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What is the LSCCF and Why Should You Support it? The Lake St. Catherine Conservation Fund (LSCCF or the Fund) was created in 2010 and is a 501(c)(3) nonprofit organization dedicated to securing the future of the Lake St. Catherine system. The LSCCF is made up of local citizens and part-time residents working to improve the entire lake system through heightened public awareness about good watershed management practices, water quality monitoring, research into best practices for lake restoration, and concrete interventions, with a special emphasis on conditions in Little Lake. It is run by an elected Board of volunteer directors.

The beauty and tranquility of Lake St. Catherine are among the core reasons that many of us have chosen to live in or visit this part of Vermont. Some of us are life-long residents, while others only discovered this wonderful spot later in life and now live here part-time or year-round, or visit whenever we can. Without question, we all share a love of the lake and its surrounding countryside. If we want to pass on the joy we feel living here to future generations, we need to fight to protect the lake. **If you want to know how you can help, please read on. You can also learn more at our website, www.lakematters.com or on Facebook at Lake St Catherine Conservation Fund Inc. in Facebook Groups.**

First, A Bit of History ... There are two community-based organizations working to protect the Lake St. Catherine system – the LSCCF and the Lake St. Catherine Association (LSCA). The LSCA has a much longer history and is much larger. Like the LSCCF, it is run by dedicated volunteers who collect dues and donations, and run programs designed to maintain and protect the lake.

The individuals who set up the LSCCF were largely drawn from the ranks of the LSCA. They had two primary motivations for breaking away: 1) leery of the long-time impact of herbicides, especially in Little Lake, they wanted to identify more environmentally-friendly methods of dealing with the issues present in the lake; and, 2) they believed that, due to differences in topography, the problems plaguing Little Lake required different solutions. As you might expect, the breakup was not friendly, and there was considerable bad blood between the two organizations. Starting in early 2020, however, attitudes began to soften, as the two groups began to explore possible areas of cooperation. **More on that later.**

How is Little Lake different? Lake St. Catherine is a complex environment covering some 852 acres, divided between the Vermont towns of Wells and Poultney. This five-mile long lake system consists of three main parts: the northern Lily Pond, the central Main Lake, and the southern Little Lake, with channels connecting all three components. Each portion of the lake faces threats, and due to their very different topography, each requires specific, targeted approaches if we are to sustain the health and vitality of the entire lake, and the ability of future generations to access all parts of it for boating, fishing and swimming.

Little Lake is located entirely within the Wells town limits and covers some 179 acres. In addition to more than 100 lakeshore homes and cottages, it is bordered by a number of wetland areas, a factor that complicates consideration of possible interventions. Although it has a maximum depth to hard bottom of over 40 feet, much of the Little Lake basin has been filled over the eons through eutrophication, which has resulted in the accumulation of huge amounts of flocculant organic material and reduced its average clear water depth to less than six feet. There are still many people who live around or visit Little Lake who remember fondly the 1960's when they could swim across this gem of a lake or water ski easily off a dock. We are working to bring back those conditions, but it will be a long, hard fight. No doubt, these vexing developments were compounded by the slow, but steady transformation of the shoreline around Little Lake from untouched woodlands, to the occasional fishing camp, to more permanent structures where many people now live year-round. These factors were dramatically exacerbated by the arrival of a noxious invasive plant, Eurasian water milfoil (EWM), in the 1970's.

Why Has It Been So Hard to Find the Right Solution? The LSCCF has long been investigating different methods of lake restoration, and we discovered that lakes all over the world are experiencing the same loss of use as Little Lake and other parts of Lake St. Catherine. The deteriorating condition of a lake filling in is known as **eutrophication**. This process takes place over time as vegetation decays each season and builds up nutrient-rich sediment, which in turn provides a fertile base for more vegetation - in Little Lake, largely invasive EWM and curly leaf pond weed. This cycle is exacerbated by factors outside the lake as well. In a natural state, the land surrounding the lake absorbs sediment runoff and chemicals such as phosphorous and nitrogen. But with increased use of fertilizers, the buildup of houses and paved areas, and breakdown of aging septic systems, these substances find their way into the lake in increasing amounts, fueling the acceleration of the eutrophication process. More needs to be done to counteract these shoreline problems, and the Fund stands ready to assist, whenever possible.

