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National Marine Weather Guide

Atlantic Regional Guide

Canada

Cat. No. En56-259/2016E-PDF
978-0-660-04148-3

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Cover Left: Huge waves at Pouch Cove, NL in March, 2013. Photo: Jennifer Gillard
Cover Center: Relentless racing in Conception Bay in 2010. Photo: Stephen D Marshall
Cover Right: Relentless participating in Royal Newfoundland Yacht Club race week 2010. Photo: Stephen D Marshall

Acknowledgments

This publication is an update of editor Peter Bowyer's comprehensive work, *Where the Wind Blows —A Guide to Marine Weather in Atlantic Canada* (1995). It also incorporates information from four associated publications: the *East Coast Marine Weather Manual* (1989), the *Gulf of St. Lawrence Marine Weather Guide* (1991), the *Scotia/Fundy Marine Weather Guide* (1992), and the *Newfoundland and Labrador Marine Weather Guide* (1993). There are many people whose names are not shown in this acknowledgement who also deserve thanks for their contribution, these people are many from the MSC staff of Atlantic region.

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Relentless at mooring in Brigus, Conception Bay. Photo: Ken Ryan

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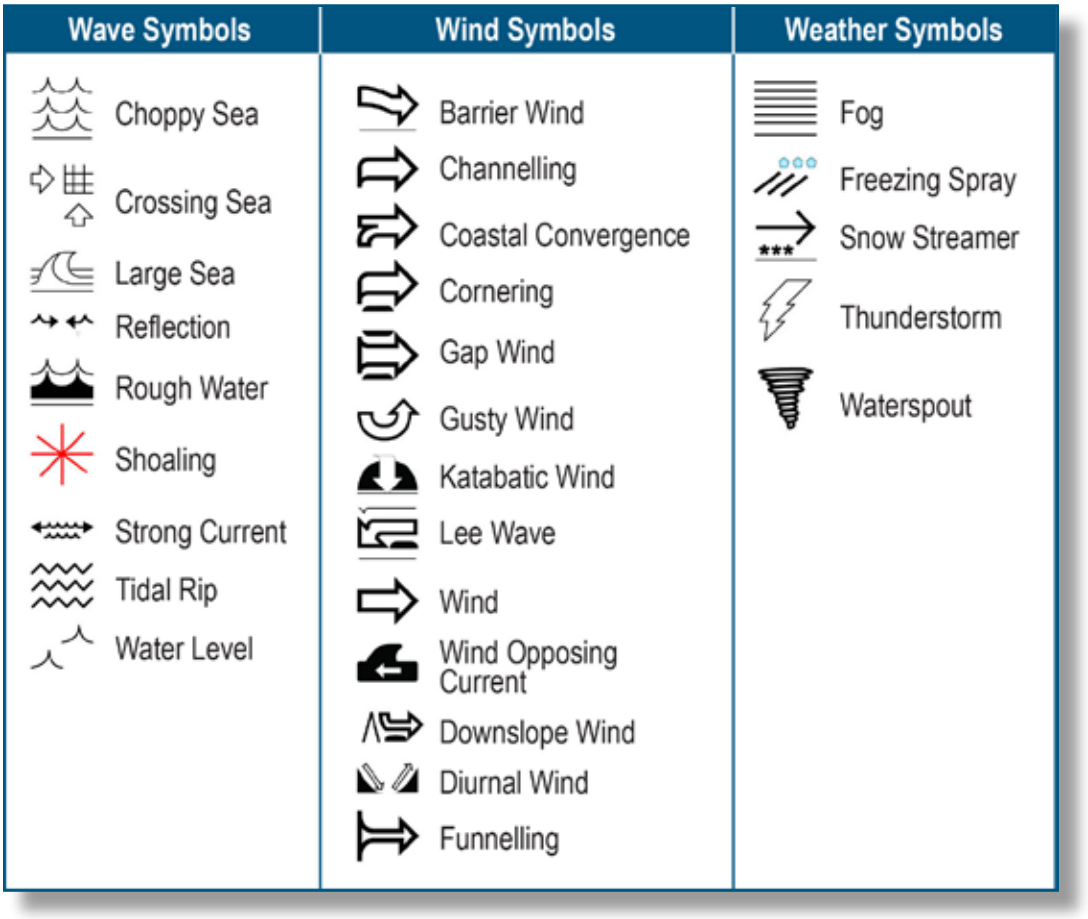


Wind, weather and wave symbols used in this guide.

ATLANTIC REGIONAL GUIDE PART 1

1. Introduction

Atlantic Canada's marine environment is diverse and potentially hostile. To travel safely in the region's waters requires a sound knowledge of regional climatology and local weather effects, both of which are covered in detail in this chapter.

Forecasting wind, sea state, and other weather conditions in Atlantic Canada's offshore waters is challenging, as the effects of large-scale weather systems are highly localized. In nearshore waters, the added complexity of topographical effects makes detailed forecasts virtually impossible—as every bay, peninsula, inlet, and island can alter the impact of such systems dramatically.

For example, a large frontal low passing south of Nova Scotia may bring hurricane-force southeasterlies to Chéticamp, storm-force easterlies to Burgeo, and moderate northeasterlies to Saint John Harbour. The same storm may cause abnormally low water levels along one stretch of coast and another area of the shoreline to be inundated.

The local effects described in this chapter are grouped under 10 sub-regions: Fundy, Atlantic Nova Scotia, Cape Breton, the Northumberland Strait, New Brunswick and Prince Edward Island North, the Southeast Gulf, Newfoundland West, Newfoundland South, Newfoundland East, and Labrador.

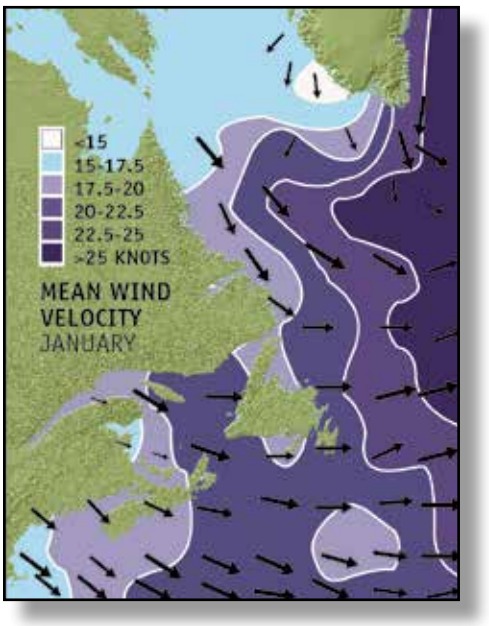
2. Climatology

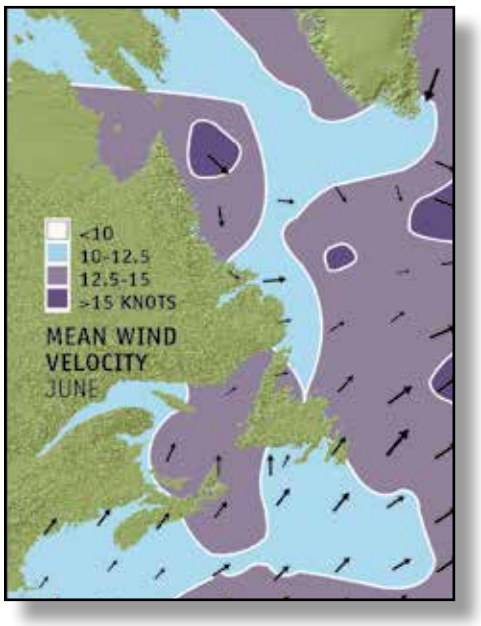
Climate is a description of the average weather conditions in a region over many years. The averages, frequencies, and extremes referred to in this section are determined by recording and studying day-to-day weather systems for long periods of time. Average conditions vary considerably from month to month and may also from year to year.

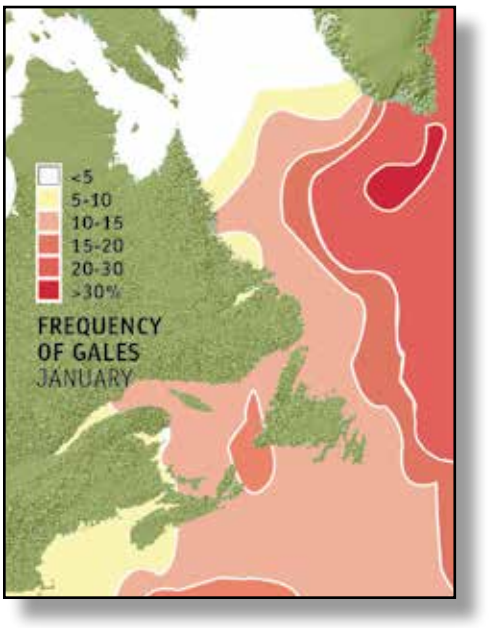
Tied up at Royal Newfoundland Yacht Club 2013. Photo: Ken Ryan

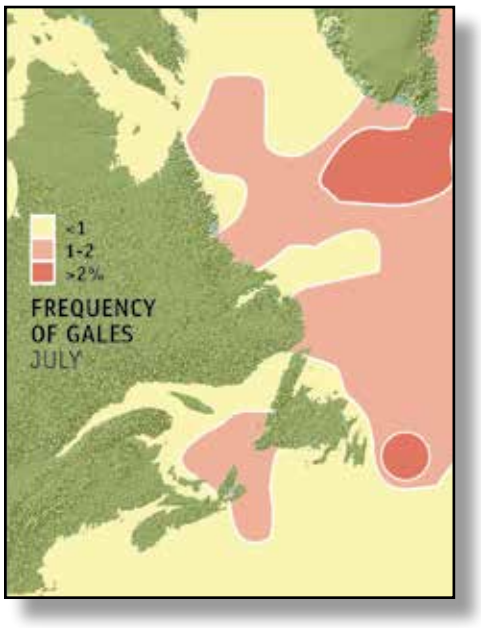
2.1 Wind

The prevailing winds over the region are westerly to northwesterly in winter and southwesterly in summer. In winter, wind speeds average around 20 kt, with gales occurring 10-20 percent of the time and storm-force winds 1-2 percent. In summer, wind speeds are much lower, averaging 10-15 kt, and storms are rare, with gales occurring less than two percent of the time. Extreme wind gusts of over 100 kt have been recorded both in winter and in association with tropical systems. Many gale and storm systems are still intensifying as they pass through the region or develop over the western Atlantic. As such, winds over northeastern regions are, on average, stronger than those over the southwest.





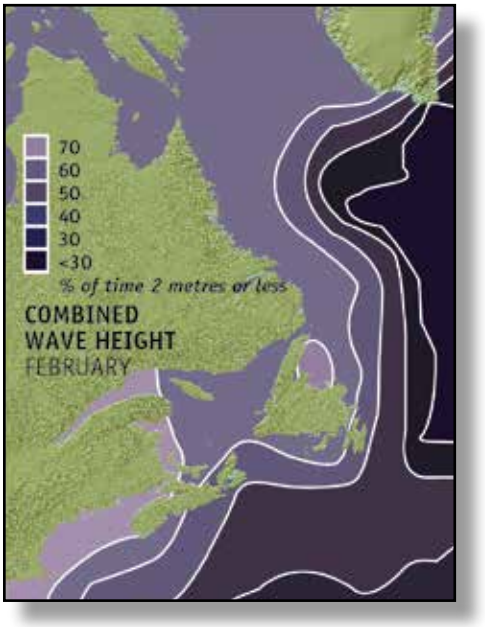


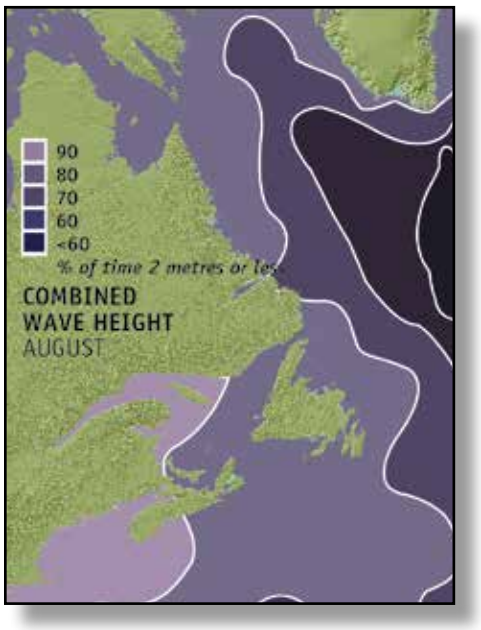


2.2 Wave Heights

Since wave heights are determined by the wind, the highest waves usually occur in the coldest months, when storms are strongest. As well, mariners observe that winter winds pack a greater "punch" than summer winds, likely due to the greater momentum of cold air.

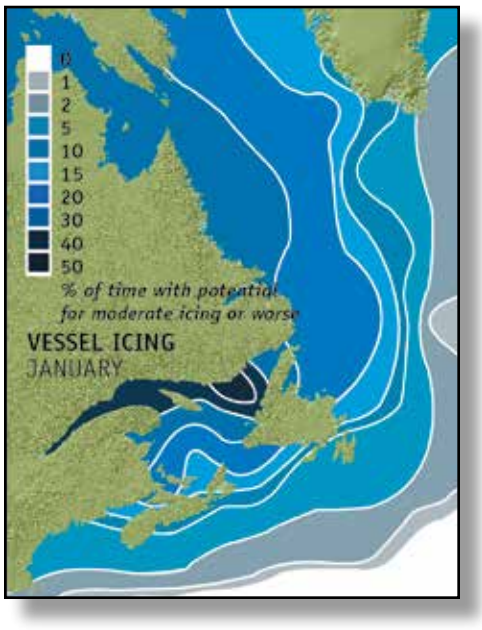
In winter, wave heights in offshore waters are greater than 2 m more than half the time; in summer, only 10-20 percent of the time. Wave heights over 6 m, while rarely observed in summer, are recorded 5-10 percent of the time in offshore waters in winter. Because wind strength is greater in the northeast, wave heights are also generally higher in those areas.





2.3 Vessel Icing

The main cause of icing on a ship's superstructure is freezing sea spray, which can be a hazard during winter months, especially to smaller vessels. Caused by a combination of strong winds, low temperatures, and high waves, freezing spray typically occurs between November and April and is most common in February, the coldest month. The potential for hazardous ice accretion on a vessel is quite low in warm Scotian Slope waters; however, in the colder waters of the Labrador Sea and the Gulf of St. Lawrence, the possibility for icing is 30-50 percent in January. Along



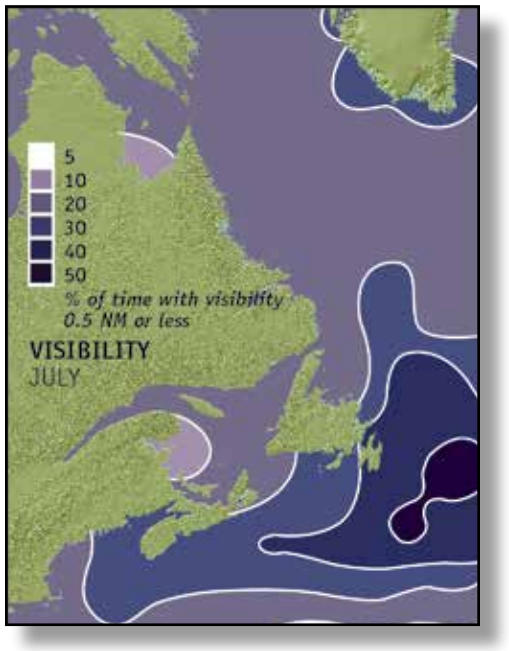
the Labrador coast and in the Gulf of St. Lawrence, where sea-ice formation inhibits wave development and decreases the potential for freezing spray, the worst month is usually December. In contrast, the cold, ice-free waters south of Newfoundland are at risk over the entire six-month period.

Did You Know?

Extreme waves occur in all of Atlantic Canada's waters, but one of the highest instrumentally measured deep-water wave in the world was the maximum wave of 30.7 m reported by the Nomad Weather Buoy on the East Scotian Slope during the Hallowe'en Storm of 1991. Less than a year and a half later, in March 1993, a monstrous frontal storm moved through the Gulf of Mexico, up the American coast, and through Atlantic Canada. Appropriately dubbed "the storm of the century", it caused near-record wave heights in the Slope waters south of Nova Scotia and the sinking of at least eight vessels over the course of its journey.

2.4 Fog

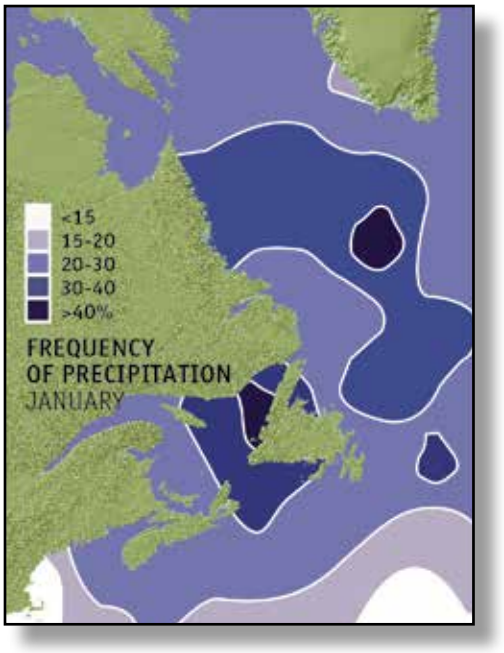
Atlantic Canada experiences some of the world's thickest and longest-lasting fog, which is most prevalent in late spring or early summer. The highest frequency of fog occurs over the Grand Banks in July, where visibility of less than 800 m occurs more than 40 percent of the time. The pool of cold water that lingers around southwestern Nova Scotia causes frequent and persistent fog in the area. The southwestern Gulf of St. Lawrence, by contrast, remains relatively fog-free because of milder water temperatures and dry air coming off the land. In early fall, fog decreases markedly across the region.

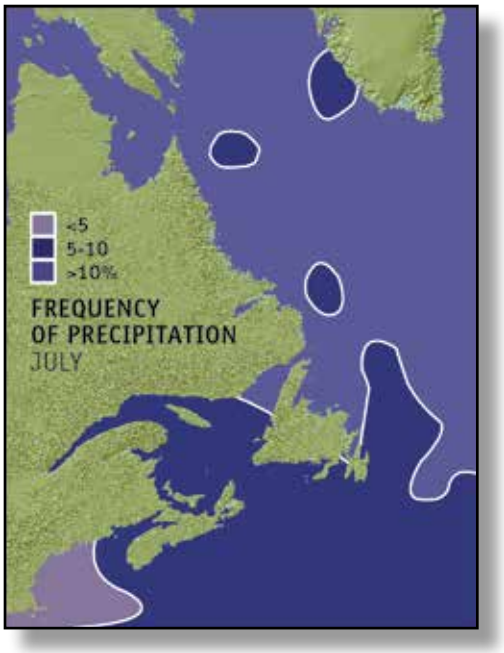


2.5 Precipitation

Precipitation is three to four times more frequent in winter than in summer, because intense cyclonic systems are more numerous. Storm systems close to Greenland often stall over the Labrador Sea and dissipate slowly, causing precipitation that lasts for days. "If you know the wind, you know the weather" is a useful old adage when it comes to speculating about precipitation, which can occur throughout the region at any time of the year. From October to May, any type of precipitation is possible: snow can accompany winds of almost any direction; rain usually occurs with a south or southwest wind; and freezing rain is typically observed with east or northeast winds. In spring, freezing drizzle and northeasterly winds can persist for days along the coastlines of Labrador and eastern Newfoundland. West-to-

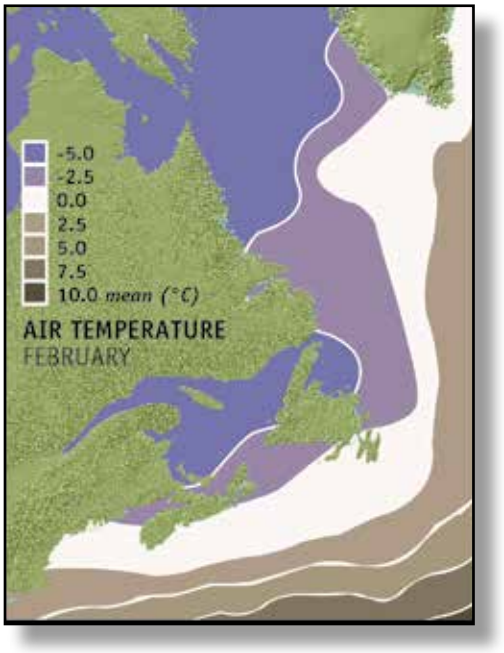
northwest winds are notorious for bringing snow streamers and very poor visibility to their facing coastlines. Such areas may experience twice as many "snow days" as other locations: for example, Newfoundland's west coast sees roughly 25 days of snow in January, dumped by cold northwesterlies that have drawn their moisture from the warm waters of the Gulf.

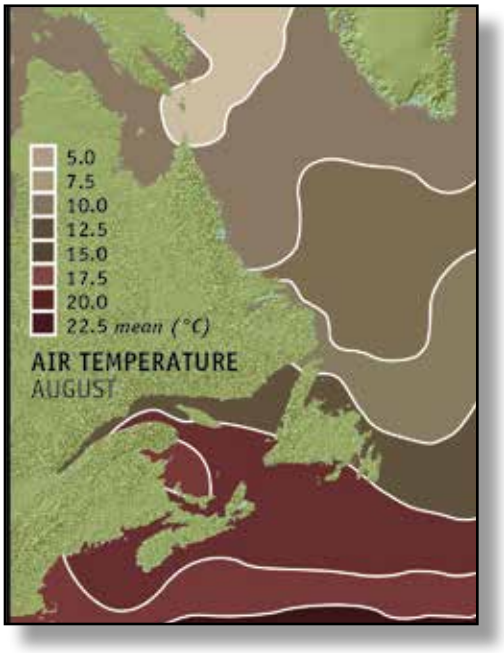




2.6 Air Temperatures

Air temperatures at sea are strongly influenced by the moderating effects of the water temperature. Away from the coast, the daily and seasonal variations are much smaller than

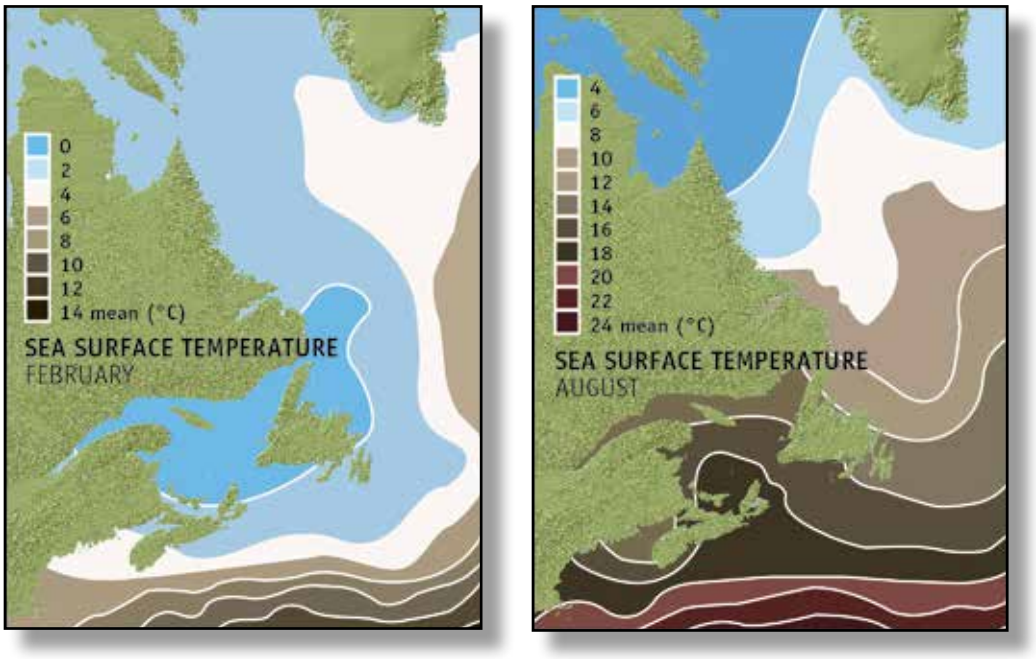




they are on land. Average air temperatures range from -8°C in the north in winter to 20°C offshore in summer.

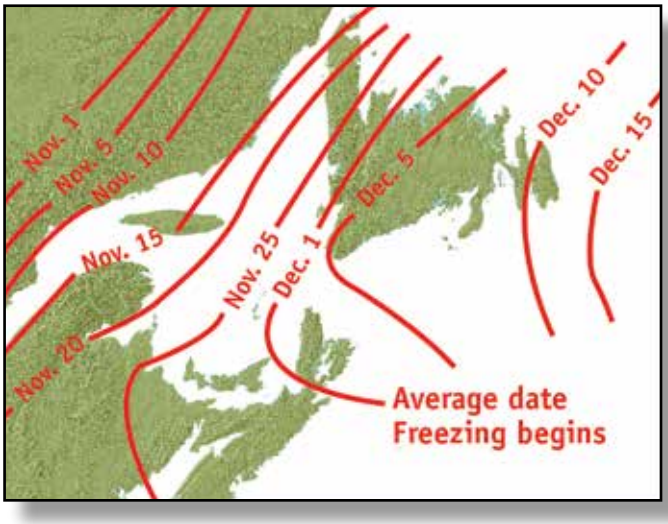
2.7 Sea-Surface Temperatures

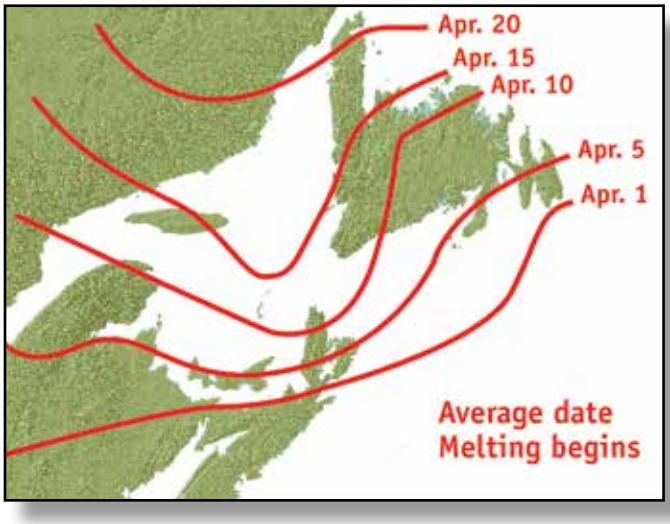
Sea-surface temperatures greatly influence the climate of Atlantic Canada. Along the Labrador coast and the east coast of Newfoundland, they average 0°C in winter and rise slightly in summer to between 3°C and 7°C. They can also drop to -2°C, the freezing point of salt water. Greater seasonal change occurs in the Scotian Slope waters, where average winter temperatures hover near 8°C and rise to 20°C in summer.



2.8 Sea Ice

Sea ice is a fact of winter in most waters off Newfoundland and Labrador and the Gulf of St. Lawrence. The extent of sea ice varies from year to year, typically peaking at the end of March and then retreating northward. The shorter days of autumn bring cold air- temperatures to Atlantic Canada. Freezing conditions develop first along the northern Labrador coast and the north coast of the Gulf of St. Lawrence in November. In December, sea ice begins to form; first in sheltered bays along the Gulf and Newfoundland and Labrador coasts. As winter progresses, sea ice spreads outward to occasionally fill the Gulf of St Lawrence or the waters south of Newfoundland. By April, the ice begins to melt; first in the Estuary, then in the central Gulf. By May, the only place ice sometimes lingers is in the northeast Gulf and along the Labrador coast, down to northern Newfoundland. Ice has been known to linger through June; however, usually by the end of June, it is found only off Labrador.

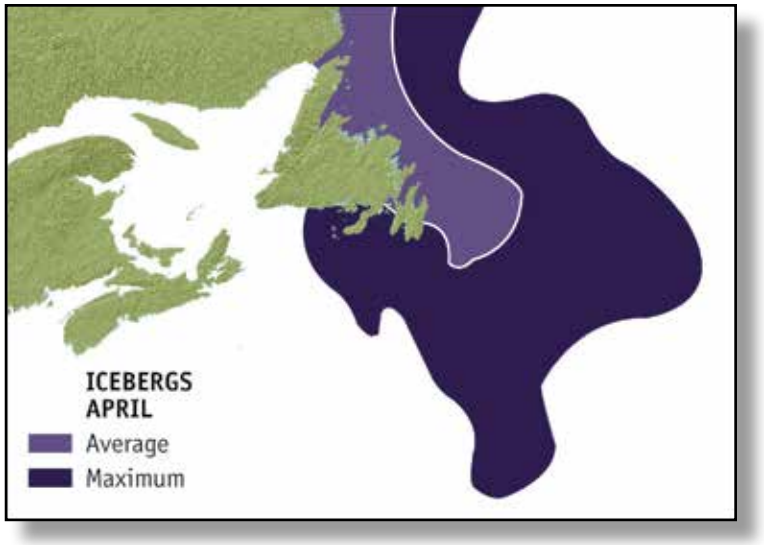


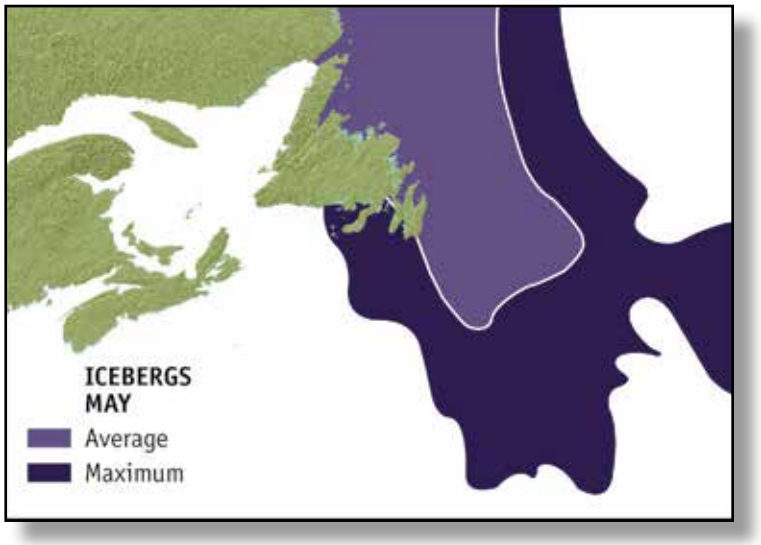


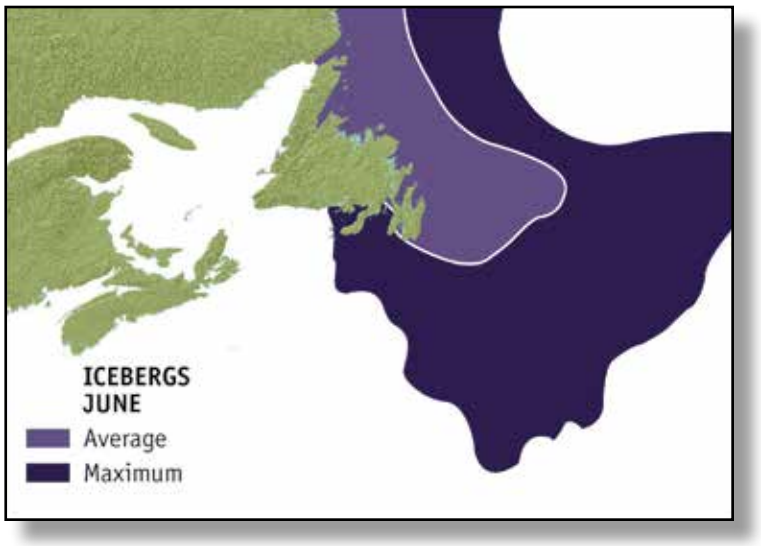
2.9 Icebergs

Icebergs are, by far, the most dangerous form of ice. These blocks of frozen fresh water slowly make their way south each year after being calved from the glaciers of Greenland or Baffin Island. They can take from one to three years to reach the Grand Banks; an average of 400 arrives each year. Icebergs are much harder than saltwater ice and come in a vast array of shapes and sizes—each one a hazard to navigation.

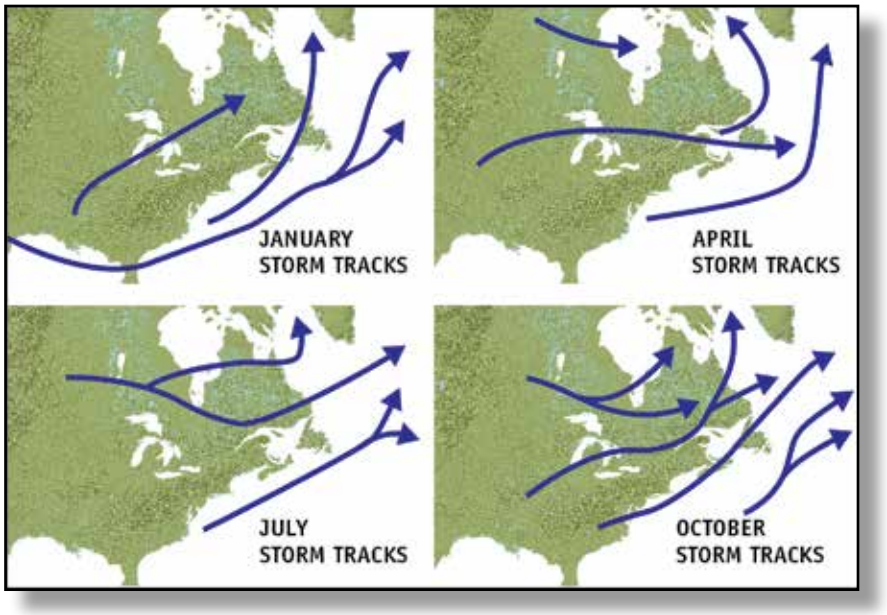
Glaciers fracture and produce icebergs more frequently when temperatures are mild. Mild temperatures also reduce the amount of sea ice available to "trap" icebergs, especially south of 45°N. In colder years, fewer icebergs are formed and many become embedded in sea-ice floes. A small iceberg trapped in a floe may pose a hazard to vessels because it is hard to detect. When the sea ice begins to melt or retreat, the icebergs resume drifting into southern waters.







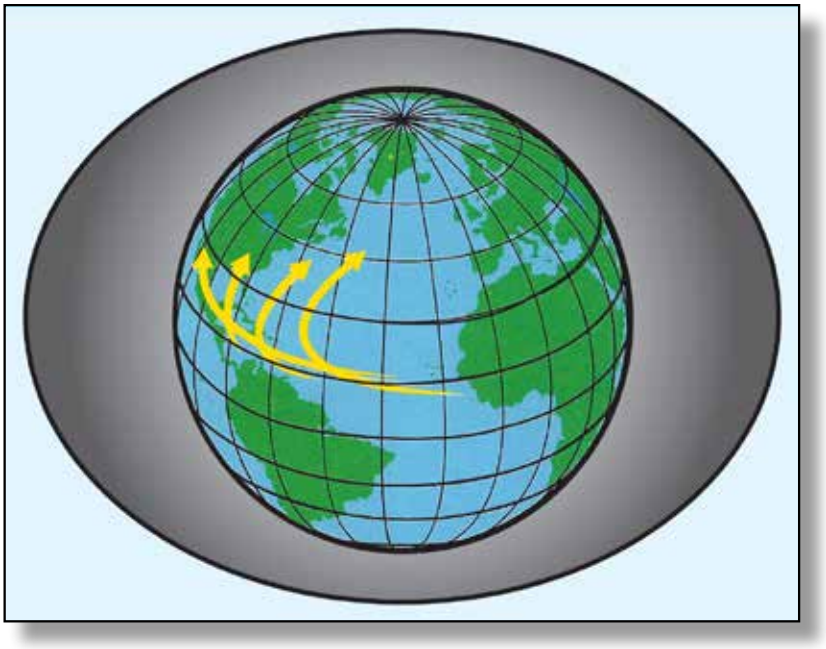
2.10 Frontal Lows



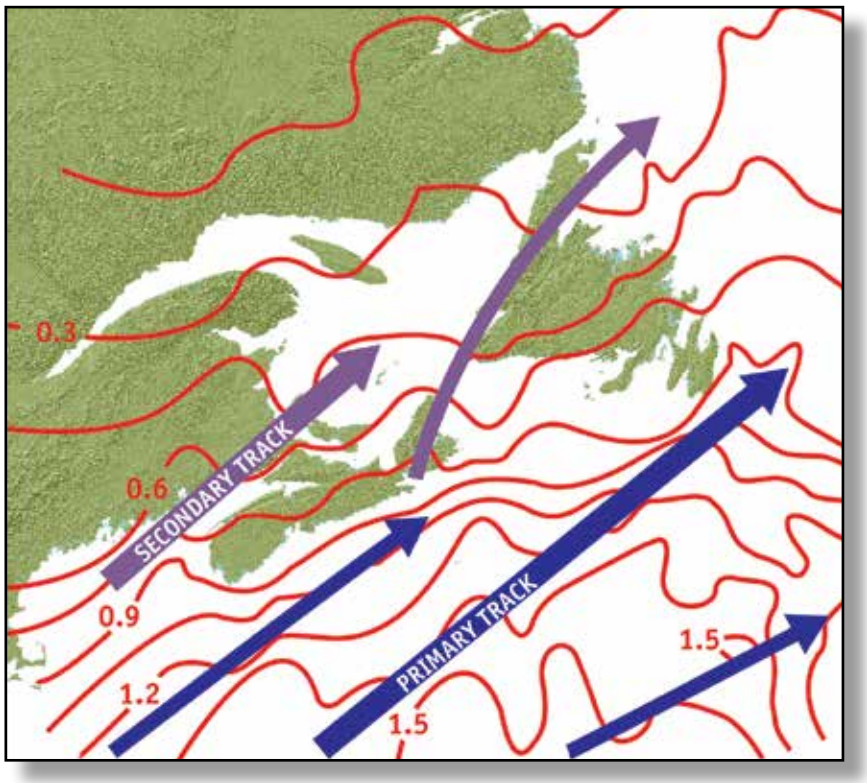
The strength of a frontal low depends, in part, on the time of year. Winter lows are more severe than summer ones, as both develop by drawing strength from the contrast between cold and warm air, which is greater in winter. Gale-force winds are 10 times more likely to accompany these systems in winter than in summer. Storm-force winds, while rare with summer lows, occur 1-4 percent of the time with winter lows.

The North Atlantic is well known for the sudden development of frontal lows. In the waters of Atlantic Canada, a low-pressure centre can intensify with little notice. Meteorologists call these intense lows “bombs” because they develop explosively. Most bombs occur in winter: in some years they are rare; in others, they are frequent. In winter, cold Arctic air pushes south of Atlantic Canada, so frontal lows track farther south than they do in summer when the cold air has retreated to the north. Seasonal variations provide only a general pattern, however, as lows track according to the location of the air masses on a given day.

2.11 Tropical Cyclones



Hurricanes and tropical storms—known generically as tropical cyclones—are among the most dangerous of all the storms faced by mariners. Vastly different from the frontal lows experienced in eastern Canada, they develop only over very warm tropical seas but often track into cooler northern waters. When tropical cyclones travel northward toward Atlantic Canada, they often weaken as they encounter the colder ocean waters; however, many intensify by drawing energy from the merging of warm and cold air masses, much like a frontal low-pressure system. Hurricane Igor, which struck Newfoundland in 2010, and Sandy in 2012 were prime examples of this. The region's hurricane season typically runs from June through November.

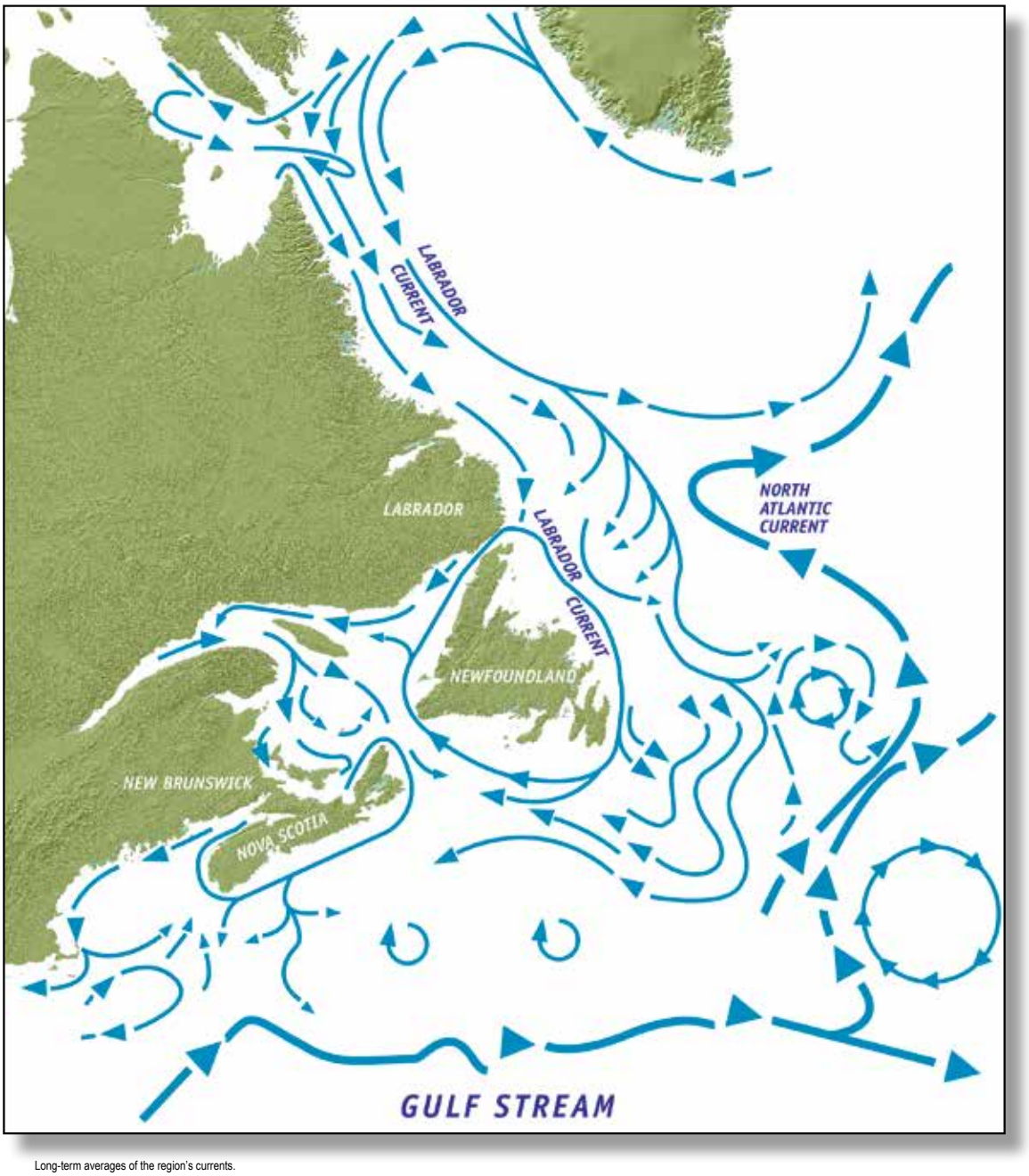


The primary and secondary tracks of tropical cyclones through Atlantic Canada's waters.

Also shown is the average number of tropical cyclones per year (from 1949 to 1983) that brought gale-force winds to some part of the region. There can be large variations in the number of storms of tropical origin that affect the region (including the offshore area). For example, in 1969, there were five hurricanes and three tropical depressions . "Major" hurricanes (e.g., with sustained winds over 100 kt) are quite rare, with only one or two occurring within the marine forecast region every 30 years.

2.12 Ocean Currents

Ocean currents are like rivers of water flowing through the ocean. Atlantic Canada is influenced by many of these currents—most significantly, the Gulf Stream and the Labrador Current. The Gulf Stream is a very warm current that originates in the Gulf of Mexico and passes south of the Slope waters. The cold Labrador Current begins in the Arctic and moves along the coast of Labrador and the east coast of Newfoundland before branching into two smaller currents. One branch of the Labrador Current passes south of the Avalon Peninsula



Long-term averages of the region's currents.

and moves west along the south coast of Newfoundland; the other flows through the Strait of Belle Isle into the northern Gulf of St. Lawrence.

Ocean currents have a major impact on Atlantic Canada's weather. The proximity of the cold Labrador Current and the warm Gulf Stream creates dynamic weather patterns that are unique to this region. The weather, in turn, also has an effect on the currents. Predictions published in the Canadian Tide and Current Tables consist of average ocean currents plus tidal streams but do not include wind-driven currents , which change with the passage of weather systems.

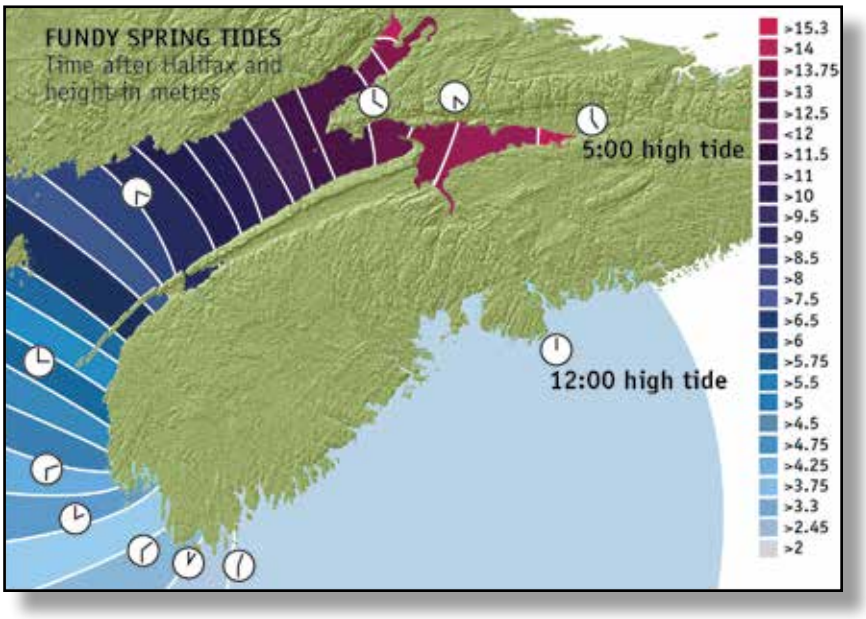
Smith Sound, July 2013. Photo: Dale Foote

2.13 Tides

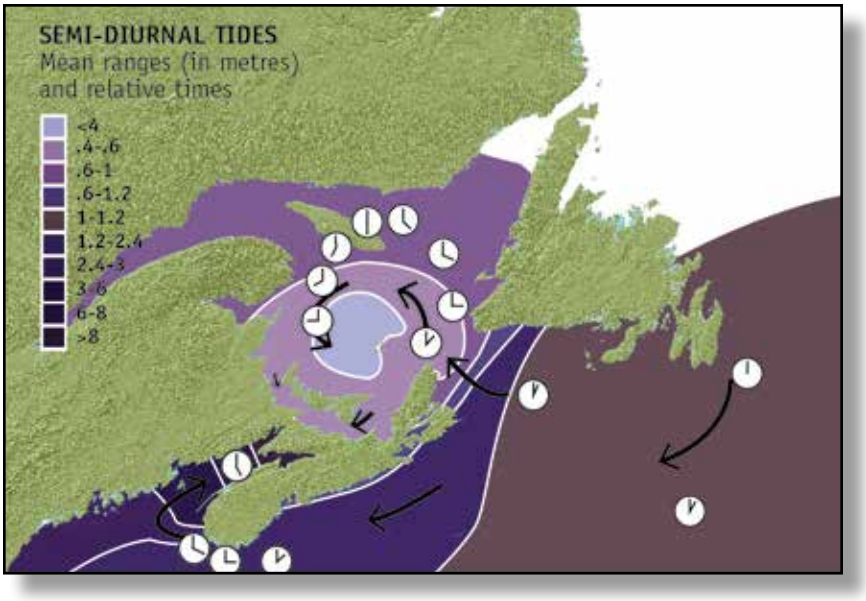
Although tides are not weather phenomena, they affect meteorological and oceanographic conditions. The largest tides in the world occur in the Bay of Fundy, and coastal areas of Atlantic Nova Scotia and the Gulf of St. Lawrence experience significant tidal rips. The predominant tides in Atlantic Canada are semi-diurnal, but each area experiences its own unique conditions. For more detailed information, consult the Sailing Directions for your area.

2.13.1 Bay of Fundy

The tides in the Gulf of Maine move into the Bay of Fundy. The narrower width of the Bay near its head is one factor that increases the range of both the semi-diurnal and diurnal tides. The most important factors, however, are its length and depth, which give the Bay a natural period of oscillation that closely corresponds to that of the semi-diurnal forces. As a result, spring tides in the upper parts of Chignecto Bay and Minas Channel have a range of about 11.3 m, compared to about 3 m in the Gulf of Maine. The highest tidal range in the Minas Basin is 16.4 m, with Cobequid Bay boasting the highest recorded tides in the world at 16.8 m.



Average heights and relative times for spring tides in the Bay of Fundy.



Mean ranges and relative times of the semi-diurnal tides.

2.13.2 Atlantic Coasts of Nova Scotia and Newfoundland

The tide along the south-facing coastlines is semi-diurnal. High water occurs almost simultaneously along all points from Placentia Bay, Newfoundland, to Shelburne, Nova Scotia. The tidal range is relatively small: the difference between high and low water seldom exceeds 1.8 m. Along the east coast of Newfoundland, the tide is mixed but mainly semi-diurnal. High water occurs simultaneously along the coast, and the tidal range is about 0.9 m.

2.13.3 Gulf of St. Lawrence

The tide moving through the Cabot Strait and the Strait of Belle Isle into the Gulf of St. Lawrence is mixed but mainly semi-diurnal—except along the coast between Cape Tormentine and Richibucto, New Brunswick, and near Savage Harbour, Prince Edward Island, where the diurnal tide dominates. At the southern tip of the Magdalen Islands and near Crossman Point, New Brunswick, the tide is entirely diurnal, with only one high and one low water each day. The Gulf has a tidal range of less than 2.7 m, and the semi-diurnal tide moves in a counter-clockwise circulation around it. High water in Cabot Strait coincides with low water in the estuary of the St. Lawrence River; three hours later, it is high water in the northeast Gulf and low water in the southwest. The pivot point of this circulation lies near the southwest coast of the Madgalen Islands. The range of the semi-diurnal tide is zero at this pivot point and increases outwardly towards the perimeter of the Gulf.

2.13.4 Labrador Coast

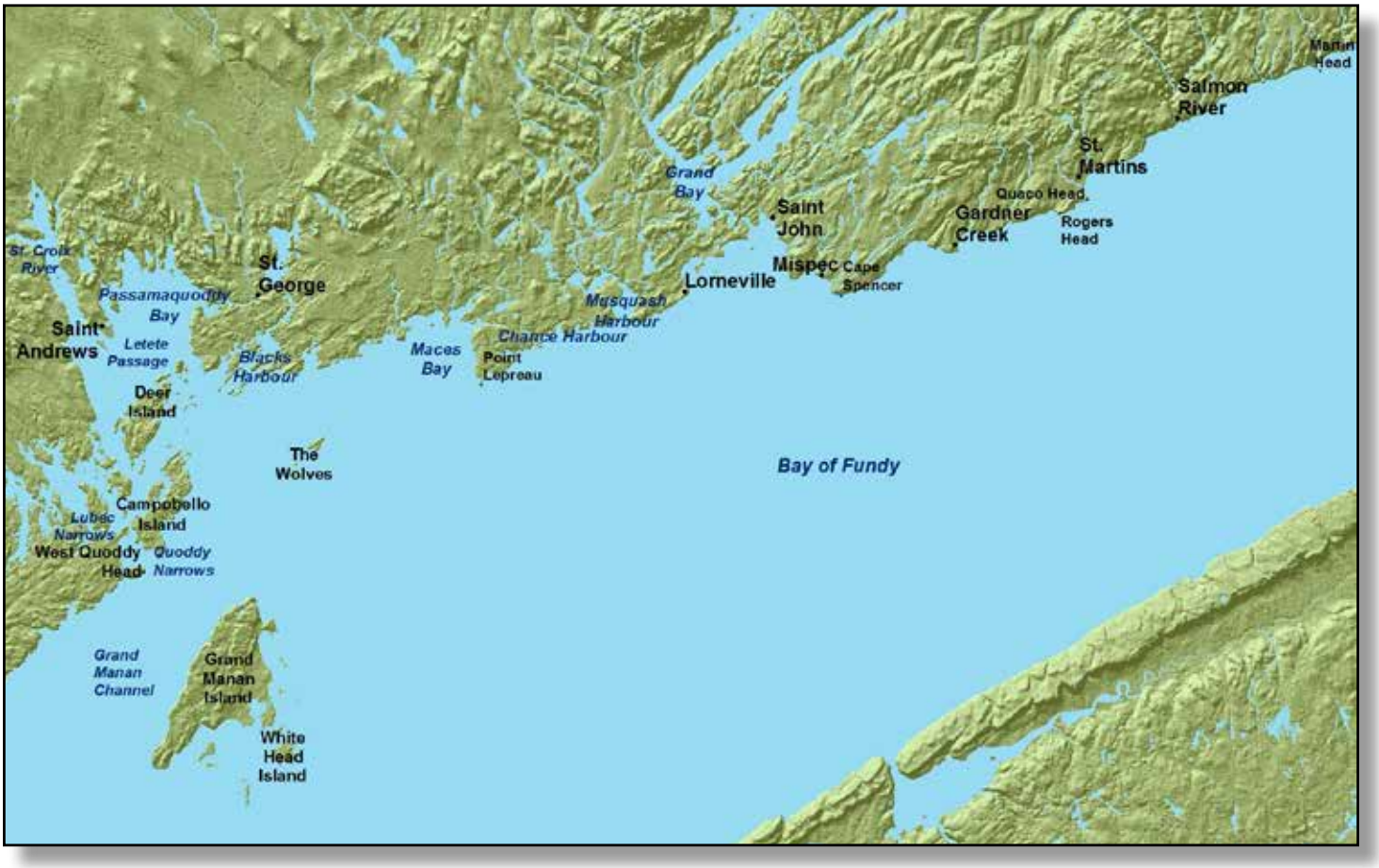
The tide along this coast is very uniform, both in terms of the time of high water and tidal range. It is only near the heads of inlets that any great changes occur. Near the coast, the flood tide generally runs northward and the ebb tide southward, rarely reaching 0.5 kt, except around headlands. Because of the intricacies of the coastline, which is fringed with innumerable inlets and small islands, currents inshore remain a matter of local knowledge. Strong, dangerous currents up to 7 kt flow into the fjords and through the tickles in this region.

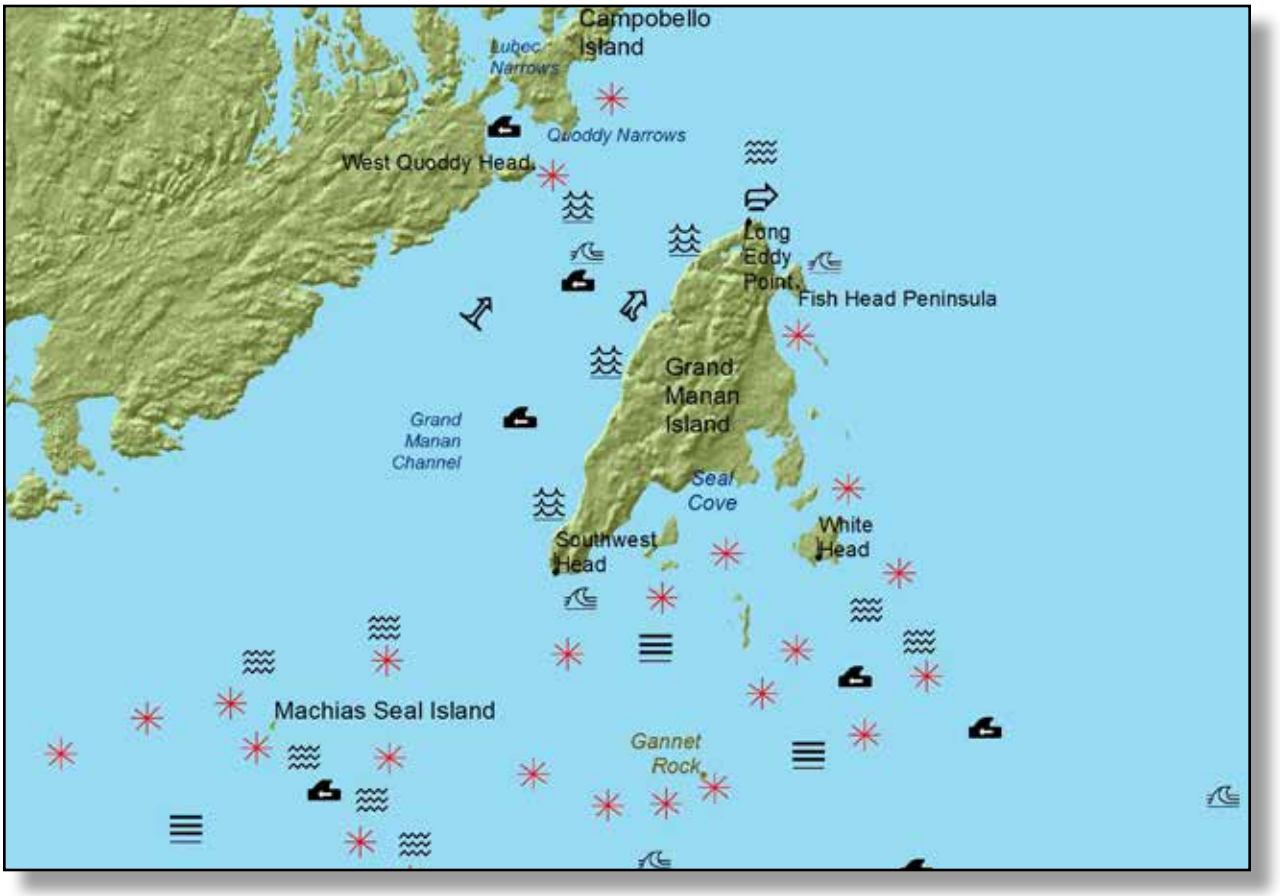
3. Fundy

Local effects for the Fundy region are divided into four main areas: Fundy Northwest, the Saint John River, Upper Fundy, and Fundy Southeast.

3.1 Fundy Northwest

High tides and strong currents bring cold water and fog to the New Brunswick shore. Currents running with or against the wind greatly affect wave and weather hazards. Passamaquoddy Bay differs from the rest of the coast due to its sheltered inland position and limited water exchange with the Bay of Fundy. On the other hand, Grand Manan has an exposed location, and the "microclimates" of its shores vary considerably. To address these differences, this stretch of coastline has been divided into five sections: Grand Manan, Quoddy Narrows to Musquash Harbour, Pasamaquoddy Bay and Approaches, Saint John Harbour, and Cape Spencer to Martin Head.





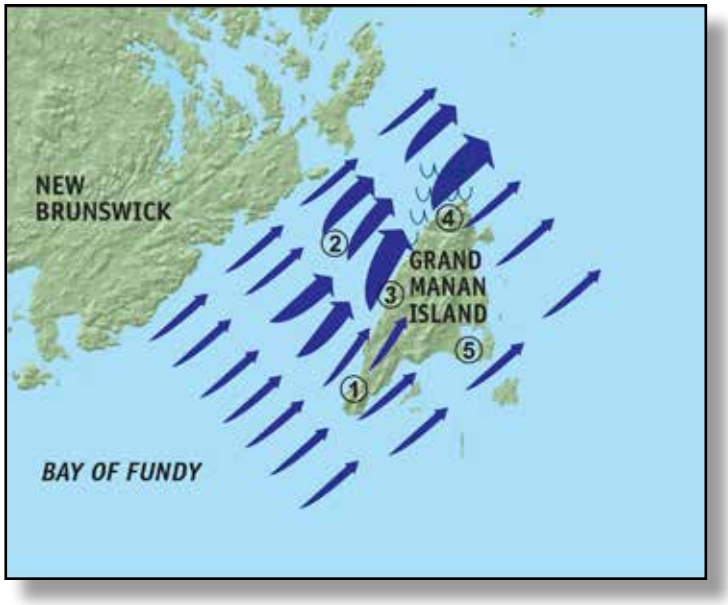
3.1.1 Grand Manan

Grand Manan is approximately 20 km long and 10 km across at its widest point. Steep, rocky cliffs on the west side of the island rise from about 60 m near Southwest Head to double that height near Long Eddy Point. From this high ridge, the island slopes down gradually to its eastern shores. In the deep Grand Manan Channel, strong southwesterly winds and ebb currents of 1.5-2.5 kt often oppose one another, creating rough seas. The conditions can be especially bad near Grand Manan, where both wind and current are stronger and backwash from the cliffs causes choppy, crossing waves near the shore. Islands, rocks, and shoals extend nearly 13 km southeast and 17 km southwest of Grand Manan. Strong currents, spawning numerous rips, run in this foggy, hazardous area. Shoaling and wind-opposing currents can also cause unusually steep waves. In contrast, there are no outlying shoals off the northeast coast. The area in the immediate lee of the land is often clear of fog, but elsewhere it shrouds the island.

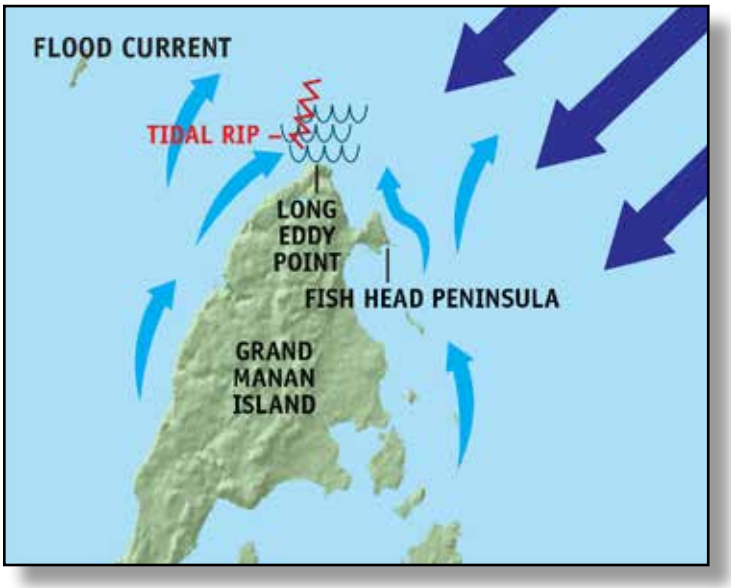
Mariners' Tips:

Take caution in an opposing tide. A 20-kt southwesterly blowing through the Grand Manan Channel on an ebb tide can cause worse wave conditions than a 40-kt southwesterly in the Bay of Fundy on a flood tide.

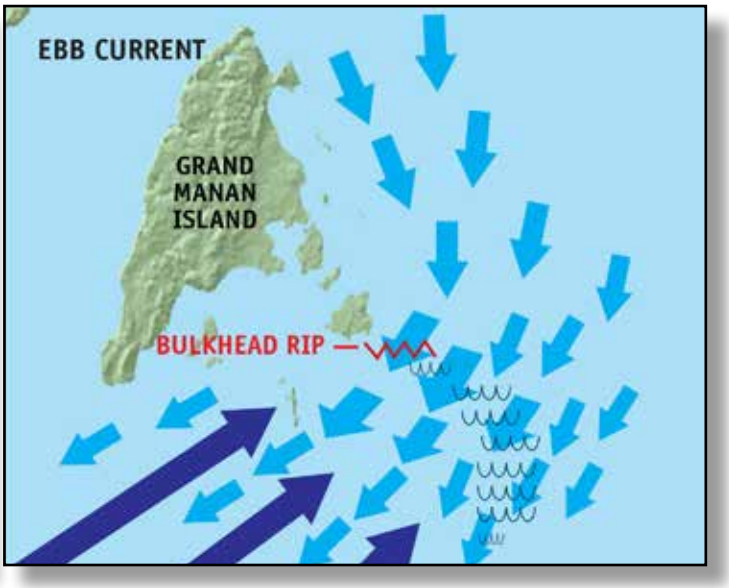
Northeasterly gales are perhaps the worst winds in the Bay of Fundy. They bring large seas to Grand Manan's northeastern shores, particularly off the Fish Head Peninsula. A tidal rip, created by converging tidal streams, lies off its namesake, Long Eddy Point. This area is especially rough, with northeasterly winds on the flood tide. Bulkhead Rip, southeast of Grand Manan, and the area south of it, where the sea-bed shoals rapidly, is another treacherous location. Very strong currents flow through the area, particularly on the ebb tide, and it has been described as "a place to be avoided with strong winds from the southwest quadrant".



1. **Channelling:** Southwesterly winds are directed along the shoreline by the cliffs on Grand Manan's west coast.
2. **Funnelling:** This coastal channelling (1) strengthens the wind where the Grand Manan Channel gradually funnels towards its northeastern end.
3. **Convergence:** Coastal convergence also contributes to these strong shoreline winds and is enhanced off northwestern sections by cornering.
4. **Cornering:** The strongest winds and highest seas occur off its northern tip.
5. **Divergence:** Coastal divergence over the southern coast of the island makes for much lighter winds off northeastern shores.



