T6.3 COASTAL AQUATIC ENVIRONMENTS

The coastline of Nova Scotia encompasses numerous bays, inlets and lagoons. The largest include St. Georges Bay (Units 521b/914), separating Antigonish and Inverness counties, and St. Margarets Bay (District 460b, Unit 911); the smallest, coastal inlets, such as Herring Cove (Unit 851), near Halifax. Bras d'Or Lake (District 560/ Unit 916) in Cape Breton Island is a unique inland waterbody.

The majority of inlets and harbours were formed as the result of submergence of river valleys. Physical conditions in coastal waterbodies tend to be warmer, more estuarine (see T6.4), and more sheltered than exposed sections of the ocean coastline. Consequently, they have animal and plant communities that differ from those found on the open coast.

TOPOGRAPHY

Coastal aquatic environments are largely determined by the type of underlying rock. Rivers on less-resistant bedrock in northern Nova Scotia erode wide lowlands and result in shallow bays and branching estuaries (e.g., Pictou Harbour and East, West and Middle rivers in Unit 521a).[1]

Rivers and glacial meltwaters have eroded narrow valleys in more-resistant bedrock in southern Nova Scotia and, consequently, formed deeper estuaries and excellent harbours. The larger bays and features such as St. Georges Bay reflect their position between major geological formations. Fjords, which are common in Newfoundland and along the Labrador coast, are uncommon on the Nova Scotia coastline. They are typically deep, have a U-shaped cross section and become shallower at the outward end. (This is called a "sill.") Examples can be found on Cape Breton Island at Ingonish Harbour (Unit 552c) and parts of Bras d'Or Lake.

PROCESSES

Land obstructions prevent tidal currents moving freely around the earth. Instead, the water moves backwards and forwards in semi-enclosed basins. Every bay or basin has a natural period of oscillation depending on its length, depth and shoreline. If this period coincides with the period of the tides, the two will augment each other, resulting in tides with high amplitude. When the two periods differ substantially, tides will tend to be low. The Bay of Fundy is tuned to semi-diurnal tidal frequencies, resulting in ever-increasing amplitudes towards the upper reaches.

The water column is not mixed significantly by tidal action in areas of southern Nova Scotia, and the water may be stratified (density increasing with depth). These areas typically receive waters which are high in organic material, or "brown water," which can block the penetration of light to the seawater below and reduce productivity during periods of high freshwater flow.

Wave exposure is generally lower in inlets and bays, resulting in sediment accumulation and lower seaweed populations. Coastal oceanographic processes often pile up more sediments along the coast than can be carried laterally by currents, leading to the formation of bars or barriers, which block the mouths of some river systems (see T8.3).

LAGOONS AND BARACHOIS

The entrance to harbours can be blocked by the development of coastal spits, barrier islands and barrier beaches, depending on local conditions. These protected areas develop an estuarine character. In the Northumberland Strait, coastal lagoons are protected from ice scour. Species of seaweed preferring warm water may develop there.

BRAS D'OR LAKE

The two channels—the Great and Little Bras d'Or Channels—leading into the Bras d'Or Lake system are very narrow, restricting the volume of water entering and leaving with each tide. For this reason, the tidal range is small, approximately 0.08 m near Baddeck, compared to 0.9 m in the Cabot Strait. In

smaller basins, such as Whycocomagh Bay, the tidal range is almost nonexistent. Tidal currents in the two channels can nevertheless be strong, with great variations in strength and direction at different depths. Barometric pressures can cause water levels in the confined lake to rise or fall by up to 0.3 m while the adjacent ocean is, of course, unaffected. The ocean water brought in through this process maintains the relatively high salt content in the system. Therefore, although they occur less frequently, the barometric tides have much greater impact on the Bras d'Or Lake than do the normal tides. Strong tidal currents of 3 m/s in the Great Bras d'Or Channel and 1.5 m/s in the Barra Strait combine with the barometric tides to mix the fresh and salt waters in the lakes.

LARGE BAYS

St. Georges Bay (Units 521b/914), Mahone Bay (District 460a/Unit 911) and St. Margarets Bay (District 460b/Unit 911) have marine environments similar to the conditions typical of the open ocean offshore. Oceanic organisms, including jellyfish and pelagic fish (such as tuna), often enter the bays, and seaweed populations can be extensive. The size of the bays permits significant wind fetch and moderate wave exposure. These areas may be affected by influxes of fresh water from coastal streams, but the bays as a whole are not estuarine. Events such as storms and tides in offshore waters have a greater impact on these bodies than local factors.[2]

CULTURAL FACTORS

Coastal bays and inlets are used increasingly for culture of fish and molluscs, principally mussels. Human development tends to cluster in areas affording suitable harbours and availability of water for disposal of wastes. As a result, some of these areas have been extensively polluted (see T12.12).

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Associated Topics

T2.7 Offshore Geology, T3.5 Offshore Bottom Characteristics, T5.2 Nova Scotia's Climate, T6.1 Ocean Currents, T6.2 Oceanic Environments, T6.4 Estuaries, T8.1 Freshwater Hydrology, T7.1 Modifying Forces, T8.2 Freshwater Environments, T7.2 Coastline Environments, T7.3 Coastal Landforms, T10.6 Trees, T11.6 Shorebirds and Other Birds of Coastal Wetlands, T11.7 Seabirds and Birds of Marine Habitats, T11.12 Marine Mammals, T11.14 Marine Fishes, T11.17 Marine Invertebrates, T12.7 The Coast and Resources

Associated Habitats

H1 Offshore, H2.5 Tidal Marsh, H3.1 Open Water Lotic (Rivers and Streams), H3.3 Bottom Lotic (Rivers and Streams)

References

1 Roland, A.E. (1982) *Geological Background and Physiography of Nova Scotia*. Nova Scotia Institute of Science, Halifax.

2 Platt, T, A. Prakash, and B. Irwin (1972) "Phytoplankton nutrients and flushing of inlets on the coast of Nova Scotia." *Le Naturaliste Canadien* 99.

Additional Reading

• Environment Canada (1988) *A Profile of Important Estuaries in Atlantic Canada*. Environmental Quality Division, Conservation and Protection Branch.