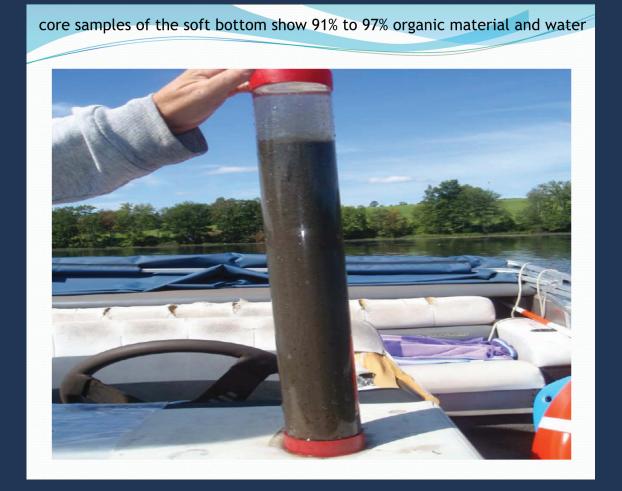


OUR ORGANIZATION



The LSCCF is a 501 c3 nonprofit, 100% grassroots, volunteer organization. For the past 10 years, our organization has been devoted to researching and implementing holistic, sustainable, environmentally-friendly technologies for lake restoration in an effort to not only reverse the effects of eutrophication in Little Lake Saint Catherine in Wells, VT, but also to find alternatives to risky, toxic, unsustainable chemical treatments – and we have had a successful, albeit limited, system running in the lake for the past six years.

The reason I am here today is because the Department of Enivironmental Conservation has given us STRONG indications that they will not be renewing our permit and intend to shut our whole project down.

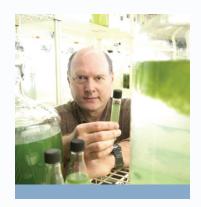


A QUICK HISTORY OF THE LAKE ST CATHERINE CONSERVATION FUND

RESEARCH AND TESTING TO BETTER UNDERSTAND OUR CHANGING LAKE ECOLOGY:

- core sampling and analyzing
- water quality monitoring
- dissolved oxygen monitoring
- extensive depth measuring to the hard bottom of the lake and top of sediment (which in much of the lake is 30 to 40 feet thick)

We've been working with leading scientists

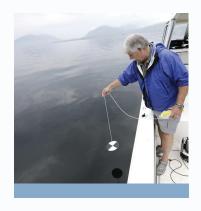


WAYNE W.
CARMICHAEL, PHD

Professor Emeritus of Biological Sciences, Wright State University



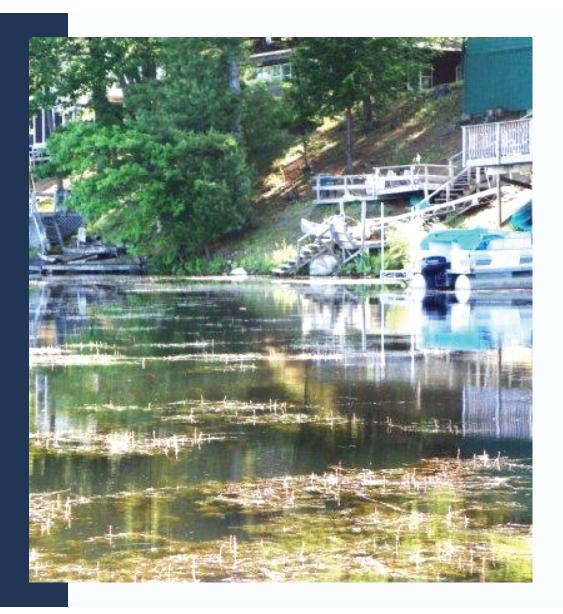
DR. JENNIFER
JERMALOWICZJONES
Limnologist, Certified
Professional
Watershed Manager

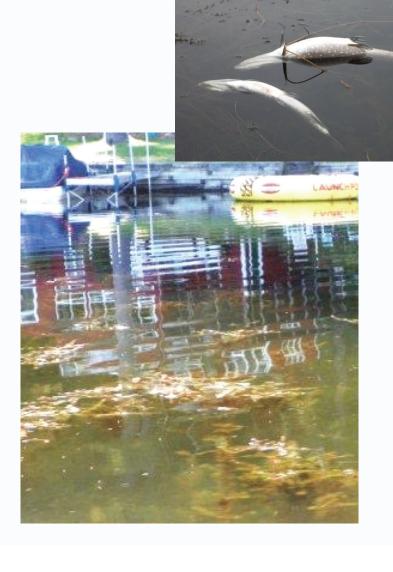


Research scientist with
the Darrin Fresh Water
Institute's laboratory on
Lake George in Bolton
Landing, New York

Additionally, we have worked with Dr. Alex Horne, Dr. Ken Wagner, and many others.

It was obvious to those of us who have lived on the lake for decades that as early as 2004 the lake was suffering, filling in, and indeed feeling the stresses of eutrophication and our data now showed that our concerns were correct and that Little Lake would greatly benefit from new advances in lake bio augmentation...





EUTROPHICATION LEADS TO...

