



THE UNIVERSITY OF VERMONT  
**RUBENSTEIN**  
SCHOOL OF ENVIRONMENT  
AND NATURAL RESOURCES

---

**The Rubenstein School of Environment and  
Natural Resources**

**The University of Vermont**

**THIRTY-NINTH ANNUAL GRADUATE  
RESEARCH SYMPOSIUM**

**Friday, October 28<sup>th</sup>, 2022  
5:00 PM**

**George D. Aiken Center, Room 311  
Or  
*MS Teams***

---

*Please recycle this program.*



# Thirty-Ninth Annual Graduate Research Symposium

Friday, October 28<sup>th</sup>, 2022

Aiken 311 or [MS Teams](#)

---

- 5:00 pm Welcome by Interim Dean Allan Strong
- 5:10 pm Rachel Swanwick Institutional Barriers to Climate Change Adaptation and Co-Produced Knowledge Systems among State, Tribal and Industrial Sectors in Present Day Maine's Forestry Community
- 5:30 pm Kate Longfield The Influence of Governmental Trust on Vermont Farmers' Willingness to Enroll in Government Conservation Programs
- 5:50 pm Maria Alfaro Influence of artificial aeration on nutrient limitation and nitrogen fixation in eutrophic Lake Carmi, VT

*Reception to follow in Aiken 311!*

## *Presenter Abstracts*

### **Institutional Barriers to Climate Change Adaptation and Co-Produced Knowledge Systems among State and Tribal sectors in Present Day Maine's Forestry Community**

*Rachel Swanwick, Master's Program*

*Advisors: Anthony D'Amato, PhD*

*Rachel Schattman, PhD, University of Maine*

The effects of climate change and the impacts of non-native insects and diseases on present day Maine's forests are projected to cause unprecedented social and ecological impacts. Although many climate change adaptation strategies have been suggested for implementation, recent research suggests that most of these strategies have not been widely adopted. Therefore, this study aims to serve as a foundation for dialogue among State and Tribal sectors in present day Maine over a shared goal: to maintain the integrity of forest systems and support climate change adaptation efforts across present day Maine in Wabanaki homelands. The first goal of this study evaluates how State and Tribal sectors in present day Maine's forestry community perceive institutional barriers as limits to their ability to mobilize an adaptive response to climate change. Institutions are defined as the rules, behaviors and norms that govern organizations. The second goal of this study characterizes how State and Tribal sectors use different types of knowledge (e.g. scientific, indigenous, observational) to address climate change adaptation and understand how diverse knowledge types can enhance adaptive response. These two goals will be analyzed through a questionnaire and series of interviews among the same study sample.

### **The Influence of Governmental Trust on Vermont Farmers' Willingness to Enroll in Government Conservation Programs**

*Kate Longfield, Master's Program*

*Advisor: Kristine Stepenuck, PhD*

Forested riparian buffers, or designated strips of native trees between agricultural land and waterways, are a highly effective conservation practice used to reduce soil erosion and nutrient runoff. However, planting and maintaining forested buffers is expensive and labor intensive for farmers, and fertile land is often taken out of production. Therefore, the decision to pursue forested buffer implementation tends to be heavily influenced by government conservation programs with financial assistance. This qualitative study, based in Vermont's Lake Champlain Basin, will explore farmers' trust in state and federal agricultural agencies, and compare this trust to both their enrollment in and feelings towards government conservation programs. The agencies of interest for this study are the Natural Resource Conservation Service, the Farm Service Agency, and the Vermont Agency of Agriculture. The study will involve conducting 20 semi-structured interviews from a random sample of dairy, livestock, crop, and diversified farmers. The random sample will be taken from a database of 1,100 farms, the entire population of interest, developed for this research from publicly available data. Interviews will be conducted over the winter of 2023, then coded and analyzed using NVivo software for qualitative analysis.

# **Influence of artificial aeration on nutrient limitation and nitrogen fixation in eutrophic Lake Carmi, VT**

*Maria Alfaro, Master's Program*  
*Advisor: Mindy Morales-Williams, PhD*

Vermont lakes are changing rapidly in response to climate and landscape disturbances and are experiencing an increase in frequency and severity of cyanobacteria blooms. In response, there has been a substantial effort to mitigate watershed phosphorus (P) inputs and internal P loading, but nitrogen (N) has been measured inconsistently and is less understood. Lake Carmi is a eutrophic lake and upstream tributary of Missisquoi Bay, Lake Champlain. In July 2018, an aeration system was deployed in Carmi to control sediment P release and mitigate cyanobacteria blooms. However, to date, cyanobacteria biomass has not decreased, and N-fixing taxa biomass has increased. Nutrient limitation bioassays conducted in 2018 pre-aeration indicated that phytoplankton were N or NP co-limited. Because of this, there is a clear need to understand N-cycling in Lake Carmi and Vermont lakes where P has been the primary focus of management efforts. To assess changes post-aeration, we conducted monthly bioassays in the fall and summer of 2022 to assess nutrient limitation and measure biologically mediated N<sub>2</sub>-fixation rates using acetylene reduction. Results of this work will increase our understanding of N-cycling in eutrophic Lake Carmi and inform future management efforts aimed at mitigating cyanobacteria blooms.

# Notes