughout the Lake Champlain basin.

3.6 AQUATIC INVASIVE SPECIES CONTROL

Once present, invasive species are costly to manage, cause negative environmental shifts in lakes, interfere with recreational uses and are difficult if not impossible to eradicate. Eurasian watermilfoil (EWM) is the most troublesome invasive species in Lake Iroquois and was first discovered in 1990 near the state fishing access. Early attempts to control it failed, and although growth varies somewhat year to year, it has been a problem since. Other invasive aquatic plant species known to be present are purple loosetrife (*Lythrum salicaria*) at the north end of the lake and curly-leaf pondweed (*Potamogeton crispus*), which has not yet become a major problem. Although the snail population of the lake has not been carefully studied, there have been reports of increases in the population of the non-native banded mystery snail (*Viviparus georgianus*) which is native to the Mississippi and southeast Atlantic drainage, but is non-indigenous to New England. In eutrophic lakes across the United States, the snail's populations can reach high densities and grow to become a nuisance. It has been observed to die off in large numbers and create odor issues when the shells wash up on the shoreline. The die offs are probably related to summertime warming and low dissolved oxygen (DO) that could be attributed to algae blooms. It is not known if these can become a greater problem in any way.

Both smallmouth (*Micropterus dolomieu*) and largemouth bass (*Micropterus salmoides*) are non-native but not considered a nuisance.

The rusty crayfish (*Orconectes virilis*), an aggressive colonizer that can out-compete native crayfish for food and habitat resources, is present. The rusty crayfish is native to the Missouri and Mississippi Rivers and the Great Lakes and probably arrived via bait bucket introductions. It inhabits the shoreline zone of Lake Iroquois in the summer and moves into the deeper waters in the late fall and winter to avoid freezing.

Although EWM is currently the only invasive species causing notable problems for Lake Iroquois, the LIA is extremely concerned about the presence of large numbers of other invasive plant and animal species in nearby lakes, states, and provinces, that could easily be transported to Lake Iroquois. Lake Champlain, for example, is host to over 50 invasive species. From Greeter Program information collected, many boats entering Lake Iroquois have also been in Lake Champlain, and therefore the potential for spread is great. Lake Champlain has confirmed populations of water chestnut (*Trapa natans*) and zebra mussel (*Dreissena polymorpha*), spiny waterflea (*Bythotrephes longimanus*) and more recently the alewife fish (*Alosa pseudoharengus*) and variable-leaved watermilfoil (*Myriophyllum heterophyllum*). Additionally, Lake Champlain has waterway connections with the Great Lakes, the Hudson River, and Lake George, where the Asian Clam (*Corbicula fluminea*) has recently been found. Once an invasive species enters Lake Champlain, there is considerable risk that the species could move to Lake Iroquois. In an effort to prevent the spread of invasive species between lakes, Vermont law prohibits the transport of any (not just invasive) plant species or quagga or zebra mussels on a boat or trailer. To lessen the risk of transport of invasive fish species and fish diseases such as hemorrhagic septicemia, Vermont also requires live bait to be purchased only from licensed sources, and prohibits transport of bait into another lake.

The Lake Iroquois management strategy is supported by VT DEC's surface water management strategy. From the Strategy:

"Invasive species such as Eurasian watermilfoil, Japanese knotweed, purple loosestrife, water

chestnut, zebra mussels and spiny waterflea cause severe impacts to aquatic habitat. These species readily out-compete native plants, algae, and animals, ruin recreational opportunities, and alter entire ecosystem functions. Invasive species are at risk of spreading throughout Vermont surface waters, especially lakes, and are transported from one waterbody to the next by boats or following road ditches. Successful control of invasive species meets Objective B of this Strategy." Objective B from VT DEC's surface water management strategy is identified as "Protect and restore aquatic and riparian habitat."

Goal: Invasive plant species are a real threat to ecosystems. They squeeze out native plant species which provide food and habitat for native insect and animal species, thereby threatening their existence; this in turn further disrupts the natural ecosystem. Once an invasive gets a foothold, it is very difficult to completely eradicate it. However, it is possible to reduce and control it in a way that minimizes its impact and allows the native species to regenerate. This is the goal of the LIA efforts in combatting EWM.

