

**Lake Champlain Basin Program
Technical Advisory Committee meeting
Wednesday, April 3, 2024, 9:00 AM – 12:30 PM
Held remotely via Microsoft Teams**

Approved TAC meeting summary

TAC Members: Jennifer Callahan, Laura DiPietro, Bryan Dore, Laurie Earley, Michele Fafette, Peter Isles, Neil Kamman, Steve Kramer, Margaret Murphy, Bridget O'Brien, Helen Polanco, Andrew Schroth, Jamie Shanley, Daniel Tremblay

LCBP + Lake Champlain Staff: Mae Kate Campbell, Kelsey Colbert, Eric Howe, Meg Modley, Matthew Vaughan, Sarah Coleman, Sarita Croce, Erin Vennie-Vollrath, Theresa Vander Woode

Guests: Kelcie Bean, Todd Chaudhry, Lori Fisher, Lizzy Gallagher, Chip Gianfagna, Claire Madden, Kellie Merrell, Tim Mihuc, Luke Myers, Colette Ward

1. Updates, announcements, public comments

- Peter (VT DEC): We just received the draft results of the feasibility study on Lake Carmi. The study recommends alum treatment and estimates the cost at \$2.6 million. The intervention can be spread out in 2 treatments with up to 5 years in between. The expected length of efficacy is 7-25 years depending on external control factors.
- Margaret (VT FWD): The State of the Lake Fisheries meeting was rescheduled to this coming Saturday (4/6) at the Whallonsburg Grange in Essex, NY.
- Steve (Miner Institute): We are working with the organization Mesonet and they have a LiDAR setup on our property for the eclipse.
- Neil (VT DEC): There are several bills moving through the general assembly of interest to this group. Senate Bill S.213 establishes statewide zoning for river corridors and floodplains. The legislature is considering a study to examine State implementation instead of municipalities. The draft bill establishes a requirement for net gain of wetlands and codifies requirement to do wetlands mapping and updated wetlands map. It includes substantial changes to dam safety regulations in VT which would expand the jurisdiction of the dam safety program. The proposal includes increased funding for unsafe the dam fund, which would allow owners to do risk reduction projects quickly if hazards arise.

LCBP updates

- Matt (LCBP) The Executive Committee reviewed TAC's recommendation for the FY24 research proposals and forwarded the recommendation to the Steering Committee for review at their April meeting. We are working to get projects that were approved last year off the ground for this spring season. LCBP staff are working hard on the *State of the Lake* report. The Executive Committee reviewed some updated graphics at their March meeting. We have a deadline of this Friday for completing all text and draft versions of graphics. The report will be released on 6/5 and all TAC members are invited to that event.

Review and approve summary of previous TAC meeting

Motion: To approve the summary from the March TAC meeting

By: Jenn

Second: Margaret

Vote: All in favor

Abstentions: Jamie

2. **Interim report and workplan: Lake Champlain Long-term Monitoring Program** (Dr. Peter Isles, Kelsey Colbert, VTDEC, Dr. Tim Mihuc, SUNY Plattsburgh)

- Peter reviewed the methods and recent data trends from the Long-Term Monitoring Program (LTMP), and Kelsey reviewed sampling details from the 2023 season.

Highlights include:

