

Factors influencing ice extent and thickness

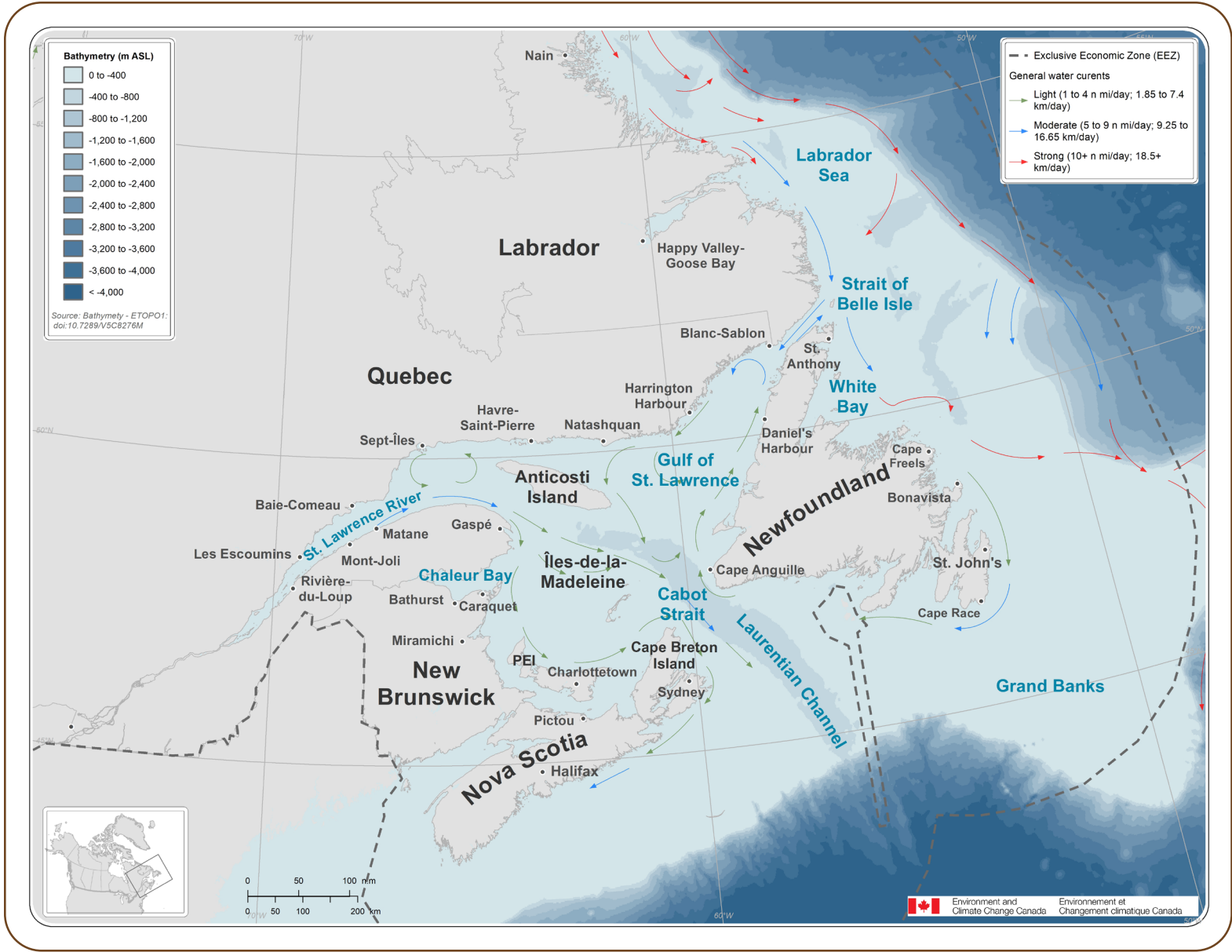
**Air temperature:** Sea ice extent and volume increase in winter as cold Arctic air invades the region from the northwest. Ice formation can be disrupted, however, by warm air brought by storms from the southeast.

**Winds:** Winds play a major role in the extent of the ice cover. At the beginning of the ice season, when the ice is still relatively thin, strong winds (and waves) can cause ice destruction and temporarily suppress ice development. Throughout the winter, along the Labrador and east Newfoundland coasts, easterly onshore winds can also cause the rapid compression and thickening (ridging) of ice along the shore, while westerly offshore winds will cause a spreading out of the ice floes, increasing the pack’s extent and often resulting in the formation of open water leads.