Objectives:

1. Prevent the further spread of aquatic and terrestrial invasives.
2. Maintain a clear fishing access channel through use of benthic barriers to minimize the further spread of EWM by boats entering the lake.
3. Appeal to the towns for continued support of lake-wide plant surveys.
4. Track Volunteer Invasive Patroller efforts to detect invasives before they proliferate.
5. Annually implement the Greeter and Boat Wash Station program as a preventative effort to detect and disallow additional invasives from entering the Lake.
6. Selectively use means permitted by the state to reduce and control EWM including aquatic herbicide, DASH (Diver Assisted Suction Harvesting), hand pulling, and benthic mats in areas where appropriate.

Actions:

3.6.1 Eurasian Watermilfoil Control Efforts

Eurasian Watermilfoil (EWM) was first identified near the public fishing access in Lake Iroquois around 1990. Various efforts were made to control the infestation including hand pulling, use of weevils, benthic mats, and establishment of the LIA Greeter Program. However, by 2014, it was clear that the EWM infestation was spreading out of control, seriously impeding boating, swimming, fishing, and causing an alarming decline in native aquatic species. In order to understand what was happening and what our options were, the LIA Board began to study and research options for reducing and controlling EWM.

The result of this work has been the development of an integrated pest management plan, a long-range management plan that involves a multi-faceted approach. This approach includes continuing to complete projects to reduce sediment and nutrient loading in the lake as high nutrient levels encourage the growth of EWM; using Diver-Assisted Suction Harvesting (DASH) where appropriate, such as clearing the boat channel at the fishing access; placing benthic mats (bottom barriers) in some areas; and the possible use of the herbicide, ProcellaCOR, to reduce the infestation to a level controllable by these other means.

3.6.2 Weevils

In 1989, VTDEC biologists discovered that a natural decline of EWM had occurred in Brownington Pond in northeastern VT, and in 1990 they received a grant to determine whether the native aquatic weevil, *Euhrychiopis lecontei*, had played a role in the decline. Researchers showed that low levels of EWM growth

were related to weevil density, and that both adult and larval weevils damaged the watermilfoil by burrowing into stems. There was no effect noted on native aquatic plants.

In 1995 volunteers partnered with the VTDEC to determine if this method of biologic control would help limit growth of EWM in Lake Iroquois. Weevils were collected by VTDEC staff from other lakes in Vermont, and introduced by LIA volunteers to large fish tanks in which EWM had been added according to a standard protocol. After allowing the weevils to multiply in the tanks, the EWM stems were then placed back in the lake by tying the stems onto growing EWM plants. Results were variable. In some years it appeared that locations where weevils had been introduced had significant declines in EWM, but in other years results were disappointing. After more than 10 years it was decided to discontinue the program.

Since then, the EWM infestation has progressed in spite of other efforts including hand pulling by volunteers and homeowners, and is now impeding recreational activities and causing a decline in native aquatic species. The LIA Board of Directors began to explore other options for control of this infestation in 2013-2014. These options are further discussed below.

3.6.3 Fishing Access Channel

Realizing that fragments of EWM will easily root and establish new plants elsewhere, for over 20 years volunteers have placed buoys to mark a channel at the public fishing access to restrict motorized craft from driving through the dense EWM in the area. Because watermilfoil easily roots from fragments, it's important to avoid breaking it up, as that enables it to spread. It also clogs propellers and rudders. More recently benthic barriers have also been used in the area. Both measures require significant volunteer effort and time in both Spring and Fall.

3.6.4 Benthic Barriers

LIA places benthic barriers in the boat channel in order to prevent further chop and spread of EWM. LIA also coordinates with the Lake Iroquois Recreation District to place benthic barriers in the swimming area. However, this method is not suitable for use across the lake as these barriers prevent growth of non-target species, including beneficial native plants. Some landowners retain permits for use of benthic barriers but do so as private citizens versus coordinated efforts with LIA. The benthic barrier permit requires removal at the end of the season in accordance with permit conditions.

3.6.5 Vermont Invasive Patroller (VIP)

Aquatic monitoring for invasive species is conducted via the Vermont Invasive Patroller (VIP) program implemented statewide by the Vermont Department of Environmental Conservation (VT DEC). Volunteers known as 'VIPs' traverse the Lake multiple times a season in search of new invasive aquatic flora and fauna before they become a significant problem.