- loss of navigation,
- loss of swimming
- loss of spawning areas for fish
- reduction of fish variety, health and size due primarily to low D.O. (Dissolved Oxygen)
- foul smelling water
- fish-kills
- epidemic level of submerged vegetation, largely the vicious invasive species Eurasian Water Milfoil
- and the overall degrading of the lake environment

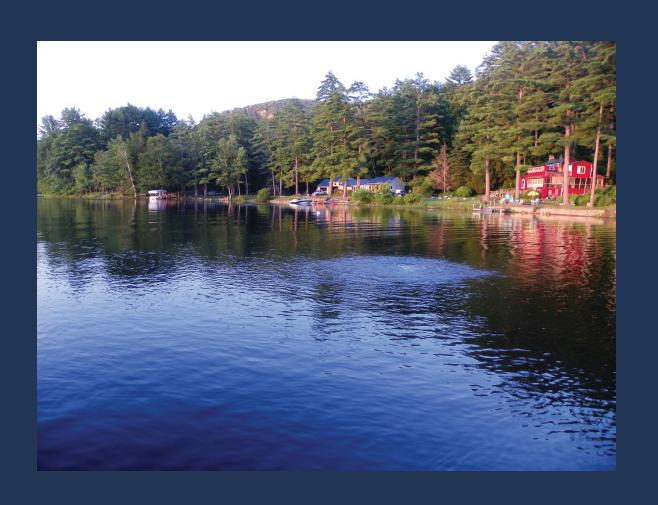
These are the exact kinds of problems that fall under the Public Trust Doctrine that the DEC is entrusted to manage for our lakes and rivers.

OUR RESEARCH LED US TO:



Cleaning Water Biologically Since 1970

A PENNSYLVANIA COMPANY WITH A SOUND TRACK RECORD OF SUCCESS IN REVERSING EUTROPHICATION AND ALL OF ITS SYMPTOMS



THIS SCIENCE-BASED COMPANY

is leading the field in reversing eutrophication in lakes around the world.

Armed with our new understanding of these modern technologies for reversing the effects of eutrophication, we urged Vermont DEC to engage with and understand what this innovative company was doing and we applied to implement their multi-pronged solution at Little Lake St Catherine in the spring of 2011.

The DEC denied us permission to implement these new innovations, which in their full form include the use of EPA-approved beneficial microbes and organic enzymes along with an oxygenation system. It's kind of like a probiotic for your ailing lake.

Under sustained pressure from the LSCCF and some political friends, the DEC eventually relented and issued us a permit (in early 2012) for a partial implementation of one part of the solution which is an oxygen restoration system which the DEC categorized as "aeration". The total bio-augmentation solution is much more than simply aeration.

We knew from conversations with the engineers at Clean-Flo that installing one of three components of a total solution in only 10% of the lake was unlikely to deliver the results that we hoped for.



Nevertheless, in hope of beginning down the road for a long-term, natural, holistic solution to the problems that plagued our Little Lake, as a community we raised the funds needed to do what DEC would let us do. With 100% volunteer labor, the LSCCF installed the system according to the manufacturer's specifications.

This was July of 2012.



AN IMPORTANT POINT

The work we are doing on Little Lake has the full support of the residents of the town of Wells, not only with their words of praise for the improvements they've seen in the lake, but also with their tax dollars. The voters of Wells have voted six years in a row to help fund our projects to the tune of over \$110,000, and our membership and directors have contributed over \$142,000 out of their own pockets to keep this and other projects running. That's a quarter of a million dollars in local funding.



HEART OF THE COMMUNITY

More than 150 homes line the shores of our lake, and lake residences make up the majority of the property tax base for the Town of Wells. Little Lake is also home to the Town Park with kayak launch, beach, and swimming area. Without question, the lake draws tourism from NY,CT, NJ, MA, and other surrounding states and is the economic heart of the community.

TIME DEPTH TURBIDITY NE 6 May 14 0.21 CLEAR NW 0.21 CLEAR 54 6 May 14 11:03 0.5 12.1 6.3 SE 0.22 CLEAR 54 6 May 14 11:06 0.5 12.6 6.6 SW 6 May 14 11:09 0.5 14.1 7.1 0.24 CLEAR 54 S CTRL 6 May 14 11:13 0.5 13.1 7.0 0.21 CLEAR 54 NE 10 May 14 12.9 0.23 CLEAR 54 1:15 0.5 5.6 NW 0.22 CLEAR 54 10 May 14 0.5 0.24 CLEAR 54 SE 10 May 14 1.20 0.5 14 1 6.8 SW 10 May 14 1:25 0.5 12.4 5.2 0.23 CLEAR 54 S CTRL 10 May 14 1:30 12.8 5.9 0.24 CLEAR 54 0.5 0.33 CLEAR 15 May 14 12:30 0.5 15.8 6.1 68 15 May 14 12:32 17.2 0.33 CLEAR 68 0.5 6.6 15 May 14 12:34 0.32 CLEAR 68 0.5 16.4 SW 0.28 CLEAR 68 15 May 14 12:35 0.5 14.8 5.2 S CTRL 15 May 14 12:40 0.5 15.7 6.6 0.29 CLEAR 68 18 May 14 1:15 0.5 30.2 12.4 0.31 CLEAR 67 NW 18 May 14 17.9 0.29 CLEAR 67 1:16 0.5 6.4 18 May 14 1:17 0.5 20.5 6.6 0.35 CLEAR 67 SW 18 May 14 1:20 0.5 16.7 5.9 0.29 CLEAR 67 S CTRL 18 May 14 0.34 CLEAR 67 1:22 0.5 22.0 7.1 71 19 Jun 14 11:00 0.5 18.2 9.1 0.35 CLEAR NW 19 Jun 14 12:00 0.5 17.4 8.9 0.31 CLEAR 71 19 Jun 14 13:00 0.5 20.9 9.1 0.31 CLEAR 71 0.30 CLEAR 71 19 Jun 14 0.5 19.7 S CTRL 71 19 Jun 14 15:00 0.5 19.5 9.1 0.30 CLEAR 21.6 0.36 CLEAR 15 Jul 14 13:00 0.5 8.9 NW 15 Jul 14 0.33 CLEAR 13:01 0.5 19.2 9.4 15 Jul 14 13:03 0.5 18.5 8.4 0.49 CLEAR 15 Jul 14 13:05 21.6 9.4 0.55 CLEAR 0.5 S CTRL 15 Jul 14 0.53 CLEAR 13:10 0.5 8.2 0.45 CLEAR NE 21 Aug 14 12:00 0.5 16.2 8.7 NW 21 Aug 14 12:00 0.5 16.3 8.4 0.44 CLEAR SF 9.0 0.45 CLEAR 21 Aug 14 18.3 0.46 CLEAR 21 Aug 14 12:00 0.5 16.3 8.4 21 Aug 14 12:00 0.5 15.7 8.4 0.44 CLEAR

