

## Appendix D – Conservation Action Plan (CAP)

**Name of District:** Caledonia County Natural Resources Conservation District (CCNRCD)

**Geographic Territory:** Caledonia County, Vermont

**Prepared by:** Taylor Johnson, Conservation Specialist

**Date:** May 2, 2025

### **Describe methodology for creating plan:**

In Vermont, it is important to acknowledge that there are a wide variety of agencies and organizations working on statewide and regional planning documents related to conservation and natural resources. This plan was developed by synthesizing available information regarding natural resource concerns in Caledonia County, Vermont. With this Conservation Action Plan, we do not seek to repeat the good, thorough work that has already been done through the following planning and data gathering processes, but instead we will focus on synthesizing the community feedback we received through the locally led conservation process, and concentrate on what CCNRCD specifically can contribute to natural resource conservation in Caledonia County. Work that already exists includes:

- Vermont Agency of Natural Resources, Department of Environmental Conservation Tactical Basin Plans
- Vermont Conservation Design
- USDA NRCS Web Soil Survey data
- Vermont State Hazard Mitigation Plan (SHMP)
- Landslide Inventory of Caledonia County, Vermont (Vermont Geological Survey)
- USDA NASS Census of Agriculture data
- University of Vermont's 2021 Vermont Climate Assessment, Vermont Fish & Wildlife Department Wildlife Action Plan
- State Hazard Mitigation Plan (SHMP) – Vermont Emergency Management/DEC.
- Road Erosion Inventories, required by the Municipal Roads General Permit
- Vermont Agency of Natural Resources, Department of Environmental Conservation River Corridor Plans

**Set overarching vision including climate-smart agriculture and forestry activities:** The vision for Caledonia County is a landscape where resilient and self-sustaining agricultural and forestry systems thrive in harmony with healthy ecosystems and human communities. This will be achieved through the widespread adoption of practices that enhance soil health, optimize water management, support diverse wildlife habitats, and mitigate the impacts of extreme weather events. We envision a community of landowners, agencies, and municipalities that value and actively participate in holistic conservation planning to ensure the long-term productivity and ecological integrity of Caledonia County for current and future generations. This includes

supporting local food security and the economic viability of small-scale producers through education, technical assistance, and access to resources.

*A note about the measurable conservation goals and objectives: The conservation goals and objectives listed in each section are examples of ways that progress in each subject area could be measured; they do not necessarily represent data that CCNRCD is already collecting, nor do they represent data that is currently possible for us to collect or even facilitate the collection of by other organizations, given our capacity and role in Caledonia County. Rather, the measurable conservation goals and objectives represent possible metrics to consider.*

## Soil

**Brief Description of current state of knowledge/barriers:** While a comprehensive USDA SCS Soil Survey Report for Caledonia County isn't available, Web Soil Survey provides detailed soil classification, land use, health indicators, limitations, and productivity data. Anecdotal evidence from NRCS EQIP applications through the St. Johnsbury Field Office and local knowledge points to concerns regarding soil erosion from agricultural lands, roads, and riverbanks. Farmland compaction, particularly on hayfields, is also an issue. The increasing frequency of intense rainfall events exacerbate erosion and can lead to saturated soils. The Landslide Inventory of Caledonia County, in particular, highlights areas prone to soil instability and with the assistance of CCNRCD many towns have completed Road Erosion Inventories to prioritize dirt roads most in need of renovation. 14% of farmland in the county is classified as prime soil, however fertility is decreasing over time; access to local nutrient sources is becoming limited as dairy businesses close. Finally, more than 70% of agricultural soils are considered drought-vulnerable.

### **Priorities for Addressing Conservation Needs:**

- Promote widespread adoption of soil health management systems on annual agricultural lands, including cover cropping, reduced tillage, and diverse crop rotations
- Provide technical assistance and resources specifically targeting soil compaction and fertility on hayfields
- Address critical erosion areas along rivers, streams, and roads through stabilization and buffer establishment.
- Support efforts to minimize soil disturbance in forestry operations and erosion on forest roads.
- Support practices that build soil carbon stocks and increase organic matter content on farms for increased drought resiliency of soils and heat stress tolerance
- Encourage soil testing to inform nutrient application decisions and monitor soil health indicators, including organic matter and nutrient levels.

