Chapter 10

4. Fundy Coast Ecoregion

The Fundy Coast Ecoregion spans the entire southern coastline of New Brunswick along the Bay of Fundy from the east side of Passamaquoddy Bay to the east side of Shepody Bay. It also encompasses the Western Isles and Outer Isles that include Grand Manan, Campobello, Deer, and Machias Seal islands. The region features a unique type of raised bog, a maritime climate, and the world's highest tides. As a measure of the area's ecological and scenic significance, it also possesses a national park and nearly a dozen other areas dedicated to biological conservation, enjoying by far the largest number of officially protected areas of any New Brunswick ecoregion.
Geology and Landscape

Rocks in the Fundy Coast Ecoregion range in age from Precambrian metasedimentary strata to Jurassic volcanic rocks, which represent the oldest and youngest rocks, respectively, in the province. Rocks of intermediate age also occur here, including the granites around St. George and Cape Spencer and the sedimentary strata at St. Martins and along the coast east of Fundy National Park.

The landscape owes much of its scenic diversity to the varied types of bedrock. Within a few kilometres it ranges from seaside salt marshes and estuaries to towering cliffs overlooking the Bay of Fundy. It supports gently rolling hills beside rugged shorelines and sandy beaches near woodlands full of wildflowers. Although elevations generally lie below 100 m, coastal cliffs can reach over 300 m.

All rivers in the ecoregion flow into the Bay of Fundy or one of its subsidiary bays and basins. Some rivers meet the ocean directly as waterfalls or swift streams, whereas others enter more gently through coastal estuaries or marshes before mingling with the salt water.

Climate

The Bay of Fundy is colder than either Northumberland Strait or Chaleur Bay (New Brunswick’s two other defining bodies of salt water) and effectively moderates the climate in this ecoregion throughout the year. Water entering the bay undergoes strong tidal mixing twice daily, propelled by the world’s highest tides. Winters are relatively mild and summers are markedly cool.

Persistent summer fog results when warm, moist air from the province's interior meets cold waters from the bay. The fog
reduces the hours of available sunshine and contributes to lower summer temperatures. During the growing season, onshore breezes of cool, moist air flow in from the bay to replace warmer air rising from the land. Upon reaching the shore, the air is forced by topography to rise and yield its abundant moisture. The resulting precipitation gives this ecoregion some of the heaviest summer rainfalls in the province. A steep temperature gradient exists between the coastline and a few kilometres inland, where the land lies farther from sea water.

**Forest Cover**

The cool, moist climate has led to a mainly coniferous forest cover. Although coniferous forests also dominate the Highlands Ecoregion, winter temperatures there are much colder than on the Fundy coast, which has the most moderate January temperatures in the province. For this reason, the coniferous community in the Fundy Coast Ecoregion is dominated by red spruce (an Appalachian species) together with balsam fir, black spruce, white spruce, and tamarack. Cedar is a predominant species on the limestone-derived soils around Saint John and in isolated places farther west.

The tolerant hardwood assemblage of yellow birch, sugar maple, and beech that thrives elsewhere in southern New Brunswick is rare here. These heat-loving species prefer well drained soils and are ill adapted to the Bay of Fundy's damp, cool summer weather. They occur only at higher elevations on the warmest and most protected sites along ecoregion borders.

The most common hardwoods are white birch, mountain ash, red maple, and some yellow birch. In the eastern part of the region, red maple and birches typically appear with balsam fir and red spruce, whereas in the western area, red maple and yellow birch occur with balsam fir and all three spruces. Research suggests that acidic fog and precipitation along the Fundy coast is an important source of stress for birch species, causing premature browning and dropping of foliage. The pollution sources that create these effects originate in southwest New Brunswick and the northeastern United States.

The fog, abundant precipitation, and low soil temperatures in
summer together have limited the frequency of regional wildfires. Fire-dependent species such as jack pine and white pine occur in only a few locales, and the intolerant hardwood community includes mountain ash and white birch. Because of the cool, damp summers, the forest understorey can support boreal-type species such as rock cranberry on dry sites and cloudberry in peatlands. Some coastal ravines and bogs also harbour noteworthy species of arctic flora, which represent disjunct vestiges of vegetation that prevailed early in the post-glacial period (see Chapter 3).

In some locations, the vegetation here shows a sharp transition from predominantly coniferous coastal forests at lower elevations to mixed or deciduous forests over the warmer inland terrain. The occurrence of sugar maple and beech marks the transition to the Caledonia Uplands Ecoregion. Where the Fundy Coast Ecoregion borders the Mount Pleasant Ecodistrict of the Valley Lowlands Ecoregion, the boundary is less sharp, owing to a predominance of granitic bedrock and acidic soils. There, coniferous cover prevails in spite of the warmer climate.