- The program QAPP was revised in 2023 and is valid for 5 years.
 - 2023 was a wet year which offered many opportunities for high-flow condition sampling, however, base flow conditions were more difficult to obtain.
 - Monitoring targets were exceeded for all lake parameters; some tributary monitoring targets were not met due to the difficulty in obtaining base flow samples.
 - Several tributaries had their highest cumulative discharge on record, like the Winooski and Little Chazy.
 - The high-frequency monitoring project (buoys) worked well apart from difficulties with the nitrate sensor in the Mallets Bay buoy. The buoys collected data during the July 2023 flood event.
 - A comparison of phosphorus measurements on the new and old lab instrument at the Vermont Agriculture and Environmental Laboratory found no significant differences between the results.
 - A new study was published by Dr. Peter Isles using LTMP dataset to test a random forest approach to improve estimates of tributary nutrient loading.
 - An additional buoy is planned to be deployed in the Northeast Arm this field season.
- Neil: Are there alternative sensors that would better suit the low nitrate concentrations we observe in our tributaries?
 - Peter: We calibrate the sensor for low concentrations. The equipment was calibrated two times a day in some cases and the readings remained unreliable. Nitrate grab-sampling was added to the QAPP. We may keep it in this year and work to establish a site-specific calibration when we maintain it. We can consider making changes to the QAPP for the next sampling season.
 - Andrew: The sensor could be swapped to a location where we expect higher nitrate concentrations. Other monitoring groups have experienced issues with this sensor.

- Tim: A graduate student at SUNY Plattsburgh completed a phytoplankton analysis from 1970-2000s and up through last 5 years using LTMP data. I hope to get a presentation on that work set up for a future TAC meeting.

3. **Interim report and workplan: Lake Champlain Cyanobacteria Monitoring Program** (Dr. Peter Isles, VTDEC)

- Peter introduced the program and provided highlights from the 2023 monitoring season, including nearly 3,000 reports from volunteers and staff. 2023 was overall a strong bloom year. There were major blooms in St. Albans Bay and Lake Carmi. Peter reviewed monitoring protocols and bloom categorization methods. Malletts Bay had a large amount of low-alert blooms, and the inland sea and northern Main Lake had higher proportions of high-alert conditions for routine reports than in previous years. St. Albans Bay had the highest proportion of high-alert routine observations this year compared to previous years and other lake regions. For the cyanotoxin monitoring program, there were 2 detections above the recreational limit and a number of detections in raw drinking water, but none in finished water. There are no major changes to the program anticipated for the 2024 monitoring season. The cyanotoxin monitoring program will be expanded due to increased funding utilizing National Oceanic and Atmospheric Administration (NOAA) funding. Plans are being made for increased satellite observations of bloom even.
- Lori: We'd like to re-convene regular meetings during the summer with NY agencies. We are still working on increasing participation, particularly in Quebec. The monitoring program was focused on visual assessments and planktonic species, but we've been observing an increase in benthic blooms which is a gap we are not sure how to fit into our assessment protocols. We are excited to see potential research get underway through the LCBP research process.
 - Peter: It would be great to get samples from benthic blooms and the overlying water column to test for toxicity.
- Neil: Do you have a dynamic where most of the volunteers are going out there on the same day of the week?
 - Lori: We ask monitors to select a specific day of the week to endeavor to have the program as unbiased as possible. When the Lake Champlain Committee (LCC) vets the reports, we look at if it's a monitor's routine day or supplemental. When a bloom occurs, we ask monitors to check back after their routine day to document the length of time the bloom occurs, but reports not submitted on their routine day are logged as supplemental.
- Neil: On the wastewater treatment facility total phosphorus discharge numbers presented in the report, I noticed you present the flow-weighted concentration, but I was unable to find the data by facility on the site. Does the site typically let you access the facility-level data?
 - Mae Kate: That level of data detail is not typically accessible by the public, but LCBP and state partners can provide them upon request.

Motion: To approve the 2023 annual reports (pending minor updates as noted by the authors) and upcoming workplans for the LTMP and Cyanobacteria Monitoring Program