**Water depth:** Shallow, undisturbed coastal waters cool more quickly than deeper offshore waters and winter ice therefore forms in these areas first.

**Waves and tides:** In coastal bays and inlets, where the water is undisturbed by large waves or tides, winter ice will generally become consolidated and land-fast. Offshore, ice remains mobile (as a pack of individual floes) due to winds, waves, tides, and currents.

**Currents:** Along the Labrador and East Newfoundland coasts, sea ice continuously drifts southwards with the Labrador Current. Thick old ice floes and icebergs embedded in this pack ice occasionally enter the Gulf via the Strait of Belle Isle. In the Gulf, currents cause winter sea ice to continuously drift out of the Estuary (where waters are less saline and therefore freeze more easily) into the central Gulf and out of Cabot Strait.



St. Lawrence Estuary

**Median ice season:** Mid-December to end March  
**Tidal Ranges:** 2.5 m (river mouth) to 4.1 m (Quebec City)  
**Special ice Features:** Currents generally carry ice eastward but prevailing northwesterly winds push most of it to the south shore, making it thicker and thus more difficult to navigate there. In March, very large floes (fragments of very thick fast ice dislodged by spring tides during mild spells) are exported to the northwestern Gulf of St. Lawrence. Locally called “battures”, these constitute a severe hazard to navigation.

West Gulf

**Median ice season:** Mid-late December to mid-April  
**Tidal Ranges:** 0.7 m (central Gulf) to 1.2-1.8 m (south of Prince Edward Island) to 1.3-2 m (Chaleur Bay). Note: western Prince Edward Island has only a single tide per day.  
**Special ice Features:** In Chaleur Bay, the constant motion due to the large tidal range means fast ice in this area tends to be limited. Northeast of Prince Edward Island, due to the general ice drift from the Estuary towards Cabot Strait, thick ice in large floes can exert considerable pressure against the northwestern shores of Cape Breton Island and the Îles de la Madeleine.

East Newfoundland

**Median ice season:** Early January to late May  
**Tidal Ranges:** 0.8-1.6 m  
**Special ice Features:** Winter fast ice is primarily found in bays north of 48.5 N. During northerly wind events, pack ice drifting southwards from Labrador, containing icebergs and traces of thick multi-year floes, is strongly compressed onshore from White Bay to Cape Freels. Vessels can become trapped during such high pressure events. During easterly wind events, the offshore pack ice may enter bays between Cape Race and Cape Freels. During westerly wind events, the pack ice spreads seaward, lowering concentrations and creating open water leads. During severe winters, the pack ice may extend as far east as the Flemish Cap and as far south as 43 N.

Central Gulf and Cabot Strait

**Median ice season:** End January to early April  
**Tidal Ranges:** 0.7-1.6 m  
**Special ice Features:** Due to winter storm winds, the ice in these unsheltered waters experiences smaller floes, limited ridging, and frequent open water leads. In extreme years, currents can bring ice all the way to St. Pierre and Miquelon and even as far as Halifax.

Labrador Coast

**Median ice season:** End November or early December to end June (extreme years August)  
**Tidal Ranges:** 0.8-1.6 m  
**Special ice Features:** Strong offshore westerly winds in the wake of winter storms often create open water leads between the coastal fast ice and the offshore mobile pack ice. However, strong onshore easterly winds ahead of storms can rapidly close these leads, dangerously trapping vessels in high pressure compression events. The mean wind flow in the Strait of Belle Isle area shifts from the northwest to the northeast around April. This leads to more frequent intrusions of old ice and icebergs into the Strait of Belle Isle. Because this ice from the Labrador area is thicker than that formed locally, clearing in the Strait is slow when these intrusions occur.

Northeast Gulf

**Median ice season:** End December to early May  
**Tidal Ranges:** 0.8-1.6 m  
**Special ice Features:** Towards the end of the season, this area receives icebergs and thick multi-year ice floes, which drift in through the Strait of Belle Isle. Additionally, strong northwesterly winds often produce an area of thick, deformed ice along the west coast of Newfoundland from the Port-au-Port Peninsula northward. Here, during extreme pressure events, ice floes can pile up to 13 m.

\*Median Ice Season is defined as the period during which median ice concentrations in the region are ≥1/10.