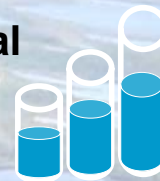


Water Flow Pathways to Ponds and Streams from Polygonal Peat Plateau in the Hudson Bay Lowland



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1. Objective

To assess the magnitude and timing of groundwater flow on a polygonal peat plateau in order to better assess the transport of freshwater, nutrients and contaminants to Hudson Bay from the Hudson Bay Lowland.

4. Results

Figure 4.1 Probability of saturation in the 5 habitat types. Ice wedge cracks, drainage slopes and moraine have a much higher probability of being saturated than other surface types.

2. Study Site

Near Churchill, Mb 5 km inland



Figure 2.1 Aerial photograph of the polygonal peat plateau on the east side of Frisbee Pond basin. (59°N 94°W)

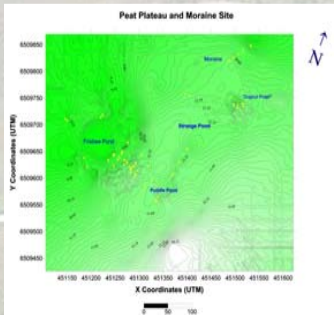
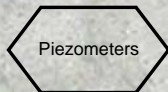


Figure 2.2 Contour map based on total station surveying, August 2005, showing placement of piezometer sites

3. Methods

49 piezometer nests at three depths provided bulk density, soil moisture, water table, and saturated hydraulic conductivity data.



Soil Samples

Soil Moisture

Saturated Hydraulic Conductivity



Bulk Densities



Water Retention



Luthin's Equation (1966)

Groundwater Flow Rates & Transit Time Darcy's Law ($V = K_s \times \Delta h / \Delta x$)

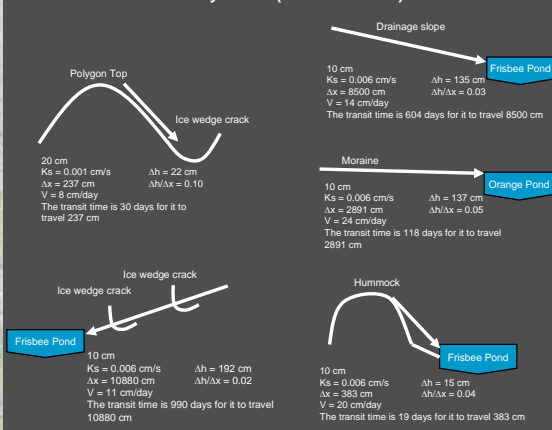


Figure 4.3 Hydraulic heads, $\Delta h / \Delta x$ based on summer median water table positions yield groundwater velocities ranging from 8 to 24 cm/day. Estimated transit times based on representative distances and hydraulic conductivities range from 30 to 967 days.

5. Discussion and Conclusions

The decrease of saturated hydraulic conductivity with depth is consistent with increased compaction and bulk density and with values from the literature. The very long transit times result from the very low slopes and low hydraulic conductivities. These results suggest that the basin is hydrologically disconnected from Frisbee Pond during the summer. These conclusions are consistent with previous studies (Macrae *et al.* 2004) indicating pond water levels respond to only rainfall and evaporation. Ice wedge cracks, moraines and drainage slopes have a much higher probability of being saturated. But unless the water table rises above the surface enabling overland flow to develop, as it would during the snowmelt season, their contribution to ponds and streams is likely very limited in the Hudson Bay Lowland.

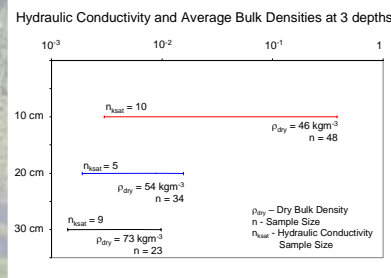
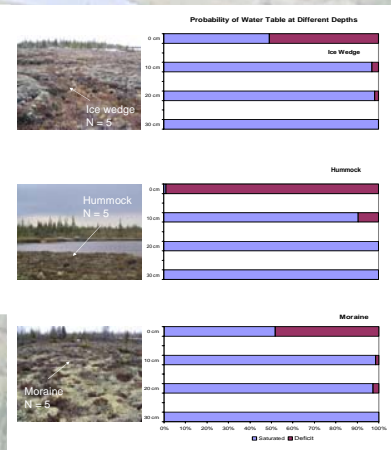


Figure 4.2 Surface hydraulic conductivities are highest and most variable. Both factors decrease with depth.