

**PHYSIOGRAPHY, GEOGRAPHY AND BATHYMETRY OF THE DIGBY NECK
AREA, BAY OF FUNDY**

Prepared by

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TABLE OF CONTENTS

Physiography	3
Geography	3
Divisions of the Bay of Fundy.....	4
Bathymetry	4
References	5
 Figure 1.	6
Major Physiographic divisions in Atlantic Canada from Williams et al., (1972).	
 Figure 1a.....	7
Explanation for Figure 1 (above)	
 Figure 2.	8
Divisions of the Bay of Fundy into inner and outer.	
 Figure 3.	9
Divisions of the Bay of Fundy into lower, mid and upper, Dadswell, 1984.	
 Figure 4.	10
Canadian Hydrographic Chart “Approaches to the Bay of Fundy”, Chart 4011. Note the chart is in fathoms and the deepest water approach to Nova Scotia from the Gulf of Maine is at Whites Point, Digby Neck.	

Physiography

The location of a proposed quarry and marine terminal on Digby Neck falls within one major physiographic province of eastern Canada known as the Appalachian Region (Figure 1). Within the Appalachian Region there are two divisions: the Atlantic Uplands and the Carboniferous-Triassic Lowlands. The proposed site falls within the Atlantic Uplands division. It borders a region known as the Fundian Lowlands which is a subdivision of the Carboniferous-Triassic lowlands (Williams et al., 1972).

The development of the Appalachian Region began during the late Jurassic to early Cretaceous time with the modification of the landscape by fluvial drainage systems. It is a mature surface. The Atlantic Uplands division includes both the onshore area of North Mountain and the adjacent nearshore submerged portion as a continuum. It is a low angle southeastwardly sloping surface developed across resistant lithologies of granite, basalt, slate, quartzite, schist and gneiss. The adjacent Fundian Lowlands cover most of the Bay of Fundy and deeper parts of the Gulf of Maine. Drainage from the Digby Neck area of this division is both to the northwest in the Bay of Fundy and to the southeast in St. Marys Bay.

Geography

The Bay of Fundy is part of a much larger regional marine system that includes the Gulf of Maine and Georges Bank and is often referred to as the FMG for research purposes. The Bay of the Fundy is the dominant large scale geographic feature of the region. It is a linear embayment, 155 km in length that tapers to 48 km wide at its northeastern end where it bifurcates into Chignecto Bay and Minas Channel. The Bay also shallows in a northwest direction from 233 m water depth in Grand Manan Basin at the entrance, to 45 m at the bifurcation. The Bay of Fundy connects to the northeastern corner of the Gulf of Maine between the islands of Grand Manan, New Brunswick; and Brier Island, Long Island and Digby Neck, Nova Scotia. At this location the water is very deep, extending to 233 m in the narrow constricted depression.

The presence of Grand Manan Island and its associated shallow shoals off the south coast act as a major topographic barrier at the entrance to the Bay of Fundy. Brier and Long Islands together with Digby Neck, are part of a narrow and high terrain resulting from volcanic basalt flows that extend into the Bay of Fundy and Gulf of Maine from the northwest mainland of Nova Scotia. St. Marys Bay occurs as a shallow water large re-entrant along the south coast of Brier Island, Long Island and Digby Neck and separates them from the mainland of Nova Scotia. St. Marys Bay opens into the Gulf of Maine to the north of Yarmouth.

Water passages occur between Brier Island and Long Island and Long Island and Digby Neck. These represent offsets along the axis of North Mountain formed as a result of faulting. To the north of Brier Island, another shallow and narrow ridge of submerged basalt extends to the southwest for over 20 nautical miles (King and MacLean, 1976). It is an underwater equivalent of North Mountain, but not as high. The shoreline extending to the northeast from Brier Island along the entire south coast of the Bay of Fundy is straight and uniform. This is the result of the consistency of North Mountain volcanic

flows and the overlying Triassic-Jurassic sedimentary rocks that define conditions along the coast.