The VT DEC trains volunteers in identifying native and non-native aquatic plant and animal species. These volunteers then search the lake for new species and report to the VT DEC to facilitate a rapid response. Lake Iroquois has participated annually since inception of the program and has several VIPs. The entire lake is surveyed at least twice each year. Reports are submitted to the VT DEC.

3.6.6 Plant Surveys

The earliest aquatic plant survey the Lake Iroquois Association is aware of was completed by VT DEC in 1984. In 2012, a VT DEC survey found new listed species but did not quantify them.

Since 2014, the LIA contracted with independent, scientific organizations, to conduct aquatic plant surveys of Lake Iroquois to study the effects of the invasive Eurasian Watermilfoil (EWM) on and document the native species in the lake, and to determine the extent of the EWM infestation. These surveys each include species rosters. While there is some variation in numbers of native aquatic plant species found in the various surveys, it is clear that the number and variety of native aquatic plants has decreased since the infestation of EWM. In 1984, 45 native species were found in the lake. The surveys completed since 2014 show a decrease to between 19 and 23 native species with the most dominant aquatic plan found being invasive EWM.

The LIA continues its efforts to reduce and control the invasive EWM and will continue to carry out regular plant surveys via an independent contractor to track progress in this regard.

The most recent aquatic plant surveys may be found on our website in the following location: https://www.lakeiroquois.org/water/plant-surveys.

3.6.7 Greeters and Boat Wash Station

There are over 51 aquatic invasive species in Lake Champlain alone, many of which are also in other Vermont lakes.

The VT DEC educates boaters about the importance of cleaning their boats and trailers when entering and leaving a lake, of draining all water (even small amounts of water, such as found in bait wells, motors, and ballast tanks can transport zebra mussel veligers), and of drying all boating equipment for at least five days (to kill animals) before moving from one lake to another. Many animal species, the larvae, or veligers, of zebra mussels' larvae are so small they cannot be easily seen with the naked eye.

As of 2018, Vermont law requires that a boat be washed if a greeter is on duty, the boat wash is operating at the time, and the greeter determines that the boat needs to be washed. These conditions apply for boats entering AND leaving the water. The AIS greeters have documentation that more completely explains this law.

In 2009, the LIA began its Greeter Program thanks to an Aquatic Nuisance Control Grant from the VT DEC, funding from the surrounding towns, and support from the LIA membership. In 2016, the LIA received a grant from the Lake Champlain Basin Program to add a high pressure, hot water wash station to the Program. LIA's Greeter Program and wash station has been used as model for other lake associations wishing to set up such a program. The Program continues to be supported by grants from the VT DEC, the towns, and the LIA membership. The Hinesburg Fire Department graciously provides in-kind water supply for the boat wash station. The Greeter Program is an important element in our efforts to ensure that no new invasives or more EWM enter the lake, and none are carried from our lake to other waterbodies.

Greeter responsibilities include both inspection and equipment washing. Greeters are on duty and the pressurized hot-water wash station is open every Friday, Saturday, and Sunday from Memorial Day to Labor Day. Greeters and the wash station are also on duty for the July 4 holiday.

The pressurized hot-water wash station at Lake Iroquois has been designated by VT DEC as an Approved Aquatic Nuisance Species Inspection Station with all greeter staff trained in all duties by VTDEC. This is just one more step the LIA takes to protect the Lake and improve lake water quality.

Greeter positions are advertised annually in March for the summer. The LIA also welcomes anyone who would like to be trained to identify invasive species and would like to participate in the greeter program on a voluntary basis. If interested, email us at Info@lakeiroquois.org.

The LIA Greeter Program is overseen by the LIA Board of Directors. In addition, the Greeter Program receives in-kind support from the Town of Williston.

The latest LIA Greeter Program statistics may be found in the Appendices.

3.6.8 Diver Assisted Suction Harvesting (DASH)

In 2016, 2018, and 2019 (2020 was also planned but cancelled due to the COVID epidemic) the LIA carried out Diver Assisted Suction Harvesting (DASH) on Lake Iroquois. Several weeks' worth of work managed to clear only the boat access channel. The organization found that while effective for clearing small, dense areas of milfoil, this method was too slow and expensive to clear the extent of the infestation.