By: Jenn

Second: Laurie

Vote: All in favor

Abstentions: Peter Isles

4. **Update: Boat Launch Steward Program (Meg Modley Gilbertson, LCBP)**

- Meg reviewed a summary of the 2023 monitoring season. LCBP deployed 18 stewards in 2023, covering NY north of Wilcox Dock and sites in Vermont and Quebec. There have been no new introductions of aquatic invasive species since 2018. Meg reviewed the training program content and the number of surveys conducted over the 2023 season. 2023 featured an interception of the invasive plant hydrilla, which is not present in Lake Champlain, coming from a boat in Texas.
- Neil: There are DEC greeters, LCBP stewards, and other organizations have greeters as well. What's the crossover in training?
 - Meg: Vermont grant-in-aid program funds a requested percentage for greeters in Vermont. LCBP also provides funding for greeters in the Lake Champlain Basin. Many greeters go to VTDEC training programs. The steward program is a bit more in-depth since it involves the decontamination station training. I would love to see an educational institution, or the state, pick up training for all these programs to make it more uniform and in-depth.
- Lori: I wanted to give a shout-out, I think one of the strengths of the Boat Launch Steward program is how willing Meg and Lauren are to integrate into other programs. LCBP stewards are trained by LCC for the cyanobacteria monitoring program and aquatic invasive patroller program. It strengthens all programs and utilizes staff who are already on the ground. Extremely valuable and collaborative, I appreciate that.

5. **Informational presentation: Overview of collaborate work by the Fisheries Technical Committee and lake trout management (Dr. Margaret Murphy, VTFWD)**

- Margaret introduced the presentation and co-authors on this work, including Bernie Pientka, Ellen Marsden, Nicole Balk, and others (UVM, USFWS, USGS, NYDEC, VTFWD). Lake Champlain supported an indigenous population of Lake Trout, but that population was rapidly depleted in 1800s and disappeared by 1900. Lake trout stocking started in the 1950s-60s with the goal of reestablishing the lake trout fishery by 1985. Sea lamprey control started in 1990. Stocked fish are fin-clipped on a 5-year rotation. Through 2019, the number of sampled fish that were unclipped was low, indicating low natural reproduction. Recent trawling data indicates successful recruitment of fry from natural reproduction to the juvenile stage. Additional sampling indicated increased wild recruitment at spawning locations. 2020-2023 data shows higher percentage of unclipped fish (10.1 - 27.3%). This met the criterion to reduce stocking levels.

Percentages vary among sampling locations. In 2024, stocking will be reduced to 50% of its original levels.

- Neil: thank you, so great to see these increases in wild fish! You've reduced stocking by 50%. What happens with the capacity at the Ed Weed Fish Hatchery?
 - Margaret: We could give them more capacity. Reduction to 41,000 is about two raceways (20,000 per raceway). We could drop it another 20,000. 33% of the stock was coming from NY, so it's not a huge reduction from VT yet.
- Meg: Is the plan to hold at this rate until a new metric is determined? 5-6 years?
 - Margaret: It probably won't be that long. We are now geared up to continue sampling if UVM cannot. It is important to make sure lake trout are still reproducing. If we see a missing year class, we may add stocking capacity. For the next two years we will be testing the impact of spring vs. fall stocking (fin-clipping to identify). Fin clipping might impact fish fitness, we don't know. Spring stocking may be more advantageous.

6. **Informational presentation: Overview of Atlantic salmon work and experimental brood stock** (Laurie Earley, USFWS)

- Laurie introduced the presentation: Re-establishing landlocked Atlantic salmon to the Lake Champlain Basin: Fisheries Assessment and Restoration Program. There was historically a large population of landlocked Atlantic salmon in the basin, however they were extirpated in the 1800s due to factors including dam construction, overfishing, and habitat degradation. The Lake Champlain Fish and Wildlife Management Cooperative was established in 1972 and focuses primarily on the restoration of salmonid populations and sea lamprey control. Due to current conditions in the Basin (including ineffective fish passage, continued habitat degradation, climate change, and invasive species), adaptive management is key to re-establishing a self-sustaining population of landlocked Atlantic salmon. Early results and accomplishments of the management program include: modified water management to increase the efficacy of hatchery rearing, research into thiamine deficiency complex following the introduction of the invasive fish alewife, documentation of the first successful reproduction in two rivers in 150 years, modification of fish bypass structures, and the evaluation of an experimental broodstock designed to increase the genetic population of low thiamine tolerant fish. More recent findings and results include the identification of a new stocking site to reduce avian predation, high angler satisfaction, and high returns in the Winooski River.
- Michele: Did you say that one angler took out 700 salmon in one year?
 - Laurie: Yes - last year. He's a retired individual who spends a lot of time on the water.
 - Michele: Is there a concern that anglers are going to out-strip the available capacity?