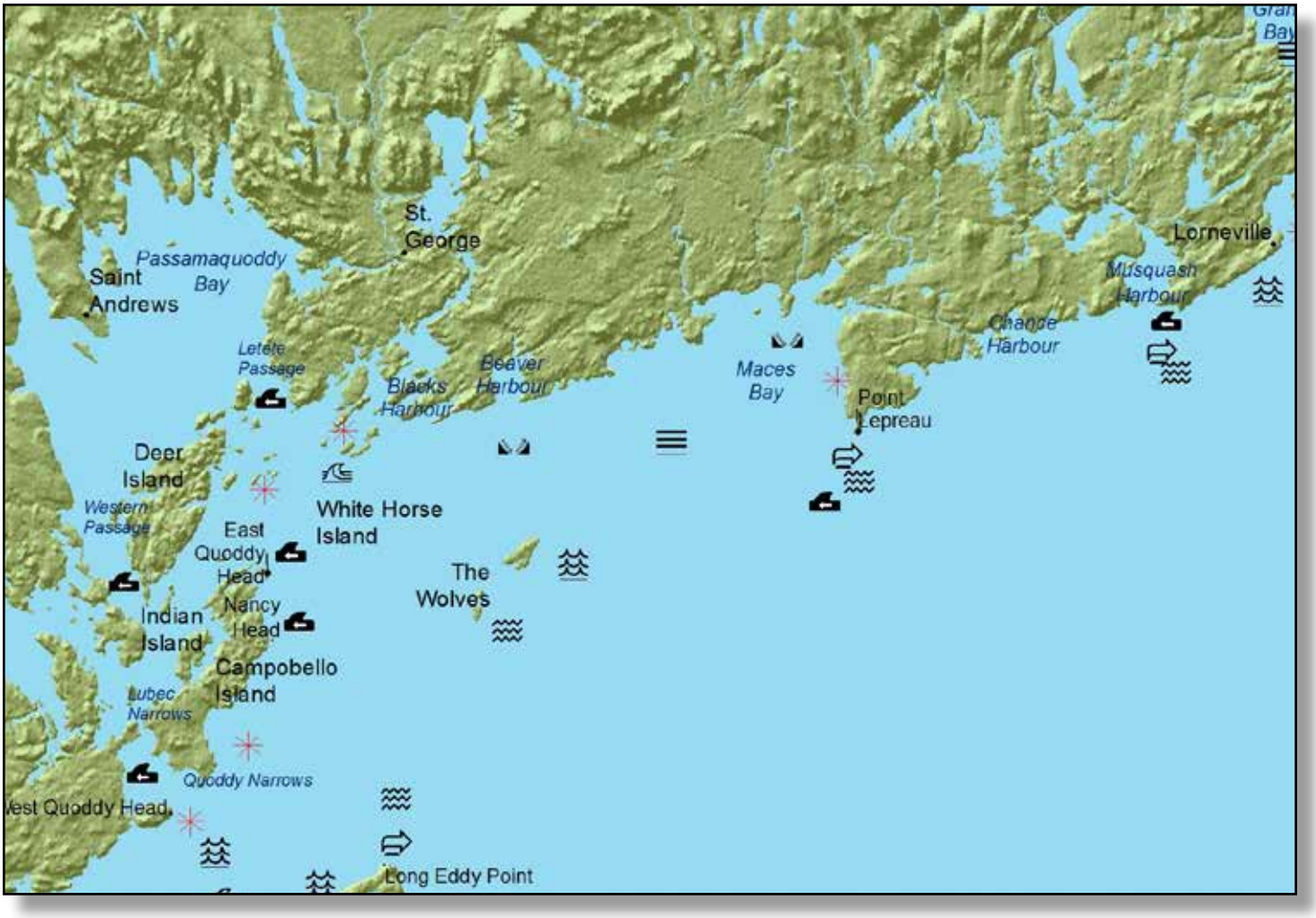
The northeastern shores of Grand Manan Island are prone to large seas during strong northeasterlies, especially on the flood tide. A tidal rip off Long Eddy Point is an added hazard for mariners.



Very strong currents and rapid shoaling make the area south and southeast of Grand Manan dangerous, particularly when an ebb tide flows against winds from the southwest.

3.1.2 Quoddy Narrows to Musquash Harbour

Tidal rips occur south of Point Lepreau and in the exposed area just south of The Wolves. Point Lepreau should be given a wide berth when the wind opposes the current. Rough, choppy water is often found near The Wolves, especially with easterly winds on the flood tide. Relatively strong southwesterly sea breezes, fueled by the temperature difference between the land and sea, are common along this coastline on warm, sunny days. Strong southwesterlies are often found in the waters east of Campobello Island, blowing from the Grand Manan Channel toward The Wolves.



3.1.3 Passamadquoddy Bay and Approaches

3.1.3.1 Passamaquoddy Bay

Very strong currents flow between the islands that stretch across the entrance to Passamaquoddy Bay. The strongest of these currents is through the Lubec narrows, where 8 knots has been recorded on the ebb tide. The bay is completely sheltered from the seas in the Bay of Fundy, and winds from the south pose little difficulty. The worst wind is a northerly or northwesterly gale that creates short, choppy seas—especially over southern sections—which, in turn, produce freezing spray in winter. The northeast portion of the bay freezes over on calm, cold winter nights, but this ice is usually short-lived. During the spring freshet, however, blocks of ice exit the rivers and caution must be exercised, particularly at night or in fog. In summer, air and sea temperatures in the bay are much warmer than elsewhere along this coastline and the incidence of fog and strong sea breezes is much lower. On a typical summer day, any fog will gradually clear out of the bay and continue out in the afternoon to just past White Horse Island. Due to its inland location, Passamaquoddy Bay is subject to some heavy summer thundershowers, which move across from Maine.

Mariners' Tips:

Fresh water from the rivers entering Passamaquoddy Bay gets rougher much faster than the salt water. With a rapid shift or increase to strong northwesterlies, choppy whitewater can be seen over the fresh water before the same conditions develop over the salt water.

3.1.3.2 The Approaches

The flood stream passes on each side of Indian Island, then turns sharply into Western Passage, forming a whirlpool known as "the Old Sow" in the narrows between Deer Island and Eastport. Reputed to be the largest whirlpool in the world, it is most active about three hours before high water and can be hazardous to small boats.

The roughest waters in this area are found where currents are exposed to high winds and seas. The conditions in five trouble spots—Letete Passage, Quoddy Narrows, Nancy Head, East Quoddy Head, and the Western Passage—are detailed with numeric references to the images below.

Letete Passage:

1. In Letete Passage, currents can run at 5 kt and are strongest three hours before and after high tide. The passage is encumbered with rocks and ledges, with many tidal swirls and eddies, particularly on the ebb flow. The area is fairly sheltered, except from easterlies and southeasterlies. When strong or gale-force southeasterlies oppose the ebb tide, swells enter the passage, creating rough conditions that make it impassable to small boats. The outside islands are also dangerous under these conditions, since waves break heavily around them.
2. Northwesterly winds on the flood tide also create rough conditions.

Quoddy Narrows:

3. Strong winds and large seas from the south can pass up through the Grand Manan Channel, creating rough, breaking seas in the approaches to Quoddy Narrows, especially on an opposing ebb tide.

Nancy Head:

4. Very rough conditions are found off Nancy Head on Campobello Island with an opposing ebb tide.
5. Similar to 4, but less severe conditions also occur in the area with a northeasterly on the flood tide.

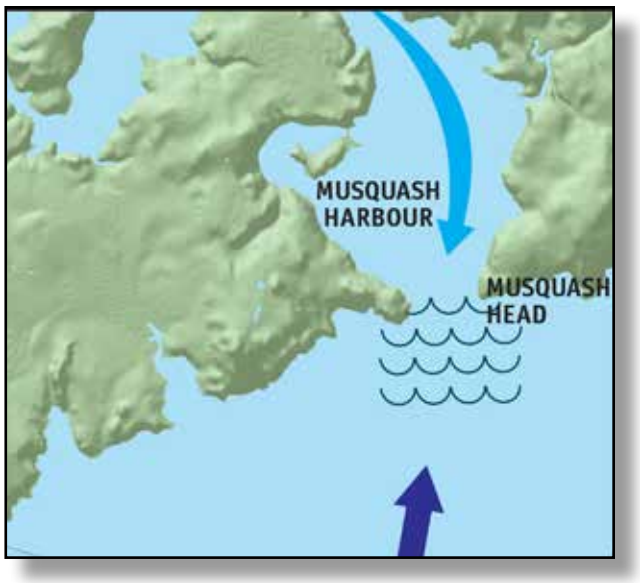
East Quoddy Head:

6. Strong easterly or northeasterly winds create a rough breaking sea off East Quoddy Head on the ebb tide.

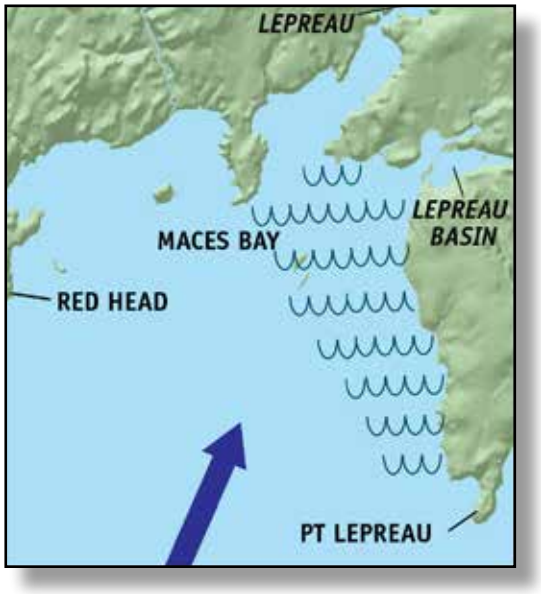
Western Passage:

7. The roughest seas at the northern entrance to Western Passage are found when northerly gales oppose the flood current.

The entrance to Musquash Harbour, an estuary of the Musquash River, sees choppy, breaking seas when strong winds oppose the ebb current, which is much enhanced during the spring freshet and after heavy rainfall. Heavy breaking waves are also frequently found over the ledges on the eastern side of Maces Bay as a result of considerable shoaling and exposure to gales and swells from the southwest.



Opposing winds and currents cause rough waters at the mouth of Musquash Harbour, especially when the current is bolstered by meltwater or heavy rainfall.



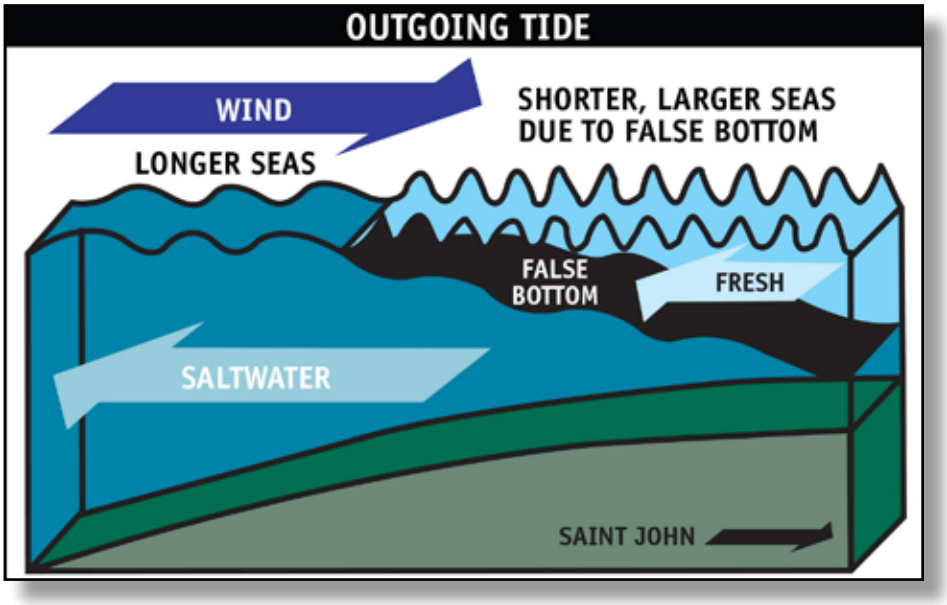
Shoaling and exposure to gales and swells from the southwest often cause breaking waves on the eastern side of Maces Bay.

3.1.4 Saint John Harbour

Saint John Harbour is completely sheltered from northwesterly winds and protected from easterly winds by Cape Spencer—to as far out as 5 km. The currents and eddies in this major harbour are extremely complex. With south-southwesterly winds, seas become progressively shorter and rougher towards the head of the Harbour, due to shoaling. These wave conditions further deteriorate with an opposing surface current.

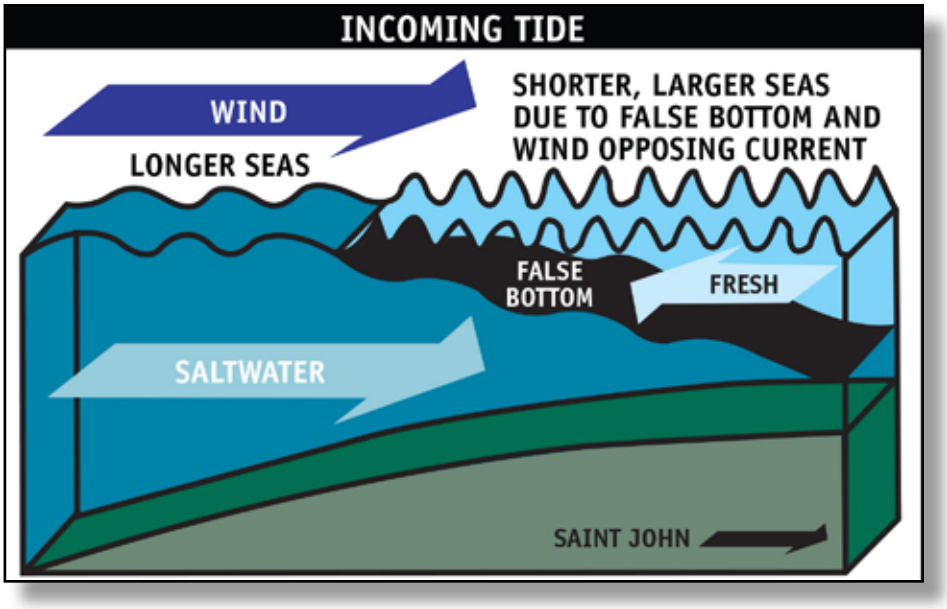
Typical wave conditions in Saint John Harbour.

Saint John Harbour experiences large tides and receives a strong outflow of fresh water from the Saint John River. Under the influence of the tide, the denser, heavier salt water advances and retreats like a wedge beneath the fresh water. After low tide, there is a strong influx of salt water at depth, while at the surface there is a strong outflow of fresh water. When water levels in the harbour exceed those in the river, there is a change in current at Reversing Falls, causing salt water to flood upriver and the flow in the harbour to shift entirely inward. After high water, the salt water continues upstream until there is, once again, a change in flow at the falls. The current is then entirely outward, and fresh water floods out into the harbour.The duration of the various phases in the cycle of currents depends on the height of the tide and the river's water level. For instance, during the peak of the spring freshet, there is an almost continuous outgoing current, and the water in the harbour is mostly fresh. The boundary between the fresh water and the salt



When there is a salt wedge in Saint John Harbour, rougher seas can occur in the fresh water. This happens because the denser salt water creates a "false bottom," which then enhances shoaling. Wave conditions worsen when saltwater and freshwater currents oppose the wind—as when a falling tide combines with an outward flow from the Reversing Falls.

water is marked by a foam line, which often shows up on ships' radar. Outside the foam line, the colour of the salt water is greenish-blue. Inside the foam line, the fresher water is brown. Experienced mariners report that the worst weather conditions in the harbour occur with south-southwesterly gales, and that waves are rougher in the fresh water.



Contrasting wave conditions across the salt wedge may be more noticeable when the tide in the harbour is rising and the flow is outward at the Reversing Falls. In this case, only the current in the fresh water opposes the wind.

Fog is common in Saint John, as is a sea breeze on warm, sunny days. In summer, fog is influenced by the tide and often coincides with or follows the arrival of relatively cold salt water. A southwesterly sea breeze of 15-25 kt extends about 8 km offshore, creating some chop and whitecaps. Both the fog and the sea breeze cause considerable cooling at the waterfront, with temperature differences of up to 20°C recorded between the downtown area and the airport, 16 km inland.

Fog in Saint John is associated with a southerly wind. If the wind is more southwesterly, fog usually clears in the city and on the western side of the harbour.

3.1.5 Cape Spencer to Martin Head

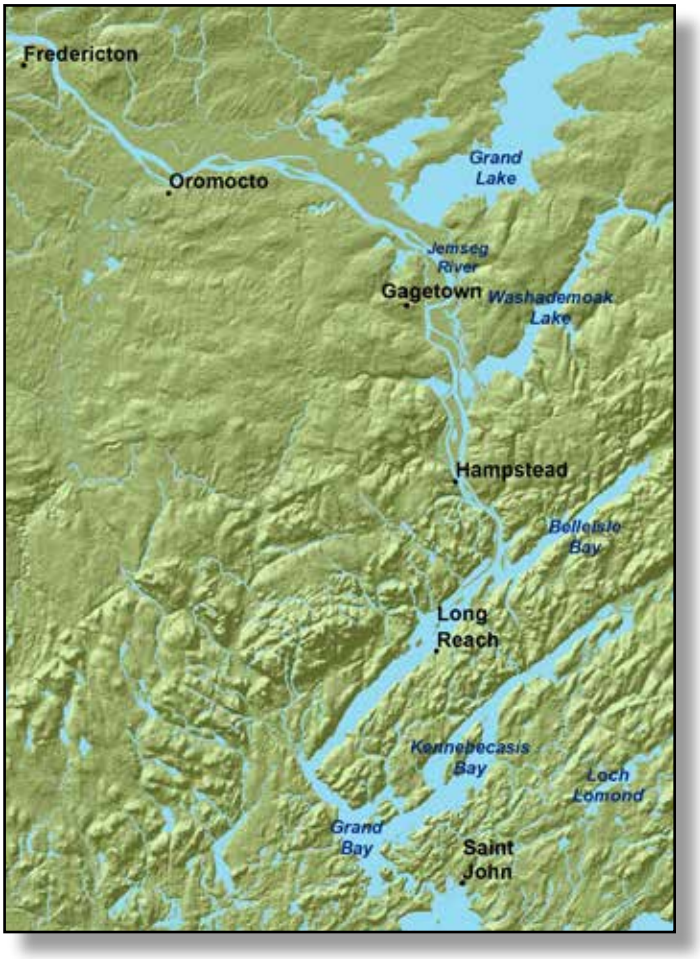
The shoreline from Cape Spencer to Martin Head is generally high and is intersected by the numerous rivers entering the Bay of Fundy. Except at the mouths of these rivers, the coastal waters within about 1-2 km of the shore are generally protected from north-to-northwesterly winds, which cause the seas further from the coast to build up gradually. In some river valleys, katabatic winds develop during the evening, reaching a peak of 15-20 kt at night.

During the spring freshet, ice from the rivers can be a hazard at night and in fog. Blocks of ice also can be found close to the river mouths in winter, after a high run of tides has lifted them from the riverbanks.

Coastal convergence occurs along this shoreline with an easterly wind and is enhanced by cornering off the prominent headlands. These effects are most pronounced in the area around St. Martins and West Quaco and off Rogers Head and Cape Spencer. Tidal streams averaging 2 kt run parallel to the shore, forming rips off the headlands. Wave conditions deteriorate everywhere when strong winds oppose these currents. This effect is particularly hazardous south of Cape Spencer, especially with a strong southwesterly on the ebb tide. Local fishermen advise that, under such circumstances, small boats stay 5-6 km south of this headland. Summer thunderstorms along this coast are mainly associated with the passage of cold fronts from New Brunswick and are most frequent in late afternoon and evening. They often weaken or dissipate completely as they move out over the cold waters of the Bay of Fundy.

3.2 Saint John River

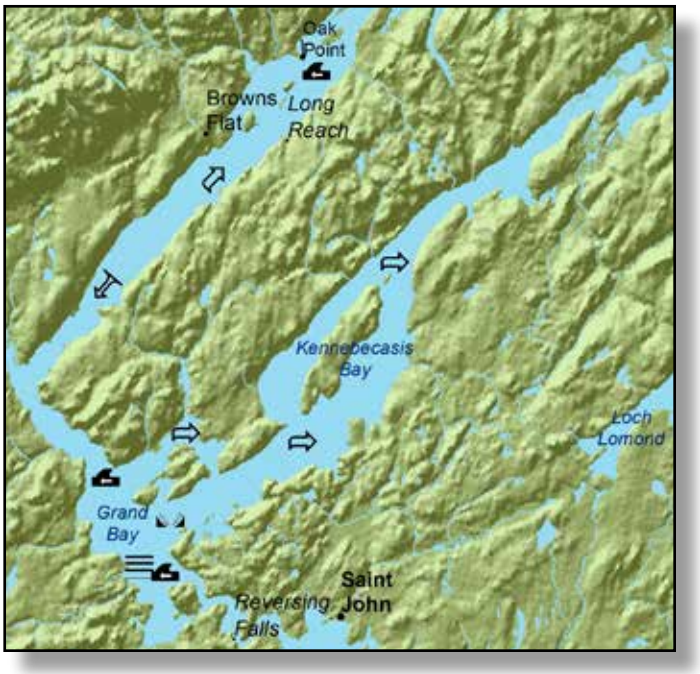
The Saint John River is a popular area for recreational sailors. The major marine weather conditions yachters can expect to encounter along the river are outlined in two sections: the Lower Saint John River, and the Upper Saint John River and Grand Lake.



3.2.1 Lower Saint John River

3.2.1.1 The Reversing Falls

Vessels can only pass through the Reversing Falls when the waters in the Saint John River and Saint John Harbour are almost level. Ordinarily, slack water lasts for 10 minutes and occurs about 2 hours and 25 minutes after high water and 3 hours and 50 minutes after low water at Saint John. The falls can be navigated for about half an hour before and after this time. During the spring freshet, from early April to the middle of May, water levels in the river are extremely high. This makes the falls impassable to vessels going up-river, since the tide does not usually rise to the level of the river. During the freshet, a 7-kt current has been reported at the Reversing Falls. Heavy rainfall also raises the water level in the river, albeit to a much lesser degree than the freshet. A heavy rainfall at Fredericton can raise the river level downstream by several feet; if replenished by still more rain, these abnormally high river levels may take up to two weeks to subside. A high run of tides at Saint John delays the runoff. Recent, heavy rainfall tends to advance the time of slack water after high tide in Saint John and delay it after low tide. Extreme drought conditions have the opposite effect. A study of storm surges in the Bay of Fundy suggests that strong southwesterlies slightly advance the phase of the tide, while strong northeasterlies delay it.

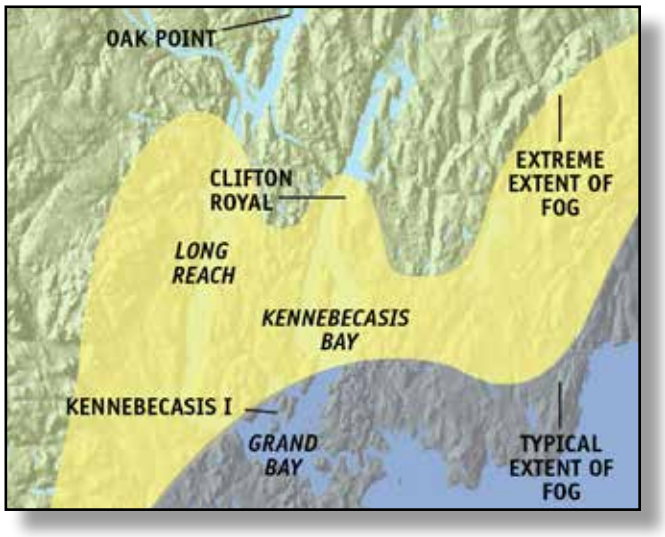


3.2.1.2 Grand Bay and Kennebecasis Bay

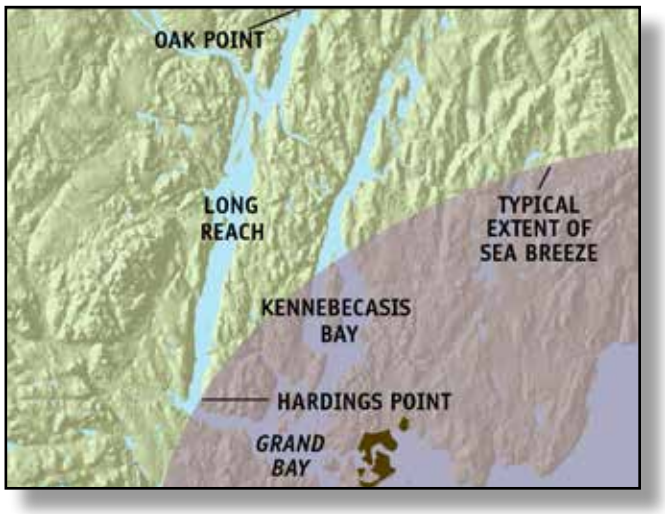
Sea fog is common in Grand Bay. Although it is usually limited to the area nearest the coast, it has been reported in Long Beach as far as Oak Point and, in Kennebecasis Bay, as far as Clifton. On otherwise fine summer days, it usually clears between 0900 and 1000.

If the wind is calm in the morning, southerly sea breezes often blow in from the coast during the afternoon at speeds of 10-12 kt. They typically reach inland as far as Long Island, in Kennebecasis Bay, and Harding Point, in the approach to Long Reach. The sea breeze goes down with the sun, often leaving yachters becalmed.

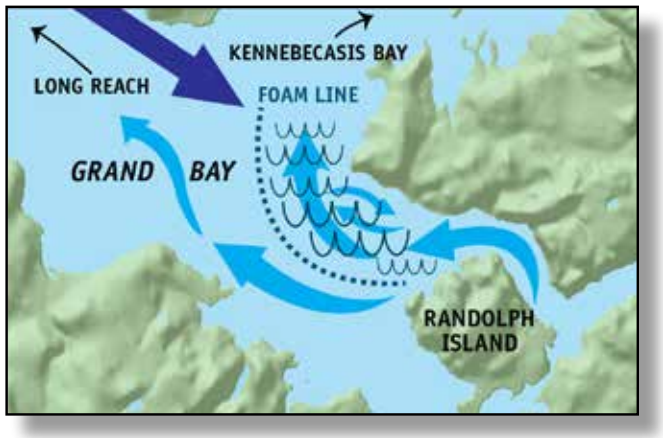
On the flood stream, the current in Grand Bay divides into Long Reach and Kennebecasis Bay; on the ebb, currents from Long Reach and Kennebecasis Bay converge in Grand Bay. A foam line often marks this division. When strong northwesterlies blow through Grand Bay, an area of small, choppy waves (less than 1 m) occurs near the stronger currents of the flood stream. An hour after high tide, the current diminishes and waves in this area flatten out.



The location of fog in Grand Bay and Kennebecasis Bay.



The location of sea breezes in Grand Bay and Kennebecasis Bay.

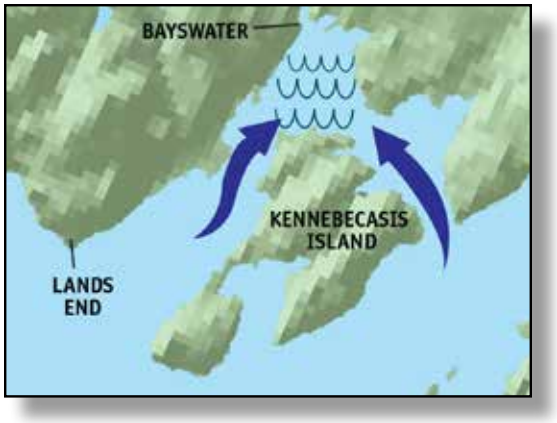


On the flood stream, the current in Grand Bay divides into Long Reach and Kennebecasis Bay

When strong northwesterlies blow through Grand Bay, an area of small, choppy waves (less than 1 m) is found near the stronger currents of the flood stream.

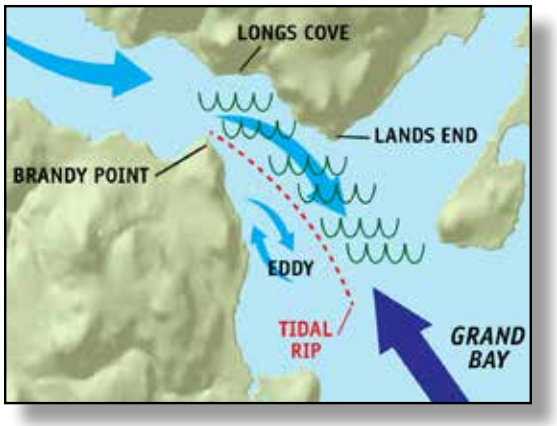
Channelling occurs around Kennebecasis Island with a southerly wind, the convergent airflows creating an area of confused, gusty winds to the north of the island. Under such circumstances, yachters sailing around the island will notice a change from a tailwind to a headwind.

With a northeasterly wind, the airflow is channelled along either side of Long Island, and strong, gusty winds blow out from the North Channel. Sailing down Kennebecassis Bay and around the southern tip of Long Island, mariners will notice the tailwind change to a headwind. The channelled wind blowing out from between Barlow Bluff and Kennebecasis Island is not very strong. Channelling around Long Island is hardly noticeable with a southwesterly.



Channelling effects around Kennebecasis Island with a southerly wind cause gusty conditions north of the island.

With a northeasterly wind, channelling effects create converging winds at the southern tip of Long Island and strong, gusty winds in the North Channel.

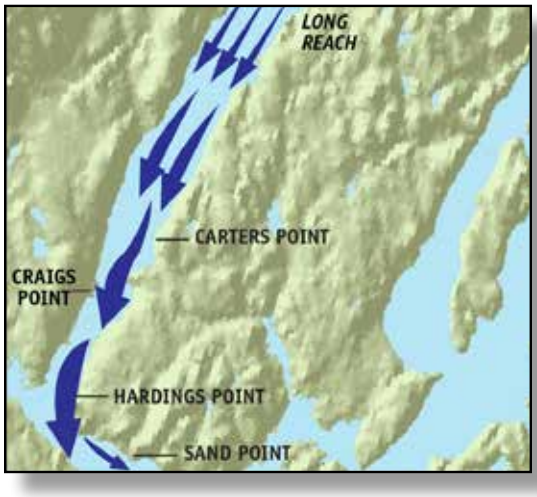


The shallows off Brandy Point cause the current to set strongly onto the shores between Longs Cove and Lands End. When strong southerly or southeasterly wind blow expect choppy seas of 0.5-1 m to form in the area.

Channelling is significant in Long Reach, as it is surrounded by high ground. The wind often blows along its entire length, either from the southwest or the northeast. Salt water often reaches up to Oak Point, where the air temperature on the river can suddenly become colder. Consistently warmer weather is found up-river from Oak Point. Thunderstorms tend to be more frequent over Long Reach than Kennebecasis Bay, due to uplift from the high ground.

With northeasterlies, slightly stronger winds are experienced near Carters Point and Craigs Point, where Long Reach narrows. After the river bend at Hardings Point, light winds occur to the lee of the land at Sand Point, while stronger, gusty winds blow on the opposite shore. Waves don't build up significantly with a northeasterly wind in Long Reach, because opposing currents are not very strong.

A strong current flows southward past Oak Point and Catons Island. When it is opposed by strong southwesterlies blowing up Long Reach, a short, steep, breaking sea develops. With gale-force winds, seas have reportedly reached 1.5-2.5 m. Choppy conditions also occur when a southeasterly wind blows opposite the current. Northwesterlies are sheltered in Long Reach as far as Catons Island; from there to Oak Point, they blow strongly until yachters reach the lee of the hills, sometimes at gale force.



Channelling effects in Long Reach cause stronger winds where the reach narrows. Lighter winds are experienced to the lee of the land at Sand Point.

Rough seas occur between Oak Point and Catons Island when southeasterly or southwesterly winds blow against the current.

Hilly land along the western shores of Long Reach north of Oak Point and south of Catons Island provides mariners with shelter from northwesterly winds, which blow strongly in the exposed stretch between the two.

3.2.2 Upper Saint John River and Grand Lake

Grand Lake, the largest lake in New Brunswick, is connected to the Saint John River by the Jemseg River. Although it is fairly shallow at its southern end, where it drains into the Jemseg, seas of up to 2 m can build virtually anywhere on the lake. Northeasterly gales cause large waves that break to the bottom in the shallows, making navigation between the river and the lake a poor decision. Sheltered conditions on the Jemseg provide no warning of the rough conditions on the lake, as evidenced by several yachts that have run aground while attempting such an exit. Southwesterly winds also blow strongly across the low marshlands south of the lake, creating steep chop as they oppose the current in the shallows. Conditions are even worse after a heavy rainfall.

Thunderstorms are frequently reported in the summer over Grand Lake, and a large waterspout has also been seen there. On average, thunderstorms occur at Saint John on 11 days a year, increasing as they move inland to 15 days a year at Fredericton. Eighty percent of these storms occur during June, July, and August.

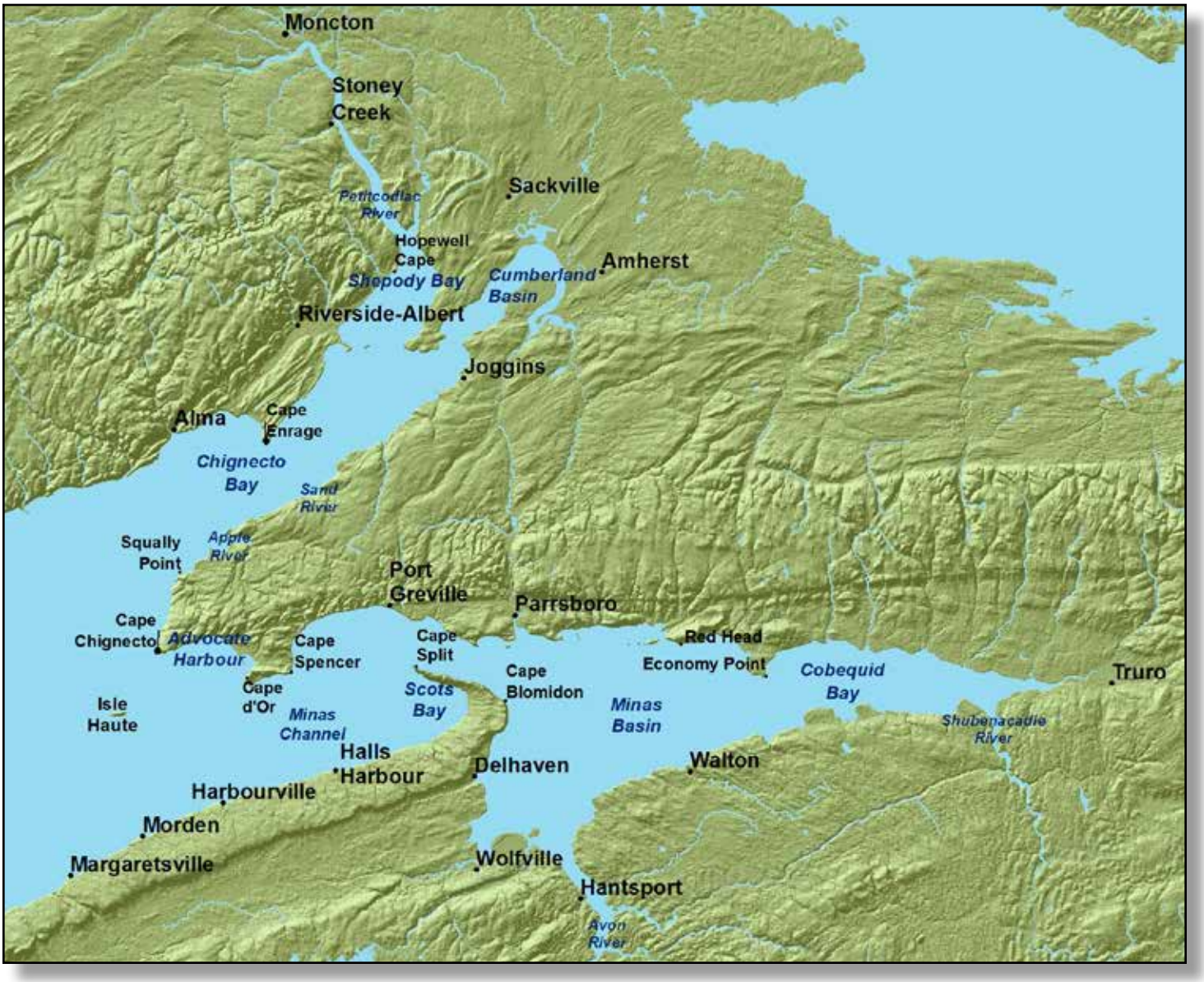
Upstream from Gagetown, the Saint John River is relatively narrow and the surrounding terrain is low. Thunderstorms affect the area, but there are no other known local weather effects.

Mariners' Tips:

Heavy thunderstorms affecting Grand Lake and the Saint John River are monitored by the public forecast service as part of Environment Canada's Summer Severe Weather Program. Severe weather watches and warnings for the area are broadcast on Weatheradio and by local radio stations.

3.3 Upper Fundy

Extremely high tides and strong currents dominate the local weather effects in the Upper Fundy area. Most weather-related hazards occur when the wind and current are opposed. Currents range from 2 kt in the Bay of Fundy to over 10 kt through the Minas Channel. From January to March, the Minas Basin and the northern parts of Chignecto Bay fill with blocks of ice, which move with the currents and the wind. Harbours within the basin are generally closed from January until early April.



3.3.1 Chignecto Bay, Cumberland Basin, and Shepody Bay

In Chignecto Bay, the tidal currents set parallel to the shore at an average rate of 2 kt, which increases toward the head of the bay. In Cumberland Basin, the currents set at 4-5 kt; in Shepody Bay, 3-4 kt. Tidal rips and eddies are common off major headlands and over shallow water. The worst weather conditions occur with southwesterly and northeasterly winds, especially when they oppose the tidal currents. The area tends to be well sheltered from other wind directions. Southwesterlies are funnelled in Chignecto Bay and blow strongly into Cumberland Basin, which is surrounded by marshy flats where they are intensified on summer afternoons by decreased stability.

Southwesterlies in Cumberland Basin can gust to gale force or storm force, producing rough waves—the largest of which are off Pecks Point. Meanwhile, winds are often light in Shepody Bay. With southwesterlies, seas are choppy everywhere on the ebb tide, but they are particularly rough in the following areas: off Cape Enrage, due to the sharp headland and strong currents; off Ragged Reef Point, where larger seas are found due to shoaling; southwest

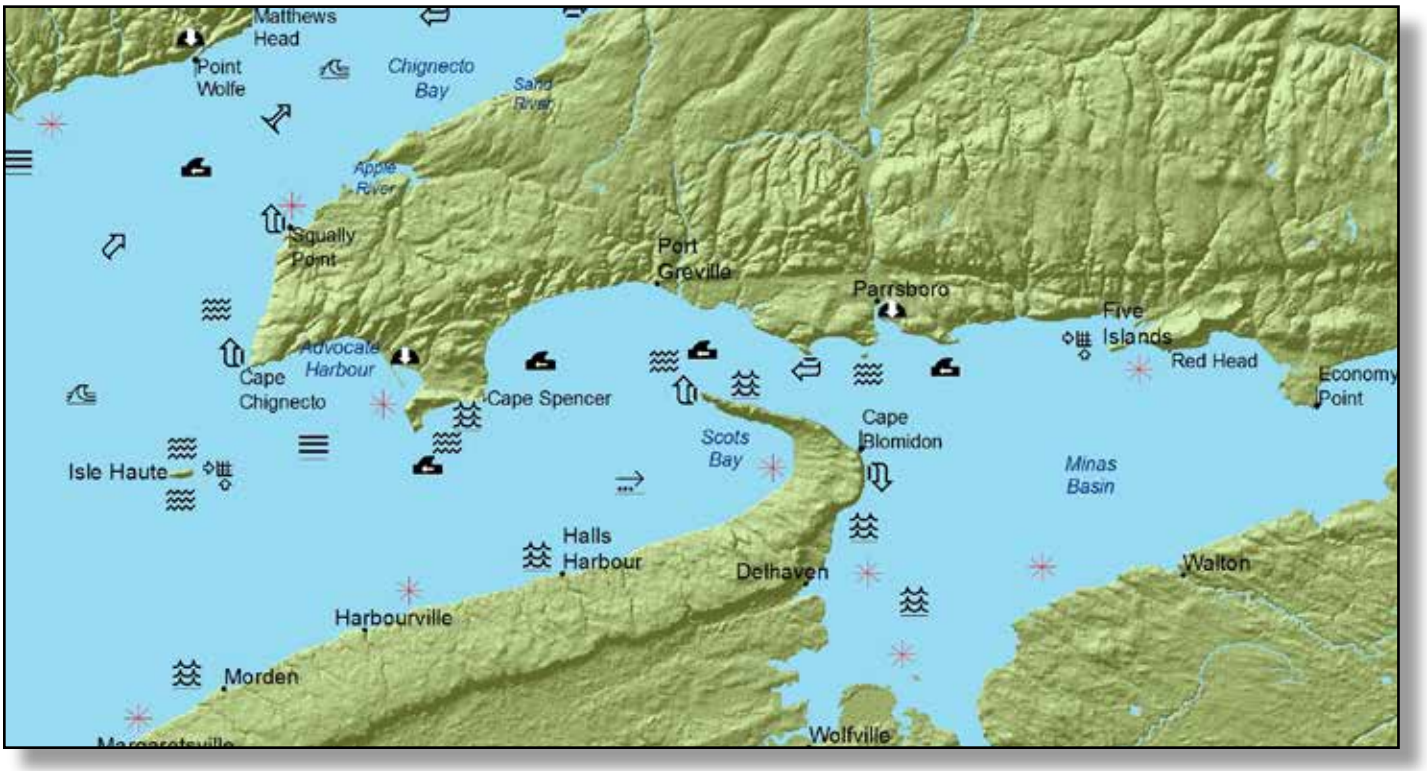
of Cape Maringouin, in the turbulent area where currents flowing from Cumberland Basin and Shepody Bay converge; and between Boss Point and Pecks Point, in the entrance to the Cumberland Basin, where both wind and current are particularly strong. In these areas, strong winds opposing the tide can produce waves over 3 m, and even light to moderate winds produce choppy seas. Northeasterlies also blow strongly through the area and create choppy seas with the flood tide, especially in Cumberland Basin; however, these seas are smaller than those associated with the southwesterlies, because they are limited by fetch.

Tidal rips extend north-northeast from Grindstone Island for about 8 km into Shepody Bay. The tidal rips worsen with a strong opposing wind. On summer days, fog is reported to burn off quickly north of the narrows between Hopewell Cape and Dorchester Cape. The Petitcodiac River is noted for its tidal bore, which occurs between Stoney Creek and Moncton.

Mariners' Tips:
Many coastal communities were originally settled because they were sheltered from the worst of the wind. Wind and other marine conditions reported from inhabited coastal sites may be significantly different from those occurring over open water.

3.3.2 Fundy East and Minas Basin

Large swells that move up the Bay of Fundy do not generally penetrate much past Cape d'Or, although they do get into Scots Bay on occasion, where they are amplified by shoaling. Similarly, fog, common in spring and summer, becomes less frequent east of Cape d'Or.



Weather phenomena in this area are strongly dependent on the phase and strength of the tide. From Cape Chignecto eastward, tidal rips and eddies occur off virtually every point or cape. When the wind opposes these currents, conditions can become dangerous for even the most experienced mariner. The flood stream in this area is reportedly more dangerous than the ebb stream, especially during spring tides. Two potentially dangerous and highly respected areas are Advocate Harbour and Cape Split.

Shoals off the entrance to Advocate Harbour, combined with a continually shifting gravel bar, make it a hazardous place. When a strong wind opposes the tidal stream, even the most experienced fishermen avoid the area.

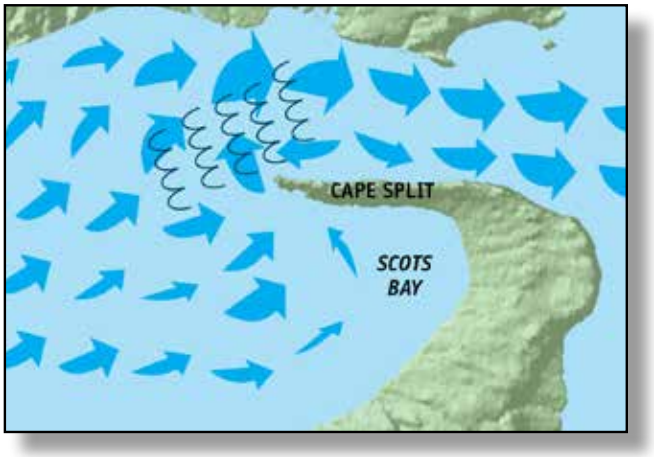
Near Cape Split, the tidal stream fills Scots Bay before flooding past the cape. Where the opposing currents meet, mariners have described seeing "a wall of water" and whirlpools as big as a house.

Channelled southwesterlies from the Annapolis Valley blow strongly south of Cape Blomidon over an area known locally as White Waters. Choppy white water is indeed found there, especially during the first four hours of the flood stream.

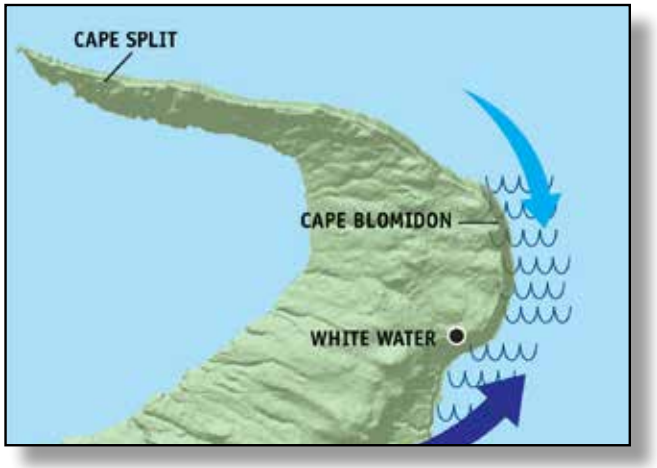
Mariners' Tips:

The place names on a map reveal a lot about the nature of the area. Squally Point, White Water, and Cape Enrage describe the dangers that can be found along this coast. Cape Blomidon was once known as Cape-Blow-Me-Down, and Wolfville was once named Mud Creek.

Shoals and a shifting gravel bar make the entrance to Advocate Harbour hazardous; even more so when the winds and currents run opposite.



The seas off Cape Split can be treacherous where the opposing currents meet.



The seas off aptly nicknamed White Water are choppy due to strong southwesterlies and an opposing current, especially during the early hours of the flood stream.

The world's highest tides are found in the Minas Basin, and extensive mud flats appear at low water. High and low water in the basin occur about an hour later than they do at Saint John.

The largest seas develop over the western part of the basin during easterly gales on the flood tide, when short, steep seas of 3-3.5 m can form. Although strong coastal winds occur from Economy Point to Cape Chignecto, particularly in easterlies, this stretch of coastline is very well sheltered from northerlies and northwesterlies.

Most wharfs in Minas Basin, like this one, become completely dry during low water.

In summer, air and sea temperatures in the Minas Basin are considerably higher than in waters west of Cape Split. This is due to the warming influence of the mud flats and the surrounding land. There are no sea breezes to speak of, and fog is infrequent and usually limited to the early morning hours. Summer thunderstorms moving from the Annapolis Valley occasionally cross Minas Basin, reaching the coast again near Economy Point. They are sometimes accompanied by heavy squalls and large hailstones.

In winter, blocks of ice from the Minas Basin may move out through the Minas Channel towards Cape Spencer. This ice is driven mainly by the strong currents in the area rather than by the wind. In the basin itself, open water can fill in with ice very quickly.

Cobequid Bay, which lies east of Economy Point, experiences no marine activity; however, it is famous for having the world's highest tides. Extensive mud flats develop in the bay at low water.

The coastline from Margaretsville to Scots Bay is relatively straight and free of outlying shoals, with Margaretsville Bank the most significant one in the area. A ridge of hills known as North Mountain runs parallel to the coast. In southwesterlies, stronger winds occur within 1.5-2.5 km of the shoreline due to coastal convergence. They are often accompanied by breaking waves, the roughest conditions found over the shallower waters within 800 m of the coast, especially when the ebb current is running.

Mariners' Tips:

Cornering causes especially strong northwesterlies off Cape Blomidon, where winds can reach 40 kt when they are blowing at 25-30 kt in the Minas Basin.

3.4 Fundy Southeast

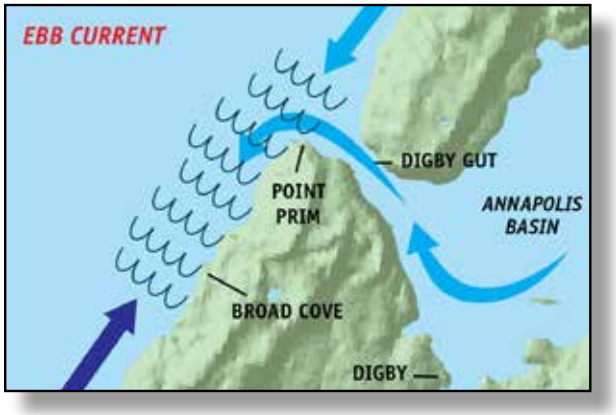
The marine weather conditions in Fundy Southeast are largely influenced by high tides and strong currents. Currents set parallel to the shoreline at a rate of 1.5-2 kt. The currents are considerably stronger through Digby Gut, Petit Passage, and Grand Passage, and over the dangerous shoals around Brier Island. Wave conditions deteriorate everywhere in an opposing wind but can be especially bad in these areas. Shallows are also found along the eastern shores and head of St. Marys Bay, but waters deepen rapidly elsewhere.

Fog is less frequent along this coastline than it is south of Cape St. Marys because the southerly winds blow offshore. In winter, the area is affected by considerable flurry activity in a northwesterly or westerly airflow.

This section looks at the conditions along this coastline in two parts: from Point George to Prim Point and Annapolis Basin, and from Broad Point to Brier Island and St. Marys Bay.

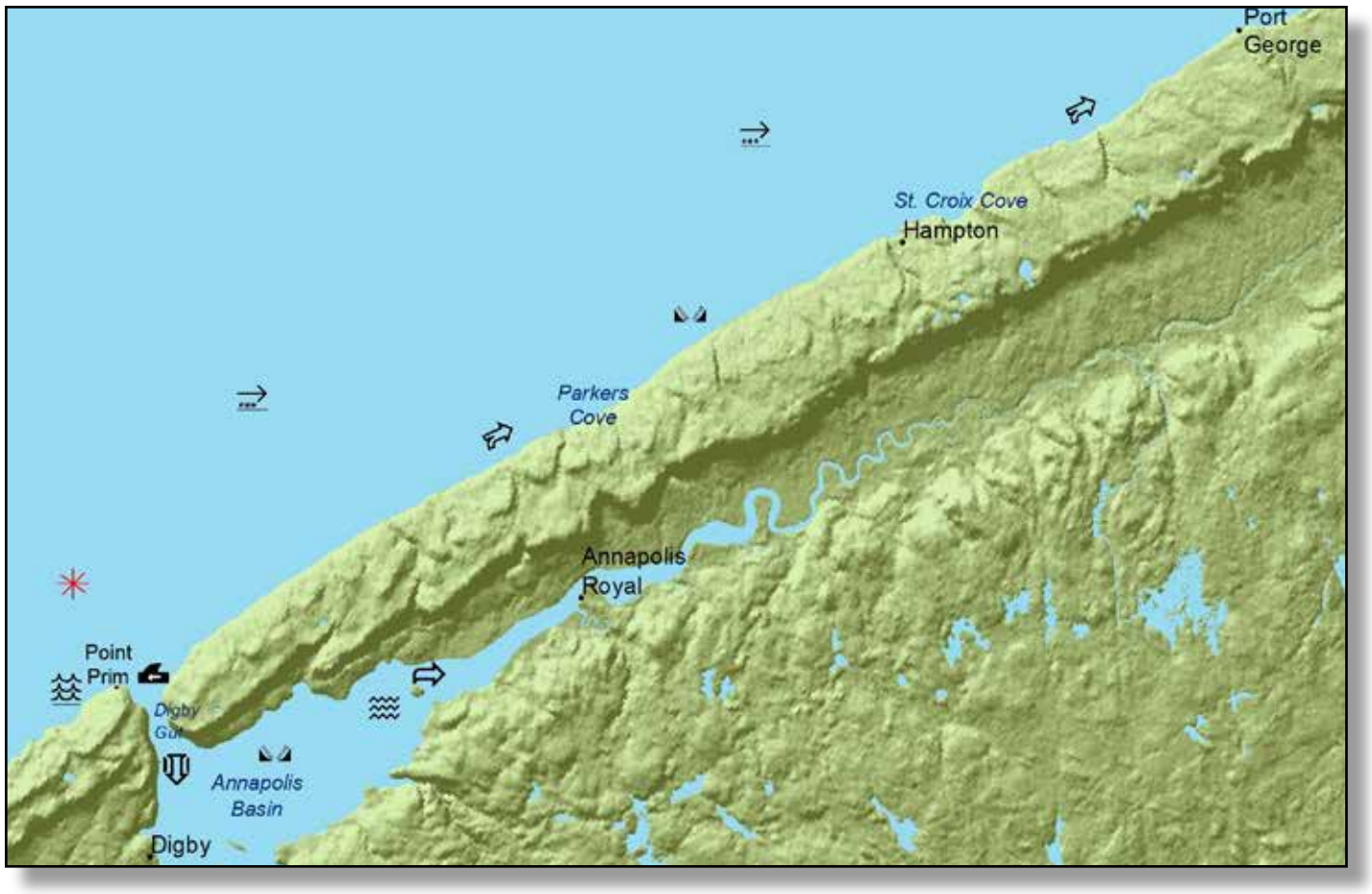
3.4.1 Port George to Prim Point and Annapolis Basin

From Port George, the coast running southwest to Digby Gut is free of outlying shoals. Coastal convergence strengthens southwesterly winds near the shoreline, and the sea breeze is a moderate northwesterly. Tidal currents run parallel to the shore at a rate of 1.5-2.5 kt, and wave conditions deteriorate when currents set into an opposing wind.



The strong currents moving in and out of Digby Gut can extend along the coast as far as Broad Cove. Opposing southwesterlies can cause choppy conditions to develop along this stretch.

Digby Gut is a steep-sided deep-water passage, about 0.6 km wide, that leads into

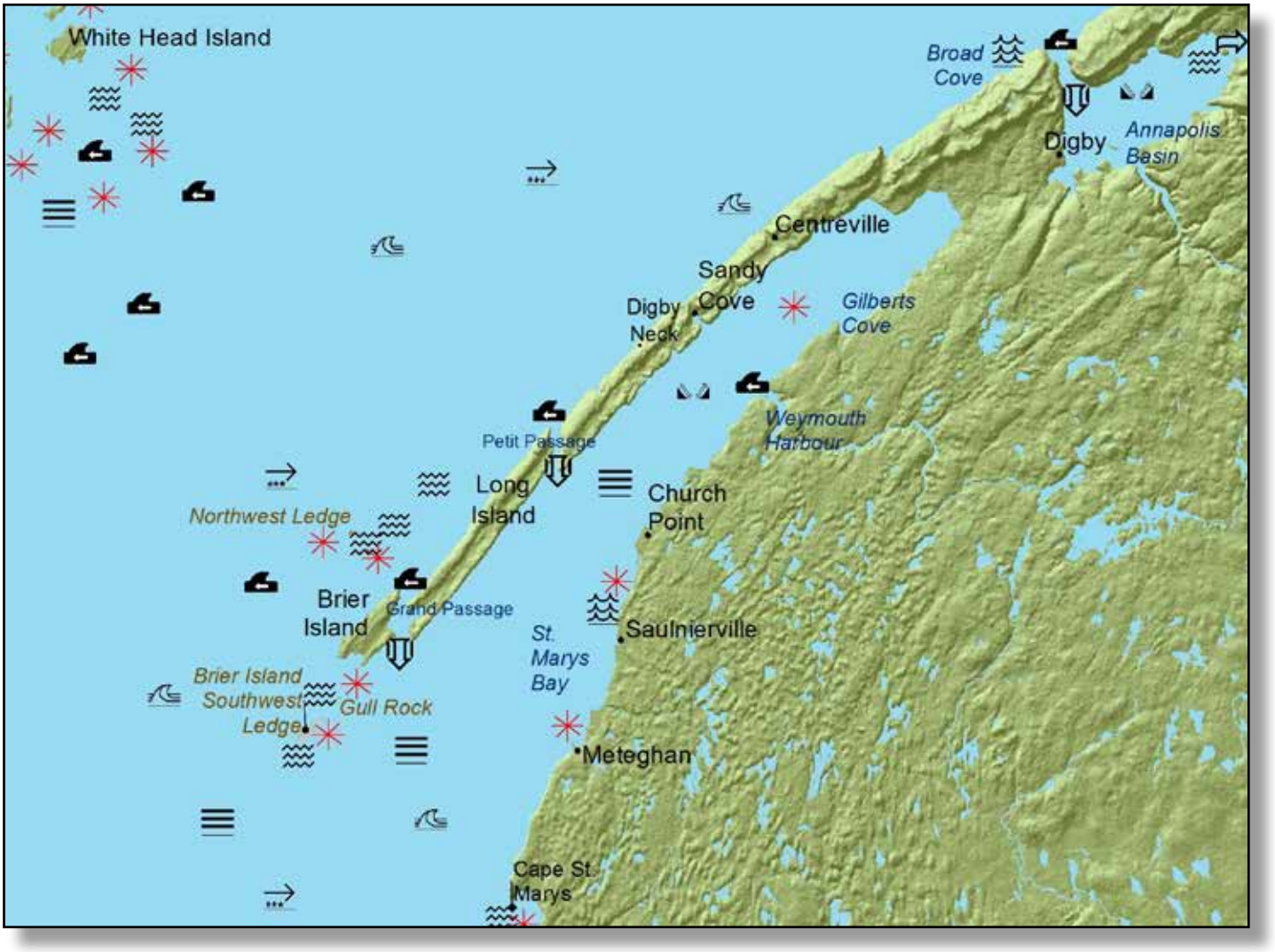


the Annapolis Basin. Strong currents flow through the passage, reaching a maximum rate of up to 5 kt. The times of high-water slack and low-water slack are almost the same as those of high and low water at Saint John. Northwesterlies blow straight through Digby Gut; with an opposing (ebb) current, winds of as little as 15 kt cause noticeably choppy conditions at its entrance, just off Prim Point. When the ebb current combines with the southwesterly swell from the bay of Fundy, large seas are formed.

Although mainly landlocked, the Annapolis Basin is subject to strong winds due to channelling. Southwesterlies blow in over the low land that separates it from St. Marys Bay, while northeasterlies blow in from the Annapolis Valley. The worst winds that occur in the area are northeasterly gales, which cause breaking seas at Digby. Southwesterly winds of 15-25 kt are common on summer afternoons, creating whitecaps on the basin while conditions outside Digby Gut are often calm.

In exceptionally cold weather, ice develops on the tidal flats in the Annapolis Basin and can be carried to lee shores by the wind and tide.

The Annapolis River is navigable as far as Annapolis Royal but can experience unexpected changes in current due to the operation of the sluice gates at the hydroelectric power station.



3.4.2 Broad Cove to Brier Island and St. Marys Bay

The tidal streams along the bold shoreline of Digby Neck and Long Island run parallel to the shore at a rate of 2-2.5 kt. The roughest conditions occur when they oppose a southwesterly or northeasterly gale, both of which can bring large seas. Fog is more frequent over Brier Island, Long Island, and Digby Neck (especially southern shores) than over coastal sections northeast of Centreville.

The Gull Rock Bars, most of which are dry at low tide, extend south of Brier Island to Gull Rock. Heavy tidal rips extend about 5.6 km southwest from Gull Rock to beyond Brier Island Southwest Ledge. This exposed area experiences strong currents and is prone to very dangerous conditions—including heavy, breaking seas—in rough weather.

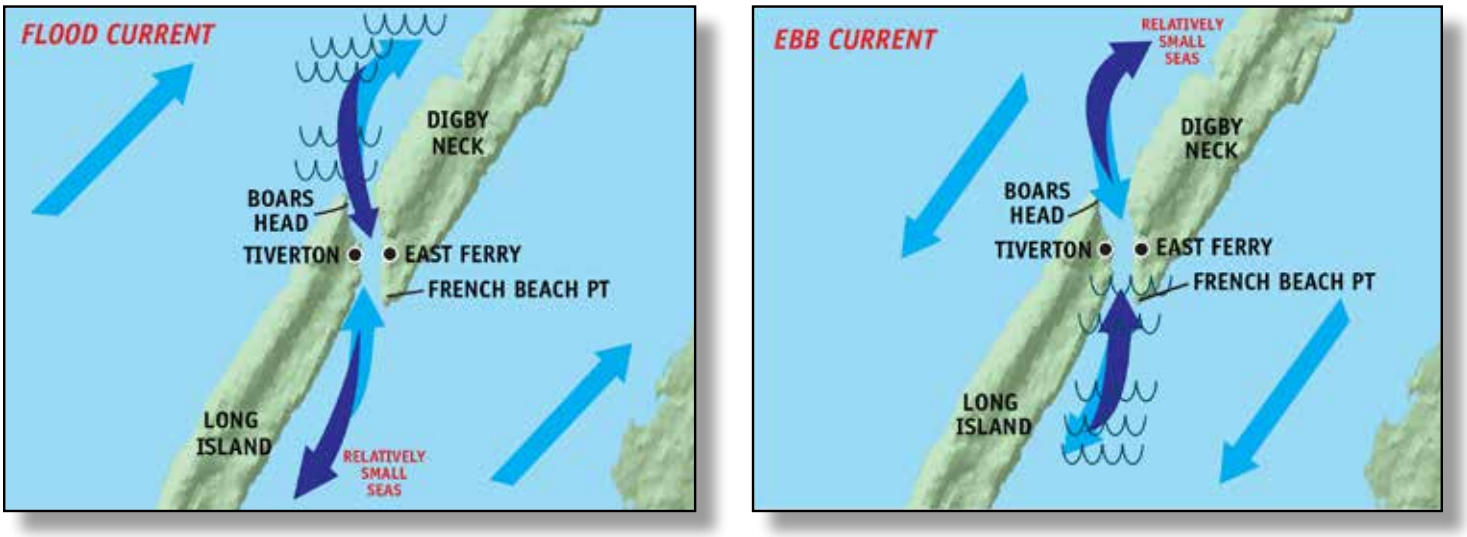
Northwest Ledge and its neighbouring shoals are also dangerous. Currents set to the north on the flood tide and to the south on the ebb tide, with both streams reaching a maximum of about 4 kt. Seas can break to the bottom when gales and currents are opposed.

St. Marys Bay is exposed to gales and swells from the southwest, during which shoaling causes rough conditions near the shore between Meteghan and Saulnierville. Beyond Church Point, the waves diminish markedly. The bay is largely protected to the north and northwest by Digby Neck, Long Island, and Brier Island; however, gales from the north create short, steep waves over its southwestern sections, making Saulnierville Harbour very choppy.

The sea breeze in St. Marys Bay is a westerly wind of 15-20 kt, which usually begins around noon. Although it blows through the whole bay, it is strongest over the eastern shores, where it creates whitecaps. Southwesterly winds blow over the low land at the head of the bay and into the Annapolis Basin.

Southwesterly winds are known to raise the water level in St. Marys Bay, while northeasterly winds lower it. Tidal currents in the bay set parallel to the shore at a rate of about 1 kt. Much stronger currents are found, however, in the approaches to Grand Passage and Petit Passage, where very rough conditions develop when strong or gale-force winds oppose the south-going ebb stream.

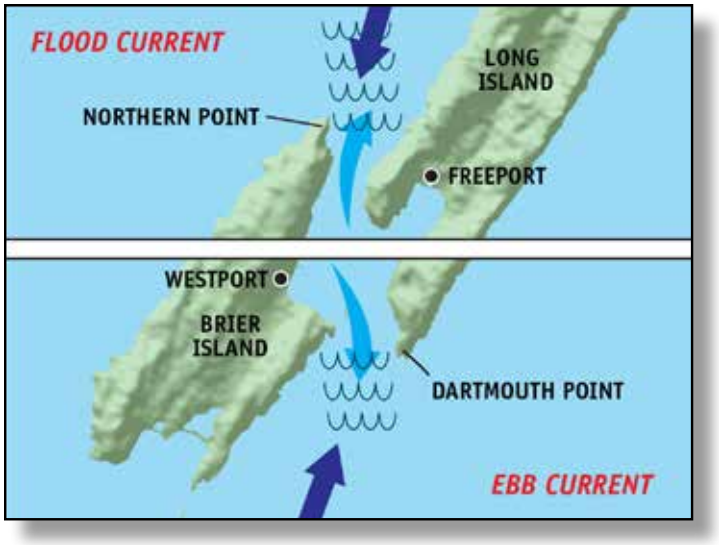
Petit Passage, which lies between Long Island and Digby Neck, has narrower and deeper topography than Grand Passage, so channelling and funnelling contribute to the strong winds that often occur there. Extremely strong currents flow through the passage, reaching rates of up to 8 kt on the north-going flood stream and 7 kt on the south-going ebb. When they are opposed by strong or gale-force winds, heavy breaking waves develop in the passage and its windward approaches. As at Grand Passage, northerly winds on the flood stream cause the worst conditions; however, when rough waves prevail at one entrance, fairly small seas are found at the other. High-water slack occurs 1 hour before the time of high water at Saint John; low-water slack occurs 1 hour and 3 minutes before low water at Saint John.