East side soft bottom depth

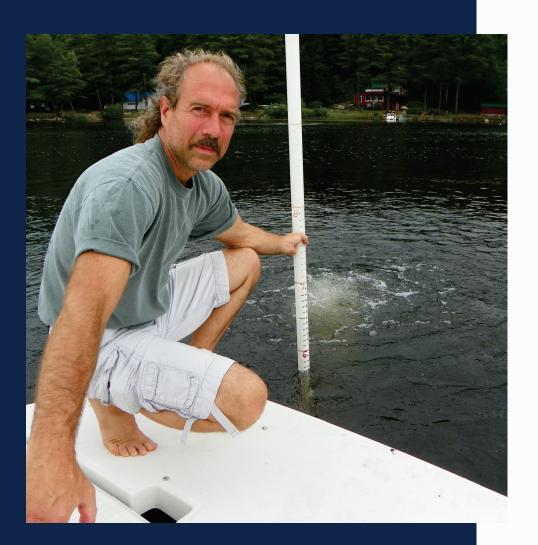
West side soft bottom

Hard bottom depth

SOME FACTS ABOUT THE PROJECT

According to the DEC permit that we were issued, we were required to do the following extensive data collection and monitoring weekly, including but not limited to:

- Suspended solids
- Total Phosphorus
- Nitrogen
- Chlorophyll
- Dissolved oxygen
- and, of course, depth readings at all 12 diffuser locations as well as 4 mid-point locations within the aeration zone, and one control point several hundred yards outside of the aeration zone.



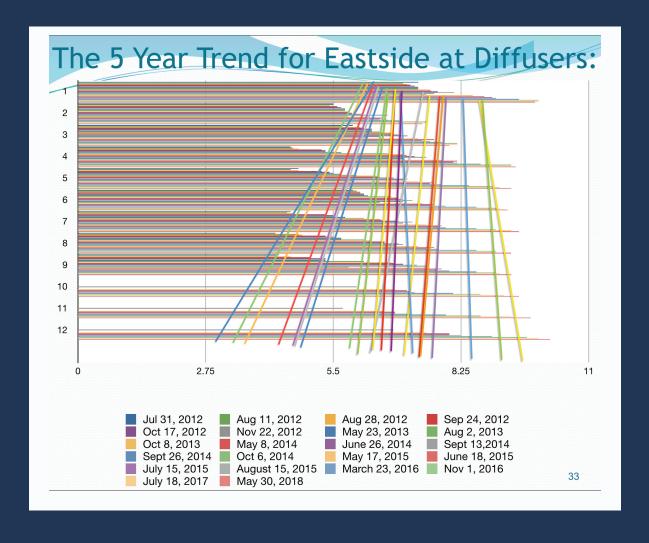
DATA COLLECTION

In total we monitored over 32 data collection points on a weekly basis for the first few years, and then we were allowed to monitor monthly. This required an enormous effort with hundreds of volunteer hours.

There is probably not a larger collection of data points on any other lake in Vermont – except maybe Lake Champlain.

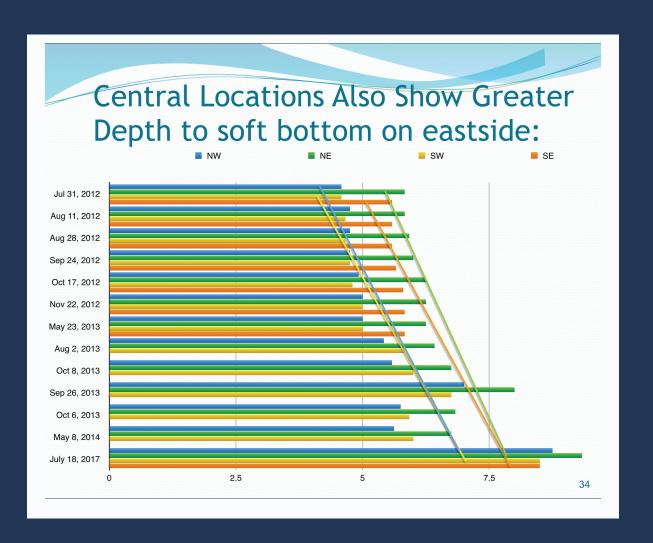
OUR OBJECTIVE

was to accelerate the rate of decomposition and deepen the lake. As you can see, our data shows that the project is achieving its stated objective.



