



LAKE CHAMPLAIN SEA GRANT AND RELATED PROGRAMS

Federal funding for Lake Champlain's environment and economy

Lake Champlain Sea Grant Institute
November 30, 2022

WHO ARE WE?

The Lake Champlain Sea Grant Institute at the University of Vermont (UVM) develops and shares science-based knowledge to benefit Vermont's environment and economy through three federally funded programs.

A coordinated education, applied research, and outreach program, the **Lake Champlain Sea Grant** supports resilient economies, environmental education, and healthy ecosystems.

The **Vermont Water Center** funds graduate student and faculty research on major water resource issues of concern to the state and disseminates results from that research.

Cross-disciplinary and collaborative research conducted through

the **Northeastern States Research Cooperative** helps Vermonters who live, work, use, and visit our forests.



LAKE CHAMPLAIN SEA GRANT

Federal Sponsor: Department of Commerce, National Oceanic and Atmospheric Administration

Congressional Authorization: National Sea Grant College Program Amendments Act of 2008 (Public Law No: 110- 394)

FY2022 Funding: \$1,259,000 NOAA, > \$630,000 Partners

Education

Since 2002, Lake Champlain Sea Grant's education program has reached *15,000 elementary, middle, and high school students; teachers; and family members* through hands-on programs in classrooms, at UVM's Rubenstein Ecosystem Science Laboratory, aboard the UVM research vessel, and in tributaries across the basin.

Our Watershed Alliance program connects K-12 teachers and their students



Photo: Ashley Eaton

with real-world challenges and engages students in hands-on field science and stewardship to improve water quality in the Lake Champlain basin. The program is a bridge between research and communities, where classroom teachers, professional environmental educators, and undergraduate intern teachers immerse themselves in local ecosystems as a learning and inquiry space.

Every year undergraduates in the highly competitive and highly regarded Watershed Educator Internship Program move on to professional positions in watershed science in Vermont and beyond.

Chief Don Stevens of the Nulhegan Abenaki Tribe and other educators share **Indigenous knowledge and cultural history** of the basin through learning activities and events at Shelburne Farms and at area K-12 schools, colleges, nonprofit organizations, and other public venues. On the horizon are development of videos (in addition to [Nebi: Abenaki Ways of Knowing Water](#)), books, and teaching materials to share Indigenous cultural history.



The video *Nebi: Abenaki Ways of Knowing Water* was developed through a collaboration of chiefs and members of the Nulhegan, Missisquoi, and Elnu Bands of the Abenaki Nation; Peregrine Productions LLC; UVM Extension, and Lake Champlain Sea Grant.

"It is important to preserve our culture and stories for the benefit of future Abenaki generations. It is equally important that non-Abenaki people understand our rich history and our connection to the environment around us." -Chief Don Stevens

Research

Lake Champlain Sea Grant's research program provides information people in the Lake Champlain basin need to know to inform policy and use best land and water management practices.

Research projects are chosen through a **competitive, peer-reviewed** process that involves national technical experts and local scientists and policy-makers. Researchers typically **collaborate with a wide variety of partners** in the conception, implementation, and use of research that may focus on community hazard resiliency, climate change adaptation, emergency preparedness, shoreline habitat protection, green infrastructure, clean water initiatives, or lake food webs, for example. Current projects include:



Data from Lake Champlain buoy observations have been used by anglers to decide when and where to fish and by the National Weather Service in Burlington to aid in forecasts of lake conditions.

- Identifying, mapping and communicating riverine erosion hazards for communities and landowners
- Increasing environmental literacy among K–12 teachers and students who identify as Black, Indigenous, and People of Color (BIPOC)
- Examination of contaminants in fish and impacts for human consumption
- Protection and management of wild and stocked lake trout using next-generation genetic tools

In addition to funding research projects, our competitive **partnered research fellowship program** creates opportunities for recent graduates and early-career professionals while contributing to shared environmental literacy, workforce development, resilient communities, and healthy ecosystem objectives. For example, the Lake Champlain Sea Grant—Vermont Youth Conservation Corps Water Quality and Careers Fellow recently developed a program for specialty water quality crews of young people to train them in techniques and create career opportunities, including with **green stormwater infrastructure**. Currently, the Lake Champlain Sea Grant

—Audubon Vermont Conservation Research Fellow conducts and shares research with **farmers and forest landowners to develop and implement best practices** for bird-friendly habitat on agricultural lands, especially in riparian areas and along shorelines.



Green stormwater infrastructure helps to reduce phosphorus runoff and protect water quality. Testing of nutrient bioretention in soil media improved state government-mandated specifications.

Outreach

Lake Champlain Sea Grant provides residents, businesses, community organizations, and state and local managers and policymakers with **tools, training, and science-based knowledge** to sustainably manage Lake Champlain basin resources.

Lake Champlain Sea Grant supports winter maintenance professionals and communities to adopt **smart road, parking lot, and sidewalk salting practices**. This helps to protect the environment, results in direct and indirect costs savings over time, and minimizes damages to infrastructure, such as buildings, roads, and bridges. Training courses help participants make cost-effective, environmentally conscious choices for winter maintenance and can help attract customers to trainees' businesses. Road salt education has improved practices in at least six communities over 972 lane miles. Trainings and broadly sharing **road salt and water quality information** with the public are leading to behavior change.



Trainings, how-to videos, and a salt calculator help winter road maintenance professionals, business owners, and homeowners reduce the amount of sodium chloride in our watersheds.