- Provide technical expertise, grant navigation, and transition planning assistance to farms, especially dairies, to ensure working landscapes remain economically viable and continue to build soil health through regenerative/closed loop agricultural practices.

**Measurable Conservation Goals and Objectives:**

- Number of acres implementing cover cropping
- Number of acres implementing nutrient management plans
- Number of farms utilizing reduced tillage or no-till practices
- Miles of new or enhanced riparian buffers
- Number of town officials report that increased knowledge of and active participation in REIs per the MRGP
- Number of annual soil health assessments on farms

**Conservation Technology Needed to Meet Goals and Objectives:**

- More widespread availability and adoption of:
  - No-till and reduced tillage equipment
  - Compaction mitigation equipment, such as subsoiler or aerator
  - GPS and precision agriculture technologies for nutrient management and participation in UVM on farm research opportunities.
  - Soil health testing, probes, and lab analysis.

**Programs and Services:**

There are many service providers that already work in Caledonia County to address soil natural resource concerns, contribute towards the measurable conservation goals and objectives, and in many cases already provide the conservation technology described in the sections above. These service providers include UVM Extension, NRCS, and CCNRCD. Existing programs and services include:

- On-farm soil sampling and health indicators – CCNRCD, NRCS.
- Soil testing analysis and interpretation – UVM SHREC, NRCS.
- Nutrient Management Planning – UVM Extension, CCNRCD, private consultants.
- Hayland compaction research – UVM

**Need for New Programs or Processes:**

In order to adequately address the scale of soil conservation needs, the priority should be more capacity for the already existing services. For example, while UVM Extension and CCNRCD provide soil sampling services, the need and interest is far greater than existing capacity.

New programs would also help address the soil conservation needs outlined here. This may include:

- A local fund pool through NRCS EQIP that provides financial and technical assistance to landowners related to soil conservation needs
- A program that provides more intensive technical assistance and cost-benefit analysis for farmers to implement soil health management systems.
- A county-wide strategy for prioritizing and addressing critical erosion sites that analyzes impacts of primary tributaries and sub watersheds to downstream processes
- Further research specific to Caledonia County on the long-term impacts of hayland compaction and effective mitigation strategies.

### **Responsibility for Action and Time Schedule:**

Given our current capacity and role in Caledonia County, CCNRCD can serve as a lead for program navigation/outreach for landowners, can provide some technical assistance, and can assist with municipal project implementation. Other organizations, such as NRCS, UVM Extension, VT DEC, VTrans, NVDA, and NOFA VT also address soil conservation needs, and will continue to do so into the future.

CCNRCD will apply for a local fund pool for FY26 that will address soil natural resource concerns. The practices included in our local fund pool will build resiliency by addressing soil health, water quantity and distribution, and crop production.

## **Water**

**Brief Description of current state of knowledge/barriers:** Caledonia County features three main watersheds: Passumpsic; Upper Lamoille; Stevens, Wells and Connecticut River Direct. The VT Department of Environmental Conservation (DEC), with input from local stakeholders, maintains a Tactical Basin Plan for each main watershed in the State. These plans serve as the guidance documents for identifying and prioritizing projects and tracking progress. In Caledonia County, the Basin 14 plan includes 56 strategies related to agriculture, developed lands, wastewater, and natural resources, and Basin 7 includes 140 targeted actions and over 1000 individual related projects. In 2024, the Passumpsic Tactical Basin Plan (Basin 15) was updated to include 56 priority strategies.

These documents, along with many other existing high-level plans created by other agencies and partnerships, highlight several key water resource concerns in Caledonia County:

**Land Use Impacts:** Development and agriculture lead to habitat discontinuity for threatened and endangered wildlife species and degraded water quality from stormwater runoff, septic issues, and nutrient overapplication.

**Priority Areas:** Degraded water quality trends are noted near residential and road development (e.g., Passumpsic south of St. Johnsbury) and areas with concentrated agriculture (e.g., Scotch Burn Brook, Ticklenaked Pond).

**Erosion and Flooding:** Increased storm intensity and precipitation are increasing flooding and water quality impairment.

**Nutrient Loading:** Excess nitrogen is a growing concern for agricultural areas draining to the Connecticut River Basin, while phosphorus continues to be a concern on farmland in the Lake Champlain watershed.

**Shoreland Disturbance:** Disturbance of shorelands due to residential development contributes to degraded lake water quality and habitat.

