Bibliography of Scientific Research in the Tli Cho Region that Furthers an Understanding of Regional Climate Change Processes

Prepared by Ecology North

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Introduction

As part of Ecology North's work to support the Tlicho government and communities in regional community-based climate change planning, the following summary of existing and on-going scientific research on topics related to climate change in the Tlicho region was compiled.

This bibliography was prepared in February and March 2009.

Methods Used to Compile the Bibliography

- topic areas that were focused on; how we selected which entries to include and which entries to exclude.

- describe search keywords etc. used by U. of Manitoba researcher

- were searches carried out for a particular timeframe?

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* Include map of the Tlicho region?

Bibliography

- alphabetical order
- entries could be grouped into topic areas if this makes sense (we can figure this out as we go...)
- include abstract / summary / comment on how relevant, helpful etc the research is...

Lafleur, P.M., and E.R. Humphreys. 2007. Spring warming and carbon dioxide exchange over low Arctic tundra in central Canada. Global Change Biology **14**: 740 - 756.

Tundra-atmosphere exchanges of carbon dioxide (CO2) and water vapour were measured near Daring Lake, Northwest Territories in the Canadian Low Arctic for 3 years, 2004– 2006. The measurement period spanned late-winter until the end of the growing period. Mean temperatures during the measurement period varied from about 2 1C less than historical average in 2004 and 2005 to 2 1C greater in 2006. Much of the added warmth in 2006 occurred at the beginning of the study, when snow melt occurred 3 weeks earlier than in the other years. Total

precipitation in 2006 (163 mm) was more than double that of the driest year, 2004 (71 mm). The tundra was a net sink for CO2 carbon in all years. Mid-summer net ecosystem exchange of CO2 (NEE) achieved maximum values of 1.3 g C m^{-2} day^{-1} (2004) to 1.8 g C m^{-2} day^{-1} (2006). Accumulated NEE values over the 109-day period were 32, 51 and 61 g C m^{-2} in 2004, 2005 and 2006, respectively. The larger CO2 uptake in 2006 was attributed to the early spring coupled with warmer air and soil conditions. In 2004, CO2 uptake was limited by the shorter growing season and mid-summer dryness, which likely reduced ecosystem productivity. Seasonal total evapotranspiration (ET) ranged from 130 mm (2004) to 181 mm (2006) and varied in accordance with the precipitation received and with the timing of snow melt. Maximum daily ET rates ranged from 2.3 to 2.7 mm day^{-1} occurring in mid July. Ecosystem water use efficiency (WUEeco) varied slightly between years, ranging from 2.2 in the driest year to 2.5 in the year with intermediate rainfall amounts. In the wettest year, increased soil evaporation may have contributed to a lower WUEeco (2.3). We speculate that most, if not all, of the modest growing season CO2 sink measured at this site could be lost due to fall and winter respiration leading to the tundra being a net CO2 source or CO2 neutral on an annual basis. However, this hypothesis is untested as yet.

Relevance: Shannon will fill in once she's gone through the article. -- Research was carried out in the Tli Cho region.