When the currents run in opposition to strong winds, heavy seas develop in Petit Passage and its windward approaches. Rough conditions are rough at one entrance, however, usually mean relatively small seas at the other.

Grand Passage, between Brier Island and Long Island, also experiences very strong currents of up to 6 kt on the north-going flood stream and 5 kt on the south-going ebb. Opposing strong or gale-force northerlies or northeasterlies in a flood current cause heavy breaking seas north of the passage, while strong southerlies or southwesterlies against the ebb current create rough (but not nearly as large) seas to its south. Mariners get little warning of these rough conditions when entering the passage from the other side.The passage is shallow in places and subject to channelling and funnelling, especially with a northerly wind. High-water slack occurs 57 minutes before the time of high water at Saint John; low-water slack, 1 hour and 18 minutes before low water at Saint John.

Rough, breaking seas are experienced as far out as 800 m from the mouth of Weymouth Harbour when a northwesterly or westerly wind of 25 kt or more opposes the area's strong ebb current. The current is enhanced after a heavy rain by outflow from the Sissiboo River.



Like Petit Passage, Grand Passage experience rough seas at its windward approach and relatively smaller ones at its other entrance when currents oppose strong winds.

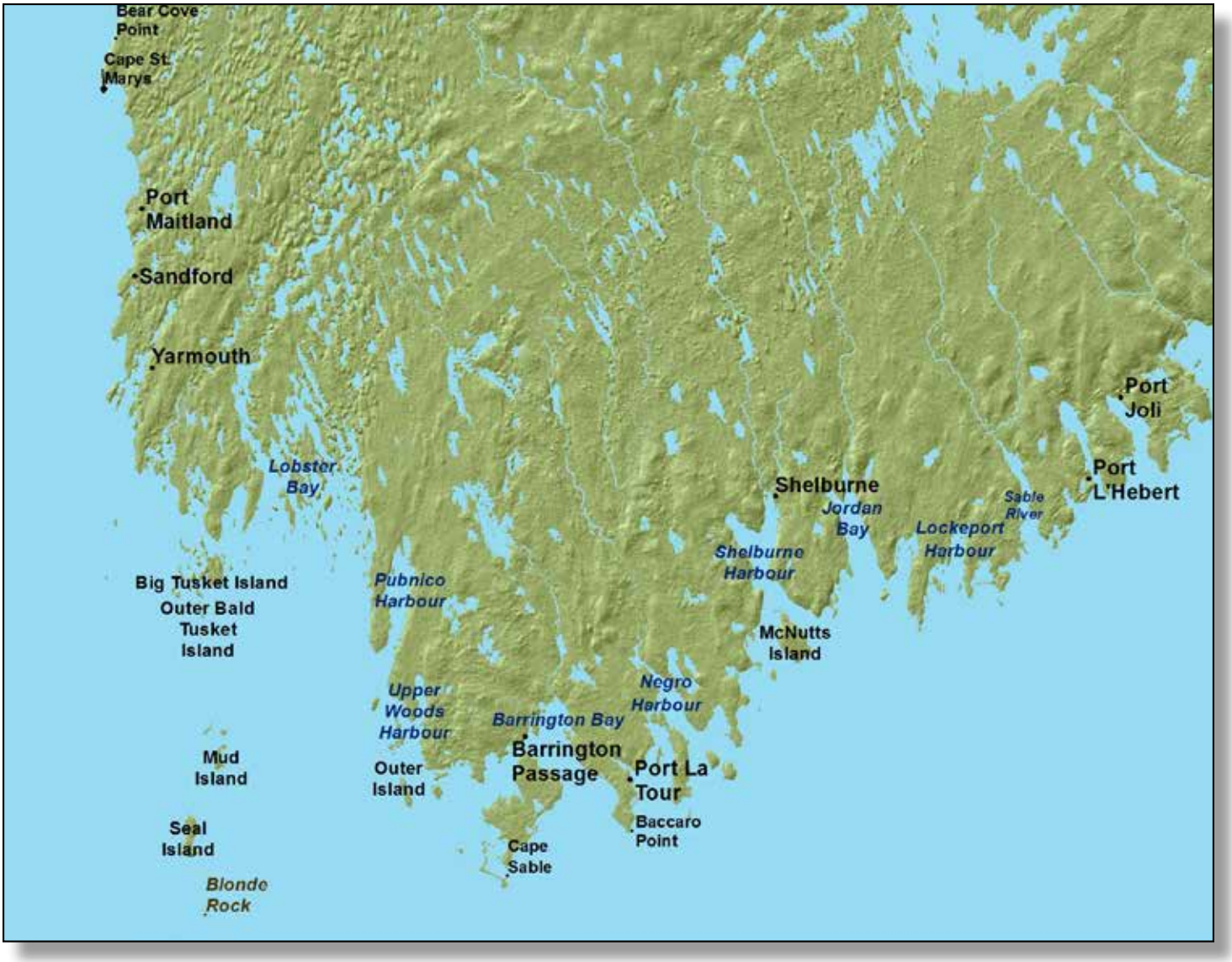
Rough waves develop outside the mouth of Weymouth Harbour when strong winds oppose a strong ebb current, the effects enhanced by heightened outflow from the Sissiboo River.

4. Atlantic Nova Scotia

4.1 Southwest Nova Scotia

Strong tidal currents are common from Cape St. Marys to Cape Sable due to the high tides in the Bay of Fundy. Numerous shoals and islands are found off this stretch of coast, with many associated tidal rips. The sea state deteriorates markedly when the tide runs against a strong or gale-force wind, causing potentially dangerous conditions.

Sea-surface temperatures along the coast of southwestern Nova Scotia are relatively cold during the warmer months, when the water is churned up by strong currents over the local shallows. This cold-water pool creates frequent, dense, and persistent fog. During winter, cold northwesterly outbreaks bring snow flurries and reduced visibility.



The bays along the coastline from Cape Sable to Port Joli cut deeply inland and are generally oriented north to south or north-northwest to south-southeast. As such, many are exposed to southerly gales and protected from northeasterlies. Friction over land makes easterly sea winds back to northeasterlies across these bays. These winds increase in strength across entrances as a result of coastal convergence and past headlands due to cornering. Within the bays, sheltering by the land causes them to weaken. The sea breeze along this coast is southerly and sets more strongly into the bays than it does over the headlands between them. For the purposes of this chapter, this stretch of coastline is divided into two sections: Cape Sable to Port Joli, and Bear Cove Point to Shag Harbour.

The usual extent of fog by early afternoon on a summer day: East of Cape Sable, it has retreated to the headlands; west of the Cape, it still remains farther inland.

Did You Know?

In 1967, Yarmouth had its foggiest summer on record, with fog reported on 85 of the 92 days of June, July, and August.

4.1.1 Cape Sable to Port Joli

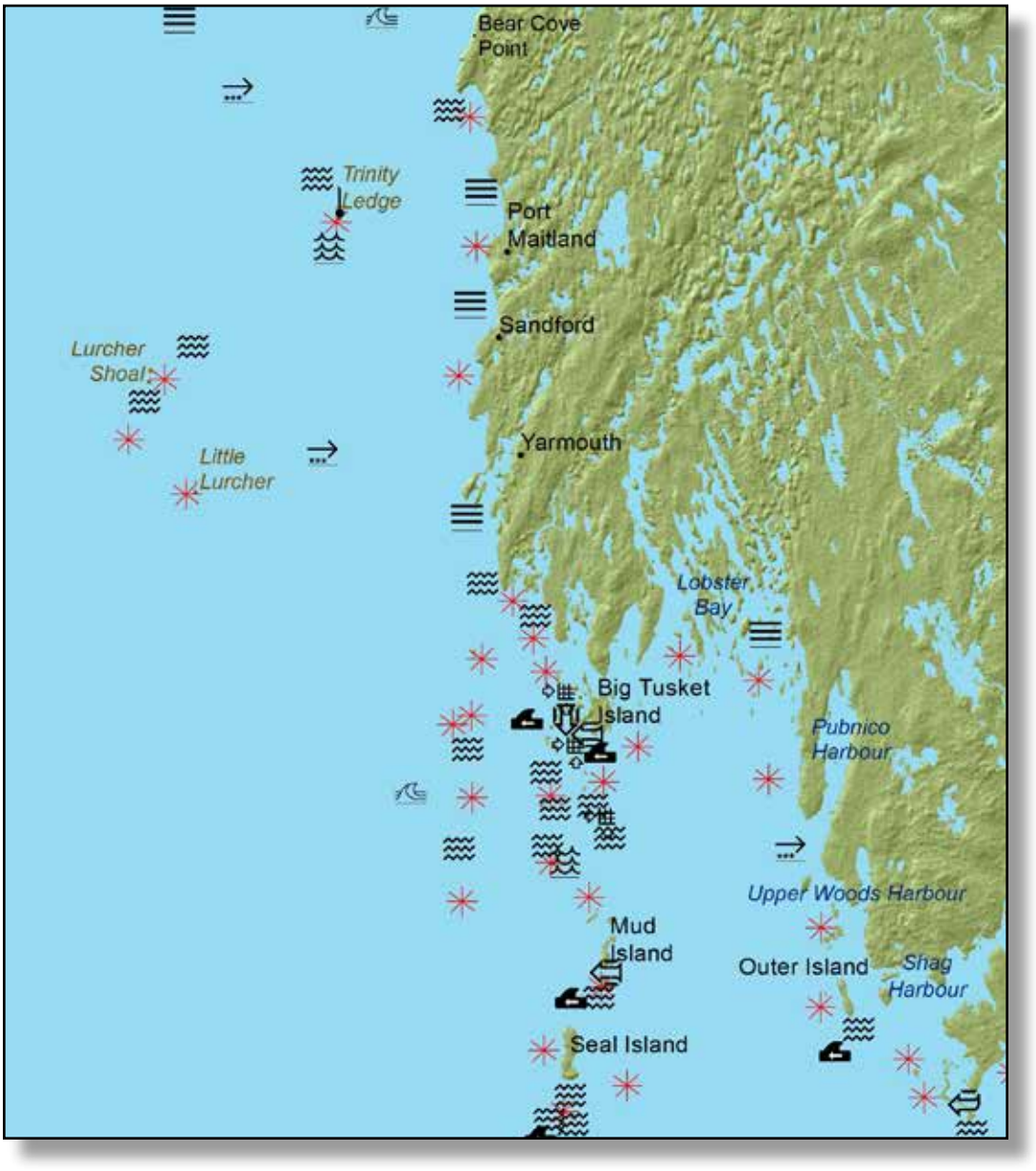
Gales from the south push large seas into several bays along this stretch of coast—most notably, Barrington Bay, Port la Tour, Jordan Bay, Green Harbour, Lockeport Harbour (seas break across its entrance), and Port Joli. Choppy waves develop when strong winds oppose the ebb current in the Eastern Way to Shelbourne Harbour, the entrance to Port L'Hébert, and Port Joli. Strong currents of up to 5 kt occur in the narrow entrance channel to Jones Harbour, just outside Sable River. The entrance is difficult to navigate when a southerly wind or swell opposes the ebb current. A heavy sea from the east or southeast causes crossing seas in the lee of Green Island.

Considerable shoaling occurs over the shallows around Cape Sable, which are exposed to swells from many directions. Strong tidal currents of up to 4 kt run south of this headland, along with heavy tidal rips. Very rough and dangerous conditions develop when these currents are opposed by strong or gale-force winds. A southeasterly gale on the ebb current is reportedly worse than a northwesterly gale on the flood current. Conditions are aggravated by crossing seas caused by ground swell or wind shifts. Extreme caution is essential in this area: the coastline is often foggy, and Cape Sable can present a poor radar image.

4.1.2 Bear Cove Point to Shag Harbour

A series of islands and shoals extend from the Yarmouth Peninsula about 29 km south to Seal Island and Blonde Rock. Rough conditions similar to those found farther down the coast at Cape Sable occur 0.8-2.5 km south of Bon Potage Island in an area known as the Shag Harbour Rip. Tidal currents are strong everywhere along this coastline. Even away from shallow water, wave conditions deteriorate when the current runs into a strong or gale-force wind.

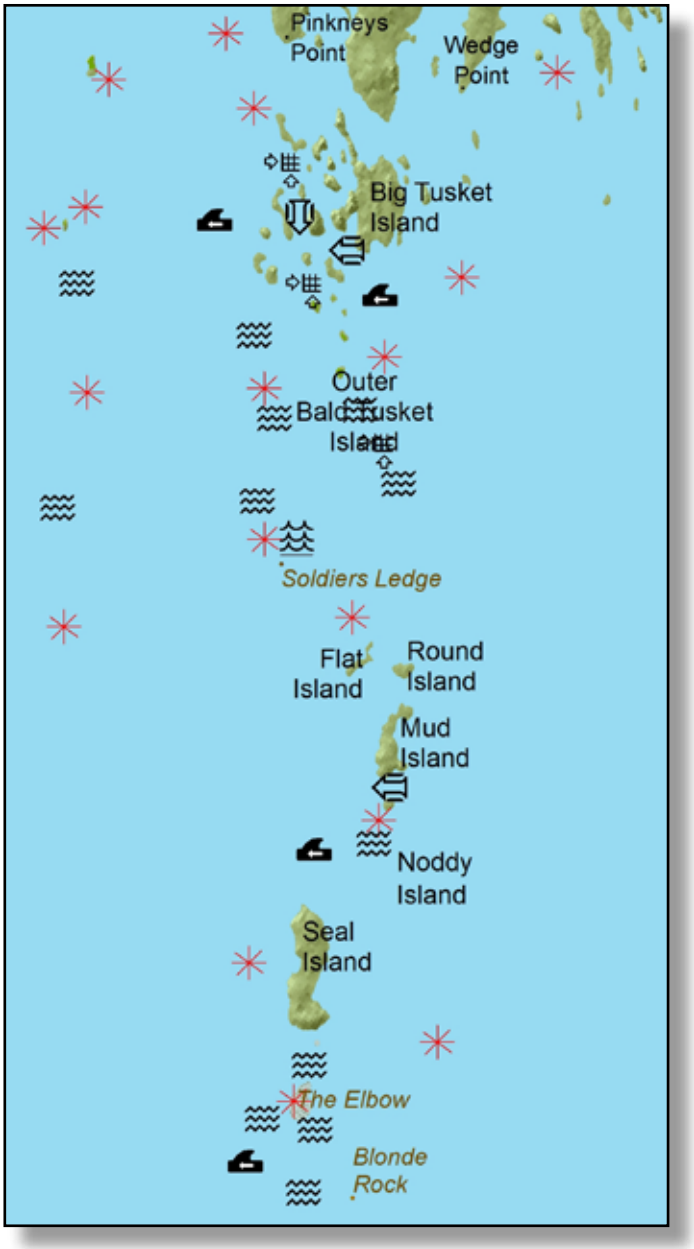
A heavy tidal rip is found over Trinity Ledge, and the waters in this area are usually "unsettled". The roughest conditions develop when strong winds or heavy swells from the southeast oppose the ebb tide, producing choppy, breaking waves.



Mariners' Tips:
Fishermen seldom measure wind speed directly but estimate it visually from the sea state. In this region, a northwest wind is said to increase on the flood tide. While the relative wind over the bow of a ship does increase under these circumstances due to the current and the movement of the vessel (which usually run the same direction), the real wind stays the same in comparison to a fixed reference point, such as the land.

Strong currents flow between the Tusket Islands, creating many heavy tidal rips and eddies. Strong gap winds are also found in this area due to the combined effects of channelling and funnelling. When these winds and currents are opposed, short, steep waves develop—particularly with a northwesterly wind against the flood stream. These conditions, combined with crossing seas, contribute to the formation of unusual "square" wave patterns in the area. Heavy tidal rips occur over several shoal patches, extending from Outer Bald Tusket Island to Soldiers Ledge.

The area from Flat Island to Blonde Rock is not only exposed to gales and swells but also subject to considerable shoaling. Strong tidal currents occur in this area—most running southeastward (ebb stream) and northwestward (flood stream). Both streams reach about 4 kt in the relatively deep channel between Noddy Island and Seal Island and are quite strong south of Seal Island, near Blonde Rock. These strong currents spawn several tidal rips, the ones west of Blonde Rock resembling breakers, even in fair weather. Wave conditions deteriorate everywhere when the wind opposes the current, most notably between Mud Island and Noddy Island, Noddy Island and Seal Island, and near Blonde Rock. Steep "square" standing waves have also been observed in these areas.



Rough waves, tidal rips, and eddies are common among the islands south of the Yarmouth Peninsula.

4.2 Southeast Nova Scotia

The southeast coast is affected by Atlantic swells, considerable fog, and south-southwesterly sea breezes. Except for some constricted entrances, tidal currents are weak and irregular, and the general flow is toward the southwest. This stretch of coastline is examined in more detail in three sections: Little Hope Island to Kings Bay, Lahave River to Shad Bay, and Halifax Harbour and vicinity.

4.2.1 Little Hope Island to Kings Bay

With onshore swells, crossing seas are found in the lee of Little Hope Island. These sea conditions worsen when the wind and current between the island and mainland run against one another.

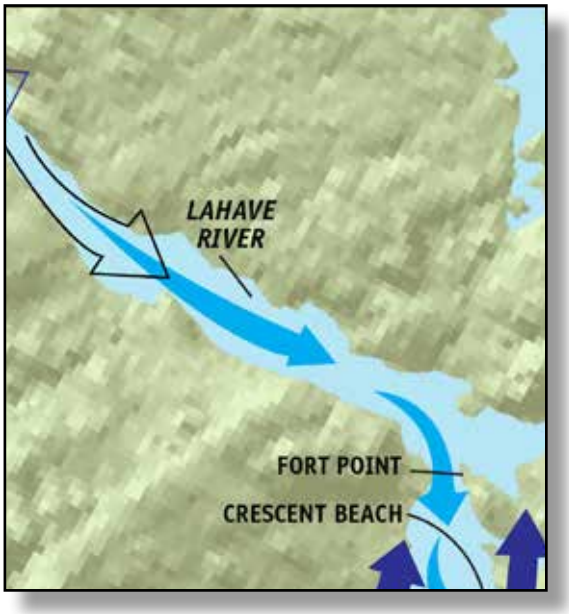
Winds in Liverpool Bay are often southeasterly or northwesterly, due to channelling. The bay is also exposed to southeasterly gales, which send large seas its way. Onshore winds of 25 kt or more cause the seas to break across the entrance to nearby Moose Harbour. Easterly gales also send large seas into Port Mouton that cause waves to break across its harbour entrance, sometimes making it impossible for boats to enter or leave.

Medway Harbour and its entrance are lined with rocks and shoals. Breaking waves are common over the shoals just east of the harbour entrance and in nearby Hell Bay. Kings Bay and Hartling Bay are entirely exposed to wind and swells from the southeast. These conditions create crossing seas in the lee of West Ironbound Island.

4.2.2 Lahave River to Shad Bay

A strong south-southwesterly sea breeze blows over Green Bay and Crescent Beach and into the approaches to the Lahave River. Farther up this long river, which is subject to some channelling, this cool wind can become light and turn into warm, gusty west-northwesterlies. In the narrow entrance near Fort Point, the current can reach 3-4 kt, and choppy seas can occur with an opposing southerly wind. Although fog is common in the area during the spring and summer, it usually burns off over the river during the day.

Large seas are often found southeast of Cross Island, which lies in the approaches to Lunenburg Bay. Choppy seas often occur over the shallow water between Cross Island and East Point Island, especially when a southwesterly wind sets against an opposing current. The deeper passage between Rose Point and Cross Island is exposed to gales and seas from the southeast quadrant, and choppy conditions are often experienced around Rose Point.



Choppy seas can occur at the entrance to the Lahave River when an opposing southerly wind blows against the current.

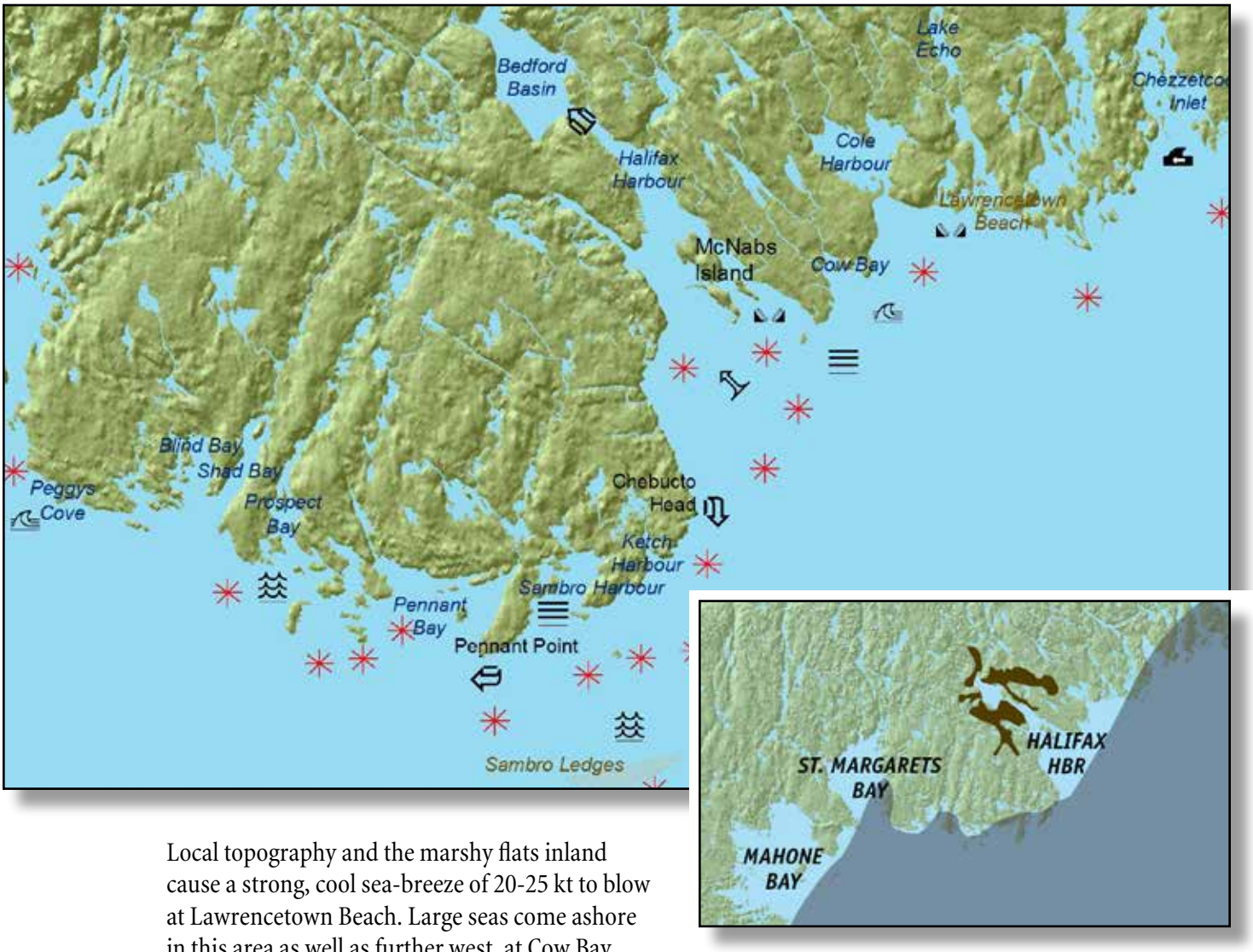
Mahone Bay and St. Margarets Bay are large bays that lie well inland. This makes them subject to the strong, gusty southwesterlies that sometimes occur over the land on summer afternoons due to increased instability from daytime heating. Summer thunderstorms develop over interior southwestern Nova Scotia and often track east-northeastward. They usually pass well inland but sometimes move across the bays, bringing hail, lightning, and heavy squalls.

Mahone Bay, in contrast to neighbouring St. Margarets Bay, is relatively shallow, and the islands and shoals across its entrance tend to buffer the waves. The tidal currents between the Tancook Islands, and between Little Tancook Island and the mainland, are strong enough to cause choppy seas when opposed by strong winds. Nearby Dares Point is known to be a windy headland. Fog in Mahone Bay tends to burn off to seaward of the Tancook Islands, especially with a southwesterly wind.

Large seas from the south affect Peggys Cove and can move into relatively deep St. Margarets Bay. Under such conditions, considerable breaking waves can make the eastern shore of this bay a rugged and dangerous place. With a southerly wind or swell, backwash causes choppy seas just south of White Point, on the Aspotogan Peninsula; shoaling results in choppy seas between White Point and Southwest Island. Sea breezes in St. Margarets Bay often blow at right angles to the shore in the late morning, drop off by early afternoon, and pick up again from the southwest in the late afternoon.

4.2.3 Halifax Harbour and Vicinity

Shoaling is a significant problem over the foggy Sambro Ledges, where choppy seas often occur over the deeper waters, particularly after a wind shift. Cornering contributes to the strong winds often found off Chebucto Head and Pennant Point. In winter, when snow is falling in Halifax, easterly winds from the relatively warm ocean can change the precipitation to rain over the southern sections of Chebucto Peninsula.



Fog that lingers offshore sometimes moves back toward the land when the sea breeze sets in during the afternoon.

Local topography and the marshy flats inland cause a strong, cool sea-breeze of 20-25 kt to blow at Lawrencetown Beach. Large seas come ashore in this area as well as further west, at Cow Bay, creating good conditions for surfing.

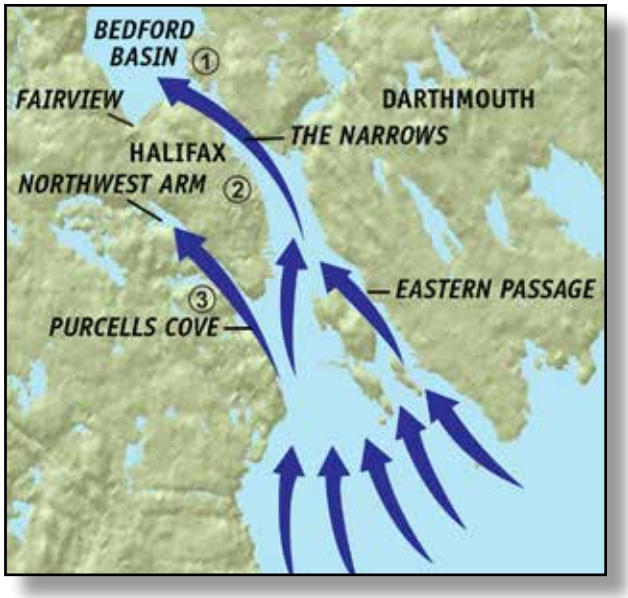
The sea breeze at Halifax and over the Chebucto Peninsula starts as a southerly but tends to veer more southwesterly over the course of the afternoon. Fog sometimes burns off clear of the headlands but can linger offshore and over the Sambro Ledges. When the sea breeze sets in during the afternoon, it often returns to Sambro Harbour and Ketch Harbour, then moves across the approaches of Halifax Harbour.

Southeasterly winds are funnelled somewhat in Halifax Harbour and blow strongly through the Narrows and into Bedford Basin. Southeasterlies are also channelled strongly into the Northwest Arm.

1. Northwesterly winds are gusty at the head of Bedford Basin and are funnelled from there into the Narrows.

2. When sailing close to the Halifax water front, yachters may experience strong gusts with westerly winds caused by the wind channelling down some of the downtown streets.

3. Channelling is very noticeable with a southwesterly wind from the land at Purcells Cove and, to a lesser extent, near Fairview.



Southeasterly winds are funnelled through the many channels and passages in Halifax Harbour.

4.3 Eastern Shore

This stretch of coastline has many interesting and often challenging wind effects. While an east-to-northeast wind is generally boosted by coastal convergence, the frictional effects of the land markedly reduce the strength of the winds in the bays and inlets. The diminishing effect of coastal divergence should be evident in southwesterly winds, with one exception. In summer, southwest winds prevail, and sunny afternoons create unstable conditions over the land. These unstable winds, which become more westerly, converge with offshore southwesterlies in a zone of strong to gale-force west-southwesterlies along the coast.

Nova Scotia's Eastern Shore—especially sections southwest of Liscomb Harbour—is fringed with islands, rocks, and shoals that shelter many harbours and coves from the full force of the Atlantic swells. The southern sections of Chedabucto Bay contain few outlying shoals, so the bay is exposed to easterly gales that bring large waves ashore. Since southerly winds blow offshore, the southern shores of the bay are relatively clear of fog, especially during the afternoon. The shoreline is affected by flurries in a northwesterly airflow.

Fog is common in the late spring and summer along this coast, and it is often dense and persistent. Persistent east and northeast gale or storm-force winds can also bring storm-surge conditions to this area of coastline.

The sea breeze generally starts as a southerly but tends to veer more southwesterly by mid-afternoon. Because harbours and inlets along this coast are generally oriented northwest to southeast, the sea breeze blows across the entrances to the harbours. By afternoon, the fog often retreats to that point, but it moves back into the harbours at night.

Tidal currents along this shoreline are irregular and weak. Except in a few restricted entrances, the strongest currents flow towards the southwest. Choppy conditions can develop offshore when these currents are opposed by a southwesterly wind, especially after a wind shift from the northeast.

More detailed information on this stretch of coastline is divided into two sections—from Chezzetcook Inlet to Ecum Secum, and from Marie Joseph Harbour to Chedabucto Bay. The unique and hazardous conditions found near Sable Island are covered separately.

Mariners' Tips:
Mariners plying this coast are advised to stay well offshore. "Sailing Directions" recommends that vessels stick to at least the 40-fathom line between Cape Canso and Halifax.

4.3.1 Chezzetcook Inlet to Ecum Secum

This coastline is strewn with islands, rocks and shoals, with steep, breaking seas occurring as far as several kilometres from the mainland. Large seas sometimes develop between the islands in the approaches to Shoal Bay, Spry Bay, and Necum Teuch Bay, but most mainland harbours and coves are quite sheltered.

Strong tidal currents of 2-3 kt flow through the narrow entrances to Chezzetcook Inlet, Petpeswick Inlet, and Musquodoboit Harbour. Heavy rains and melting snow can increase the rate of the ebb flow to 4 kt or more. These inlets are shallow, and breaking waves are found at their entrances during strong or gale-force southerlies—especially when these winds oppose the ebb current.

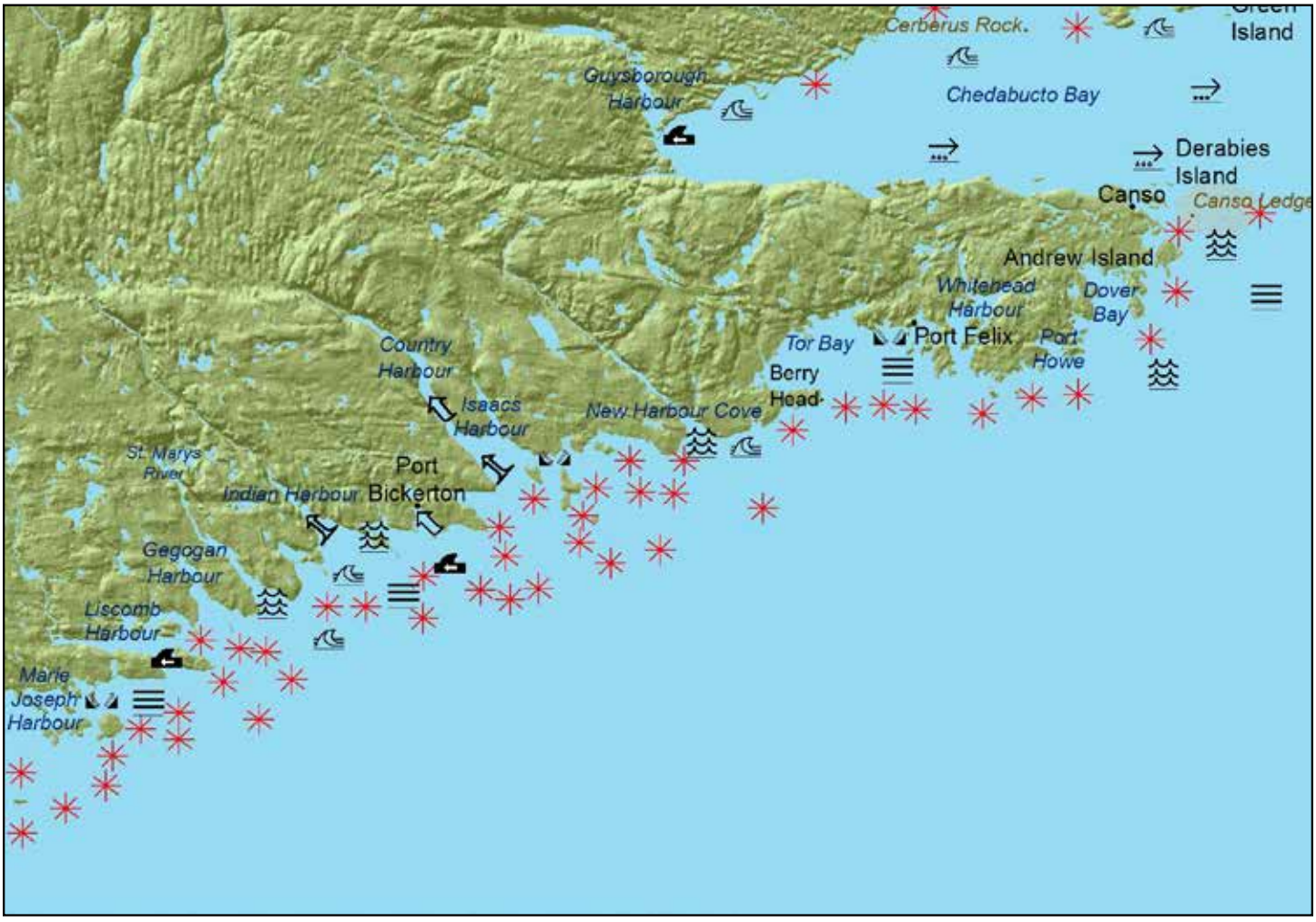
The normal tidal currents in the entrance to Ship Harbour are modest, but the ebb current is greatly increased after heavy rainfall or snow melt. Under these conditions, choppy seas are experienced when the current is opposed by a southeasterly wind.

4.3.2 Marie Joseph Harbour to Chedabucto Bay

Strong southwesterly gusts have been reported on summer afternoons in the lee of Liscomb and Barren islands when only moderate local winds prevailed elsewhere. These gusts are likely due to the significant size of the islands and the effects of the daytime heating of the land.

Strong tidal currents run south of Liscomb Island in the deep-water channel to Liscomb Harbour. Very rough conditions develop in the area when a strong or gale-force southeasterly opposes the ebb current.

The entrances to St. Marys River, Wine Harbour, and Indian Harbour Bay are not protected by offshore shoals and are, therefore, fully exposed to Atlantic swells. The eastern shore of Indian Cove deepens rapidly, and backwash produces choppy seas within half a kilometre of the coast. The shallow heads of these bays become a mass of breakers during southeasterly gales. In the entrance to the St. Marys River, this condition is aggravated by a strong outflow current, especially after a heavy rainfall.



Country Harbour is protected by many islands and shoals, which buffer the seas. The harbour is more than 20 km long, with steep shores on both sides that rise from 60 m near its entrance to more than 120 m near its head. Channelling is common, and the harbour is subject to funnelling with a southeasterly wind.

The typical extent of fog by early afternoon on a summer day that starts foggy inland. Note that the inner reaches of the bays and inlets are clear.

Mariners' Tips:

Yachters sailing up Country Harbour in summer will find that the cool southwesterly sea breeze at its entrance often turns to a warm northwesterly headwind farther up the harbour.

Large waves come ashore along the coast from New Harbour Cove to Little Harbour. These seas break across the entrance to Little Harbour, and backwash causes them to become choppy off the east side of New Harbour Cove.

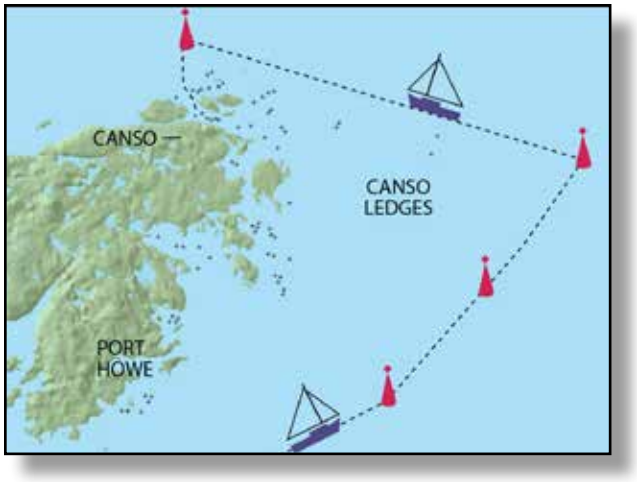
Tor Bay is largely protected by a series of islands and shoals situated at its entrance and upon which the sea breaks heavily. The southwesterly sea breeze is stronger over the eastern sections of the bay, where it can raise some chop and whitecaps and often contributes to persistent fog in the area.

The currents in the narrow entrance to Guysborough Harbour are strong, especially after a heavy rainfall. The shallow outer sandbar at the harbour entrance is often impassable due to heavy breakers—in particular, when easterly winds and swells oppose the ebb current, which can reach 4-5 kt.

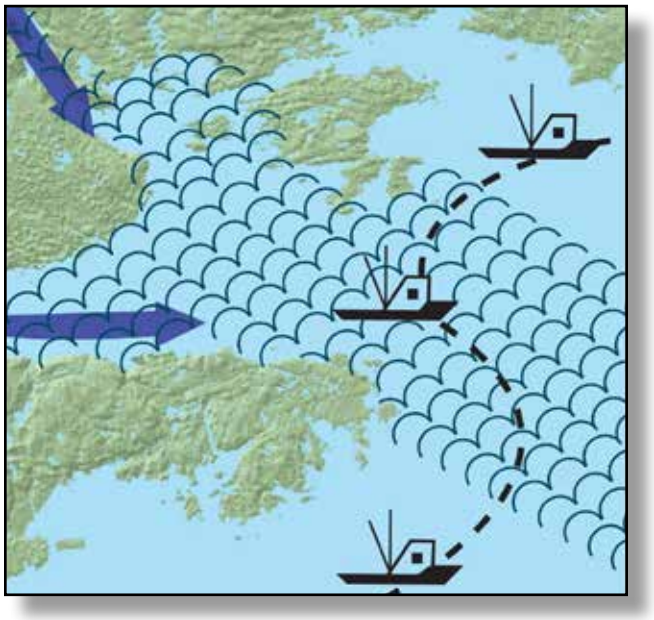
Fog along this part of the coast is mainly associated with southerly winds and often burns off the land during the morning, retreating to the coast.

When sailing from the southwest, there are many hazards along the island routes between Port Howe and Canso. This area, as well as the Canso Ledges, is often foggy—and the irregular shallows can cause confused, steep waves. If fog prevails or the seas are heavy from the south, experienced yachters recommend staying outside the fairway buoys and entering Canso from the northwest.

Mariners travelling near the coastline during a west or northwesterly blow may experience a significant deterioration in the weather when passing the exposed waters of Chedabucto Bay. Winds are stronger and seas higher in this area than they are along the coast, with 4-m seas known to build in storm-force winds. Snow squalls, which may seriously reduce visibility, and freezing spray may be encountered even when they are absent elsewhere along the route.



In fog or heavy seas from the south, the safest way to enter Canso is from the northwest.



Winds, waves, and weather tend to be worse both inside and outside exposed Chedabucto Bay when the winds are westerly or northwesterly.

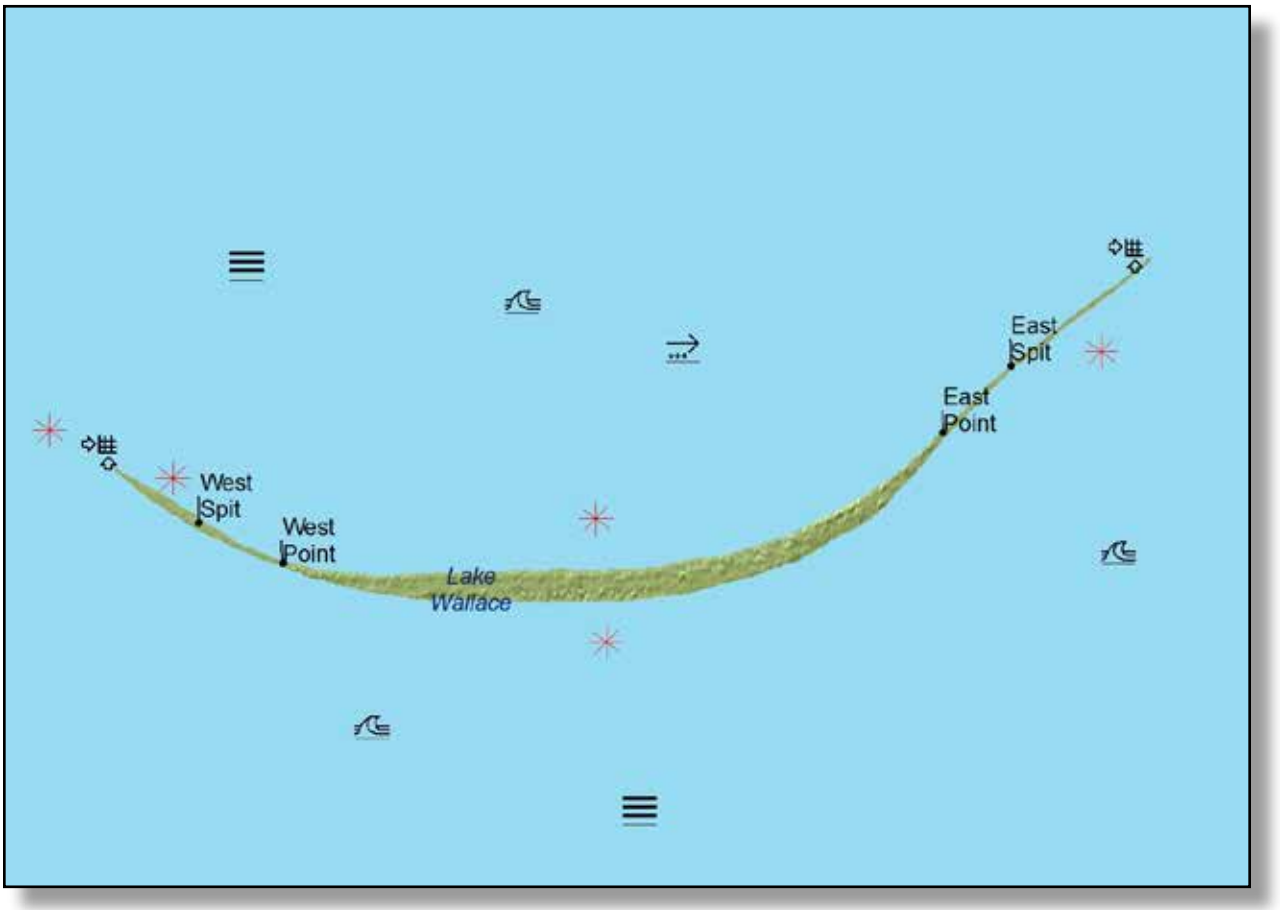
4.3.3 Sable Island

Sable Island is a dangerous area with complex coastal effects and extremely hazardous weather conditions. You are required to register with Parks Canada prior to your trip to Sable Island National Park Reserve.

The visitor season on Sable Island is June to the end of October. The most favourable travel conditions exist between August and October, since fog is often thick from late June to early August.

Because vessels sometimes seek shelter from gales on the lee side of the island, some local weather information is provided in this section.

Sable Island is exposed to the full force of the Atlantic and is affected by gales and large seas from all directions. The island's beaches and sand bars are known to shift on occasion, and depths of less than 10 m, on which the sea breaks heavily, extend nearly 13 km northeast of East Spit and 8 km west-northwest of West Spit. The waters off the north coast of the island shoal seaward in a regular pattern, and sandy ridges run parallel to the coast near the shore.



The waters around Sable Island are extremely hazardous to mariners, as they are prone to high winds and heavy, breaking seas in all directions.

The sea breaks heavily on these ridges and, during strong northerly winds, organized rows of breakers often occur in continuous lines within about 400 m of the shoreline.

Waters deepen more slowly off the south coast of the island, and depths vary irregularly. During strong southerly winds, breakers occur within about 1.5 km of the shore, but they are generally disorganized. Crossing seas, caused by the shoaling effect of the bars, happen within roughly the same distance of East and West spits, particularly when the wind blows parallel to the island.

Sable Island is very foggy, especially in spring and summer. Fog prevails about a third of the time during June and July and has been known to persist for nearly a week without clearing, even in high winds. During such periods, visibility is slightly better to the lee of the island.

On rare occasions when the wind is nearly calm, the island can experience sudden temperature changes—in summer, heating up by as much as 5°C in one hour. In such situations, light sea breezes of 5 kt may occur and cumulus clouds may develop, but they will dissipate as they drift seaward. At night, under clear skies and calm winds, temperatures sometimes fall at the same rate, and radiation fog forms. It is seldom more than 6 m thick, however, and breaks up as it drifts seaward on even the slightest breeze.

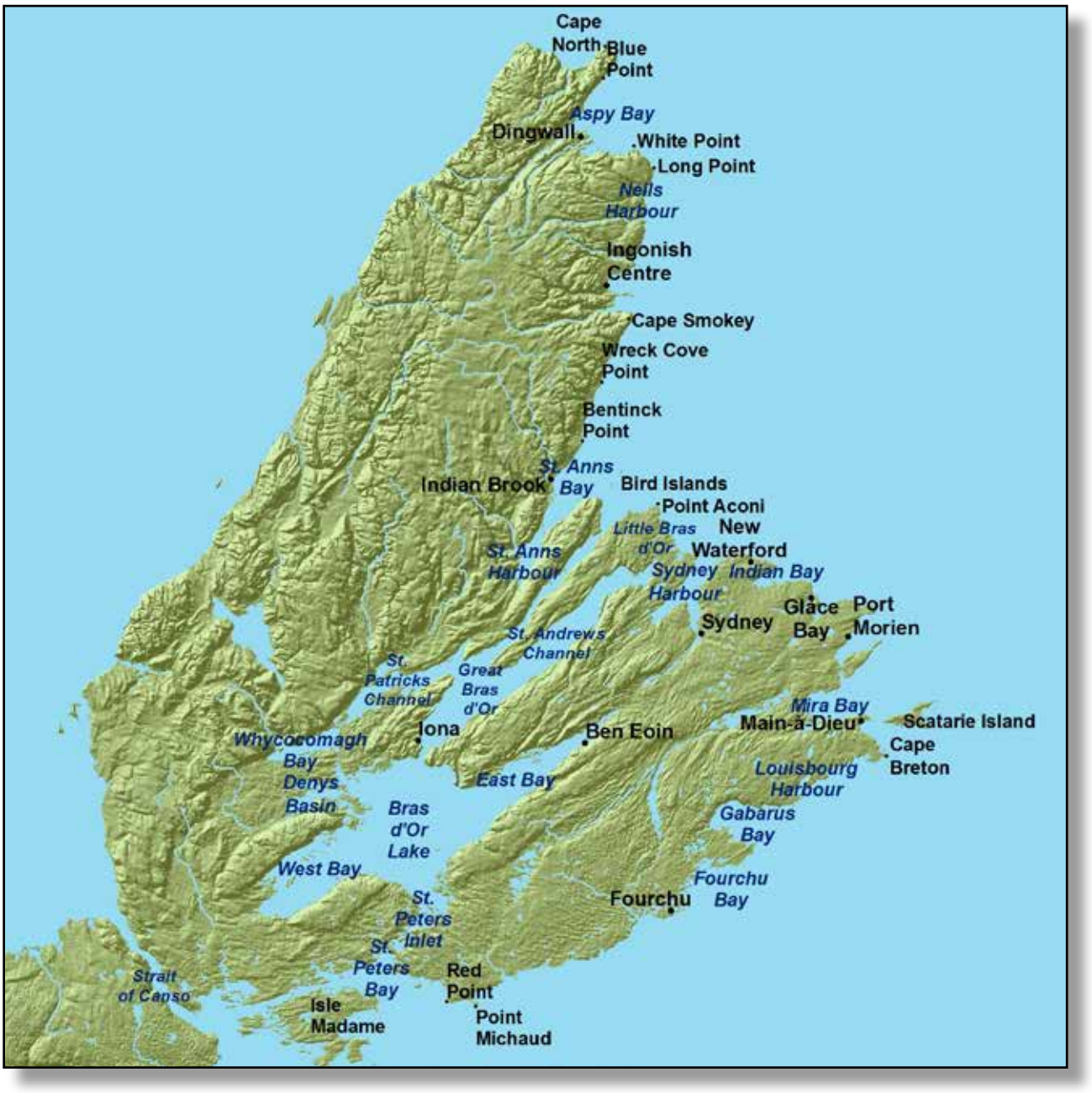
During very cold outbreaks in winter, freezing spray and snow streamers forming off the coast of Nova Scotia can also affect the area.

Mariners' Tips:
Vessels near Sable Island should pay close attention to the weather forecast, as rapid weather changes can occur. A sudden wind shift can quickly change a sheltered area into an exposed one, add to that the complexities of many coastal effects and the conditions can become very dangerous.

ATLANTIC REGIONAL GUIDE PART 2

5. Cape Breton

Local effects for Cape Breton are grouped under three main sections: Cape Breton East, the Bras d'Or Lakes, and Cape Breton West.



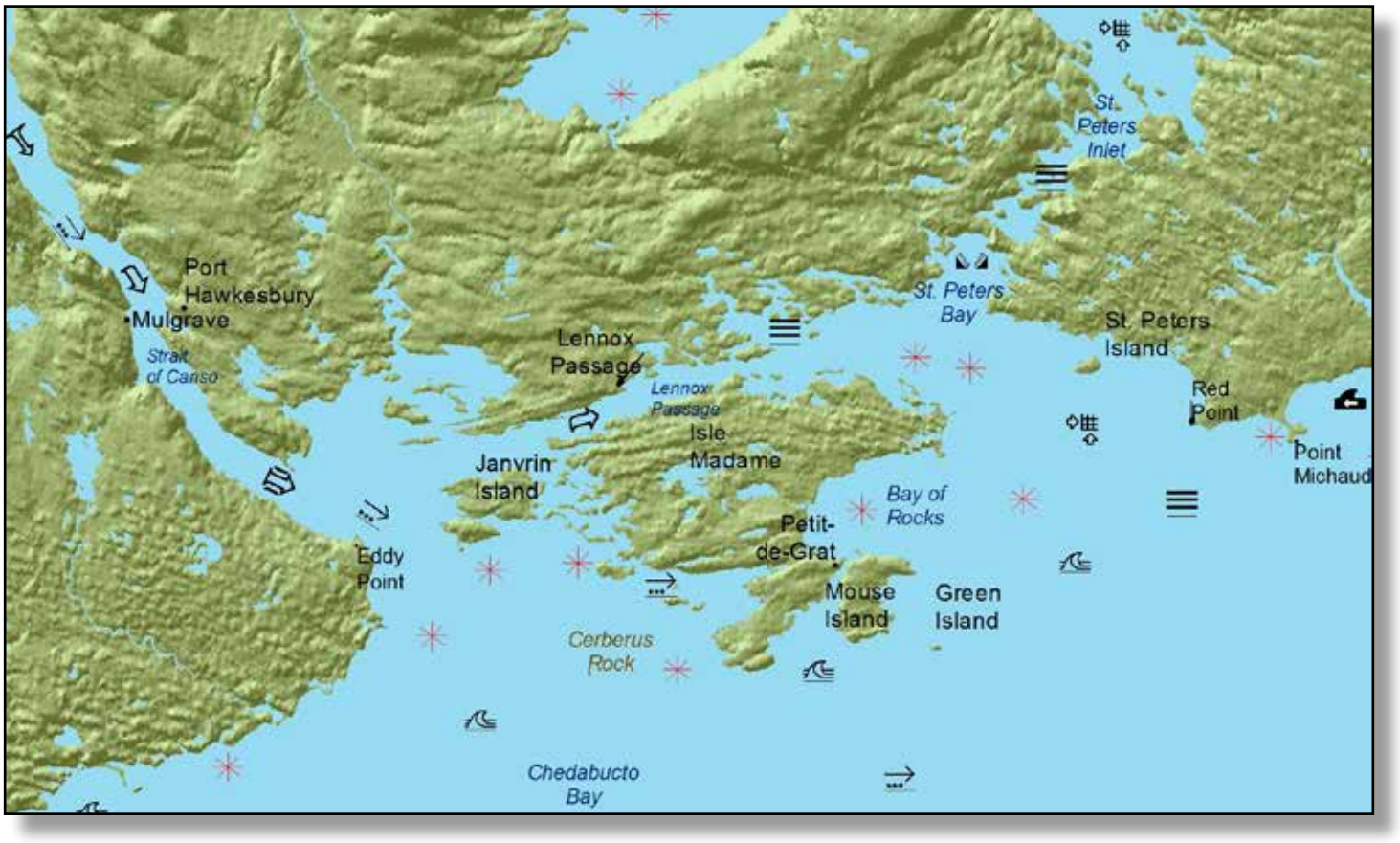
5.1 Cape Breton East

Local weather in this area is a varied as the shoreline itself. Mountainous terrain and deep coastal waters characterize the north, while gentle hills and shallow bays lie to the south. Information on conditions along this stretch of coastline is divided into four sections: the Strait of Canso to Point Michaud; Point Michaud to Louisbourg; Scatarie Island to St. Anns Bay; and Indian Brook to Cape North.

5.1.1 Strait of Canso to Point Michaud

Channelling and funnelling occur in the Strait of Canso with both northwesterlies and southeasterlies. The effect is enhanced with a northwesterly, when gap winds blowing out of the strait can be felt over the northern sections of Chedabucto Bay as far east as Cerberus Rock. In late fall and winter, before St. Georges Bay freezes over, snow streamers can also accompany these northwesterlies. The resulting flurries affect the Strait of Canso, Janvrin Island, and southern sections of Isle Madame to Green Island. On the south shore of Chedabucto Bay, they affect the coast from Half Island Cove eastward to Cranberry Island.

Lennox Passage, which separates Isle Madame from Cape Breton Island, is full of shoals and can have strong currents. Southerly sea breezes also affect the area, and mariners travelling from the passage into the Strait of Canso on a fine summer day will notice that a southerly wind on the beam often turns into a northwesterly headwind.



Large seas from the Atlantic affect the southeast coast of Isle Madame. In strong southerly winds, the sea usually breaks across the entrance to Petit-de-Grat Harbour, near Mouse Island.

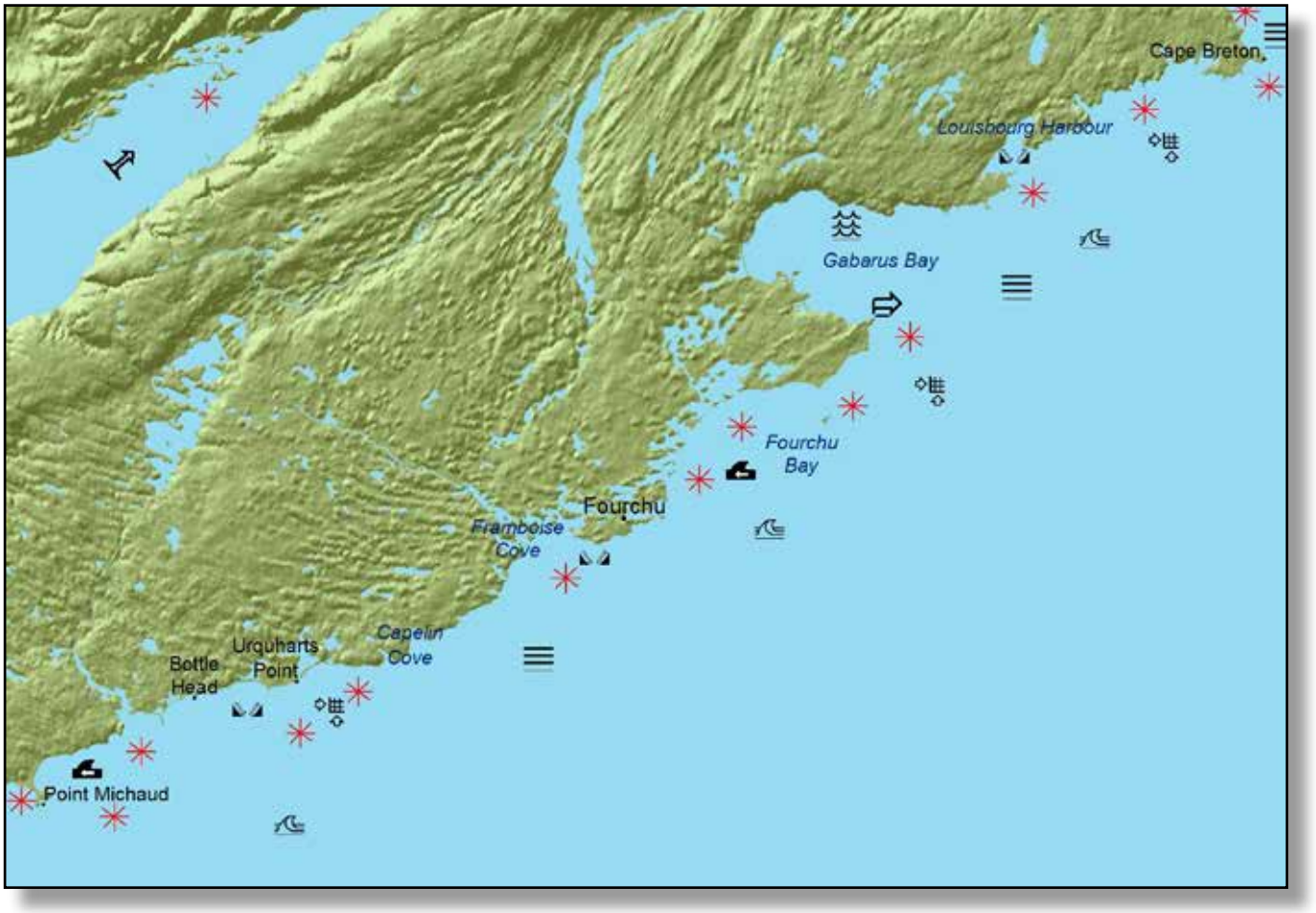
5.1.2 Point Michaud to Louisbourg

This section of coastline dips gradually down below sea-level. Characterized by shallow, rocky, and exposed bays, such as Framboise Cove and Fourchu Bay, most of it is exposed to the full brunt of Atlantic swells, and shoaling effects are common.

Fog, which is usually associated with southerly winds, is a major problem; in late spring and early summer, it is frequent, dense, and persistent. Sea breezes along this coastline are southerly, and average 15-20 kt. Coastal convergence can affect northeasterlies.

Gabarus Bay is open to bad weather from the east and southeast. Its north shore is steep, with cliffs rising abruptly to 60 m; as such, some backwash occurs in these seas.

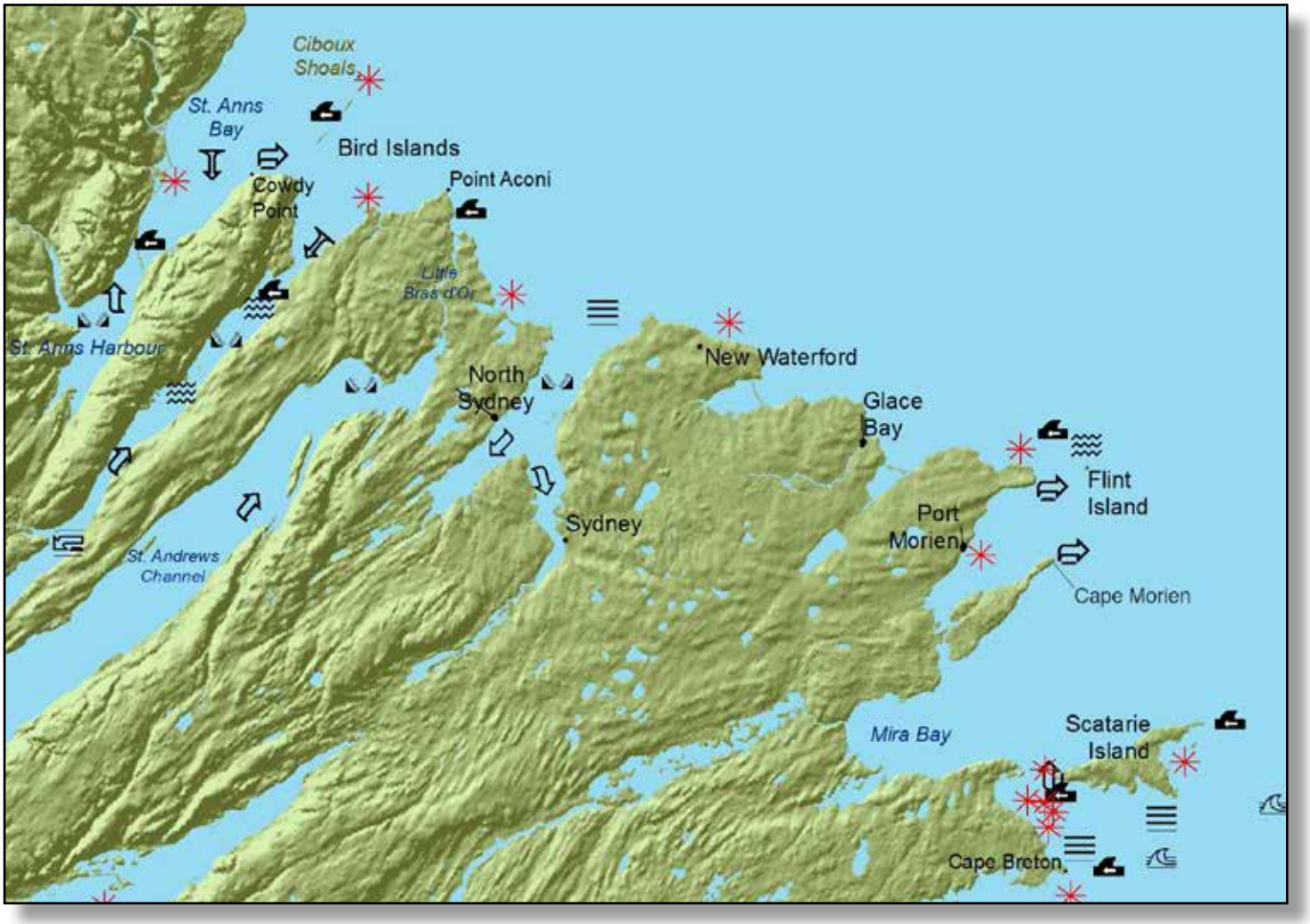
The entrance to the historic harbour of Louisbourg is well protected by islands and shoals, upon which the sea breaks heavily. The sea breeze blows the length of the harbour at speeds of up to 25 kt, causing some chop and whitecaps near the village end.

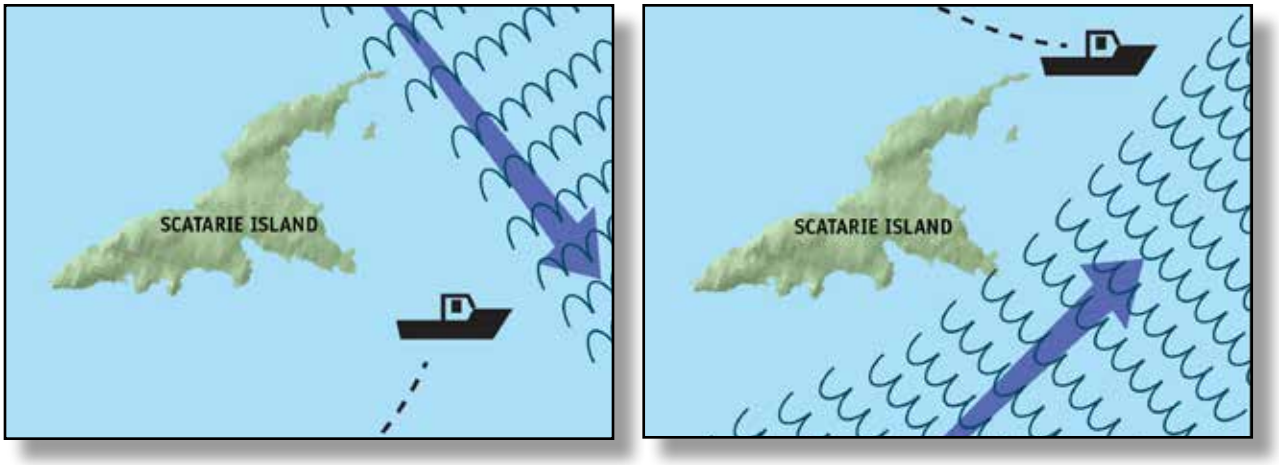


5.1.3 Scatarie Island to St. Anns Bay

The character of the coast changes considerably along this shoreline, as mountains in the northwest give way to moderate elevations in the southeast. The coast is exposed to gales from the northeast quadrant, which send heavy seas into Mira Bay, Morien Bay, Glace Bay, and Indian Bay. Morien Bay becomes particularly rough, since it has a large area of shallow water at its head. Cornering is experienced with a westerly wind off Cape Morien and Wreck Cove. Northeasterly sea breezes average 15 kt along this stretch of coastline, but are stronger in the various channel entrances, where they can also be accompanied by fog.

A change in weather is often experienced in the waters east of Scatarie Island. The mariner coming from the southwest is exposed at this point to gales and swells that may be running from the north and northwest. A mariner approaching from the northwest is exposed to bad weather from the south and southwest.

