

April 13, 2026 CAC Meeting

CAC Members Present: Lori Fisher, Denise Smith, Breck Bowden, Evan Fitzgerald, Eric Clifford, Andrew Milliken, Bob Fischer, Carol Ode, Hilary Solomon, Alison Spasyk.

Public: Alexa Lewis (Charlotte), Crea Lintilhac (Shelburne), Jim Carrier, Jed Davis

Presenters: Heather Darby, Margaret Murphy, Roz Renfrew, Joshua

Introductions

- Karina is at LCBP steering committee field trip, steering committee meeting next two days
- Breck moves, Eric seconds to approve November, December, January, February, March meeting summaries
 - Breck, Hilary, Lori abstain from approving for March

Presentation from F&W

- Rosalind Renfrew - Wildlife Diversity Program Manager for F&W - wildlife not hunted or fished for all of Vermont
- Margaret Murphy - Fisheries program manager for western part of the state.
- Ros discussing how the State Wildlife Action Plan works, what it does, Margaret will focus on Lake Champlain issues.
- Jon Kart is the coordinator of the plan
- Wildlife Action Plan is required for federal State Wildlife Grants so all states have them, updated every 10 years started in 2005 in Vermont
- What are the priorities, what actions are needed is what the plan covers
- Vermont State Wildlife Grant Apportionments - state provides 30% match to the federal grant, donations to the nongame fund is important to fund this match. Total budget for their work is around \$600,00 for the last few years
 - Works with partners to get all the work done, work is way beyond what \$600,000 can cover from the State
- The Action Plan is the blueprint and guide for everyone for species and habitat conservation in Vermont
- Focuses on species most in need/most vulnerable - Species of Greatest Conservation Need (SGCN)
- Plan asks - How are species doing, what problems do they have, what can be done?
- Species level - what is the identified distribution of SGCN, habitat needs or concerns, threats, research monitoring needs, actions that can be taken to respond to that.
- First one done in 2005 was a big lift, 2015 did a revision, added Vermont Conservation Design, added climate change section and plant section. In 2025 a second revision added conservation at three scales - species, habitat, and landscape. Also added actions for specific habitats, added fungi section, working on a searchable database to broaden communications and engagement.

- Taxa Teams evaluate SGCN - mammals, birds, inverts, plants, fungi, fish, reptiles and amphibians.
 - Rely on scientific experts to inform the specific taxa and conservation needs. Much of this is done on a volunteer basis from the experts.
- Determining Species of Greatest Conservation Need
 - Population Status - ranks of rare/endangered, population declines
 - Vulnerabilities - habitat loss/fragmentation, limited populations, high threats
 - Other Potential Factors - regional responsibility for the population that are doing better here than other places, life history traits (such as very slow to reproduce) can factor into the determination for SGCN.
 - If there is some urgency to the species need
 - Example - Wright's spikesedge - 21 populations in Vermont. Climate change, shoreline development, drought/flood, beach raking, trampling, geese browse have caused population decline.
 - Sometimes species are identified as need to learn more, or put on a watchlist to monitor the species.
 - Carol Ode - Could other states share funding for species that we are maintaining on behalf of a region?
 - That would be great, but we would also have to give some of our funding up for species that they are maintaining, so it would be a little complicated to operationalize. We have a regional group that assesses the needs at the northeast level. All the states contribute to that regional funding.
- Conservation Across Scales - all necessary, need to be approaching them simultaneously
 - Species
 - Habitat - wetlands, forests, rivers, grass, shrub
 - Landscapes - large blocks of habitat, watersheds, connections
- Species can help "hook" people into the discussion
- Wood turtle good example of how to support wood turtles at all scales
 - Species - timber harvesting, delay mowing, raise decks, restrict motor vehicles, create/improve road underpasses, remove pond sliders, enforce poaching
 - Habitat - protect riparian areas and wetlands, remove invasives
 - Landscape - protecting watersheds, blocks of riparian buffers, conserve lands
- Bob - are there metrics that track the species of greatest conservation need on how they are doing?
 - Really dependent on the taxa, birds have much better data than others. Invertebrates are really hard to track and survey. It depends on what taxa and how easy it is to survey. How all species of greatest conservation need are doing is difficult to know. Species of Greatest Conservation Need means that they are in a very vulnerable condition so most of the species are not doing well by any means.
- The plan uses Vermont Conservation Design as a tool to identify habitat and landscape features for conservation

