Vermont Water Resources and Lake Studies Center

Congressional Authorization:
Water Resources Research Act of 1964 (Public Law 88-379)

FY 2021 Funding:
Federal Funds
$125,000

Non-Federal Funds
$250,000

Total Funds
$375,000

Host:
University of Vermont Rubenstein School of Environment and Natural Resources

Director:
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NIWR THE NATIONAL INSTITUTES FOR WATER RESOURCES

USGS science for a changing world

The Vermont Water Resources and Lake Studies Center (Vermont Water Center) is one of 54 state water resources research institutes established by the Water Resources Research Act of 1964 and located at land-grant universities. Through cooperation with the U.S. Geological Survey's National Institutes for Water Resources, the Vermont Water Center leverages expertise in research, education, and outreach to address Vermont's water resource challenges.

The Vermont Water Center runs an annual competition to fund research projects to inform and impact important water resource issues. The Center shares research results with stakeholders and uses findings to educate Vermonters about our water resources. Projects are led by Vermont-based faculty or by graduate students with faculty support.

USGS-NIWR annual base funding to Vermont supports:

Up to 5 research projects per year that include training for about 5 graduate and 5 undergraduate students from a range of disciplines.

About 3-5 peer-reviewed publications, 2-4 theses, and 12+ outreach products per year.

Scientific knowledge that informs water resources management in Vermont. Recent results:

- First published report of bloom-forming cyanobacteria in Vermont's high elevation acid-impaired lakes will contribute to development and implementation of biotic indices for rapid assessment of water quality impairment.
- Metagenomic analyses on riparian soil samples created a novel, cutting-edge dataset that will be used to describe how soil microbial communities change according to land use and landscape position during spring snowmelt.
- Research on the adaptation of freshwater whitefish to environmental variability will help understand the range of possible responses to climate change and assist managers to conserve fisheries.

2021 Research Projects

Quantifying mineral-bound phosphorus sources in rock and soil in forested headwater watersheds

Don Ross & graduate student Jenny Bower, University of Vermont College of Agriculture and Life Sciences & Beverley Wemple, University of Vermont College of Arts & Sciences

Phosphorus pollution impacts water bodies throughout Vermont and the Lake Champlain basin. The EPA has proposed phosphorus reductions of nearly half in priority areas, including forested areas where phosphorus originates from rockbound minerals. Researchers will measure magnitude and availability of background phosphorus in soil and rock of upland forests and use the data to inform policies and practices that address phosphorus pollution in Vermont.

Vermont cyanobacterial harmful algal bloom ecology and toxin biosynthesis gene activity: a path to novel management strategies

Erin Eggleston, Middlebury College & Mindy Morales-Williams, University of Vermont Rubenstein School of Environment and Natural Resources

Cyanobacterial harmful algal blooms negatively impact water quality and produce toxins in aquatic ecosystems throughout Vermont. Researchers will investigate the ecology of the cyanobacteria, gene expression related to metabolism and toxin production, and top-down population effects of cyanobacterial viruses to help develop new management strategies.

Quantifying the response of Lake Carmi legacy phosphorus to aeration

Andrew Schroth & graduate student Ashton Kirol, University of Vermont College of Arts and Sciences

To mitigate cyanobacterial harmful algal blooms in Vermont's Lake Carmi, the state is using an aeration system to suppress phosphorus, a nutrient that worsens blooms. To quantify aeration impacts, researchers will deploy temperature and oxygen sensors to monitor lake stratification and oxygen and collect monthly sediment core samples to quantify phosphorus. Data from this research and state monitoring data will be used to inform lake management.

Feasibility of using open-source, custom designed cyanobacteria, algae, and turbidity sensor (CATS) systems to monitor water quality in real-time along Lake Champlain's swimming beaches in Burlington, Vermont

Clay Williams, St. Michael's College & Tian Xia, University of Vermont College of Engineering and Mathematical Sciences

Reseachers will test the CATS system to provide real-time, quantitative data on cyanobacteria bloom conditions at six public beaches in Burlington. The study will determine if CATS can complement existing community and state cyanobacteria monitoring programs, provide faster identification of blooms, and help protect the public from exposure to potentially harmful substances.

Paleolimnological data synthesis to assess and predict long-term ecological change in Vermont inland lakes

Mindy Morales-Williams & graduate student Ismar Biberovic, University of Vermont Rubenstein School of Environment and Natural Resources

Using existing Vermont data, researchers will define disturbance gradients across 103 of Vermont's inland lakes by focusing on three known stressors: nitrogen and phosphorus, road salt, and acidification. They will then use lake sediment cores to learn how phytoplankton communites and disburbance gradients have changed over time and how they may change in the future.