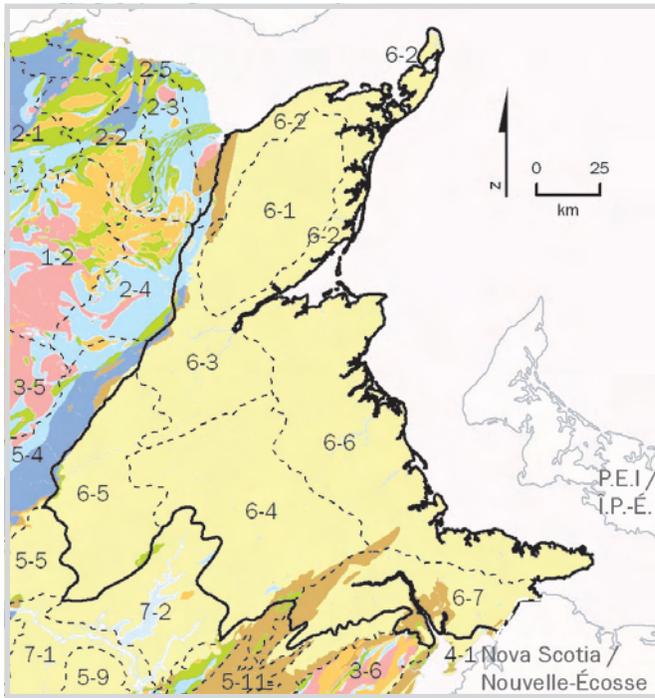


The Eastern Lowlands Ecoregion includes the lower reaches of the Miramichi watershed, as well as the headwaters of several rivers that flow into the Northumberland Strait. Vegetation is dominated by acid-loving forests, heath species, and coastal zone specialists.

Chapter 12

6. Eastern Lowlands Ecoregion

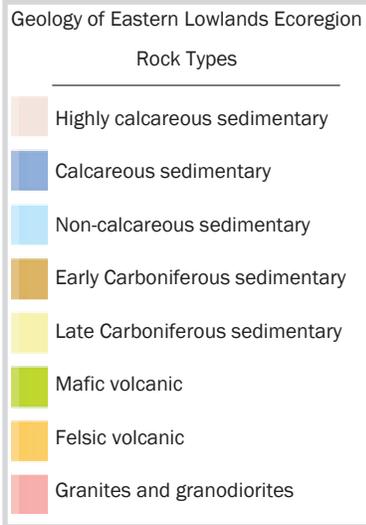
The Eastern Lowlands Ecoregion is a broad wedge of flat to gently rolling terrain that reaches from Bathurst in the northeast down to Sackville in the southeast of the province. The region's northern and eastern margins are defined by Chaleur Bay and the Northumberland Strait. The coastal area bears a delicate fringe of sand dunes, salt marshes, and lagoons that harbour a distinctive fauna and flora. Inland, there are extensive peatlands hosting both common and rare plant and animal species.



Geology and Landscape

The ecoregion is underlain by Carboniferous sedimentary rocks ranging from fine, reddish siltstones, through grey, quartz-rich sandstones, to coarse, pebble conglomerates. Elevations range between 150 m and sea level throughout the ecoregion.

The low relief of this ecoregion makes for poor soil drainage. In the north, the Nepisiguit River and a number of smaller streams and rivers flow towards Chaleur Bay or the eastern coast of the Acadian Peninsula. The Miramichi River and its countless sister rivers and streams drain the central part of the region, and an enormous volume of water enters Miramichi



Bay beneath the bridges at Miramichi City. The Miramichi River between the town of Quarryville and Miramichi Bay is actually an estuary with a significant influence of ocean tides.

The Canaan and Salmon Rivers drain much of the boggy, central plateau areas of the ecoregion towards Grand Lake.

Along the southern Northumberland coast, several major rivers, including the Richibucto and Kougibouguac, move languidly eastward, typically merging into lagoons, tidal estuaries or salt marshes before reaching the Northumberland Strait. Rivers in the southeast corner of the region drain toward the Bay of Fundy, entering it either directly or via the Petitcodiac River.

Climate

The Eastern Lowlands Ecoregion lies at the intersection of two rain shadow areas. Most moisture from the prevailing westerly winds is intercepted by the Highlands Ecoregion to the west, whereas precipitation from southwesterly storms coming across the Bay of Fundy is intercepted by higher elevations of the Fundy Coast and Central Uplands ecoregions.

The upland areas to the south and west of the region offer protection, so that its inland summer temperatures are comparable to those in the Valley Lowlands Ecoregion. The Northumberland coastline experiences some of the highest summer temperatures in the province. Unlike the Bay of Fundy, the Northumberland Strait

does little to moderate the summer climate, as the prevailing winds blow warm land air out to sea, rather than cool oceanic air onshore. In winter, waters from the strait tend to warm the adjacent land areas.

Forest Cover

The forests of this ecoregion display a primarily boreal-looking community of conifers that contrasts markedly with the more tolerant hardwood-dominated forests of the adjacent Valley Lowlands. Two reasons exist for this condition. First, the role of fire in forest composition is evident in the abundance of fire-adapted species such as trembling aspen, jack pine, red pine, white pine, and black spruce. Second, the low relief, poor soil drainage, and high soil acidity together create conditions that discourage the development of tolerant hardwood stands, which prefer well drained upper slopes and ridges.

The Carboniferous strata of the region are very flat-lying and uniform; the only topographic relief results from rivers eroding the bedrock over long periods of time. The height of land between watersheds is dominated by expansive peatlands with only discontinuous, often stunted forest cover featuring black spruce, tamarack, and ericaceous shrubs. Sites with gently sloping terrain contain a distinctive association of red spruce, black spruce, balsam fir, red maple, hemlock, white pine, red pine, and jack pine. Only the relatively few hilltops in the region display the classic tolerant hardwood assemblage of sugar maple, yellow birch, and beech. The forest contains understorey species that typically occur with boreal-type forests and peatlands. These include sheep laurel, mountain-holly, speckled alder, wintergreen, goldthread, bunchberry, bristly club-moss, sphagnum, and Schreber's moss.

Wetlands

The Eastern Lowlands Ecoregion contains the highest percentage of wetlands of all New Brunswick ecoregions, and has by far the largest area of peatlands. The peatlands occur both inland and along the coast, and, in several locations, are being commercially 'mined' for horticultural peat. Most of the coastal peatlands are raised bogs with indicator species that include black crowberry and bake-apple, and are associated with an abundant cover of lichens. The bogs formed in shallow depressions following the post-glacial changes in sea levels and have since coalesced into extensive complexes. Unlike the raised bogs of the Fundy Coast

Ecoregion with their limited number of small surface pools, the Northumberland bogs have large surface pools.

