Jarvis, S., Wolfe, B.B., <u>Johnston, J.W.</u>, Edwards, T.W.D., Hall, R.I., 2007, **Peace River** flood frequency and magnitude over the past millennium from oxbow lake sediments in the Peace-Athabasca Delta, northern Alberta, *Canadian Quaternary Association Conference*, June 4-8, Carleton University, Ottawa, Ontario.

Ice-jam flooding of the Peace-Athabasca Delta (PAD) is an important hydrological process for the replenishment of shallow perched basins that support a highly productive northern freshwater ecosystem. 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.

Stratigraphic observations and analyses on sediment cores from the proximal and distal locations of one oxbow have produced a remarkably coherent and consistent record of flood frequency and magnitude over the past millennium. Dark beds in the sediment cores have sharp lower contacts and diffuse upper contacts, consistent with energy conditions associated with flood events. Peaks in magnetic susceptibility, measured at a 5mm resolution, have been used to identify flood deposits. Results show significant shifts in flood frequency and magnitude down-core. The sediment chronologies, constrained using cesium-137 and carbon-14 dating techniques, as well as dendroclimatological records, suggest that Peace River flood frequency and magnitude were substantially greater during the Medieval Warm Period (MWP: ~1200-1500 AD) when compared to the Little Ice Age (LIA: ~1500-1900 AD) and post-LIA interval (~1900-present). Although climatic conditions during the MWP were relatively warm and dry in Canada's Northern Great Plains, earlier and/or more rapid snowmelt in the eastern Rocky Mountains may have produced conditions conducive to more frequent and more severe ice-jam events along the downstream reaches of the Peace River in the vicinity of the PAD. While climate conditions are currently warming, the continual retreat of alpine glaciers and declining snowpacks in the headwater region of the Peace River will likely not be conducive to frequent ice-jam development downstream in the future. A paleoenvironmental perspective covering a timeframe with a wide range of climatic conditions is critical for effective stewardship of this internationally-recognized ecosystem.