Submitted Abstracts - Paper

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SCALE-ing The Adirondacks: A Synthesis Of Monitoring And Modelling

As part of the Survey of Climate change and Adirondack Lake Ecosystems (SCALE) we assessed past monitoring data from multiple lake survey programs and developed lake models to assess how Adirondack lakes have changed over the past 40 years. Our goal was to design a sampling scheme for sampling lakes at nested levels of intensity. The first step in this process was to collect and assess the current state of knowledge on Adirondack lakes. Using the National Hydrography Dataset, we identified over 11,200 lakes and ponds within the park, with over half of those less than 1 ha of surface area. Over 1600 lakes within the park have been sampled by one of several monitoring programs over the years. We compiled monitoring data from 8 programs to describe the levels of variation in water quality, morphometry, land cover, and more across Adirondack lakes, to ensure future sampling captures the full range of potential climate change impacts. In addition to monitoring, we constructed 1D models of 443 lakes to assess the potential for changes in thermal regimes over the past 40 years and into the future. We synthesized these data to help us decide which lakes to sample at high, medium, and low intensities over the next few years.

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Rosales , Jon1

Foreseeing Impacts in the North Country: What We Can Learn from the Frontlines of Climate Change in the Arctic

While every socio-ecological region is different, there are some inferences that can be drawn from an examination of the frontlines of climate change to anticipate change here. The fact that global heating is happening nearly four times the global rate in the Arct ic, a process known as Arctic amplification, offers decisionmakers, residents , and scholars in the Adirondacks an opportunity to anticipate changes not captured in assessment reports. Assessment reports assess published literature largely by region and even then, do not capture all elements of climatic change. The recent New York State Climate Impacts Assessment similarly bases its assessment on published literature that focuses on the state or region. The IPCC has in the past included a chapter on "cross-cutting issues" attempting to synthesize knowledge across geographic regions and economic sectors, but the focus is on a global synthesis of those regional climatic factors. Here we take a different approach. We consider what we have documented from studying climate change in the Bering Strait Region of Alaska for the past 15 years and envision what we can learn from that work and consider what may have been missed for the North Country with the large assessment reports and learn from the witnesses on the frontlines of climate change - Arctic Indigenous peoples who closely observe their environment under sudden change as part of their subsistence practices.

Poster Abstracts

1Kemmerling, Lucas, Mary Alldred

The Role of Small Mitigation Wetlands in Supporting Fall Migrating Waterfowl

Due to high rates of wetland loss in the United States, legislators under the Clean Water Act have adopted a “no net loss” policy of wetland conservation requiring that if wetlands are to be disturbed, then mitigation efforts are required to offset disturbance. An EPA study revealed these restored, created, or enhanced mitigation wetlands are on average just 4.3 acres and can be found anywhere from urban centers to rural areas like the Champlain Valley. This mosaic of small wetlands across the landscape offers important stopover habitat for migratory birds like waterfowl. Unfortunately, not all mitigation wetlands are created equally and their role in supporting migratory waterfowl is not well studied. Research has revealed that just 21% of mitigation wetlands meet the standards of ecological equivalency to that of the originally disturbed wetland. When this loss of quality is extrapolated across the landscape, we risk the degradation of habitat for species we find valuable, like waterfowl. The aim of my research is to better understand the role of small mitigation wetlands in supporting fall migrating waterfowl to inform quality standards of wetland mitigation. My research does this by determining the energetic carrying capacity of five restored, created, or enhanced wetlands for waterfowl in the Lake Champlain Valley. We used stratified random sampling of plant and invertebrate food biomass (kg/ha) for waterfowl in late summer of 2023 before the fall migration. Wetlands were

divided into habitat types where food items such as emergent vegetation, invertebrates, tubers, and submerged aquatic vegetation were collected. Waterfowl food items were dried and weighed, and these data will be used to estimate the number of waterfowl each wetland can support. Additionally, camera surveys have been conducted to estimate actual waterfowl use at each study area to be compared to estimated carrying capacity. I am currently processing samples and beginning to analyze data with preliminary results to be presented at Adirondack Research Consortium.

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SCALE-Remote Sensing: Validation and Monitoring of Temperature Variability in Adirondack Lakes Over the Past 40 Years

This study aimed to validate satellite remote sensing observations from the Landsat series over 150 lakes in the Adirondacks and examine their temperature variability trends over the past 40 years. The project is part of the Survey of Climate Change and Adirondack Lake Ecosystems (SCALE). The Moderate Resolution Imaging Spectroradiometer (MODIS) onboard the Aqua satellite and the Landsat series (5 and 7) provide lake-scale observations from the 1980s to the present. Park-scale results were derived by extracting MODIS daytime surface temperatures within the Adirondack Park boundary. Lake-scale results were estimated using Landsat 5 (1984-2011) and Landsat 7 (1999-2023) observations for each lake's boundaries. The results revealed that satellite water surface temperature observations are within a reasonable range of in situ measurements, with an RMSE of 1.7 to 1.9°C. The temperature variability trends over the study period were comparable with water surface temperature trends from ground observations. A comprehensive trend analysis was then conducted on the selected lakes on an annual, seasonal, and monthly basis. Landsat 5 showed higher warming rates than the years covered by Landsat 7. The park-wide study of all surfaces using MODIS showed similar variability to observations from Landsat 7. Overall, our study demonstrated that most lakes are warming, and remote sensing observations have the potential for monitoring lake surface temperatures when continuous ground observations are unavailable.

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