- Breck - does the plan speak to the impact of development on habitat, and pressures of accelerated development with the housing need?
 - The plan is organized by species, but also habitats and landscapes more broadly. Development is mentioned in the habitat chapter and in the species sections when relevant. Human response to flooding can have a big impact.
- Andrew - our plan addresses flood mitigation which focuses on protecting wetlands/can that be expanded to SGCN? What is the federal funding situations for this work?
 - America the beautiful act would have increased funding by tenfold, would have been huge change in what could be done, but it wasn't passed. Trump administration zeroed out the budget for State Wildlife Grants but congress did not agree and it would likely be funded again. State Wildlife Grants have strong bipartisan support.
 - There are many species in Lake Champlain like softshell turtles and endangered birds that could be mentioned in the CAC plan, habitats like sandy beaches that support specific plant species are very rare that also factor into flood mitigation discussion.
 - Hilary - trying to do work in the headwaters, been thinking of species in their most northern and southern extent, is there any part of the plan that speaks to the changes that are happening and tools in the plan to talk to landowners.
 - The plan is usually general, the plan wouldn't recommend a specific practice for specific land, that is the next level of detail. The plan's role is to communicate the species of greatest need, their habitats, and areas of priorities, so that you can be aware of working towards big goals
 - Margaret - 98 fish species, about two thirds of those are in Lake Champlain.
 - Added a lot of species this year to the SGCN list, habitat degradation, flooding, drought, extreme fluctuations, flooding response which can often cause more damage than the flood are all leading to population decline for fish. Whatever happens in the watershed will end up reflected in the water. For example, flow regime impacts ability to spawn.
 - What puts a species on the watchlist?
 - Not SGCN status, indicates potential to become SGCN, or regional interplay to watch out for
 - Alison - Response to flooding causing damage - what do you mean?
 - Removing wood, dredging sediment, rip rapping with big machines can exacerbate problems and increase flow rate. Finding capacity to hold flood water is critical. Don't get to that level in the plan, but allowing rivers to move and leaving wood in the river is important.

Presentation Joshua Faulkner

- Vermont is getting wetter, farms have recognized that something needed to be done to maintain productivity, so tile drainage started to be of interest.
- 2023 was the wettest years since monitoring in 1895
- Excess moisture accounts for 60% of crop failures from data in insurance payouts

- This is very different in the south and west where drought is a main concern
- What is tile drainage?
 - It used to be made of terra cotta clay which is why it is called 'tile', now it is black corrugated pipe
 - It is artificial drainage under the roots, a piping system used since ancient times, usually placed about 30-40 inches below the surface
 - Farmers use it to improve crop production and alleviate year to year variability, it allows earlier and later field operations, allows machines to get into the field without damaging the soil or compacting the soil overmuch which also improves yield.
 - Can yield 30% increase over 25 years in crop and soybean study
 - No drainage, surface drainage (ditching), tile at 100 ft spacing, tile at 50 foot spacing study showed a 1-4 yield ration between no drainage and tile drainage every 50 ft.
 - Cost of putting in tile is paid off in 4-6 years
 - Compaction - bearing pressure is limited by drier soils. Deep compaction (18-24 inch depth) is very hard to reverse or manage
 - What about drought/dry years?
 - It doesn't drain out excess water in a drought year, it keeps the water level low during the early season which makes the plant produce deeper roots which makes the plants grow deeper roots,, helping plants be resilient to drought.
 - Drainage has been an agriculturally necessary in this state since Europeans have been farming here
 - Done through configurations of laterals feeding into a main pipe, could be arranged into different forms.
 - Environmental concerns
 - It was believed that phosphorus wouldn't be carried by tile drains because of binding to soils, but that has been proven wrong. Much of this came out in the 20teens which started monitoring in Vermont.
- Preferential Flow Concept
 - Water moves through the soil evenly through the soil matrix, but that's not what happens with preferential flow, it's not even, it will find its way through cracks or pores and move rapidly through that space, if that intersects with a tile drain it can transport pollutants very quickly. Especially in clay soils like in lake champlain basin such as Addison County.
 - Tile drainage has an attenuating effect on hydrology, in still dampens the hydrograph, because the water moves through the soil and pipe instead of running off the surface
 - Complicated issue, benefit to the farm, environmental concerns while decreasing surface runoff and thus erosion through ephemeral gullies, improved yields means more fertilizer has been taken up by the plants
 - Total Annual Phosphorus Loss from Dead Creek Fields
 - Around 1% of phosphorus applied is lost through tile drains

- Have installed tile drain filters, using pea gravel and iron shavings for the phosphorus to bind to, has removed 69% of cumulative TP load over several years, 87% of soluble reactive phosphorus.
- Bob - What's the lifespan of the filter?
 - Design life was 15 years, at that point designed to remove 50% of Phosphorus, and will see declining removal and performance after that. Would need to be replaced after that. Material could be used as fill responsibility.
- Lori - what is the cost of the filter? Do we know where all the tile drains are and how old they are?
 - They were installed for about \$5000-\$6000 for about 10-13 acres of tile drain system. I don't know if there are any good maps or reports on location or age of tile drains.
- Crea - Alexandra Drizo (UVM) removed P via steel slag aggregates. Do you use her technology now? Has the technology evolved?
 - I am familiar with that, with precipitation there was issues with pH that would end up calcifying and clogging the system. A lot of work has been done on this and has been researched continuously. In 2023 the pea gravel and iron shavings were the best material to use
- Breck - where do you get the iron?
 - Bought it out of Illinois from a company that creates iron shavings, could use iron waste shavings if they were clean and didn't have any oil contaminants on it. If you have an industry that produces iron shavings.
- Carol - Is there any way to figure out where tile drain is necessary and pay for the drainage and/or filters?
 - Conservation districts have helped pay for tile drains in the past, but there is not an appetite for that now. USDA will help pay for filters, but there is really no benefit to the productivity to the farms so it is hard to catch on with farmers.
- What is the added cost of the filters to the tile drain system percentage wise?
 - \$1400 for tile drainage, \$5-\$6000 for filters.

