

Lake Champlain Basin Program
Technical Advisory Committee meeting
Wednesday, November 1, 2023, 9 AM – 1 PM
Held Remotely via MS Teams

TAC Members: Jennifer Callahan, Ryan Cunningham, Laura DiPietro, Bryan Dore, Laurie Earley, Michele Fafette, Peter Isles, Neil Kamman, Steve Kramer, Margaret Murphy, Andrew Schroth

LCBP Staff: Mae Kate Campbell, Meg Modley, Matthew Vaughan, Sarah Coleman, Sarita Croce, Erin Vennie-Vollrath

Guests: Colin Fuss, Tim Mihuc, Aude Lochet, Anne Jefferson, Danielle Garneau, Sal DeCarli, Michael Lew-Smith, Alex Sotola, Dan Sitch, Meghan Arpino, Stephanie Hurley, Sam Brewer, Benny Berkenkotter, Neal Hagstrom, Les Carver, Adam Zylka, Paul Marangelo, Mark Ferguson

Approved TAC meeting summary

1. Updates, announcements, public comments

- Margaret (VT Fish and Wildlife): There is a massive salmon run occurring in the Winooski River. We are now at just under 200 returns. This is record-breaking, the highest returns we've seen since we've been monitoring.
 - Laurie: We are at 203 now!
- Laurie (US Fish and Wildlife): The salmon run on the Bouquet has been slow to start, but they are coming in now. It's a big year on the Saranac as well. Fishermen are sending us samples also. It's great to see our efforts to help these populations. Rain has postponed lampricide treatments; we are still working on trying to reschedule for Lewis Creek. We are hoping to treat the mouth of the Ausable next week. Putnam Creek and the Poultney River have been treated.
- Neil (VT DEC): The VT Clean Water Board meets to consider the state fiscal 2025 budget on Thursday and will take public comments. There is a lot of money programmed for Clean Water work.
- Matt (LCBP): The request for pre-proposals (RFPP) for Clean Water and Healthy Ecosystems research closes on 11/10. Please spread the word to partners as relevant. TAC will review the pre-proposals as homework between this meeting and the November meeting. The process will be different this year - you will receive instructions from our admin team on how to log-in to our online grant management system. The focus of the December 6th TAC meeting (which will be held in-person at the Grand Isle office) will be discussing the pre-proposals and forming a recommendation to the Steering Committee. The January TAC meeting will be focused on the State of the Lake report.
- Meg (LCBP): The Boat Launch Steward program ended for the season on 10/9. We had over 16,000 surveys; we will share the field season summary shortly, once we finish quality control. LCBP just hired a new Publications and Communications staff member.

Round goby are still on the downstream side of lock C1, though physical and eDNA samples have been collected in the channel leading up to the lock. eDNA detection of round goby occurred above the St. Ours dam in Québec, so they've likely moved through the dam. They still have 60 km to move up to Lake Champlain, but this is not great news. We are working with Québec partners to discuss the situation. The US Fish and Wildlife Department (USFWS) has been sampling in a NY lake with a known sterile population of grass carp to get more information about possible movement of these specimens during high-flow events. The Champlain Hudson Power Express funding is moving forward with Lake Champlain priorities.

- Margaret: It would be helpful to have Nicole come present at this group on that topic.
- Matt: Last meeting there was a request from TAC members for more guidance on reviewing workplans and quality assurance project plans (QAPPs). I drafted a document as a resource.

Review and approve summary of previous TAC meeting

Motion: To approve the summary from the October TAC meeting

By: Jenn

Second: Margaret

Discussion: Neil: I made a few minor typographical edits in the online summary.

Vote: All in favor

2. **Workplan review: Nutrient loading to headwater streams in the Lake Champlain Basin: controls of forest age and management** (Colin Fuss and Mark Lesser, SUNY Plattsburgh)

- Colin and Mark presented. The goal of this project is to sample nutrient export in headwater streams in areas with mature and mid-successional forested land use, to better understand nutrient contributions in forested areas, considering that 2/3 of the Lake Champlain watershed is forested. The project will include site selection with a focus on the Northeastern area of the Adirondacks to look at chemistry changes and more intensive sites for comparative hydrologic event sampling. The project will include a QAPP, forest surveys, stream gauging, and hydrologic sampling will include base flow and ISCO sampling for high flow events. Laboratory and data analysis will be conducted at the State University of New York at Plattsburgh (SUNY Plattsburgh) for water chemistry using standard EPA approved analytical methods. Associated outreach events will include classroom/K-12 activities, public education, publication, and stakeholder engagement working with Lake Champlain Sea Grant (LCSG).
- Michele: I have some concerns about several assumptions that will have a direct impact on the transport of nitrogen and phosphorus. You looked at the diameter of trees to establish the age of the forest, but have not addressed the layer of duff and canopy cover. Duff will have a great impact on nutrient transport. Are there any roads, paths, or

parks that run through forest? How will the native and invasive status and health of the forest be characterized? Are all the forests public access?