**Road Erosion:** Erosion from hydrologically connected forest roads, including on ANR-owned lands, contributes to sediment and phosphorus loading.

#### **Priorities for Addressing Conservation Needs:**

- Support agricultural Best Management Practice (BMP) outreach and practice implementation including program navigation to applicable financial assistance and development of nutrient management plans
- Address stormwater management from developed lands through mapping, prioritization, and implementation of stormwater projects
- Reduce road erosion through inventories and implementation of best management practices, including on forest roads.
- Address critical erosion areas along rivers, streams, and roads through stabilization, buffer plantings and floodplain access
- Promote conservation easements and strategic acquisitions of river corridor parcels
- Restore and protect wetlands for their water quality and flood mitigation benefits, including assessing and potentially reclassifying high-value wetlands.
- Promote agricultural water conservation practices in agriculture and other sectors to enhance drought resilience.
- Increase farmer awareness and implementation of practices to enhance soil water infiltration and water-holding capacity to improve drought resilience and reduce surface runoff of nutrients.

#### **Measurable Conservation Goals and Objectives:**

- Monitor phosphorus loading in impaired water bodies, including those formerly classified with TMDL limitations such as Ticklenaked Pond
- Increase the number of small farms implementing comprehensive nutrient management plans
- Acreage of protected wetlands through conservation easements or other mechanisms
- Municipal progress on addressing high priority road segments identified in Road Erosion Inventories (required by the Municipal Roads General Permit)

- Number of farms accessing technical and financial resources for irrigation water management
- Develop accessible methods to track and quantify nitrogen loading into the Connecticut through on farm research
- Identify priority streams (wildlife connectivity, water quality, and flood mitigation) and continue to install riparian buffers on private lands
- Implement aquatic organism passage projects
- Improve wood turtle and other important species habitat through riparian restoration and conservation easements throughout the county
- Number of towns with updated and implemented Local Hazard Mitigation Plans
- Partner with lakeshore housing groups to increase awareness of Shoreland Best Management Practices and assist landowners with project implementation

**Conservation Technology Needed:**

- Improved manure storage and handling systems
- Streambank stabilization materials and techniques
- Rainwater capturing system design for municipalities and landowners
- Stormwater management infrastructure (e.g., rain gardens, permeable pavement, culvert upgrades)
- Irrigation water management tools and technologies

**Programs and Services:**

- DEC Water Quality Programs and Monitoring.
- NRCS Environmental Quality Incentives Program (EQIP)
- CCNRCD technical assistance and grant programs (as available)
- Vermont Clean Water Initiative Program (VCWIP) grants
- FEMA Hazard Mitigation Assistance programs

**Need for New Programs or Processes:**

- Develop targeted outreach and financial assistance programs for stormwater management on small developed parcels, including rain gardens, culverts, and water catchment
- Enhance collaboration between agricultural and municipal sectors on water quality protection
- Conduct a comprehensive assessment of wetland function and restoration potential in the county
- Direct specific funding opportunities toward riparian restoration, on-farm water management practices, wetland and river corridor easements, stormwater infrastructure upgrades, forest road erosion BMPs, and municipal road erosion projects

**Responsibility for Action and Time Schedule:**

This has already been adequately outlined in the VT DEC Tactical Basin Planning Process for each watershed. Please see strategy tables.

Given our current capacity and role in Caledonia County, CCNRCD can serve as a lead for program navigation/outreach for landowners, can provide some technical assistance, and can assist with municipal project implementation. Other organizations, such as NRCS, UVM Extension, VT DEC, VTrans, NVDA, and NOFA VT also address soil conservation needs.

CCNRCD will apply for a local fund pool for FY26 that will address water natural resource concerns. The practices included in our local fund pool will build resiliency by addressing soil health, water quantity and distribution, and crop production.

## Air & Energy

**Brief Description of current state of knowledge/barriers:** The current understanding of air quality in Caledonia County indicates a complex situation influenced by both local and external factors. Out-of-state emissions of sulfur and nitrogen oxides contribute to air pollution in the region, as noted in the Basin 14 Tactical Basin Plan. This plan also highlights the impact of acid rain deposition on aquatic ecosystems, with ongoing monitoring at Levi Pond in Groton. The Regional Haze State Implementation Plan addresses visibility concerns in nearby Class I areas, identifying in-state sources like Ryegate Associates, LLC, within Caledonia County, as a significant emitter of nitrogen oxides. Furthermore, the Vermont Climate Action Plan underscores the need to reduce greenhouse gas emissions from sectors such as transportation, building energy, and agriculture, which inherently affect air quality. Key challenges include the difficulty in tackling pollution transported from outside Vermont, a lack of detailed air quality data specific to Caledonia County, and the overarching need to transition to cleaner energy across various sectors coupled with cultural opposition to moving away from traditional wood heat or fossil fuel driven vehicles.