The changing sea levels since glaciation have caused shorelines to shift back and forth for several millennia. In our current era of rising sea levels, some coastal bogs have been subject to wave erosion, exposing peat cliffs. These cross sections through peat reveal a chronicle of 10,000 years of post-glacial vegetation change.



Peat Cliffs near Pointe Escuminac; aerial view (above), and closeup.

The dramatic barrier beaches that characterize this ecoregion are the result of low coastal relief meeting the effects of longshore drift and other littoral phenomena. Interaction between the barrier beaches and the tidal estuaries at the mouths of major rivers has created a series of rich coastal marshes. Low marsh is a significant element in the complexes of the more southerly portion of the region along the Tormentine Peninsula (see Fundy Coast Ecoregion), while high marsh is generally more common, particularly in the shelter behind lagoons or barrier beaches. Alder shrub swamps occur alongside streams, while the few lakes tend to have peaty shorelines with a shrub cover of leather-leaf, rhodora, and Labrador-tea.

6.1. Tabusintac Ecodistrict

The Tabusintac Ecodistrict forms the oval-shaped core of the Acadian Peninsula in northeast New Brunswick. It sits at a higher elevation than the Caraquet Ecodistrict, which encircles it.

Geology

The entire ecodistrict is underlain by Pennsylvanian sedimentary rocks that consist of red, buff, grey and olive green sandstone, interbedded with mudstone and conglomerate.

A Jurassic diabase dyke called the Caraquet Dyke intersects the Tabusintac Ecodistrict at Petit-Pacquetville in the northeast and exits near Trout Brook in the southwest. This geological feature surfaces irregularly across much of the province.

Landscape and Climate

The Tabusintac Ecodistrict is encircled by coastal flats of the Caraquet Ecodistrict. The landscape undulates gently up from the

bordering flatlands to a maximum height of about 180 m just south of Allardville, and then declines to 120 m at the western boundary.

Major rivers are the Caraquet, Pokemouche, Tracadie, Tabusintac, and Bartibog. They arise from interior bogs, lakes or springs, and flow eastward into saltwater bays of the Gulf of St. Lawrence. Although moderately incising in places, the rivers tend to meander across the land, gathering tributaries before merging into coastal estuaries teeming with a variety of plants and animals.

Lakes in the area are few, tiny, and shallow. Teagues Lake, south of Janeville is the largest and has extensive aquatic vegetation with one of the few yellow perch populations in northern New Brunswick. As would be expected in a region of slow-moving rivers and low relief, the landscape is a tapestry of richly hued bogs and marshlands.

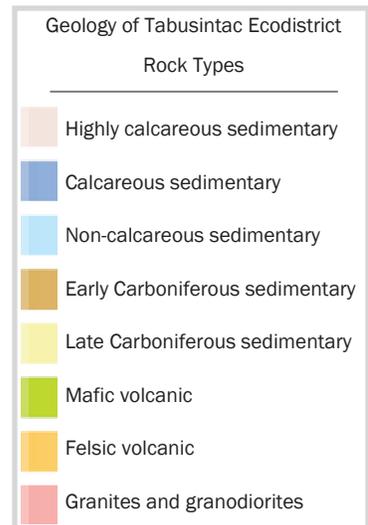
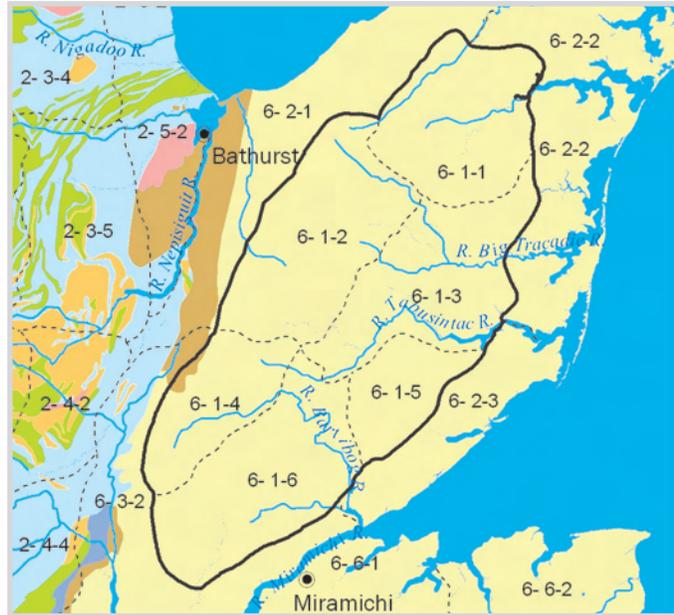
The climate is dry and cool, as the land lies in the rain shadow of the Northern Uplands and Southern Upland ecoregions and is cooled by influences of the Gulf of St. Lawrence.

Soils

The widespread Pennsylvanian sedimentary rocks weather easily to form deep, acidic soils. Red mudstone in the south produces fine-textured, compact soils of the Stony Brook and Harcourt Units. The soils have low inherent fertility, but are well-textured and low in stoniness. Where situated on sites with good drainage, they support agricultural crops.

Olive grey sandstone in central parts of the ecodistrict yields compact, medium-textured loamy soils of the Reece Unit, and non-compact, coarse-textured soil of the Sunbury Unit. The latter soils occur close to Allardville and St-Isidore, and tend to line the incised river valleys. Shallow, residual soils of the Fair Isle Unit, also derived from olive grey sandstone, occur farther east between the Tracadie and Tabusintac Rivers.

A large glaciofluvial deposit belonging to the Riverbank Unit occurs along the upper stretches of the Pokemouche River. These droughty soils are among the least fertile in the area, and are



tolerated mainly by jack pine and black spruce. Patches of poorly-drained Organic Unit soil are associated with headwaters of the Bartibog and Tabusintac Rivers.

Biota

A combination of high fire frequency and acidic, wet soils is reflected in the largely coniferous forest cover here. Black spruce dominates along upper stretches of the Bartibog River, where fine-textured, poorly drained soils (3) are common; it is accompanied by balsam fir, jack pine, and occasional white pine.

Large stands of jack pine frequent the sandier soils (1, 2) of the Tabusintac and Tracadie river valleys, whereas balsam fir, red spruce, hemlock, and white spruce, mixed with hardwoods, tend to occur on the mid-slope (5) sites.