- Colin: The work is mostly on Adirondack preserved lands and they are public. Some forests are privately managed and would require permission.
- Michele: If we are restricted to public lands that might limit the study.
- Colin: We have thought through the complications of site selection and know that an ideal older forest may not have an ideal younger forest paired next to it. It's possible that we may have to work on private lands.
- Matt: This project would benefit from a follow-up TAC meeting.
- Andrew: In my feedback, I noted that using a salt slug approach may help you get better data. Event based sampling may require you to capture more events. It might be good to get in a sensor sampling earlier.
 - Colin: Students will likely be willing to run out into the field to capture events.
 - Andrew: Seasonality is going to be hard to address with the number of samples that are scheduled to be collected.
- Neil: I am wondering about the high flow samples, it might be hard to capture those events due to safety considerations.
- Matt: In summary, there are considerations about the best methodology for establishing an accurate rating curve, and concerns that 4 discharge measurements would not be enough for the purposes of this project. We can work with the project reviewers to get the workplan in place and work out more of these technical details at the QAPP stage.

Motion: To approve the workplan pending approval of TAC point people

By: Andrew

Second: Jenn

Vote: All in favor

3. **Workplan review: Pelagic, tributary, and shoreline microplastics in Lake Champlain: Sources and dynamics** (Dr. Tim Mihuc and Dr. Danielle Garneau, SUNY Plattsburgh, Dr. Anne Jefferson and Aude Lochet, Lake Champlain Sea Grant)
 - Tim presented. This project has a team of 4 principal investigators from the University of Vermont (UVM) and SUNY Plattsburgh. The study continues work funded by LCSG to begin to characterize microplastics in the Lake Champlain Basin. That study looked at samples from the long-term monitoring program (LTMP) and identified nurdles in many samples. The Roselia project has also worked on microplastics in Lake Champlain. Current data show that plastics are present in Lake Champlain in a variety of places. The goal of this project is to determine pelagic, tributary, and shoreline sources, pathways, and sinks for microplastics in the Lake Champlain Basin. Tasks include determining study sites and sampling design, data collection and data analysis for 2 years, outreach, and the final report. The project intends to collect samples at 16 tributary sites, 15 lake sites, and 12 beach sites. Fewer samples will be collected at a greater number of sites in year 1 in order to home in on a subset of sites with high microplastic concentrations in year 2 that will be sampled for more dates. Anne reviewed

river sampling, Tim reviewed lake sampling, and Danielle reviewed beach sampling methodology. Aude reviewed the outreach plan for engaging community scientists in sample collection.

- Neil: I am excited that we are finally funding a project of this nature. There's a lot of work and value in this project. I had a few specific thoughts with respect to the sampling design, which were addressed in this presentation. In the QAPP, more detail on how the subset of sites will be selected, and more detail on the selection of specific times of day for sampling would be helpful. I am also curious about the types of quality assurance (QA) that might be applied to the project. Is there contamination control, can you do blanks, can you do matrix spikes? I am not sure what is relevant, but we are finally doing this work in a robust way and there is a lot of interest in this topic, so making sure we get the QA strong will be important.
- Matt: Following up on the outcome of this project, I'm also excited. Neil left a comment on anticipated benefits that we will know more about ecosystem health based on this project. It's a comprehensive look at microplastics but doesn't focus on the effects of microplastics on biota. Do you plan to include interpretation on how our results compare to other water bodies? I also read a review that looked at experiments that have been done on microplastics, and the observed effects were not well compared to the natural results of sediment and other items suspended in the lake that are not anthropogenic. Paying attention to that will be important to communicate these results to the management community.
 - Tim: This project will lead us to better knowledge of what plastics are where, which can help us better ask the question of how that might be affecting ecosystems.
 - Anne: LCSG staff are looking at microplastics in fish guts. It will give us an opportunity to talk about what we are seeing in the samples vs. what they are seeing in this fish.
- Neil: A nurdle is plastic used to manufacture plastic items, correct? Clearly, somehow these are making their way into the environment in relatively high quantities, unused.
 - Tim: Those nurdles in Lake Champlain are disconcerting. They are throughout the stratified layer. We don't know where they are coming from specifically, we'd like to at least identify where they are. They are coming from industry.
- Laura: I always thought there was erosion going on and that plastic was being eroded into balls, but this is concerning.
 - Anne: Secondary plastics can be present, but nurdles are definitely primary microplastics that are used in industry.

