Harms, P. L., Brock, B., Wolfe, B.B., Johnston, J., and Hall, R., 2008, **Multi-proxy paleolimnological reconstruction of hydroecology in the Slave River Delta, NWT,** *Ontario-Québec Paleolimnology Group Graduate Student Conference (PALS2)*, May 7 - 9, Université Laval, Quebec City, Quebec, Abstracts with Program.

The Slave River Delta (SRD), on the south shore of Great Slave Lake, is a productive ecosystem supporting a wide variety of wildlife and riparian plant communities. Natural diversity and productivity in the SRD are closely interconnected with the local climate and flood regime of the Slave River. Changes in climate and Peace River regulation over the past several decades have raised concern about potential impacts on the hydroecology of the delta. Recently, local observations of declining levels in the Slave River are causing further concern about increasing water diversion for development of the Athabasca tar sands on the Athabasca River, a major tributary of the Slave River. These concerns highlight the need for a more comprehensive understanding of the role of the Slave River in the hydroecology of the SRD.

Previous multi-proxy studies on a 49-cm gravity core from a basin adjacent to the Slave River have revealed a high-resolution record of flood frequency spanning the past ~75 years. The hydrology has been highly variable over this time period, yet this site does not offer clear evidence to suggest that flood frequency has declined due to regulation of the Peace River in 1968. Given the highly dynamic nature of the SRD, paleolimnological studies of other basins are needed to fully examine hydroecological responses to multiple drivers. Here we report preliminary multi-proxy results from cores collected from Willow Lake, which is located in the active part of the delta within an area that is particularly significant for local hunting, trapping and fishing. Willow Lake is situated to the south of two major distributary channels which underwent natural changes around 1966 when the vast majority of Slave River flow moved into ResDelta Channel. Thus, the sediments may also potentially record hydroecological responses to natural geomorphic changes in the delta.

Preliminary analysis indicates that Willow Lake has evolved from a higher to a lower energy environment. The lower 2.9 m of a 3.4-m long vibracore is dominated by medium- to fine- grained sandy sediments with black and light grey beds and laminations. Two contacts in the top 0.5 m of the core indicate a shift to low energy conditions. The first (39 cm) marks a transition to silty sediment with clay beds, and the second (12 cm) defines a gradational change to black, organic-rich sediments. Loss-on-ignition analysis of a 31.5-cm gravity core shows a distinct shift to higher organic content at 7.5 cm. Elemental and stable isotope geochemistry analyses will further characterize the paleohydrologic evolution of this basin and analyses of 210Pb, 137Cs and 14C will provide chronological control. Ultimately, results will be used to define relationships between variability in Slave River hydrology and delta hydroecology, in order to anticipate potential impacts from projected changes in climate and river discharge.