Wetlands

The Fundy Coast Ecoregion has a rich diversity of wetland types. The most remarkable of these are the raised coastal bogs that occur mainly west of Saint John and across the international border in Maine.

As with other coastal bogs in the province, the Fundy bogs contain typical plants such as dwarf huckleberry, the lichen *Cladina terrae-novae*, and the mosses *Sphagnum imbricatum* and *Sphagnum austinii*. What most distinguishes the Fundy bogs, however, is their morphology and surface features. The bogs along the Fundy coast have generally formed in deep depressions that are topographically restricted. By contrast, bogs along the Chaleur and Northumberland coasts developed in shallow depressions and, over time, have coalesced into extensive complexes. The Fundy bogs have a limited number of small surface pools, whereas those along the east coast have many large surface pools, some the size of small lakes.

Another notable surface feature of the Fundy bogs is their scirpus lawns: vibrant carpets of mostly red mosses covered with the sedge *Scirpus caespitosus* in combination with other species such the lichen *Cladina terrae-novae*, or dwarfed shrubs such as leatherleaf or bog rosemary. Elsewhere in the province, scirpus
lawns are restricted to small areas: around ponds in the Eastern Lowlands Ecoregion, and in narrow, wet hollows on the more inland bogs. Along the Fundy coast, however, the lawns are much more extensive for reasons that scientists have yet to fully understand. The red sphagnum mosses are variously treated as a single species or as a complex of one or several species that are difficult to discern.

Eastward along the coast from Saint John, the incidence of wetlands decreases as the topography grows more rugged, then increases again east of Rocher Bay where the bedrock and terrain are gentler. There, the interaction between high tides and lowlands has created a network of interesting estuaries and salt marshes.

Coastal marshlands in this ecoregion are unusual in that they comprise significant areas of both low and high salt marsh, unlike the Northumberland and Chaleur coasts, where low salt marsh is less common. Low salt marsh lies below the mean high-water mark, is flooded daily by tides, and features salt-water cord-grass as the dominant vegetation. High salt marsh lies above the mean high-water mark, experiences flooding only during the highest tides, and is dominated by salt-meadow grass and black grass.

4.1. Fundy Coastal Ecodistrict

The Fundy Coastal Ecodistrict comprises the southern coastline of New Brunswick along the Bay of Fundy from east Passamaquoddy Bay to Shepody Bay. It also encompasses the Western Isles, including Campobello, Deer, and Grand Manan islands.

Geology

This ecodistrict contains New Brunswick’s oldest and youngest rocks. The oldest rocks reach up to 900 million years old; they consist primarily of Precambrian marble, quartzite, and siltstone and occur in the Saint John area, where a marbleized limestone has been quarried for about 300 years. The youngest lithologies are Jurassic mafic volcanic rocks (mainly basalt) that are about 190 million years old and underlie much of Grand Manan Island. Collectors from across North America visit the island to gather rare minerals called zeolites, which fill vesicles in the basalt.

Precambrian volcanic rocks lie west of Fundy National Park along the coast between Point Wolfe and Salmon River, as well as in the Saint John area and on Deer Island. Granitic rocks of both Precambrian and Silurian–Devonian age are present around St.
Sedimentary strata in this ecodistrict also span a range of geological eras. Pennsylvanian and Mississippian sandstone, conglomerate, and siltstone form the coastline east of Fundy Provincial Park. The red cliffs at St. Martins are composed of Triassic sandstone and conglomerate, whereas older, Silurian sandstone forms the Letang shoreline.

In places, the sedimentary rocks are embedded with fossils. The most famous area is Fern Ledges near Saint John, where geologists working in the 1860s collected nearly 8000 fossils from Pennsylvanian shales. The site contains fossils of insects, snails, plants, reptile footprints, and amphibian footprints. Charles Darwin mentions the site in his classic *The Descent of Man*. Just east of Fern Ledges, the Proterozoic marble deposits in Saint John contain algal stromatolites, which are among the world's oldest fossils.

Many deposits of economic mineral commodities are associated with the bedrock here, including copper, lead, gold, silver, zinc, manganese, gypsum, and building stone. In several instances, they have been commercially developed.