GAINED SIGNIFICANT DEPTH

Here is a look at our depth readings - charted out over a sixyear span, as you can clearly see we have gained significant depth in the aeration zone, an average of 54 inches at diffuser locations and an average of 49.5 inches at the midpoint locations (which are approximately 100 feet away from any of the diffusers.)



DEC APPROVES EXPANSION

In 2015 we applied for and received a permit from the DEC for an expansion of the system to the west side of Little Lake. In this new permit, the DEC sited multiple times "there have been no negative environmental impacts from the east side aeration project."

As our data clearly showed, the aeration systems were not causing any negative impacts to the lake environment, and clearly the lake was getting deeper.

- cumulative impact. The diffusers and airlines are located on the lake bottom and will be installed with weights to ensure the system remains in place and does not interfere with public uses. The visible bubbles and upwelling on the surface of the lake will also be limited to this portion of Little Lake directly over the aerators. The proposed project will not have an adverse cumulative impact when considered with other existing encroachments and other uses on Little Lake.
- Public Good Analysis Summary 29 V.S.A. § 405(b): The project will have no anticipated negative impacts on water quality, fish and wildlife habitat, and aquatic and shoreline vegetation. The project will have an anticipated positive impact on navigation, recreation, and other public uses. The project will have temporary minimal impacts on the natural surroundings and will have no adverse cumulative impacts. Overall, the proposed project will not adversely affect the public good.
- Public Trust Analysis: The public trust doctrine requires the Department to determine what public trust uses are at issue, to determine if the proposal serves a public purpose, to determine the cumulative effects of the proposal on the public trust uses, and to balance the beneficial and detrimental effects of

the proposal. The public trust uses relevant to this proposal are fishing, boating, swimming, navigation, and environmental research related to the use of aeration as a potential site specific lake management strategy to reduce accumulated sediment as a way to reestablish previously accustomed public trust uses. There is a potential that the project will negatively impact public trust uses in the project area due to the visual disturbance of the water surface, thereby causing the public to avoid the area. This potential should be lessened by the posting of an informational sign at the public boat launch and by providing residents and users of Little Lake information regarding the project. The project will provide useful information to the permittee and Department regarding the effectiveness of this management technique to increase the decomposition of organic sediment to increase water depth in select areas where use has been impeded by accelerated organic sediment accumulation. If the project is successful in achieving its purpose, there will be a positive impact to the public trust uses that are relevant. The Department has therefore determined that the project is consistent with the public trust doctrine.

An important point about depth measurements:

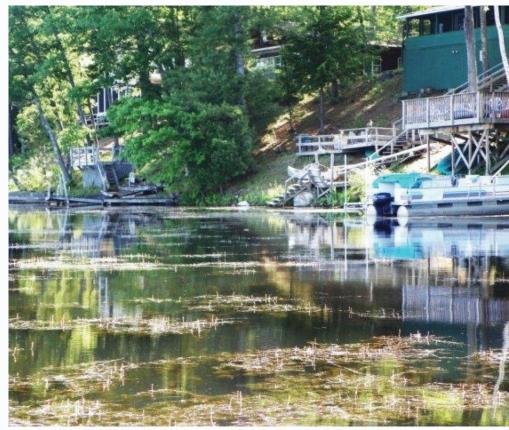
The depth measurements taken by the LSCCF are the ONLY depth measurements ever taken on Little Lake that have a benchmark reading as a point of reference of lake water level on Lake Saint Catherine. Historically, Lake St Catherine's water level has fluctuated as much as 2 feet.

Consequently, any lake depth measurements without a benchmark measurement are worthless for determining accurate lake depth at any given point in time, or change in lake depth over time.

