Jarvis, S., Wolfe, B.B., Johnston, J.W., Hall, R.I., Edwards, T.W.D., **Peace River paleohydrology from oxbow lake sediment cores in the Peace-Athabasca Delta, Canada**, *10th International Paleolimnology Symposium*, June 25-29, Duluth, Minnesota, Abstracts with Program.

River flooding of the Peace-Athabasca Delta, Canada, is an important hydrological process for the replenishment of shallow perched basins that support a wide variety of fauna, particularly migratory birds. Previous research on laminated sediments collected from two oxbow lakes periodically connected to major Peace River distributaries has resulted in a 300-year record of flood frequency. In an effort to extend this record and broaden the understanding of the relationship between Peace River hydrology and climate variability, a series of vibracores and gravity cores were collected at sites proximal, intermediate, and distal to the inlet of each oxbow lake. At all coring sites, the upper 3.5 metres of sediment consist largely of laminated clay deposits. Observations suggest that dark-coloured deposits represent flood events, with dark beds having sharp lower contacts and gradational upper contacts. Stratigraphic features in lower portions of the vibracores include rip-up clasts, large pieces of woody debris, and thick sandy deposits indicating relatively high energy conditions. Preliminary results of loss-on-ignition analyses show relatively low but variable organic matter content. Short cores collected from the distal sites of each oxbow lake contain slightly higher organic matter and water content when compared to cores from proximal locations. Sites proximal to the inlet of each oxbow likely experience a greater dilution of autochthonous organic matter by floodwaters carrying substantial suspended inorganic sediment loads. Continuing work includes the development of sediment chronologies using cesium-137, lead-210, and carbon-14 dating techniques. Magnetic susceptibility, a key tool in previous studies, will be used to identify flood events. Grain size analysis of particles ranging from clay to coarse sand and pebbles will characterize energy conditions during flood and non-flood intervals. Multi-proxy analysis of sediment cores, in conjunction with ongoing dendroclimatological analyses by colleagues, will identify the response of Peace River hydrology to climate variability. An investigation covering a timeframe with a wide range of climatic conditions is essential for the stewardship of this internationally-recognized ecosystem and the successful management of Wood Buffalo National Park.