4 FUTURE MANAGEMENT GOALS, OBJECTIVES, AND ACTIONS

4.5.1.2 Land Acquisition

4.5.1.2.1 Support LIRD in working with the Vermont Land Trust (VLT) to acquire and conserve undeveloped property on the west side of lake.

4.5.1.3 Sampling and Monitoring
4.5.1.3.1 Cyanobacteria monitoring: Send out alerts in case of a cyanobacteria bloom & provide information and outreach to lake users about cyano blooms.

4.5.1.3.2 Lay Monitoring

4.5.1.3.3 Tributary Sampling
Adjust LaRosa Partnership Program sampling to include additional tributaries, eliminate tributaries that do not reflect nutrient regulatory exceedances, expand to perform more bracket monitoring).

AQUATIC INVASIVE SPECIES CONTROL
-Greeter and Wash Program (Consider expanding days of coverage)
-Implement integrated EWM control program (DASH, benthic mats, herbicide use)
-Continue boat Channel marking from VT DFW public boat launch to keep boats out of EWM

4.5.1.1 Conservation

4.5.1.1.1 Work with Eric Hanson of the Loon Restoration Project (Vermont Center for Ecostudies) to put out and later remove signs alerting boaters to avoid the nesting loons, send out notices and warnings, and reconstruct and reposition the loon raft as necessary.

4.5.1.4.2 Work with LIRD and other landowners to address terrestrial invasives around the lake

5 SUMMARY OF PRIORITIZATION

5.1 HIGHEST PRIORITY

-Controlling EWM (Currently active)
-Continuation of the Greeter and Wash Program (Currently active)
-Reduction of Phosphorus entering the lake. Increase Lake Wise award properties around the lake
-Beebe Lane upgrades (Grant application approval pending)

5.2 HIGH PRIORITY

-Septic upgrades
-Connect with Dynamite Hill and Shadow Lane property owners
-Access road assessments and improvements

5.3 MEDIUM PRIORITY

-Connect with Sunset Lake property owners

5.4 ONGOING AND LONG-TERM (5+ YEARS)

-Acquire the open land on the west side of the lake
-Watershed assessment plan (Grant application approval pending)
-Collaboration with LIRD
-Collaboration with Town Conservation Commissions & Recreation Committees

5.5 FUTURE ACTIONS TO CONSIDER:

-Possible employment of a grant writer
-Develop volunteer program

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7 GLOSSARY OF TERMS

AIS	Aquatic Invasive Species
ANC	Aquatic Nuisance Control
ANR	Agency of Natural Resources
ATV	All-Terrain Vehicle
BMP	Best Management Practice
CCRPC	Chittenden County Regional Planning Commission
COVID	Corona Virus Disease
CWD	Champlain Water District
DASH	Diver Assisted Suction Harvesting
DEC	Department of Environmental Conservation
DFW	Department of Fish and Wildlife
ERP	Ecosystem Restoration Program
EWM	Eurasian Water Milfoil
FOVLAP	Federation of Vermont Lakes and Ponds
LCA	Lewis Creek Association
LCBP	Lake Champlain Basin Planning
LCC	Lake Champlain Committee
LIA	Lake Iroquois Association
LIRD	Lake Iroquois Recreation District
LISPA	Lake Iroquois Association Protection Association
LMP	Lay Monitoring Program
LPP	LaRosa Partnership Program
MARC	Mount Ascutney Regional Commission
PWC	Personal Watercraft
PUD	Planning Unit Development
PWD	Public Works Department
RAP	Required Agricultural Practices
RR	Rural Residential
SPA	Shoreline Protection Act
SPP	Shoreline Protection Plan
VCE	Vermont Center for Ecostudies
VIP	Vermont Invasive Patroller
VT DEC	Vermont Department of Environmental Conservation
VT DFW	Vermont Department of Fish and Wildlife
VSA	Vermont Statues Annotated
VT	Vermont
WNRCD	Winooski Natural Resources Conservation District

8 FIGURES

9 TABLES

10 APPENDICES: Annual Reports