

**Lake Champlain Basin Program**  
**Technical Advisory Committee meeting**  
**Wednesday, February 4, 2026, 9:00 AM – 11:15 AM**  
**Held remotely via Microsoft Teams**

**Approved TAC meeting summary**

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

**LCBP + Lake Champlain Staff:** Mae Kate Campbell, Emma Janson, Matthew Vaughan, Sonya Vogel, Erin Vennie-Vollrath, Colette Ward, Sarah Coleman

**Guests:** Breck Bowden, Josh Serpe, Judson Peck, Chris Smith, Claire Madden, William Bastian, Dave Braun

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

- Sarah (VTDEC): Based on our data, projects implemented to date have achieved 35% of the required phosphorus reduction towards total maximum daily load (TMDL) goals in the Lake Champlain basin. In this [CW Performance Report](#) we changed our approach on how investments are made and timing of publishing the report. The 2024 fiscal year is a better indicator of progress to date. We are encouraged by these results, it's a big uptick from the 2024 calendar year report.
  - Neil: So excited for these results! Claire Madden is responsible for developing the methods for this. We saw a big jump in loading reductions. There has been a lag that Sarah's team has documented; phosphorus reductions increase every year, because the team is catching up for where reporting data is coming. Important step forward. 10 years in, 35% of the way there for reductions. Reminder that it took 5 years to just set up the funding, etc. Research priorities are being put to work here and in NY. It's a neat step forward and I am happy to see it. Looking forward to continuing dialogue with the Environmental Protection Agency (EPA).
- Jamie (USGS): The US Geological Survey (USGS) office in Montpelier has moved to Waterbury and is officially open. Rick Kiah, who oversaw the USGS Stream gages in VT/NH retired in December. Our new interim data chief is Nick Stasulis in our Maine office, [nstasuli@usgs.gov](mailto:nstasuli@usgs.gov). I think there will be a search for a more permanent replacement, I will let you know.
  - Matt: Rick was an incredible resource for the region - always helpful with questions.
- Neil (VTDEC): General assembly season is ongoing. There seems to be a fair amount of energy around how VT would move to classify its lakes. That would translate into how we would do assessment, classification, and re-classification for higher level uses on lakes. I do not see any changes on the horizon on how we would approach Lake Champlain.

- Matt (LCBP): Thank you and congratulations on a successful Lake Champlain Research Conference. Thank Karyn for her service to the committee - you've been really helpful in your time in this role, and we wish you luck in your new role. Welcome Quinn Rufa, who was appointed to the TAC in December. Ben Luskin was also appointed. Updates to TAC schedule - we will send full proposals in mid-February, and your scores will be due in late March. LCBP has 2 open requests for proposals for tree nursery and aquatic organism passage projects.
  - Neil: It was great to see the presentations from the Schroth lab.
  - Sarah: How many full proposals are we expecting?
  - Matt: It will be around 20.

*Review and approve summary of previous TAC meeting*

Motion: To approve the summary from the December 2025 TAC meeting.

By: Jenn

Second: Steve

Vote: All in favor

2. **Final report review: *Achieving verifiable phosphorus removal from tile drains discharging to Lake Carmi tributaries*** (Dave Braun, Stone Environmental)

- Dave introduced the project and shared a presentation. Study objectives were to:
  - Design, construct, and monitor the performance of tile drains in reducing phosphorus (P) in the Lake Carmi watershed
  - Refine components of tile drain design - lowered cost, increased efficiency
- Site/Methods:
  - Farm on shoreline of Lake Carmi, 9 tile drains. Aerial extent of tile drain systems ~5-20 acres.
  - 4 drains were fitted with filters based on P concentrations and flow rates from site characterization efforts.
  - Half-inch Swanton black shale and zero valent iron (ZVI) were used as filter media. The media mixture was expressed as ZVI proportion as percent by volume.
  - Autosamplers collected flow-paced composite samples, samples analyzed for total phosphorus/total dissolved phosphorus (TP/TDP) between September 2024 and June 2025.
- Challenges:
  - Monitoring equipment: power interruptions, sampler breakdowns, flowmeter malfunction, etc.
  - Clogged filters
  - Loss of iron and sorbed P
- Results:
  - Filter outflow median TP concentrations were higher than inflow concentrations.
  - TDP concentrations were reduced in outflows at lower flows, difference inconsequential at high flows.