**Landscape and Climate**

The landscape here ranges from flat-lying salt marshes to high cliffs, and from the gently rolling hills of Letang Peninsula to the rugged, highly dissected shoreline of Mackerel Cove. Relief generally fluctuates between 30 m and 80 m. Overall, the area lies below 100 m in elevation except near Martin Head. There, coastal cliffs soar 300 m above the Bay of Fundy to give a stunning view of the upper bay.

The coastline features several spectacular and pristine gorges, such as at Little Salmon River, where a tributary tumbles 30 m over a cliff near the mouth of the river. Elsewhere along the coast are sea stacks, such as the Hopewell Rocks, that were formed by a combination of bedrock fracturing and differential erosion of coarse- and fine-grained sedimentary rocks. A rift cave occurs near Alma but is best left undisturbed to avoid stressing its fragile population of little brown bats and long-eared bats.

The climate is strongly influenced by cold waters of the Bay of Fundy that create moisture-laden air masses responsible for the
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ecodistrict’s abundant precipitation and persistent fog. The bay also moderates local temperatures to produce relatively cool summers and mild winters.

**Soils**

The most common soils along the coast are those derived from igneous lithologies including granite, gabbro, and volcanic rocks that are generally acidic. Soils of igneous derivation are represented by the Big Bald Mountain, Juniper, and Lomond units. These stony, acidic soils occur on hills and ridges, and are shallow, non-compact, sandy loams. They are shallow and have low fertility.

Large glaciofluvial deposits of the Gagetown and Kennebecasis units are present near Pennfield Ridge and Quaco Bay. These droughty soils also have low fertility and typically support black spruce and heath vegetation or ericaceous shrubs.

The most fertile and arable lands in the area overlie zones of sedimentary rocks and tidal deposits that erode readily to create fine-textured soils of loam to clay. Examples of these soils can be found near St. Martins, Lepreau, and Cape Enrage.

**Biota**

The cool, wet climate has created a forest composition with many boreal elements, except for the prominence of red spruce. Forest stands on higher plateaus in the east consist almost solely of pure red spruce (5h). Elsewhere, forests comprise a mixture of red spruce with white spruce and black spruce, or balsam fir with some red maple, white birch, and yellow birch (2, 3, 5). Typically, black spruce is associated with the margins of bogs and wet areas; white spruce is the predominant spruce species in a narrow band along the shoreline and on abandoned pastures and fields. Cedar is concentrated on ridges around Saint John in areas of calcareous bedrock (7c).

The few tolerant hardwood stands contain mostly yellow birch with lesser quantities of sugar maple and beech (4, 7). What little forest exists on tidal marshes (6t) consists entirely of spruce; essentially treeless bogs (3b) also are scattered throughout the ecodistrict. Heat-loving species such as pine, hemlock, oak, ironwood, and ash are all but absent. The intolerant hardwood community that follows harvesting activities is mostly white birch with red maple, yellow birch, and grey birch. Poplar is absent from...
these first successional stages.

The craggy escarpment along the Point Wolfe River hosts at least three unusual plant species: glaucous meadow-grass, livelong saxifrage, and small eyebright. A tiny bog lake between Martin Head and Little Salmon River is a haven for the twining screw-stem and Oakes' pondweed. Smooth woodsia, also relatively rare, grows on calcareous cliff faces at several locations. The gorge at the Little Salmon River is one of the few New Brunswick sites with curly-grass fern.

The Fundy Coastal Ecodistrict contains Fundy National Park, two conservation areas, four nature preserves, one nature park, one ecological reserve, and three bird sanctuaries – a reflection of the ecodistrict’s ecological and biodiversity significance. The nature preserves at Cape Enrage Marsh and at Saints Rest Marsh protect representative salt marshes. The latter site is crucial for migrating waterfowl and shorebirds. Together with the adjoining Irving Nature Park on Taylors Island, it has the greatest recorded diversity of bird life in New Brunswick; almost two-thirds of the province's known bird species have been seen here. Manawagonish Island Nature Preserve near Saints Rest Marsh is also an important refuge and nesting site for ducks, seabirds, cormorants, and gulls.

The Loch Alva Ecological Reserve protects a magnificent old red spruce stand and one of the deepest lakes (Loch Alva) in the province. Loch Alva supports landlocked salmon and an introduced population of lake trout. The stand is situated along the lake shore: an undisturbed, solemn acreage of trees that were seedlings when the first Loyalists set foot in New Brunswick. Immediately north of the reserve is Turtle Mountain, whose rocky summit provides a spectacular view of Saint John and the lower Bay of Fundy.

