Jarvis, S.R., Wolfe, B.B., Johnston, J.W., Hall, R.I., Edwards, T.W.D., 2005, **Reconstruction of Peace River hydrology from oxbow lake sediment cores in the Peace-Athabasca Delta**, *Canadian Geophysical Union - Hydrology Section Conference*, Dec. 9-10, Wilfrid Laurier University, Waterloo, Ontario.

The Peace-Athabasca Delta (PAD), located in Northern Alberta, is one of the largest inland deltas in the world and forms a significant portion of Wood Buffalo National Park. The health of the ecosystem and the maintenance of water levels are largely dependent upon periodic overland flooding to replenish perched basins that provide habitat for a variety of organisms including migratory birds, bison, and small mammals. A variety of concerns have arisen involving fluctuating water levels and the health of the ecosystem as a whole, although a limited temporal perspective on hydro-ecological conditions has hampered the development of appropriate ecosystem management strategies. Previous research on laminated sediment cores recovered from two oxbows periodically connected to major Peace River distributaries during flooding has resulted in a flood reconstruction spanning the last 300 years. In March of 2005, a six-member field team revisited these oxbows and collected 6 vibracores. In addition, short cores (Glew cores) were collected from the topmost sediments at each sampling site. The main objective of this research is to extend the existing 300-year record to better understand past hydrologic behavior of the Peace River as it relates to the frequency of wet and dry cycles in the PAD and climate variability. Preliminary observations of sediment cores suggest that dark-coloured deposits represent flood events and light-coloured deposits represent non-flood periods. Magnetic susceptibility, a key tool in previous studies, will be used to identify flood events. Carbon-14 dating of multiple deposits of organic material, along with $^{137}Cs$ dating, will aid in the development of sediment chronologies. Grain size analysis of particles ranging from clay to coarse sand and pebbles will be analyzed to help characterize energy conditions during flood and non-flood intervals. Multi-proxy analysis of sediment cores, in conjunction with ongoing dendroclimatological analyses, will improve knowledge of the response of Peace River hydrology to climate variability, and key for the design of successful management strategies for this internationally recognised ecosystem.