Jarvis S.R., Wolfe B.B., Johnston J.W., Edwards T.W.D., and Hall R.I., 2007, **Peace River flood frequency and magnitude reconstruction from oxbow lake sediments in the Peace-Athabasca Delta, northern Alberta, Canada**, *8th ACUNS International Student Conference on Northern Studies*, October 18 – 21, Saskatoon, Saskatchewan.

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 ecosystem. The PAD is also used by surrounding First Nations communities for traditional lifestyle occupations such as hunting and trapping. 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 among climate variability, Peace River hydrology, and delta hydroecology, a series of vibracores and gravity cores were collected at sites proximal, intermediate, and distal to the inlet of each oxbow lake. The sediment cores contain laminated clay deposits, with dark beds having sharp lower contacts and diffuse upper contacts, consistent with energy conditions associated with flood events. Remarkably consistent patterns of strongly varying flood frequency and magnitude are evident in the magnetic susceptibility records from sediment cores obtained from the proximal and distal locations of one oxbow. The sediment chronologies, constrained using cesium-137, radiocarbon dating, and 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) and post-LIA (~1900-present) interval. The distinct shift to reduced flood frequency and magnitude at the end of the MWP is also reflected by reduced river floodwater influence and a substantial increase in evaporation inferred from the isotopic record of an upland basin in the northern Peace sector of the PAD. Low frequency trends in the Peace River ice-jam flood record are negatively correlated to a tree-ring reconstruction of North Saskatchewan annual discharge (QNSR), indicating the two records are recording different hydrological processes in the headwater region. However, high frequency trends are positively correlated, with troughs in ice-jam flood frequency along the Peace River in close agreement with troughs in annual QNSR likely reflecting periods of glacial advances during the LIA. 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 spring ice-jam events along the Peace River while not sustaining annual discharge. With increasing demands on freshwater resources and natural resource exploration and exploitation in Canada's North, a paleoenvironmental perspective covering a timeframe with a wide range of climatic conditions is critical for effective stewardship of this internationally-recognized ecosystem.