Pure tolerant hardwood communities here are infrequent and grow only on the steeper slopes and ridgetops (4, 8). Deciduous forests more commonly tend to consist of trembling aspen, white birch, and red maple. However, the well drained slopes (7) east of Allardville support some mixed forests with red maple, beech, red spruce, and balsam fir.

Sugar maple occurs in scattered, but productive, patches around Pacquetville. One commercial sugar bush in the area supports a grove of trees that has individual specimens more than 200 years old. The community of Notre-Dame-des-Érables was named for its local maple stands.

The peat bogs, estuaries, and riverbanks make for an interesting assemblage of flora and fauna. Two species of orchids occur along the South Branch of the Little Bartibog River near Highway 8. The Tracadie River has several sites with unusual plants, such as bloodroot and little shinleaf.

Back Dam Marsh east of Patterson Siding attracts a wide diversity of ducks, plus great blue heron, belted kingfisher, and ruffed grouse. A bog just east of Bartibog Station is the largest minerotrophic peatland in northern New Brunswick. At Gaythorne, the Tabusintac estuary fingers inland from the coast to feed Big Marsh, which is a brackish intertidal haven for osprey, great blue heron, bald eagle, and waterfowl.

The Tabusintac Ecodistrict has attracted several uncommon butterfly species. The purple lesser fritillary and greenish blue can be sighted in the vicinities of Allardville and Bartibog. Summer visitors to the sandier stretches of Highway 8 around Bartibog might

glimpse various species of elfin butterflies or, if they are lucky, the scarce silvery checkerspot.

Large numbers of great spangled fritillary occur along the lower reaches of the Tracadie River, and brighten up the now-inactive Tracadie Military Area.

Settlement and Land Use

The Tabusintac Ecodistrict lies within the traditional Mi'kmaq territory of Gespegeog. Aboriginals from coastal communities that lay just beyond the eastern ecodistrict border at the mouths of the Tabusintac, Tracadie, and Pokemouche Rivers visited the area regularly for fishing and hunting.

The first non-aboriginal residents on the Acadian Peninsula were early French and refugee Acadian settlers who chose to live along the coast. Not until the *Free Grants Act* in the 1860s did inland villages, such as St-Isidore and Paquetville, begin to appear within the ecodistrict. The gentle terrain enabled settlements to expand out from the coast and rivers over time.

The completion of the Intercolonial Railway between Bathurst and Newcastle in 1876 caused new hamlets to spring up along the railroad, one of which was Bartibog Station. A wartime train carrying Sir Winston Churchill to Québec City was sidetracked overnight at Bartibog Station to give Churchill an undisturbed sleep.

Records show that logging began modestly in the early 1800s and continued more or less steadily over the next century. The area's type of forest cover, boggy terrain, and fire frequency prevented it from achieving anything like the phenomenal productivity of the Miramichi and Restigouche tracts during their logging heyday.

Few economic mineral deposits of interest have been discovered here. Buff sandstone outcrops were quarried in the past for dimension stone to erect local buildings such as the St-Augustine Church in Paquetville and St-Isidore Church in St-Isidore. The latter church, in particular, is an opulent delight with its pure white interior and 14-carat gold leaf appliqué along ceilings, pillars, and walls.



St-Augustine Church in Paquetville,
New Brunswick.

6.1. Tabusintac Ecodistrict at a Glance

Ecoregion: Eastern Lowlands

Area: 255, 996 ha

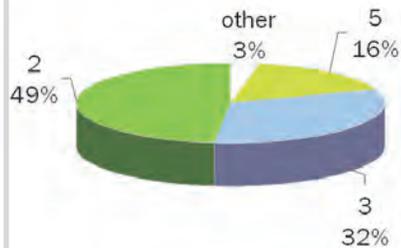
Average elevation above sea level: 98 m

Average May-September precipitation: 375 mm

Average annual degree-days above 5°C: 1,400–1,600

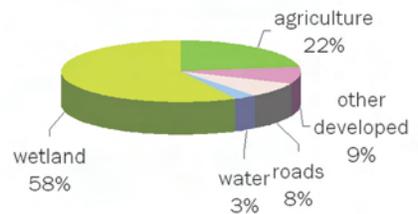
90% of Tabusintac Ecodistrict has forest cover