The remaining reserves include two offshore protected areas (Robert M. Stewart Nature Preserve and Machias Seal Island Migratory Bird Sanctuary), the Shepody National Wildlife Area, and the Mary's Point Ramsar Site. Mary's Point is famous across North America as a stopover point for migratory shorebirds, especially for the thousands of semipalmated sandpipers that congregate to feed on mud shrimp.

New Brunswick's offshore islands have tremendous seabird and floral significance. The outer Bay of Fundy Islands, particularly Machias Seal Island has the only known nesting site in the province for arctic tern, Atlantic puffin, and razorbill, and supports the largest puffin colony in the Maritimes. The Wolves contain one of the
greatest concentrations of wintering harlequin ducks in New Brunswick. This latter species is recognized in 2001 as of Special Concern by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC).

Several other biotic features are worthy of note in the ecoregion. A small lake in Fundy National Park is the only known New Brunswick site for the four-toed salamander. The Saint John River estuary is the only Canadian river to carry the shortnose sturgeon, which appears here at the northern extent of its range.

Gypsum deposits near Riverside-Albert were quarried for nearly 200 years but are now undisturbed by excavation. Today, they support patches of rare and disjunct arctic plants, including a species of willow, a goldenrod, and mountain avens.

The only records of long-tailed or rock shrew in New Brunswick are from talus slopes north of Riverside-Albert. Local caves are an important refuge for several bat species, including the little brown bat, long-eared bat, and eastern pipistrelle.

**Settlement and Land Use**

The Fundy Coastal Ecodistrict spans the traditional territories of the Mi’kmaq, Maliseet, and Passamaquoddy. Artifacts here date back to 4000 years BP, and several aboriginal settlements lived along the south coast, including in Ouigoudi at the mouth of the Saint John River. A Paleo-Indian point discovered at Quaco Head has been dated at 11,000 years old.

Many centuries ago, the Fundy coast and islands would have supported an immensely productive intertidal and tidal zone full of sea urchins, mollusks, seabirds, and seals. The native inhabitants would camp for a time at one site and deposit shellfish refuse in a mound that, when they moved on, compacted into a shell midden. Archaeological maps of the coastline west of Saint John show hundreds of midden sites, a testament to several thousand years of uninterrupted human habitation.

In the early 1600s, the lower Saint John River valley became one of the first areas in New Brunswick to be permanently settled by European immigrants. Except for the rugged terrain between Salmon River and West River, much of south coast became inhabited by people who earned earn their living as farmers, fishermen, or loggers. Then, as today, agriculture consisted primarily of mixed farming and occurred on areas of soil derived from sedimentary rock.
Many types of economic mineral commodities have been discovered and developed along the Fundy coast since the early 1800s. A partial list of formerly productive operations include graphite mines near Saint John, copper mines at Letete and Goose Creek, building stone quarries at Mary's Point and Grindstone Island, and a gold mine at Cape Spencer. The only currently active producer is a limestone aggregate quarry just east of Saint John.

Saint John has been the major settlement in the ecodistrict since before its incorporation in 1785.
4.1. Fundy Coastal Ecodistrict at a Glance

Ecoregion: Fundy Coast
Area: 226, 450 ha
Average elevation above sea level: 84 m
Average May—September precipitation: 450–500 mm
Average annual degree-days above 5°C: 1500–1650

76% of Fundy Coastal Ecodistrict has forest cover

24% of Fundy Coastal ecodistrict is not forested

Percent cover of forest stand types by ecosite

**Vertical axis**: TH—tolerant hardwood species; THSW—tolerant hardwood with softwood species; HWTH—intolerant hardwood and tolerant hardwood species; EC—eastern white cedar; HWSW—intolerant hardwood and softwood species; BF—balsam fir; SP—red or white spruce; PINE—white pine; JP jack pine; BS—black spruce

**Horizontal axis**: percent cover.
### Percent cover of forest stand types by ecosite (continued)

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**Vertical axis:** TH—tolerant hardwood species; THSW—tolerant hardwood with softwood species; HWTH—intolerant hardwood and tolerant hardwood species; EC—eastern white cedar; HWSW—intolerant hardwood and softwood species; BF—balsam fir; SP—red or white spruce; PINE—white pine; JP—jack pine; BS—black spruce

**Horizontal axis:** Percent cover.

**Ecosite modifiers**
- 1: c (calcareous)
- 2: o (organic)
- 3: f (periodically flooded)
- 4: h (high elevation)
- 5: m (mining debris)
- 6: water

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**Map legend:**
- 1: c (calcareous)
- 2: o (organic)
- 3: f (periodically flooded)
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**Reference Map**

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