BEFORE AND AFTER

AERATION

JULY 2011 JULY 2014





BEFORE AND AFTER

AERATION

JULY 2011 JULY 2014





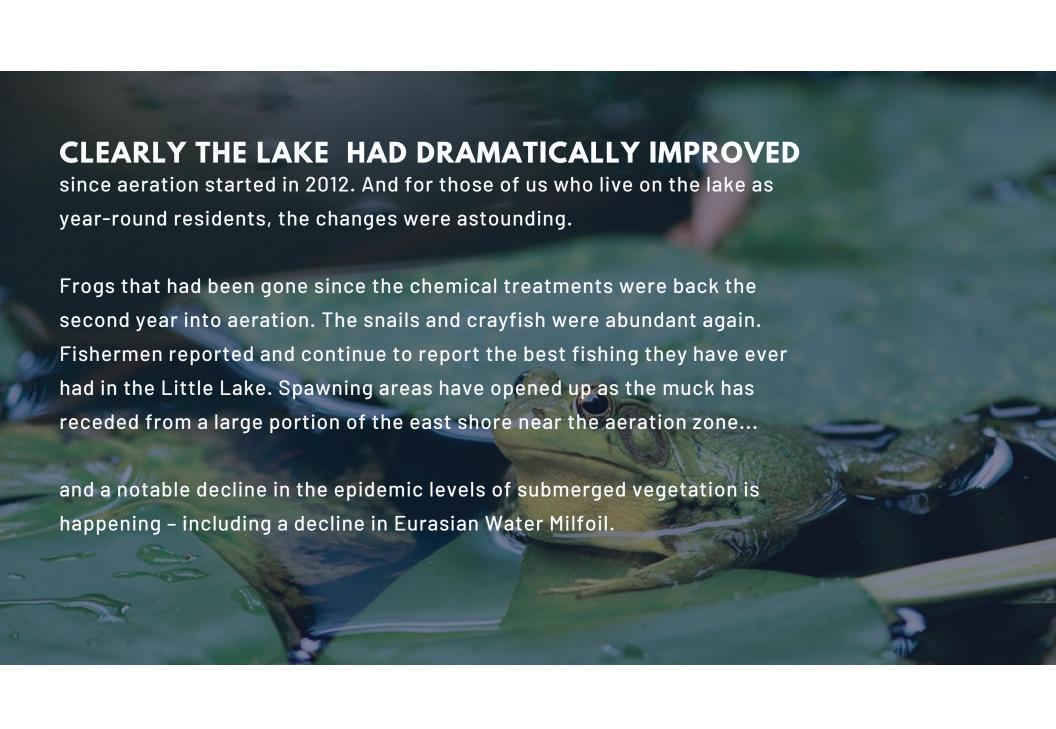
BEFORE AND AFTER

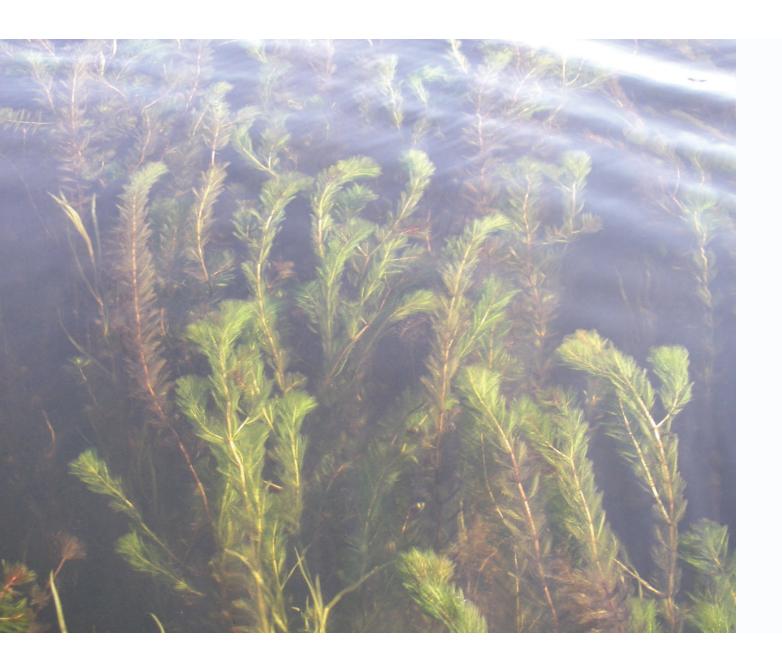
AERATION

JULY 2011 JULY 2014









Could aeration
actually be causing a
decline in Eurasian
Water Milfoil?
We wanted to know
what the scientists
had to say about that.



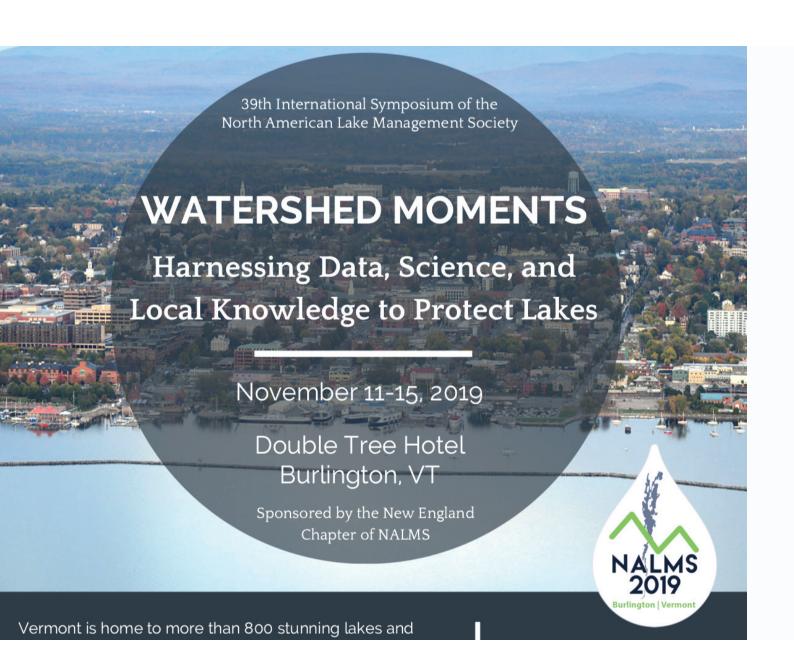
WE DOVE INTO FURTHER
RESEARCH
to find evidence of the effects of aeration on the

reduction of Eurasian Water Milfoil. And what did we find? We found Dr. Jennifer Jermalowicz-Jones, of Restorative Lake Sciences Spring Lake, Michigan. Dr Jones is a Professional Limnologist, and a Certified Professional Watershed Manager.

For over a decade, Dr Jones has been studying laminar flow bio-augmentation technologies and its effects on not only muck reduction but also its impact on the reduction of Eurasian Water Milfoil.