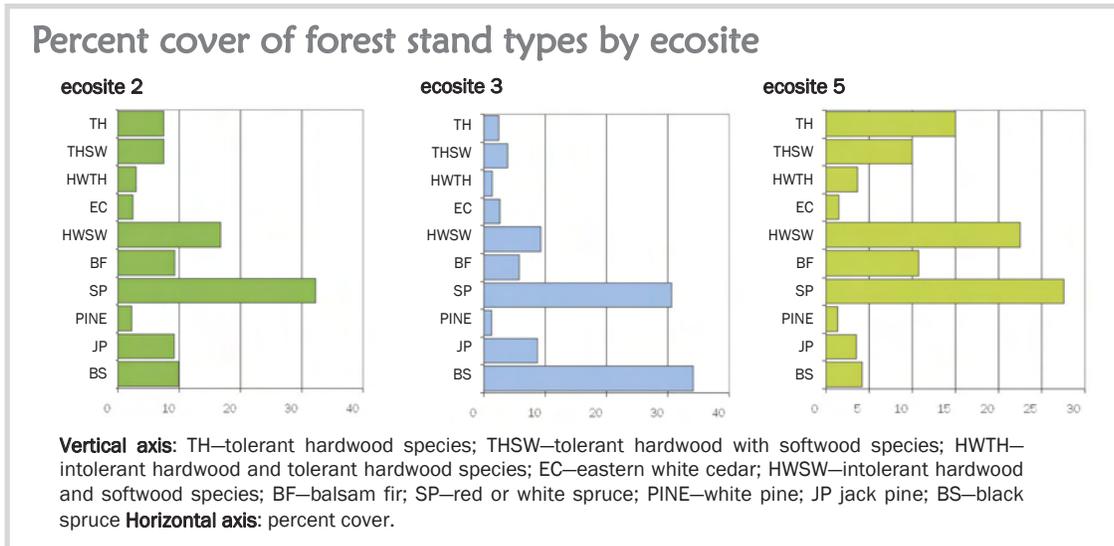
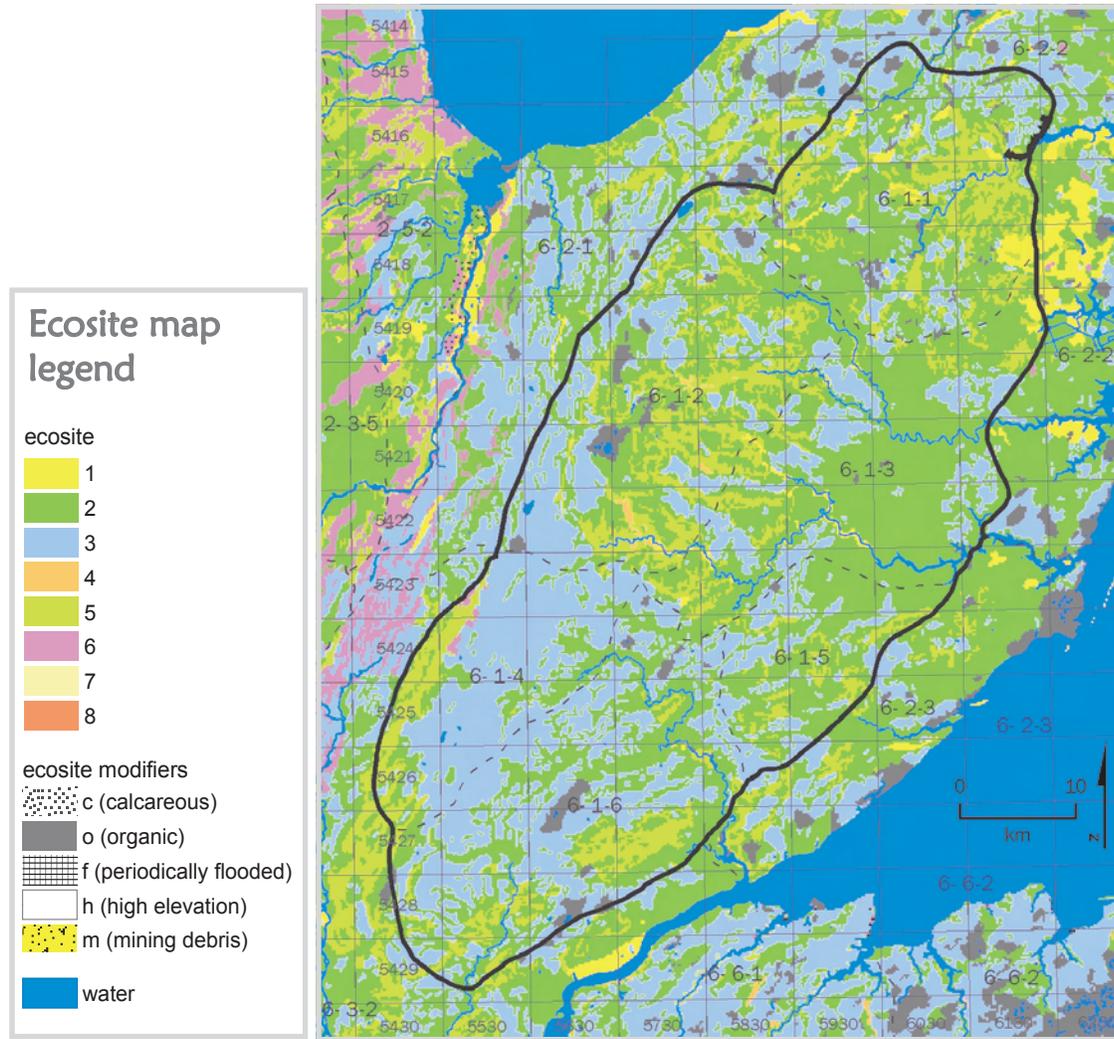
ecosite coverage of forest area



10% of Tabusintac Ecodistrict is not forested

uses of non-forest area



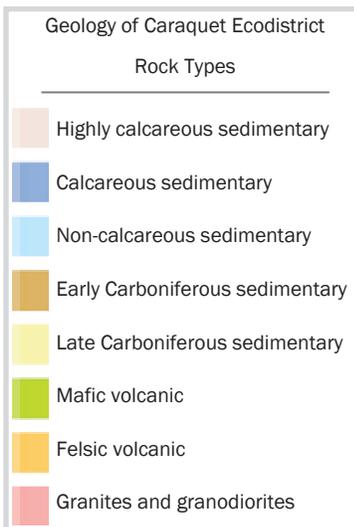


6.2. Caraquet Ecodistrict

The Caraquet Ecodistrict is a crescent of land averaging 10 km wide that rims the Acadian Peninsula coastline. It begins at the mouth of the Nepisiguit River, curves around Miscou Island, and ends at the mouth of the Miramichi River.

Geology

The bedrock in this ecodistrict consists almost entirely of Pennsylvanian non-calcareous red and grey sandstone, interbedded



with mudstone and conglomerate. The sea stacks at Pokeshaw Provincial Park display several of these rocks in sequence, with grey sandstone at the base overlain by red conglomerate and sandstone. A thin band of red, slightly calcareous Pennsylvanian conglomerate and sandstone occurs along the Nepisiguit River.

Pennsylvanian plant fossils are visible in several locations, including the sandstone cliffs at Stonehaven and Clifton, where they are associated with coal seams. Plant fossils at Pigeon Hill, near Lamèque, are partly replaced and encrusted by two copper minerals: bright green malachite

and blue connellite.

Landscape and Climate

The landscape here can be divided into three distinct zones. The smallest zone parallels the western border and the Nepisiguit River, stretching from near Bathurst Mines up to the town of Bathurst. The land achieves an elevation of perhaps 100 m, and its streams and rivers drain into the Nepisiguit River.

The second zone is situated between Bathurst and Caraquet Island. It has a low, gently sloping appearance with coastal cliffs measuring perhaps 30 m high near Grand Anse. Its rivers flow towards Chaleur Bay, and the beaches feature crumbling sandstone cliffs with an unfettered view over much of the bay.

The third, and largest, landscape zone reaches from Caraquet Island around the Miscou Lighthouse and down to Bartibog Bridge. The coastline in this area is linked by an almost continuous chain of sand dunes, sand spits, protected bays, and salt marshes, severed only by estuaries of the Pokemouche, Tracadie, Tabusintac, and other rivers merging into the Gulf of St. Lawrence.

The cool, dry climate of the Caraquet Ecodistrict resembles that in the adjacent Tabusintac Ecodistrict, but its summer wind velocity is nearly twice the speed of the inland breezes. Prolonged exposure to the buffeting onshore winds has stunted and damaged many coastal trees, an effect which gradually diminishes inland.



Tabusintac Gully. Photograph © Ron Garnett–AirScapes.ca.

