

**Lake Champlain Basin Program  
Technical Advisory Committee meeting  
Wednesday, September 3, 2025, 9:00 AM – 2:00 PM**

**Held remotely via Microsoft Teams**

**Approved TAC meeting summary**

**TAC Members:** Jennifer Callahan, Sarah Coleman, Bryan Dore, Brian Duffy, Laurie Earley, Michele Fafette, Karyn Hanson, Peter Isles, Steve Kramer, Bridget O'Brien, Andrew Schroth, Jamie Shanley, Daniel Tremblay

**LCBP + Lake Champlain Staff:** Mae Kate Campbell, Emma Janson, Meg Modley, Matthew Vaughan, Sonya Vogel, Erin Vennie-Vollrath, Colette Ward, Theresa Vander Woode

**Guests:** Ellen Marsden, Vivien Taylor, Aubert Michaud, Abou Niang, Wade Bastian, Todd Chaudry, Ben Luskins, Pamela Wadman

**1. Updates, announcements, public comments**

- Matt reviewed changes in TAC membership. Dennis DeWeese (USDA-NRCS NY) has retired after many years of service. Brian Duffy and Karyn Hanson from the New York State Department of Environmental Conservation (NYSDEC) are now official TAC members. Ben Luskin will be nominated to replace Ryan Cunningham as the appointee from the New York State Department of Agriculture and Markets.
- Steve (Miner): On September 6<sup>th</sup>, the Miner Institute will be holding an outreach event targeted at junior high school students.
- Laurie (USFWS): There have been staffing changes in our regional office. Currently we have many folks in acting positions – Sharon Marino is the acting regional director. The sea lamprey control program is planning a treatment on the Bouquet this month; that's the only planned treatment this year.
- Erin (NYSDEC/NEIWPC): The New York Lake Champlain Basin Wetland and Floodplain Restoration Projects request for proposals is open, please share with your networks.
- Jamie (USGS): Gage questions always come up this time of year. I do not have any updates but will pass on information as I receive it. USGS funding situation is fluid right now; we were looking at a huge cut in the President's budget, but most of that was restored in the Senate and House markups.
- Matt (LCBP): Welcome everyone back to the new TAC season and welcome new folks. LCBP has several requests for proposals open:
  - Clean Water Implementation and Planning
  - Healthy Ecosystems Habitat and Native Species
  - Aquatic Organism Passage
  - Land Conservation for Clean Water and Healthy Ecosystems

- NY Wetland and Floodplain Restoration
- Public Access Improvement closed recently
- Research Request for Pre-Proposals is planned for release in late September
- The next Steering Committee meeting is 9/16. After that meeting there will be a public meeting focused on water quality in Missisquoi Bay. Our Science Blog has been active sharing research results aimed at the management community and technical audiences.
- Meg (LCBP): It was a busy boat launch steward field season. We've been working to have the stewards stationed at launches 7 days a week, 7am-6pm, Memorial Day through Labor Day. This year we are seeing more local Lake Champlain users and fewer Québec users. The aquatic invasive species rapid response task force has been meeting to review grass carp and round goby response. There was one positive detection for grass carp in Québec. There's not much of an update on corbicula; they have not been found in other locations, but we confirmed more in the location they were originally found. The World Canals conference in Buffalo has a special session on aquatic invasive species management. The U.S. Army Corps of Engineers (USACE) has a new appointee to the Lake Champlain Steering Committee and is continuing to review projects. Vermont will not be receiving USACE funds for water chestnut management next year. The second round of the Infrastructure Investments and Jobs Act-funded tree nursery projects are in development.

*TAC season overview, plan for meetings (in person vs. remote, field trips)*

- Matt shared the TAC schedule overview document, available in the September meeting folder. The November meeting may be rescheduled to avoid a conflict with the North American Lake Management conference. TAC will continue with a primarily remote meeting schedule but we will plan to have the research proposal review meetings in December and March with an in-person option.

*Review and approve summary of previous TAC meeting*

Motion: To approve the summary from the June 2025 TAC meeting

By: Jenn

Second: Laurie

Discussion: A minor correction was made to correct an acronym.

Vote: All in favor

**2. Discussion: TAC point people for FY25 research projects**

- Matt explained the role of TAC point people in reviewing research projects. The fiscal year 2025 (FY25) research projects were reviewed and TAC point people were assigned. Details on project management and assigned point people are available on the FY25 research project management Excel doc. Some TAC members will be discussing research projects with their colleagues who may act on their behalf as point people.