Motion: To approve the workplan

By: Margaret

Second: Laurie

Vote: All in favor

4. **Workplan review: Utilizing Unoccupied Aircraft Systems (UAS) as a Rapid Assessment Tool to Identify and Prioritize Sites for Habitat and Water Quality Protection, Enhancement, and Monitoring** (Sal DeCarli, EA Engineering)

- Sal presented. This project will advance use of UAS to fly stretches in the Lake Champlain Basin to look for groundwater upwellings, salmon spawning sites, etc. Technology will allow thermal locational data to identify thermal cold water refugia in streams. The primary objectives are to identify the uses and limitations of UAS to aid in fisheries and water quality practitioners, identify groundwater influences that are critical for cold water fisheries, assess the applicability of UAS to monitor and assess salmon spawning, and identify potential point sources for contamination. Project locations were selected with partners on the Boquet River (North Fork and Beaver Brook Confluence) in NY and on the Winooski River in VT. The plan is to fly 5 miles of each river. UAS summer flights will include fixed-wing systems, multirotor sensor platform, true color, LiDAR, thermal sensors, etc. to pick up the biggest thermal temperature differences between ground water and thermal discharges. UAS fall flights are focused on salmon spawning sites and we will only use a multirotor sensor platform. Data analysis will occur after each year with check ins with partners to guide research.
- Laurie: Your description of the pros and cons of each technology in this presentation was really helpful. It would be great to provide additional details in those considerations in the workplan.
- Margaret: I had minor written comments on your workplan. I am curious about the need for the second year of flight at the same locations. Can you expand upon the need for duplicating the same 5 miles versus selecting another section?
 - Sal: There is some supporting information that suggests that confirming characteristics in the river are more consistent vs temporary with a second year of flight. There are built-in opportunities for repetitiveness but also opportunity to select new stretches.

Motion: To approve the workplan pending TAC PAC review

By: Laurie

Second: Margaret

Vote: All in favor

5. **Workplan review: Long Term Freshwater Mussel Population Assessment in the Poultney and Lower Missisquoi Rivers** (Michael Lew-Smith, Arrowwood Environmental)

- Paul introduced the project, which will take place on the Missisquoi, Lamoille, Winooski, and Poultney rivers and builds on a previously conducted assessment, allowing for characterization of population dynamics over time. Paul shared background on freshwater mussel biodiversity and lifecycle dynamics. 19 species of freshwater mussels are present in Lake Champlain; 10 are state-listed as threatened and one is federally endangered. Paul shared information on qualitative (timed search within mussel beds) and quantitative (systematic deployment of quadrats with excavating/sieving) sampling methods, and the scope of sampling planned for each river.

- Mark: Some sites, particularly on the Lamoille and Winooski, had some relocation efforts accompanying it, such as bridge projects that we were asked to move mussels as a result of. Something to keep in mind as you conduct this work.
 - Paul: The Lamoille is an open book; if we find tagged animals, will probably end up avoiding those areas so we don't end up with an inflated density estimate. We want to work with partners to determine what serves the best purpose of documenting populations and changing dynamics.
 - Mark: It may not matter since it happened a few years ago. Oftentimes we found that moved mussels were blown out of place in future years.
 - Michael: I imagine this will only be an issue in the Lamoille since that's the only place we haven't established permanent sites.
- Mark: The Missisquoi work that was done previously had 13 sites, this is a reduction. I realize you can't do everything; establishing new monitoring takes new time. I'm curious what that change means for the Missisquoi, does that mean we are looking at reducing the number of monitoring sites? Is establishing new sites more of a priority than going back and looking at historic sites?
 - Paul: Going back to the 1998 report, I recommended 5 sites on the Missisquoi be considered for long-term monitoring. We will be doing 8. I don't know what we gain by expanding to the 13 sites rather than doing work in other rivers. That was our rationale for crafting the workplan for this project. We are open to discussion.
 - Mark: That makes perfect sense, thanks for that additional context.
 - Meg: Adding that reasoning to the workplan would help clarify this approach.
- Margaret: I am also curious, looking at the Missisquoi map, there's a large section of the river you are not sampling. In the workplan it says there will be 6 sites. What is the rationale for not sampling those areas?
 - Paul: In 1998 after doing this project, I worked as a consultant mussel biologist. The time we spent on the Missisquoi was one of the most intensive sampling plans ever done. We have a great understanding of the distribution of productive mussel habitats. We know the backwaters behind the Swanton dam are not worth looking at, for example. Habitat by the delta is really homogenous, with a couple exceptions. Blank spaces in the map indicate high degrees of heterogeneity or homogeneity which have already been captured by previous qualitative sampling, so we've focused our quantitative sites where they are at using those data for context.