Soils

The Pennsylvanian rocks have produced relatively fertile soils, due in part to the lithological variety in the conglomerates. The ecodistrict border approximates the boundaries of soils derived from marine or glaciomarine sediments. These range from the fine textured soils of the Tracadie Unit, derived from red mudstone, to the coarse textured soils of the Riverbank Unit, associated with grey sandstone.

Glaciomarine soil of the Barrieau-Buctouche unit is intermediate in composition between the Tracadie and Riverbank Units. It displays sandy, non-compact material over a reddish, loamy compact till and is suitable for agriculture if well drained.

Glacial tills occur farther inland where fine-textured, compact soils of the Stony Brook Unit are the most common. Medium-textured, compact soils derived from red conglomerate and belonging to the Parry Unit are limited to areas near Meadow Brook.

Organic soils have developed in many of the flat, poorly drained coastal areas and include large peat bogs near Shippagan, Caraquet, Grande-Anse and Wishart Point.

Biota

The long history of settlement and forest disturbance has resulted in a dominant forest of intolerant hardwood species: red maple, trembling aspen, and grey birch. Traces of sugar maple,

yellow birch, and beech occur only along the inland perimeter.

Valley bottoms (2) and sites with coarse-textured soils (1) are covered with species such as black spruce and jack pine, which indicate a high fire frequency. The mid-slopes tend to support more hardwood, especially red maple, together with red spruce, white pine, balsam fir, and hemlock.

Hemlock used to be more widespread on the Acadian Peninsula, but is now reduced to remnant stands. Eastern white cedar and tamarack commonly occur with black spruce in areas of poor drainage (3, 6).

The predominantly coastal, sand dune environment has given rise to salt marshes, dunes, beaches and spits that offer refuge to several species of rare or endangered plants, birds and butterflies.

One of the more outstanding sites is Miscou Island's northeast shoreline, which has the widest dune system in eastern Canada. It displays a range of ecological succession with shoreline grasses grading into areas with wild iris and sweet gale, through to inland areas where stunted white spruce anchors the soil against ceaseless winds.

Miscou Island is also host to the Gulf of St. Lawrence Aster, one of two rare annual asters that are shared between Caraquet and the Tabusintac Ecodistrict. As the name implies, the Gulf of St. Lawrence Aster is known only from the shores of the Gulf of St. Lawrence. The other aster, Annual Saltmarsh Aster, has a form that appears to be unique to the New Brunswick coast. While taxonomists no longer consider this to be a separate species, its distinctiveness has nonetheless earned it the name of Bathurst Aster - reminiscent of the area from which it was first described.

As the Caraquet Ecodistrict extends into the Gulf of St. Lawrence, in the form of Lameque and Miscou islands, it intercepts the path of many migratory bird species. The large numbers of birds moving through the area include the occasional confused individual that has traveled off course and finds itself outside its normal geographic range. Miscou Island, in particular, has hosted several unexpected visitors, such as the fork-tailed flycatcher and the scissor-tailed flycatcher.

Rare birds seen here include the endangered piping plover, which nests in this and the adjacent Kouchibouguac Ecodistrict. It is recognized as nationally endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and is protected under the provincial *Endangered Species Act*. Tabusintac Gully is an

important breeding ground for piping plover, terns, and other shorebirds. The largest black-crowned night heron colony in the Maritimes occurs farther south near Inkerman, at a site that also harbours great blue heron.

The salt marshes of the ecodistrict host several interesting butterfly species, including the nationally and provincially rare Maritime ringlet. These marshes also harbour the salt-marsh copper, and the uncommon short-tailed swallowtail butterflies.

Settlement and Land Use

The Caraquet Ecodistrict lies within the traditional Mi'kmaq territory of Gespegeog and has many archaeological sites. For at least 4000 years, the Mi'kmaq or their ancestors had settlements at the mouths of the Tabusintac, Tracadie, and Pokemouche Rivers where they fished the rivers, gathered shellfish, and hunted seabirds and sea mammals.

The French explorer and merchant Nicolas Denys established a short-lived fishing and fur trading post on Miscou Island in 1645. About eighty years later, French immigrants formed a permanent settlement at Caraquet. They subsequently were joined by Acadians returning from exile in the 1760s and, later, by people from Québec. More recent native villages were situated at Miscou Island and farther south at Burnt Church, where the Recollects established a mission in 1685-86.

The various communities that evolved along the coast relied upon fishing, farming, and logging for their livelihood. Between the late 1700s and about 1930, an important grindstone industry thrived on the north shore.

Extensive coastal quarries were worked at Stonehaven, New Bandon, Clifton, and Grande Anse. The stone was used to make grindstones for markets across eastern North America, and also to provide building stone for the area's many stone churches.

The local economy today depends heavily upon its natural resources, including the fisheries. Peat harvesting takes place at nearly two dozen coastal bogs.

Pokemouche River, looking north.
 Photograph © Ron Garnett--
 AirScapes.ca.



Mixed farming occurs patchily along the coast and is dominated by pasture, forage, and grain production, with significant areas of blueberry harvesting.

Burnt Church First Nation occupies Burnt Church Point in the foreground. Beyond Morin Point and Hay Island lies the village of Nguac.



6.2. Caraquet Ecodistrict at a Glance

Ecoregion: Eastern Lowlands

Area: 200,166 ha

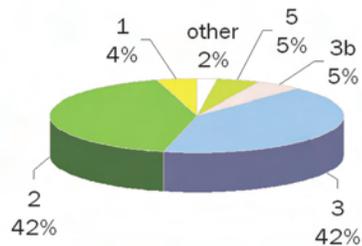
Average elevation above sea level: 42 m

Average May–September precipitation: 350–400 mm

Average annual degree-days above 5°C: 1400–1600

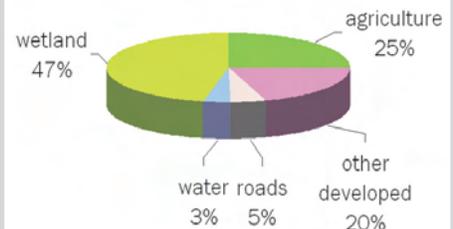
70% of Caraquet Ecodistrict has forest cover