"We can cut salt use by half and still keep roads and sidewalks safe. These are environmental and safety wins at the same time." -Lake Champlain Sea Grant Associate Director Kris Stepenuck

Lake Champlain Sea Grant offers **accredited workshops to Vermont real estate professionals** on septic systems, wetlands, shoreland erosion control, rivers and floodplains, and tax-incentive programs for forest and agricultural land preservation and management. In turn, realtors help ensure that homebuyers and sellers make informed decisions that conform with regulations and protect their properties while also contributing to water quality and community resilience to hazards



Real estate professionals want trainings about regulations and policies that new homeowners need to know as they contemplate renovations and landscaping that affect people and nature downstream.

After taking a workshop on wetlands, a real estate professional said, "I will use the [information] to help buyers/sellers identify the likelihood of wetlands, what that might mean for their plans, and to some extent, help them sense the importance of stewardship of the wetlands, as opposed to considering them only reduced land value area."



VERMONT WATER RESOURCES AND LAKE STUDIES CENTER

Federal Sponsor: Department of Interior, United States Geological Survey

Congressional Authorization: Water Resources Research Act of 1984, Public Law No: 88-379, Reauthorized in 2021 Infrastructure Bill

FY2022 Funding: \$267,540

Part of a national network of centers at land grant universities, the Vermont Water Center addresses Vermont's water resource challenges by funding graduate student and faculty research and outreach.

Researchers have created and are piloting remote open-source, custom designed cyanobacteria, algae, and turbidity sensor (CATS) systems to provide real-time, quantitative data on cyanobacteria bloom conditions **at six public beaches in Burlington.** The study will determine how to

complement existing community and state cyanobacteria monitoring programs to provide faster identification of blooms, and **help protect the public from exposure to potentially harmful substances**. Instances of poor water quality on lake shores increases health risks for humans and animals and decreases tourism revenues and property values in the state.



In an effort to mitigate **harmful algal blooms** related to cyanobacteria in **Lake Carmi**, researchers quantify impacts from the state's aeration system to suppress phosphorus, a nutrient that worsens blooms. They deploy temperature and oxygen sensors and collect monthly sediment core samples to collect data. The data, together with data collected with state partners, will help inform lake management for Lake Carmi and other lakes that also experience an increase in severity and number of days with harmful blooms.



To help understand how lake ecosystems are responding to climate change, scientists are researching lakes' responses to **environmental variability**. Vermont Water Center researchers examine how **freshwater whitefish populations**, a key species for **Lake Champlain** and the Great Lakes, have and are responding to environmental variability. They are using this information to assist policy-makers, including fisheries managers who are concerned with the conservation of the high-value whitefish fisheries. Experiments conducted as part of the project were run in tandem with the University of Jyväskylä, allowing for an international comparison.





NORTHEASTERN STATES RESEARCH COOPERATIVE

Funding Sponsor: Department of Agriculture, United States Forest Service

Congressional Authorization: Forest and Rangeland Renewable Resources Research Act of 1978 (Public Law 95-307) as amended (16 U.S.C. 1641-1646, Public Law 108-198, December 31, 2003)

FY2022 Funding: \$4,000,000 USFS; ~\$2,000,000 Partners

NSRC puts science to work in support of a vibrant and thriving economy and culture, rooted in forest health.



NSRC advances **problem-driven research** that yields actionable results useful to and used by forest stewards and decision-makers. By working with 17 **representatives of communities, businesses, industries, and agencies** that contribute to and benefit from forest research, we ensure the research we support meets people's needs. These advisors guide the scale and objectives of research projects. NSRC also engaged with consultants who are citizens of Tribal Nations and members of Indigenous communities in the region to ensure we address research-related priorities of

Indigenous Peoples in the Northern Forest both in our main research competition and through an **Indigenous Forest Knowledge Fund competition**.



Maple syrup can be produced from forests that are managed in dramatically different ways. The **long-term sustainability of maple sap production** is entirely contingent on healthy forests, but our knowledge is limited on how the complex drivers of increased maple sap production intensity, differing management strategies, and climate change will affect biodiversity, ecosystem services, and overall ecological health of sugarbushes. Field surveys of biodiversity and ecosystem service metrics across a gradient of sugarbush production and

management intensities expand our knowledge base and allow for tools and policies that provide **sustainable sugarbush management guidelines** for sugarmakers that are relevant across Vermont and throughout the Northern Forest.



Vermont's habitat allows for movement and genetic exchange of animals across several states and provinces. This movement promotes **healthier and more resilient animal populations**. Vermont is also a critical link for movement of species northward as climate conditions change. However, habitat fragmentation, alteration, and loss represent persistent conservation problems that substantially impact wildlife populations by limiting how and where species move across the landscape. NSRC researchers in Vermont

integrate ecological and genetic data to map connectivity for **10 managed species with high ecological, economic, and cultural importance**. Their precise and comprehensive depiction of wildlife connectivity across the region will support management decision-making at multiple scales.

FEDERAL FUNDING FOR RESEARCH IN VERMONT

Helps Vermont and Vermonters today.

Prepares for tomorrow.

Federally funded research sponsored by Vermont's Congressional delegation is creating new knowledge to meet environmental and natural resource challenges faced by Vermont communities.



“The challenges facing our communities—from climate change to seismic shifts in our rural economy to invasive species—require advances in research that are both comprehensive and collaborative. This strategic research will

help provide the information and understanding needed for our communities to thrive, which is why it is crucial to continue to support this work.” -Vermont Senator Patrick Leahy



All photos from Lake Champlain Sea Grant Institute unless otherwise indicated.

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