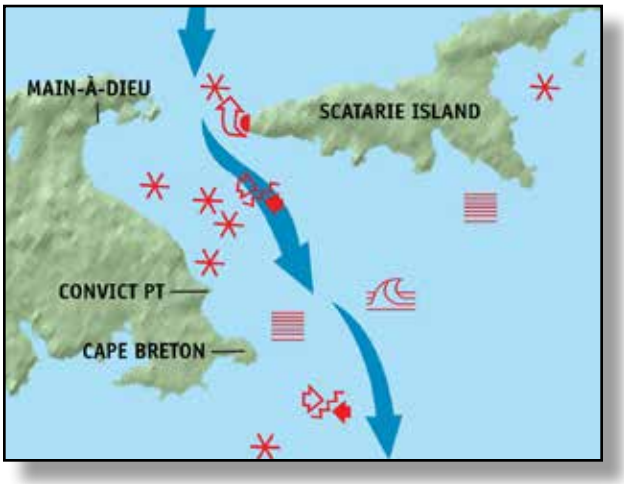




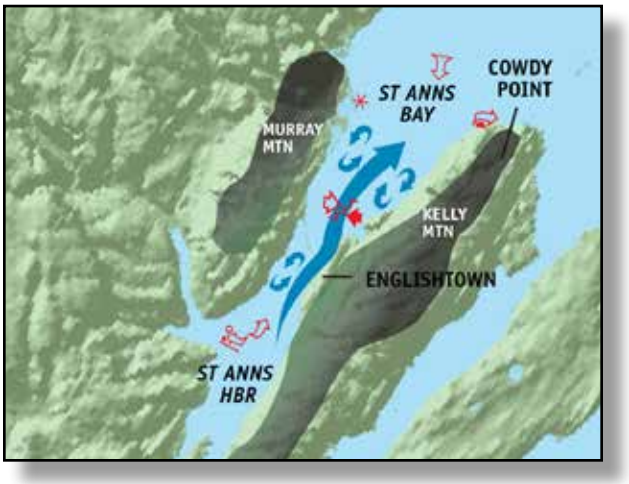
Mariners approaching Scatarie Island from the southwest or northwest may be exposed to sudden changes in the weather in the waters east of the island.

In Sidney Harbour, a northeasterly wind is channelled into the North West Arm and the South Arm. Conversely, channelled winds blowing seaward through the two arms converge in the harbour, where the sea breeze is northeasterly at 15-20 kt. In late spring and early summer, this cold wind is sometimes accompanied by fog; in winter and spring, northeasterlies can bring ice into the harbour.

Currents flowing from the Great Bras d'Or channel can be felt as far seaward as Table Head, and turbulent, chaotic seas are experienced with an opposing wind. The entrance to the Little Bras d'Or is closed by breakers when there is a heavy sea, especially when the strong tidal stream sets against an onshore wind. Strong currents flow between the Bird Islands—Hertford Island and Ciboux Island—as well as over Ciboux Shoal, and choppy seas develop in an opposing wind.



Shoals, strong currents, exposure to gale and swells from the southeast, and frequent fog make Main-a-Dieu Passage a hazardous location in bad weather.



The area between St. Anns Bay and St. Anns Harbour can experience strong winds as a result of channeling and funneling. The waters approaching Englishtown can also be rough when the wind opposes a seaward current.

Main-a-Dieu Passage is complicated by several shoals, and whitewater can often be seen on its western side, even in fair weather. It is a dangerous place to be in poor weather: currents are strong if exposed to gales and swells from the southeast, and the area is often shrouded in fog.

Wedge-shaped St. Anns Bay lies between Kelly Mountain to the east and Murray Mountain to the west. Winds prevail from the southwest or northeast, due to channelling. Northeasterlies are also funnelled and can be violent. It is common to find southwesterlies inside the harbour when southeasterlies blow over the open water beyond the approaches to the bay. Sea breezes are northeasterly and can be as strong as 25 kt; however, although they raise some chop and whitecaps, they produce little sea. Cornering is experienced off Cowdy Point with a southwesterly.

Strong tidal currents run through the narrow entrance to the harbour where the Englishtown ferry crosses. The normal tidal current in the area has a maximum strength of 4 kt, but the seaward current can be considerably stronger after heavy rainfall and during the spring freshet. When a northeasterly wind opposes a seaward current, rough conditions may be found near the ferry crossing to just over a kilometre seaward.

5.1.4 Indian Brook to Cape North

This dramatic and mountainous coastline is free of outlying shoals, except near the Bird Islands. Peaks just inland reach elevations of over 420 m, which greatly influences winds near the coast. Strong winds, enhanced by mountain-wave effects, can occur after a cold front passes, producing violent gusts in areas such as North Bay Ingonish and South Bay Ingonish.

During summer evenings, katabatic winds can flow from the river valleys leading into Ingonish Harbour, South Pond Dingwall, and North Pond Dingwall. These are generally only light breezes, but in Ingonish Harbour, they can be strong enough to raise whitecaps.

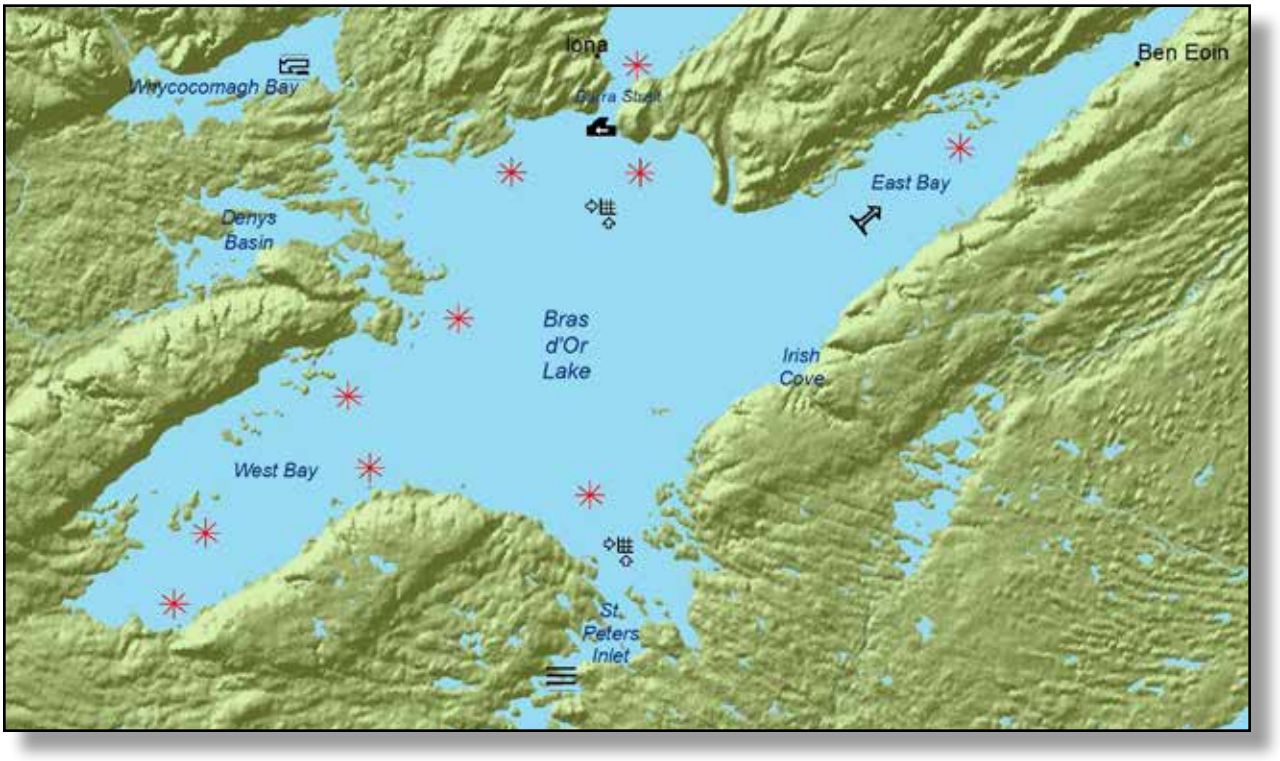
This coast is exposed to gales from the east, which send heavy seas into the Ingonish bays and Aspy Bay, often preventing entry into Dingwall Harbour. Cornering causes northwesterly winds to be particularly strong off the steep headlands of Cape North, Money Point, Cape Egmont, and Cape Smokey.

Choppy seas occur off steeper sections of this coastline due to backwash, particularly when the waves hit at an angle to the cliffs. Flurries over the western highlands in a northwesterly airflow can spill over North Mountain into Aspy Bay and Cape Egmont; however, they seldom reach Neils Harbour. This mountainous coastline is not generally influenced by strong sea breezes.

Mariners' Tips:
In a northwesterly airflow, wind eddies often form in the lee of the steep cliffs from Money Point to just south of Blue Point. Under such conditions, small waves and moderate, gusty, southeasterly winds can be expected within about 800 m of the shore. Beyond that point, the winds become strong, gusty, and northwesterly, and waves begin to build.

5.2 The Bras d'Or Lakes

The Bras d'Or Lakes consist of two enclosed bodies of water: Bras d'Or Lake (known locally as the "large lake"), to the south of Iona; and Great Bras d'Or Lake (known as the "small lake"), to the north. The latter consists of three major channels with a southwest-northeast



orientation. The surrounding mountains and hills influence the wind patterns on the water, frequently causing channelling and funnelling, and sometimes setting up mountain waves.

The lakes are considerably less salty than the surrounding ocean water, due to the influx of fresh water from many streams. The tidal range is small, but there are strong tidal currents in the constricted passages leading to the sea and in the Barra Strait. These currents, and the water levels within the lakes, are affected by rainfall, snow melt, and strong winds.

The weather on the lakes is greatly influenced by the water temperature and the surrounding topography. In summer, the prevailing wind is southwesterly at 10-15 kt; gusts to 25 kt often develop in the afternoon but die out by early evening. Warm water-temperatures inhibit fog formation in summer; although early-morning radiation fog can develop in coves and along the shoreline, it dissipates shortly after sunrise. Mountainous terrain generally protects the lakes from sea fog, with the exception of the Great Bras d'Or and St. Peters areas. Summer sea breezes can also push fog partway up into the channels. Thunderstorms and showers occur more frequently over the Bras d'Or Lakes than at Sydney, likely because of warm water temperatures and local topography.

Ice forms on the Bras d'Or Lakes early in January and lasts until late March or early April. Sea ice often fills the Great Bras d'Or channel as far south as Seal Island.

5.2.1 Bras d'Or Lake

Bras d'Or Lake is entered from the north through Barra Strait. Normal tidal currents there have a maximum flow of about 3 kt; when they are opposed by high winds, large irregular waves develop. All yacht races are stopped and restarted on either side of the train bridge, and auxiliary power is recommended when passing through the strait.

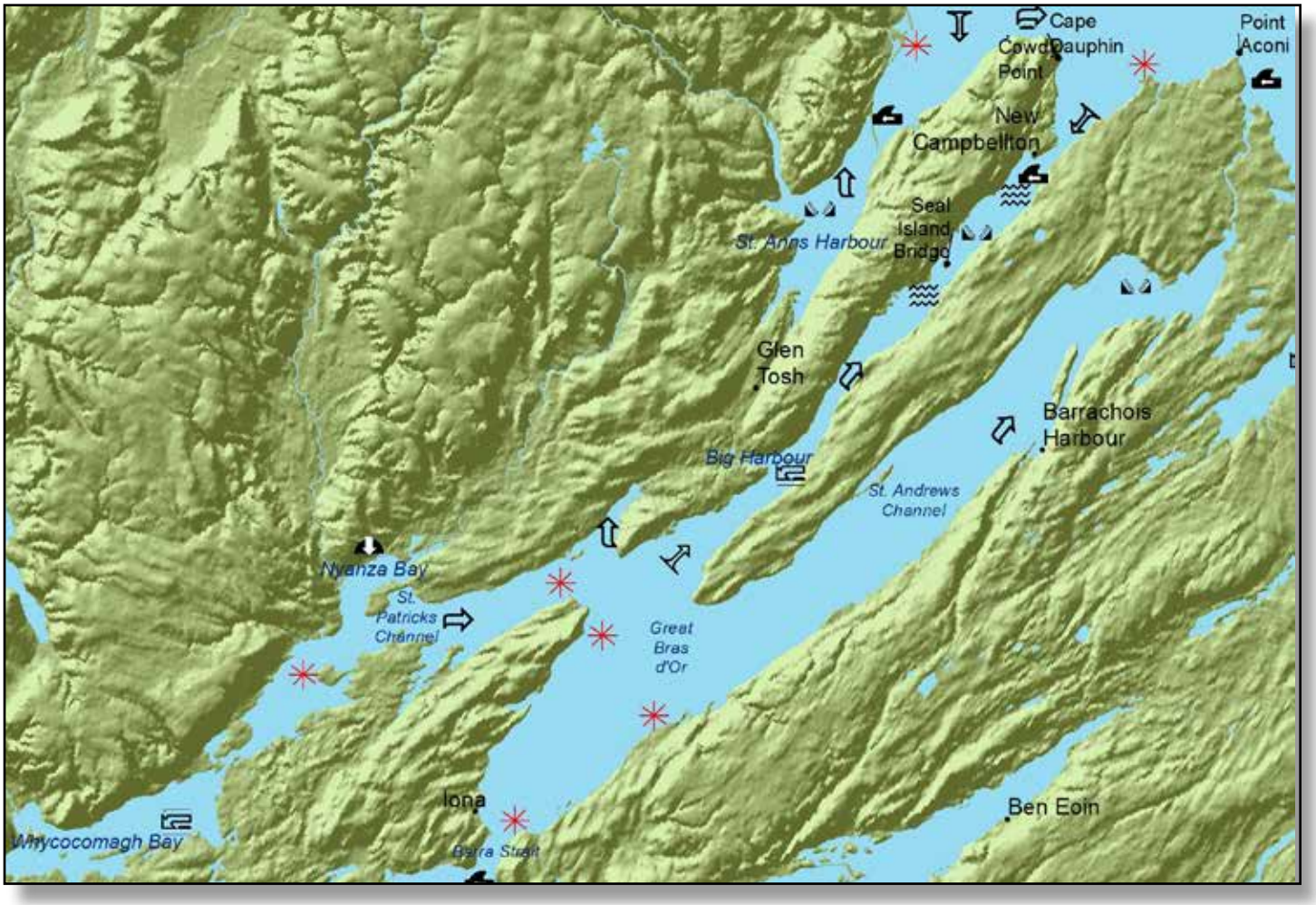
The larger reaches of Bras d'Or Lake allow for considerable sea formation during high winds, with short, steep waves sometimes developing over the shallower waters. Gale-force north-northwesterly winds can bring large waves to the southern shores during the fall and early winter. Crossing and often breaking seas occur where wave trains intersect after leaving the various bays and inlets. Smaller crossing seas have been reported to the lee of some islands in West Bay. The narrow, steep-sided St. Peters Canal—the southern entry point to the lake—is sheltered from all wind directions, except southwesterly and northeasterly. South-to-southwesterly sea breezes from the Atlantic affect St. Peters inlet and are often accompanied by fog.

5.2.2 Great Bras d'Or Lake

The Great Bras d'Or Channel is the main passage into the lakes from the north. Narrow and surrounded by high ground, its winds—predominantly southwest or northeast—are funnelled somewhat at both entrances. Normal tidal currents in the narrows near New Cambellton are 4-5 kt, with runoff reportedly increasing the seaward current to as much as 8 kt. These strong currents cause tidal rips and eddies—in particular, near the narrows and seaward to Black Rock. Steep, choppy seas can be hazardous in this area when the wind opposes the current.

On fine summer afternoons, a northeasterly sea breeze of 20-25 kt often blows into the channel. These breezes are strongest over the northeastern sections, up to Seal Island Bridge, but become noticeably weaker if they make it as far as Big Harbour. These winds are cold and sometimes bring fog up to Seal Island Bridge.

Channelling also occurs to a lesser degree in St. Andrews Channel and St. Patricks Channel. The former experiences some sea formation and shoaling in bad weather. Violent westerly and northwesterly winds can develop in the farther reaches of St. Patricks Channel due to mountain waves from the high ground to the north. In the evenings, gentle katabatic winds can flow through the river valleys leading into Nyanza Bay. A northeasterly wind blowing through St. Anns Harbour continues through the valley past Glen Tosh and into Baddeck Bay. The winds seldom exceed 25 kt, but can cause sleepless nights on yachts moored in Baddeck Bay.



5.3 Cape Breton West

Most of this picturesque stretch of coastline is exposed to strong northwesterlies that bring large seas and swell ashore. In winter, as long as there is enough open water, these winds also bring snow streamers off the Gulf. The heaviest snowfalls occur from Inverness northward.

Sea breezes along this coast are mainly west or northwest. Where river valleys open to the sea, local sea breezes are often enhanced by anabatic winds moving up the mountainsides.

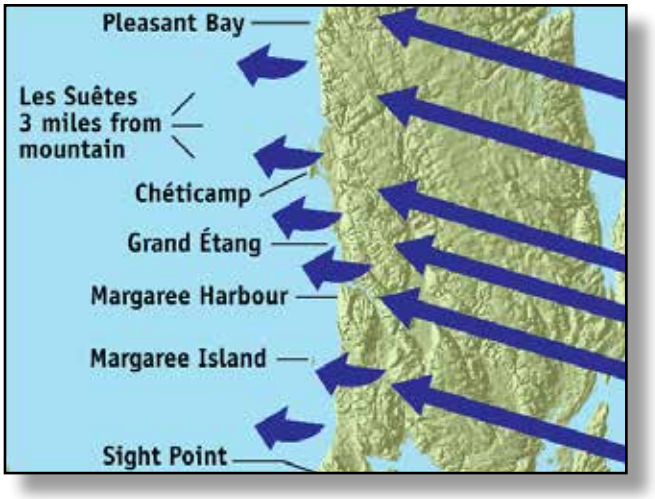
The steep terrain along this coastline makes for drainage winds and Arctic sea smoke at many places—notably, at Pleasant Bay, the mouths of Sailor Brook (in Sailor Cove), Blair River (in Polletts Cover), Fishing Cove River, and Corney Brook.

Local conditions in this area are covered in two parts: Cape North to Margaree Island, and Margaree Island to Port Hastings.

5.3.1 Cape North to Margaree Island

Along most of this coastline, westerly winds are redirected to southwesterly by the high terrain. Seas become confused when sea and swell from the west meet these southwesterlies near the coast. Coastal convergence and cornering create a significant effect at Cape St. Lawrence, where southwest winds are never light and are often twice as strong as they are over the Gulf. This convergence of southwesterlies is usually noticeable as far south as Presqu'ile.

Perhaps the best-known and most significant local effects in the Maritimes are the violent southeasterly winds known as "les suêtes", which develop near Chéticamp. These powerful winds, caused by mountain waves that develop off the highlands of Cape Breton, reach their maximum surface speed about 5 km from the mountain peak. In such cases, they are usually double the strength of the winds further up the coast.



The stretch of coastline between Pleasant Bay and Sight Point is affected by violent winds known as "les suêtes", caused by mountain waves that develop off the Cape Breton Highlands.

Did You Know?

The Environment Canada Meteorologists in Atlantic Canada have been issuing special inland and marine warnings for les suêtes since 1992. Since the early 1990s, meteorologists have come to recognize signs of these violent winds and learned to forecast them accurately and well in advance. In March 1993, during what was dubbed the "Storm of the Century", les suêtes at Grand Étang exceeded 125 kt and ripped the roof off the Chéticamp hospital.

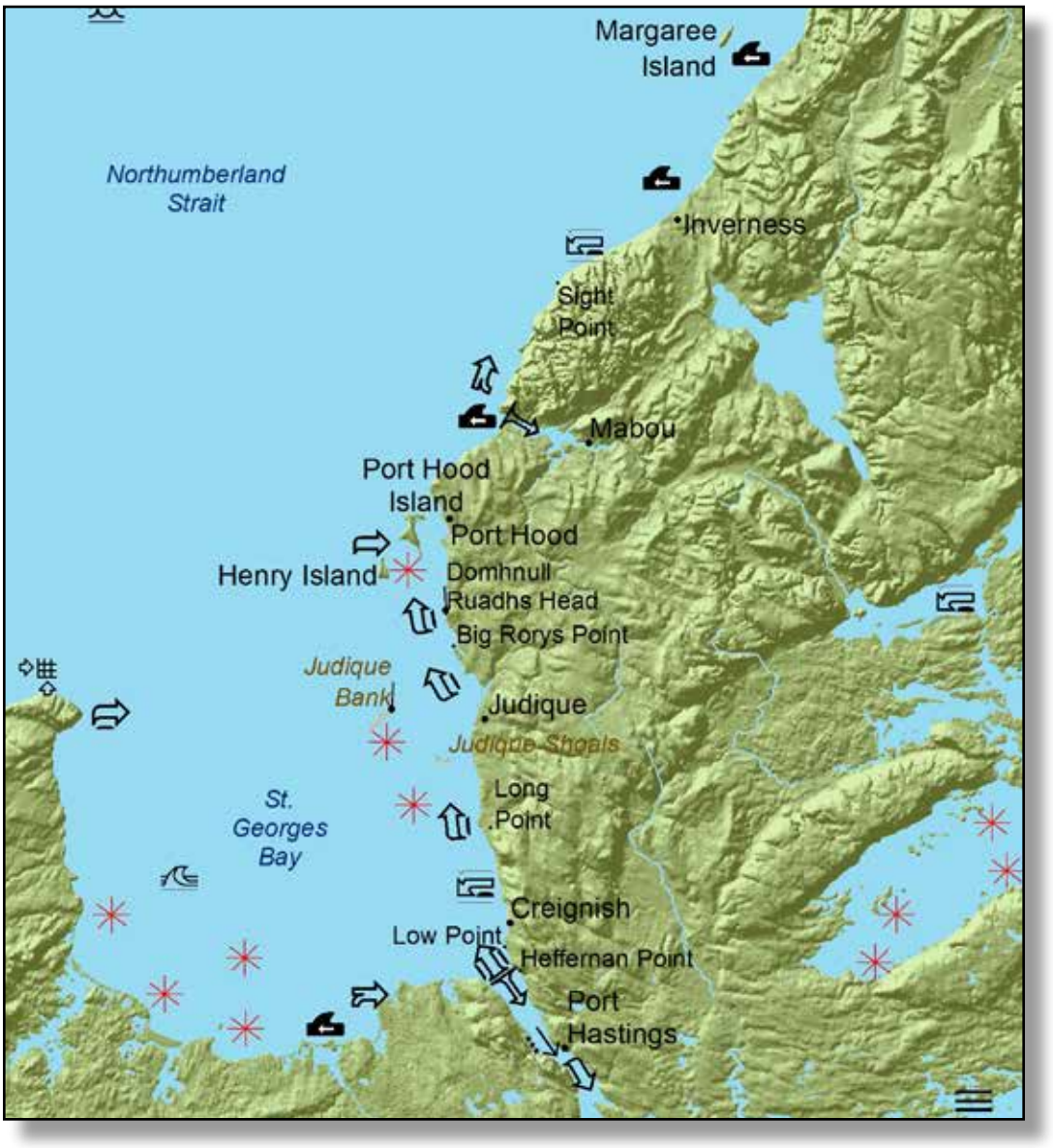
Mariners' Tips:

A rough sea develops in Margaree Harbour when winds oppose the current, especially during run-off, when freshwater currents in the harbour are significant.

5.3.2 Margaree Island to Port Hastings

Along this coastline, westerly winds are redirected to southwesterly by the high terrain. Port Hood is sheltered from the west by Port Hood Island, Henry Island, and the reefs between them and is partially protected from the northwest by breakwater. Exposed to the south, however, it receives heavy seas in sustained southerly or southwesterly gales.

Northwesterlies are channelled between Port Hood Island and Henry Island, creating steep and confused seas in the shallow water between them. Southerlies are strengthened by coastal convergence along most of the coast, from Port Hood to Low Point. Cornering increases this effect off some prominent headlands, such as Domhnull Ruadhs Head, Big Rory's Point, and Long Point.



6. The Northumberland Strait

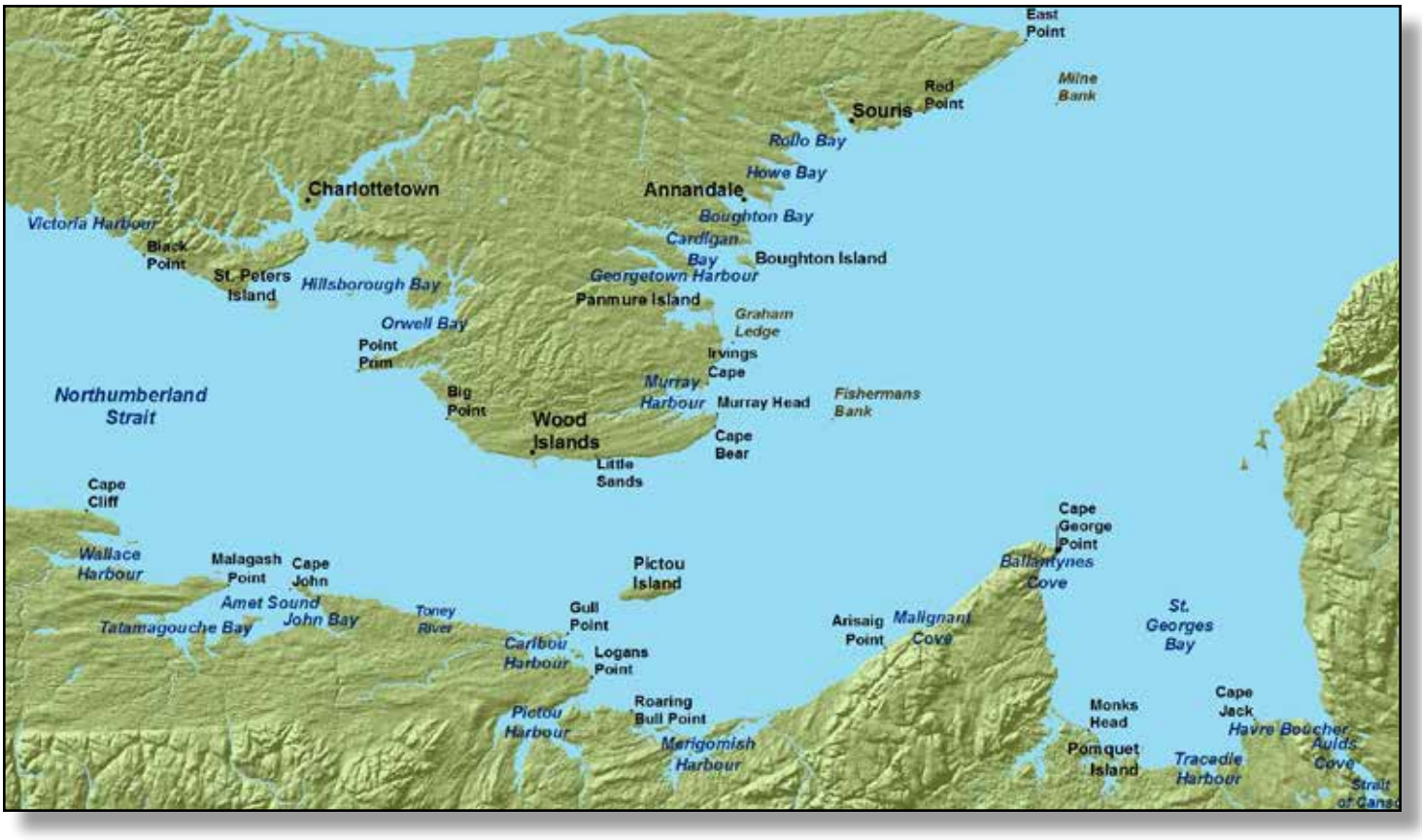
The information in this section is focused on the two main areas of the Strait: Northumberland East and Northumberland West.

6.1 Northumberland East

Warm water temperatures along this coast can lead to marine hazards in late summer and fall. Squall lines sometimes occur, and waterspouts are often sighted. Fog is not as common here as in other Canadian Atlantic waters, since the air brought by southerly winds dries out somewhat as it crosses Nova Scotia. Sea breezes along the north shore of Nova Scotia tend to be northeasterly and are limited to otherwise calm, sunny days. They occur from about midday to near dusk.

St. Georges Bay and the eastern part of Northumberland Strait are open to a long fetch from the northeast, since there is no land to block wind or sea all the way to the Strait of Belle Isle. Sustained northeasterly winds bring heavy seas. Fishermen report that northeasterlies also reduce the lobster catch, as the large swells disturb the sea floor.

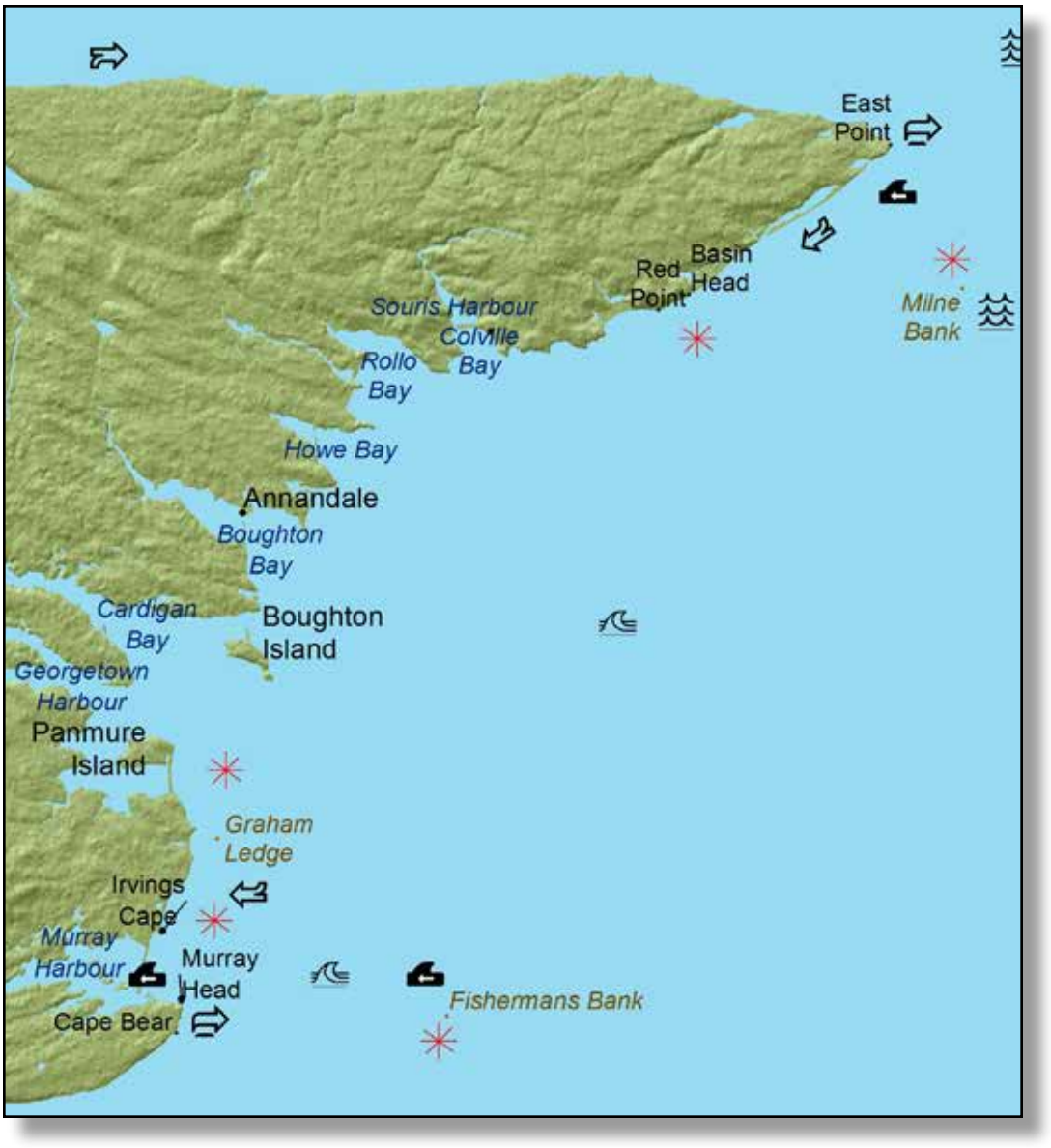
Local conditions are grouped under three geographic areas: East Point to Cape Bear Head, Prince Edward Island (PEI); Aulds Cove to Merigomish Harbour, Nova Scotia; and Pictou Island, Nova Scotia, to Victoria Harbour, PEI.



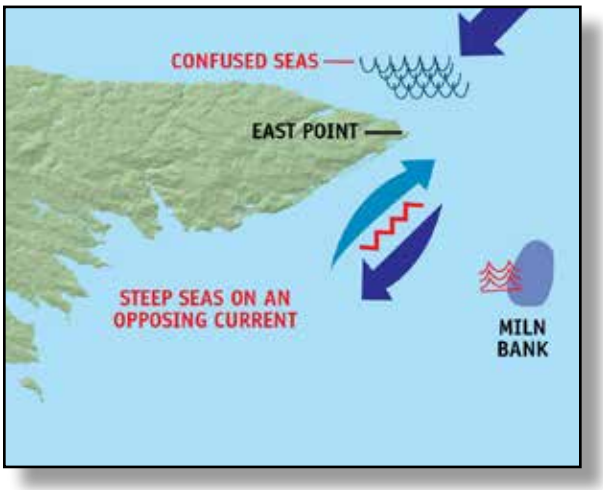
6.1.1 East Point to Cape Bear Head, PEI

There are many harbours and bays along this stretch with narrow, shallow entrances. While this shelters them from seaward-blowing winds, it affords little protection from onshore winds and makes them difficult to enter. The channel into Murray Harbour is sometimes impassable in easterly winds because a line of breakers sets up over the shallow waters across the mouth of the harbour. The channels in all of these harbours are subject to rapid silting and shifting, so navigational aids marking the best route may be moved without advance notice.

East Point is possibly the most dangerous coastal location around PEI. Winds blowing from anywhere between northwest and northeast are strengthened by cornering near the point, the greatest effects of which are usually felt within 8 km of the point, but may extend



halfway across Northumberland Strait. These winds frequently blow against the tidal stream, increasing the seas. The worst combination is a northeast wind against an ebbing (northeast-going) tide, particularly over the shoal water, which extends more than 1.5 km east of the point.



One of the most dangerous coastal locations around PEI, East Point experiences strong cornering effects and rough seas, as winds often blow against the tidal stream. Conditions are particularly bad over the offshore shoals east of the point.

Breakers caused by easterly winds at the shallow entrance to Murray Harbour sometimes make the area impassible.

Mariners' Tips:

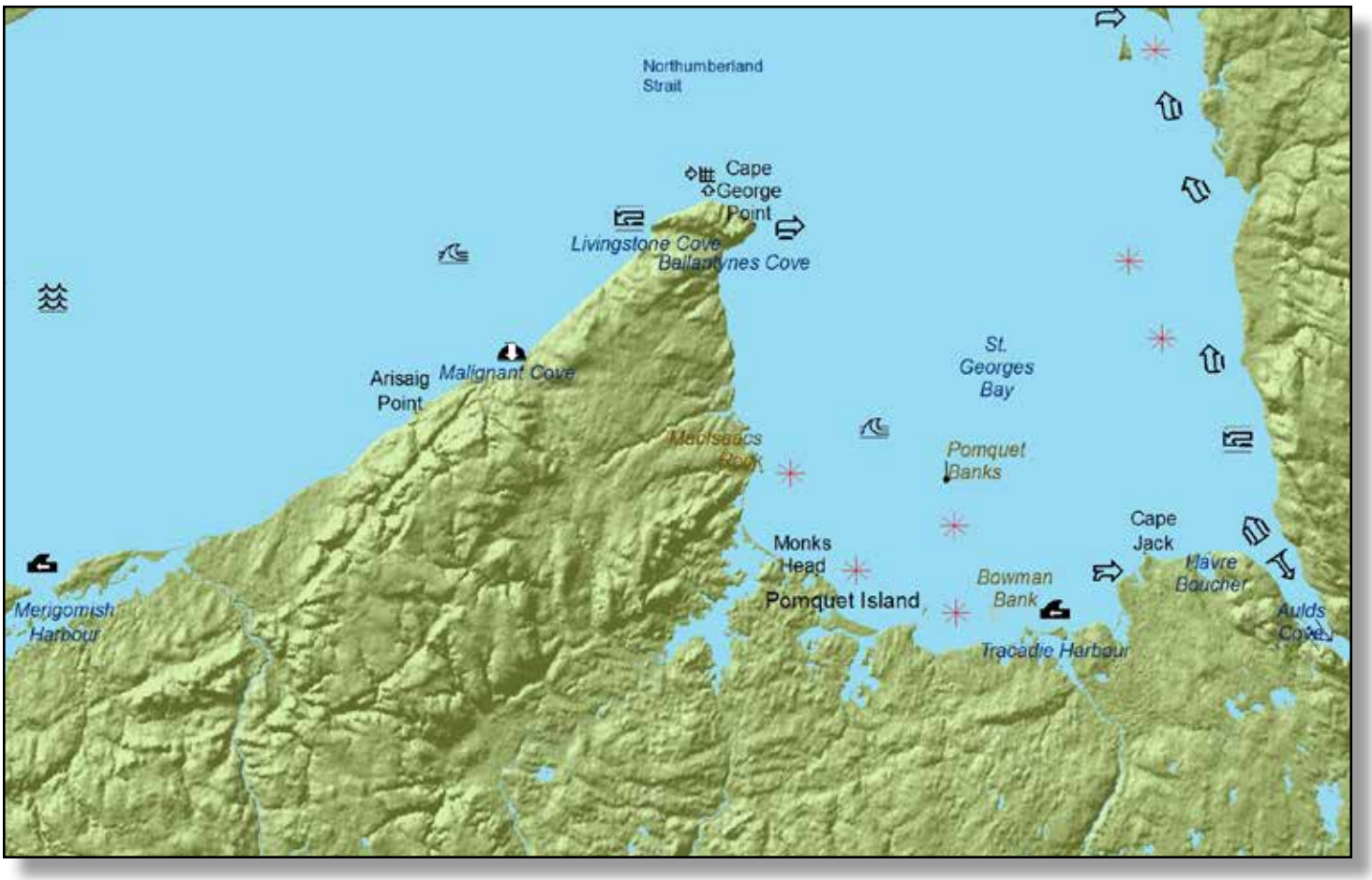
Souris Harbour, with its deep entrance, is a safe haven for rest, as it is easy to enter under almost all weather conditions.

6.1.2 Aulds Cove to Merigomish Harbour, Nova Scotia

The Strait of Canso is surrounded by high terrain that causes considerable funnelling and channelling. These effects are most pronounced in northwesterlies, which can blow much stronger in the Strait than in St. Georges Bay. This effect occurs as far out as 3-5 km from the North Canso Light but is strongest south of it.

Prevailing southwesterlies on summer afternoons blow very heavily off the land along this stretch of coastline. Instability from daytime heating creates strong, gusty winds that carry offshore for a few kilometres before diminishing to lighter, steadier values.

The eastern localities of northern Nova Scotia are more vulnerable to large waves than anywhere else along the Northumberland Strait. A long fetch to the north and northeast allows the fully developed seas of the Gulf of St. Lawrence to enter the Strait. Mariners in this area note that "nor'easters" make for terrible conditions.

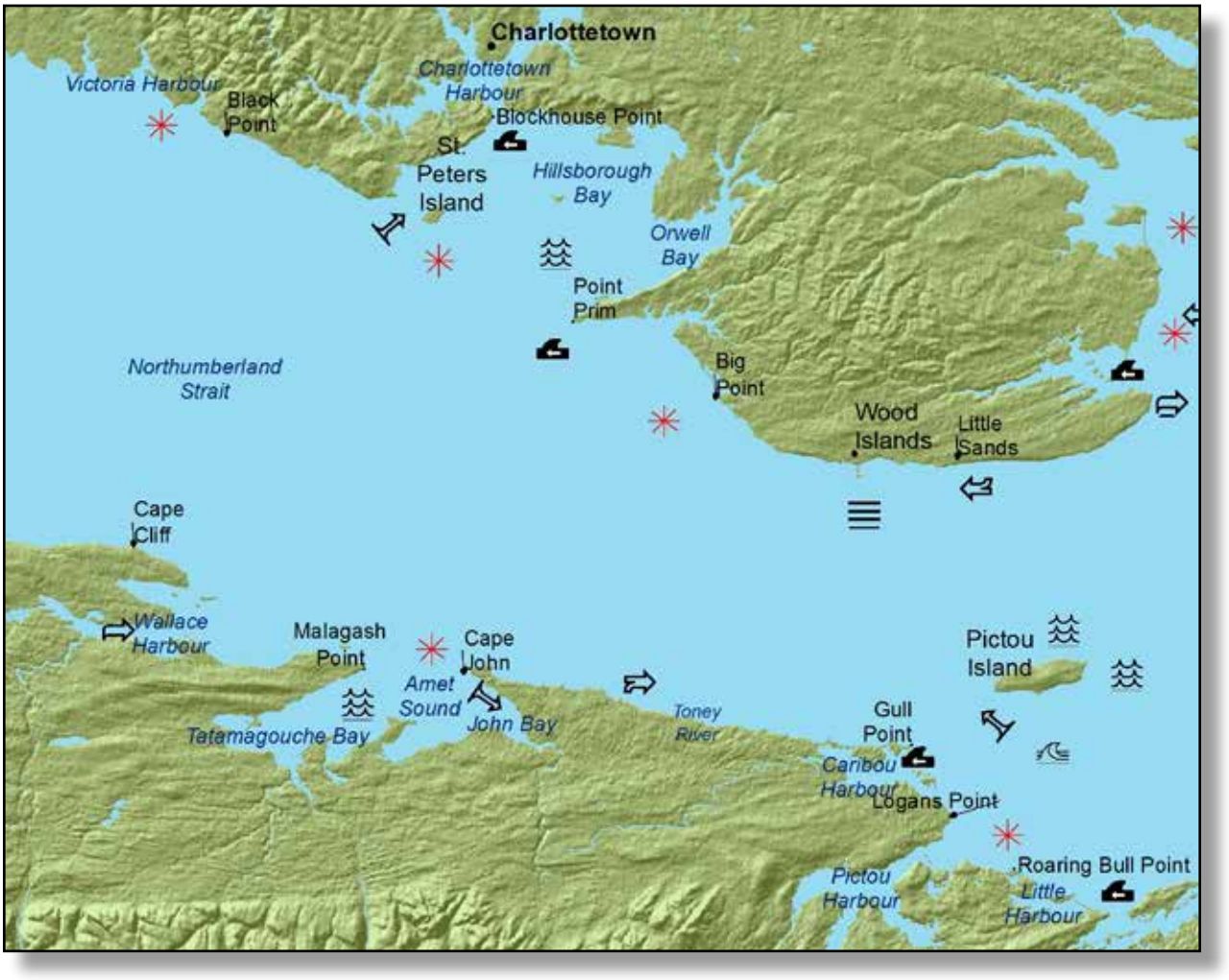


Mariners' Tips:
Northwesterly winds can develop very quickly in the wake of a passing storm. Since they start in the west and spread east, mariners can forecast their arrival by heeding observations from locations upstream. For example, when winds increase in Arisaig Harbour (about 40 km due east of Caribou Point), the boats fishing further east in St. Georges Bay are warned by radio, so they have time to retrieve their gear.

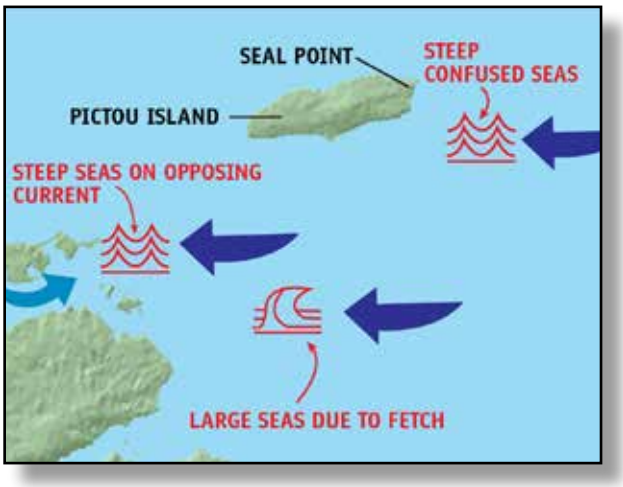
6.1.3 Pictou Island, Nova Scotia, to Victoria Harbour, PEI

In summer, westerly winds are often much weaker along the south shore of PEI than they are along the southern side of the Strait, near the coast of Nova Scotia. This discrepancy is caused by coastal divergence along the shore of the island.

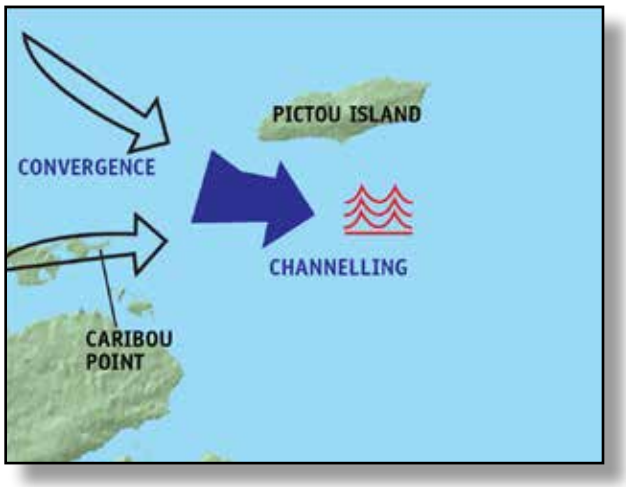
The area around Pictou Island is well known for poor sea conditions, and its eastern end becomes quite rough in easterly winds. Although shoaling is not severe, the waves tend to be larger, due to a lengthy fetch with easterly winds. A reef extends from Seal Point, with



deep water on either side. Westerlies funnel between Caribou Point and Pictou Island, strengthening the wind, while the shallow water causes steep, confused seas that are exacerbated by tidal currents around the island. Currents generally flow from the west and split into two branches along either side of the island.

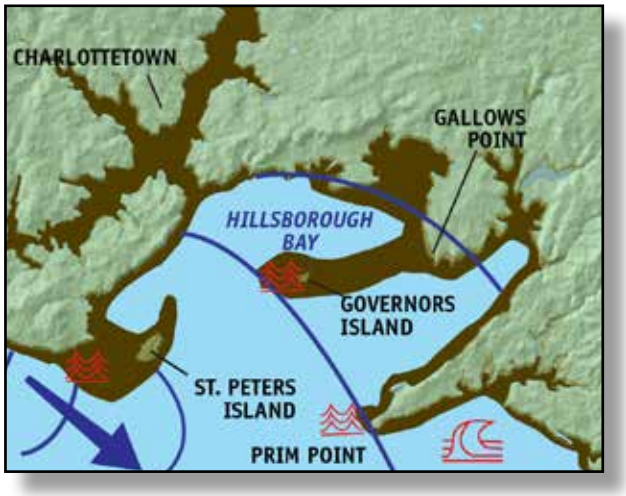


The sea state around Pictou Island can be challenging in easterly winds due to the added effects of funneling, tidal currents, a long fetch, and the presence of a reef off its easternmost tip.



Coastal convergence, funneling, and channeling strengthens the westerlies that flow between Caribou Point and Pictou Island, causing steep, confused seas over the shallow waters near the island.

In Charlottetown Harbour, northeasterly winds are stronger along the southeastern side of St. Peters Island, due to cornering effects. West-to-southwest winds blow over a substantial fetch from Baie Verte and can bring heavy seas into the eastern part of Hillsborough Bay. These seas affect the coast from Gallows Point to Prim Point and the Bay seaward of Governors Island. When northwesterlies are blowing the full length of Northumberland Strait, the swell will refract into these sections of coast. Conditions can become hazardous because of the many shoals and reefs in Hillsborough Bay.



The winds in Charlottetown Harbour are influenced by the topographical effects of its islands and points. Rough waters can be experienced along the coast from Gallows Point to Prim Point and on the seaward side of Governors Island, with conditions in Hillsborough Bay made more dangerous by its many shoals and reefs.

6.2 Northumberland West

These waters enjoy some of the warmest summertime sea-surface temperatures in the Maritimes. Although this means the area gets little fog, warm water also has its drawbacks. Summer thunderstorms moving from New Brunswick often die out upon reaching the cold waters of the Bay of Fundy or the Gulf of St. Lawrence, but they stay active over the warm waters of the Northumberland Strait—creating hazardous conditions for ships.

The varied stretches of coastline in this area are discussed in four short sections: Borden to Cape Egmont, PEI; Pugwash Harbour, Nova Scotia, to Cocagne Island, PEI; Baie De Bouctouche to Point Escuminac, New Brunswick; and Red Head to North Cape, PEI.

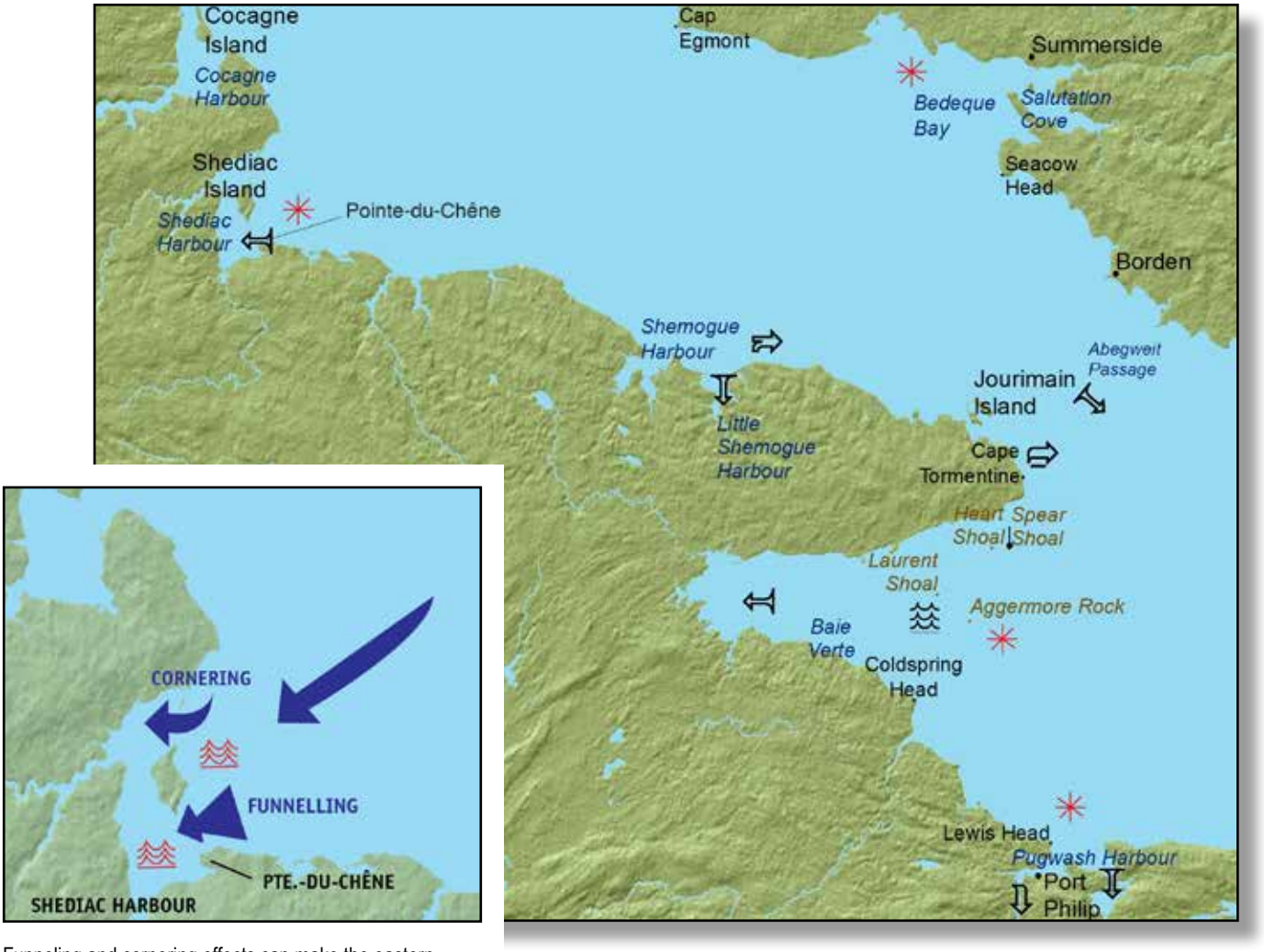
6.2.1 Borden to Cape Egmont, PEI

Northumberland Strait narrows in Abegweit Passage, between Borden and Cape Tormentine. Northwest and southeast winds are funnelled and channelled through this gap, where the wind speed can be 30 kt faster than it is over the rest of the Strait.

6.2.2 Pugwash Harbour, Nova Scotia, to Cocagne Island, New Brunswick

Baie Verte experiences strong southwesterly winds that blow in from the Tantramar Marshes, causing very choppy conditions along the shore. Easterly winds can also bring rough seas into the bay. These effects are compounded by shoal water in locations such as Aggermore Rock, Laurent Shoal, Spear Shoal, and Heart Shoal.

Very shallow water makes the approach to Shediac Harbour from the east dangerous, except for small craft. Northeast winds are funnelled as they enter Shediac Bay and bring particularly rough seas to the shoals around Pointe-du-Chêne.



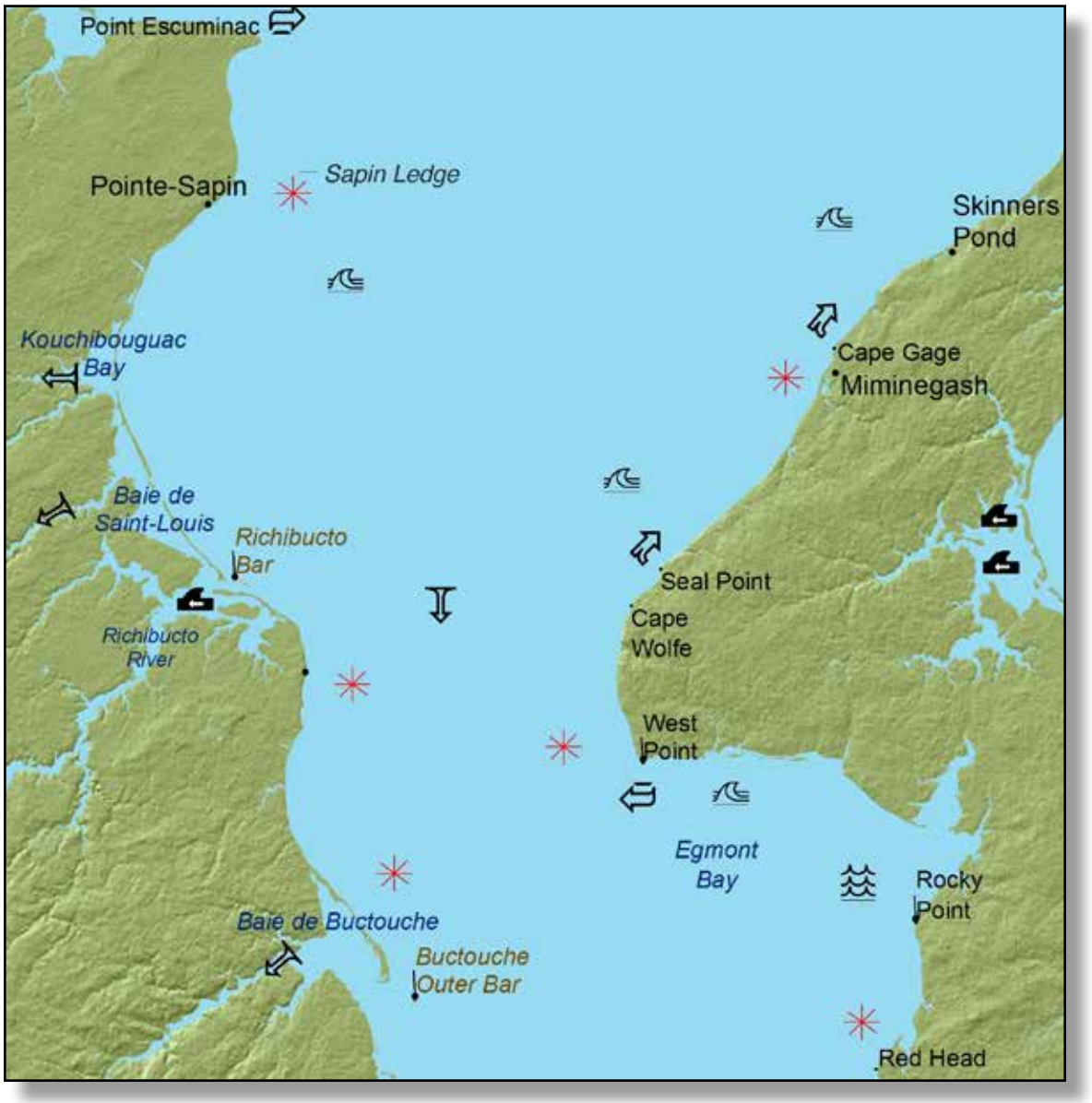
Funneling and cornering effects can make the eastern approach to Shediac Harbour extremely rough, in particular over the shoals near Pointe-du-Chêne.

6.2.3 Baie de Bouctouche to Point Escuminac, New Brunswick

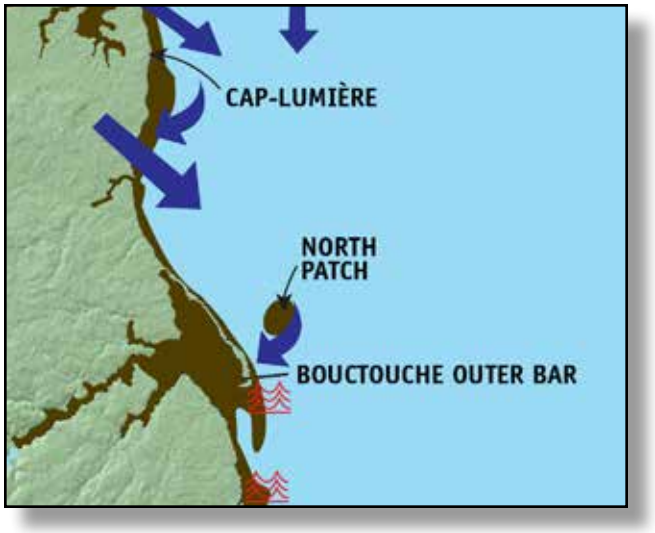
The coastline from Richibucto to Point Escuminac is exposed to northeast winds. Conditions can become dangerous due to shallow water and irregular seas. The highest seas are at Sapin Ledge.

6.2.4 Red Head to North Cape, PEI

Egmont Bay, between West Point and Cape Egmont, provides good anchorage with offshore winds. Maximum fetch is with southwesterly winds, which can create choppy conditions. Southerly winds may be stronger near Red Head and Rocky Point due to cornering and coastal convergence.



The funnelling of northerly winds at the northern entrance to the Northumberland Strait is felt most strongly just east of Cap Lumière, where the winds create breaking seas in the shallow waters to the south.



Breaking seas occur in the shallow waters to the south of Cap Lumière as a result of the strong funneling effects on the winds near the cape.

7. New Brunswick and Prince Edward Island–North

This section focuses on local effects in two areas: New Brunswick North and Gaspé, and Prince Edward Island North.

7.1 New Brunswick North and Gaspé

The Bay of Chaleur is the largest bay in the Gulf of St. Lawrence. It has no detached shoals, except near the coast, and its deep water gradually becomes shallow towards its head. The area west of Cape D'Espoir is sheltered from most winds, but those coming from the west or northwest can be a problem in the fall. Cold air moving over relatively warm water can very quickly bring storms from the west or northwest—and what initially looks like a squall may last 12 to 48 hours.

More detailed information on local effects is grouped under three areas: Miramichi Bay to Miscou Island; Bay of Chaleur (West); and Bay of Chaleur (East).

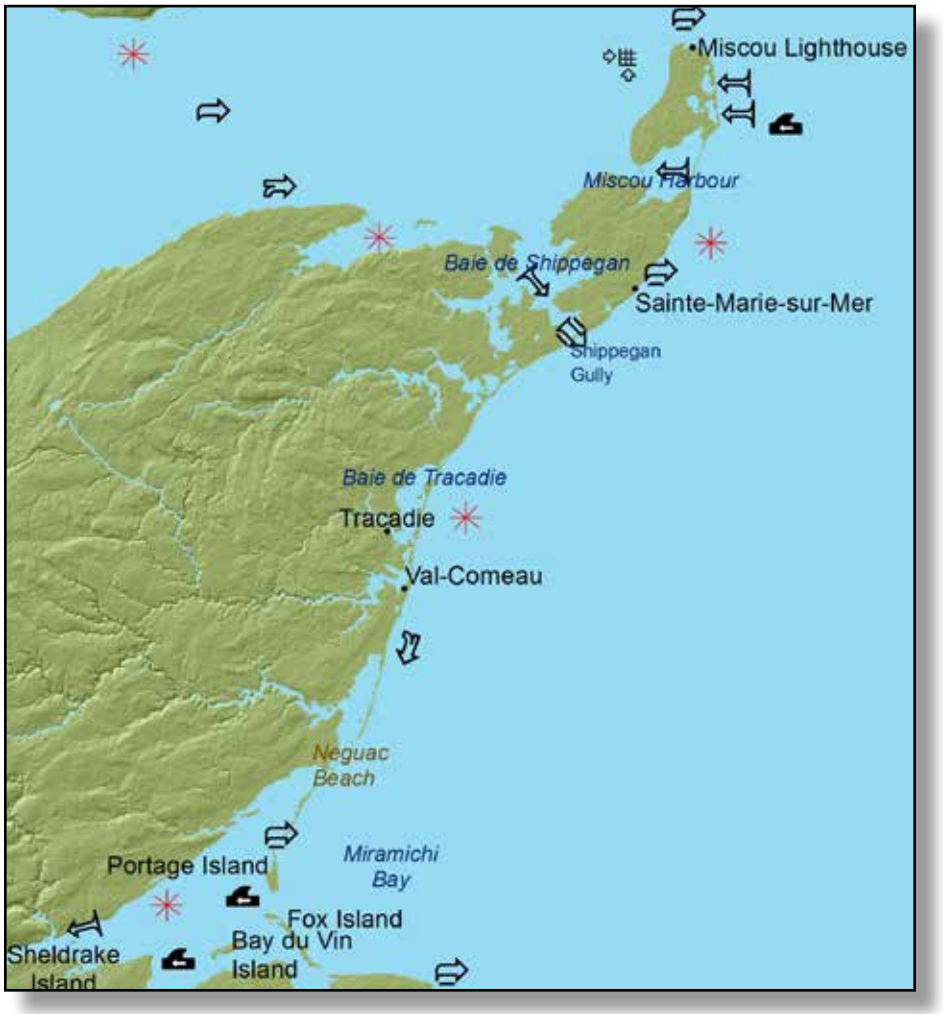
Did You Know?

Tragedy struck Miramichi Bay on June 20, 1959, when a powerful storm brought northeasterly winds and stirred up huge waves and a storm surge, causing extensive coastal flooding and damage on land. Many ships in the fishing fleet that were out that night were destroyed, with 35 lives lost. Some survived by sailing into deeper water and facing into the waves.

7.1.1 Miramichi Bay to Miscou Island

The ebb current flowing out of Miramichi Bay can reach 3.5 kt between Fox Island and Portage Island. Steep seas develop in the area when an east-to-northeast wind runs against the tide. The coast from Neguac Beach to Miscou Lighthouse is exposed to winds and seas from the northeast to southeast. Serious storm-surge conditions occur there in persistent northeast gales, with seas steepening and breaking in the shallow waters off the coast.

Access to the area off Val-Comeau can be restricted by onshore winds and seas. Off Tracadie, there are strong southeast winds and the seas are dangerous. Along eastern Miscou Island, and south of it, very hazardous seas develop, causing sand dunes to shift. After each storm, the dunes must be relocated and the buoys moved to mark the safe passage. Sea breezes along this coast are generally northeast to east, but this varies in bays and inlets.



7.1.2 Bay of Chaleur (West)

Easterly winds become funnelled in the western end of the Bay of Chaleur. This effect produces choppy waves, especially when the wind blows against an ebb tide combined with outflow from the Restigouche River. The high ground of the Gaspé Peninsula makes coastal areas along the north shore of the bay prone to drainage winds and Arctic sea smoke in winter.

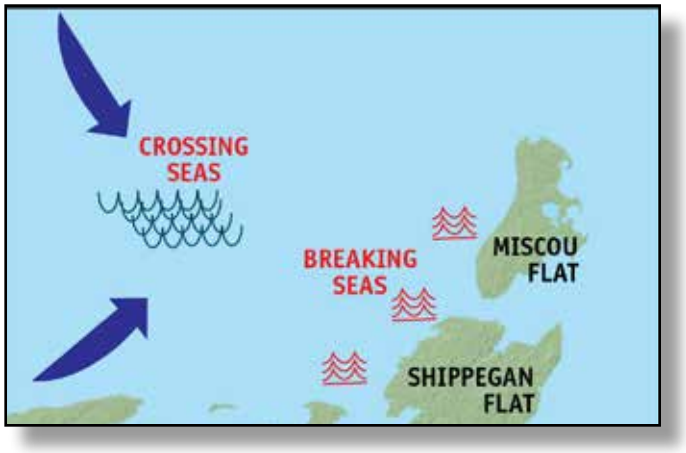
Mariners' Tips:

The marine forecast for the Chaleur-Miscou area usually reflects conditions at the mouth of Bay of Chaleur and over open water. Conditions are often considerably better in the inner bay than the forecast indicates.