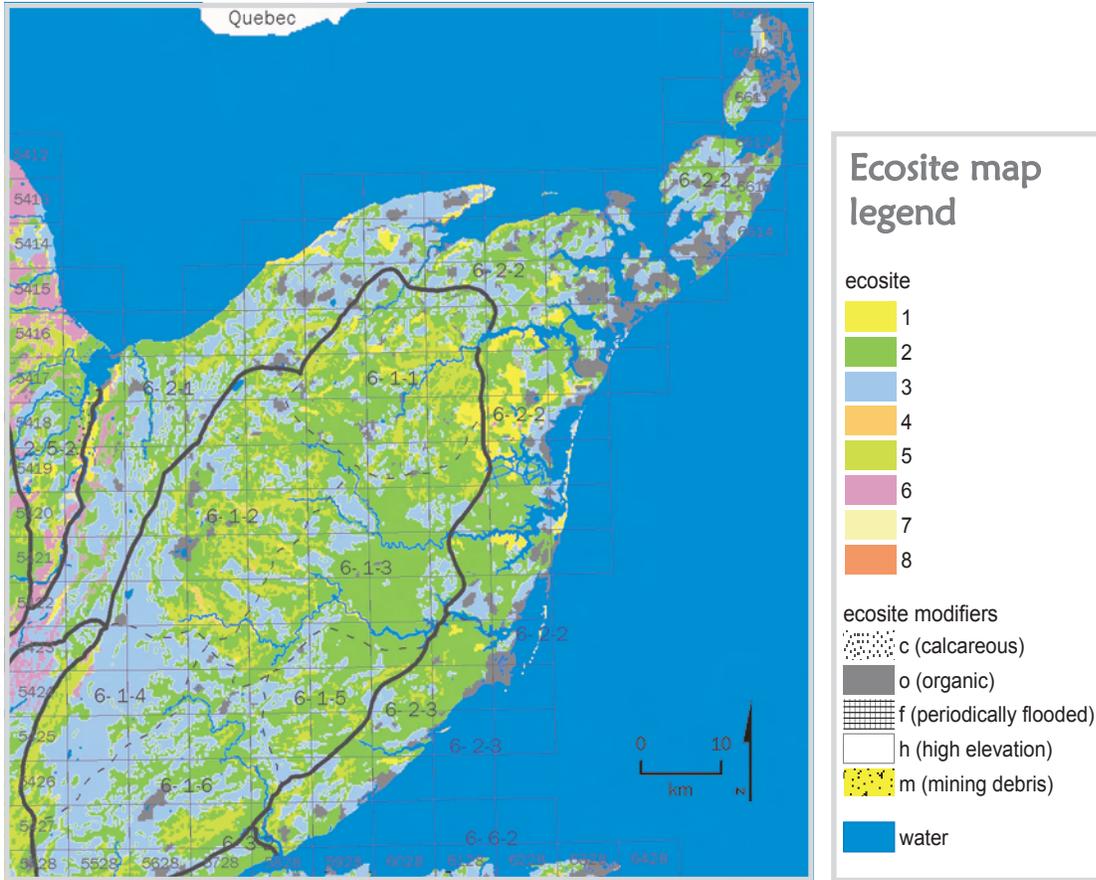
ecosite coverage of forest area



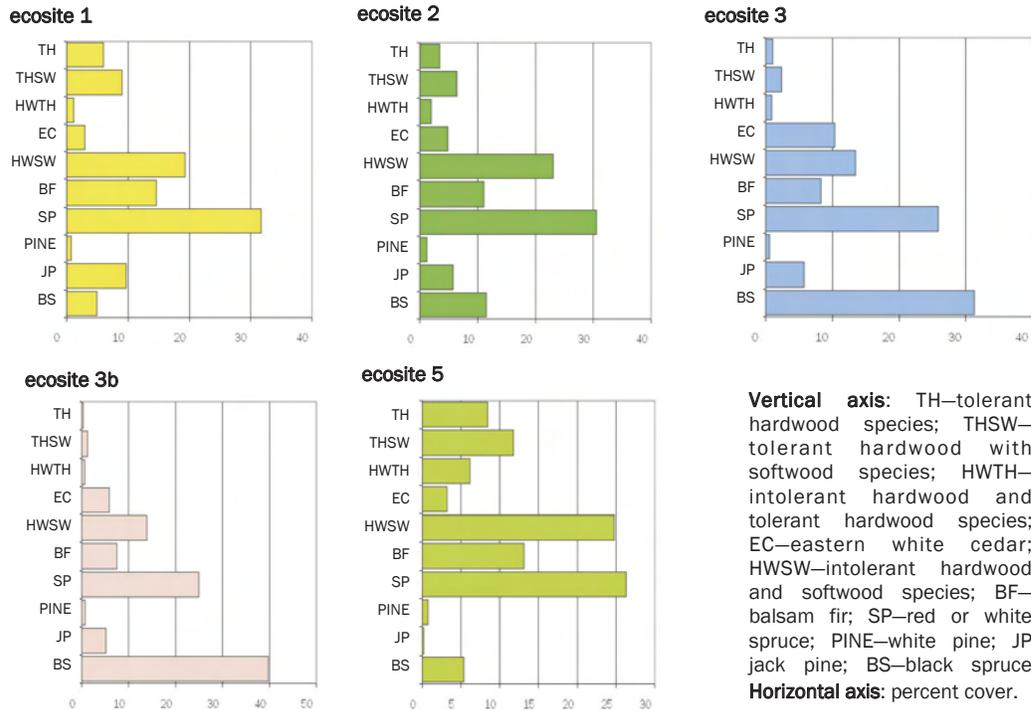
30% of Caraquet Ecodistrict is not forested

uses of non-forest area





Percent cover of forest stand types by ecosite



6.3. Red Bank Ecodistrict

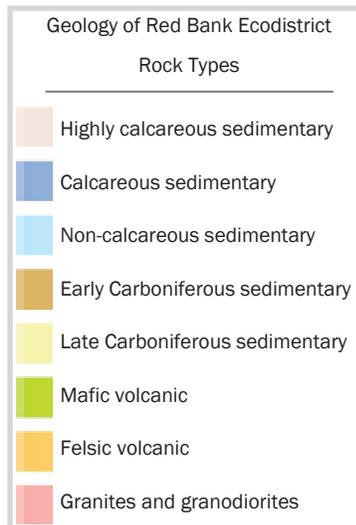
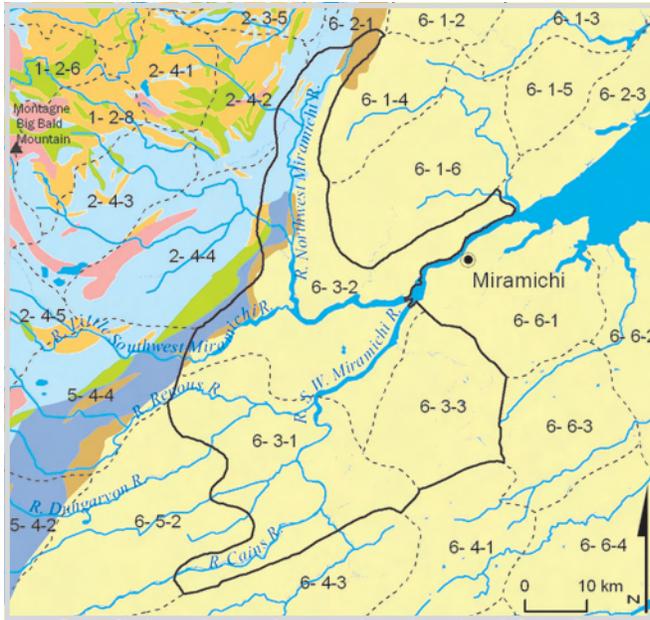
The Red Bank Ecodistrict presents a flat to gently sloping terrain that includes the lower reaches of the Southwest and Northwest Miramichi rivers.