Other factors are also at play, however. Vegetation in the lake dies off each year and contributes to the huge accumulation of organic sediment (commonly known as muck), particularly in Little Lake and shallower bays elsewhere, causing navigation problems to increase. These conditions allow more sunlight to penetrate to the growth zone, fueling the growth of even more vegetation, and so the deterioration keeps accelerating. As a result, the sediment is now over 30 feet deep in places in Little Lake! **The LSCCF is convinced that reducing the muck is the key to returning Little Lake to its true glory.**

What's Been Tried? Restoring a lake undergoing eutrophication is a difficult problem that does not lend itself to a simple solution. Over the years, the Fund has researched and deployed a number of methods that have been used, with varying degrees of success, around the world. These strategies fall into three basic categories: mechanical, chemical, and biological.

Mechanical treatments include such activities as harvesting, hand-pulling of weeds, raking, dredging, laying in barriers, and suction harvesting. Chemical treatments include the use of herbicides and dyes which can temporarily kill off vegetation. Biological controls attempt to restore the natural balance through the use of herbivorous organisms (weevils, enzymes, carp, etc.) and/or by adding more oxygen to the water (laminar flow aeration - LFA) to encourage natural breakdown of organic sediment and attrition of excess vegetation.

Attempts led by the LSCA prior to 2010 to use herbicides to control EWM in Little Lake proved counterproductive at the time, since the addition of the dying organic material to the top of the sediment layer only worsened navigation problems and invasive plant growth. As noted above, the LSCCF was set up to explore other answers. One of our early efforts featured the introduction of weevils to eat the EWM. That failed because the weevils would not eat the milfoil.

The Fund quickly identified LFA as a promising potential solution. This technology had not been allowed in Vermont before this, but was in use elsewhere. It took several years of hard work to convince the Vermont Department of Environmental Conservation (DEC) to grant our first aeration permit in 2012. Over the next six years, the Fund scraped together the money for more equipment and relentlessly pushed the DEC to allow us to expand the LFA coverage. In the end, we had 23 aerations deployed (representing an investment of approximately \$100,000 and countless hours of volunteer time), covering much of the east and west sides of Little Lake. Based on the data we were gathering and the gradual, but visible, signs of progress everyone living around Little Lake could see, the Fund was preparing to apply for the next step – a full-lake system in Little Lake, coupled with the introduction of enzymes as a bio-augmentation agent. (The bio-augmentation was strongly recommended by the experts we were working with.)

Then, in 2018, the DEC surprised us by taking a hard line against further use of LFA. After many conversations with DEC officials, supportive documentation from world-renowned scientists and local political figures who favor more action to save Little Lake, and submission, in late 2019, of two complex, lengthy applications for permits to install a full-lake LFA system with bio-augmentation, the DEC denied our LFA request in March 2021. (Technically, the DEC did not address the bio-augmentation application, but it was a moot point without LFA.) The DEC's reasons were 1) Little Lake is not in trouble; 2) there is no concrete evidence that LFA is beneficial; and 3) the use of LFA might cause harm to the environment.

Even before the DEC put an end to the LFA, it was apparent that the problem of excess vegetation in Little Lake was getting worse by the year. In response, the LSCCF decided to revive an old technique used by the LSCA years ago. We obtained a permit from the DEC in 2017 to carry out a **harvesting operation** to remove surface vegetation and cut plants below the surface. We have two used harvesters, although keeping both of them operational is a challenge. Each year, we have a machine out on Little Lake, carving out navigational channels for residents and visitors alike. With one machine run by a contractor, we can remove over 2,500 cubic yards of weed a season. We have a couple of options for the second machine: use it as a weekend supplement with volunteer operators; sell it; or scrap it for parts. In addition to the \$80,000 spent on equipment so far, it costs nearly \$30,000 to run this program each summer. **The plain truth, however, is that using mechanical harvesters is a stopgap control measure to buy time until we can successfully implement non-chemical means to solve the problems of deepening muck and excess plant growth.**

Another idea that has been around for years is **why not dredge Little Lake?** First of all, the DEC has made it clear informally that dredging Little Lake in its entirety would never be allowed as it would be catastrophically destructive for the fauna and flora, and the surrounding wetlands. The idea continued to come up, however, so we contacted the U.S. Army Corps of Engineers to better understand what large-scale dredging would entail. Their 2020 answer, quoted in part below, put an end to the discussion:

“In terms of whether dredging is a viable alternative, the cost and environmental impacts associated with dredging would likely preclude this option as well. A preliminary cost estimate based on the information you provided is **roughly \$45 million to dredge to a depth of ten**

feet, or \$150 million to dredge to a depth of 40 feet. This does not include those costs associated with surveys, planning, design, environmental compliance, dredge material placement, and potential environmental impact mitigation.”