7.1.3 Bay of Chaleur (East)

Under certain conditions, lee waves develop off the mountains of Gaspé in northwesterly flows. These winds can vary greatly in speed and direction and cause strong northwesterly gusts. This effect is experienced in the inner bay and along the north coast of the outer bay, to the tip of the Gaspé Peninsula.

The area west of Miscou Island can be dangerous. When winds are generally northwest in the Bay of Chaleur, the coastline along the south steers waves towards the northeast. These waves meet the wind-waves coming from the northwest, creating crossing seas. The condition is worsened by shallow water, especially over Miscou and Shippegan flats.



Crossing seas caused by the convergence of wind-driven waves can cause dangerous conditions west of Miscou Island, particularly over the shallow waters near its flats.

7.2 Prince Edward Island North

Prince Edward Island lies in the southwestern part of the Gulf, where the water is shallower. The water temperature varies considerably over the course of the year as a result, reaching the freezing point early in winter and becoming quite warm in summer. Fog is less frequent here than elsewhere in the Gulf, especially in summer, partly because of the warmer water-temperatures and partly because the southwesterly winds are drier.

Sea breezes are more common in spring just after ice break-up, when the water is still cold. They become weaker and less frequent by mid- to late summer as it warms up. The waters around Prince Edward Island are subject to line squalls and waterspouts in late summer and fall.

Local effects along the coastline in this area are divided into two short sections: East Point to Tracadie Bay; and Cove Head to North Cape.

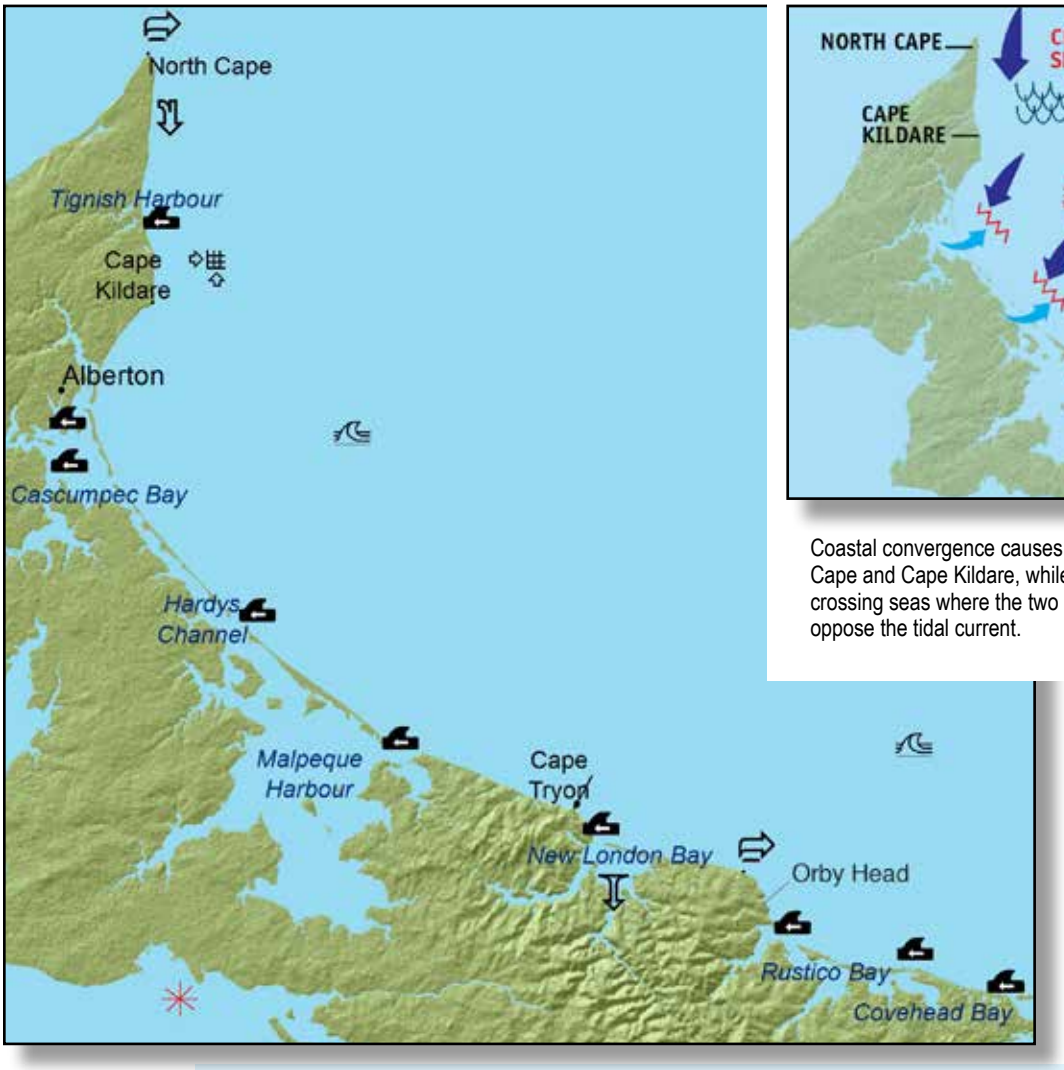
Mariners' Tips:
The many bays along this coast are connected to the sea by narrow channels. A great deal of water passes through these channels with each change in tide, so the currents near their entrances are very strong during spring tides. The sandbars usually found outside the channels have, themselves, shallow channels running through them that often shift in storms. At times, buoys, leading lights, and other markers must be moved to mark the safest route. In strong winds and heavy seas, it is often impossible to find these channels. Conditions are further aggravated by northwest-to-northeast winds and waves moving against the current.

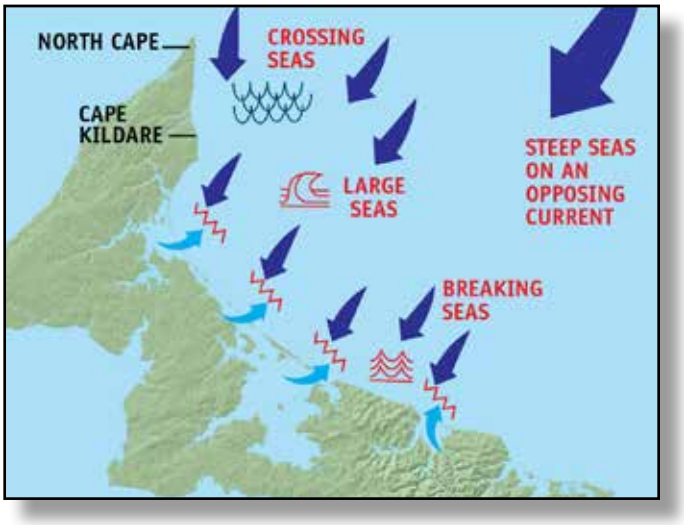
7.2.1 East Point to Tracadie Bay

Winds from any direction between northwest and northeast bring the heaviest seas onshore in this area. In many cases, the winds align with the coast and strengthen within 3-5 km of the shoreline due to coastal convergence. This occurs from East Point to Rustico Island with winds from between west and northwest.

7.2.2 Cove Head Bay to North Cape

Coastal convergence also occurs with northwesterly winds between Orby Head and Alberton, the effects of which may be strengthened by cornering near Cape Tryon. Winds from between north and northeast bring maximum seas onshore between Rustico Island and Alberton, making the coast dangerous between Cape Tryon and Cape Aylesbury. Winds from between north and northeast are subject to coastal convergence between Cape Kildare and North Cape, with northeast-to-east winds bringing maximum seas onshore along this coast.





Coastal convergence causes strong winds just offshore between North Cape and Cape Kildare, while strong northeast-to-east winds cause crossing seas where the two meet and breaking seas where they oppose the tidal current.

Mariners' Tips:

In summer, when winds are most often southwesterly, sand dunes along the north shore of PEI provide some shelter. A sea-breeze circulation offsets the southwest winds, and the wind becomes nearly calm at the coast. This is deceptive to board and dinghy sailors, who set off from the beach only to encounter southwesterly winds a short way out. These conditions can make it difficult to return to shore.

8. Southeast Gulf

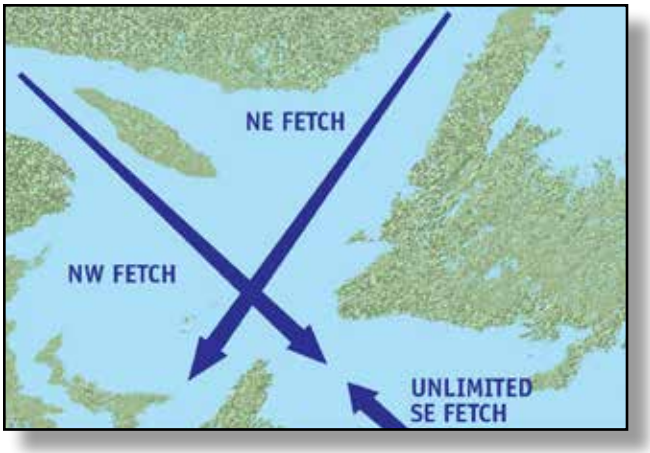
Local effects in the southeast portion of the Gulf of St. Lawrence are examined in two parts: the Cabot Strait and St. Paul Island, and the Magdalen Islands.

8.1 The Cabot Strait and St. Paul Island

The Cabot Strait is the main shipping entrance to the Gulf of St. Lawrence and all inland ports. A moderate current usually moves out of the Gulf near the Cape Breton side of the Strait and a weak ingoing current occurs on the Cape Ray side. These currents can cause choppy seas when they run against the wind and are affected significantly by sustained periods of wind.

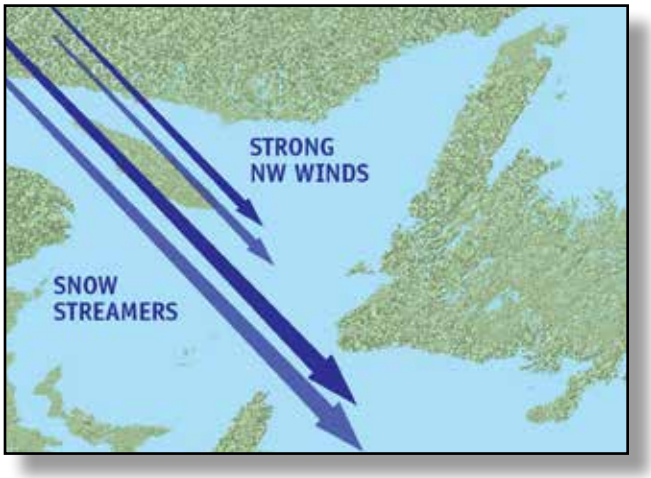
Ice usually moves into the Cabot Strait in late January, and most years there is considerable ice cover until mid-April. The ice continues to thicken as it drifts southeastward across the Gulf. Strong winds put the ice under pressure, especially along sections of coast where the winds are blowing onshore.

The Cabot Strait has one of the harshest climates in the region. It often remains ice-free in winter, yet water temperatures can drop below zero, creating freezing spray. The expanse across the Strait between Cape Breton and Newfoundland is wide enough to be open water. Similar to the Gulf of St. Lawrence on one side (in north-to-west winds) and to the Atlantic on the other (in south-to-east winds), it often experiences the worst of both worlds. The report from windy St. Paul Island is considered representative of wind conditions in the Strait.



Cabot Strait's exposure to very long open-water fetches allows extremely large seas to form there, making its waters among the roughest in Atlantic Canada.

The Strait is exposed to very long open-water fetches. From the northwest, it is open all the way to the Gaspé Passage (Détroit d'Honguedo), a distance of about 400 km. To the southeast, there is an unlimited fetch out into the Atlantic. The fetch from the northeast is limited in the Strait itself, but stretches to almost 400 km moving into the Gulf, toward the Magdalen Islands. These long fetches allow very large seas to form in the area and waves continue to roll long after the wind dies down. This is one of the roughest areas in Atlantic Canadian waters.



Snow streamers can develop in strong, cold northwesterlies in the fall and winter, affecting various areas in and around the Cabot Strait, depending on the direction of the wind.

In fall and winter, when there is enough ice-free water, snow streamers can develop in cold northwesterly winds, while the skies may be clear just a couple of kilometres away. The Gaspé Passage is a frequent source of these streamers, which can reduce visibility to almost zero in heavy snow. Depending on the wind direction, they can affect the Magdalen Islands and their surrounding waters, the waters downstream to the Cape Breton coast, Cabot Strait, or the Newfoundland coast. With a slight shift in wind direction, the streamers will move a few kilometres north or south.

The water around St. Paul Island deepens rapidly, as the island rises steeply from the ocean floor. Waves reflect off its cliffs, causing steep, confused seas that are compounded by variable currents.

Northwest winds are particularly strong off Northeast Point, due to cornering. The same effect strengthens east-to-southeast winds off Southwest Point. Atlantic Cove and South Martin Powers Cove are sheltered from west to northwest, but are exposed to east-to-southeast winds and seas. North Martin Powers Cove is sheltered from the east but is exposed to west-to-northwest winds and seas.

8.2 The Magdalen Islands

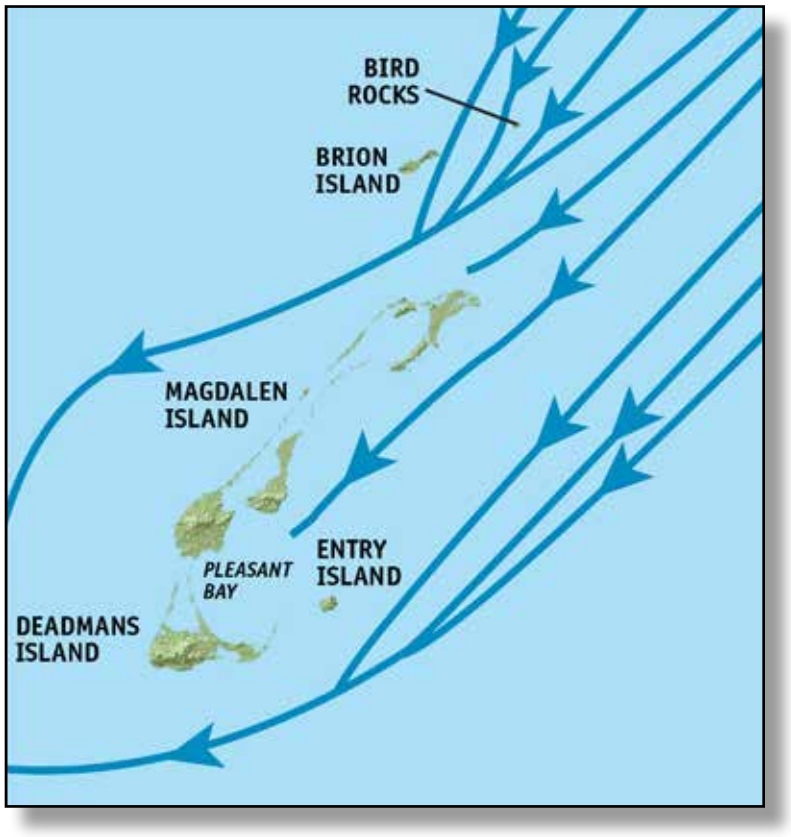
The water around the Magdalen Islands is cooler in spring and summer than the shallower waters of the southwestern Gulf. Air that has picked up a lot of moisture before reaching the islands becomes chilled by the cooler water, and frequent fogs result.

The main semi-diurnal tides of the Gulf of St. Lawrence rotate around the Magdalen Islands. This means that there is a small tidal range and, on the western side of the main islands, only one high and one low tide per day; however, around the islands, currents are quite variable in direction and speed.

Mariners' Tips:
The Magdalen Islands' large, enclosed lagoons offer an ideal and relatively safe haven for recreational sailing, especially board sailing. Sand dunes create an enclosed area, so there is little danger of being swept out to sea—except, possibly, near the entrance at ebb tide. The dunes are low enough to allow the winds of the Gulf to blow over the lagoons, creating near-perfect sailing conditions in summer.

The Magdalen Islands and their smaller, surrounding islands have many significant shoals—most of them on their eastern sides, where rough seas and breaking waves occur in strong easterly winds. In spring, northeasterly winds tend to dominate, their sustained onset coinciding with the end of the ice season. Waves generated by these strong northeasterlies split when they meet the shoals and pass the islands on both sides. This occurs fairly gently around the Magdalen Islands but much more dramatically around Bird Rocks, with hazardous crossing waves forming on the lee side of the rocks where the waves rejoin.

Shoals of note in this area are found about 1.5 km southeast of Pointe de l'Est; within 1.5 km east of Old Harry Point; extending from about 1.5 km southwest of Old Harry Point to Les Colombines, some 3 km southeast; and Alright Reef, which extends eastward just over 6 km from Cap Alright (see map on page 91).



Wind-driven waves separate when they encounter shoals and pass the islands on both sides. Where they rejoin after passing Bird Rocks, crossing waves create challenging seas.

Mariners' Tips:

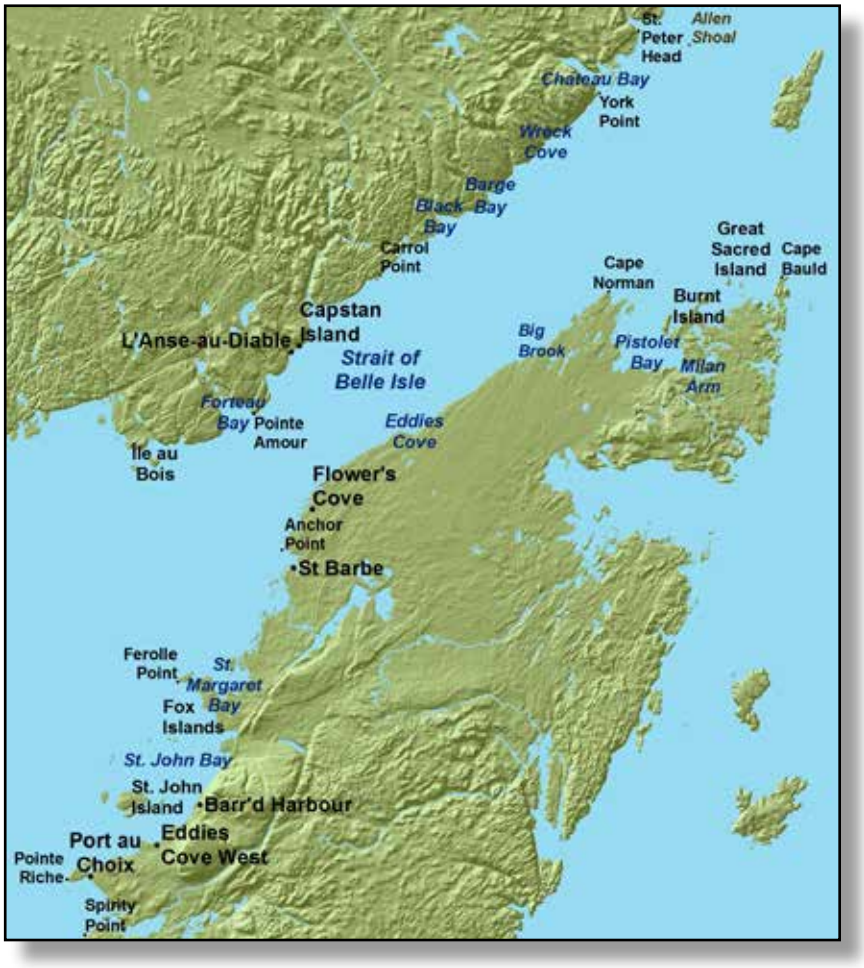
The Magdalen Islands provide some shelter on their leeward side, but the strongest winds are usually associated with moving storms. For example, strong southeasterlies usually accompany an approaching storm, while northwesterlies signal its departure. Since storms often intensify as they move, the northwesterly winds may be much stronger than the initial southeasterlies. This can make a once-sheltered location the most dangerous place to be. Follow the forecast and check "Sailing Directions" to anticipate changes in wind direction. Other harbours offer more secure shelter.

ATLANTIC REGIONAL GUIDE PART 3

9. Newfoundland West

This section covers local effects for the Belle Isle, Northeast Gulf, and Gulf-Port au Port regions of Newfoundland West.

9.1 Strait of Belle Isle



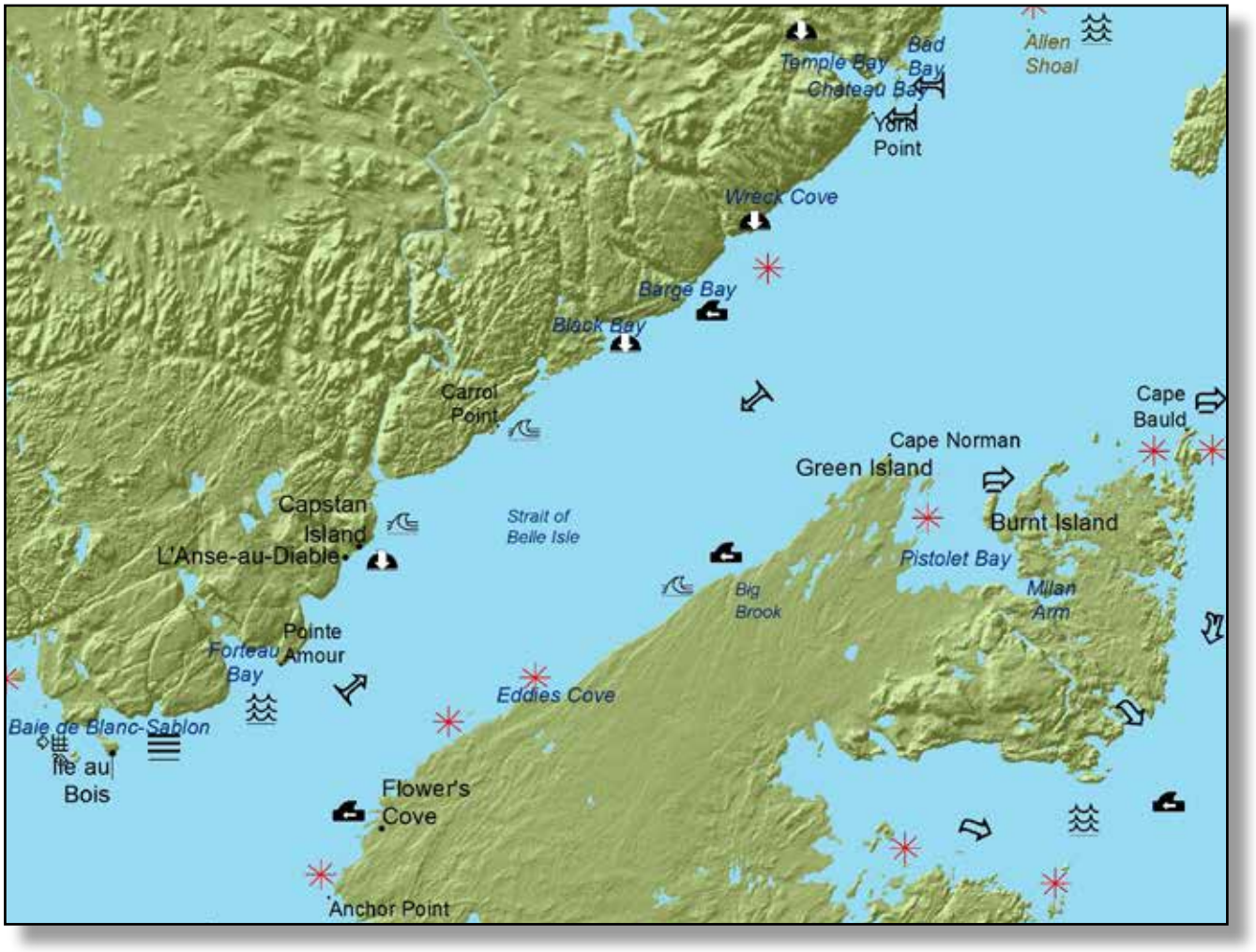
Winds tend to blow from the southwest or northeast along the axis of the Strait of Belle Isle. The larger waves associated with these wind directions are carried into the Strait from the Gulf of St. Lawrence and the Atlantic. Currents run back and forth with the tide, creating steep, choppy seas when the current runs against the wind. The choppiest conditions are usually encountered in the narrow part of the Strait.

Westerly winds produce flat seas on the Labrador side of the Strait and choppier ones on the Newfoundland side. The reverse is true for easterly winds. In summer, when warm southwesterly winds blow across the cooler water, the area is prone to fog, which pushes from the Gulf into the narrow confines of the Strait. An inflow of cold water on the Labrador side and an outflow of warmer Gulf water on the Newfoundland side makes average water temperatures on the north side of the Strait 4°C colder in July than they are on the Newfoundland side. As such, fog is more prevalent along the north coast.

This stretch of coastline is examined more closely in two parts: the Strait of Belle Isle, and St. Barbe to Spirity Point.

9.1.1 Strait of Belle Isle

The Newfoundland side of the Strait of Belle Isle is shallower than the Labrador side. Shoaling occurs at several places along the coast, and choppy seas develop near the coast from Cape Norman to Flower's Cove when the wind opposes the current.



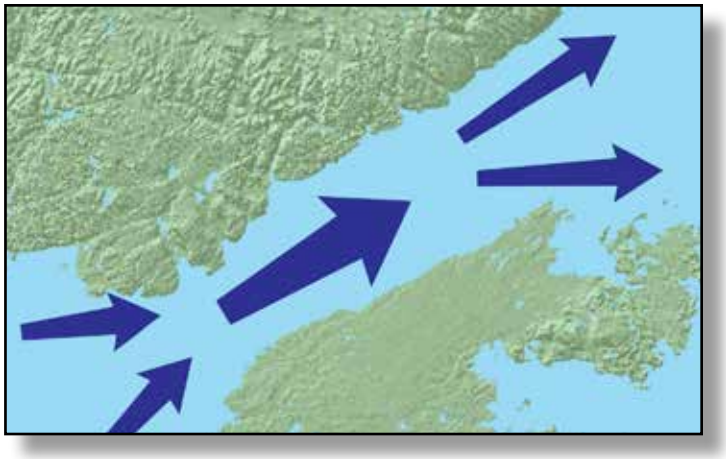
Mariners' Tips:

Steep hills line the Labrador coast along the Strait of Belle Isle, so katabatic winds commonly occur when the prevailing winds are light to moderate. While the offshore winds may be only 15 kt, winds blowing between the hills from the north or northwest can be funnelled into northerlies of 35-40 kt near the shore.

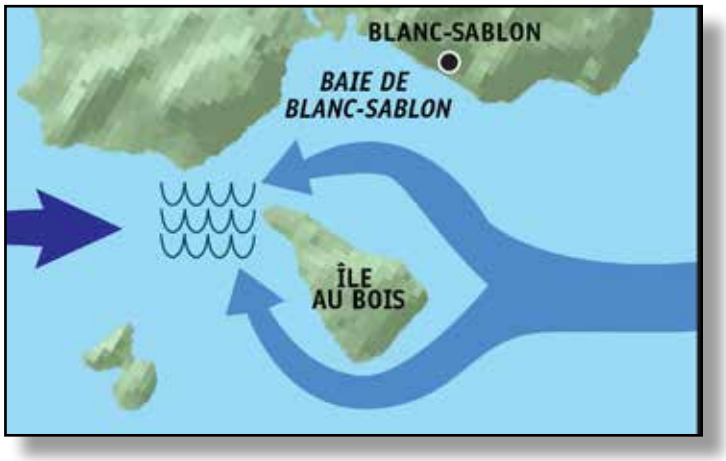
Funnelling increases the speed of certain winds flowing through the narrow part of the Strait. A west-southwest to south-southwest wind becomes southwesterly and increases in speed as it encounters the Strait. A similar effect strengthens north-northeast to east winds, which become northeasterly.

When there is an opposing wind, heavy seas occur northwest of Île au Bois where the west-going current converges after forking around the island. When it is foggy at nearby Blanc-Sablon, visibility will sometimes improve farther east, as the southwest winds that bring the fog will remain offshore over warmer water.

Katabatic winds produce strong northerly gusts at L'Anse-au-Diable that can be felt up to 2.5 km from the shore. A valley north of the area channels the air flow southward toward the coastal cliffs, causing winds of up to 25 kt at L'Anse-au-Diable and 40 kt at the cliffs, where frictional effects can also cause whirlwinds.



Funnelling increases wind speed through the narrow part of the Strait of Belle Isle.



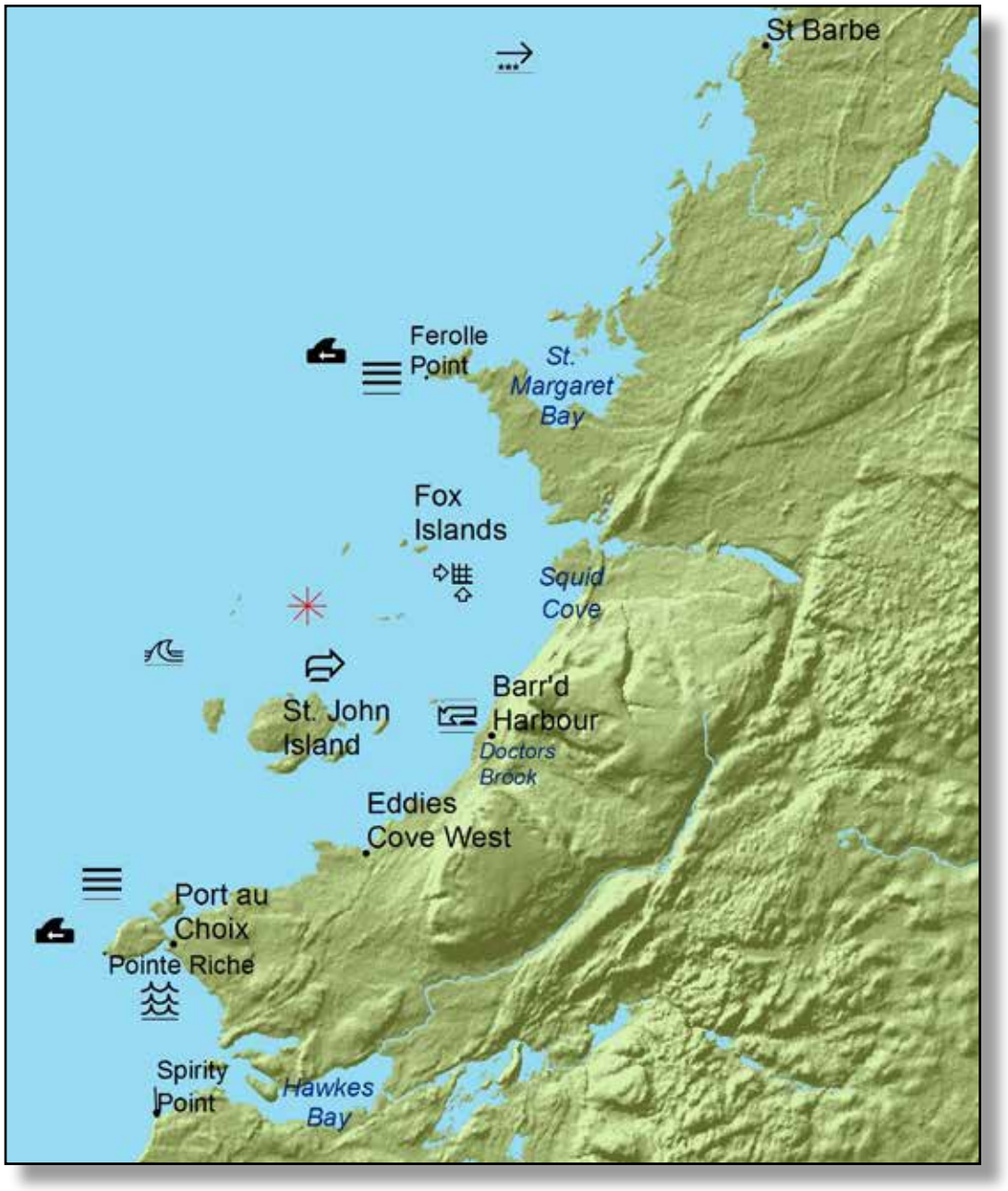
Heavy seas occur northwest of Île au Bois when the wind opposes the current. .

In a southwest wind, visibility is often better to the east when Blanc-Sablon is foggy.

Katabatic winds from the north cause strong, gusty winds off the coast of L'Anse-au-Diable and even higher winds and whirlwinds near its cliffs.

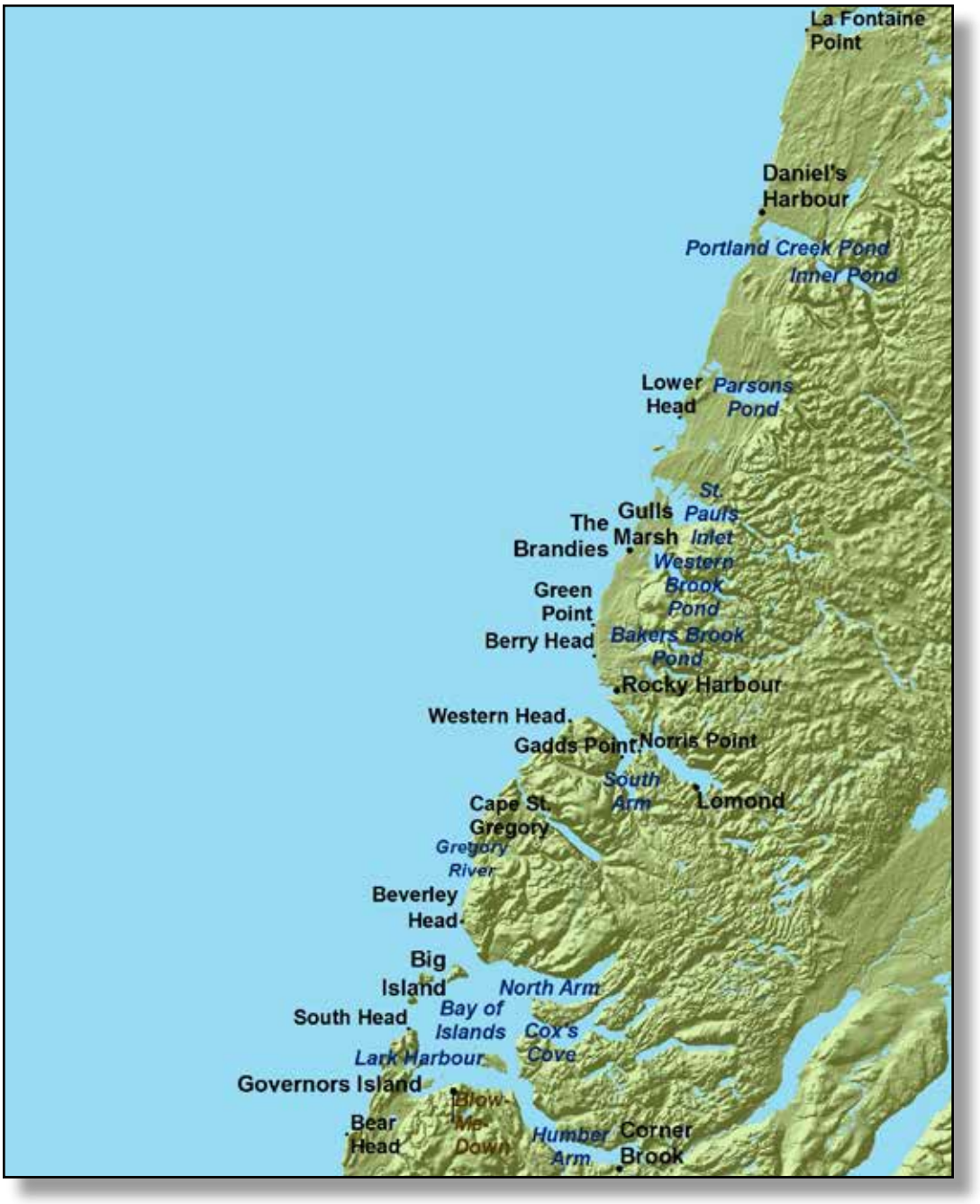
9.1.2 St. Barbe to Spirity Point

St. John Bay is a roughly semicircular bay between Ferolle Point and Pointe Riche, just southwest of Port au Choix. Its waters are generally less than half the depth of those just beyond it. Southwesterly winds, which have a long fetch over the Gulf of St. Lawrence, carry large seas into the bay, and waves become choppier as they cross its shallower waters.

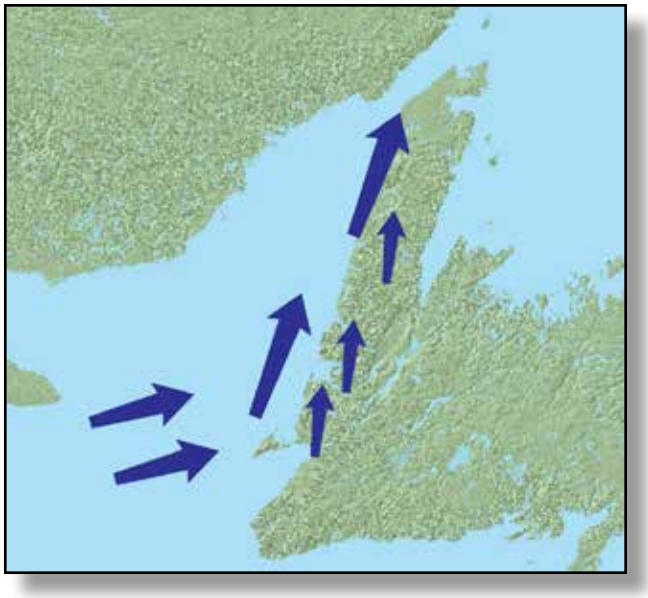


9.2 Northeast Gulf

The west coast of Newfoundland, below the Strait of Belle Isle, lies in a southwest-to-northeast line. Southwesterly winds undergo coastal convergence, creating a band of stronger winds. Over southern sections of the coast, the Long Range Mountains push these winds some distance offshore. In the north, the mountains are farther inland, so the stronger winds occur at the coast. This effect is observed along the entire west coast of Newfoundland, but is most prominent on this stretch of coastline.



Strong southeasterly winds—known locally as squalls but caused mainly by mountain waves—also occur at several places along this coast. Drainage and funnelling through the mountain valleys strengthen these winds, which are most common from November through May. Whirlwinds or "white winds" of 50-70 kt can accompany these squalls, raising swirling columns of water 2-10 m in diameter. White winds appear suddenly but last only a few seconds in one place; fishermen caught in them have compared them to a swirling waterfall.



Coastal convergence strengthens southwesterly winds along the west coast of Newfoundland.

Southwest-to-northwest winds over the Gulf generally cause the highest seas. If the wind is northerly, it will blow against the north-going current to create choppy seas. When there is enough ice-free water in fall and winter, westerly winds bring snow streamers. Most of this coastline receives significant snowfalls.

Weather conditions along the Northeast Gulf are examined in more detail for three geographic areas: La Fontaine Point to Gulls Marsh; Bonne Bay; and Bay of Islands.

Mariners' Tips:

Local fishermen know that fog at the base of the mountains is a sign that strong southeasterly winds or "squalls" will begin in a few hours. As cold air starts to drain down the mountainside and flow through the valleys, it mixes with the moist air over ponds to create fog at the base of the slope. White water is also visible over the ponds a few minutes before the gusts reach the coast.

9.2.1 La Fontaine Point to Gulls Marsh

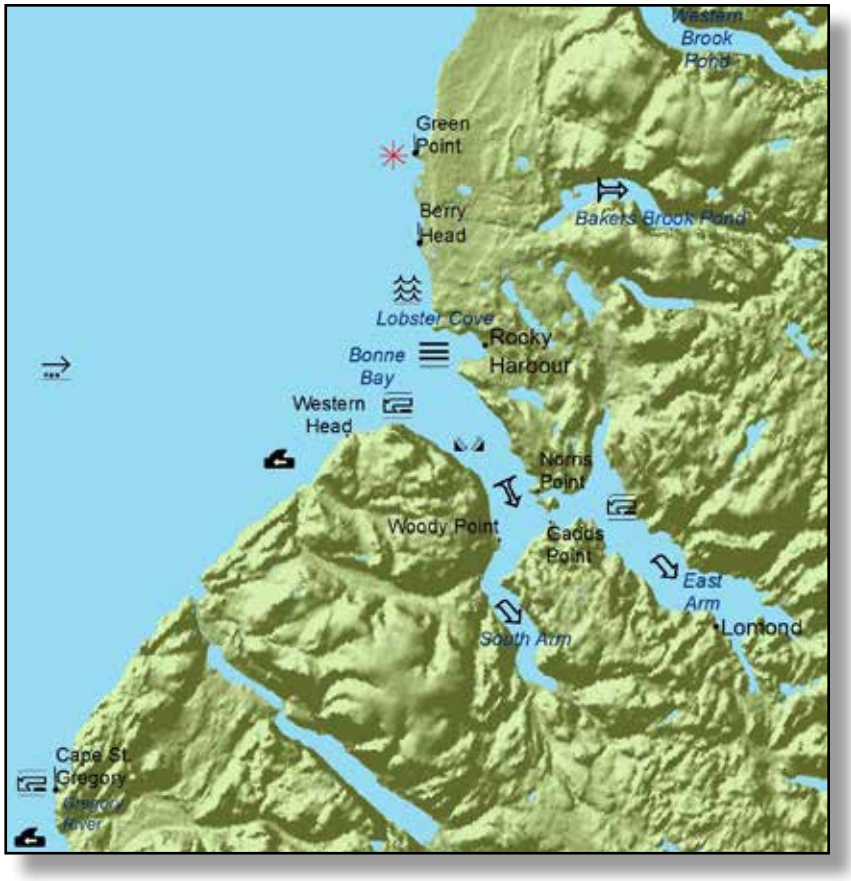
Several valleys with ponds cut deeply into the western face of the coastal mountains. Mountain waves funnelling through the valleys cause strong southeast winds near the coast. Unaffected by friction, these winds remain strong as they blow across the ponds on their way to the coast.

Rips sometimes form off La Fontaine Point as the result of a strong, north-going current that runs over a shallow bank extending about 800 m offshore.

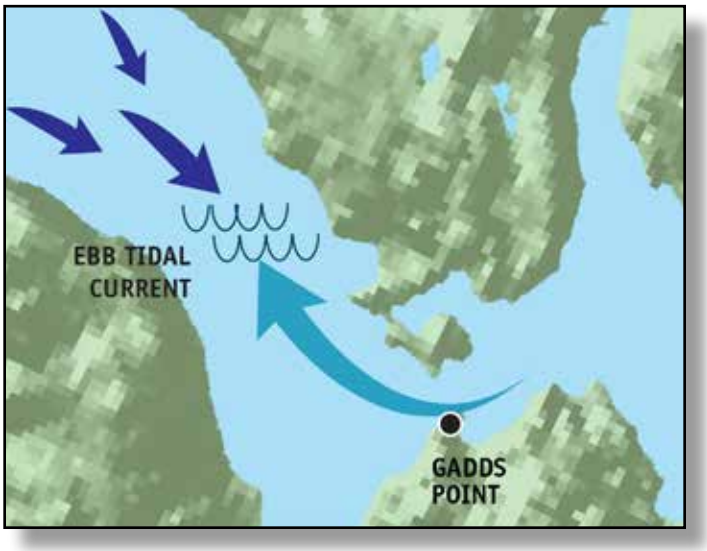
9.2.2 Bonne Bay

Bonne Bay is long and narrow, with many steep cliffs. The steepest terrain surrounds East Arm, which rises to over 730 m about 3 km inland. Winds are often funnelled through the bay and its arms and channelled along their southeast-to-northwest axes.

Under a southwest flow, fog can creep into the mouth of Bonne Bay almost as far as Rocky Harbour. High terrain around Western Head prevents it from pushing further inland. When a northwest flow funnels into the mouth of the bay, it creates squally northwesterlies at Gadds Point. Heavy seas occur on the east side of the bay when these winds blow against the ebb tide.



Fog can creep into Bonne Bay with a southwest wind.

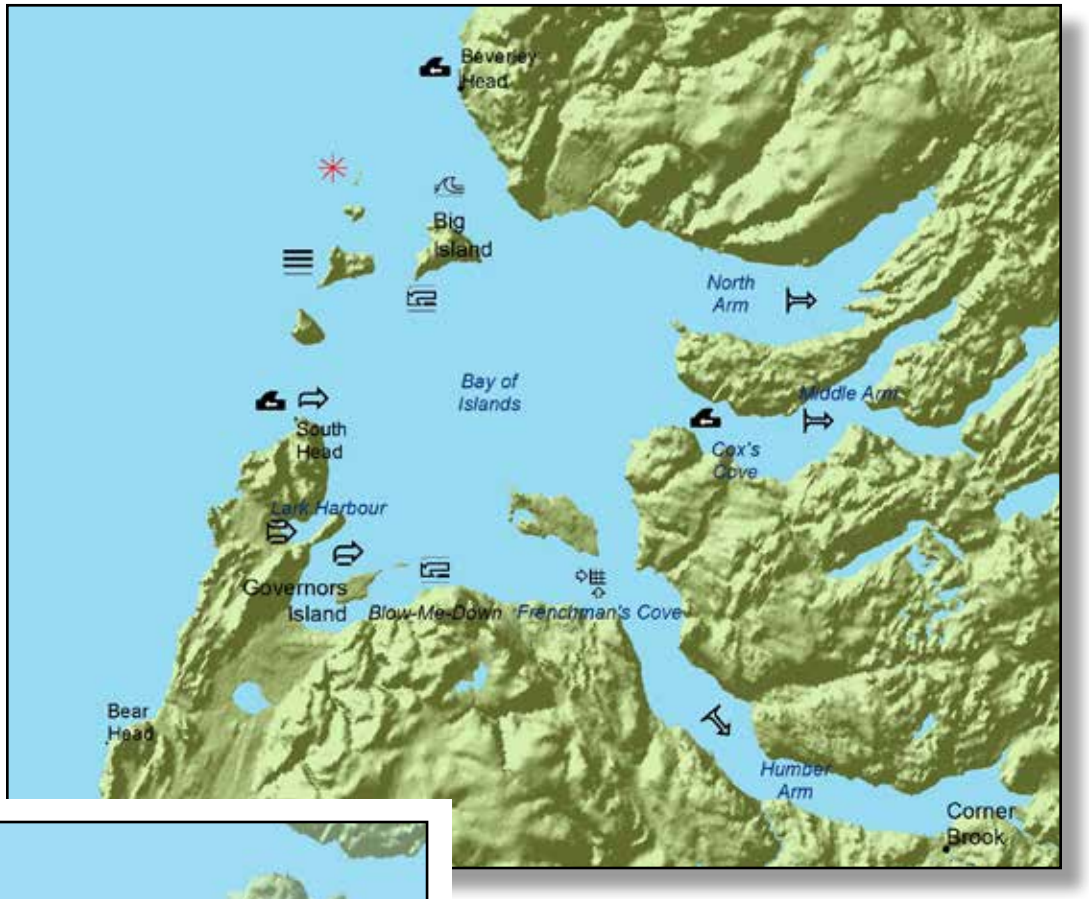


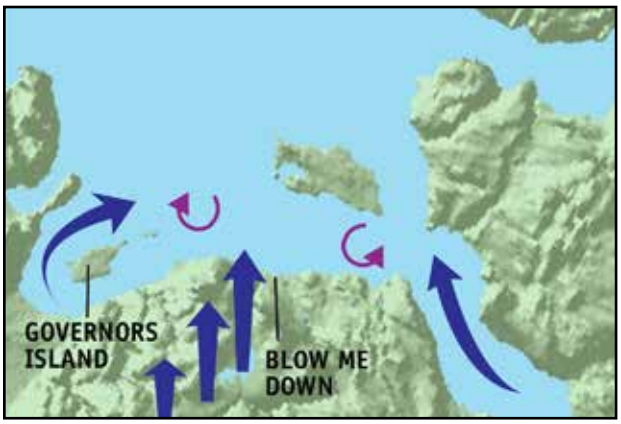
Northwest winds create heavy seas east of Gadds Point when they flow against the ebb current.

9.2.3 Bay of Islands

Like Bonne Bay, the Bay of Islands is surrounded by high terrain. Strong winds caused by mountain waves are common there, and funnelling and channelling occur in its arms.

In a southwest to southeast flow, high winds and whirlwinds occur off Blow Me Down that are reinforced by cornering effects around the southwest side of Governors Island. Southwesterly gusts are a much bigger problem during the summer months.





Strong winds and whirlwinds occur off Blow Me Down when the flow is from the southeast to southwest.

Mariners' Tips:

In this area, the strongest winds caused by mountain waves come from the east. As such, the rule of thumb for fishermen is to add 20 kt to a forecast easterly.

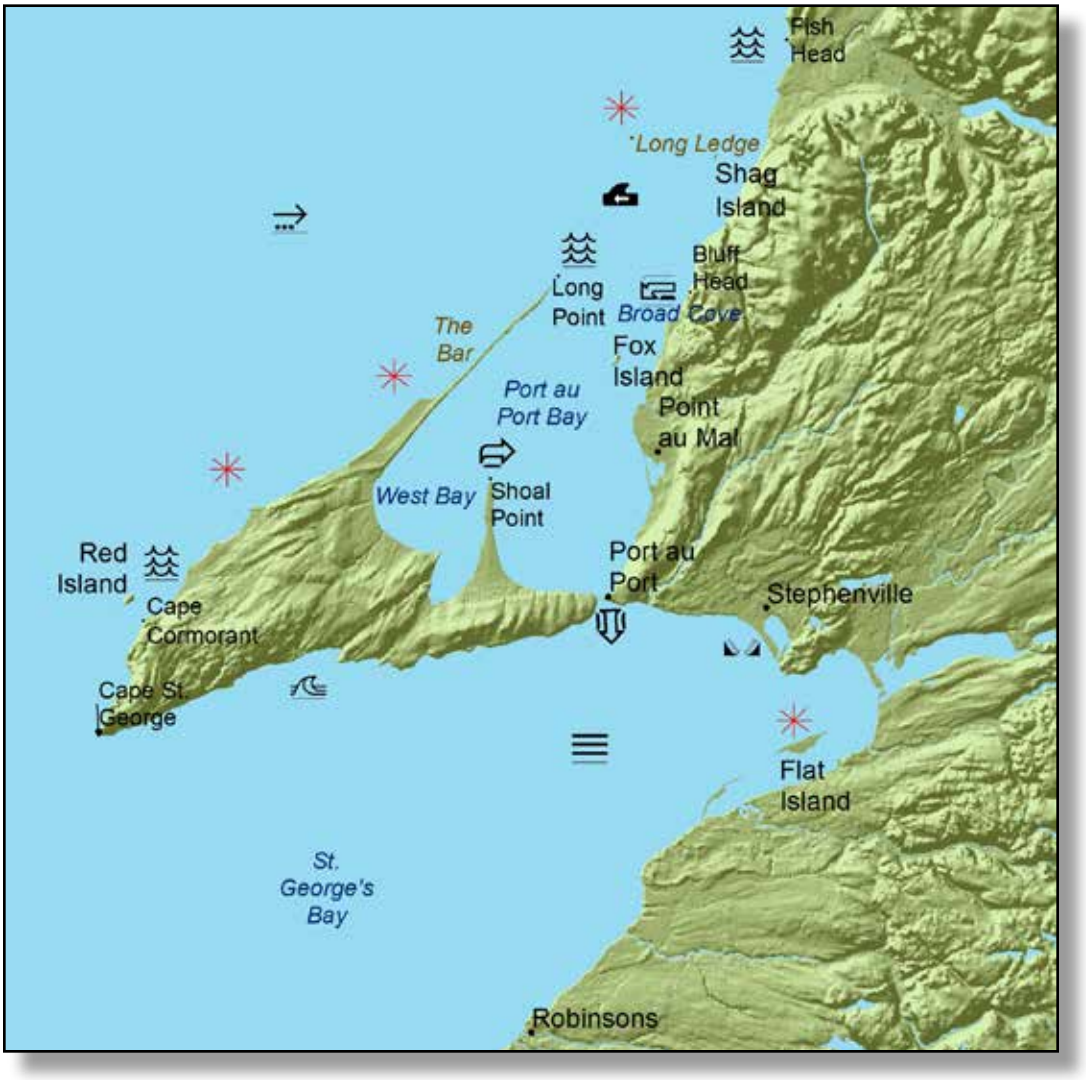
9.3 Gulf-Port au Port

Southeast winds caused by mountain waves are very strong along the southern part of Newfoundland's west coast, where they are commonly known as "Wreckhouse" winds. Most of this area of coastline faces the open waters of the Gulf of St. Lawrence. Prolonged west or northwest winds often bring large seas that can break as much as 2.5 km from the coast. St. George's Bay is somewhat protected from these winds but open to southwesterly winds, which cause rough seas along the coast from Cape St. George to Stephenville.

Local effects along this coastline are detailed in two sections: Fish Head to Robinsons, and Robinsons to Port aux Basques.

9.3.1 Fish Head to Robinsons

St. George's Bay is much deeper than Port au Port Bay; however, rough seas occur along the coast from Cape St. George to Stephenville when winds are southwest. The bay opens to the Gulf of St. Lawrence from the southwest and is protected from sea and swell from any other direction. Fog from the Gulf is trapped by the funnel shape of the bay, much of which remains ice-free for most of the winter.

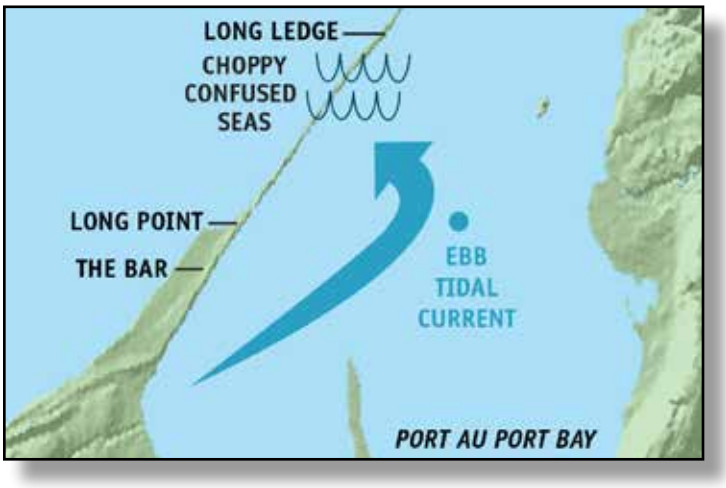


Mariners' Tips:

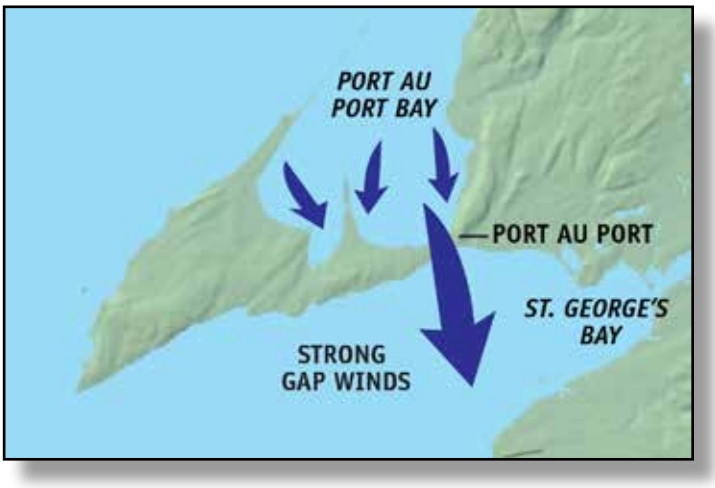
Many place names hint at potential weather conditions in an area. In Newfoundland, Funnel Head, Wreck Cove, Mistaken Point, Cap au Diable (Cape of the Devil), and several Blow Me Downs all speak for themselves. The shape of the land and the sea bed also affects the behaviour of the wind and the sea, providing another clue to weather conditions.

The ebb-tide current leaving Port au Port Bay turns west to cross The Bar at Long Point, causing eddies and overfalls. Both flood and ebb tides move quickly across The Bar, creating heavy seas when the wind opposes the current.

Violent northerly winds from Port au Port funnel across the narrow isthmus connecting the peninsula to the mainland, and can be felt southward to more than 3 km out. These strong gap winds fan out as they enter St. George's Bay, where they have also been known to pick up a fair amount of spray.

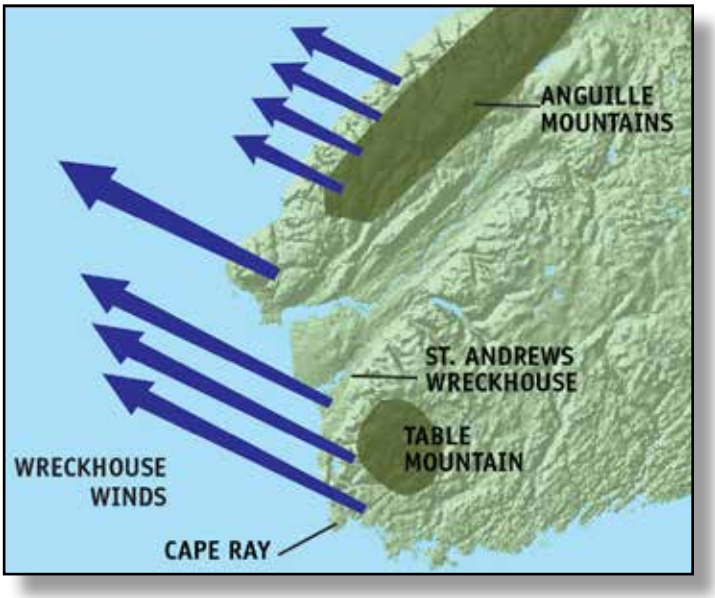


Tides from Port au Port Bay move quickly across The Bar, causing heavy seas when the wind blows in opposition to the current.



Violent northerlies from Port au Port Bay cause strong gap winds as they funnel across the narrow isthmus and into St. George's Bay.

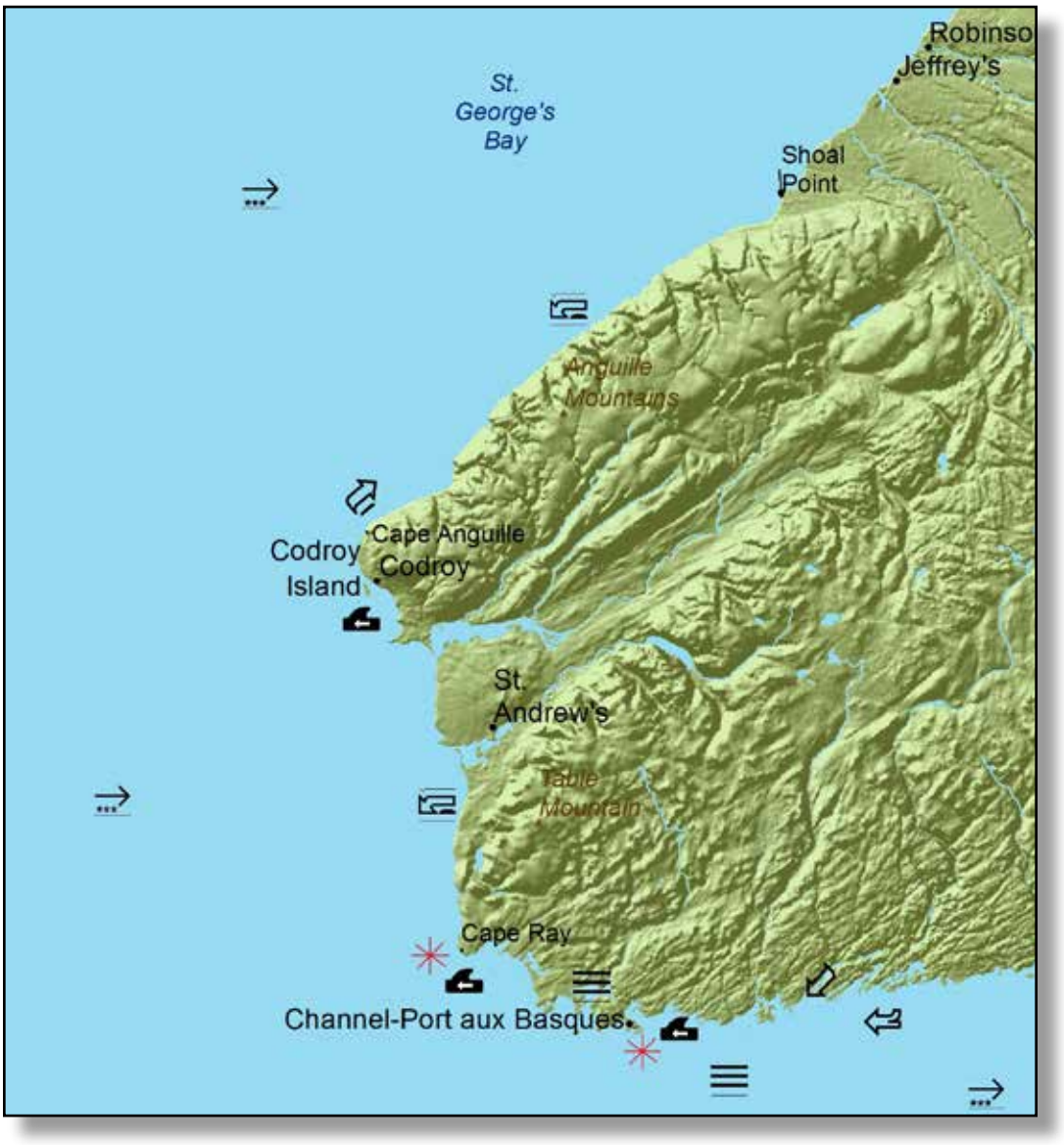
The coast from about 5 km south of St. Andrews to Cape Ray is well known for its vicious Wreckhouse winds, which are infamous for derailing trains, toppling power-line towers and tipping over transport trucks. Mountain waves off Table Mountain create the effect, which is felt more than 30 km out to sea and sometimes enhanced by drainage and funnelling. Southeast winds of 25-30 kt at Port aux Basques can suggest winds of 50-60 knots at Wreckhouse and the forecast will ordinarily capture this local effect.



One of the windiest places in the world, the Wreckhouse region is famous for the powerful blows spawned by mountain waves from nearby Table Mountain.

9.3.2 Robinsons to Port aux Basques

Cape Ray is the southwesternmost point on Newfoundland. The coast to the north is exposed to the northwest; toward Port aux Basques and beyond, it is open to the south and southwest. Fog is much more frequent at Port aux Basques than at Cape Ray, but when it's showery at Cape Ray and the winds are west to northwest, the weather is often much better at Port aux Basques and to the east.



10. Newfoundland South

Local effects in Newfoundland South are divided into four parts: Southwest Newfoundland, Fortune, Placentia Bay, and Avalon South.

10.1 Southwest Newfoundland

A series of steep cliffs runs parallel to this stretch of the Newfoundland coastline. They are indented by many narrow, steep-sided bays that run from north to south—a configuration that produces gap winds when winds blow from the northeast. This effect combines with coastal convergence to create violent winds in and around the mouths of these bays.

The coastline is exposed to an unlimited fetch of open sea to the south, so it takes the full brunt of large waves and swells that have been generated over the deep ocean. Areas with shoals feel the greatest effect. During the winter, the seas off this coastline cool to slightly below 0°C but usually do not freeze. This causes freezing spray to be a concern when cold westerlies blow and thick fog to develop when mild southerlies set in.

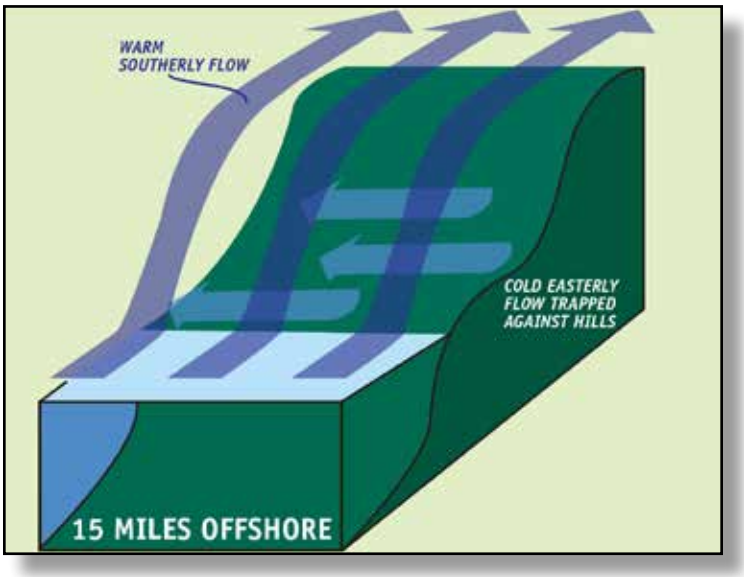
Southerly and westerly winds are also affected by the coastline's geography. Steep cliffs and hills along the coast block southerly flows, creating strong easterlies near the shore. This occurs mainly in the spring, when a mild southerly flow pushes the cooler easterly flow against these higher areas of the coastline. The warm southerlies ride over the cool, trapped air—and the resulting difference in pressure between the two air masses leads to the development of an easterly circulation along the coast. This effect is often observed up to 24 km out to sea.

Local effects for this area are divided into two parts: Port aux Basques to Burgeo, and Burgeo to Hare Bay.

10.1.1 Port aux Basques to Burgeo

This stretch of coastline runs from east to west and is marked by steep, rugged cliffs indented with north-to-south-running bays and inlets. The topography makes the blocking, channelling, and funnelling of winds important effects near the shore.