Divisions of the Bay of Fundy

The Bay of Fundy has been divided into geographic regions for research purposes. One system divides the Bay into what is referred to as the “Upper Bay” and the “Lower Bay” with the dividing line running from Cape Spencer east of Saint John to Parkers Cove northeast of Digby (Figure 2). A further subdivision is sometimes used to divide the Bay into four quadrants. Another dividing line runs parallel to the axis of the Bay from Cape Chignecto to the southwest, south of Grand Manan Island.

Within this divisional system the Whites Point area of Digby Neck falls into the south outer Bay of Fundy division. The boundary of the outer Bay of Fundy is universally accepted as a line that runs from Brier Island to the southwestern tip of Grand Manan Island.

Other divisional systems define the boundary between the inner and outer Bay of Fundy as a line that runs in a more southerly direction from Cape Spencer in NB to the Digby Gut area. Dadswell et al, (1984), in a review of fisheries in the Bay of Fundy, divided it into three geographic regions: lower, mid and upper (Figure 3). Others have proposed yet another divisional system in the Bay of Fundy that separated the outer Bay from the inner by a line extending much further out the Bay from Digby to Point Lepreau. Fisheries divisions of the Bay of Fundy term the inner Bay as area 55 and the outer Bay as area 54. The dividing line in this case is between Digby and Musquash Head in NB. In all cases the Whites Point area of Digby Neck occurs within the outer or lower Bay of Fundy.

Bathymetry

The following is a description of the bathymetry of the region taken from Canadian Hydrographic Charts 4011 (Figure 4). The Bay of Fundy extends from Grand Manan Basin at the entrance to the Bay and shallows uniformly in a northeastward direction to the inner area of Minas Channel and Chignecto Bay. The deepest water closest to land along the south shore of the Bay occurs at the entrance to the Bay of Fundy off Digby Neck. Here the water rapidly deepens from the shoreline to 100 m water depth less than 2 nautical miles offshore. The shortest distance to deep water at the entrance to the Bay is adjacent to Whites Point, Digby Neck. The proposed shipping route from the marine terminal follows this channel and is largely confined to the deepest and shortest route to land.

Adjacent to the Whites Point proposed quarry and marine terminal the water depths range to 24 m with the terminal site centered at 16 m. The detailed bathymetry shows that the seabed is a generally uniform slope extending from the shoreline. A few isolated bedrock controlled mounds occur close to shore and the most rugged area of seabed generally occurs in less than 6 m water depth. The largest and anomalous local feature is the large ridge which projects to the west from the coastline adjacent to Sandy Cove.

Figures

Figure 1. Major Physiographic divisions in Atlantic Canada from Williams et al., (1972).

Figure 2. Divisions of the Bay of Fundy into inner and outer.

Figure 3. Divisions of the Bay of Fundy into lower, mid and upper, Dadswell, 1984.

Figure 4. Canadian Hydrographic Chart “Approaches to the Bay of Fundy”, Chart 4011. Note the chart is in fathoms and the deepest water approach to Nova Scotia from the Gulf of Maine is at Whites Point, Digby Neck.