### 3. Discussion: FY26 Clean Water and Healthy Ecosystems research priorities

- Matt: Each year, LCBP releases a request for pre-proposals for research needs identified by the management community. The pre-proposal contains tracks highlighting research priorities. The process starts with asking Steering Committee members to work with their teams to identify research needs and submit them to LCBP. Now, TAC will review all submissions and make a recommendation for which should be included in this year's RFPP. These priorities are for projects that would begin in 2027.
- Andrew: Is there room for us to add other areas of interest beyond what has been recommended by partners?
  - Matt: Yes, feel free to suggest additional ideas.
- TAC members reviewed and categorized priorities in a separate document.

### 4. Final report review: Lake Champlain fish community monitoring (Dr. J. Ellen Marsden, University of Vermont)

- Meg introduced the project, the intention of the forage fish monitoring work, and Dr. Ellen Marsden who will be presenting the final report. Dr. Jason Stockwell and masters student Shelby Scarfo are also contributors to this work.
- Background
  - Ellen shared a timeline of previous forage fish monitoring efforts in Lake Champlain, and events that impacted food web dynamics (including invasive species introductions)
  - Management goals for the projects changed with the end of lake trout stocking
  - What information is needed?
    - Abundance (smelt and alewife) – catch per unit effort (CPUE)
    - Condition – is there sufficient food for smelt and alewife?
    - Biomass of fish – how much food is available?
    - Age composition – are population demographics stable?
    - Length-at-age – how well are forage fish growing?
- Methods
  - Stepped-oblique midwater trawl survey, hydroacoustics, and gillnet survey in the Main Lake in 2024-2025.
  - Bottom trawling during the day, in the spring.
  - Sites: Previous VT Fish and Wildlife Department surveyed-sites (NE Arm, Valcour Island, Malletts Bay, Burlington Bay, Barber Point), and UVM sites (Butler Island, Rockwell Bay, Fish Bladder, Essex)
- Results
  - Rainbow smelt has remained at a smaller than average size in the modern surveys, which is consistent with small decline in size seen in previous surveys
  - Saw small declines in ages in both rainbow smelt and alewife, consistent with time of year of sampling. Previous surveys occurred in the summer and modern surveys in spring.
- Takeaways

- Partners (VTFWS, NYSDEC, UVM, USFWS) will meet in the fall to discuss fish forage strategy moving forward

### *Discussion*

- Meg: Great information. Please make sure that the materials included here are in the final report. We'll work with the project advisory committee to sum this up. This is a very important body of work for the fish community.
- Laurie: Thanks, Ellen. I'm happy to see some of the information that was missing from the draft report is included in this presentation. In the survey evaluation, that table was great. Maybe provide more information about the limitations of the survey designs. Pulling all the management discussions together will be great too. It would be great to add Shelby's thesis as an appendix of this work if that is possible.
  - Ellen: I don't think that the thesis will be ready to tack on with the timeframe that this grant project must be concluded.
- Collette: I'm intrigued about how long-term weather changes may be affecting forage fish dynamics, particularly cold-water fish that can't handle the warmer temperatures higher in the water column. Is there potential to look at how CPUEs shift?
  - Ellen: We've been spending a lot of time looking at where the thermocline is throughout the year. The biggest change in the Main Lake is the delayed stratification. We'll see the kind of effects you are talking about in the fish. In the Inland Sea, the volume is small enough that we are seeing a change in the behavior of the thermocline (lowering), so more warm water than cold water, as well as anoxic zones. So, forage fish that need cold water have a smaller area to live in. Lake trout are not in that equation; they leave that area. Other predators stay, like salmon. We don't know to what extent the predators of the Inland Sea are supplied with forage fish from the Main Lake.
- Karyn: Thank you. I was thinking about your presentation on the populations over time. Distribution is similar- what does that mean to you in terms of long-term quality of the lake and forage fish population?
  - Ellen: I wouldn't expect anything different yet. Some managers like stocking fish, but natural populations will be affected by changes in the forage fish. We think of stability as something responsive to conditions; trends change stability, not small oscillations. Indicators that say "if we see x metric change, then we start to make changes as anticipated", the feeling is that lake trout needs to stop being stocked at a certain population level. That was used well by the state, and stocking stopped. It's incredibly complicated to determine the artificial metrics that trigger management reactions.
- Jamie: If alewife and smelt are invasive, what were the forage fish prior to their invasion?
  - Ellen: Smelt are not invasive in this lake. They were the backbone of this food web. Sculpin are little, thus not interesting to trout. Trout and perch are never in the stomachs of larger fish, weird! But they are hunting in the low waters like other predators.

