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Climate Related Changes in Chemical Characteristics of Arctic Tundra Ponds over the Past 40 Years.

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The Arctic tundra ponds at the International Biological Program (IBP) site in Barrow, AK were first studied in the 1970s and were re-visited in 2010. Recognizing modifications in the ponds' structure and activity is critical to distinguishing possible climate-related impacts on Arctic freshwater ecosystems. The main objective of this project was to re-sample historical pond research sites in order to establish how the physical and chemical characteristics of the ponds have been altered over the past 40 years. Preliminary data from the same IBP ponds sampled in 2009-10 and the 1970's demonstrate an increase of phosphorus and a decrease in nitrate concentrations over time. The increase in phosphorus may be present due to the greater proximity of the IBP sites to urban areas or release from thawing permafrost. Comparisons to other more isolated ponds in the region indicate that the IBP ponds are not nutrient enriched because of their location near the village of Barrow. These data support climate change and permafrost thaw as the principal cause of this nutrient enrichment. Results from this and further studies will lead to a better understanding of the implication of climate change on Arctic tundra pond ecosystems.