Northeasterly winds are funnelled and channelled through Bay de Loup before being further enhanced by convergence as they flow down the coast. In such conditions, winds of up to 75 kt have been reported at Burgeo, and whirlwinds are often observed near shore. These effects are common to northeast channels along this stretch.



A strong easterly circulation can occur along the steep coastal cliffs and hills of Southwest Newfoundland during a mild southerly flow.

Whirlwinds often occur near the mouths of northeast channels along the southwest coast due to enhanced wind speeds from funnelling, channelling, and coastal convergence.

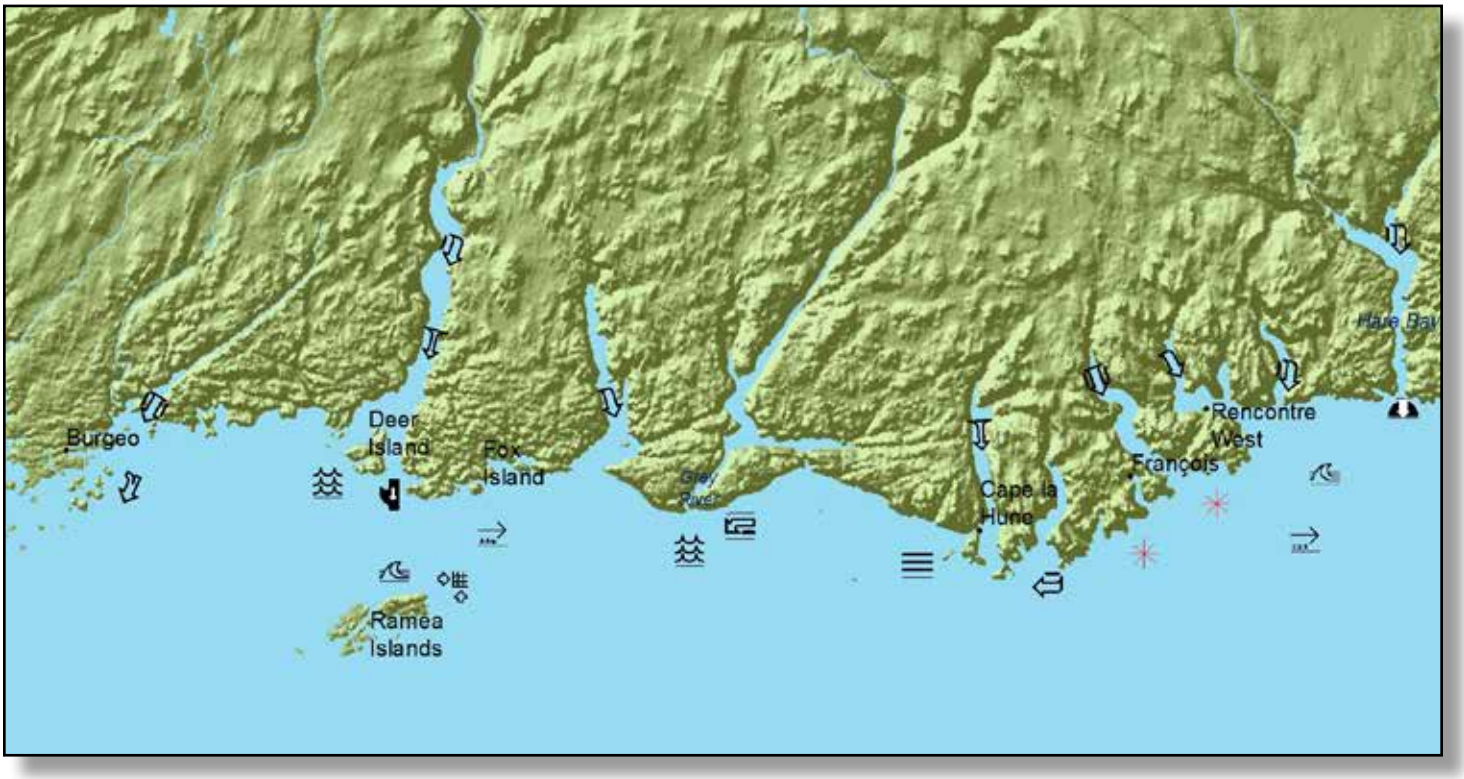
Mariners' Tips:
Local fishermen add 15-20 kt to the forecast wind speed along this coastline when crossing the mouth of a bay in north-to-northeasterly winds. The winds slacken on the far side of the bay.

10.1.2 Burgeo to Hare Bay

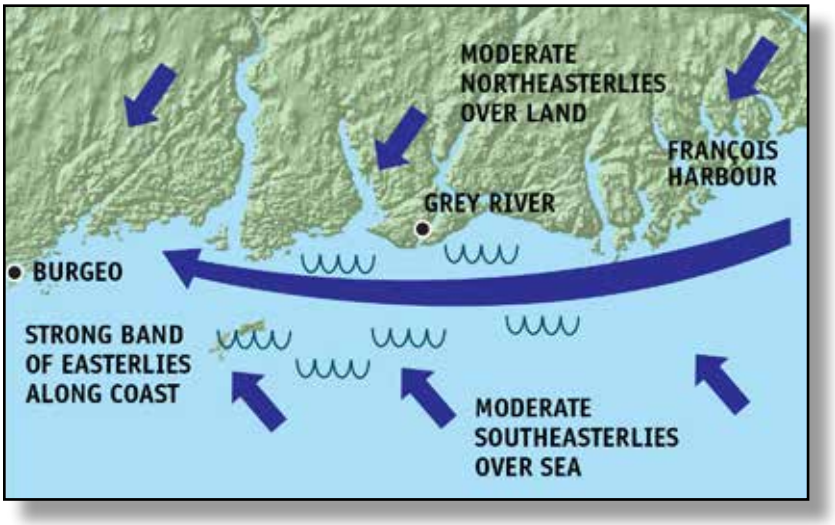
Many factors combine to produce the well-known high seas along this coastline—the most important being unlimited southern exposure, or fetch, to the Atlantic. Strong southeast-to-southwest winds contribute to the effect. Local conditions such as wave refraction around Ramea Island and shoaling between Cape La Hune and Recontre West, 10 kilometres west of Hare Bay, can produce waves three times higher than those on the open sea.

During the late spring, run-off from the river valleys around the bays generates strong seaward currents. When winds blow onshore against these currents, confused seas develop near the bays and around the small islands that dot the shoreline.

Easterly winds in this area cause coastal convergence—hence, there are stronger winds near the shore. Conversely, strong westerlies here are usually weaker near the shore, due to the divergence effect. Although westerly gales are rare along this coast during the summer, they are sometimes observed about 10 km offshore. This is likely due to a combination of coastal divergence and the stabilizing influence of the cooler coastal water.



Blow Me Down Point experiences very strong winds, as northerlies funnelling between the steep cliffs toward White Bear Bay further increase in speed at the point as a result of cornering effects. After being channelled and funnelled through the bay, the winds flow around either side of White Bear Island, creating confused seas on its leeward side. Seas are roughest on the southeastern side, due to cornering, and even worse when the northerly wind opposes a north-going flood tide.



A strong band of easterlies flows near the shoreline along this stretch of coast. The influence of moderate onshore and offshore winds also contribute to the high seas in the area.

Cornering effects at Blow Me Down Point further increase the speed of northerly winds flowing down into White Bear Bay.

Rough seas on the leeward side of Bear Island are even worse when the strong northerlies channelled and funnelled through White Bear Bay oppose a north-going ebb tide.

10.2 Fortune

This coastline has several large bays running from southwest to northeast. With the exception of Bay d'Espoir, they are fairly open to seas from the southwest, but are sheltered from southerly waves by the Burin Peninsula and the Miquelon Islands. Their configuration causes southwesterly and northeasterly winds to be channelled and funnelled. Cornering effects are also common due to the many exposed capes and headlands in the region.

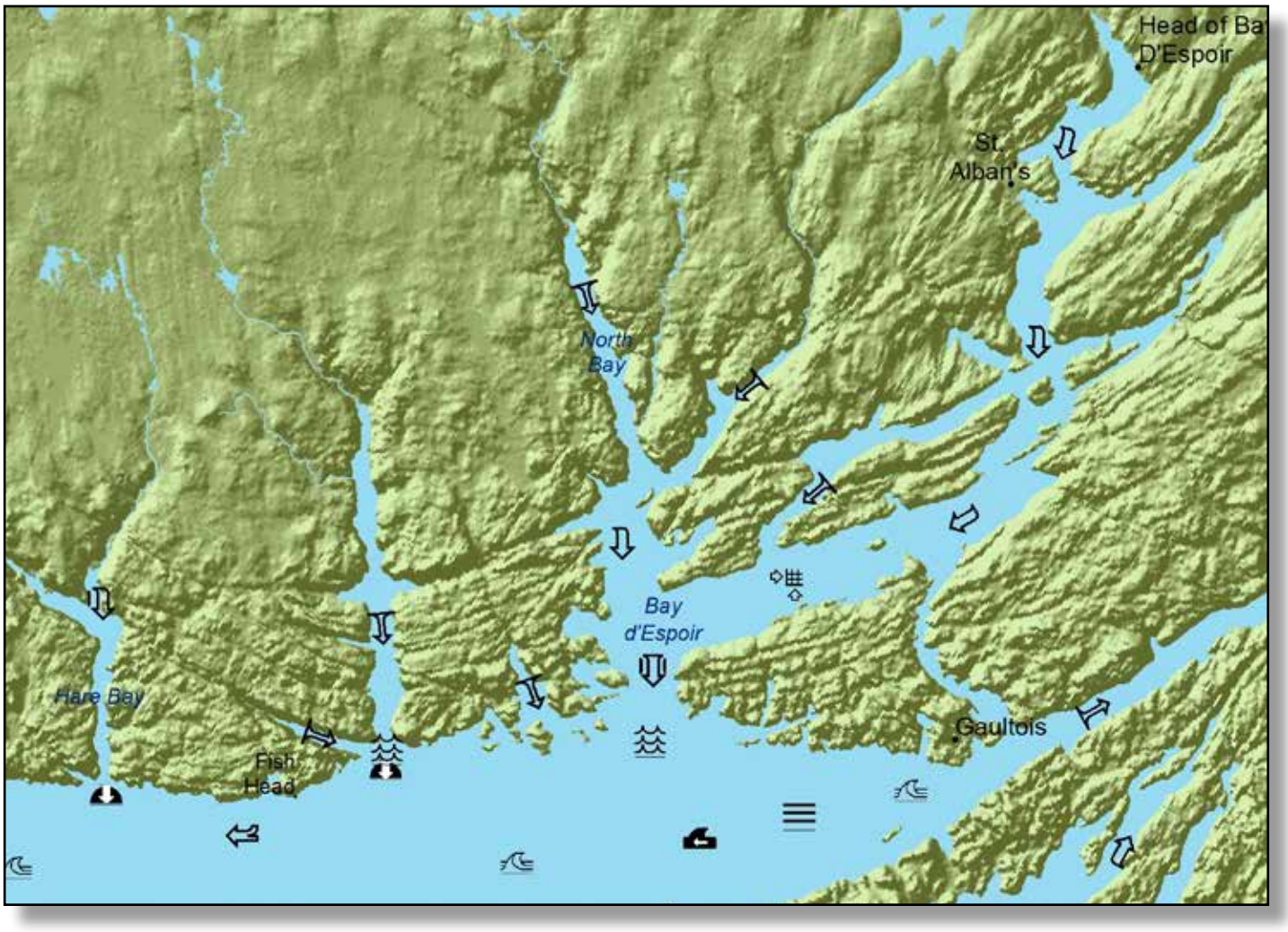
Open water year-round makes fog common along this coast and causes freezing spray and heavy snowsqualls in winter. More detailed weather effects for this coastline have been divided into three sections: Hare Bay to Gaultois; Gaultois to Garnish; and Garnish to Point May.

10.2.1 Hare Bay to Gaultois

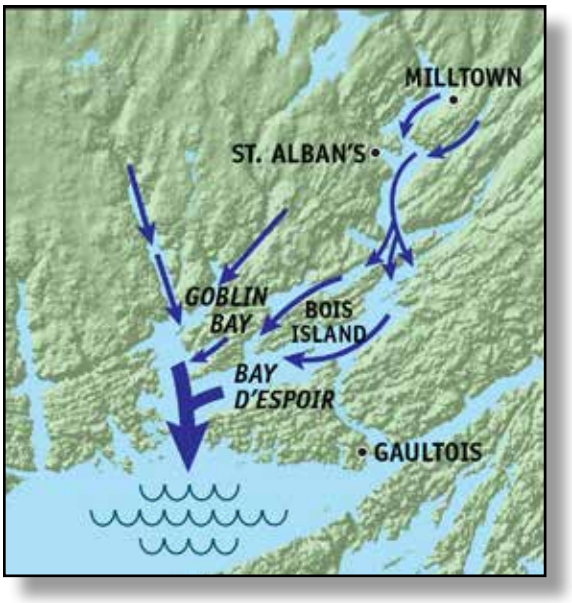
Like the coastline from Burgeo to Hare Bay, this stretch of coast has river valleys with late spring run-off that generate strong seaward currents. Onshore winds blowing against these currents create confused and choppy seas near shore.

The dominant feature in the area is Bay d'Espoir, a large and complex bay that runs roughly southwest to northeast. It has a small and fairly well-sheltered entrance that protects it from large swells, strong winds from the sea, and fog. During warmer months, in a southwesterly flow, the more exposed coastline is fogged in, while Bay d'Espoir has much better visibility.

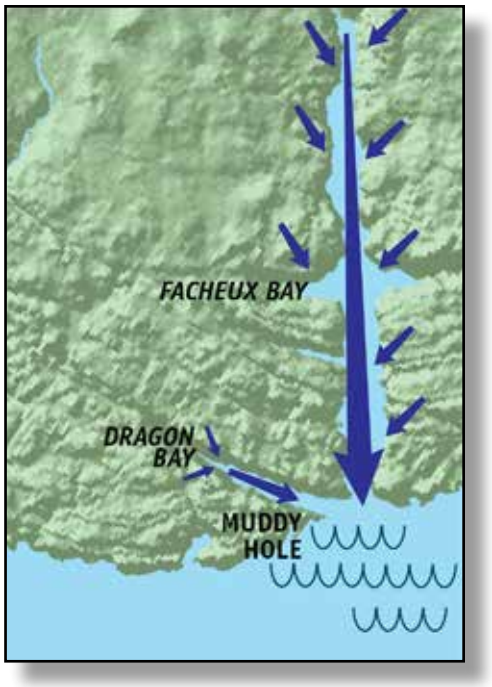
Northerly winds, however, are dramatically altered as they flow through the islands, steep-walled valleys, and many-cliffed bays and coves of Bay d'Espoir. Channelling and funnelling caused by these features creates high winds in the bay, which can double in strength where they funnel through the narrow cliffs at its entrance. Channelling causes winds to align with its various bays, which range in orientation from northwest to east. Funnelling through valleys and cornering around islands also creates areas of much stronger winds.



Cool, gusty drainage winds are a frequent occurrence at the mouths of bays along this coastline. They are most common on summer nights, when skies are clear and winds are fairly light. A good example of this is Muddy Hole, where cool air drains out of Facheux Bay and Dragon Bay. Fishermen familiar with this area report that cold, gusty northerlies are also common in the early morning during the summer.



The winds in Bay d'Espoir are strong and highly variable due to channelling, funnelling, and cornering effects caused by its many islands and steep-walled valleys and bays. At its narrow entrance, northerly winds can double in speed.



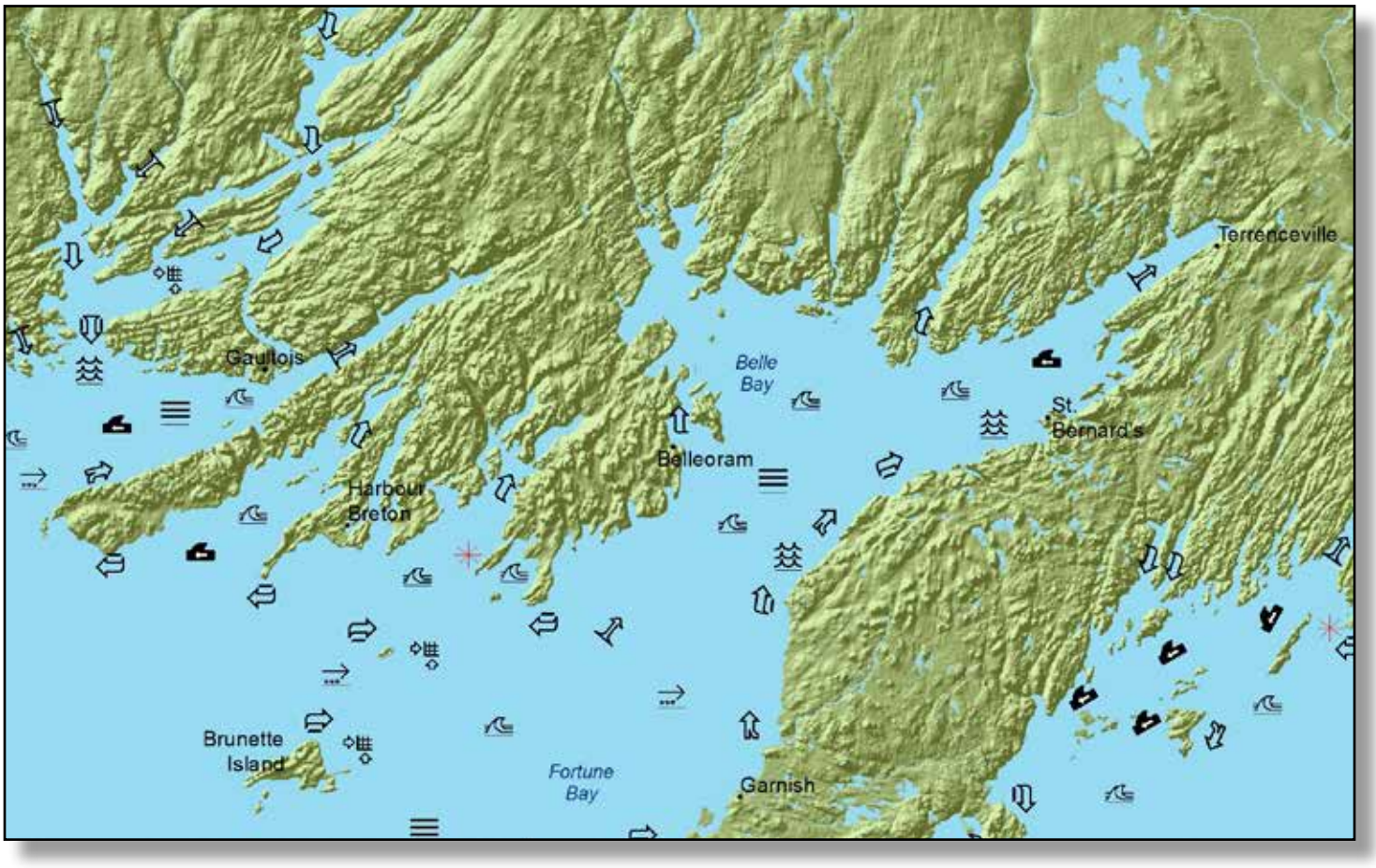
Like many other bays along the coast, Muddy Hole often experiences cool, gusty drainage winds at night and in early morning during the summer.

10.2.2 Gaultois to Garnish

This area includes several large bays that extend from southwest to northeast—the largest being Fortune Bay. Their orientation makes the funnelling and channelling of northeast and southwest winds a major influence on marine weather, with conditions exacerbated by cornering effects around the many capes between the bays. The funnelling of southwesterlies at the tip of Fortune Bay, near Terrenceville, can make navigation difficult, and ferries often seek shelter in Bay L'Argent.

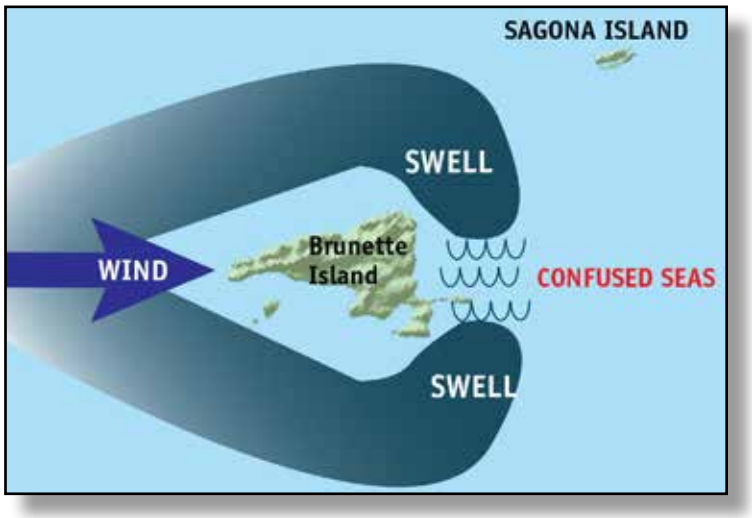
The bays along the western portion of this stretch of coast are fully exposed to the southwest, so large swells are driven onto the shore. When these swells are forced into the narrow bays, very high seas can develop. This effect is further enhanced at high tide—in particular, spring tide, when seas can become treacherous.

Strong westerlies and the large seas that accompany them flow around both sides of Brunette Island, creating very rough seas where they converge on its leeward side. These winds are often enhanced around the northern shores of the island and nearby Sagona Island, due to cornering and convergence. These effects can also enhance snow streamers, causing very low visibility and winds that gust to speeds over 30 kt higher than they do elsewhere. Seas are less rough in easterly winds because the fetch of the open water is insufficient to build large waves.



Mariners' Tips:
Sagona Island is exposed to winds from all quadrants, so the wind report from the automatic station on the island is a good indication of offshore conditions.

Fortune Bay is known for frequent heavy fogs, mainly in spring, when warm air from the south travels across the cold water. During late spring and summer, the sun is usually strong enough to lift the fog inland and along the coast, but it rolls in again at nightfall.

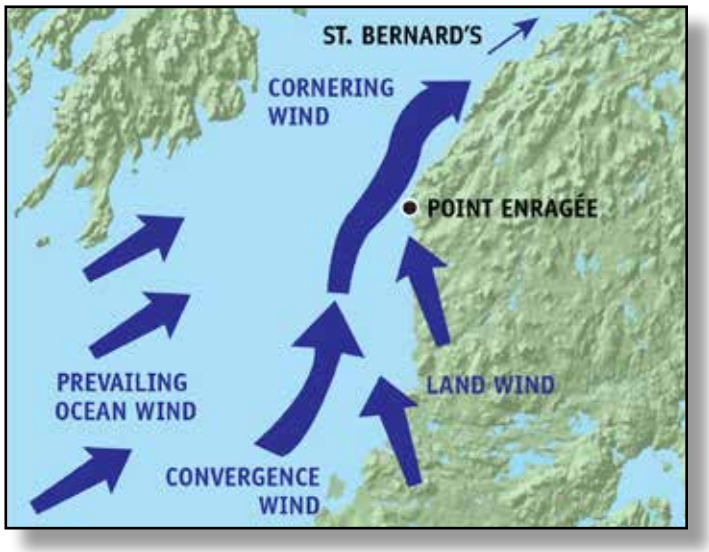


Blocked by Brunette Island, high westerly winds and their accompanying swell split and re-converge on the leeward side of the island, causing confused seas.

In Belle Bay—a medium-sized bay extending northward from Fortune Bay—the upstream land and the Miquelon Islands provide effective shelter from the southwest. Unlike other bays in the area, Belle Bay is uniquely sheltered from the open ocean and protected by land from all directions but the south and southeast, where there is a fairly small fetch across Fortune Bay. When strong southwesterlies bring fog and large swells to Fortune Bay, Belle Bay usually experiences lighter winds, smoother seas, and better visibility.

On the eastern side of Fortune Bay, between Garnish and St. Bernard's,

Fog is a frequent problem in Fortune Bay in the spring, brought in by strong southwesterly winds, while Belle Bay is relatively protected.



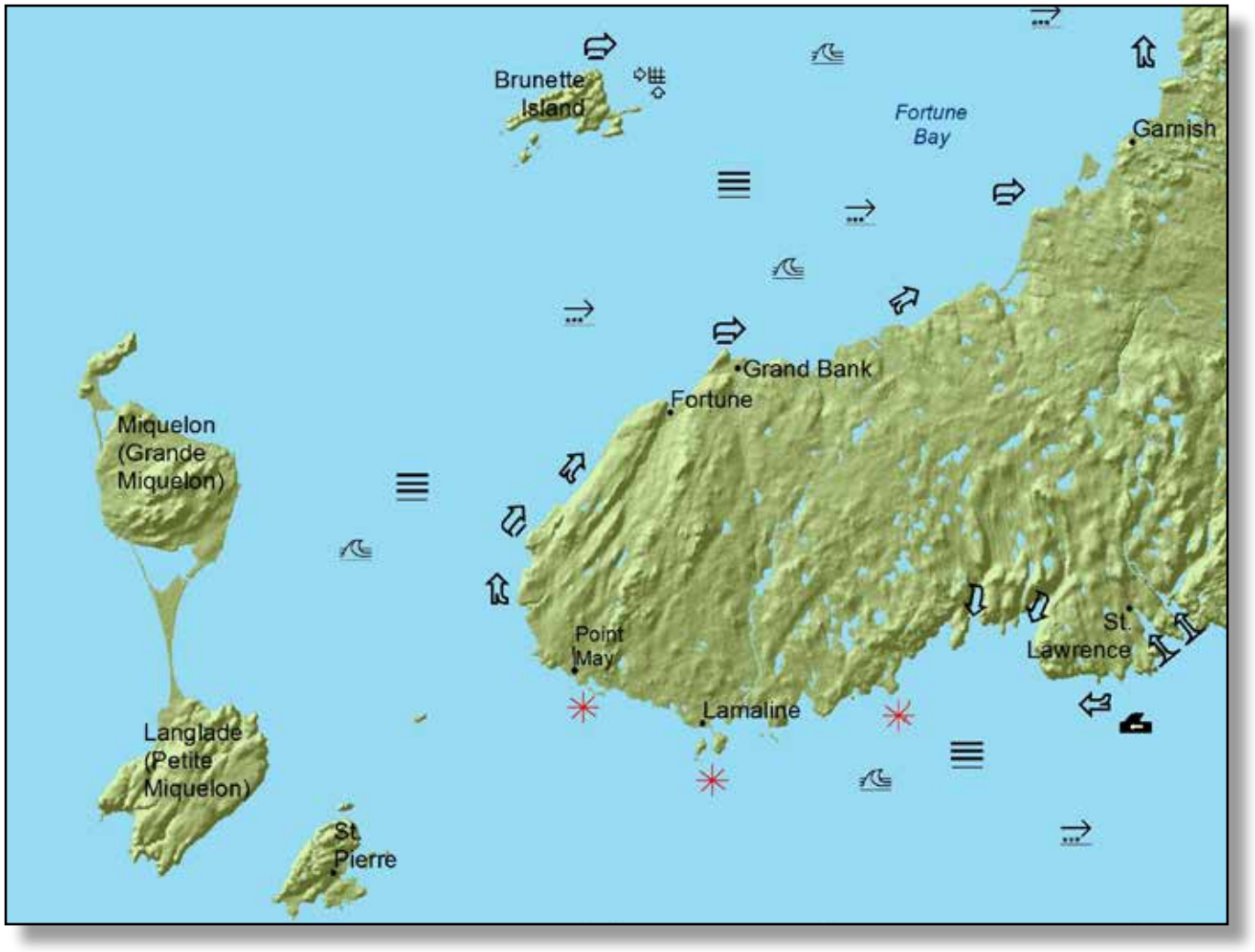
Coastal convergence and cornering effects cause very high winds and choppy seas near the eastern shore of Fortune Bay, between Garnish and St. Bernard's—in particular, near Point Enragée.

southwest winds undergo coastal convergence, resulting in a band of very strong winds and choppy seas near the shore. This effect is increased at Point Enragée, where cornering makes the winds even stronger.

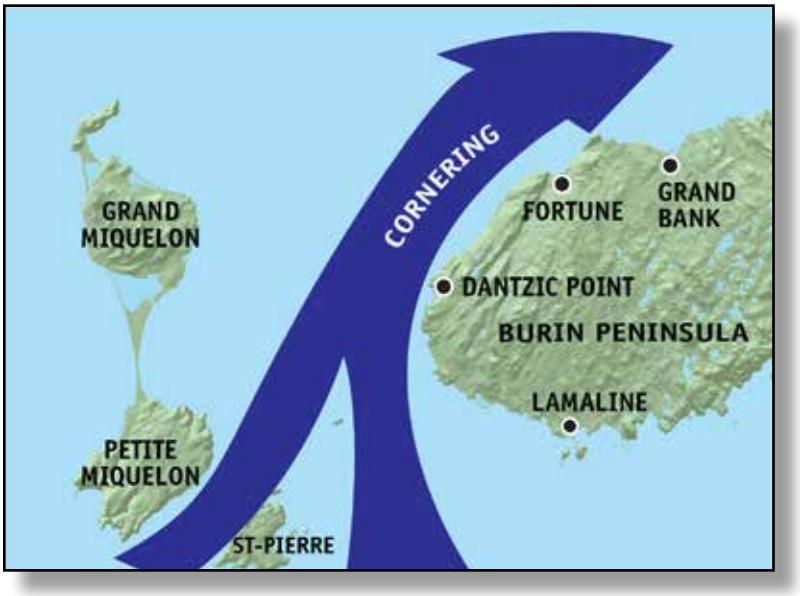
In winter, the waters off the coast between Gaultois and Garnish do not freeze, making snowsqualls and freezing spray common from late December through February. Freezing spray is especially dangerous during snow squalls, when heavy snow build-up adds to the weight of icing, and during rough seas, when the sea-surface temperature is below 0°C.

10.2.3 Garnish to Point May

The coastline in the southwestern portion of the Burin Peninsula, from Garnish to Point May, is dominated by low, rolling hills and several small coves. For the most part, the area is fairly well sheltered from the worst effects of the wind, with the peninsula providing protection from the east and the Miquelon Islands some shelter from swells to the southwest. Western exposure, however, is quite extensive, which makes for heavy onshore snowfall.



A few exposed points along the coast are prone to cornering effects, including Dantzic Point, where strong southerlies funnelled between the Miquelon Islands and the southwestern tip of the peninsula are made even more powerful as a result.



Cornering effects at Dantzic Point add to the strength of southeasterly winds funnelled between the Miquelon Islands and the tip of the Burin Peninsula.

10.3 Placentia Bay

Placentia Bay is a large, triangular bay bound to the west by the Burin Peninsula and to the east by the Avalon Peninsula. The bay's deep, wide entrance gives way to narrower and shallower waters midway into the bay. Shoals become extensive in the shallow section, causing areas of very rough seas under certain weather conditions.

The bay's wide opening to the south allows large swells to travel into its narrower and shallower reaches, causing frequent rough seas. Storm surges are common on the eastern coast of the bay, especially north of the town of Placentia.

Coastal convergence increases southwesterlies on the east side of the bay, while northeasterlies are enhanced on the west. Several large islands near the head of the bay create areas where channelling and funnelling occur. Southerly winds produce widespread fog that does not lift over the course of the day as long as the winds persist.

Local effects for this coastline are described in three sections: Point May to Rushoon; Rushoon to Point Verde; and Point Verde to Point Lance.

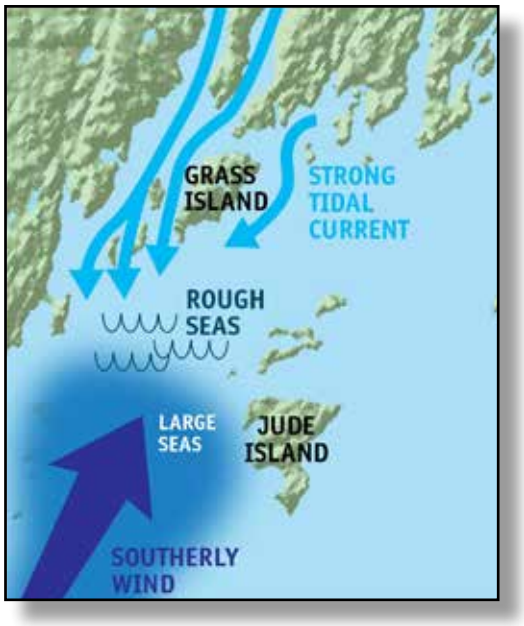
10.3.1 Point May to Rushoon

This fairly flat stretch of coastline is marked by several bays and dotted with small islands. The low terrain does little to block southwesterly winds, while coastal convergence tends to strengthen northeasterlies.

Northwesterly winds travel virtually unobstructed across the exposed southern part of the peninsula between St. Lawrence and Burin, where they are channelled or funnelled through several small river valleys along the coast. This effect causes strong, gusty winds near the mouths of these valleys and coastal bays.

When the tide is falling, there is a strong southward tidal current between the Burin Peninsula and the many small islands offshore. Southerly winds bring large seas into the area that oppose the current and create rough, confused seas.

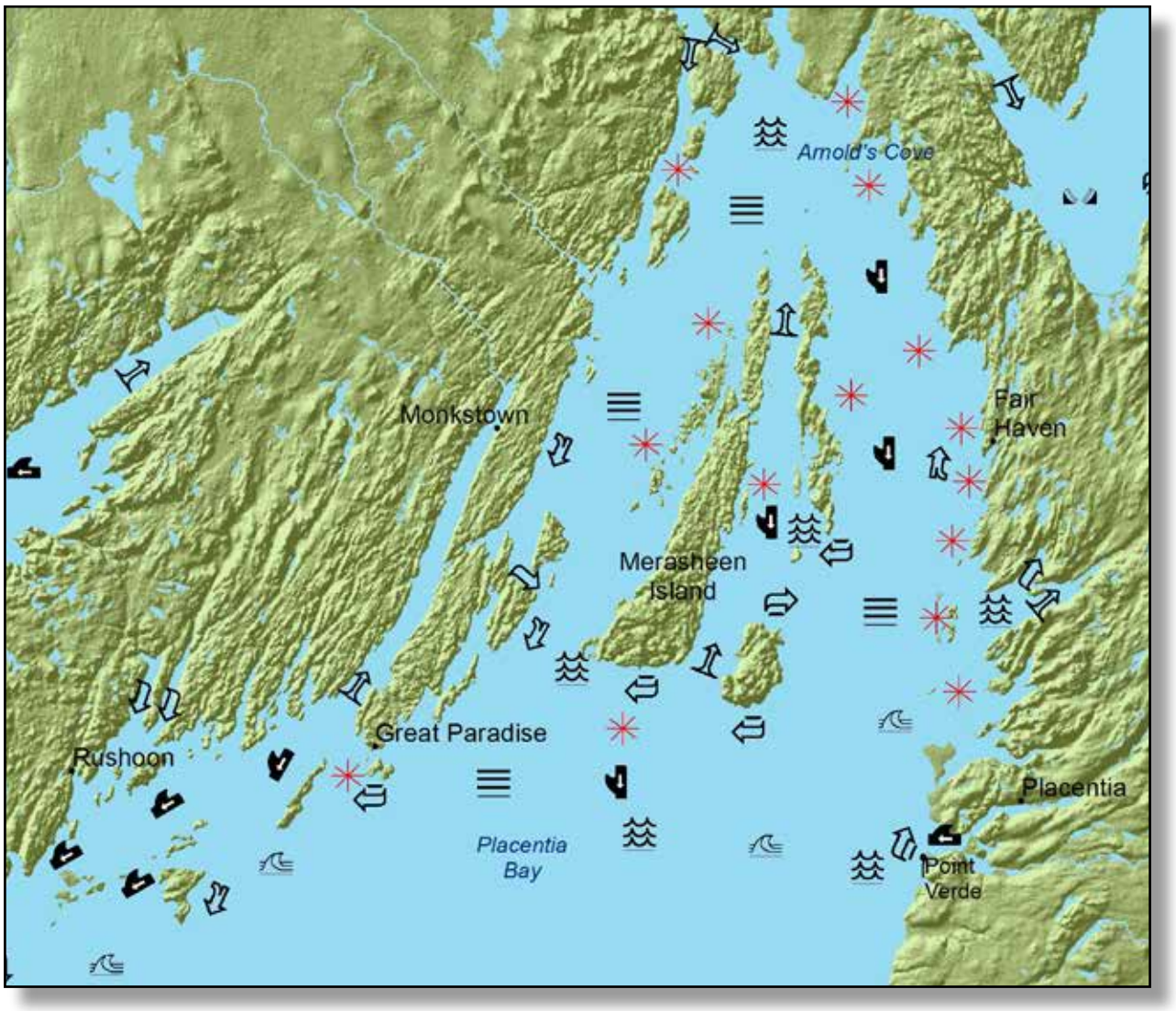
Gusty winds occur near the mouths of bays and river valleys from St. Lawrence to Burin.



The waters between the Burin Peninsula and its many small offshore islands become rough when southerly winds and their large seas oppose the strong, falling tide.

10.3.2 Rushoon to Point Verde

This wedge-shaped area, indented by many narrow bays, includes the narrowest and shallowest waters in Placentia Bay. Several large islands at the head of Placentia Bay create many long channels through which winds can be funnelled. Southwesterly winds drive large waves into this shallow area, causing very rough seas. The geometry of the bay makes for frequent storm surges and seiches.



Mariners' Tips:

The shallowness of this section of Placentia Bay makes knowledge of the many areas of shoaling critical. Mariners are strongly advised to make full use of "Sailing Directions".

Placentia Bay is noted for its storm surges and seiches. Deep, low-pressure centres with persistent gales create large surges, with seiches setting up in the wake of storms once the wind has shifted. In such conditions, high water will slosh from one side of the bay to the other for up to a couple of days.

Mariners' Tips:

It takes only a moderate southerly wind to generate large seas in and around Placentia Bay, due to its shape and bathymetry (ocean depth). Because of the sizable fetch to the south, large swells generated well south of Newfoundland can enter the bay at any time, even if conditions seem benign.

The most common storm-surge scenario for this part of Placentia Bay occurs when an intense low-pressure centre passes just west of the Burin Peninsula. Gale- to storm-force southerly winds ahead of the low push large swells into the bay, the movement of water to the right of the wind forcing even more sea onto the coast. Storm surges near the town of Placentia can cause severe flooding because the coastal waters are shallow. This is especially true if the surge occurs at high tide during a spring tide.

Did You Know?

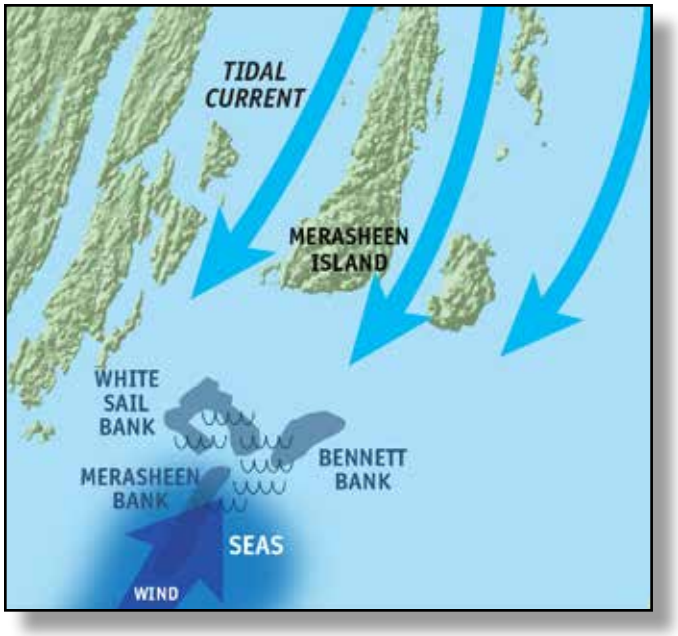
On January 5, 1989, storm-force southerlies pushed very large seas into Placentia Bay at high tide, when levels were near spring-tide height. Forced over the low-lying land near the town of Placentia, the storm surge caused extensive flooding. The tidal gauge at the mouth of Argentia Harbour registered 3.17 m above the predicted tide—an all-time record.

Steep, choppy waves occur near the mouth of Paradise Sound, the narrow channel between Great Paradise and Petit Forte, when a southerly wind and large seas oppose a south-moving tidal current from the Sound.

The area near the entrance to Paradise Sound experiences steep, choppy seas, when southerly winds oppose its south-going tidal current.

In similar wind and tidal conditions, rough seas predominate to the east of the tip of Great Paradise, south of Merasheen Island, in the shallow waters over White Sail Bank, Bennet Bank, and Merasheen Bank.

Strong southwesterly winds are funnelled through the Central Channel between Merasheen and Red islands, some veering west just south of Red Island. Cornering around the northern shore of Red Island creates a strong band of westerly winds, while lighter winds prevail near the coast of Merasheen Island due to coastal divergence.



The shallow waters over the banks south of Merasheen Island cause rough seas, especially when southerly winds oppose a south-going tidal current.

Strong southwesterly winds are funnelled through the Central Channel between Merasheen and Red islands, some veering west just south of Red Island.

10.3.3 Point Verde to Point Lance

Rolling hills indented by a few small bays and coves characterize the coast between Point Verde and Point Lance. Large seas, generated by strong southerly winds, are a major consideration for mariners, and several capes, especially Cape St. Mary's, experience higher wind speeds due to cornering effects.

Mariners' Tips:

Westerly winds along this coast set up steep, choppy seas, making it dangerous to fish and sail. A southerly wind, however, sets up a long swell, which usually doesn't interfere with vessel operations.

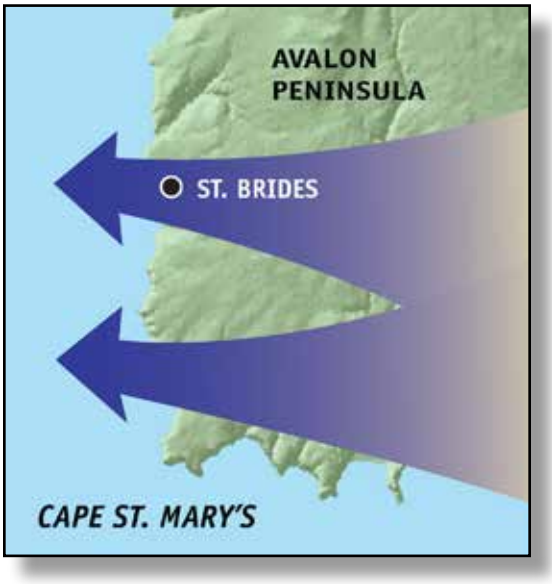
The shallow waters along this stretch of coast make shoaling and tidal rips common hazards, especially between Cape St. Mary's and Point Lance, where local fishermen report exceptionally rough conditions to as much as 5 km away. At its worst when the tides turn, the sea here has been described as "boiling" and the waves as seeming to "crack against each other". Seas are also rough when strong westerlies oppose the branch of the Labrador Current that runs along the coast. The strength of the current alone causes the seas to "bubble" off Cape St. Mary's, even on a good day. The shallower waters south of Point Breme also make for rougher seas. The coastline's considerable westward exposure makes snow streamers possible in the winter.

Mariners' Tips:

Lance Cove is considered a poor location for shelter from high seas between Cape St. Mary's and Point Lance, due to its exposure and shallow waters. Local fishermen use nearby Golden Bay instead.

Easterly winds pass over the hills covering the southwestern Avalon. The valleys between these hills, for the most part, run east to west, so the easterlies increase in strength as they are funnelled through them. This results in strong gap winds along the coast near and south of St. Brides. Despite the limited fetch of the easterly winds in this area, mariners say they cause high, choppy seas. They "smooth out" when the wind becomes northerly, pushing water out of the bay and away from the coast.

In this part of Placentia Bay, a southerly wind sets up a north-going sea. When the waves approach the western coast of the Avalon Peninsula, the shallower water refracts the waves towards the shore. Southerlies also bring dense fog into the bay. When winds shift from southerly to easterly, the seas become very rough within a few kilometres of shore, especially over the shoals.



Easterlies increase in strength as they funnel through the east-west valleys over the southwestern Avalon Peninsula, causing strong gap winds along the coast.

Fog is common along the western coast of the Avalon Peninsula in southerly winds.

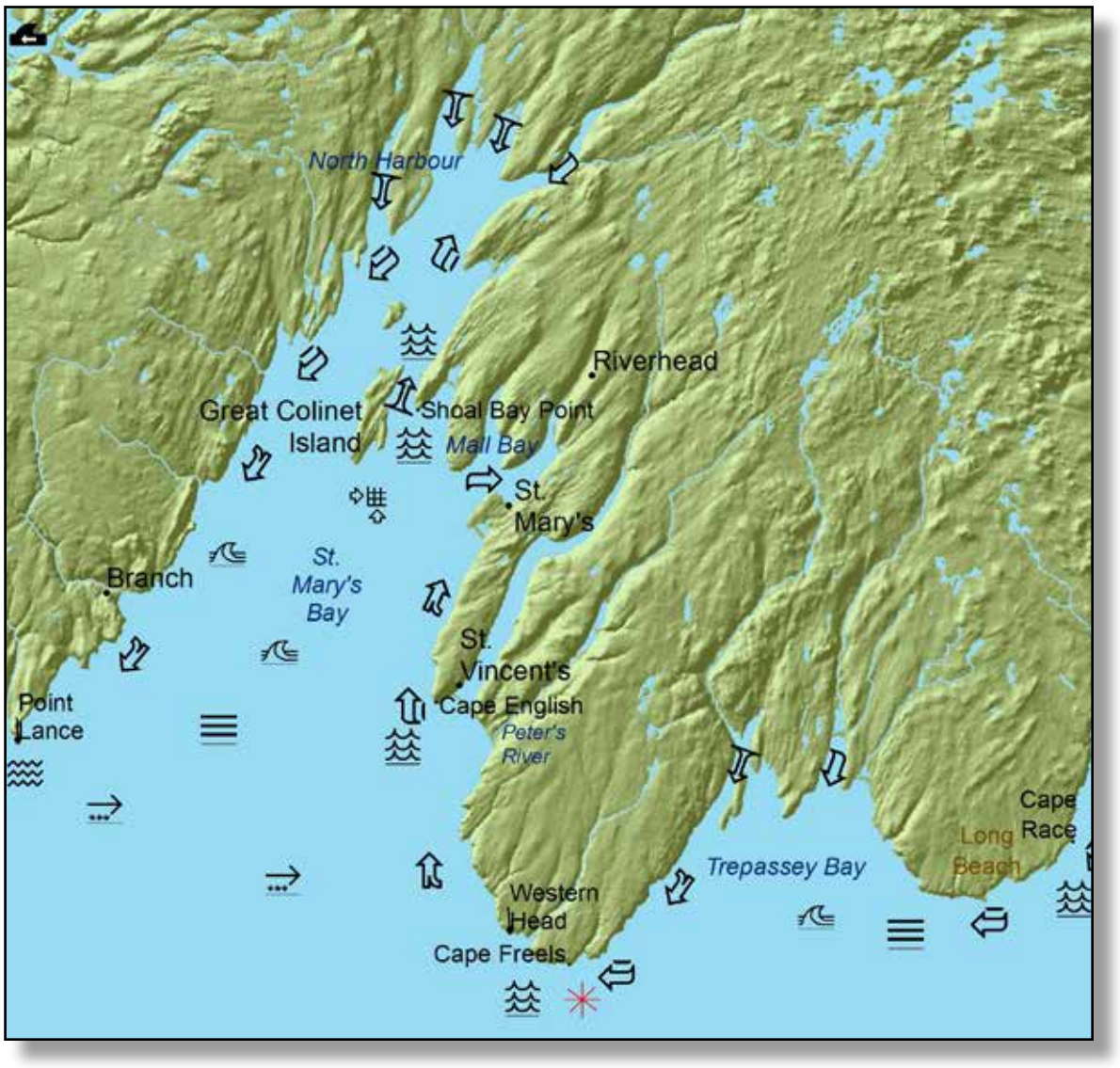
Mariners' Tips:
According to local fishermen, "If you're lost in fog near the shore, go with the swell and you'll make landfall."

10.4 Avalon South

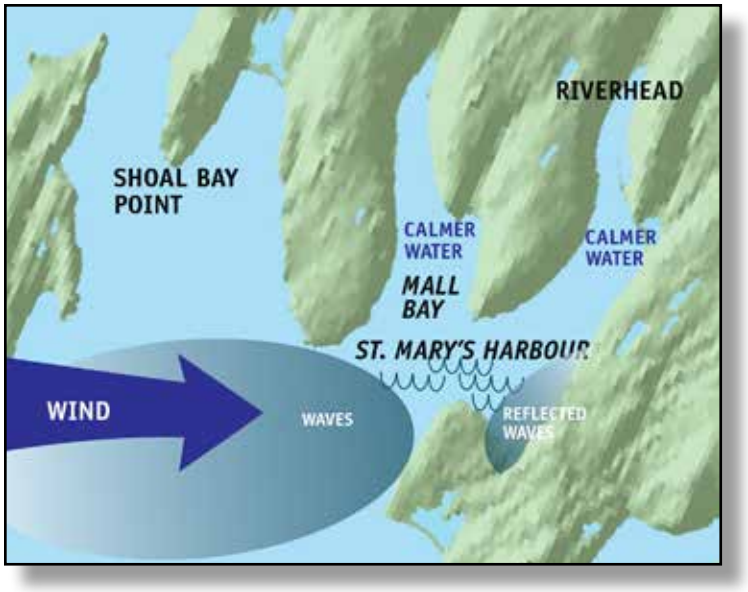
The southern half of this region is generally flat and barren. St. Mary's Bay and Trepassy Bay, along with many other smaller bays and inlets, runs from northeast to southwest. Channelling and funnelling occur in many areas, as a result, and the winds are greatly affected by the many capes and islands along the coastline. Full exposure to the open ocean from the south allows swells to move into the area, although occasional ice-cover reduces their magnitude. Southerly winds bring in dense sea-fog, and the many shoals and banks just offshore combine with strong tidal currents to produce rough seas in some spots.

Mariners' Tips:
Local fishermen use Wild Cove, on the southern shore of Great Colinet Island, for shelter from strong northerlies. Mall Bay provides respite from the rough seas that develop from Shoal Bay Point to Point La Haye during moderate-to-strong southwesterlies.

Coastal convergence strengthens southerlies near the eastern coast of St. Mary's Bay. Between Peter's River and Western Head, this also happens with east-to-southeast winds and has been reported as a band of very strong winds within 1.5-3 km of the coast. Northerlies are also enhanced by convergence along the western coast and are channelled and funnelled through the many entrances to St. Mary's Bay. These winds may remain quite strong out in the open bay.



St. Mary's Harbour has a fairly shallow entrance that is open to the west. With only a moderate westerly wind, seas can develop in the bay and be redirected into the harbour, creating larger waves. About three-quarters of the way from its mouth to its head (at Riverhead), the axis of the harbour narrows and turns sharply northward. This causes the waves to pile up as they reflect back on themselves, resulting in very rough seas. Because of this turn in the harbour, the waters near Riverhead are usually calm.



Westerly winds can create "the worst conditions in the bay" where St. Mary's Harbour turns north; in comparison, the waters in Mall Bay and around Riverhead are quite calm.

Mariners' Tips:

High seas develop under southerly winds throughout St. Mary's Bay. They tend to be somewhat smoother from Cape English to Point La Haye, due to the sheltering effect of the large spit of land that extends down the western side of Holyrood Pond.

ATLANTIC REGIONAL GUIDE PART 4

11. Newfoundland East

Local effects for this region of Newfoundland are divided into four sections: Avalon East, Trinity-Bonavista, Notre Dame, and Newfoundland North.

11.1 Avalon East

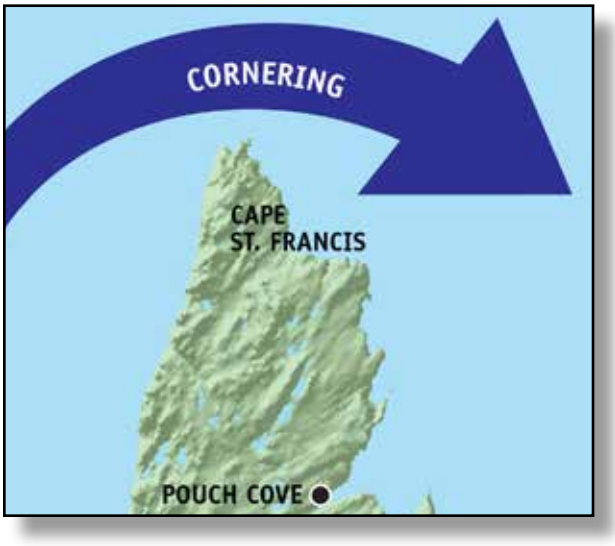
The coastline of Avalon East—the eastern part of the Avalon Peninsula—is fully exposed to the open ocean from the north, east, and south. Winds in the area are affected by its many capes and islands as well as by its numerous small bays, which run from west to east.

The region becomes hillier toward its northern end, the dominant feature of which is Conception Bay. The many shoals and banks found just offshore can make for very rough seas. The marine weather in this area is described for the coastal region from Cape Race to Cape St. Francis, and for Conception Bay.

11.1.1 Cape Race to Cape St. Francis

This section of coastline is oriented roughly north-south and indented by several small but fairly well sheltered east-to-west running harbours. The terrain ranges from flat in the south to hilly in the north.

Coastal convergence strengthens northeasterly winds, which further intensify around many capes and headlands due to cornering effects. Large swells are possible to the east, where there is unlimited exposure to the ocean. Rough seas are common over the Bantam and Ballard Banks, which lie just off the southern half of the coast, and over the steeply sloping ocean floor off its northern end.



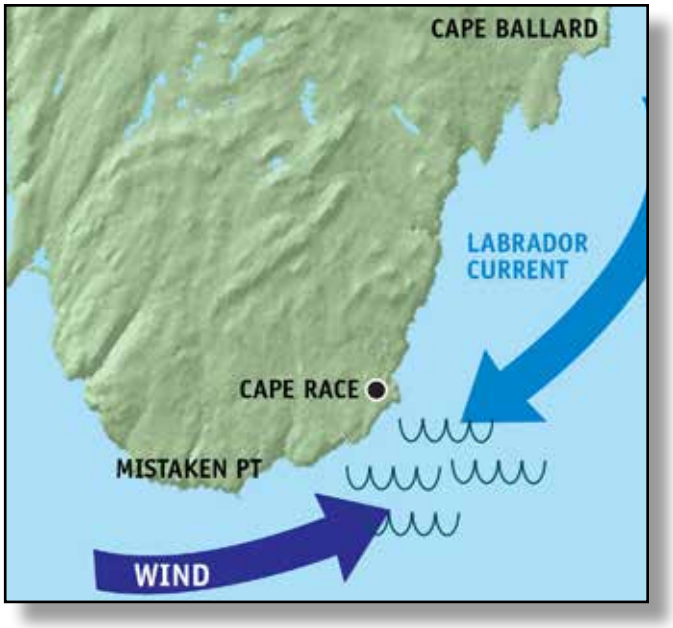
Cornering occurs at several places along the coast, the most extreme example being at Cape Race. Northeasterly winds affected by both coastal convergence and cornering blow up to 25 kt stronger at the cape than they do elsewhere. The same effect occurs, to a lesser extent, with a westerly wind at Cape St. Francis.

When westerlies oppose the Labrador Current, rough seas can make it very difficult for mariners to round Cape Race.

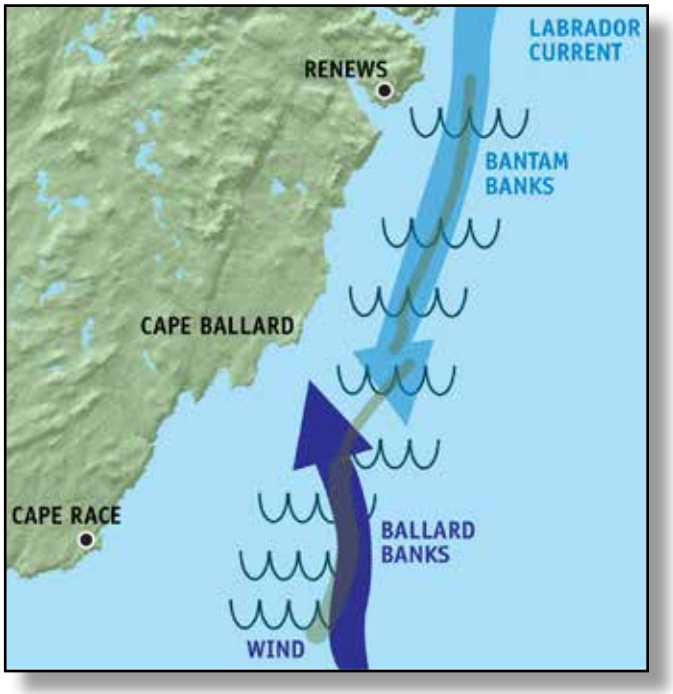
Just a few kilometres off Cape Ballard is a long stretch of banks—called the Bantam and Ballard banks—that run southward toward Cape Race. The shallow banks, which are just over 12 m deep in places, cause steep, breaking seas, even during moderate easterly winds. Conditions are worse when winds become south to southeasterly because they oppose the strong southward arm of the Labrador Current. Mariners say anyone caught in this area during a storm is "at the mercy of God".

A northerly wind blows parallel to this section of coast. If persistent, it can result in fully developed seas with large swells refracted onto the fairly shallow shoreline. This can create rough near-shore conditions. The longer the northerlies persist, the longer it takes the sea to settle down.

Mariners' Tips:
Renews Harbour is very shallow, so navigating its waters in rough weather is difficult.



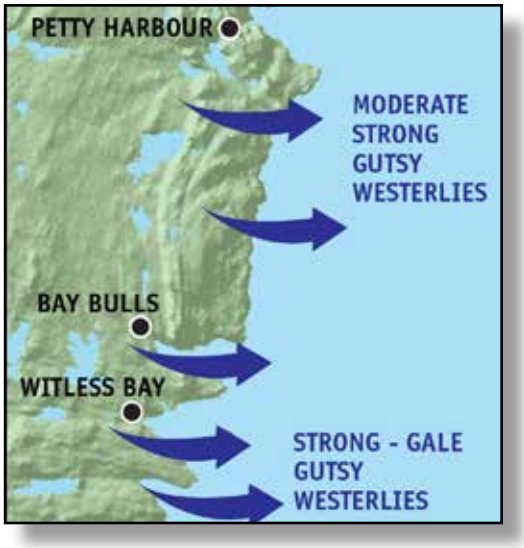
The waters off Cape Race can be very difficult to navigate when a westerly wind opposes the strong Labrador Current.



Steep seas over the shallow banks off Cape Ballard become particularly treacherous when southerly winds oppose the south-going Labrador Current.

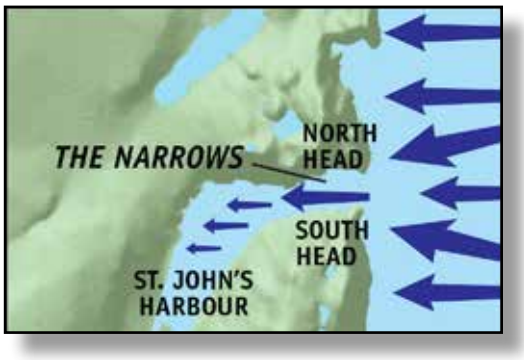
During the summer months, light-to-moderate westerlies often become very gusty in the afternoon near the coast, due to the instability of the air over the land. The gusts are strengthened by funnelling through the many east-to-west-running bays and harbours along the coast, and their effects can be felt as far as 16 km offshore.

Mariners' Tips:
From Cappahayden to Bauline East are several sheltered harbours. One of them, Aquaforte Harbour, is sheltered by Ferryland Head. Fishermen report that even when a gale is blowing at the head, there are only light-to-moderate winds in the harbour.



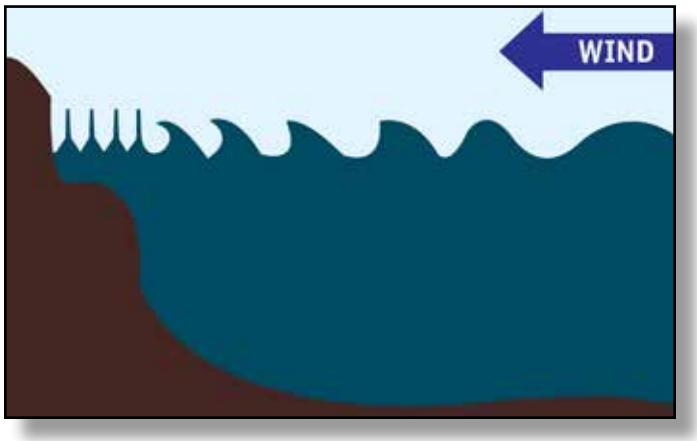
Funnelling through west-east running bays and harbours strengthens often gusty conditions along this coastline in summer, the effects of which can be felt further offshore.

Southwesterly winds are funnelled through St. John's Harbour and may be magnified as they flow through its narrow mouth; easterlies are funnelled but tend to weaken at the harbour's head. Exposure to the east allows large waves to enter the harbour that grow as they funnel through its narrow entrance. Large storm surges can occur here, but the steepness of the land on either side of the harbour reduces the risk of flooding. During the winter, the harbour's entrance is often hampered by ice. Sea ice and small icebergs move in and out of the harbour with the changing wind; easterlies push the ice in, while southwesterlies force it out. An open-water lead may appear along the coast as the ice moves east.



Easterly winds are funnelled as they pass through the narrow entrance to St. John's Harbour but weaken as they move toward its head.

The section of coast from St. John's north to Cape St. Francis is very rugged and steep—as is the sea bottom, which ranges from shoreline level to more than 180 m deep at the Cordelia deeps, a few kilometres off the coast. Extremely steep breaking seas develop along this section during prolonged onshore winds. Except for St. John's Harbour, there is little shelter along this coastline.



Prolonged onshore winds push the seas against the shallow coastline creating steep breaking seas that make navigation hazardous.

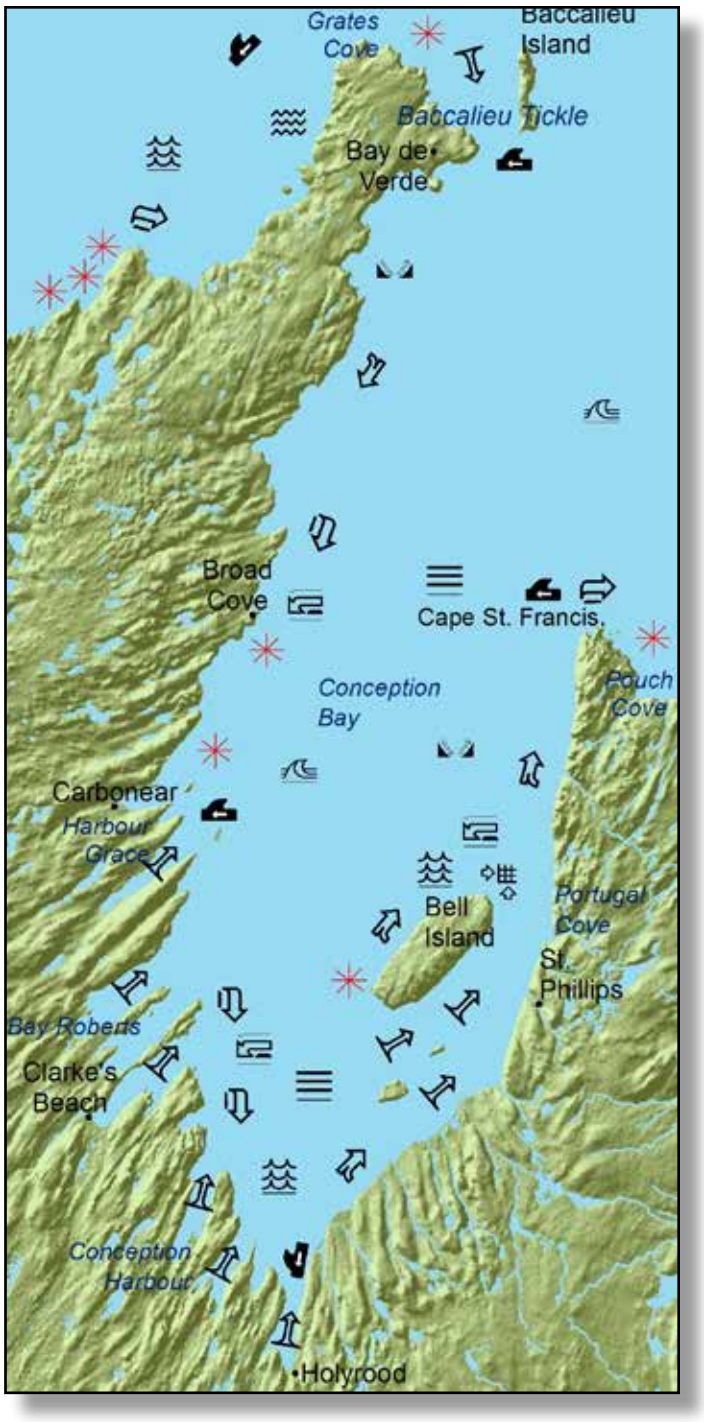
11.1.2 Conception Bay

Conception Bay is a large, deep, V-shaped bay marked by sheer cliffs on its eastern side and rolling terrain to its west. The southwestern portion of the bay is indented by many northeast-to-southwest bays that are prone to funnelling. Elsewhere, the coastline is made up of rugged cliffs, with little shelter available. Shoals on the western side of the bay can produce treacherous seas in northeast winds.

The bay has vast exposure to the north, towards the open ocean. When large waves interact with the shallow coastline, Bell Island, or the narrow and shallow Baccalieu Tickle, very rough seas result.