References

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Figure 1

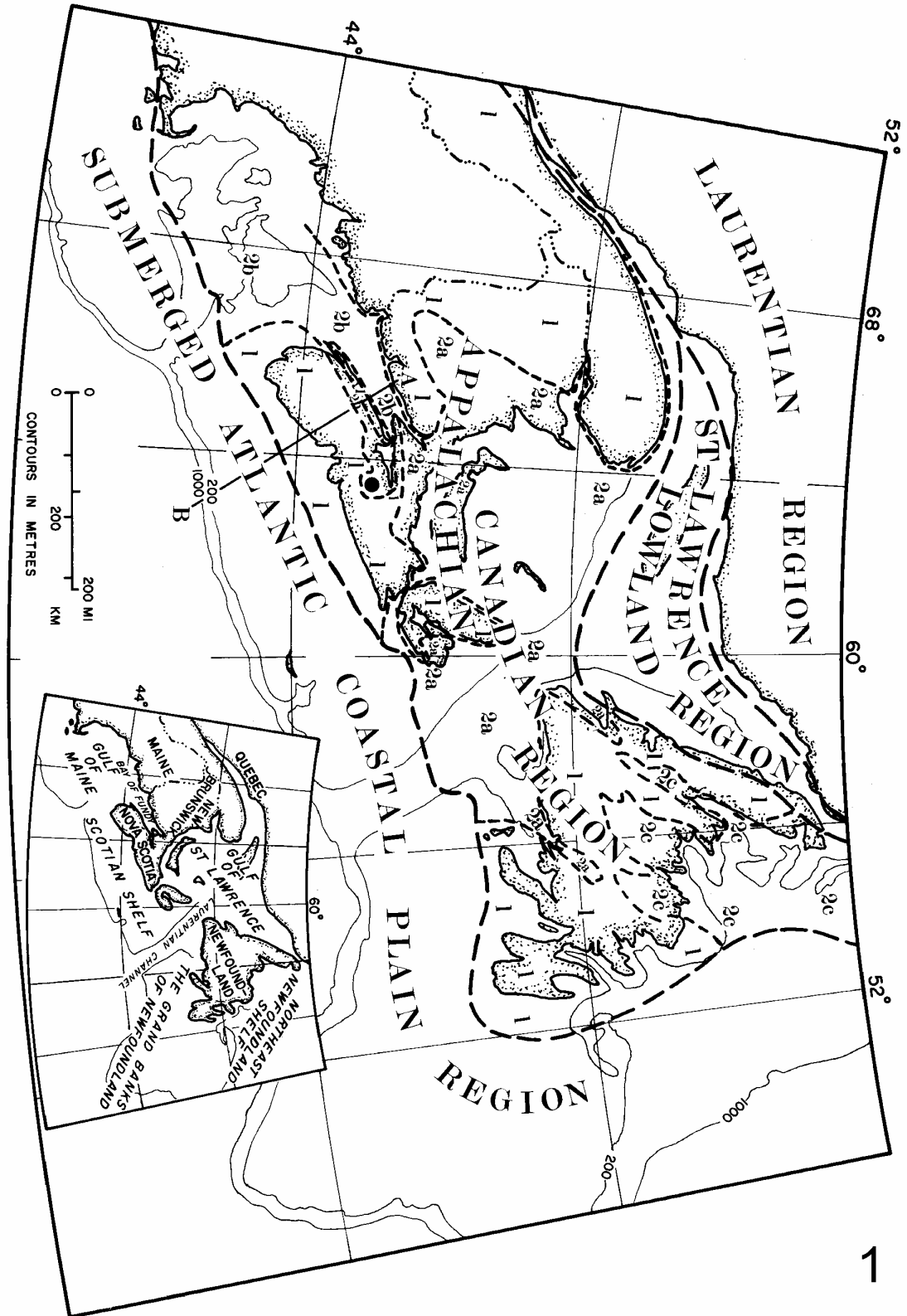


Figure 1a

EXPLANATION FOR FIGURE 1

REGIONS	DIVISIONS	SUBDIVISIONS
APPALACHIAN (Onshore and inner continental shelf)	1 Atlantic Uplands	1A Southern Uplands of Nova Scotia and the inner Scotian Shelf 1B North Mountain 1C Nova Scotia Highlands 1Ca Cobequid Highlands 1Cb Antigonish Highlands 1Cc Cape Breton Highlands 1D New Brunswick Highlands 1Da Miramichi Highlands 1Db St. Croix Highlands 1Dc Caledonian Highlands 1E Chaleur Uplands
	2 Sutton Mountains (Green Mountains)	1F Notre Dame Mountains
	3 Magantic Hills (White Mountains)	1G Eastern Quebec Uplands
	4 Carboniferous-Triassic Lowlands	1H Southern Uplands of Newfoundland and the inner Grand Banks of Newfoundland
		1I Newfoundland Highlands 1Ia Long Range Mountains 1Ib Serpentine Range 1Ic Anguille 1Id Long Range 1Ie Topsail Hills 1If Dunamogon Highland
	4A Maritime Plain 4Aa New Brunswick Lowland 4Ab Prince Edward Island 4Ac Cumberland Lowland 4Ad Cape Breton Lowlands 4Ae St. George's Lowland 4Af Baie D'Espoir Lowland 4Ag Southern Gulf of St. Lawrence and southern approaches	4C Central Lowland of Newfoundland and inner Northeast Newfoundland Shelf 4Ca Grand Lake Lowland 4Cb Notre Dame Lowland
	4B Fundian Lowlands 4Ba Bay of Fundy and northern and central Gulf of Maine 4Bb Annapolis Lowland 4Bc Minas Lowland	