Motion: To approve the workplan

By: Margaret

Second: Jenn

Vote: All in favor

6. **Workplan review: Assessment of watermilfoils (*Myriophyllum spp.*) in the Lake Champlain Basin: population genetics and influence on native plant communities**
(Dr. Alex Sotola and Dr. Dan Stich, SUNY Oneonta)

- Alex introduced the project and provided background on the challenges of the invasive varieties of watermilfoil. Hybridization of watermilfoil has been observed in other parts of the country and has been shown to increase the invasiveness of watermilfoil. The project goals are to determine how the genetic and phenotypic variation is partitioned within and between members of the *Myriophyllum* genus and any hybrids and to determine how the genetic ancestry of *Myriophyllum* members influence native plant biodiversity within and among waterbodies in the Lake Champlain Basin. Project tasks include developing a QAPP, selecting waterbodies, sampling 30 inland lakes (15 per state) as well as Lake George and Lake Champlain, genetic lab work, data analysis, biodiversity data analysis, biodiversity simulation, selecting waterbodies for fine-scale sampling, sampling waterbodies to characterize hybridization, and reporting. Alex provided an overview of DNA genotyping methodology and Dan reviewed methodology for biodiversity analysis for the population assessment and targeted sampling phases of the project.
- Erin: Thank you for the presentation – this is lots of work packed into one study. I was interested in the final deliverable of having a species ID reference sheet. Will the hybrids be part of that tool?
 - Alex: Absolutely.
- Erin: In terms of about native plant species and richness, I was thinking about our native pond weeds and how difficult they can be to ID. Do you have plans for that?
 - Dan: We plan to bring a microscope to the field. We have experts who are pretty adept at species identification here, so we have the option of bringing tissues back to the lab for help with those aspects. We are planning to follow the suggestion to attend plant camp and have students attend as well.
- Erin: Additional comments I had included clarification of what questions the project will be focusing on. It would be great to add that detail to the workplan, since they were included in the presentation.
- Meg: Sampling methods and analysis details will be worked out in the QAPP stage.
- Margaret: How are you going to get this all done in a year? Sounds like a huge undertaking.
 - Alex: This will be our only focus for the next 2 summers.
 - Dan: We have the ability to bring up canoe trailers, so we can divide and conquer and have 3-5 teams deployed at one time.
 - Margaret: You can work with Fish and Wildlife and the New York State Department of Environmental Conservation (NYSDEC), we are definitely interested in the outcomes of this project from a fisheries perspective.

Motion: To approve the workplan

By: Margaret

Second: Jenn

Vote: All in favor

7. **Final report review: Bioretention soil specifications evaluation** (Meghan Arpino, Stone Environmental, Dr. Stephanie Hurley and Sam Brewer, University of Vermont)

- Stephanie and Sam presented. The goals of this project were to complete a comprehensive review of bioretention soil specifications and performance studies, evaluate comparative performance of different bioretention strategies, and provide recommendations for how to improve efficacy for 2023. Some strategies studied have mobilized nutrients. The project included a literature review and bioretention laboratory and field studies. For the field study: 12 inflow tanks were monitored through simulated and ambient stormwater simulations. The runoff flows down to bioretention mesocosms with different soil media treatments (sand, topsoil, woodchips, and drinking water treatment residuals all with pea gravel), which then flow down to the effluent tanks. Vegetation planted in bioretention mesocosms included perennials, with a focus on plants that were native to the Northeast, provided pollinator habitat, were resilient to drought and inundation, and were aesthetically pleasing (to encourage implementation). The study compared water quality across 4 treatments and plant health. Some conclusions included the observation that nitrate removal performance was not consistent among any of the bioretention soil media treatments; systems with drinking water treatment residuals performed similarly to sand and topsoil in phosphorus removal; all treatments performed well for copper and zinc removal.

- Michele: I am curious about the design for bioretention design system, would you consider using a sock or geofabric over the drainage tubes to keep other inputs out?
 - Stephanie: Wrapping the pipe can be more of an issue for clogging than its effectiveness at preventing materials from getting in.
- Michele: Was *Panicum virgatum* [switchgrass] studied for potential inclusion?
 - Stephanie: That species can present some challenges, since it does not come back quickly in the spring and is often over cut by managers, reducing its effectiveness.
- Neil: You introduced fresh ground wood chips and this reminds me of a wood chip bed for tertiary wastewater treatment, where you needed debarked wood chips. Are you aware of this?
 - Stephanie: I have not heard of debarking before.
- Neil: Did you have any findings about the interaction between plant height, soil type, and retention?
 - Sam: We have not run those tests. Water quality was analyzed separately from plant health.
- Matt: If the plants are doing well, can we say anything about how the bioretention is doing?
 - Stephanie: That is the back door question that we used to develop this research project. We might use percent cover instead of height of plant.

Motion: To approve the final report pending incorporation of suggested revisions

By: Jenn

Second: Steve

Vote: All in favor