### **Priorities for Addressing Conservation Needs:**

- Reduce emissions from heating by supporting the transition to cleaner heating alternatives, including in agricultural sectors like maple production, and improving building energy efficiency
- Promote agricultural equipment upgrades and practices that minimize air pollutant emissions, including nutrient off gases from unincorporated manure
- Protect and enhance forest health and agroforestry practices to support carbon sequestration and air pollutant removal
- Raise awareness of existing state planning documents and reports to the general public and conservation service providers

### **Measurable Conservation Goals and Objectives:**

- Increase adoption of higher-level nutrient management strategies farms, including innovative technologies like manure drag lines, anaerobic digester energy capture, or pre-sidedress nitrogen testing and application
- Increase number of farms participating in equipment rental to reduce emissions related to manufacturing of new farm equipment
- Improve outreach to maple producers on cost-share options for reverse osmosis equipment to reduce wood fuel consumption
- Educate landowners on carbon sequestering benefits of agroforestry and riparian buffers
- Facilitate energy efficient irrigation and heating on farms, including installation of solar heated high tunnel systems.

**Conservation Technology Needed:**

- Technical assistance and equipment (e.g., manure drag lines, anaerobic digester energy capture, pre-sidedress nitrogen testing and application)
- Agricultural equipment available in county or Northeast Vermont region for rental programs and trials
- Energy-efficient irrigation and heating designs for individual farm needs

**Programs and Services:**

- Existing planning and strategy documents including Tactical Basin Plans (Basin 14, Passumpsic River Basin), Vermont Climate Action Plan, Regional Haze SIP, Agricultural Best Management Practices (BMPs)
- Nutrient Management Planning services through CCNRCD, UVM, and NRCS
- Technical and financial assistance through NRCS, VAAF, and state energy efficiency programs & rebates

**Need for New Programs or Processes:**

- Improved data collection and monitoring of air quality specific to Caledonia County
- Outreach through trusted community organizations to support the transition to cleaner heating alternatives, farm equipment upgrades, and address cultural resistance to change
- Strategies to better integrate air quality considerations into agricultural practices and planning
- Research, demonstration sites, and workshops related to agroforestry and energy efficient farm technologies local to the county
- Additional targeted training for technical service providers to facilitate applications to existing NRCS air and energy conservation related practice

**Responsibility for Action and Time Schedule:**

Many groups in Vermont already play a role in addressing air and energy conservation needs. CCNRCD can continue to provide technical assistance and program navigation services. Other organizations that may contribute to addressing air and energy conservation needs include:

- Vermont Agency of Natural Resources (ANR) Department of Environmental Conservation (DEC)
- Northeastern Vermont Development Association
- Vermont Climate Council
- NRCS provides technical and financial assistance through EQIP and other programs
- Municipal partners

## Plants & Animals

**Brief Description of current state of knowledge/barriers:** Caledonia County's approach to plant and animal conservation is significantly shaped by statewide initiatives, as county-bounded data is limited. The towns of Hardwick, Greensboro and Burke have undergone ecological inventories/ natural resource assessments to provide local analyses of opportunities and challenges for biodiversity and natural communities. State managed areas like Groton State Forest, Steam Mill Brook WMA, Roy Mountain WMA, and Bald Hill WMA are significant habitat connectivity blocks with dedicated management plans. Management strategies include monitoring and habitat protection for several rare and uncommon animal species, including bats (some state-listed as endangered due to White-nose Syndrome), the Canada lynx, and the American marten. Additionally, the wood turtle is a semi-terrestrial turtle found in the county that is listed as a species of special status.