Dr. Jennifer Jermalowicz-Jones, LimnologistCertified Professional Watershed Manager



Dr Jones is also a scheduled speaker at this year's North American Lake Management Society conference to be held in Burlington, VT speaking on this exact topic.

"Laminar Flow Aeration has proven itself as a useful lake improvement tool for reducing organic matter (muck) and also sedimentary ammonia in the sediments. The latter has led to a reduction in rooted EWM which utilizes ammonia as a key food source. In addition, removal of organic matter has led to increased water depths in previously shallowed areas. Laminar Flow Aeration is also showing great promise in water column nutrient reductions."



DR. JENNIFER L. JERMALOWICZ-JONES
PROFESSIONAL LIMNOLOGIST
CERTIFIED PROFESSIONAL WATERSHED MANAGER
RESTORATIVE LAKE SCIENCES

I have included a prominent lake study by Dr. Jennifer Jones that documents reductions in both lake sediments and EWM. I've previously shared these studies; as with other significant research the LSCCF has done over the years with DEC officials.

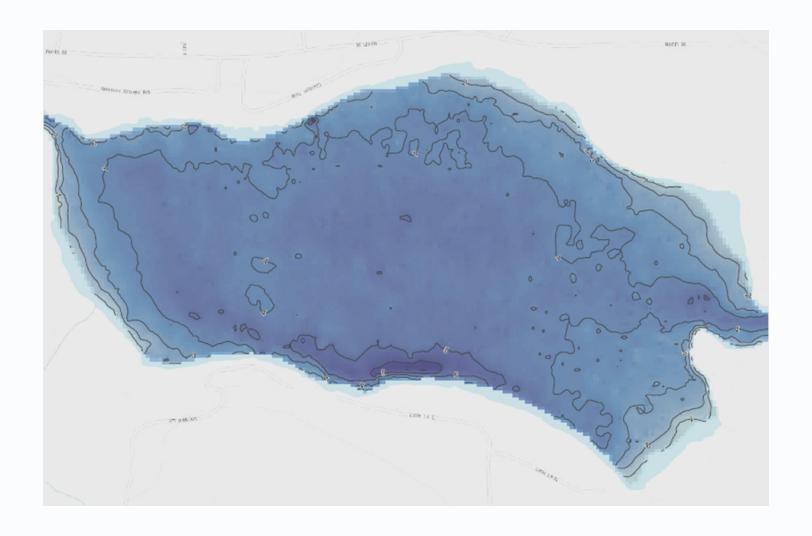
I urge this committee to encourage the DEC and ANR to investigate this research. In my humble opinion, it is unconscionable to continue to rely on risky chemicals for combating EWM when clearly there are promising alternatives that need exploring, and a pilot project – albeit with significant DEC-imposed limitations – has been underway in Little Lake for the past six years...

Yet no one at the DEC or ANR seems interested in participating in this research.

DEC claims that the aeration project on Little Lake is not producing results – is not deepening the lake – and is not having a positive effect on Little Lake.

And since the DEC did not do any of the weekly, monthly, or yearly data collection and observation, they base their claim largely on a sonar scan that was done by the DEC in 2018...

Here is an image of that scan.





BioBase Automated Mapping

Interpreting bottom hardness in shallow lakes and ponds: digging deeper into the data



biobasemaps

May 1, 2017

BioBase, composition, EcoSound, grid, hardness BioBase's EcoSound bottom composition (hardness) algorithm has become quite popular for researchers and lake/pond managers to determine where sedimentation from the watershed may be occurring. However, interpreting sonar returns in shallow environments (e.g., less than 7 ft or 2 m) with off-the-shelf sonar is challenging, especially if aquatic vegetation is present. Each situation is different and the objective of this blog is to

DIFFICULTY OF USING SONAR SCANS IN SHALLOW LAKE ENVIRONMENTS

There are a couple of critical problems with this DEC scan. First, the BioBase automated Mapping Cloud Platform used to create this map has quite a lot to say about the inaccuracy of the sonar scans in shallow lake environments in their operator literature. I've included a more detailed report, from the company, in my submission.

"Just like regular statistical models, the type, quality, and amount of data going into the interpolation model determine the quality and accuracy of the map output. So, if you can't get a good sonar reading in a shallow, weedy bay, EcoSound may automatically "cleanse" the sonar return data during processing and the map produced (if any) may be based on insufficient input and not accurate. There are a variety of reasons why data may be cleansed by EcoSound and one of those is over vegetation greater than 60% biovolume."

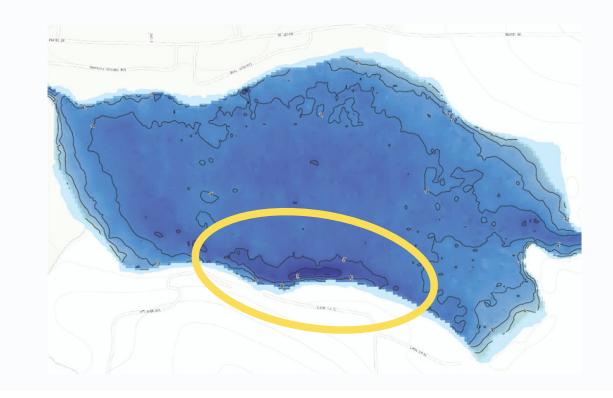




The second critical problem with this map is that there was no benchmark reading taken the day of the scan – or ever, for that matter – by the DEC. Therefore, this map is virtually worthless (unless you want to assume that BioBase's internal algorithm interpreted enough data points to extrapolate some kind of general measurement to soft bottom... even though we know we had a lake full of vegetation at the time of the scan.)