A strong tidal current runs northward along the northeastern side of Conception Bay when the tide is falling. When a strong northerly wind opposes this current, large waves are forced into the bay. This combination of wind, tide, and waves leads to very steep, confused seas west of Cape St. Francis and around Bell Island.

Strong southwesterlies "split" around Bell Island—intensified on the northern side by coastal convergence and on the southern side by funnelling. These stronger winds meet on the northeast side of the island, resulting in rough crossing seas.



Mariners' Tips:

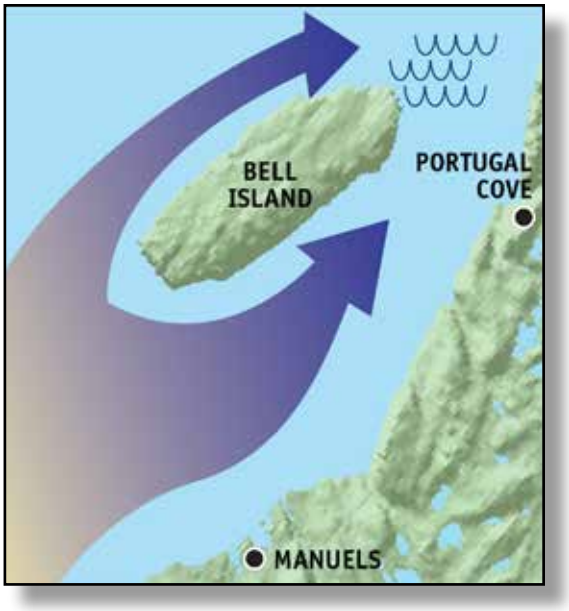
Strong northerly winds generate large seas that are "corralled" into Holyrood Bay. When this occurs at high tide, the seas become high enough to wash over breakwaters and wharves.

The coastline between Cape St. Francis and Portugal Cove is characterized by very steep cliffs (up to 275 m), most of which rise straight out of the water. Strong westerly winds crash against this wall of rock and reflect back upon themselves, leading to gusty, variable winds and confused seas. Southeasterlies "fall" off the cliffs, often causing whirlwinds when they hit the water.

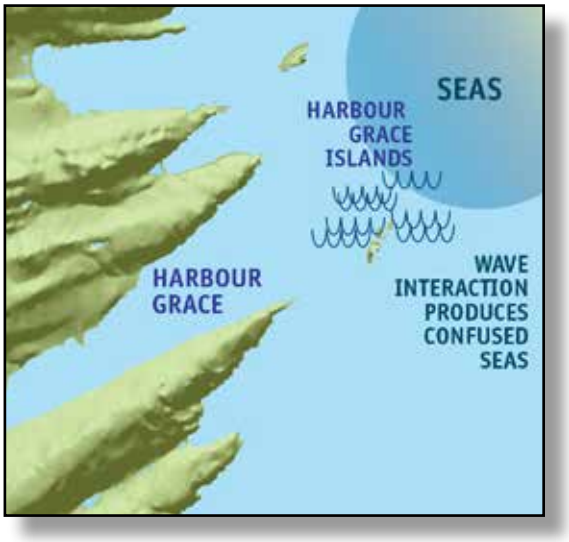
Mariners' Tips:
The funnelling of southwesterlies in the tickle between Bell Island and the coast results in winds 15-25 kt stronger than in other parts of Conception Bay.

Northeasterly winds push large seas into Conception Bay, causing breaking waves when they reach the shallow waters near the northern side of the Harbour Grace Islands. Seas are made even rougher when the waves refract around these small islands. Confused seas occur here within 3-5 km of shore, even in a moderate northeasterly.

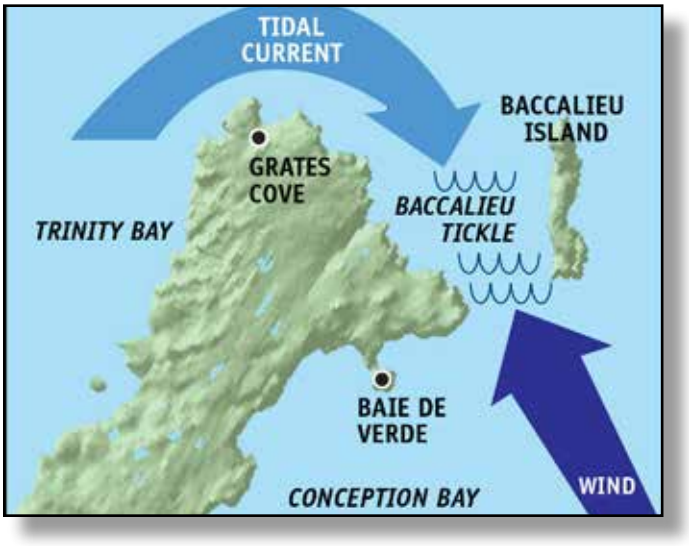
Baccalieu Tickle, a narrow and fairly shallow passage between the island of the same name and the mainland north of Conception Bay, experiences very steep seas when southwesterlies are channelled through it. The effect is complicated when the winds cross or oppose the strong tidal current that moves southward through the tickle when the tide leaves Trinity Bay.



Strong southwesterlies split and flow around both sides of Bell Island, creating rough seas off Portugal Cove, where they converge.



Rough seas can be expected in even a moderate northeasterly in the shallows north of the Harbour Grace Islands and to within 5 km of shore.



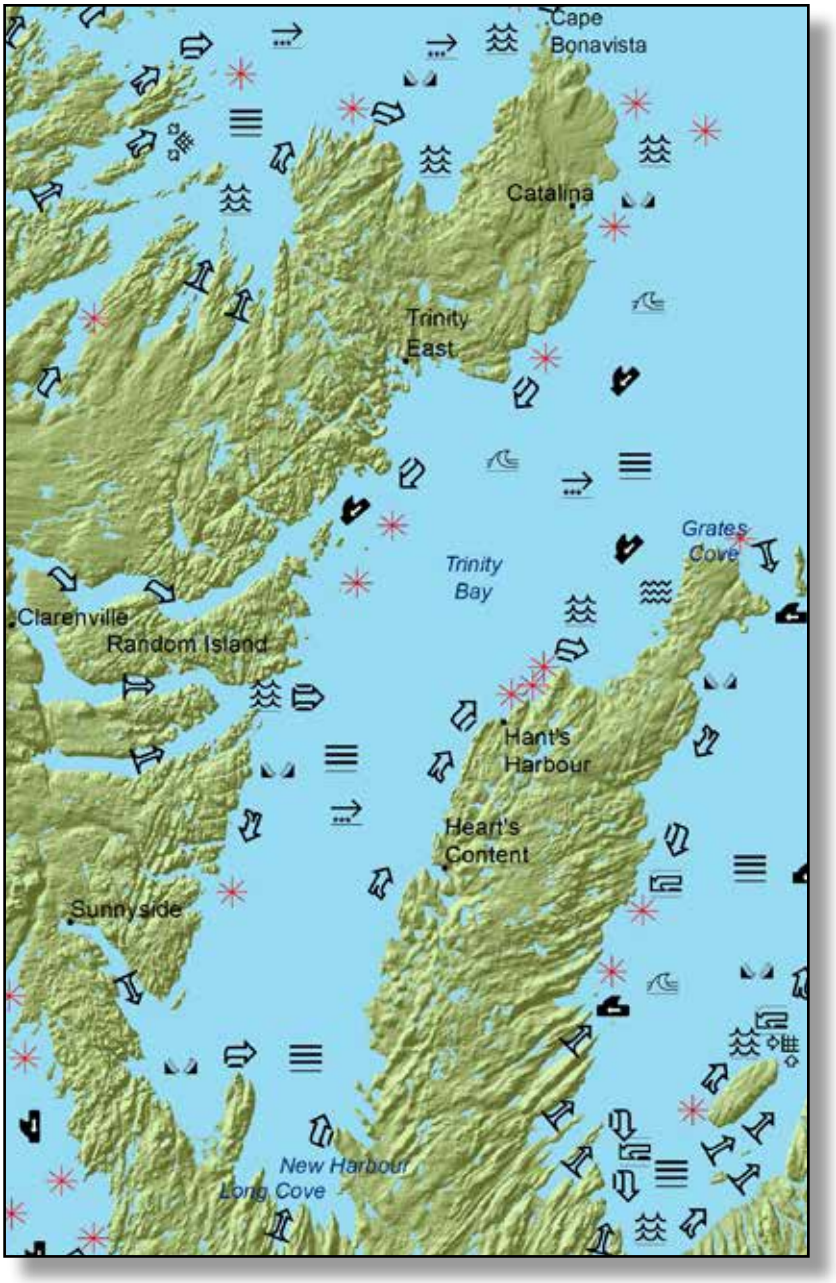
Steep, confused seas occur in Baccalieu Tickle when winds are blowing from the southwest; in particular, when they oppose the tidal current from Trinity Bay.

11.2 Trinity-Bonavista

This area is made up of two large bays that are separated by the Bonavista Peninsula: Trinity Bay to the south and Bonavista Bay to the north. The rugged, rocky coastlines of these bays feature many steep cliffs and are indented by several sounds and inlets. Islands and shoals are common, the latter occurring more frequently to the north. Around Cape Freels alone, there are more than a dozen tidal currents, which cause very rough seas when they oppose one another or interact with the wind and shoals. During the winter, sea ice moves into the bays with the winds and ocean currents. Local marine-weather effects for Trinity Bay and Bonavista Bay are examined in more detail in the following two sections.

11.2.1 Trinity Bay

Trinity Bay is deep and rectangular, with a very rugged coastline, a few small inlets on the eastern side, and numerous large inlets and arms to the west. Funnelling and cornering are common, due to the many sounds and headlands. The inlets along this section of coast are prone to strong winds; however, their entrances are fairly well sheltered from waves. Some streamers are common in the bay from late October to December and during the spring. Gusts, due to the instability of the streamers, can reach values of 25 kt more than the average speed elsewhere.



Although the centre of the bay is very deep, it becomes shallow very quickly near the shoreline, where large Atlantic swells from the northeast break heavily upon its many rocks and shoals. The shoal known as Back of the Knife or "the Rif Raf", off the coast from Salvage Point, is notorious for its rough conditions, as are The Skerries and The Haypooks, two shallow areas of submerged rocks that lie a few kilometres northeast of Little Catalina. Northeasterly winds of moderate or greater strength drive large waves onto the rocks. The waves pile up "like a haystack"—sometimes reaching heights of over 15 m—and break unexpectedly. Northeasterlies also blows across the branch of the Labrador Current in this area, intensifying the rough conditions.

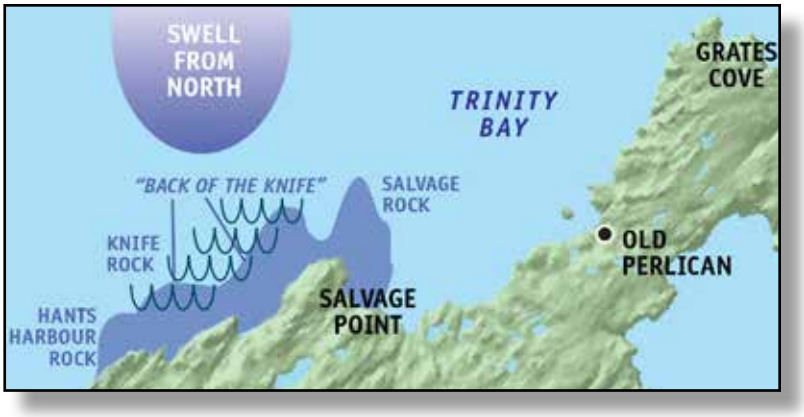
Sea ice is a common sight along the northeast coast of Newfoundland through the winter and spring, and many local fishermen work on or near the ice edge during the winter. The strong tidal currents from Salvage Point to Grates Cove make this area particularly hazardous, as they can cause ice pans to split and head in different directions or force masses of ice to pile up.

Mariners' Tips:
Local fishermen avoid the coastline from Grates Cover to Winterton during strong northeasterly winds, when large waves break heavily against the many shoals along this shallow section of coast.

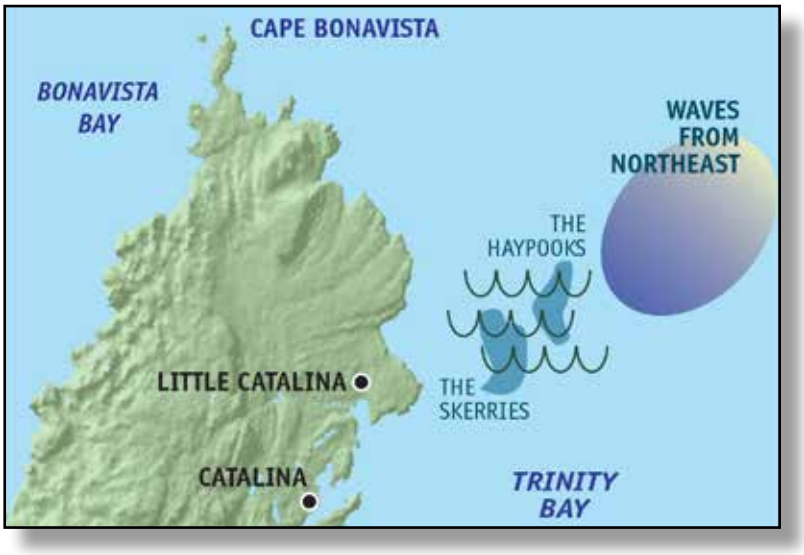
Strong northerly winds push large seas into the bay, the curve of its eastern shore leaving areas north of Winterton greatly exposed. South of Winterton, however, where the water is deeper, the coastline is usually sheltered from the wind and swell.

Tickle Harbour Point, at the tip of a small peninsula at the head of Trinity Bay, receives the brunt of strong southwesterlies that blow, unobstructed, across the narrow and barren isthmus between the Avalon Peninsula and the rest of Newfoundland. The winds, which also blow strongly in the bay, are made stronger and gustier by cornering effects at the point.

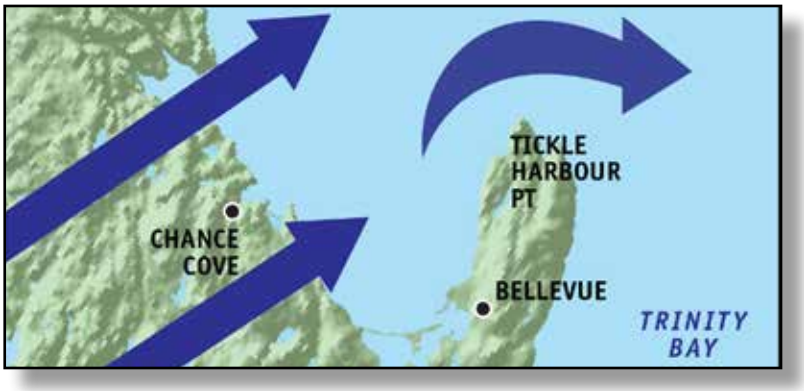
Southwesterly winds often bring good weather to Trinity Bay; however, from winter until early summer, persistent blows carry fog from Placentia Bay into the southern half of Trinity Bay.



Rough seas are found over the shoals known as Back of the Knife or "the Rif Raf", a few kilometres off the coast between Salvage Point and just south of Hants Harbour Rock.



Waters as shallow as 7 m, lined with submerged rocks, cause waves from the northeast to pile up and break heavily at the The Haypooks and The Skerries.



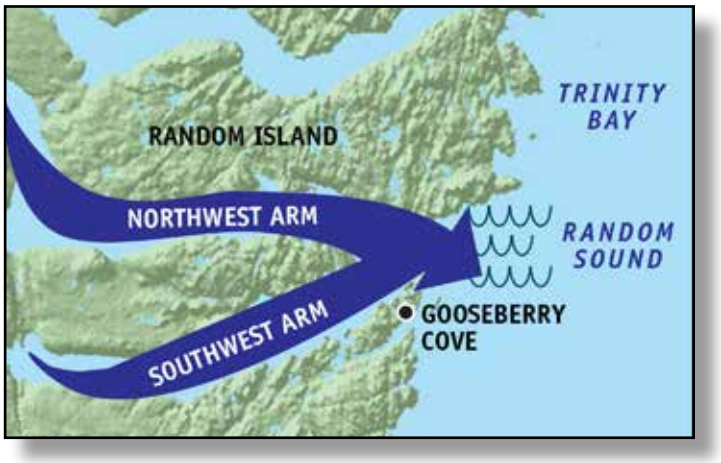
Strong southwesterlies become stronger and gustier at Tickle Harbour Point as the result of cornering effects.

Mariners' Tips:

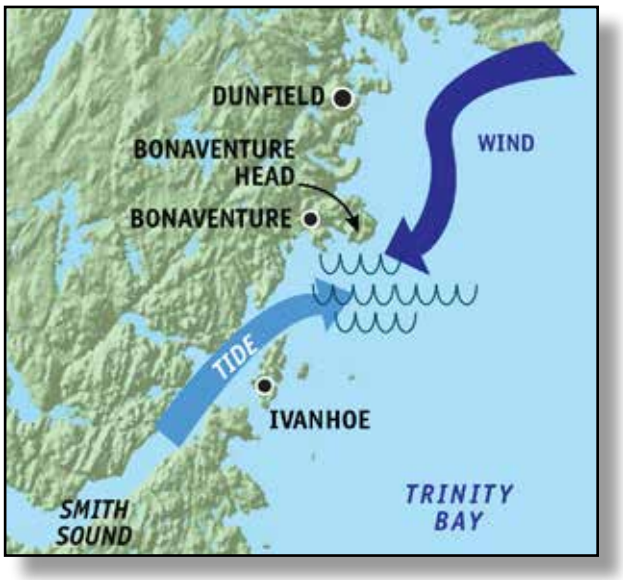
Sea breezes tend to be prevented from developing along the eastern shore of Trinity Bay due to its higher terrain, but they do occur along its western shore. During spring and summer, easterly-to-northeasterly sea breezes in the area can reach 20-25 kt.

Strong westerly winds funnel down the Northwest Arm and the Southwest Arm, producing choppy seas where they converge in Random Sound. Southwest winds in the Southwest Arm are often up to 20 kt stronger than those in the bay, due to funnelling.

Smith Sound is a narrow and well-protected waterway that snakes from east to west along the north shore of Random Island. Winds are channelled through the sound but are not usually funnelled, due to its width and many curves. The mouth of Smith Sound is well sheltered from the large swells that roll into Trinity Bay, although northeasterly winds bring large seas into the bay, particularly along the western shore. When an ebb tide is moving out of Smith Sound, confused seas develop near Bonaventure Head. The effect is compounded when northeasterly winds corner around the head and become even stronger. Under these conditions, the seas seem to approach from all directions.



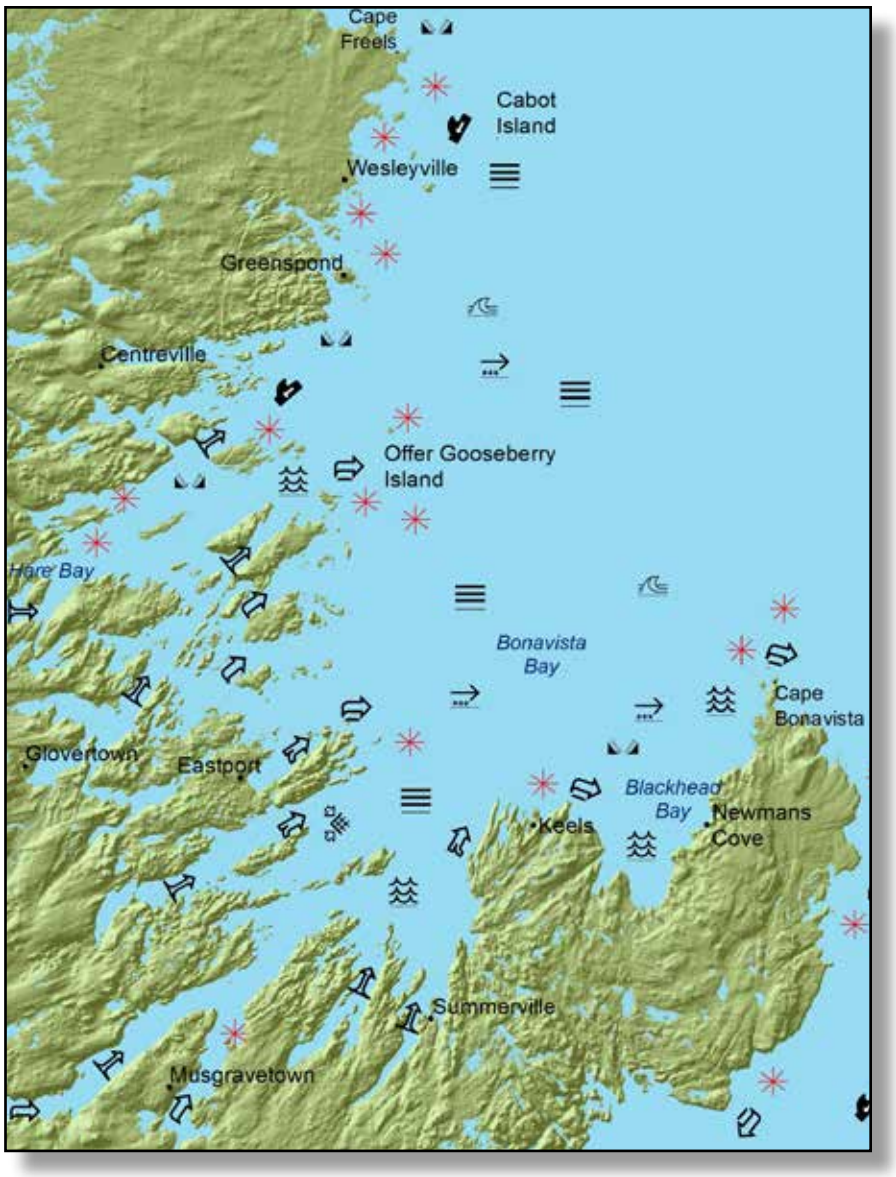
The funneling of strong westerly winds down the Northwest and Southwest arms produces choppy seas in Random Sound.



When an ebb tide moving out of Smith Sound opposes strong northeasterly winds, rough seas develop off Bonaventure Head.

11.2.2 Bonavista Bay

Bonavista Bay is a large, irregularly shaped body of water that is completely exposed to the northeast. Its rugged, rocky coastline—in places, marked by steep cliffs—is indented with channels and sounds, and its offshore waters are dotted with islands. This varied geography makes funnelling and cornering very common. While the main body of the bay is deep, as are many of its channels, its coastal and island waters are generally quite shallow. As such, they tend to be characterized by shoaling and rough seas.



The bay is also subject to strong tidal currents, which create rough seas when opposed by the wind or large waves. The currents also influence the motion of the thick sea-ice that moves into the bay every winter, some of which is also driven by a north or northwest wind.

The many small islands in the western part of the bay offer excellent shelter from large Atlantic swells, which break on the shoals, rocks, and steep shelf that lie between them and the deep waters of the bay. The seas diminish inside Offer Gooseberry Island.

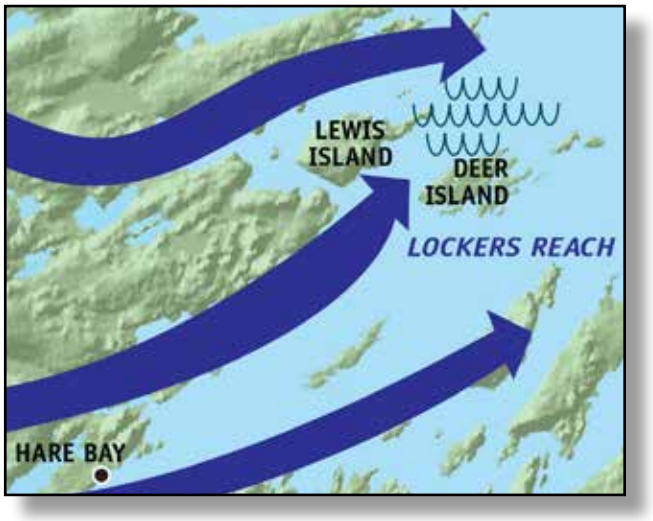
During the summer months, when the waters in Bonavista Bay reach their maximum temperature, fog usually remains offshore from about 24 km east of Cabot Island to 48 km northeast of Cape Bonavista. When it is pushed into the bay by east or northeast winds, the warm water causes it to lift into a deck of low cloud. It is difficult for fog to form in the bay because warm winds, like those from the southwest, are usually fairly dry, while winds from other directions are too cold.

Cape Bonavista is a barren point of land exposed to the full force of the wind from virtually every direction. Westerlies here undergo cornering around the cape, making them even stronger. Wave energy is also focused at the headlands because they are shallow. The shallow water and shoals just offshore make this area very rough whenever the wind is strong. Local mariners sail 6-8 km offshore to avoid the turbulent seas.

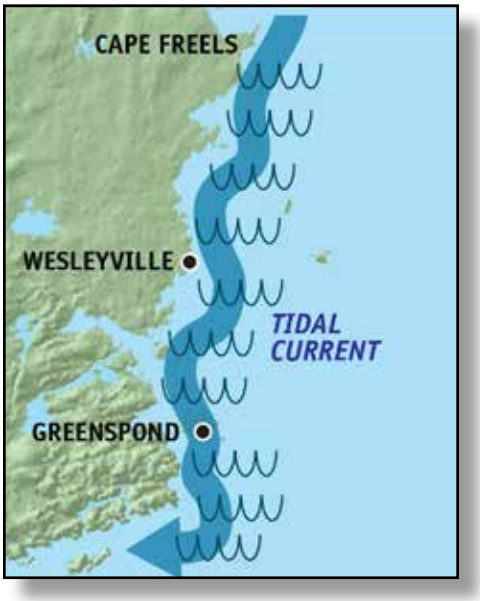
Mariners' Tips:

Freezing spray is common along this coast in winter, especially along the eastern coast of Blackhead Bay to Cape Bonavista, where there is usually enough fetch over open water for it to develop.

Westerly winds undergo funnelling and coastal convergence on the north side of Lewis Island. Through Lockers Reach, to the south, the winds are channelled to become southwesterlies and then funnelled between Deer Island and Lewis Island. Where they intersect on the east side of Lewis Island, there are strong winds and choppy seas.



Westerly winds strengthened by channelling, funnelling, and coastal convergence intersect on the east side of Lewis Island, creating choppy seas.



A strong tidal current causes rough seas along this stretch of coastline, even in good weather, and even worse ones when a southwesterly wind is blowing.

The seas between Cape Freels and Greenspond are rough, even on a calm day, because of a strong tidal current that runs along this shallow stretch of coast. They become even choppier when a southwesterly wind opposes the current, prompting local mariners to sail up to 16 km offshore just to avoid them.

11.3 Notre Dame

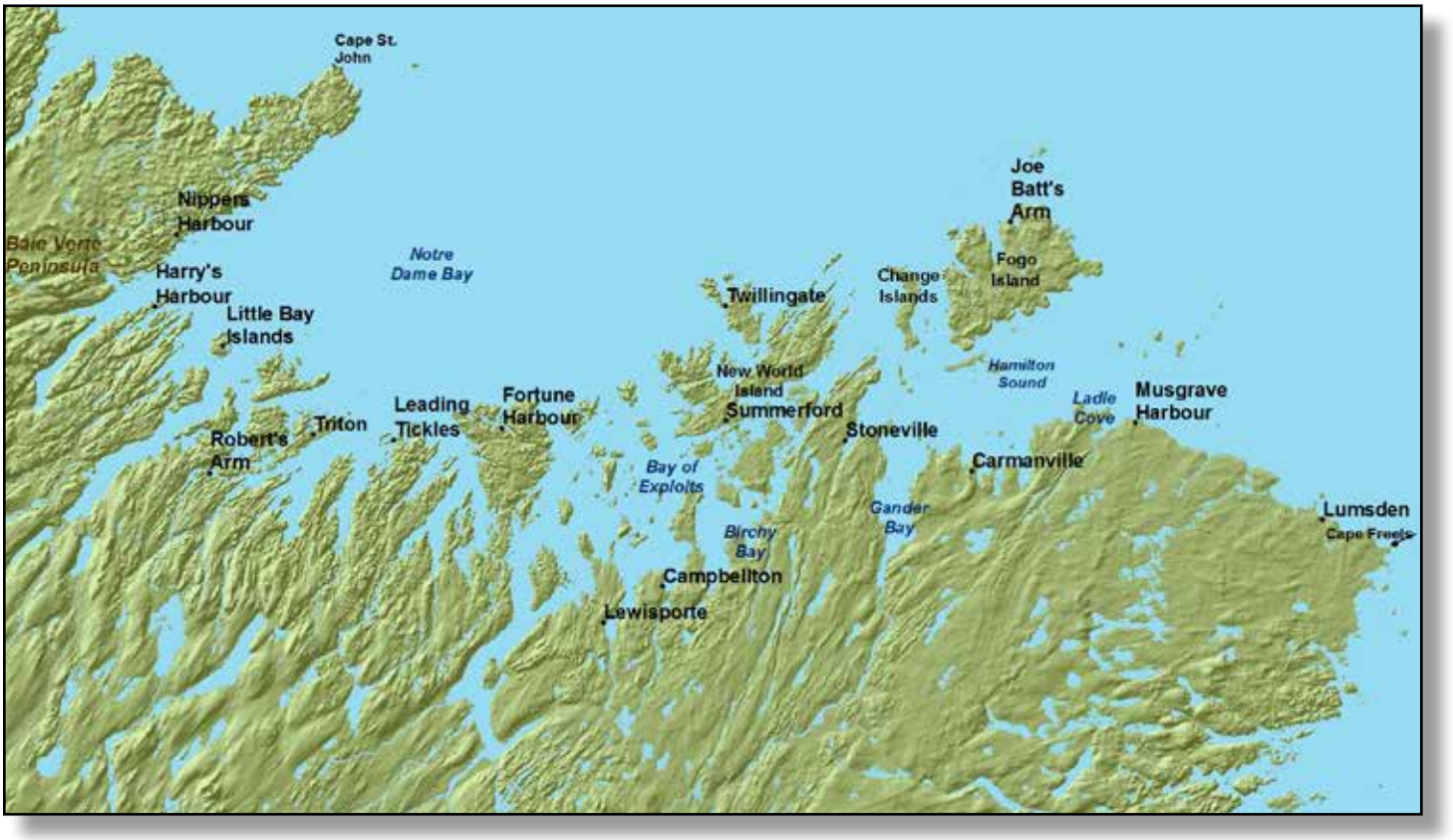
This section of coastline runs generally from east to west, from Cape Freels to the Baie Verte Peninsula. It is indented by many north-to-south-running bays and inlets, and many islands lie off the coast, two of the largest being New World Island and Fogo Island.

Numerous shoals and shallow areas are found near the shore, especially around the islands. These shallow areas, combined with strong tidal currents and strong spring run-off, produce very rough seas in many spots.

Light-to-moderate southwesterlies often gust to strong or gale force on sunny summer afternoons as a result of the unstable conditions caused by solar heating. This usually occurs within 8-10 km of the coast and ends at sunset.

Sea ice reaches the area by late January, the moving pans of ice creating a serious hazard for shipping activities in the winter and spring. Icebergs also move in along the coast in spring, transported by the Labrador Current.

Information of local effects along this coastline is divided into two sections: Cape Freels to Campbellton; and Campbellton to Cape St. John.



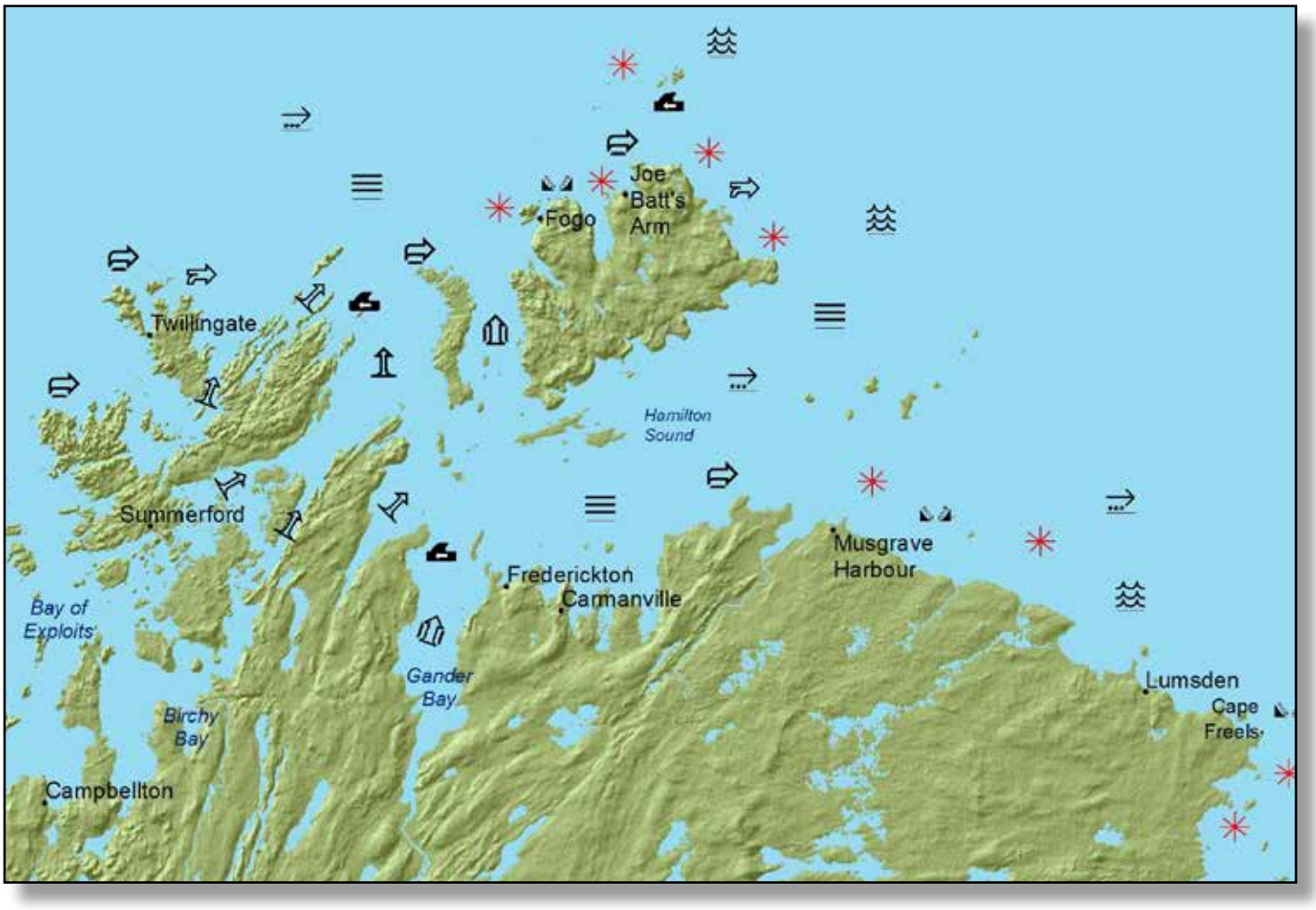
11.3.1 Cape Freels to Campbellton

The terrain along this part of the coastline is fairly flat to the east, with higher ground to the west. Offshore, there is a chain of large islands running northeastward from the Bay of Exploits. The channels that separate these islands not only have many shoals and strong tidal currents but also channel and funnel the winds flowing between them. This makes for rough, hazardous seas.

Mariners' Tips:

East-to-northeast winds cause very rough seas along this coast, which is exposed to the open sea and characterized by shallow coastal waters.

The weather along this coast can be extremely harsh. To the north—where the islands are completely exposed to the cold Atlantic ocean—snow, fog, and freezing drizzle are common. Icebergs are often sighted in spring, as tidal currents bring them close to shore, posing a serious threat to navigation and marine operations.



The flatness of the coastline from Cape Freels to Frederickton creates little difference in friction between the sea surface and the land. As a result, westerly winds do not experience significant convergence along this section.

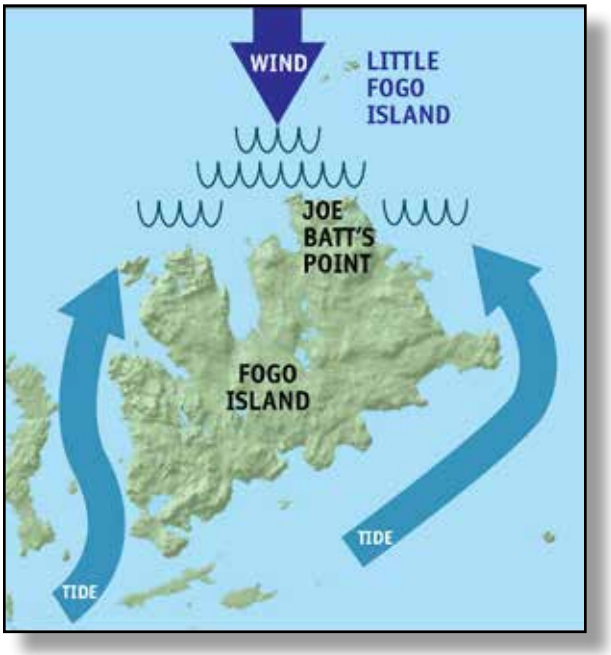
Fogo Island, a few kilometres off the northeast coast, has a gently sloping shelf on its north side that extends into the Atlantic. The island's vast northern exposure and shallow offshore waters lead to very rough seas when winds are from the north or northwest. Conditions often worsened between Joe Batt's Point and the Little Fogo Islands due to strong tidal currents. Seas are much calmer on the sheltered, south side of Fogo Island in these situations.

In the waters near the northern end of the Change Islands, the seas become very rough when the tide ebbing out of Hamilton Sound meets a strong northwesterly wind. This effect is reported to extend nearly 16 km out to sea. Local mariners use extreme care under these conditions.

Mariners' Tips:

When seas are rough between Bacalhao Island and the Change Islands, the waters inside Herring Head are usually much calmer.

During the summer months, and especially in August and September, sea breezes are common—in particular, when there is a ridge of high pressure over Newfoundland. In such cases, the lighter prevailing winds are overpowered by the flow of air created by the land-sea



When north or northwest winds meet an opposing tidal current, the seas can become quite rough in the shallow waters off the north coast of Fogo Island.

When an ebb tide from Hamilton Sound meets opposing northwesterlies, rough waters can be found for a fair distance off the northern end of the Change Islands.

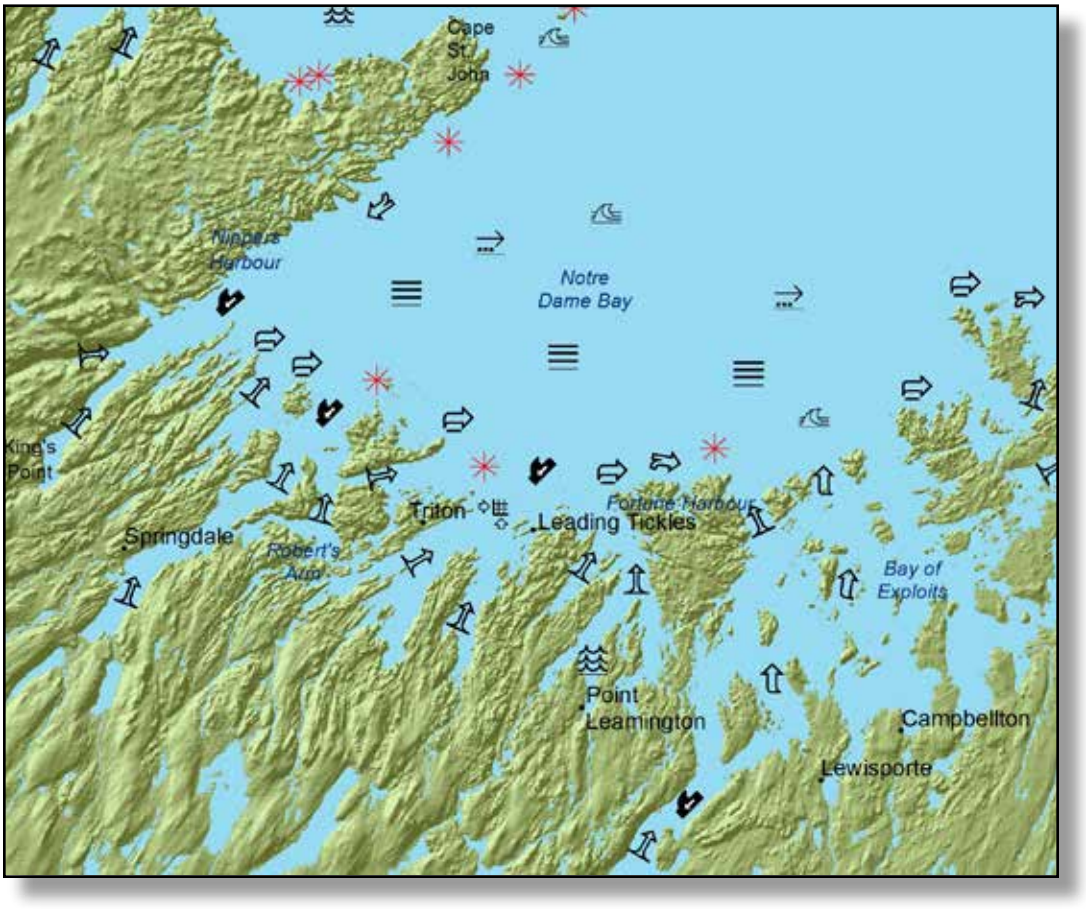
temperature difference, which increases as the land is heated. As a result, a 10-15-kt westerly wind with sunny skies in the morning often switches to a cool easterly wind of 15-20 kt in the afternoon, as the sea breeze sets in. Offshore fog can also be driven to the coast on these breezes.

Every spring, icebergs can be seen off the northeast coast of Newfoundland. Tidal currents often bring them close to shore, where they can enter harbours and become grounded in shallower water.

Mariners' Tips:
If the sea ice in Bonavista Bay is blocked and the wind is from the northwest, sea ice often moves into Hamilton Sound. If, however, the bay is ice-free, the sea ice usually stays out of the sound.

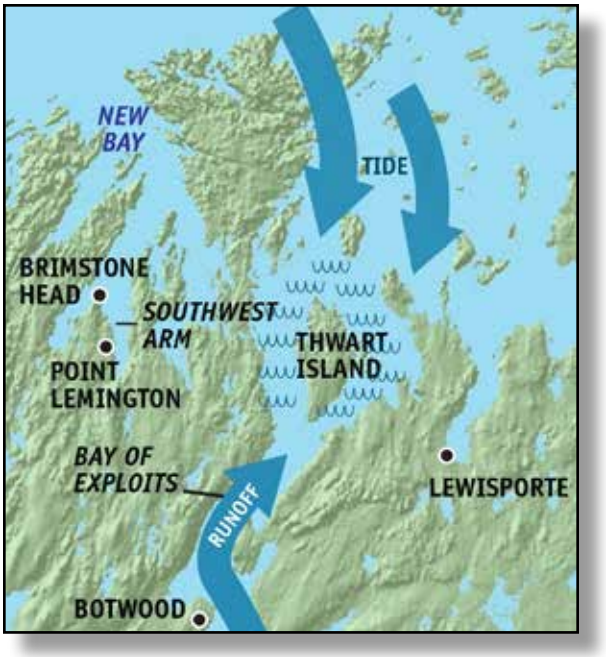
11.3.2 Campbellton to Cape St. John

This rugged stretch of coastline is marked by fairly steep cliffs punctuated by several northeast-to-southwest bays. Channelling and funnelling of southwesterlies and northeasterlies through the bays and between a few of the small islands along this coast are common.



Like most of the bays and inlets that indent this coastline, Notre Dame Bay is fairly deep; however, there are a few shallow areas near the coast where shoaling occurs, especially near the islands. Rough seas also occur when winds blow against the strong tidal currents in the bays.

Spring run-off can contribute to rough seas and strong currents in and near many of the bays, in particular the Bay of Exploits. During the spring, when much snow and ice melts into the Exploits River, a strong current of fresh water flows into the bay. When it meets an incoming tide or is opposed by the wind, very choppy seas result. These conditions are compounded by local tidal currents, which are strengthened by the bay's funnel shape.



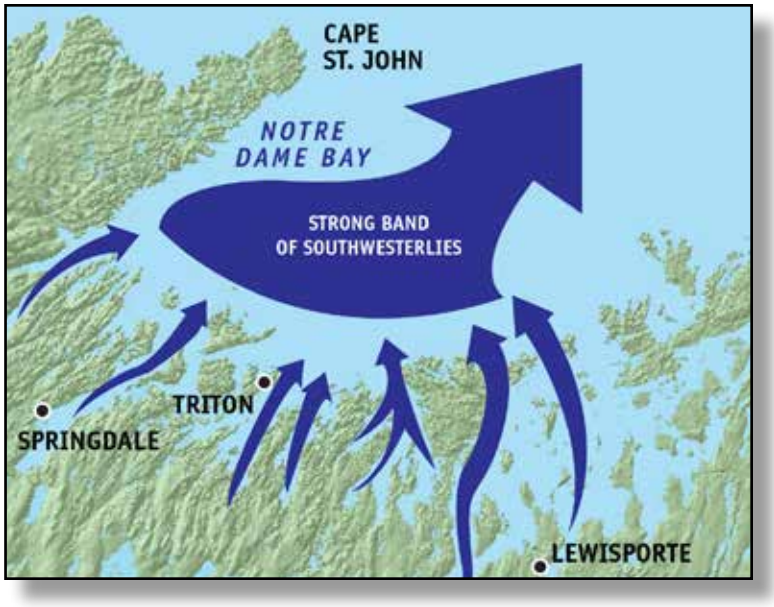
Spring runoff boosts the volume of fresh water flowing from the Exploits River, creating rough seas in the Bay of Exploits, especially in an opposing wind or tide.

Freezing drizzle often occurs in spring, when sea ice and cold, open water are present offshore. Northeasterly winds push cool air over this mixture of ice and water, making the air very moist. When the temperature is between 0°C and -7°C, freezing drizzle and fog result.

Mariners' Tips:

Tidal currents running into New Bay, and then into the Southwest Arm, refract around Brimstone Head, causing steep, choppy seas from Point Leamington to Brimstone Head.

Southwesterly winds are funnelled between the cliffs that line the many northeast-to-southwest-running bays that empty into Notre Dame Bay—and between the many islands along its shores—causing powerful winds in the bay, where they converge. In such conditions, caution should be exercised when crossing the entrances to the bays or leaving the shelter of the islands. This effect is strongest in the summer, when the land is heated to its maximum. The orientation of these bays also causes northeasterly winds to undergo funnelling and coastal convergence along the eastern side of the Baie Verte Peninsula. If these strong winds oppose the tide ebbing out of the Southwest and Middle arms, very rough seas can develop in Green Bay.



Funneling caused by the orientation of the many bays flowing into Notre Dame Bay creates a strong band of southwesterlies where these powerful winds converge.

Strong northeasterlies strengthened by funnelling and coastal convergence cause very rough seas in Green Bay when they meet an ebb tide from the Southwest and Middle arms.

11.4 Newfoundland North

This section of the Newfoundland coast is dominated by the Long Range Mountains, which are indented by several bays that open into the Atlantic. Lee-wave effects are common because of the mountains, while funnelling affects the steep-walled bays.

This coast is exposed to the full force of the north Atlantic Ocean from the northeast. The abundance of cold water and ice leads to frequent, heavy snow in winter, and freezing precipitation and fog are common in spring. Most of the water along this coast is quite deep and shoaling is infrequent. Rough seas develop, however, when large seas or strong winds interact with the vigorous tidal currents that run throughout the region. For easier reading, this coastline is examined in two sections: Cape St. John to Harbour Deep, and Harbour Deep to Cape Bauld.

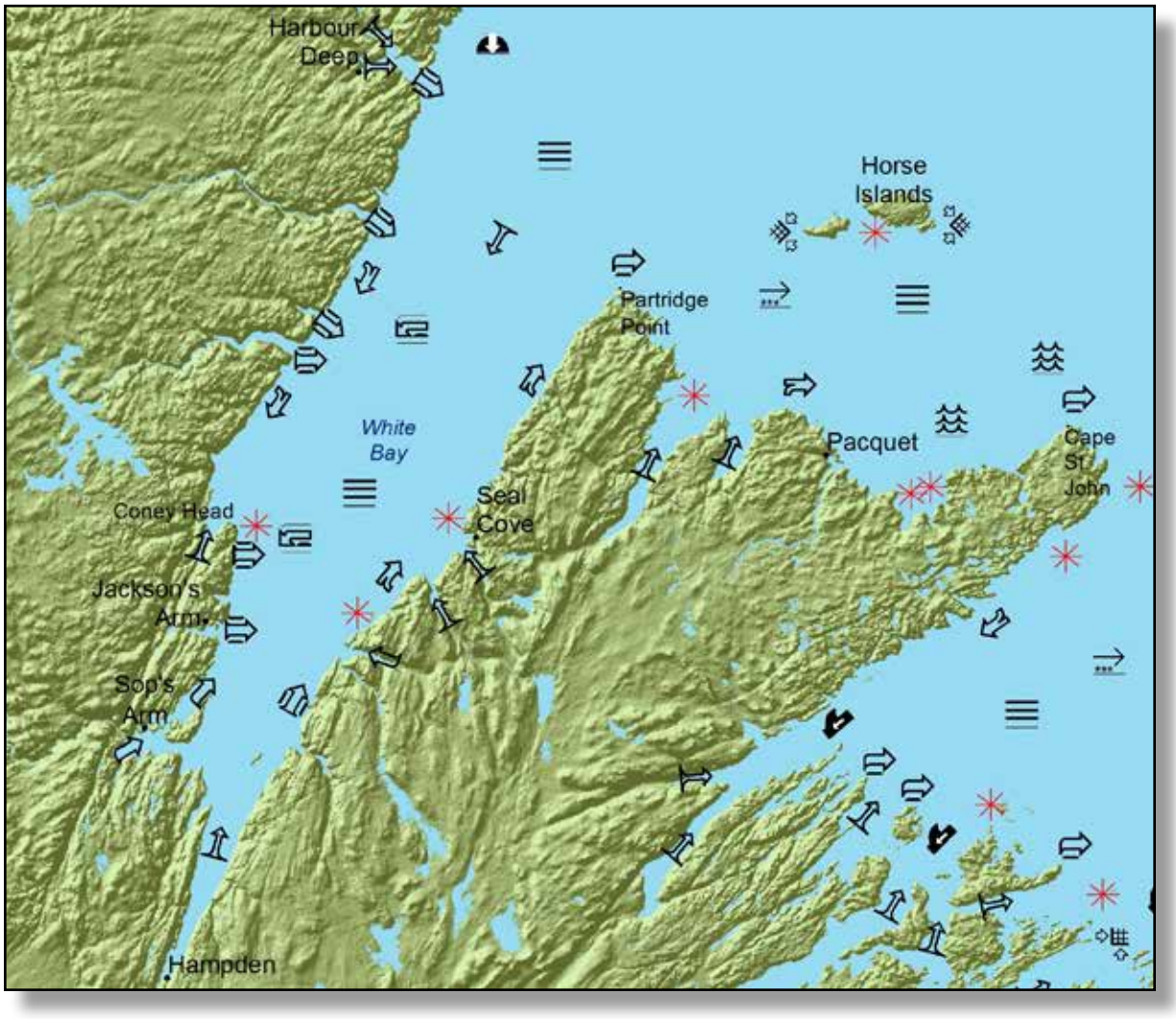
11.4.1 Cape St. John to Great Harbour Deep

This section of coast begins on the extreme eastern end of the Baie Verte Peninsula and is bordered by the Northern Peninsula to the west. On the Baie Verte Peninsula, the bays run from southwest to northeast; on the Northern Peninsula, from east to west. The largest bay in the area is White Bay, a large, deep, and V-shaped bay that extends from northeast to southwest.

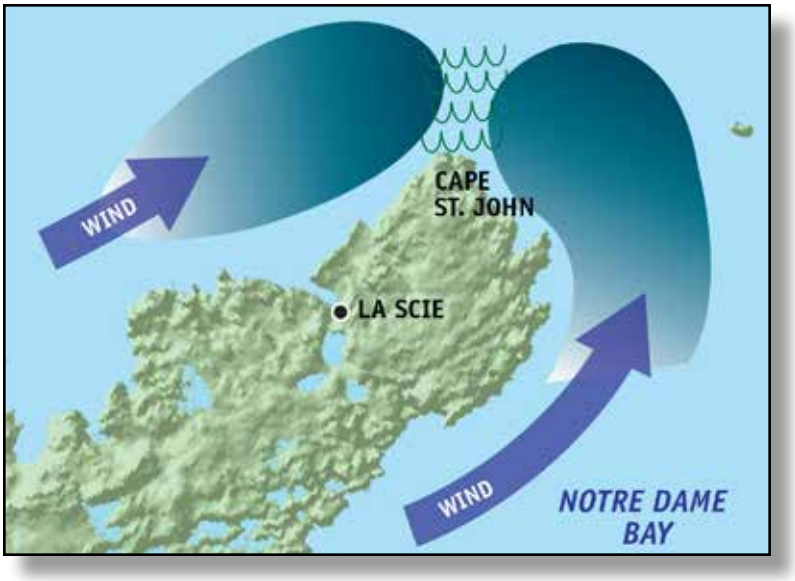
Seas in this area are often very rough. Hazardous conditions are produced by shoals along the northern shore of the Baie Verte Peninsula, strong tidal currents, the Horse Islands, large ocean swells, and several exposed capes.

Mariners' Tips:

Mariners report that when sea ice is 30-50 km off the coast of the Horse Islands, the ice will stay offshore—even if a northeast wind blows for a few days.



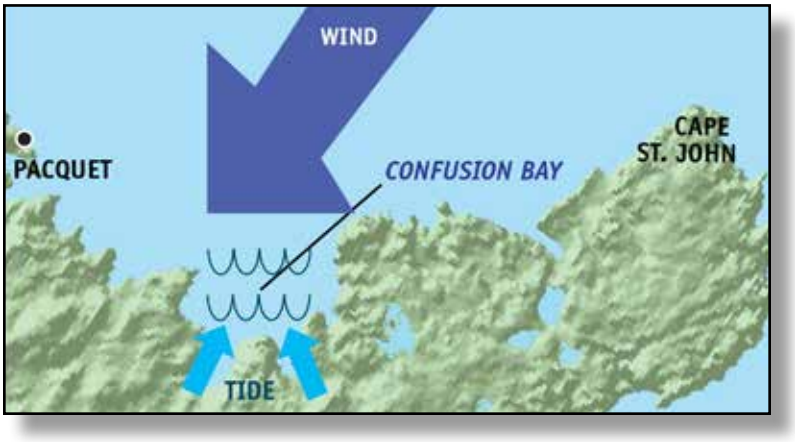
South-to-southwest winds generate northeast-running currents in Notre Dame Bay and along the coast just west of Cape St. John. These currents are redirected around the cape, causing them to cross just to its north. Under these conditions, seas can become very rough within 5-24 km north of the cape.



Rough seas can be found as far out as 24 km north of Cape St. John due to crossing currents generated by south-to-southwest winds.

Aptly named Confusion Bay, on the north shore of the Baie Verte Peninsula, is quite shallow, with shoals along its shore. Seas become very confused when an onshore wind forces large ocean waves onto the shoals, and conditions worsen when the tide in the bay opposes the wind. Local mariners use caution when navigating this bay during northeasterlies.

Mariners' Tips:
The refraction of waves around the Horse Islands leads to crossed seas on its leeward side.



Large, wind-driven waves forced onto the shoals in shallow Confusion Bay cause confused seas that are made even more hazardous in an opposing tide.

When the tide runs out of White Bay, a strong eastward tidal current sets up between the Horse Islands and the Baie Verte Peninsula. Very strong seas result when a brisk easterly or northeasterly wind opposes this current.

Southwesterlies are funnelled between the steep cliffs that border White Bay near Hampden and are channelled through Sops Arm. The result is strong and sustained southwesterlies in White Bay, even when moderate southwesterlies are being reported elsewhere.

Northeasterlies undergo funnelling in White Bay and are also increased by coastal convergence along its western side. These strong winds push large waves into the bay, which break along the relatively shallow shoreline. Seas are, therefore, extremely rough over this part of the coast.

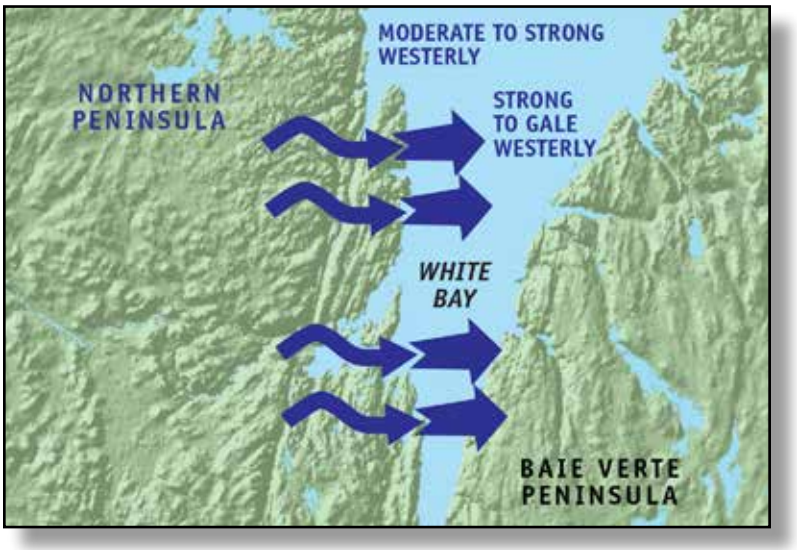
Mariners' Tips:
Coastal convergence strengthens southwesterlies along the eastern shore of White Bay more than along the western shore.

Deep low-pressure centres that pass east of the Baie Verte Peninsula are characterized by strong northeasterly winds and accompanying storm surges in White Bay. The bathymetry of the V-shaped bay makes it prone to flooding from storm surges, especially at the head of the bay at high tide.

Whirlwinds near the coast usually accompany strong mountain waves when the wind speed exceeds 30 kt. These can be very hazardous to small boats.

The western side of White Bay is bounded by steep, high cliffs. Strong cliff effects result when westerly winds blow off these cliffs and "fall" to the water below. Mariners report a band of fairly light winds within 8 km of the coast (except as noted below) increasing to very strong westerlies farther into the bay. These intensified westerlies are often strong enough to trap boats along the eastern side of the bay.

The wind patterns near the western coast of the bay become complicated near the mouths of the smaller bays on the western side, so mariners must exercise caution. Westerly winds intensify as they pass through these steep-walled bays; across the mouths of the bays, the winds can reach 50-60 kt, while in White Bay, they are at 20-30 kt. The wind bands along the western coast of White Bay therefore range from light to storm-force, depending on the location in the bay.

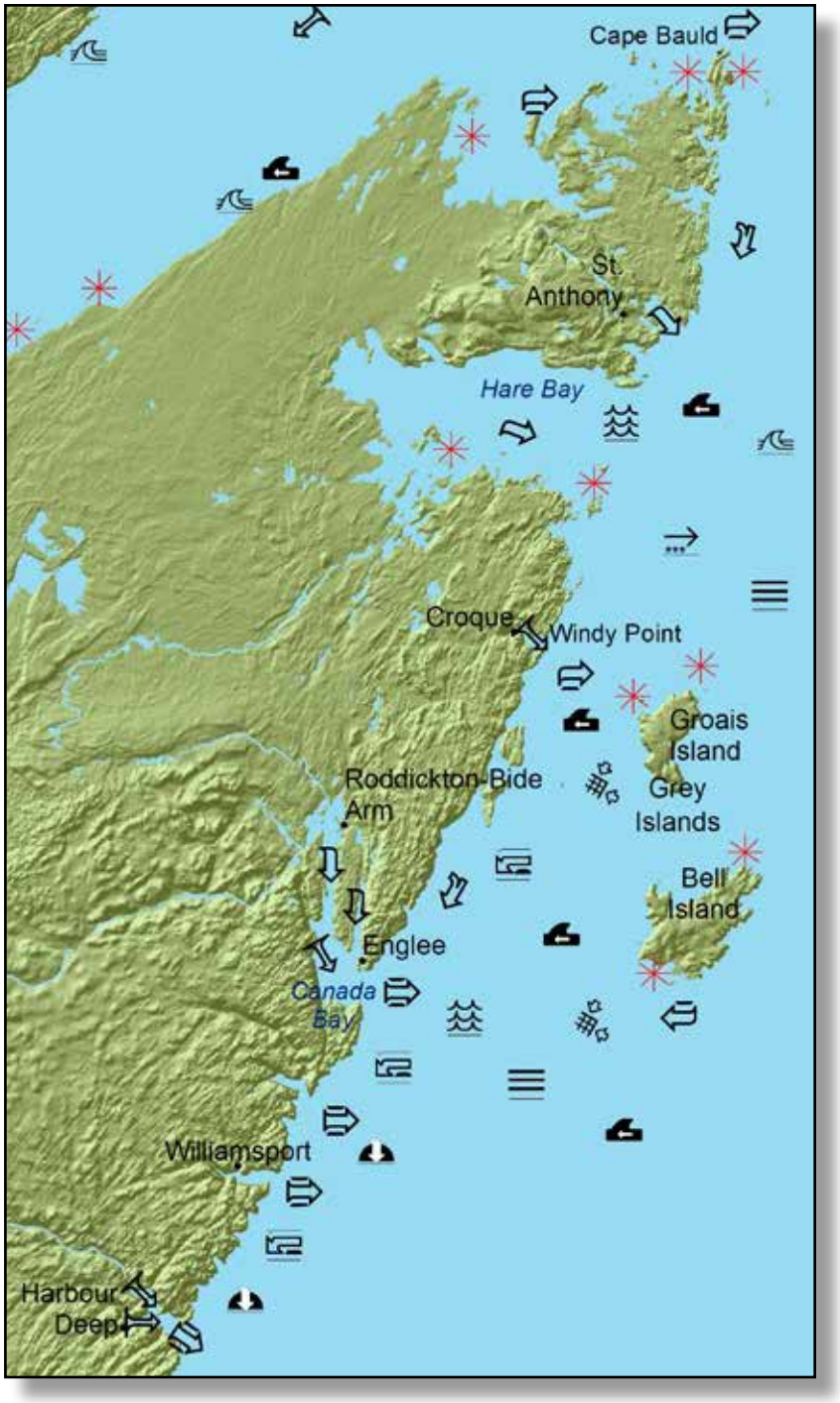


Westerly winds are intensified off the western coast of White Bay, where they "fall" off coastal cliffs and are funnelled through small, steep-walled bays leading into it.

11.4.2 Great Harbour Deep to Cape Bauld

As along most of the Newfoundland coastline, the weather in this area can be very harsh. Along this section of coast, the Long Range Mountains dominate the south, while flatter and swampier land lies to the north. Two fairly large bays indent the coast: Canada Bay and Hare Bay. The presence of the mountains makes lee-wave effects common, and the bays are prone to funnelling and channelling. Local wind effects are also pronounced around the Grey Islands, which lie just offshore.

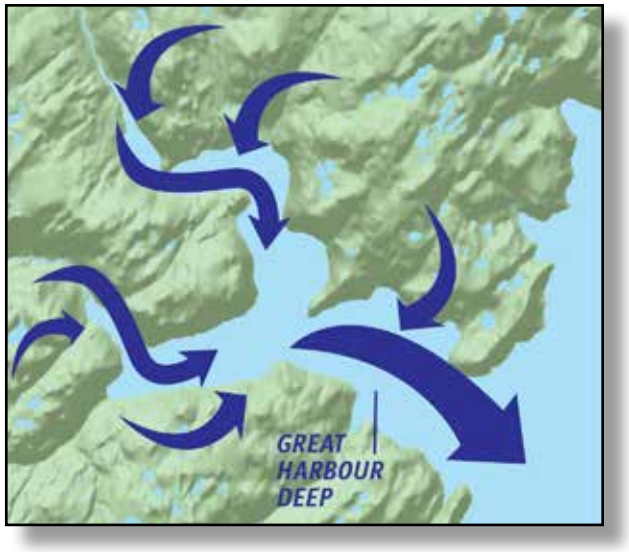
The water off this shoreline is relatively deep, so shoaling is limited to a few areas around Hare Bay, the Grey Islands, and near Cape Bauld. Rough seas are created mainly by the combined wind, tide, and wave-refraction effects around islands. By December, sea ice covers most waters and remains until early summer, leading to long, cold, and snowy winters and springs.



Mariners' Tips:

Since strong northwesterly winds along the Labrador coast generate a large ground swell, mariners have come to expect similar conditions along this stretch of coastline within a day after the swell arrives from the north.

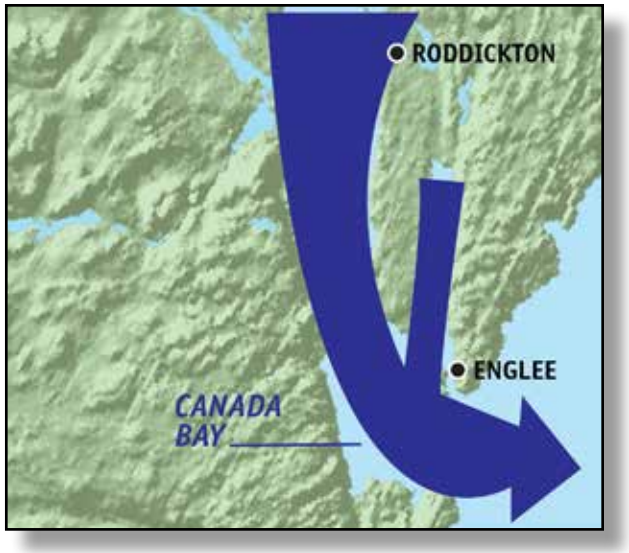
In Great Harbour Deep, as in most bays along this stretch of coastline, drainage winds are quite common during the summer, resulting in cool westerly winds of about 20 kt in the morning. The winds diminish soon after sunrise, as the sun begins to reheat the air.