- Grab samples suggest that TP concentration results were impacted by iron floc problem. Undisturbed grab samples measured much lower TP concentrations in outflows.
- Results varied drain to drain (changed with flow, location, and ZVI content)

#### Discussion:

- Neil: Super interesting!
- Steve: When you first started in 2022, that was apparently one of the fourth wettest falls on record in your area. Changes in precipitation could be an explanation for some of the results. Thinking about where the sources and sinks of P area are.
  - Dave: Our largest events were in mid-December, right after manure application. We measured high concentrations during those events. In September and June, there is not much going on. Low flows, low P concentrations. There's too much of those conditions in the dataset which I presume impacts the results significantly.
  - Steve: Are we seeing extended periods of drying, especially in the summer, then more rainstorms in the fall? It seems like we are amassing nutrients in the soil, they become saturated, then move through the system via overland flow, etc.
  - Dave: Nothing was going to move this past year in July-September. We don't have a flow issue here that we had in Addison county where you were expected to dry ahead of the rain. Here we had sandy loams. I believe that the difference in soil type impacted flows
- Andrew: Two questions. I wonder if in the future it would be useful to measure soluble reactive phosphorus (SRP) in addition to TDP. Some of the differences you are seeing could be impacted by organic vs. inorganic movement.
  - Dave: I agree. Manure applications impact organic P. It's a pain to measure
  - Andrew: I've seen ZVI in acid mine drainage literature. I wonder if the iron you are seeing is not a result of the environment going anoxic, but rather, that process happening.
  - Dave: Everything was coated in rust (Andrew: which is what you want). I feel like our flow rates were high enough that those materials were being flushed to the outlets when they otherwise might have not been. I would like to excavate the filters and look into sediment accumulations. The goal would not be to remove iron from the system. They do lake treatments with this material, it precipitates in all the redox processes.
- Neil: Dave as you are talking it struck me that if you are transforming ZVI to ferrous bound P, as this is released to the river is there some benefit to the P on ferric particles? Would they be more preferentially binding to sediment than be transformed to TDP?
  - Dave: Did you mean converting dissolved to particle, but reducing conditions developing wherever that iron deposits should be relatively stable. It shouldn't move, maybe it traps more P in the lake and augments that treatment. I still don't think it is good for the filters. Not good to see clean water going in and orange stuff coming out.
- Matt: This may be in the report more than I realize, but I was wondering about filtering out results based on conditions. Maybe redoing certain figures where you notice that it is

more effective for higher concentrations, higher flows, etc. to produce a more meaningful result?

- Dave: There was one way to salvage it. If we try to do that, stratify the data, I can see how that impacts the full dataset. If we try it on individual filters, there are not enough events to stratify the table that way.
- Neil: You have another two years on this, right? You could tune the autosamplers to be looking more closely at certain events.
- Dave: We are sampling monthly. We did everything we could with ISCO to address our flow sampling problem, but it did not help. I agree, if we did this type of study again, I think we would want to forget about the summer. Folks in the Midwest are focusing on high-priority flows after manure application, and not trying to keep filters operational throughout the year.

Motion: To approve the final report, pending final edits from Matt and any other interested TAC members

By: Jenn Callahan

Second: Steve Kramer

Discussion: Steve Kramer volunteers to provide further comments

Vote: All in favor

### 3. **Presentation: *Loads of Confusion: Why the nutrient load paradigm can get in the way of understanding lake-watershed connections*** (Dr. Peter Isles, VTDEC)

- Matt: Peter and I have been talking about this idea for a few years now and we are working on a manuscript on this topic together.
- Peter shared a presentation. Study objectives:
  - Thinking in terms of loads is incomplete for understanding lake impacts
  - Dissolved P is the fraction we should be most concerned about
  - Present a conceptual model of how P is cycled from tributaries to lakes
  - Propose a simple index to estimate the importance of internal loading to lakes
  - Identify important management implications
- Takeaways
  - DP reductions will have more benefits than PP reductions
  - TMDLs could consider DP
  - When possible, tributary monitoring should include DP
  - More precipitation will mean higher loads but not necessarily higher lake TP
  - The TP(int-proportion) can give a rough estimate of the importance of internal loading

#### Discussion

- Andrew: Does this conflict with previous papers we've worked on where winter is also important? What role does ice play in this, especially in longer residence systems, where you're not flushing everything?
  - Peter: In the longer residence time systems, it averages out anyways. In shorter residence time systems, that might be more salient, but they flush out better. I haven't digested all recent data from your lab.