But if we do make this leap of faith, we can use this map to compare some parts of the lake with others and we can certainly see if any parts of the lake are deeper; and, lo and behold, we find that the east side aeration zone area is the deepest part of the Little Lake, according to the DEC scan (6 feet of depth in much of the aeration zone.)

This yellow circle shows the area where the aeration system has been in operation for six seasons. It's pretty obvious to see where the deepest part of the lake is. The deepest contours, according to the DEC scan, are 6 feet.

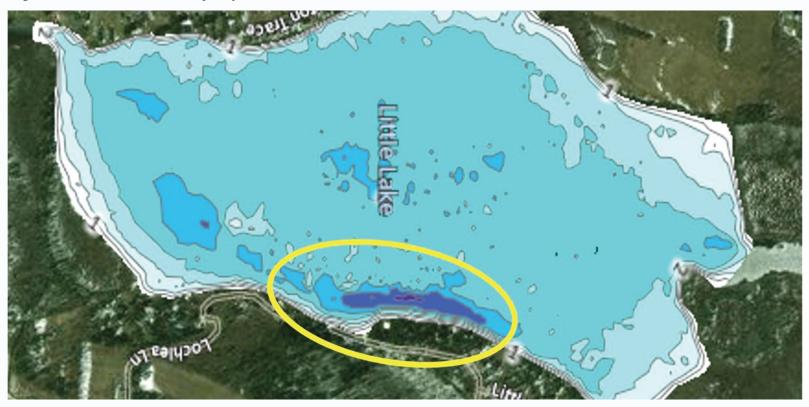


Yet, the DEC claims that the aeration system in Little Lake St. Catherine is not having any positive effect, and the lake is not getting any deeper.

They have gone on to say in correspondence with our association that they have historical data that shows that Little Lake has always been a 4 and 5 foot deep lake and it still is a 4 and 5 foot deep lake.

In response to their inadequate scan, the LSCCF contracted with an experienced BioBase mapping company to have an accurate scan done under the proper conditions.

This scan was done just eight days ago, right after ice-out, when you have the least amount of vegetation in the water column. Prior to the scan, a benchmark water level reading was taken at the concrete dam abutment at the south end of the lake. This scan can now be used going forward as an accurate BioBase scan that is in itself a benchmark to measure future change against. The LSCCF will be doing these scans every April.



Here is specific data from the bathymetric survey that was completed just 8 days ago, that shows that depths of over 7 ½ feet have been achieved.

Record	Longitude	Latitude		DepthInFeet
84105	-73.2009	43.432	1	-7.63167
84175	-73.2009	43.43	5	-7.6290922
84035	-73.2009	43.43 2	7	-7.623621
83860	-73.2009	43.43 1	8	-7.589838
84070	-73.2009	43.43	9	-7.5465035
83895	-73.2009	43.43 1	9	-7.5121307
84245	-73.2008	43.4. 2	4	-7.4832702
57540	-73.2007	43.432	9	-7.4817376
57505	-73.2007	43.4321	7	-7.4702663
84210	-73.2008	43.43238		-7.4498081
84280	-73.2008	43.43242		- 40065 3
57575	-73.2007	43.43221		-7.3557801
84140	-73.2009	43.4323	3	-7.3255625
115675	-73.2008	43.4318	3	-7.3180199
115570	-73.2008	43.4317	4	-7.3046875
57470	-73.2007	43.4321	3	-7.2860298
57645	-73.2007	43.4322	8	-7.2599707
84315	-73.2008	43.4324	4	-7.2321606
84420	-73.2008	43.4325	1	-7.2291331

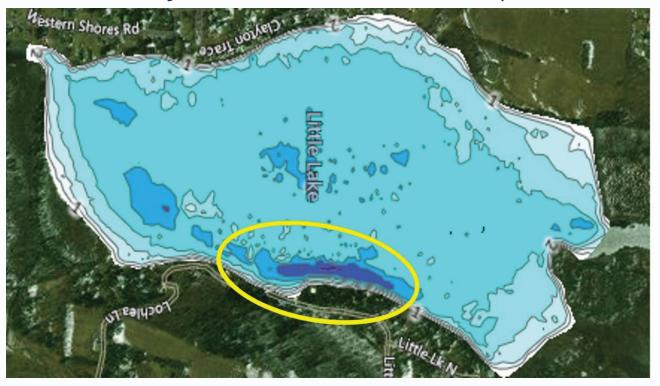
As you can see, this eightday-old scan shows that we have depths of over 7.5 feet in the aeration zone. As DEC has pointed out, this lake has been documented to be 4 and 5 feet deep for decades.

With 7 foot readings in the aeration zone, clearly the aeration project is deepening the lake.

A BIT MORE ON THE BIOBASE SYSTEM

It is vital to understand that sonar scans of shallow lakes will never give you accurate numbers in a soft bottom environment. It is not until you have a substantial hard bottom that you will have true bottom readings in a shallow lake. See the report on

BioBase mapping included with my submission. The usefulness of the BioBase map that the LSCCF has produced is for going forward. We now clearly have a benchmark map to work from and can measure progress with this state of the art technology.



In light of DEC's claims that "aeration doesn't work" and rather than argue about Phosphorus and "aeration" and reversing the effects of eutrophication with VT DEC, we decided to seek the opinion of the top expert in the world on Cyanobacteria.