Drainage winds are common in the bays along the coast, producing cool, moderate westerly winds in the mornings.

Mariners' Tips:
Extreme caution should be used when crossing the fjords along the southern half of this coast under westerly winds, as funnelling and channelling increases their speed by up to 30 kt.

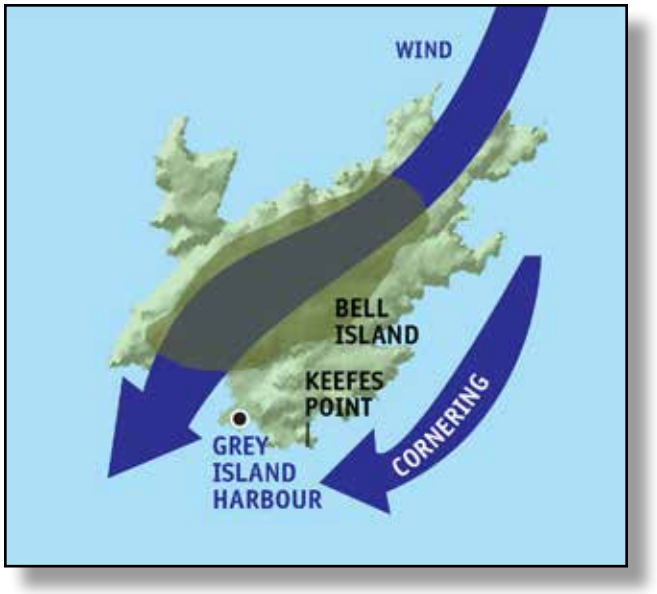
Westerly and northwesterly winds are channelled and funnelled through the high cliffs that line Canada Bay, producing particularly strong westerlies at its mouth. Winds reported from the automated observing station at nearby Englee are usually two to three times faster than those recorded farther north. It is suspected that mountain waves are also a factor in these strong winds.



Very strong westerlies occur at the mouth of Canada Bay, as the winds are intensified by channelling and funnelling through its high cliffs.

Northeasterly winds undergo cornering at Keefes Point, on the southeast corner of Bell Island (the southernmost part of the Grey Islands). Strengthened by mountain waves produced by the 150-m hills that dominate the island, they can gust up to 20 kt faster than the northeasterlies blowing 16 km to the south.

Aptly named Windy Point lies at the southern end of the mouth of Croque Harbour. Westerly and northwesterly winds intensify as they funnel through the harbour and are further strengthened by cornering at the point. Northeasterlies, too, are increased when they undergo coastal convergence.



Mountain waves and cornering effects make northeasterly winds strong and gusty at the southeast corner of Bell Island.

Mariners' Tips:
Along this coast, seas tend to be higher between Croque Harbour and Cape Bauld due to shallower water and greater exposure to the open ocean north of the Grey Islands.

Mariners' Tips:
Seas can be rough near the coast in the spring, when strong currents are created by run-off. Local mariners report that the roughest seas are found at the mouth of Hare Bay.

12. Labrador

Local marine weather effects in Labrador are examined in three sections: Labrador South, Hamilton Inlet, and Labrador North.

12.1 Labrador South

This steep, rugged coast is dotted with numerous islands and east-to-west-oriented bays that cause funnelling and channelling. Exposed to the full fury of easterly gales, the coast is pounded by large waves, making navigation hazardous. The Labrador Current runs southward, parallel to the coast. Southerly gales that oppose this current create steep seas off the headlands.

Fog remains offshore under a south-to-southwesterly flow but is common and often dense over the cold waters of the Labrador Current. Ice begins to form along the north Labrador coast by late November and moves quickly southward to cover the south coast by early to mid-December. Melting usually begins in May or June.

The coastline between Island of Ponds and West Bay, oriented northwest to southeast, is somewhat flatter and less rugged. Shallower water along this stretch leads to a large area of breakers when strong winds blow onshore. There is little shelter from these winds, creating hazardous conditions for small vessels.

This area is examined in two parts: St. Peter Bay to Island of Ponds, and Island of Ponds to West Bay.

12.1.1 St. Peter Bay to Island of Ponds

The numerous islands and bays that indent the coastline cause the wind to funnel and channel along their axes. Wind blowing offshore during the warmer months can be very gusty near the land but becomes calmer over the colder waters of the Labrador Current.

During the summer months, dense fog lingers offshore over the cold waters of the Labrador Current. When wind blows onshore, the dense fog bank moves onto the coast, creating very low visibility. Northerly winds undergo coastal convergence, causing a band of stronger wind near the coast.

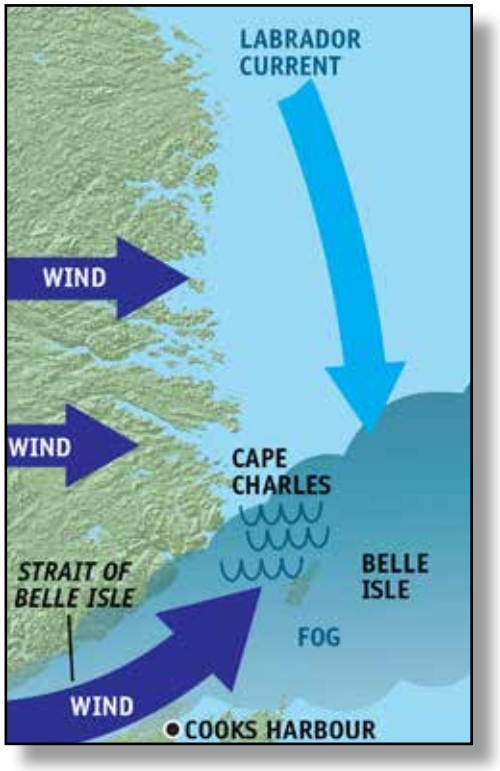
Large waves pound the headlands during strong onshore winds. This makes navigation hazardous, even for large vessels, but narrow bays and inlets provide shelter from these seas. After a period of persistent onshore winds, it can take a day or more for the ground swell to settle, due to the unlimited fetch of open ocean to the east.

Steep seas develop off the headlands, then move seaward when strong southerly-

to-southeasterly winds oppose the Labrador Current. Spear Point, Frances Cape, and Cape Bluff are exposed points that are particularly prone to choppy seas in such conditions.

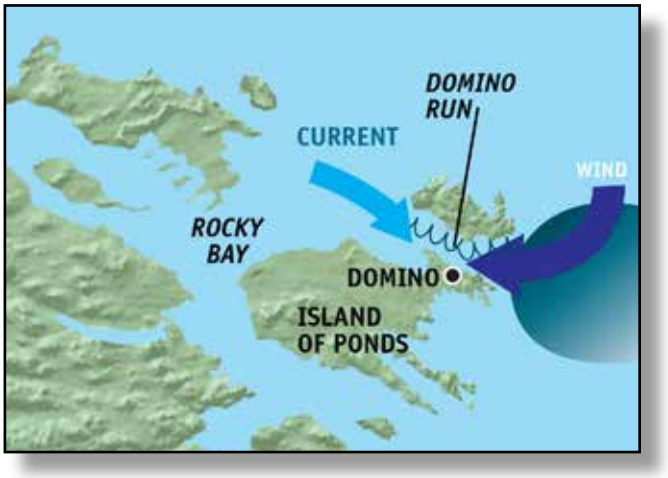
Northerly winds run parallel to this stretch of the coast. Wave refraction brings the seas from these winds onshore, and rough seas develop in shallow waters along the shore. Surges created by strong northerlies can also cause higher water levels along the coast.

Weather conditions can differ drastically between north and south of Cape Charles. Moderate westerly winds and sunny skies might prevail to the north while gusty southwesterlies dominate to the south. When these warm winds, funnelled out of the Strait of Belle Isle, meet the cold, south-going Labrador Current, choppy seas result. Fog can also form as the air is cooled or be blown into the area by the winds from the strait.



Strong southwesterlies funnelled out of the Strait of Belle Isle can cause rough seas and fog south of Cape Charles.

Exposed to the east, Domino Run has a reputation for rough seas during strong onshore winds. The eastern entrance is particularly dangerous, as large seas cause steep waves to break over its shoals. The narrow channel shelters its western end from the full fury of the waves; however, rough seas still occur when strong winds oppose the current.

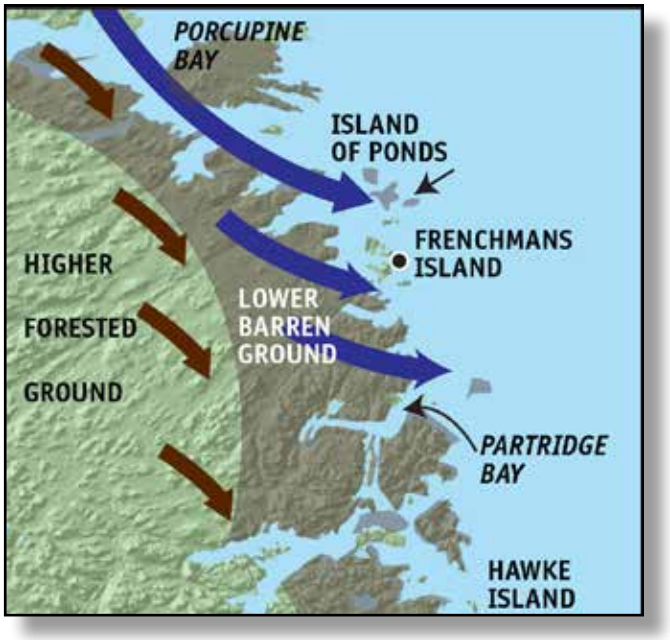


The eastern end of Domino Run experiences steep waves in onshore winds, although the western end can also be rough when the wind and current run in opposition.

Westerlies tend to blow more strongly and steadily in the area north of Hawke Island, because the land near the coast is low and barren. Without any physical barriers to create friction, the wind has nothing to slow its speed as it crosses the barrens. Northwesterly winds are particularly strong in Porcupine Bay and Partridge Bay, due to funnelling.

An unstable air mass is created around the Island of Ponds when frigid Arctic air settles over the area. Heat transferred to the air by the open-water leads —and even through the ice itself—can create localized areas of instability. The strong, gusty winds created in these areas can cause low visibility in blowing snow.

Northeasterly winds are enhanced by cornering from the eastern end of Spotted Island to Black Tickle, making it a challenge for local mariners to leave the area for the open sea. During persistent northeasterly winds, large seas heave up onto the land, creating even more hazardous conditions.



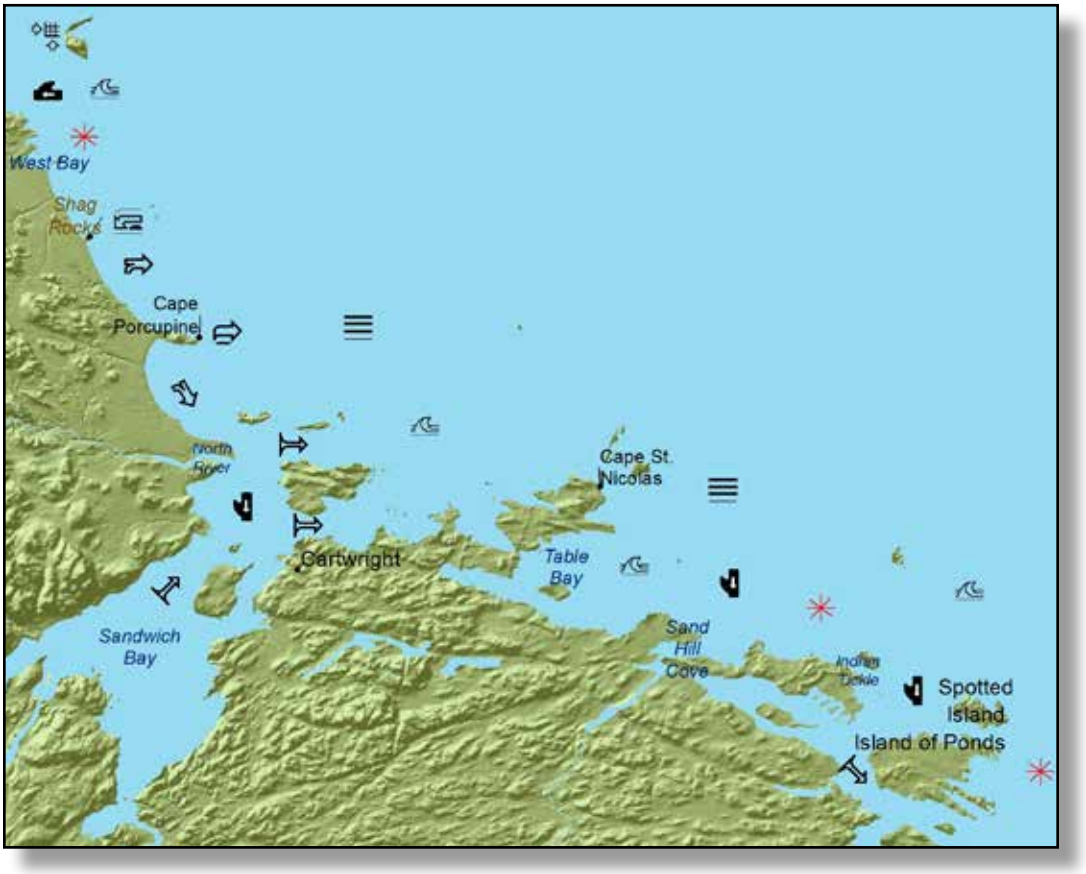
Westerlies are strong off the coast north of Hawke Island, where the ground is low and barren.

Northeasterly winds strengthened by cornering effects from Spotted Island to Black Tickle cause high seas in the area.

12.1.2 Island of Ponds to West Bay

North of Island of Ponds, the coastal orientation changes to northwest to southeast. Coastal elevations of up to 150 m at Sandwich Bay rise to 300 m further north. North-to-northeasterly gales cause large waves to break on exposed shores. Table Bay is sheltered from all directions but the east; further north, Sandwich Bay is protected from Atlantic swells by a narrow channel and the many islands that dot its entrance.

A small peninsula extending from Cartwright to Cape St. Nicolas shelters the area from Spotted Island to Table Bay from the full brunt of northwesterly winds. North of the islands, off the tip of the peninsula, the winds are stronger and the sea rougher due to coastal convergence and the increased fetch of the water. Conditions improve near the outer approaches of Groswater Bay, where the fetch is once again limited.



Mariners' Tips:

Cartwright's wind report does not generally represent the wind conditions over open water, since the site is exposed only to the northwest.

In the late spring or early summer, melting snow and ice cause a strong current of fresh water to empty into Sand Hill Cove from the Sand Hill River. Very choppy seas result when this current meets an incoming tide in the bay or is opposed by the wind.

When strong tidal currents (up to 3.5 kt) out of Sandwich Bay move against a strong northerly wind, large, steep waves develop in Sandwich Tickle and Diver Tickle. This effect is enhanced by funnelling.

Northwesterly winds strengthened by coastal convergence cause a band of strong winds to develop along the coast between North River Point and West Bay. South of Shag Rocks, these winds are intensified by mountain waves from terrain that rises to some 370 m inland.

Sandwich Tickle and Diver Tickle experience large, steep waves when powerful northerly winds oppose the strong tidal current moving out of Sandwich Bay.

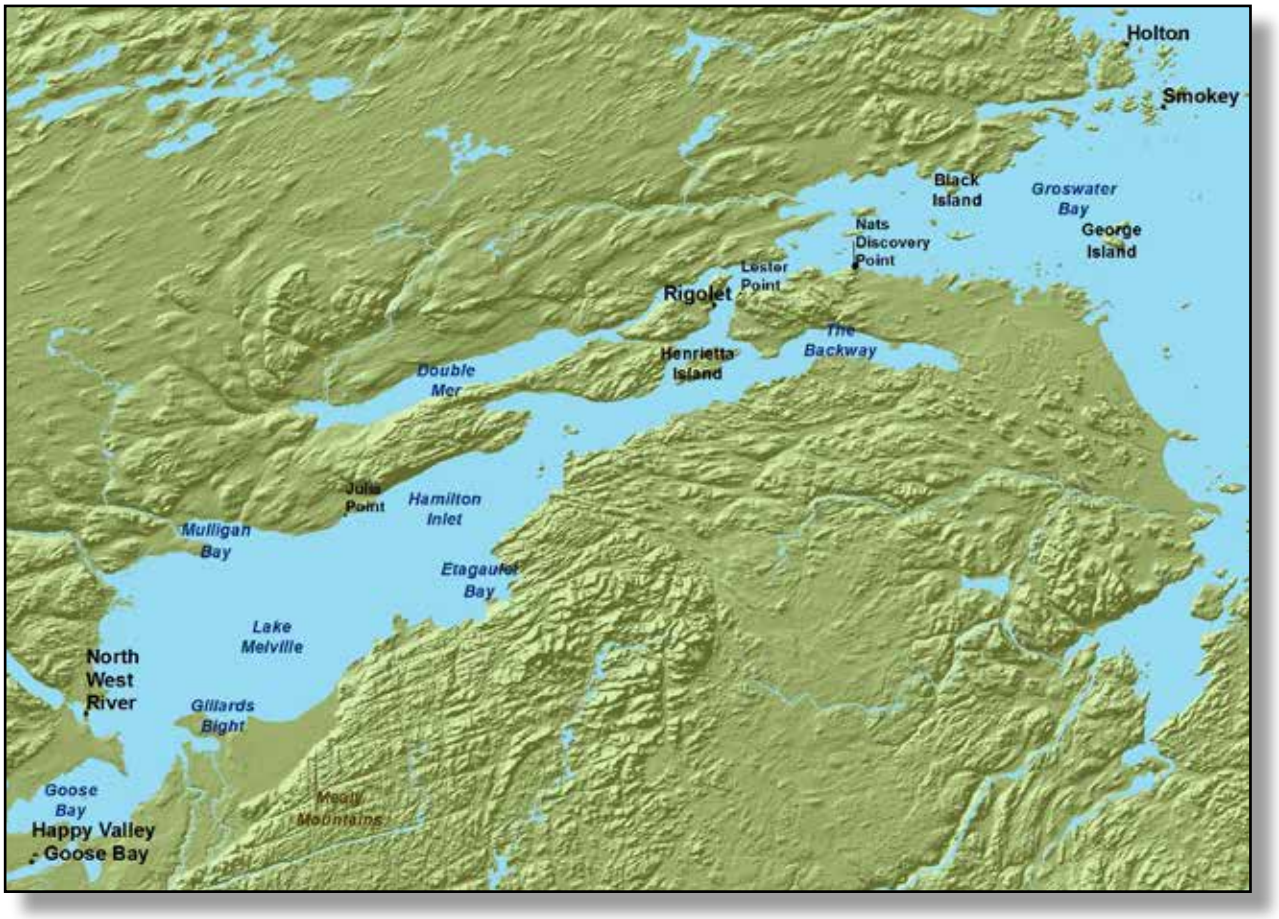
Mariners' Tips:

The large waves in the entrance to Sandwich Bay—known locally as "rampers"—are very unpredictable and can rise straight up and fall in any direction. These waves are very dangerous to boats: in particular, small open ones.

12.2 Hamilton Inlet

Hamilton Inlet extends from the coast to approximately 220 km inland. The winds in Groswater Bay, at the outer portion of the inlet, are funnelled and channelled between the many islands and inlets that dot its northern entrance. The hilly, barren terrain surrounding the inlet is an indicator of the harsh coastal climate: in fall and winter, in particular, storms bring gale-force winds and heavy precipitation to the area. Fog is frequent and is related to the onshore airflow off the cold Labrador Current. These harsh effects diminish further inland, where there is more extensive vegetation and forest cover

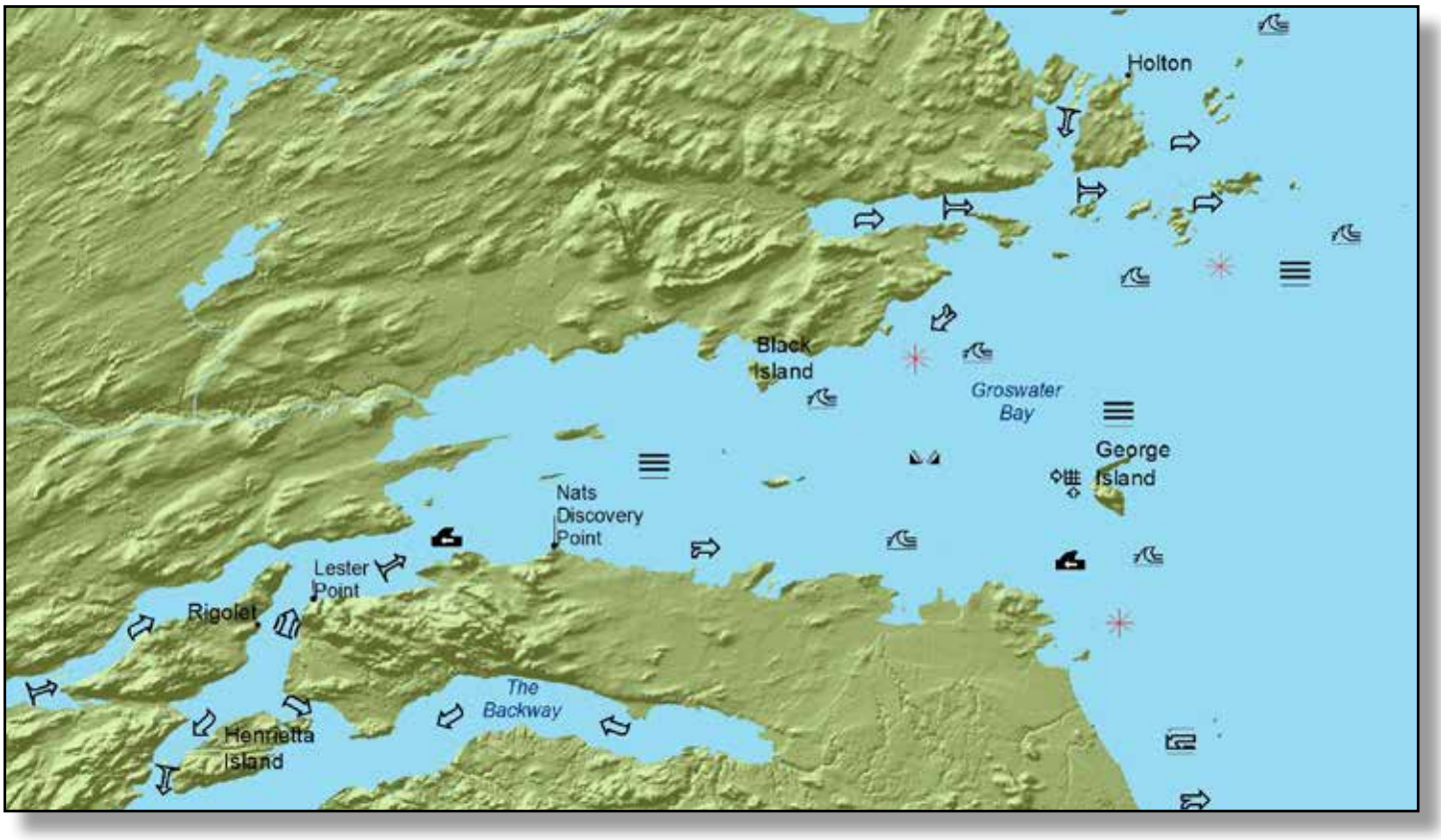
The Narrows connects Groswater Bay with Lake Melville. Surrounded by steep, hilly terrain, it rarely freezes over due to the strong tidal currents that flow through it. Lake Melville is a large body of water that runs from northeast to southwest. Because of its orientation, winds from both directions are funnelled and channelled. The Mealy Mountains, just south of the lake, cause mountain waves.



12.2.1 Groswater Bay

This V-shaped bay, the largest on the Labrador coast, is bounded by a variety of terrain—ranging from barren, hilly land to the north to flat, swampy land to the south, east of Nats Discovery Point. Vast exposure to the Labrador Sea to the east produces rough seas under strong easterlies, especially near the shoals and islands at the mouth of the bay, where cornering, funnelling, and channelling occur. Strong tidal currents also interact with high seas and strong winds to create hazardous conditions. Convergence leads to intensified westerlies along the southern coast, while easterlies are strengthened in the north.

Southeast gales bring large breaking seas over the shallow waters between George Island and the mainland. These effects, combined with strong tidal currents, can make navigation a challenge. On the west side of the island, crossing seas develop under strong easterlies, the result of large ocean-waves refracting around the island.

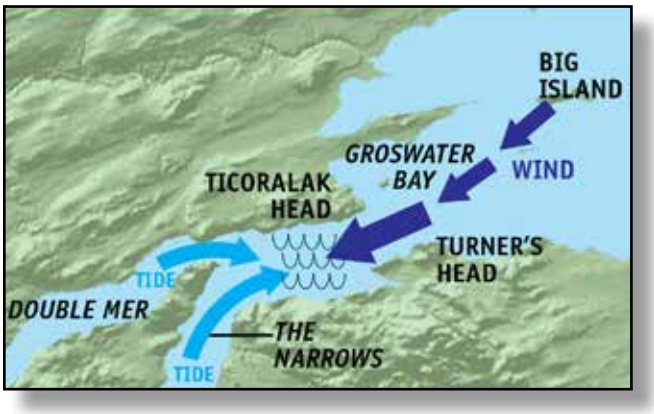


Seas can become fully developed along the coast between Twin Islands and Cut Throat Island when strong, prolonged southeasterlies blow across the south Labrador coast and Belle Isle Bank. When these deep-water waves run over shallow water, the seas steepen and break. Large swells can enter Indian Harbour when such conditions prevail, due to the refraction of the waves at the harbour's entrance. Strong, gusty winds result when westerly winds are channelled and funnelled from Pottles Bay to Ice Tickle—sometimes increasing to storm force during summer thunderstorms.

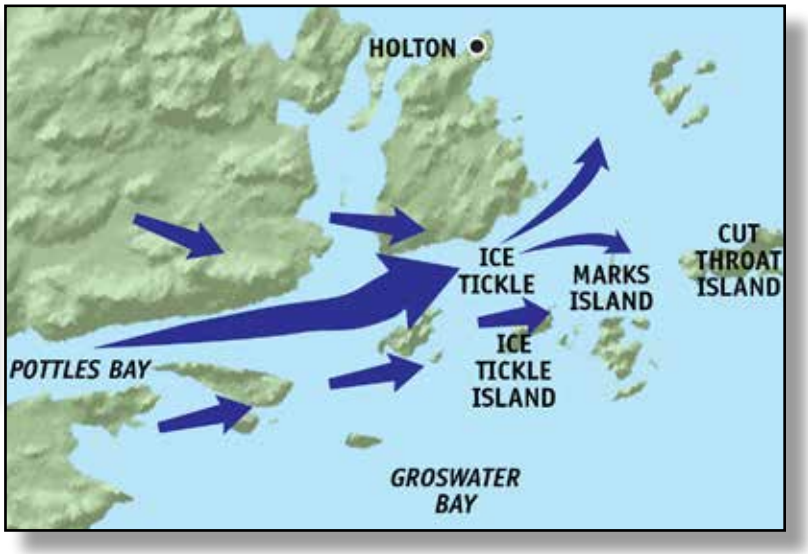
At the head of Groswater Bay, northeasterly and southwesterly winds funnel between Ticoralak Head and Turner's Head, increasing in speed by up to 15 kt. Combined with strong tidal currents, these winds can create steep, choppy seas. Sea breezes affect the bay during the warmer months, with westerly winds early in the day often shifting to moderate easterlies later on. Sea ice drifting offshore in the morning may be blown shoreward in the afternoon, as the sea breeze becomes established.

Northeast and southwest winds undergo funnelling and channelling in The Narrows , and strong southwest gap winds can be expected between Double Mer Point and Lester Point. Winds also funnel and channel in the arms around Henrietta Island and in The Backway, an arm of Lake Melville. These effects make it difficult to predict the prevailing wind direction when navigating The Narrows and adjacent arms.

Strong southeasterlies create fully developed seas between Twin Islands and Cut Throat Island, causing deep-water waves to steepen and break over the shallow water.



Fast winds, funnelled between Ticoralak and Turner's heads, create Choppy seas near the entrance to The Narrows when they run against the tide.



Strong, gusty winds are created by channelling and funnelling from Pottles Bay to Ice Tickle

Mariners' Tips:
During northeast gales, mariners can find shelter in a small cove on the eastern end of Pike Back Run.

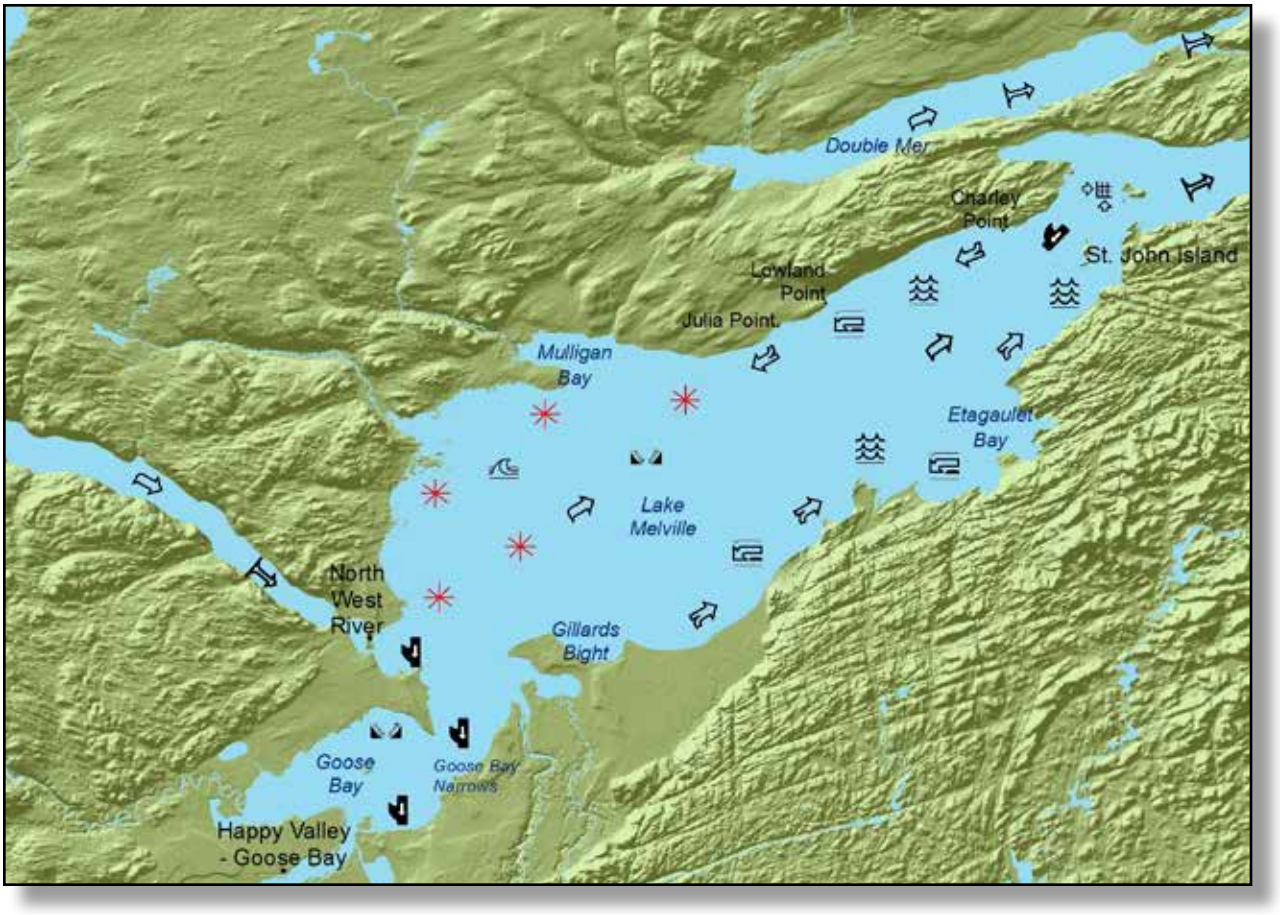
12.2.2 Lake Melville

Lake Melville is a tidal and generally deep body of water that is oriented northeast to southwest. Winds funnel and channel along its axis, resulting in strong northeasterlies and southwesterlies. Most of the shoreline is bounded by high terrain, especially on the southern coast, where the Mealy Mountains rise to about 1200 m roughly 11 km inland. Heavy squalls can develop off the mountains in southeasterly winds.

The high terrain surrounding the lake, along with its inland setting, results in a continental climate rather than a maritime one, like that found on the Labrador coast. Fog in this area is less frequent, and greater temperature extremes occur. The mean daily temperature at Goose Bay is 3°C colder in winter and 3°C warmer in summer than it is at Cartwright.

During the summer months, thunderstorms that form over land can cause squalls over the lake. Ice typically begins to form over shallower western sections in mid-November and then spreads eastward to cover the remaining areas by early-December. The ice usually starts to clear in May, but it could be mid-June until the lake is ice-free.

Strong southwesterly winds divide and flow around both sides of St. John Island. Coastal convergence produces a band of strong winds on the northern side; on the southern, the

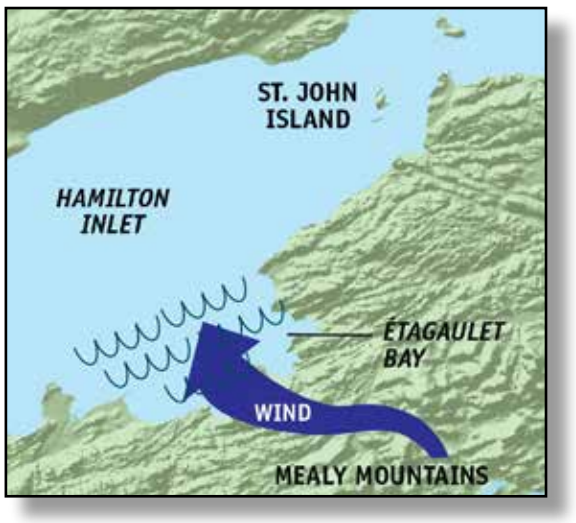


winds are strengthened by funnelling and channelling. The sea becomes confused where the two wind streams meet on the northeast side and turns even rougher during a flood tide.

Etagaulet Bay is known for its very strong easterly-to-southeasterly winds, which can reach speeds of up to 50 kt in squalls. Waves off the Mealy Mountains can quickly produce storm conditions from the mouth of the bay to well out into Lake Melville.

Mariners' Tips:
When crossing the mouth of Etagaulet Bay in east or southeasterly winds, mariners generally add 20 kt to the forecast wind speed.

East-to-northeasterly winds undergo coastal convergence along the western shoreline from Charley Point to Julia Point. Because the terrain between Charley Point and Lowland Point is high, it deflects this band of stronger winds to about 5-6 km offshore. When north-to-northwest winds blow off the steep cliffs, turbulent eddies form in the lee of the cliffs, and a band of gusty winds is usually found within about 6.5 km of shore, where it creates choppy seas. From Lowland Point to a few kilometres west of Julia Point, the terrain is low and swampy, so stronger winds flow within 1.5 km of shore.



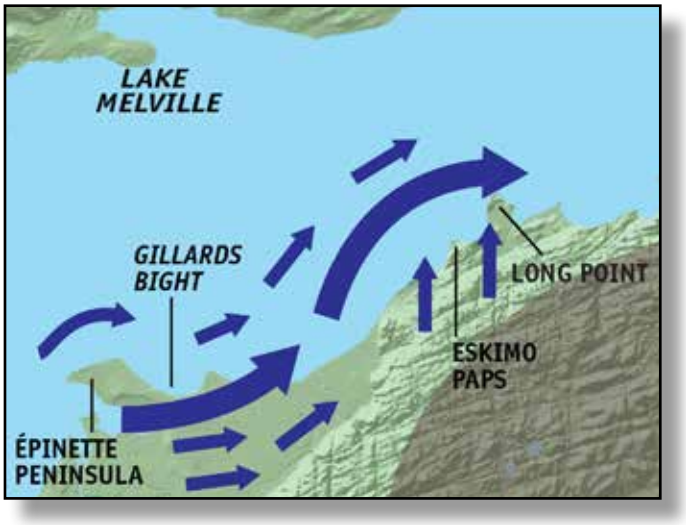
Waves from the Mealy Mountains can quickly turn strong easterly-to-southeasterly winds into storm conditions in Étagaulet Bay and beyond.

Southwesterly also winds undergo coastal convergence along the low, swampy stretch of coastline from Gillards Bight, on the Épinette Peninsula, to 6.5 km west of Eskimo Paps. This effect results in a band of strong winds that hugs the coast. Elsewhere, higher and more rugged terrain tends to deflect this band of wind to 3-5 km offshore.

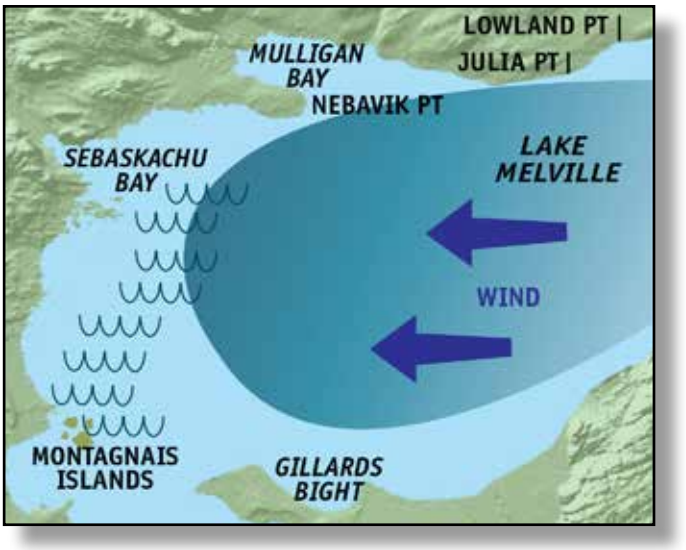
Mariners' Tips:
Small vessels can find shelter from southeasterly gales in the bay between Eskimo Paps and Long Point.

The waters around the Montagnais Islands and Sebaskachu Bay are perhaps the shallowest in Lake Melville. Easterlies blow the length of the lake, producing high waves as a result of the long fetch. As the waves pile up in the shallow water of the bay, shoaling causes them to steepen and break, creating short, choppy seas.

During the summer months, air-mass thunderstorms often develop around Lake Melville. These storms form over the warm land and tend to weaken as they move over the lake's colder waters. Lightning, heavy rain, and strong, gusty winds accompany the storms, which are usually more severe near the shoreline than they are further out, due to the stabilizing effect of the cold water. Thunderstorm activity also increases when sea breezes along the shore converge.



A band of strong winds hugs the low-lying eastern coastline near the head of Lake Melville, the result of coastal convergence.

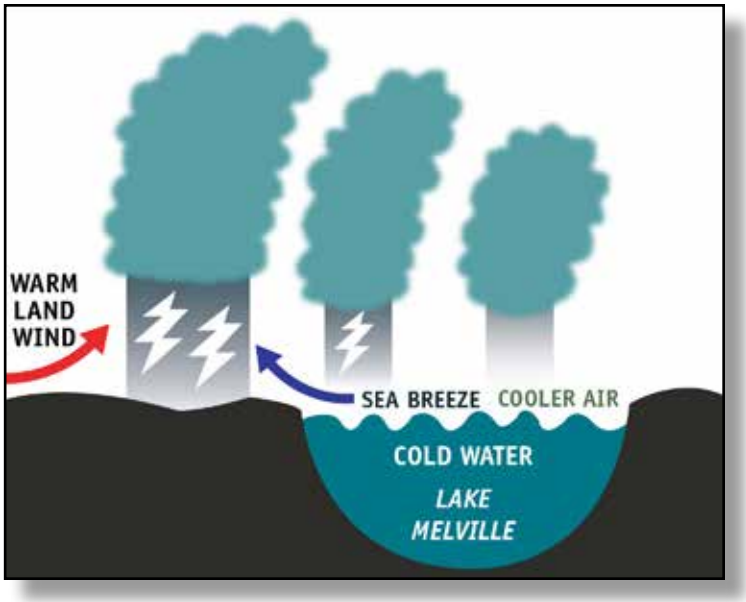


Lake Melville's long fetch pushes high waves into the shallow waters of Sebaskachu Bay, creating short, choppy seas.

Mariners' Tips:
Line or frontal thunderstorms rarely weaken over Lake Melville but tend to form a continuous line of active weather that is difficult to avoid by altering course.

The prevailing winds in Goose Bay are westerly and, under light to moderate flows, somewhat influenced by the Churchill River basin. This sheltered bay is fringed by extensive wooded vegetation, which has a calming influence on the wind. Winds, especially southwesterlies, are generally lighter here than elsewhere in Lake Melville, where a longer fetch over the ice or water leads to stronger winds.

When strong northerly winds oppose the ebb tide out of Goose Bay, short, choppy seas are created. Conditions are usually worse during the spring run-off, when large volumes of fresh water running into the bay from the Churchill River cause even stronger currents.



Thunderstorms are more severe near the shores of Lake Melville than they are further out because the cold waters of the lake have a stabilizing effect.

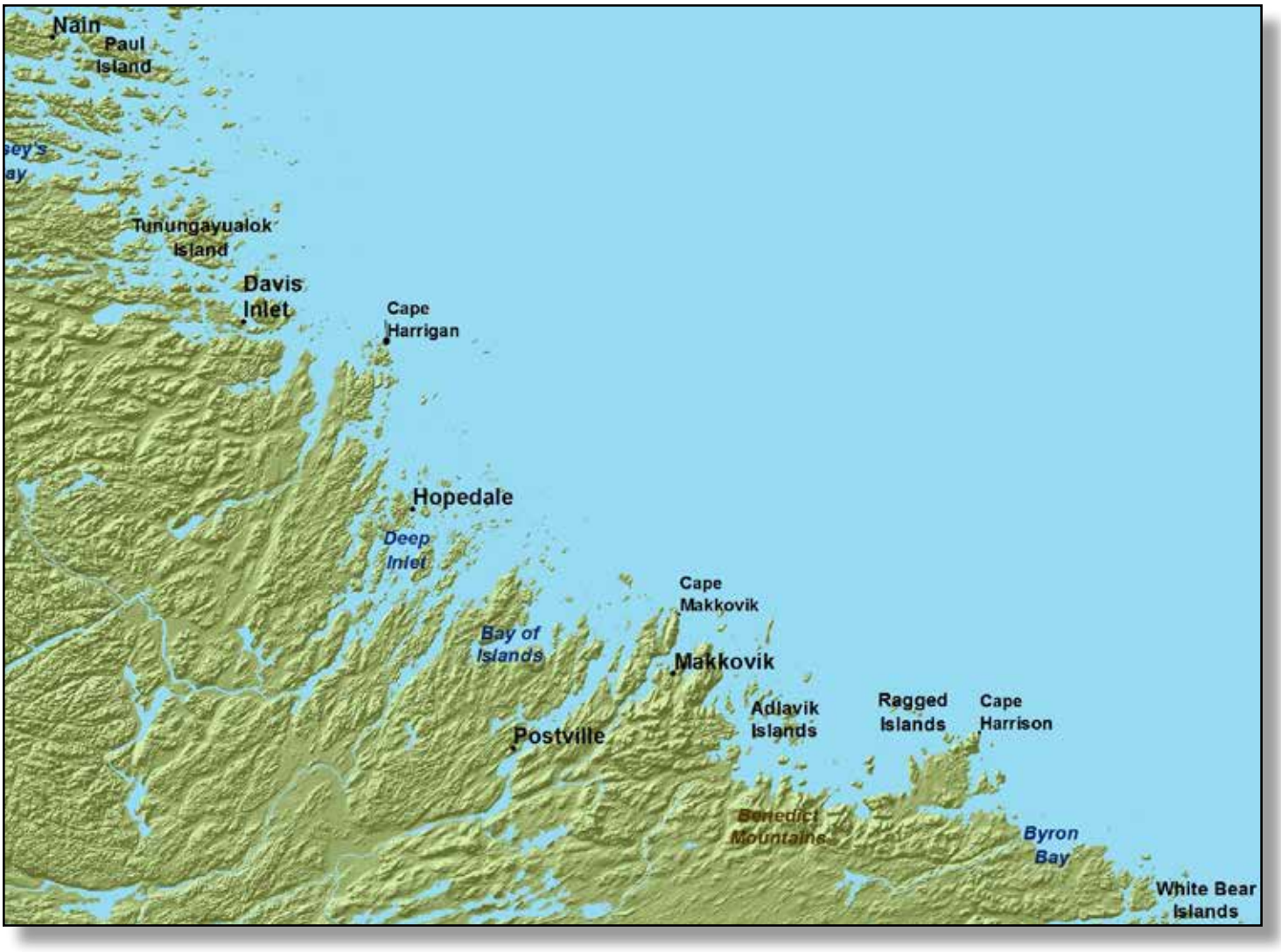
Mariners' Tips:
The observation site at the Goose Bay Airport is sheltered from most directions. Mariners usually add 10-20 kt to its wind reports to determine exposed conditions on Lake Melville.

Speed boats at Petley marina, July 2013. Photo: Dale Foote

12.3 Labrador North

This coastline is deeply indented by numerous bays and steep-sided inlets that are fronted with hundreds of islands. More mountainous terrain and fjordic inlets are found north of Cape Harrigan. This topography results in drastic local effects, especially funnelling and channelling. Funnelling, in particular, can give rise to storm-force winds, while gap winds can surprise mariners as they pass the mouths of bays and inlets.

During the fall and winter, intense low-pressure systems moving through the Labrador Sea bring gale- to storm-force winds and heavy precipitation (mostly snow) to the coast. During the summer, gales are less frequent but can still occur in narrow channels and fjords, while thunderstorms form inland, causing heavy squalls as they move towards the coast. Local variations in climate are evident everywhere from the outer islands to the inner reaches of the long inlets. Gales, fog, and precipitation tend to be more prevalent along the coast than they are further inland.

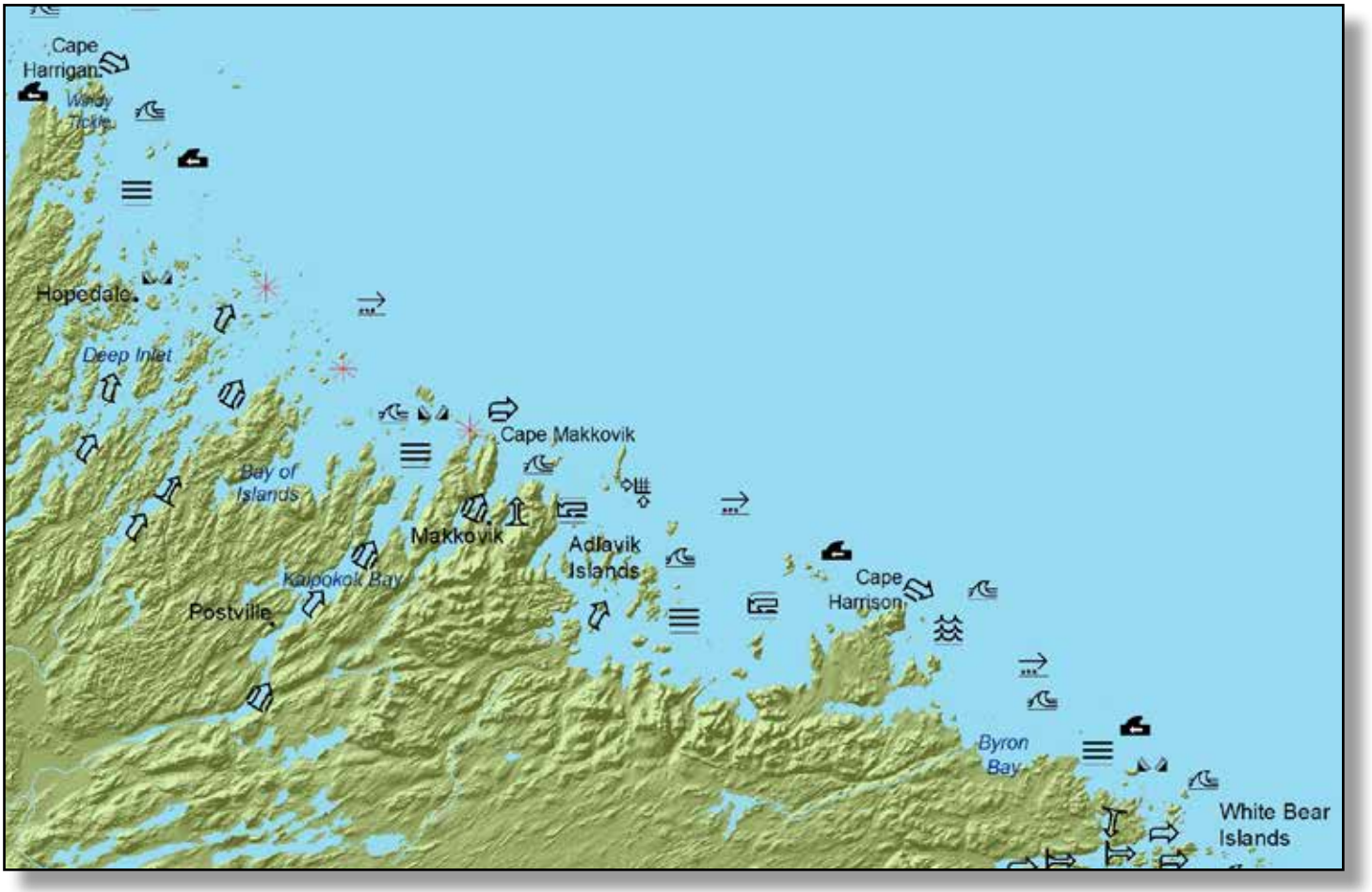


The Labrador Current generally flows southeastward parallel to the coast. When strong winds oppose the current, seas become choppy and steep. Land and sea breezes are common and enhanced considerably by the topography. The long fetch over the Labrador Sea causes large waves to pound the exposed coastline during strong, persistent onshore winds. Ice begins to form over northern bays and inlets by late November and moves quickly southward to cover remaining areas by early December. Melting usually begins in May or June.

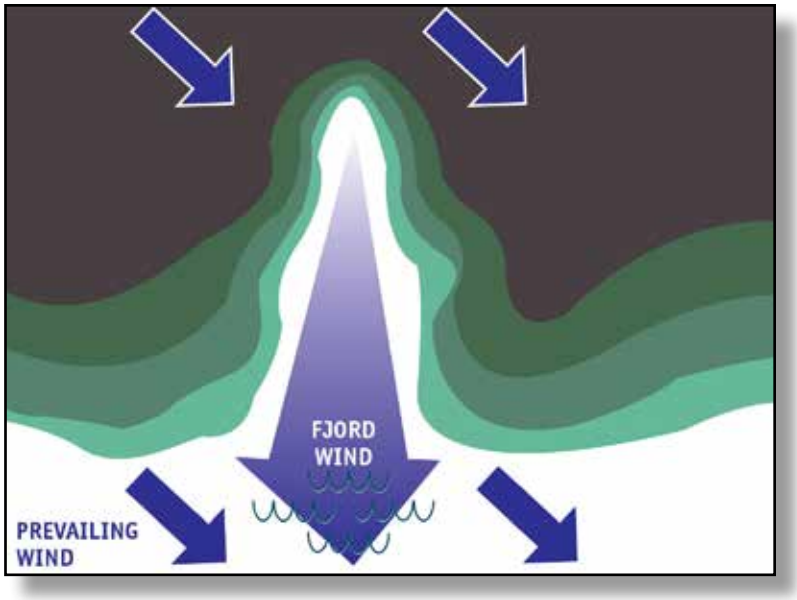
This stretch of coastline is covered in two parts: White Bear Islands to Cape Harrigan; and Cape Harrigan to Nain. Beyond Nain, the coastline is similar, so mariners can apply much of the same information found in this chapter to the fjords, capes, and islands that comprise the remainder of the coastline.

12.3.1 White Bear Islands to Cape Harrigan

This area of coast is dotted with numerous islands and indented by long inlets that are oriented from northeast to southwest. Southwesterlies and northeasterlies are the strongest and most common winds along this stretch.

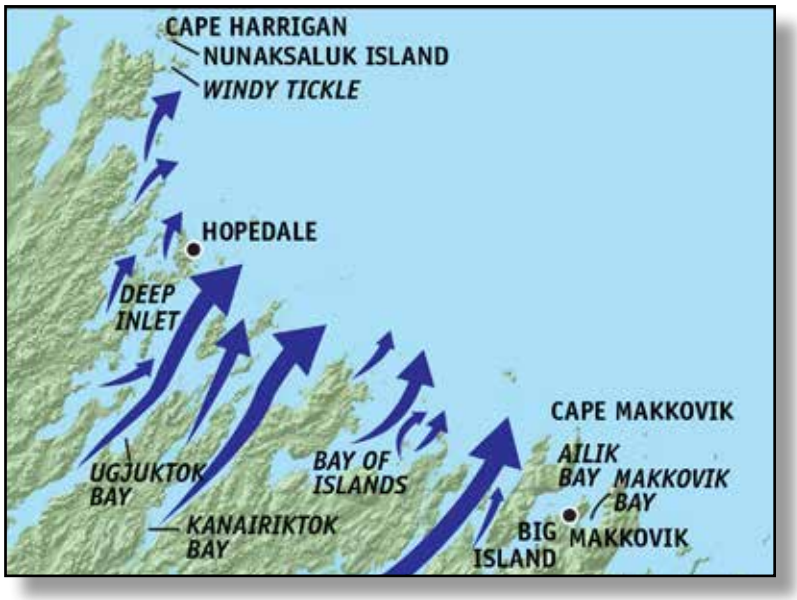


The coast of Labrador contains many deep, steep-walled fjords, which can create tricky wind conditions for mariners. Winds inside a fjord usually blow along its axis or length. In an east-to-west-oriented fjord, for example, a northwest or southwest wind over the open water will shift to west within the fjord. When winds blow along the fjord's axis, they are funnelled by its steep walls and can double in speed both inside the fjord and at its mouth. The strong gap winds that exit a fjord can be violent and can catch inexperienced mariners by surprise. Under these conditions, experienced mariners add 20-30 kt to the open-water wind speed when they are crossing a fjord. Waves moving towards a fjord can also be corralled, resulting in tricky seas. A fjord's steep walls can, however, provide shelter to mariners when winds blow across the fjord's axis. For example, strong southerlies over the open water outside an east-to-west fjord will be significantly lighter inside.



Winds blowing roughly the same direction as the axis of a fjord will align themselves with its orientation and increase significantly in strength due to funnelling.

Seaward of the area from Cape Harrison to Cape Makkovik to Cape Harrigan, the ocean exposure can intensify northwesterly winds and seas. During cold outbreaks in the fall, before sea ice forms, conditions can become dangerous due to freezing spray. They improve, however, inside the capes and inner islands.



Westerly flows shift to southwesterly as they are channelled along the many inlets on this stretch of coastline, creating strong gaps winds at their mouths.

Wind Opposing the Labrador Current

When gale-force southeast winds oppose the Labrador Current, seas steepen and become dangerous. Prominent headlands such as Cape Harrison, Cape Makkovik, and Cape Harrigan are particularly prone to steep, choppy seas.

From Cape Makkovik to Cape Harrigan, westerly flows across Labrador shift to south to southwesterly, due to channelling along the axis of the inlets, with localized areas of strong gap winds occuring at their mouths.

In strong, persistent northeast winds, large seas can push into the mouths of Makkovik and Aillik bays, causing confused seas. As well, significant ground swell can move into Makkovik Harbour. Between Cape Makkovik and Big Island, a band of stronger northeasterly winds, enhanced by coastal convergence, can cause seas to steepen even more.

Mariners' Tips:
Strong, gusty southwest winds caused by mountain waves off Benedict Mountains can be felt as far as the Ragged Islands, near Cape Harrison.

Kaipokok Bay, Kanairiktok Bay and Udjuktok Bay
Kaipokok Bay is a narrow bay bordered by steep, hilly terrain. Funnelling, channelling, and coastal convergence make for strong winds here, along the length of the bay. Where the bay narrows, between Postville and Post Hill, gap winds occur, sometimes accompanied by whirlwinds. Similar conditions affect Kanairiktok Bay and Udjuktok Bay.

Mariners' Tips:
Local mariners add 15-20 kt to open-water wind forecasts when crossing the mouths of larger bays in winds that are blowing off the land.

Sea Breeze

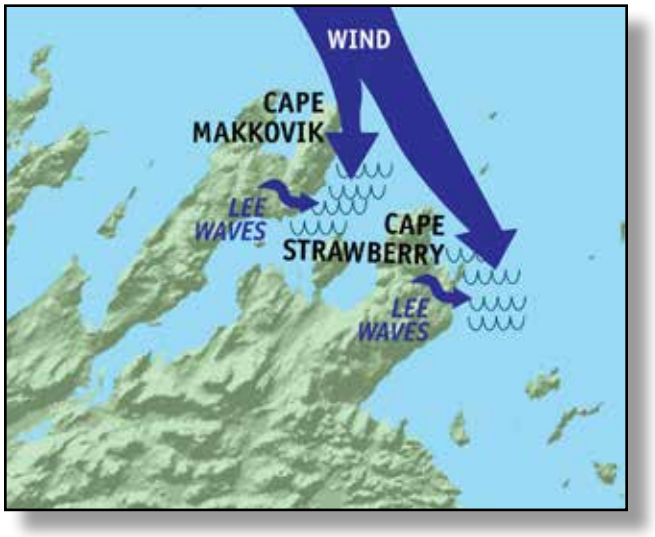
Strong temperature contrasts characterize the summer months, when warm offshore winds meet the cold waters of the Labrador Sea. Moderate offshore winds in the morning can give way to brisk onshore winds (sea breezes) in the afternoon. Funnelling causes these winds to increase from 10–15 knots outside the bays to 25 knots inside, where channelling turns the winds northeasterly in Kaipokok Bay, Kanairiktok Bay, and Udjuktok Bay.

STRONG WINDS AROUND PROMINENT HEADLANDS

Capes Harrison, Strawberry, Makkovik, and Harrigan are exposed high points of land subject to very strong winds from every direction. North and northwesterly winds are particularly fearsome, due to cornering. These winds, added to small-scale lee waves east of these capes, make for gustier winds and choppier seas.

The diagram shows this effect in the Cape Makkovik and Cape Strawberry areas. Similar effects can be expected around other headlands.

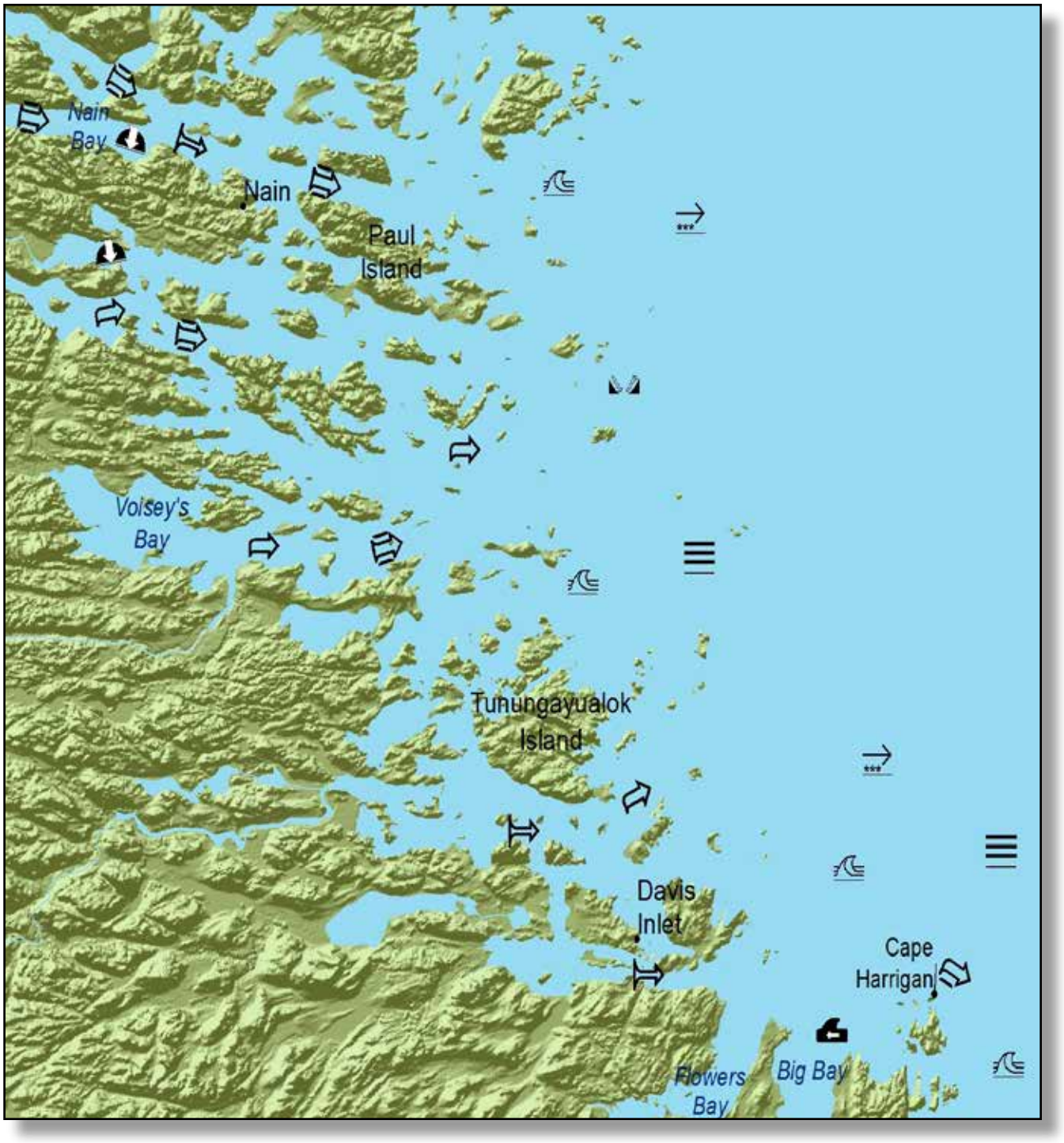
As its name implies, Windy Tickle is known for its wind—in particular, its violent northerly squalls. Cornering on the east side of Nanaksaluk Island produces a narrow band of stronger northerly winds, which are intensified by funnelling and channelling through the tickle. Whirlwinds or swirling columns of water sometimes accompany these squalls.



Exposure to north and northeasterly winds that are strengthened by cornering and small-scale lee waves cause steep, choppy seas off prominent headlands.

12.3.2 Cape Harrigan to Nain

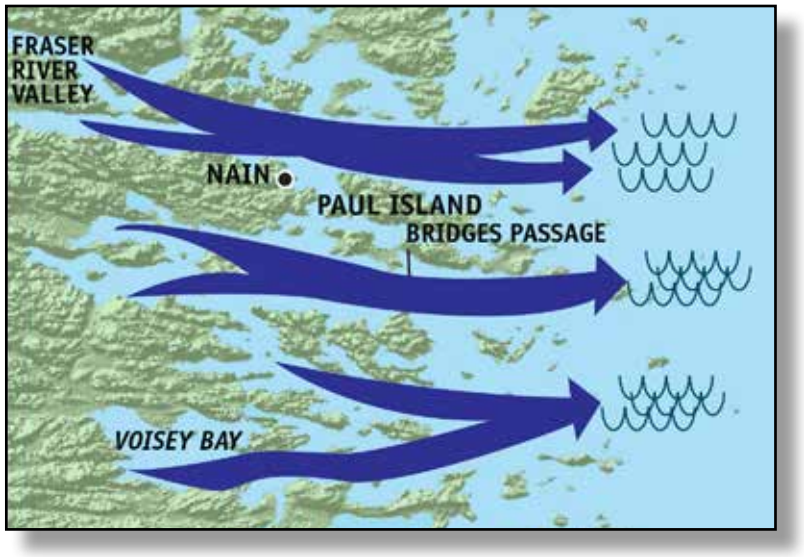
The bays and steep-sided inlets along this coastline are oriented more east-to-west than those south of Cape Harrigan, so the winds tend to be more westerly. The terrain is consistently mountainous, with many inlets having fjordic characteristics. Hundreds of islands dot the coast.



Mariners' Tips:
Sea breezes can be 25 kt or greater in the narrow passages and inlets along this coast due to the effects of funnelling.

The predominant local effects are funnelling and channelling, so violent winds are common, even with only moderate westerly circulations. Strong westerlies funnel down the fjordic Fraser River, emerging from Nain Bay with a vengeance. Similar but less violent winds are felt at Voisey Bay and the Bridges Passage. The orientation of these passages allows squalls to reach the outer islands virtually unimpeded.

When strong northerly winds oppose the ebb tide out of Big Bay and Flowers Bay, seas become very rough. Conditions can worsen if the onshore winds are persistent and cause the seas to become fully developed.



Westerly flows shift to southwesterly as they are channelled along the many inlets on this stretch of coastline, creating strong gaps winds at their mouths.

Mariners' Tips:
Nain is a sheltered site, so wind reports from the community do not generally represent conditions outside the islands. North-to-northeast winds tend to be lighter at Nain than those further offshore, and the terrain often causes them to shift to the west.