Overall, forest health is a concern, with the Vermont Department of Forests, Parks, and Recreation (FPR) actively monitoring forest damage caused by insects, diseases, and other stressors. In 2019, aerial surveys documented 76,896 acres of forest damage across the state. Several aquatic invasive plant species are known to be present in Caledonia County, including Eurasian watermilfoil, water chestnut, European frogbit, yellow flag iris, Japanese knotweed, and purple loosestrife. Waters are additionally impacted by Zebra mussels, spiny waterfleas, rusty crayfish, Asian clams, Alewife, rudd, tench, and Chinese mystery snail. Common invasive plants in the area include common and glossy buckthorn, bush honeysuckle, burning bush, barberry, multiflora rose, and Japanese knotweed. Invasive insects of concern include the Asian longhorned beetle, emerald ash borer, and hemlock woolly adelgid. Invasive species pose a substantial threat to Caledonia County's native biodiversity, disrupting habitat structure and ecological processes.

Habitat fragmentation and loss, driven by development and changes in land use management, remain significant concerns for maintaining native biodiversity and ecological connectivity in the county.

### **Priorities for Addressing Conservation Needs:**

- Conserve and enhance critical habitats and connectivity corridors, as identified in the Vermont Conservation Design
- Manage and control invasive species to protect native biodiversity
- Promote forest health and resilience through sustainable forest management practices and strategies to mitigate the impacts of forest pests and diseases
- Implement strategies to help species adapt to climate change, such as protecting climate refugia and enhancing habitat connectivity
- Protect and restore aquatic habitats to support native fish and wildlife, including vernal pools and wetlands
- Minimize habitat fragmentation and loss through responsible land use planning
- Implement the Vermont Wildlife Action Plan to conserve Species of Greatest Conservation Need (SGCN)

**Measurable Conservation Goals and Objectives:**

- Identify critical habitat as identified in the Vermont Conservation Design in Caledonia County and provide targeted outreach
- Control invasive species on priority conservation lands
- Increase the number of landowners, especially small parcels, implementing ecological forest management plans
- Restore riparian buffers to enhance aquatic habitat
- Upgrade culverts to allow for aquatic organism passage
- Establish new habitat connectivity corridors
- Install pollinator and wildlife conservation practices on farms

**Conservation Technology Needed:**

- Remote sensing for forest health monitoring
- Equipment and techniques for invasive species control
- Database for invasive species tracking

**Programs and Services:**

- Vermont Conservation Design
- Current Use (UVA) Appraisal (VT FPR)
- Vermont Family Forest Carbon Program
- Forest Stewardship Program (USFS)
- Vermont Forest Invasive Pest Status Map (VT FPR)
- Pollinator Pathways
- Conservation District Native Plant Sales
- Landowner assistance programs (VT FWD, VT FPR, NRCS)

- Conservation easements and land acquisition programs (Vermont Land Trust, Upper Valley Land Trust, Passumpsic Valley Land Trust, etc.)
- Vermont Fish and Wildlife Department (VFWD) is the lead agency for wildlife conservation
- Vermont Department of Forests, Parks, and Recreation (FPR) is the lead agency for forest health and management
- Department of Environmental Conservation (DEC) provides overall coordination of natural resource conservation efforts, including invasive species tracking

**Need for New Programs or Processes:**

- Dedicated funding for long-term monitoring and management of invasive species
- Dedicated funding for installation of pollinator and wildlife plants at municipal, homeowner, and farm scale
- Additional research on impacts of invasive species to ecosystem health, including impacts to forestry and agricultural productivity and economic considerations for the region
- Increased collaboration between agencies and organizations to address habitat fragmentation across jurisdictional boundaries, including a focus on development planning that prioritizes connectivity.
- Outreach, dedicated incentives and technical assistance for landowners to implement ecological forestry and agricultural practices that support plant and animal species especially with forgone income considerations
- Concentrated adult education and citizen science outreach to promote the importance of local biodiversity conservation, highlight Caledonia County species of concern, and provide guidance to available informational resources

**Responsibility for Action and Time Schedule:**

Many groups in Vermont already play a role in addressing plant and animal conservation needs. CCNRCD can continue to provide technical assistance and program navigation services to Caledonia County landowners. CCNRCD will also continue to partner with other conservation organizations that work in Caledonia County (including Trout Unlimited, Passumpsic Valley Land Trust, and Connecticut River Conservancy) to implement aquatic organism passage projects and enhance riparian buffers.

CCNRCD will apply for a local fund pool for FY26 that will address plant natural resource concerns. The practices included in our local fund pool will build resiliency by addressing soil health, water quantity and distribution, and crop production.