Geology

The bedrock consists primarily of the same Pennsylvanian lithologies—red, buff and grey sandstone, mudstone, and conglomerate—that underlie much of the Eastern Lowlands Ecoregion.

A narrow zone of older rock outcrop in the western part of the ecodistrict. These are mainly Ordovician metasedimentary rocks, dominated by metaquartzite, phyllite and slate, interbedded with some Silurian sedimentary rocks and Ordovician mafic volcanic rocks.

An unusual cave is located near Oldfields Island on the Northwest Miramichi River. Its entrance is 20 m wide, 5 m tall, and embedded with angular pebbles of rose and milky quartz.



Landscape and Climate

The Red Bank Ecodistrict is the geographic point of reckoning for all tributaries, branches, and streams associated with the Miramichi River. The Northwest Branch, Little Southwest Miramichi, Southwest Miramichi, Renous and Dungarvon Rivers converge within the ecodistrict, surging their joint waters under the Centennial Bridge at Miramichi City to enter Miramichi Bay.

The size and power of the rivers has enabled them to erode and dissect the landscape fairly deeply. River valleys drop about 70 m from riverbank to riverbed, and even more along the east shore of the Northwest Miramichi River.

The climate is relatively warm and dry. Summer precipitation is substantially lower than in adjacent ecodistricts to the west, with an associated greater risk of forest fire. The area has a high historical incidence of fires, the most famous being the 1825 Miramichi Fires.

The highest elevation in this otherwise low-lying terrain is 152 m near the village of Lumsden Road.

Soils

Soils are poorly drained because of low relief and tend to have limited fertility regardless of bedrock derivation.

Large deposits of glaciofluvial, alluvial, and marine materials line the major rivers. Sand and gravel are the dominant constituents, forming coarse-textured, generally droughty soils of the Gagetown and Riverbank Units. They are ideally suited for pines and black spruce.

Soils located inland away from the river valleys are mainly grey, compact basal tills belonging to the Reece and Rogersville Units. The Reece Unit derives from grey sandstone, while the Rogersville is quite similar to the Reece, but with a minor metasedimentary and igneous rock component. Red compact soils of the Stony Brook Unit occur in small areas north of Sunny Corner. Their fine texture gives these soils a high nutrient-holding capacity which is sometimes realized where slopes are well drained.

Biota

Forests here are dominated by black spruce and red spruce, often in association with balsam fir and hemlock, or, less commonly, jack pine and white pine.

Black spruce is most common on wet flatlands (3, 3b) and is found together with cedar on wet seepage slopes (6). Red spruce becomes more dominant on moist flatlands and slopes (2, 5), whereas pine is prominent on the dry, flat areas (1) along the major tributaries of the Miramichi River. Impressive specimens of both species can be seen in places near Doaktown, where white pine and red spruce tower over a mixture of balsam fir, red maple, and beech.

A site south of Red Bank has a large, mature coniferous community of red spruce with hemlock. Its understorey of dwarf rattlesnake-plantain and painted trillium creates a colourful forest quilt in spring.

The dissected, higher relief river valleys yield a greater proportion of hardwood vegetation than occurs elsewhere in the Eastern Lowlands Ecoregion. Forests of sugar maple, yellow birch, and beech are few and are confined to well drained sites on higher landscape positions. One such site occurs near Harris Brook Settlement on a hardwood ridge featuring ironwood, sugar maple, and witch-hazel.

Large black cherry grows at a site west of Upper Blackville Bridge, and a patch of black willow occurs downstream at Arbeau

Settlement. Both species are sparsely distributed in New Brunswick.

Most of the unusual or rare plants growing here prefer moist or wet conditions. A floodplain at the junction of the Barnaby and Southwest Miramichi rivers shelters the smooth yellow violet, plus an upland forest with beech, elm, black willow, and ironwood. The giant rattlesnake-plantain grows in a cedar swamp on the Northwest Miramichi River, north of Wayerton. The Quarryville area supports botanical rarities, such as threadfoot and the small-flowered gerardia.

An old black spruce forest just west of Weaver Siding harbours the uncommon purple lesser fritillary butterfly, formerly called the titania fritillary.

The Miramichi River contains the spawning grounds and nursery habitat of one North America's largest populations of Atlantic salmon. Also occurring in the ecodistrict is the only known spawning ground of the southern Gulf of St. Lawrence striped bass population, which also happens to be the northern-most population of this species in the Atlantic Ocean.

The lower Miramichi estuary has numerous salt marshes, bogs, swamps, islands, tidal flats, and other enclaves that are used annually by thousands of birds for nesting and staging areas. Exmoor Island, for instance, is frequented by osprey and many species of waterfowl. Jones Cove, near Miramichi City, is an important feeding ground for ducks, despite its proximity to human disturbances.

Settlement and Land Use

The Red Bank Ecodistrict lies within the traditional Mi'kmaq territory of Gespegeog and encompasses the famous Oxbow archaeological site located on the Little Southwest Miramichi River, adjacent to the community of Red Bank. The site shows almost unbroken habitation dating back at least 2800 years, which means that Red Bank (Metepenagiag) is New Brunswick's oldest continuously occupied village.

The Augustine Mound just north of Red Bank dates back 2400 years and contains artifacts showing that aboriginals from the area maintained close connections with people in the Ohio River Valley from about 2500 to 2000 years ago. Both the Augustine Mound and Red Bank sites are National Historic Sites.

Metepenagiag is strategically placed between forest and marine resources. As a result, the population always had a thriving trade in

surplus food and other items. In pre-colonial days, its residents lived beside the rivers in spring and summer, catching and preserving sturgeon, salmon and other fish. In fall, they traveled to coastal marshes for migratory bird hunts and, in winter, they moved inland to hunt deer, moose, and caribou.