1a

Figure 2

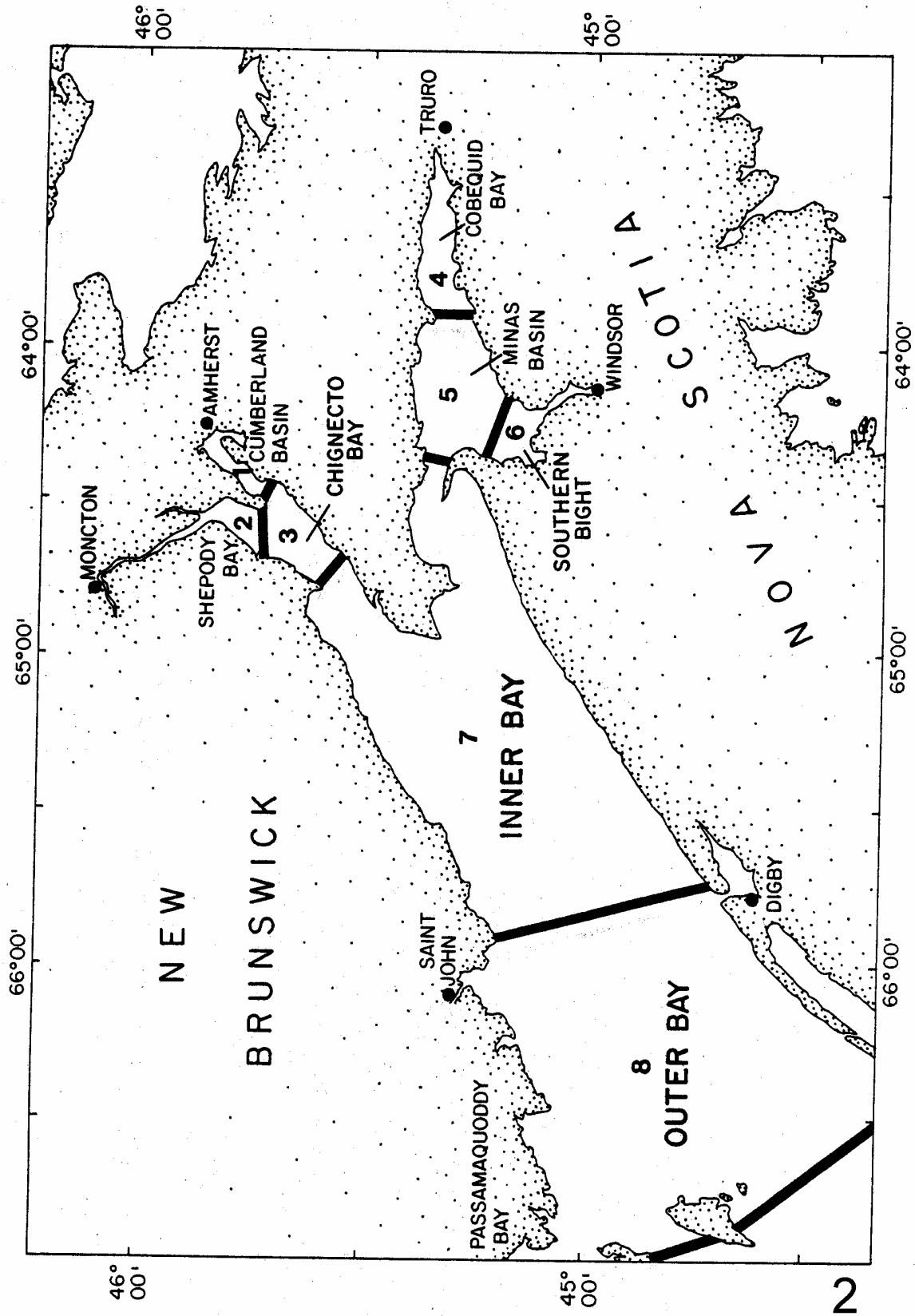