Heather Darby

Is tile drainage a conservation practice?

- Put out a survey of farmers to understand impact of tile on the landscape, where it's located, who's using it, farm testimony about impact of tile on their farm
- Overall, I heard from the survey that tile is a conservation practice because it helps utilize conservation practices and be on the ground under more favorable conditions.
 - Improves field conditions, increases no till, increases cover crops, increases reduced tillage, increases yield, timeliness of planing, manage applications, tillage operation, timeliness of fertilizer applications, reduces pesticide use
 - It allows for greater implementation of agronomic practice, utilization of conservation practices, and increases viability
- 60,000 acres in Vermont are farmed, 15% of that are tile drained.
 - Field crops are the most common crop used with tile, although hay and pasture were also using it, but all types of farmers utilize tile.
- Before tile drainage in one year out of five,

- 75% experience crop failure, 98% experienced depressed yields, 99% implemented field practices in less than ideal conditions, 0% met or exceeded yield goals in all five years
- After tile
 - 80% had yield improvement, 95% had more timely implementation of field practices
- “Without tile, we would have to double our environmental footprint in acres to obtain the same volume of crops”
- Allows farmers to meet goals without increasing pesticide or fertilizer rates
- Helps farmers reduce/eliminate tillage, increase cover crops, reduce pesticides, more able to implement practices in Nutrient Management Plan by being able to distribute and spread nutrients in a more timely way
- Discovery Farms - best management practices study for tile drains in Vermont.
 - New project, farmer driven, farmers invested in setting up a field to study tile and impact soil, water and crops
 - Project set up in St. Albans Bay on commercial farm on heavy clay soil
 - Site is set up with two tile systems, with BMPs (cover crop, no till, manure injection) and “business as usual” conditions (cover crop, tillage, manure spreading), two sections without tile that repeat the farming practices as controls. At the edge of the field there is monitoring to collect water from the tiles and surface runoff on each of the four parcels.
 - Wrapping up the second year of implementation, going into the third year so a lot to come.
 - Cover crop biomass production - very different tile/no tile, using BMP practices with tile producing more than double the cover crop biomass than without tile, and more than four times the biomass that “business as usual” conditions. Cover crop helps protect water quality
 - Ground cover - Tile and BMPs the most ground cover
 - Pre-Sidedress Nitrate Tests - in tiled area when tested soil for nitrates before treatment for the growing season, tile section maintained nitrogen, which meant that farmers needed to apply ~45 less nutrient to meet yield goals
 - Crop yields - tile and BMPs double the yield with 45% less nitrogen
 - One year into implementing the treatments, on clay soils no till is not usually done, so looked into success on clay. Planted cover crop according to BMP with no till on clay soil and had the same yield as the tilled section with tile. This supports what the farmers were saying in the survey that they were better able to implement no till with tile drainage. 20-50% more yield in first year with tile.
 - Tile, no till, more cover crop biomass, then went into a drought, had suppressed yields. The cover crops had used a lot of water and nutrients in a drought year.

- Right now they have funding until the end of 2026. Also looking at Green House Gas emissions, so hopeful that the experiment continues, needs more funding.
- Breck - fantastic data - farmers on clay tend to use no till or do till?
 - They still till. Doing no till is very difficult.
 - Why?
 - To aerate the soil, dry it out/warm it out. Farmers tend to use a lot. Compaction, excess moisture is hard to address without tillage.
 - Tillage tends to happen in the fall?
 - Yes.
- Using tile and BMPs in connection to each other to keep soil health and water
- Breck - did you measure other soil other than nitrates?
 - Now also measure gasses leaving soil, nitrous oxide, trying to look at the whole nitrogen cycle, so phosphorus, and nitrite ammonium.
- Rolling and crimping strategy a primary issue has been managing moisture on organic farms, if we let the cover crops go, it can dry the ground out but then if you go into a drought, then the soil is overly dried.

MOU is being discussed tomorrow at the steering committee.

Consideration of recognition of Mark Naud at retreat to do something to recognize the contribution he's made with the MOU work. Could name an award after him? Give a gift certificate? Framed photos? Lori and Denise to figure out what would be meaningful for him.

Denise and Karina spoke with Jane Clifford about her interest in joining the committee, Denise and Karina both recommended her. Has a lot of really important background in water quality and agriculture. Bob also highly recommends her. Breck agrees.

Meeting with the Governor - Thursday at 11. Karina will plan on doing a broad overview of CAC, who we are and priorities, Denise will discuss the graphic and elaborate. and then likely pass to Breck for Climate Resilience, then Bob for contaminants, then Andrew for AIS and Lake Access?

- Anderw/Hilary will connect on south lake access work that is being done.
- Whoever can, plan to meet early in the cafeteria to discuss the plan.