EXECUTIVE SUMMARY

The primary objective of this study was to characterize the hydrology of Labrador. This information is critical for the preliminary planning and design of water resources systems such as water supply systems for municipal and industrial uses, and hydroelectric power developments. The information is also needed for the design of hydraulic structures such as dams, bridges and culverts, and also for the general management of the water resources of this area of the province. Unfortunately, only large watersheds (>1000 km^2) had any significant length of streamflow records. Since water resources systems are frequently sited on smaller watersheds, a methodology was needed for transferring hydrological information from large gauged watersheds to small ungauged watersheds.

The hydrological characteristics of large gauged watersheds in Labrador were obtained by analyzing the available physiographic, climatic and streamflow data. Hydrological characteristics of large watersheds can sometimes be transferred to small to medium sized watersheds with appropriate transfer methodologies. The relationship between streamflow, climatic and physiographic variables were explored to help identify appropriate transfer methodologies.

Correlations were developed between the streamflow and climatic data.

While some streamflow and climatic variables were significantly correlated on some watersheds, no correlations could be found which could be applied throughout Labrador. The shortness of streamflow records, combined with the non-representativeness of the climatic data, made any correlation difficult.

Correlations were developed between the streamflow and physiographic data. A linear regression was performed on the normal and log transformed mean annual instantanteous maximum discharge and drainage area data for outlet controlled watersheds, not outlet controlled watersheds, and for the combined case. Outlet control is a subjective evaluation of whether a lake near the outlet of the watershed has a significant attenuating influence on annual maximum instantaneous discharges. The lack of watershed specific physiographic data precluded detailed analysis. Mean peak flow data from nearby watersheds in Quebec and hydrologically similar watersheds on the island of Newfoundland had to be used so that mean peak flows could be extrapolated down to small to medium sized watersheds. Mean peak flow data on small to medium sized watersheds in Labrador was non-exixtent. Since the ratios of higher return period peak flows to the mean peak flow are approximately constant, peak flows of various return periods on small to medium sized watersheds could be calculated from the product of the ratio for a given return period and the mean peak flow estimated from the regression equations.

It was concluded that: the physiographic, climatic and hydrometric databases are not adequate to meet the modelling requirements for water resources management.

It was recommended that:

1. Detailed physiographic data be abstracted from watersheds in Labrador which have been gauged for natural streamflow for a period of 5 years or more;
2. Climate stations be established in all gauged watersheds in Labrador;
3. The calculation of flood flows of various return periods on small to medium sized watersheds in Labrador utilize the methodology developed in Section 7; and
4. Streamflow gauging stations be installed on Labrador rivers with drainage areas in the 200 km^2 to 800 km^2 range.