- Laurie: A summary of the lake trout information should be added to the final report.
- Meg: The PAC will incorporate requested revisions and work with Ellen to finalize the report.

#### 5. Final report review: **Going deep: evaluating deep and shallow water drivers of mercury in Lake Champlain fish** (Dr. Vivien Taylor, Dartmouth College)

- Vivien shared a presentation. The project had 3 areas of focus:
  - Outreach: regional stakeholder meetings and outreach plan to communicate with stakeholder communities, with a focus on subsistence fishers and recreational anglers. Meetings with advisory/stakeholder groups concerning fish consumption advisories.
  - Fish survey: To measure mercury levels in fish
  - Research: Collect additional data to assess the drivers of mercury bioaccumulation in fish
- Fish mercury survey: 2022-2023
  - Used same methods as previous surveys that have been completed every 5 years in Lake Champlain.
  - Species surveyed are lake trout, smallmouth bass, walleye, white perch, and yellow perch
- Fish survey: Outcomes / Recommendations: Results
  - Yellow perch, smallmouth bass, and lake trout mercury levels declined to 2011 levels
  - White perch – declined for first time on record
  - Walleye – no trend identified, wide variety of measurements
  - Study methods determined that precipitation is not the dominant source or mercury in fish in Lake Champlain. Instead, river inputs drive mercury processes.

#### *Discussion*

- Matt: You included a plot showing mercury concentrations in Missisquoi Bay and St. Albans Bay and noted that mercury concentrations were lower in Missisquoi Bay due to a cyanobacteria bloom lowering concentrations in phytoplankton. Was there a bloom in St. Albans Bay during that sampling year as well?
  - Vivien: There was a bloom in St. Albans Bay during that sampling timeframe; however, the sample from Missisquoi Bay contained only cyanobacteria, while the St. Albans Bay sample had zooplankton.
  - Matt: So, you were identifying what species were there and not doing abundance?
  - Vivien: We would take photos of the sample, measure the area of the sample, and determine how many phytoplankton would fit in that area. The determination that there was more zooplankton in the St. Albans sample was a key piece of the puzzle in understanding why that sample had a higher mercury concentration. The areal difference measurements were conducted in deep basins to distinguish the epilimnion and hypolimnion.

- Matt: So oligotrophic lakes have increased Secchi depth and higher concentrations of mercury because there's less of a bio-dilution effect?
  - Vivien: At the base of the food web in oligotrophic systems, there's nothing to bind mercury so it's really easy to take up, but it's also really phyto-methylated, so it is cycled really fast.
- Karen: For the dissolved organic matter methods – how were different tributaries compared?
  - Vivien: We measured dissolved organic matter in three tributaries: the Lamoille, the Mill, and the Missisquoi, which are all attached to shallow basins. Otherwise we were using values from the literature and Department of Environmental Conservation data.
  - Matt: The Long-Term Monitoring Program (LTMP) in its early years was measuring dissolved organic carbon. The analysis was cut a while back and only recently added back in. They only look at dissolved organic concentration, not what the composition of that matter is. It varies greatly based on land use; some researchers have sensors to monitor.
  - Vivien: We collected sonde data at three sampling timepoints.
- Jamie: Comparing challenges with mercury to challenges with phosphorus – both have huge legacy concentrations in the watershed. With our high watershed to lake ratio, processes will keep bringing that legacy mercury in for decades to centuries. That challenge emphasized the importance of the outreach being done in this study, particularly focusing on subsistence fishers who are most impacted. I really appreciate that piece of this work.
  - Vivien: Kris Stepenuck was a great collaborator and is always a pleasure to work with. She led that piece of this project.
- Jamie: I always thought most of the mercury in the lake was coming from the watershed, and it's cool that data confirmed that.
  - Vivien: I agree. When you are in the Main Lake, you don't always realize how connected it is to the watershed,
- Matt: These results show an increase from the last round of the survey, which was undertaken in 2016-2017, in the Main Lake, which is a nuance we don't capture in the *State of the Lake* report.
  - Vivien: It's in Mark Swinton's paper, and in lake trout which is essentially a whole lake monitor.
  - Jamie: In Mark's paper, he attributed a lot of that mercury as an input of the 2011 flood that lagged behind due to the timeframe of bioaccumulation. You also sampled in a high-water year, would you project concentrations might increase again in the next survey?
  - Vivien: I do wonder I would have loved to see how zooplankton changed following Irene. I haven't seen much data on that – since the last two flood events, have there been changes to the lower food web? I also wonder if it could still be attached to something. The watershed really is the driver, so it will be interesting to see if that happens again.
- Jamie: In the methylmercury figures with depth, since you ruled out anerobic conditions in base of water column as source of methylmercury – where does that methylmercury come from?