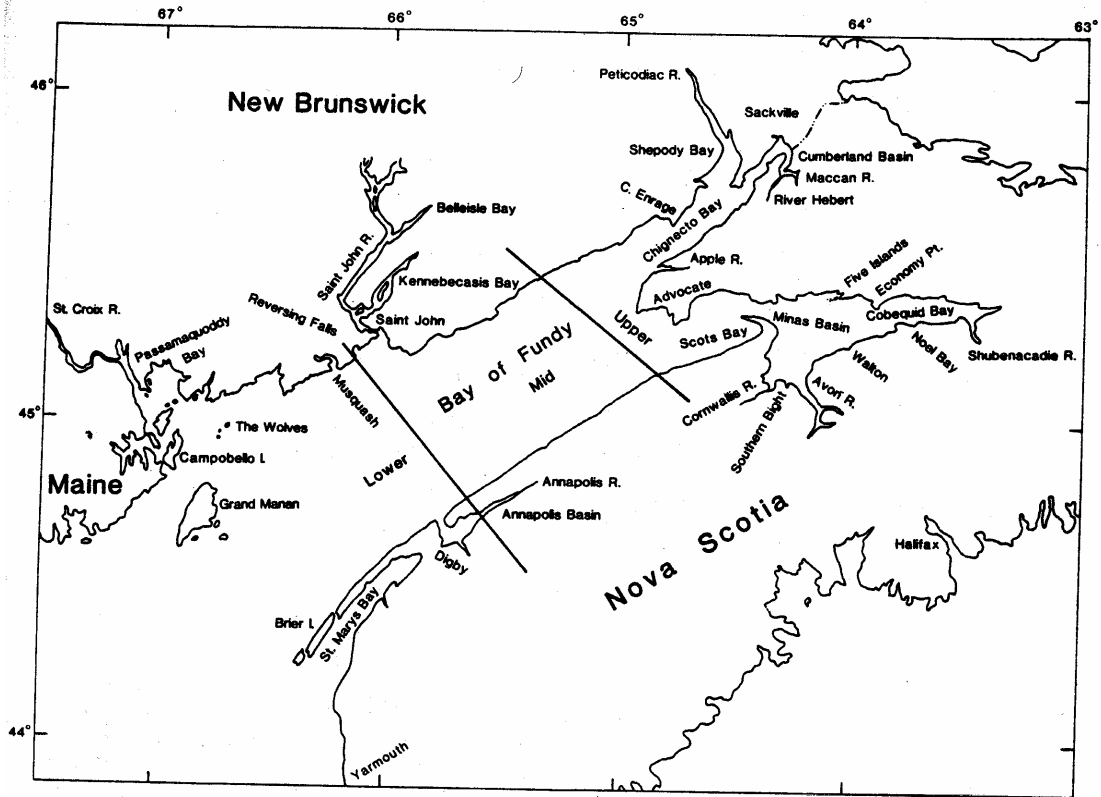


Figure 3



3

Figure 4