One last point on dredging. While the DEC sees dredging all of Little Lake as a non-starter, they did grant the LSCCF a permit in 2013 to conduct an experimental hydraulic dredging project to address a severe runoff issue in the northwest corner of Little Lake. For years, action on this permit languished, due to a lack of money and volunteers to do the work. In 2020, a LSCCF board member purchased a small dredge which we tested out in the toughest portion of the permitted work zone. The results were discouraging – the rooted plants overwhelmed the dredge, but we plan to do more testing to see whether this machine might work around docks in other, less vegetated areas. To test the dredging concept in the heavily-vegetated areas, however, will require a heavy-duty dredge. Renting one for a month will cost @\$30,000. At this point, we do not have sufficient funds for that purpose.

What Happens Next? Long before the final decision on the LFA permit was handed down, the LSCCF Board could see that the outcome was likely not going to be favorable. Urged on by a couple of LSCCF members who also had links to the LSCA, we joined in discussions in early 2020 with the LSCA Board regarding how the two groups might work together. The LSCA has had success with a new herbicide in the past several years, and believes that this chemical can work well in Little Lake. Given the clear need to do more to control the EWM, and the DEC shutdown of the LFA system, the Fund agreed in March 2021 to join the LSCA in a joint fundraising project to support a **three-year herbicide use program in Little Lake**, starting in the summer of 2021. This program will be administered under a LSCA permit, but the LSCCF will be deeply involved in ensuring there are adequate data collection and measure protocols in place to assess its impacts and overall success. We also intend to continue our harvesting program to ensure access to Little Lake for all. The two groups also worked together to land a grant for an expansion of the LSCA’s **Lake Wise program** which is designed to help property owners improve their watershed management approaches. The LSCCF also hopes to work with the LSCA on putting together and implementing a **comprehensive watershed management action plan** for the entire lake.

Plans for the 2021-2025 Timeframe ... Like all residents and visitors to Little Lake, we want the three-year herbicide program to succeed, and we pledge to do everything we can to ensure its success. The early results look good, as the herbicide has clearly knocked back the EWM, without any visible troubling side effects. Nevertheless, we still have questions about its impact over the long term. Will the EWM regrow quickly, given the relative shallow nature of Little Lake, leaving us no better off without resorting to the annual application of chemicals? Will the rapid knocking down of the EWM flood the bottom of Little Lake with even more organic material, resulting in depleted oxygen levels and unexpected fish kills? Can we avoid experiencing dreaded blue-green algae blooms in Little Lake? The LSCCF looks forward to working with the Vermont Department of Environmental Conservation (DEC) and the LSCA to monitor the lake carefully for these kinds of warning signs of a lake in crisis.

Even if the herbicide program is a smashing success, the plain fact is that the people who live here in Wells, Vermont see Little Lake as already in crisis. Not the type of crisis that results in newspaper headlines and breathless TV reports, but rather a slow developing set of problems resulting in a lake featuring a bottom filled in with huge amounts of disgusting flocculant organic material and incredible amounts of excess vegetation.

Time will tell, but most experts tell us that the elimination of EWM would only slow down the process of eutrophication, and would do nothing to reverse the damage it has already caused. The problems of muck and excess vegetation are likely to remain, and may well worsen. If that turns out to be true, the crisis will intensify as the ability of residents and visitors alike to use and enjoy Little Lake further diminishes. The economic consequences for a small town like Wells in one of Vermont's less-prosperous counties cannot not be overstated.

Over the next few years, the LSCCF and friends of Little Lake will be watching carefully to see how this long-running saga unfolds. The Fund will be working hard to document any adverse changes and will be consulting with lake management experts across the country to build a case for the use of aeration and bio-augmentation. With time, we anticipate that the scientific literature on this subject will catch up with the practical steps people are currently taking outside of Vermont. We trust that the DEC will be willing to consider new approaches, if the crisis we see unfolding in Little Lake continues to deepen.

How Can You Help? Most of the financial support for the LSCCF's work has come from the State of Vermont (through a harvesting program grant) and a grant from the Town of Wells. However, without members' dues and donations from members and friends of the lake, and the encouragement of all those who enjoy the joy of living and boating on Lake St. Catherine, the Fund's work would not succeed. **Please join the LSCCF and help us secure the lake's future.**

For more information, please visit our website, lakematters.com. You can also contact us at lakematters@aol.com or at:

**Lake St. Catherine Conservation Fund
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