- Vivien: I think it's largely from the water column at least in deep basins. Methylmercury accrues in sedimentation and aggregation of particles that are depositing. This is what we see in the oceans, and deep lakes are similar to the ocean. This is the theory for the Great Lakes as well.
- Jamie: So there are pockets occurring within the water column? Could some be coming in from the watershed?
- Vivien: Yes to your first question. Good question on the second part. Concentrations are higher in rivers than in the lake, so that could be part of the story, though we couldn't fully get an answer from the isotopes. Methylation is really hard to measure when levels are this low.
- Jamie: What's the starting point for mercury isotopes? How were Lake Erie and Lake Champlain so similar?
  - Vivien: This is where things get complicated.  $\delta^{202}\text{Hg}$  is affected by lots of reactions. Photodemethylation has a strong and predictable effect on  $^{199}\text{Hg}$  but an unpredictable effect on  $\delta^{202}\text{Hg}$ . We can't quite deconvolute  $\delta^{202}\text{Hg}$ , we'd need a sediment core.
- Matt: Can you share more about the influence of low oxygen concentrations on samples? I've seen from Andrew's work that short periods of lower oxygen can affect phosphorus movement. How can it affect mercury?
  - Vivien: Under those conditions there is probably methylation occurring in bottom waters. Not enough to build up in the water column that you'd be able to measure a difference in concentrations in a big basin. Certainly, methylation is occurring in anoxic bottom waters – in shallow lakes over the summer, methylmercury spikes in the hypolimnion and then during fall turnover that creates a big plug of mercury into the base of the food web. It would be really hard to measure, however.
  - Matt: To distill what you're saying: it's likely happening, but it's difficult or not possible to measure, and it isn't a driving factor.
  - Vivien: In deep basins, methylation is happening in the water column. But also in deep basins, there's not enough of it happening for the concentration of methylmercury to change. In shallow basins, it probably is a source, but we're not sure that it's building up in the water column in sufficient quantities to measure unless the water column is stratified for a long time.
- Andrew: As part of today's discussion, should we incorporate PFAS into future mercury in fish tissue studies that LCBP funds?
  - Vivien: PFAS analysis is very expensive and requires totally different collection and analysis methods. I believe that the impacts of PFAS tend to be more localized. I am currently analyzing some of the fish collected for this study for PFAS (yellow perch, some eels, and carp), and I hope to have those data in the next 4-6 months. I'd be happy to share. PFAS is throwing mercury advisories on their head, since it's difficult to base consumption advisories solely on mercury.

Motion: To provisionally approve the final report pending the incorporation of comments from Jamie, Matt, and Neil

By: Jenn

Second: Laurie

Vote: All in favor

Abstentions: Andrew Schroth

**6. Final report review: Soil health diagnosis of Quebec portion of the Missisquoi Bay Basin following a remote sensing approach (Dr. Aubert Michaud, OBVBM)**

- Aubert presented the results of the Soil Health Diagnosis project, on behalf of the project team from OBVBM and IRDA.
- Background
  - Soil health findings: emerging issue with deep roots, wetness and heavy machinery compact soils, waterlogged zones impact field erosion and non-point source pollution
- Objective: Develop a user-friendly GIS platform with soil physical condition, crop conservation practices
- Methods
  - Classify land occupation: corn and soybean cropland
  - Terrain analysis and generation of topographic indices
  - Generation of soil indices, crop development indices, agri-climatic indices, soil health indices
  - Develop spatial toolkit
- Outcomes
  - An open-source, QGIS tool
  - Farm network connections

Motion: To approve the final report “Soil health diagnosis of Quebec portion of the Missisquoi Bay Basin following a remote sensing approach”

By: Jenn Callahan

Second: Andrew Schroth

Vote: All in favor

**7. Continue FY26 Clean Water and Healthy Ecosystems research priorities**

- TAC continued to discuss potential research priorities. A working draft will be circulated over email for finishing touches.