- Laurie: Many of these folks are catch-and-release fishers. There is a limit of 2 on the number of fish you can take per day.
- Neil: What was it about the Winooski 1 site that had so many gulls?
 - Laurie: It was a long-term site, and the years we were doing those counts steelhead were released a few weeks prior, so the gulls may have been cued in. This is a consistent problem with historic stocking sites across the nation.
 - Margaret: That release location also left fish a bit more vulnerable - they were unable to get deep quickly. The new site further downstream lets fish access deeper water and the lake more quickly.
 - Michele: Avian predation is quite prominent in the restoration industry. For instance, geese pulling out restoration plant plugs.
- Andrew: Is there a gold standard for a successful reintroduction of landlocked Atlantic salmon in New England, or are we setting the standard here in Lake Champlain?
 - Laurie: Lake Sebago has been able to continue to manage that fishery, and that's where we originally pulled fish from for our program. Lake Ontario is looking to us in Lake Champlain with their program currently. I can't think of a gold standard.
 - Margaret: There are few examples of success stories for landlocked salmon currently.

7. Informational presentation: Linking sediment and water column phosphorus dynamics to oxygen, temperature, and aeration in Lake Carmi and Missisquoi Bay (Dr. Andrew Schroth, UVM)

- Andrew: I will be focusing on data from Lake Carmi, since Missisquoi Bay data were previously presented to the TAC through another LCBP-funded project. Andrew shared a presentation. He reviewed sources of phosphorus loading to surface waters and drivers of internal loading. He then reviewed strategies for suppressing legacy phosphorus loading and the aeration system deployed in Lake Carmi. Data on dissolved oxygen and total phosphorus concentrations in the water column were collected prior to and during the aeration system implementation. Major effects of the aeration system included an increase in bottom water temperature, the onset of summer mixing events, and less stratification. The aeration system led to wind effects being the main driver between anoxic and oxygenated conditions, surface water concentrations are higher for longer in the summer due to more frequent mixing, and bottom water concentrations of iron and manganese were decreased.
- Peter: The feasibility study complemented the work done by Andrew and his team.
 - Andrew: If the alum treatment does happen, it will be such an interesting case study on this system.
- Jamie: Phosphorus release was still strong with aeration. Do you think this confirms your lab experiments that showed iterative anoxia caused increasing returns of phosphorus from the iron?
 - Andrew: You get rapid releases and then they get consumed. We have lots of cool synchrotron data with these samples, and one thing we saw in Carmi and our experiments is that when you have sustained anoxia, you start to precipitate

iron phosphorus minerals. It transitions to different minerals controlling bottom water phosphorus in more stable systems.

- Neil: We are inverting the pace of sediment diagenesis by doing this.
- Andrew: The other thing we are also doing is that those warmer temperatures increase the rate of organic mineralization, so you are also potentially increasing the lability of that phase independent of oxygen conditions.
- Matt: Could you talk more about what the physical mechanism of the aeration is doing to raise bottom water temperature?
 - Andrew: This one is mostly designed to mix the water column. You can oxygenate it without breaking down the thermal stratification by using an oxygen tank, which has been done in other systems.
 - Matt: Did you notice other temperature changes - if the bottom water is cooling upper parts of the column as it's mixing?
 - Andrew: It's cooled a little, but the more substantial change is the bottom water temperature.
- Jamie: It was interesting to me that the change in temperature and oxygen results in new minerals being precipitated.
 - Andrew: This has been demonstrated in the soil literature as well.