2. HYDROLOGICAL SETTING

2.1 Physical Features and Relief

Labrador is bounded in the east by the Labrador Sea (Atlantic Ocean), in the west by the watershed divide, and in the south, for the most part, by the provincial border at 52° N latitude. The major physiographic features are shown in Figure 2.1. The approximate range of latitude is 51° 28' N to 60° 16' N. The approximate range of longitude is 55° 50' W to 66° 55' W. The area of Labrador is 294,330 square kilometers.

Relief in Labrador ranges between sea level on the coast to over 1500 meters in the Torngat mountains. South of Lake Melville, the Mealy Mountains approach 1500 meters. The elevations on the interior plateau generally vary between 300 and 650 meters with some hills rising to 900 meters. Drainage on the interior plateau is poor due to relatively flat terrain and the many lakes and wetlands. Near the coast, drainage is good due to high relief in the river valleys. Relief is shown in Figure 2.2

2.2 Surficial and Bedrock Geology

Labrador is the eastern limit of the Canadian Shield. It has been divided into 5 Pre-Cambrian geological provinces: Grenville, Churchill, Nain, Superior and Makkovik. The provinces are shown in Figure 2.3. Intrusions of Anorthosite have also been shown. A large variety of igneous, sedimentary and metamorphic rocks can be found in all provinces. The orientation of lakes, rivers, valleys and hills in Labrador is largely the result of Pre-Cambrian folding and faulting.

The surficial cover in Labrador varies from exposed bedrock to glacial till deposits of up to 7 meters in depth. The surficial geology is shown in Figure 2.3. Much of the surficial material consists of glacial till which is less than 1.5 meters in depth. North of Nain and the region along the coast are almost completely free of surficial materials. Glacial till deposits can however be up to 7 meters in depth. The depth of surficial materials is greatest in the western, central and south-central regions of Labrador. Extensive alluvial and fluvioglacial deposits can be found throughout Labrador. These deposits are fewer in western and southern Labrador. Wetlands can be found throughout Labrador.





¹Taken from: Water Resources Atlas of Newfoundland, 1992.





²Taken from: Atlas of Newfoundland and Labrador, 1991.





³Taken from: Water Resources Atlas of Newfoundland, 1992.

2.3 Vegetation

Vegetation in Labrador can be divided into three broad classes: forested (trees and shrubs), wetlands (bogs, marshes and water bodies) and barren (little vegetation). Western, central and south-eastern Labrador have been classified as either Boreal Woodland or Boreal Forest (Rowe 1972). North of about 56° N latitude vegetation quickly disappears in the Low Arctic Tundra. A Forest Tundra transition zone lies between about 55° N latitude and about 56° N latitude. Forest Tundra also exists in the form of a 50 km wide band on the east and south-east coasts. Wetlands can be found throughout Labrador south of 55° N latitude. Wetlands are found in areas of low local relief. These areas are numerous in the western plateau and also in the central and eastern areas. Barrens exist in coastal areas, north of about 55° N latitude, and in the Mealy Mountains. Figure 2.4 shows 5 classes of vegetation in Labrador.

2.4 Climate

The climatic zones of Labrador are listed in *The Natural Environment of Newfoundland Past and Present*. Listed below are the zones and a brief description of their characteristics. Figure 2.5 shows the zones.

Interior Labrador

The interior of Labrador has a continental climatic regime. Annual precipitation is generally in the 900-1100 mm range. Precipitation is highest in the summer. Winters are long with heavy snow accumulation. Air temperatures in winter can be below -15EC for extended periods. Summers are short and cool with occasional brief spells of daily maxima in the 23-27EC range. Winds are light.

Inner Lake Melville area

The climate of the Inner Lake Melville area is similar to the Interior of Labrador except that the summers are notably warmer and winters are much shorter.

Southeastern Labrador Interior

This upland area is closer to the Strait of Belle Isle frontal cyclone track than the Interior of Labrador. The climate is less continental than rest of the interior, with a greater percentage of total precipitation occurring in winter. Annual precipitation is in the 1000-1200 mm range.

Coastal Labrador

The climate of Coastal Labrador is less continental than the interior. Annual precipitation is in the 1000-1300 mm range. Precipitation is lowest during the spring. Summers are a little cooler than the interior uplands and the winters are a little milder due to the proximity to the Labrador Sea.

Figure 2.4 Vegetation Classification in Labrador⁴



Tundra

The low treeless vegetation of high latitudes and altitudes, usually characterized by lichens, sedges and dwarf shrubs.

Forest and Tundra

A patchwork of tundra "barrens" and patches of stunted forest forming a transition zone between tundra and subarctic forest and peatlands. Tundra expands northward.

Barrens

Sparsely forested heath and moss barrens, stunted open and patchy or sometimes continuous cover of Black Spruce and Balsam Fir alternating with moss and heath barrens, rock outcrops and lakes on a generally featureless, windswept terrain.

Peatland

A patchwork of lakes and rivers, bogs, swamps and muskeg with areas of upland barrens and forest.

Forest

Conifers form the majority of the forest cover and the most prevalent species over the range is Black Spruce, usually found in pure stands or mixed with Balsam Fir and White Birch. On deeper lowland soils, Black Spruce, Balsam Fir, White Spruce, White Birch and Balsam Poplar are common.



⁴Taken from: Atlas of Newfoundland and Labrador, 1991.





-- Southern limit of discontinuous permafrost (Brown, 1968)

- 7. Interior Labrador
- 7a. Interior Lake Melville Area
- 8. Southeastern Labrador interior
- 9. Coastal Labrador
- 10. Northern Labrador

⁵Taken from: The Natural Environment of Newfoundland, Past and Present, 1981.

Northern Labrador

The climate of Northern Labrador is "Tundra". Tree growth is stunted due to the cool summer temperature. The warmest monthly mean is less than 10EC. Annual precipitation is in the 850-1000 mm range. There is a risk of frost throughout the short summer. Mountains and fjords create significant local weather variations.

2.5 Hydrology

While event hydrographs at southern latitudes are similar to event hydrographs at northern latitudes during the snow-free period, the annual hydrographs are markedly different. In northern latitudes the snow accumulation period is longer. The temperature regime has a very significant influence on streamflows. The annual peak flow almost invariably occurs in the spring due to rising temperatures and consequent snowmelt. The baseflow contribution to streamflow is usually small due to the occurrence of permafrost. Increases in streamflow during a midwinter mild spell or rainfall event are rare due to the lack of significant events and due to the water holding capacity of the snowpack.

Annual hydrographs in Labrador exhibit many of the characteristics of hydrographs in northern watersheds. Almost invariably, the peak annual flow occurs during the spring when temperatures rise above zero. A period of low flows immediately precedes the start of the spring flood. The data for a simplified water budget for Labrador, south of 56E30'N latitude, are given in *Water Resources Study of Newfoundland and Labrador*:

Precipitation = 800 mmRunoff = 600 mmand Evaporation = 200 mm

A perusal of the *Water Resources Atlas of Newfoundland* indicates the following ranges of specified parameters:

mean annual precipitation	750-950 mm
mean annual snowfall	200-475 cm
mean annual temperature	-1 to 3 EC
mean annual potential evapotranspiration	375-450 mm
mean annual runoff	600-700 mm