- Andrew: In Carmi and other systems, I'd think internal loading under the ice would be more important in terms of where you start.
- Peter: I think that would be captured by the equation if we have flow weighted mean concentrations (FWMC).
- Matt: The metric we are talking about is more useful on a longer timeframe.
- Andrew: I agree that DP is the most targeted way we can impact restoration. I'm interested to hear how EPA would respond to this.
- Dave: Have you applied this internal loading equation index to all the lake segments - are you coming up with a relative risk of internal loading?
  - Peter: I think we shouldn't try to apply this on a year-to-year basis. There's too much noise in the data, residence time is dynamic. I'd recommend getting at least 5 years of data.
  - Matt: It's a longer-term paradigm. This is also true when thinking about loads from year to year.
- Karyn: Neat, I will be taking this back to the NYDEC watersheds group. I was wondering about residence time and how you're looking at that. I think of residence time as lake specific, so how is it evaluated for different bays in Lake Champlain? Does that translate into a lake specific residence time?
  - Peter: For this study, there are some estimates I've pulled from the literature. You can think about residence time in terms of a whole lake or more specific locations. In Lake Champlain, individual bays are pretty isolated, so thinking of them separately makes more sense to me. I've been talking to USGS about getting a more specific study using tracers, which would plug into our equation nicely. Residence time overall would be important for a range of lake questions.
- Jamie: Nice presentation, I learned a lot. Especially that the source of organically complex P may be the most important source for resuspended internal P - very interesting. Expressing internal loading as a percentage really puts it in nice perspective, but wonder for the paper since that initial starting concentration for the lake is a moving target, if you would want to express that differently?
  - Peter: So, expressing it in terms of how many mg/L are the result of internal loading?
  - Jamie: Yes, since that percentage would be higher if we succeed in lowering in lake concentrations.
  - Peter: I do think reducing overall in lake concentrations would have an indirect result of lowering DP as well. The equation would be applicable for a given length of time. I wouldn't try to do this analysis on a year-to-year basis, but you could do it for blocks of years.
- Neil: If we center in on needing to reduce DP, my reaction would be, we need to go after those things producing DP. Certain voices may suggest that the source that is highest in DP would be wastewater = so we need to go after that over any other source. We might want to do some analysis - what is the proportion of DP coming from a WWTF, and what is the proportion of that DP coming from FWMC in a river? Another thing I think about, especially bearing in mind that nutrient reductions from WWTF are the most expensive. There's a lot of practices that produce DP reductions by dint of the reduction of TP - tile

filters, ag, stormwater. Lots to unpack. The message isn't simply, 'find the highest proportion DP sources and cut those down'.

- Peter: We are measuring DP at the mouths of rivers. Looking at things from this lens, things like streambank erosion from non ag areas, might be less important to meeting overall nutrient reduction foals. Erosion of ag sediments will still be an important contributor of DP, but less important than pure dissolved runoff.
- Matt: We've talked about messaging and are landing on that we want to communicate this more as – 'how do we complete the picture'. Just because something is contributing DP, its overall load might be small, and it could be an overall low contribution to FWMC. One other point on making reductions, like we do on TP, we want to think about the reducible DP. We are never going to get some of these streams to 0.
- Peter: This is a really useful frame for looking at FWMC. We can use DP and do an analysis based on land use for different catchments to determining a reasonable baseline for reductions, then use that to set targets.
- Matt: Not to say that targeting TP will not have a benefit, since DP is a fraction of that.
- Chris: To reinforce messaging - I am working in restoration world with landowners on the landscape. I could see ag users say "we've been saying all along it's the WWTFs!". Messaging on this may be critical given how we've been rolling out messaging for the last couple of decades.
- Neil: Peter mentioned streambank erosion. Generally, our goal is to set the table for stream equilibrium, not targeting erosion only/specifically. Stream equilibrium restoration creates space for floodplain access and spreading P out on landscape.
- Bryan: Nice to see your presentation, Peter. I am thinking about where the web takes us through this and how far-reaching this could go. I am thinking about timeliness in terms of tactical basin plans and long-term planning goals - how we could use this lens to fine tune those plans and opportunities. We are looking at accountability frameworks and thinking about pace of progress - why we take certain approaches, why timelines are the way they are. This approach feeds in to our total understanding for EPA to consider the TMDL under, and provides more tools to fine tune our approach. I also think about linkages to other part of our agency – this could be an opportunity to bring nutrient experts in and build connections. I appreciate this work, I'm seeing good outcomes, and I'd like to engage more past this meeting with other EPA contacts.
  - Peter: I think it would be interesting to apply this to a more nationwide study.
  - Neil: Great context! Adaptive management in real time
  - Matt: We are incredibly lucky that folks in the early 90s who developed the LTMP began collecting these data then that allowed us to do this analysis. That's a huge benefit of the dataset that's been built over the last 35 years.