PROFESSOR WAYNE CARMICHAEL

is recognized as the top global expert in Cyanobacteria and it was he who first established that Cyanobacteria were the organisms responsible for producing toxins.

INTERNATIONAL CONFERENCE ON TOXIC CYANOBACTERIA

Professor Carmichael is the founder of the International Conference on Toxic Cyanobacteria and staged and hosted the first three conferences at Wright University in Ohio. He has consulted to CDC, United Nations, World Health Organization, etc.

He cannot be here today because he is in Europe preparing for the 11th International Conference on Toxic Cyanobacteria.



The theme of this year's ICTC 11 is:

"Learning from the past to predict the

The event also includes excursions and off-site visits participants a wider insight about the heritage of Kraroyal capital city of Kraków is the spiritual centre of F. Kraków S. Old Town, along with Wawel Castle and the their place on the First World Haritage List created the control of the control of

We sent Professor Carmichael a copy of the VT DEC's 2019 report titled "Aeration as a Lake Management Tool and Its Use in Vermont" and asked his opinion.					
He sent a written response in view of his commitments in Poland at the ICTC.					
I've included his full letter in my submission. Please take a moment to read his full response.					

SOME OF PROFESSOR CARMICHAEL'S KEY REMARKS

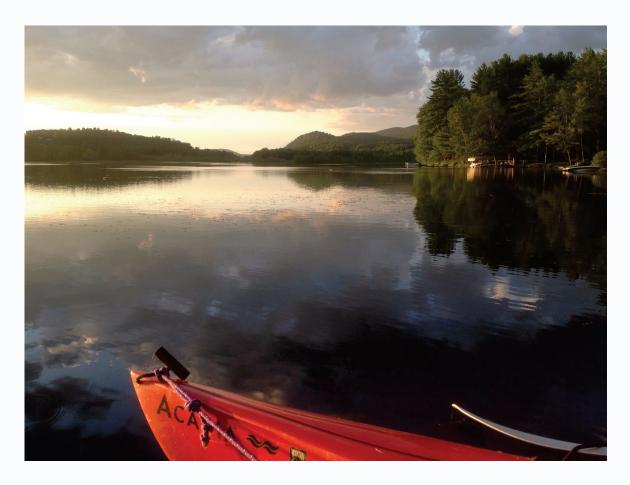
"I do not agree that there is no support for air flow methods that lead to reduction of accumulated organic matter on a lake's bottom (page 5, paragraph 4 of DEC's report). There are methods using air/water flow, complemented with bioaugmentation that will reduce and remove lake sediments and that will meet all 7 criteria, for permitting future aeration projects, as given on page 31 of the VT DEC (Jan 2019) document."

"Eutrophication is a whole lake process. It is multi-faceted, with numerous factors that can drive the process. Attempts to manage eutrophication that are focused on just one or two factors, and/or are not implemented on a whole lake basis are ineffective."

"One of the end results of failure to reverse eutrophication will be reduced water quality leading to cyanoHAB dominance. This is evidenced by significant examples such as Lake Erie and Lake Tai in China. Failure to mitigate eutrophication resulted in the Toledo situation in 2014. Similar fates will most likely occur in Lake St Catherine and Lake Carmi."

SO WHAT DOES THIS ALL MEAN?

It means this: there are new, innovative, modern-day solutions to the consequences of eutrophication being successfully used around the world and around this country, and the 180-acre water body known as Little Lake Saint Catherine has been running a successful project testing a portion of these new technologies for the past six years with extremely positive results.



MOVING TOWARD THE FUTURE

In the coming weeks, the LSCCF intends to file an application with the DEC for a continuation and expansion of the aeration project on Little Lake, and our request of this committee is for your full support of this application.

Oxygenation with bioaugmentation is clearly reversing the effects of eutrophication in water-bodies around the world. There is a lot more for the DEC to learn about these promising technologies and Little Lake is a great place to learn it.

We urge this committee to recommend to the DEC that the aeration project in Little Lake be allowed to continue; and, furthermore, that this project be turned into a complete, whole-lake bioaugmentation project for the purposes of tracking this new technology's ability to reverse the negative effects of eutrophication and its end point Cyanobacteria – and, if indeed, the added benefit of ammonia denitrification in lake sediments is responsible for dramatic reductions in EWM populations.



JOINTLY MONITORED

We propose that this project be monitored by a collective effort from DEC staff, scientists like professor Wayne Carmichael and Dr Jennifer Jones, LSCCF volunteers.

LOCALLY FUNDED

The LSCCF and the residents of the Town
Of Wells and others are committed to

raising the funds for this project.





VERMONT CAN LEAD THE WAY

Little Lake has the potential to be a shining jewel for the State of Vermont to hold up as the way of the future for lake restoration, cyanobacteria mitigation, and EWM reduction. Let Vermont lead the way for holistic, sustainable, environmentally-friendly lake restoration, and lake management. And let us leave a legacy to our children and grandchildren of clean, healthy lakes that can be enjoyed for generations to come.

PLEASE STOP THEM FROM SHUTTING US DOWN.

I appreciate your time today.
Please dig into the extra information
I provided for you with my
presentation. I promise you, there
are things in there you need to read.

l am available for any and all followup at dave7vt@gmail.com and by phone at: 802-236-2566

I'll be happy to answer any questions, either now or via phone or email.

