Vermont Water Resources and Lake Studies Center

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

FY 2020 Federal Funds:
$125,000

FY 2020 Non-Federal Funds:
$250,000

FY 2020 Total Funds:
$375,000

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

Director:
Dr. William 'Breck' Bowden

uvm.edu/rsenr/vtwater

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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 of the National Institutes for Water Resources and U.S. Geological Survey, 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 most likely to inform and impact important water resource issues. We disseminate research results to stakeholders and more broadly across the state and use this research to educate students about local water resources. Projects are led by Vermont-based faculty or by graduate students with faculty support.

2018 and 2019 Research Projects (2020 projects on page 2)

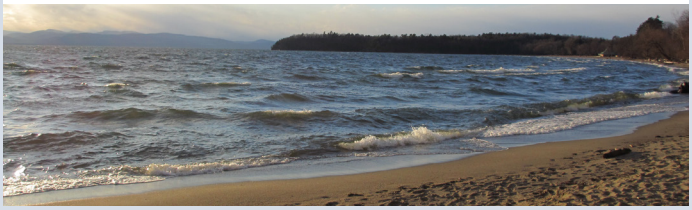
- A field study to investigate potentially **toxic cyanobacterial aerosols** from Shelburne Pond and farm fields in Vermont.
- Governing **water quality limits in agricultural watersheds**: Farmer behavior and perceptions under Vermont's Clean Water Act.
- Identifying drivers of change in **denitrification capacity of riparian soils** during the spring snowmelt/runoff period.
- Influence of **changing lake temperatures on early life stages of freshwater whitefishes** at local to global scales: Modeling and experimental approaches.
- A mental models approach to understanding **public knowledge of harmful algal blooms** in Lake Champlain.
- Response of phytoplankton communities to **recovery from acidification in Vermont lakes**.
- Trails to remediation: the effects of **seasonal variations on the acid mine drainage microbiome** at Ely Copper Mine in Vershire, VT.

2020 Research Projects

Impact of storms on lake phytoplankton community dynamics

Jason Stockwell & Jennifer Brentrup,
University of Vermont Rubenstein School of Environment and Natural Resources

Storms can have strong impacts on water clarity, thermal stratification, and mixing dynamics of lakes, which in turn may influence niche availability and phytoplankton succession, and thus taxonomic and functional diversity of freshwater phytoplankton communities. Data compilation and analysis in this project provides a framework for links between storm events (meteorological forcing), physical structures of lakes, and plankton communities, contributing to greater understanding of lake phytoplankton diversity and ecosystem resiliency worldwide.



How much carbon is in those mussels? The potential impact of a quagga mussel invasion on energy pathways in Lake Champlain

Ellen Marsden & Ariana Chiapella,
University of Vermont Rubenstein School of Environment and Natural Resources

Quagga mussels are a clear and imminent danger to the ecology, nutrient cycling, and food web structure in Lake Chmaplain, as evidenced by the experience in the Great Lakes. Researchers will collect data from lake-bottom photos to provde a map of zebra mussel densities and estimate baseline carbon storage by quagga mussels prior to invasion. This data will be used in forecasting the effects of quagga mussels and other potential invasive species on water quallity and fishery stability and will provide management agencies with information to mitigate impacts of quagga mussels.

Hydraulic modeling to support Vermont's Functioning Floodplain Initiative

Kristen Underwood & Rebecca Diehl,
University of Vermont School of Engineering and Mathematical Sciences

Floodplains provide ecosystem functions including sediment and nutrient storage, groundwater recharge, and support to aquatic and riparian habitats. Connected and functioning floodplains may reduce flood risk to downstream communities by attenuating peak discharges. This pilot study in the Mad River watershed will integrate existing stream geomorphic assessment data with probabilistic inundation mapping to better interpret the influence of reach-scale channel-floodplain configurations on floodplain function and flooding risk. Better information on extent, timing, and duration of lateral flows will inform estimates of floodplain function for water and sediment/nutrient storage, biogeochemical cycling, and support to aquatic and terrestrial habitats.

Cyanobacteria bloom impacts on fish: ecological and human health considerations

Jason Stockwell & Natalie Flores,
University of Vermont Rubenstein School of Environment and Natural Resources

Cyanobacteria in freshwater are a primary focus for research and management due to their potential to harm wildlife, pets, and humans. Researchers will address understudied impacts of cyanobacteria on fish by investigating which cyanobacteria toxin concentrations in fish are species-dependent, how changes in tissue composition of fatty acids are correlated to cyanobacteria, and the composition of fatty acids in yellow perch and golden shiners. Results will help to assess how fish from eutrophic lakes may affect human health.