French and English fur traders began visiting the ecodistrict by at least the 1600s. Acadian families appear to have settled along the the Little Southwest Miramichi River in the early 1700s, followed in 1765 by William Davidson who dealt in fish, furs, shipbuilding, and masts. Succeeding merchants preserved fish, secured huge timber licenses, and erected sawmills and shipbuilding facilities at Newcastle and Chatham.

Bog manganese deposits are common here, but have not been commercially developed. More important were the sandstone quarries located at French Fort Cove and Quarryville, which shipped dimension stone to markets across eastern Canada between 1885 and the early 1900s. Stone from French Fort Cove in Newcastle was used to build the Langevin Block of the Ottawa Parliament Buildings.

The largest centre in the ecodistrict today is Miramichi City, which includes the former towns of Newcastle and Chatham. Most other communities occur within a narrow fringe paralleling rivers and streams. The pulp and paper industry is a major area employer.



Until the opening of the Centennial Bridge in 1967, a ferry crossed the Miramichi River between Chatham and Douglstown. Several communities including Chatham and Douglstown were amalgamated in 1995 to form the city of Miramichi. *Photograph © Ron Garnett–AirScapes.ca.*

6.3. Red Bank Ecodistrict at a glance

Ecoregion: Eastern Lowlands

Area: 223,981 ha

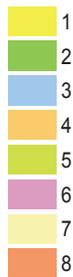
Average elevation above sea level: 71 m

Average May–September precipitation: 425 mm

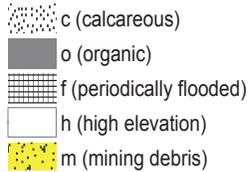
Average annual degree-days above 5°C: 1600–1800

Ecosite map legend

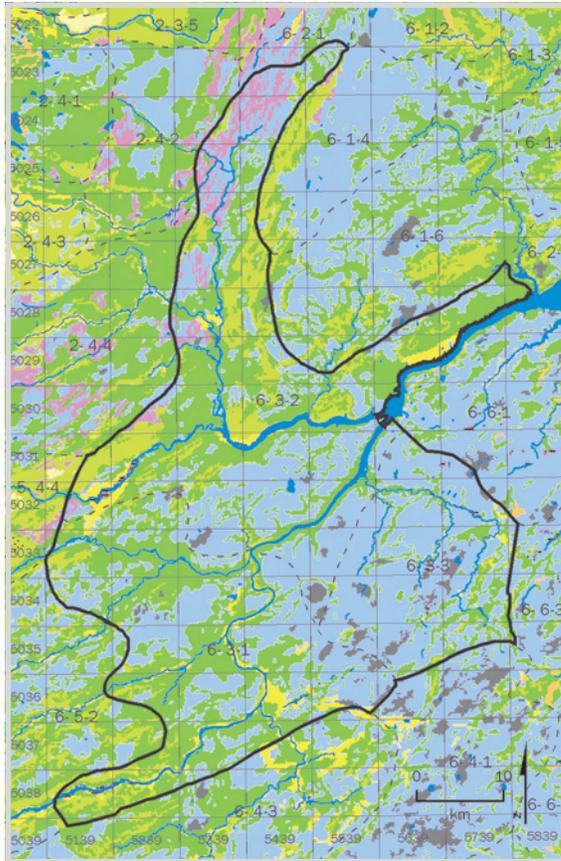
ecosite



ecosite modifiers

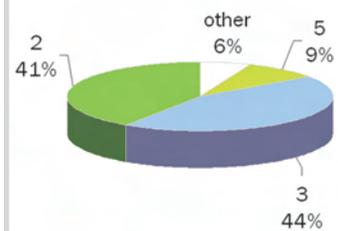


water



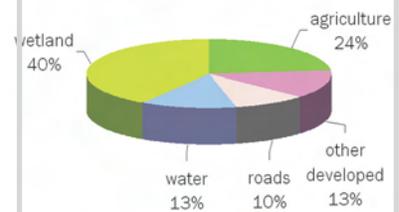
86% of Red Bank Ecodistrict has forest

ecosite coverage of forest area



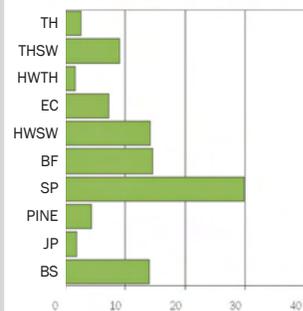
14% of Red Bank Ecodistrict is not forested

uses of non-forest area

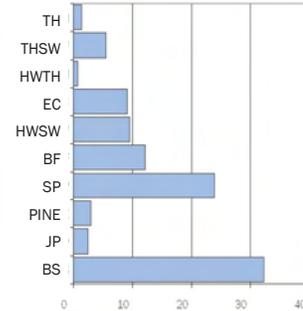


forest cover of ecosites

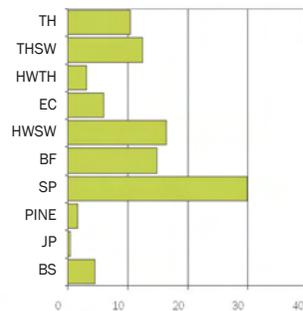
ecosite 2



ecosite 3



ecosite 5



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.

6.4. Castaway Ecodistrict

The Castaway Ecodistrict is a low, flat plateau that represents the height of land between the Kouchibouguac and Grand Lake Ecodistricts.

Geology

The bedrock consists almost entirely of Pennsylvanian grey and red sandstone, mudstone, and conglomerate. Near the southern border at New Canaan, a patch of Silurian volcanic rocks underlies a long, narrow band of Mississippian sediments that include limestone and other evaporites.

Landscape and Climate

The Castaway Ecodistrict is a landscape characterized by three major rivers interrupted by large tracts of bog and other wetlands. It has limited human settlement but abundant habitat for flora and fauna.

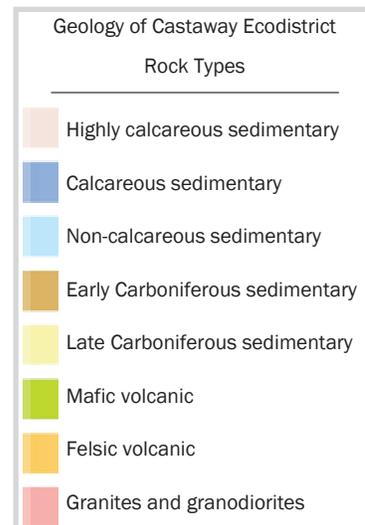
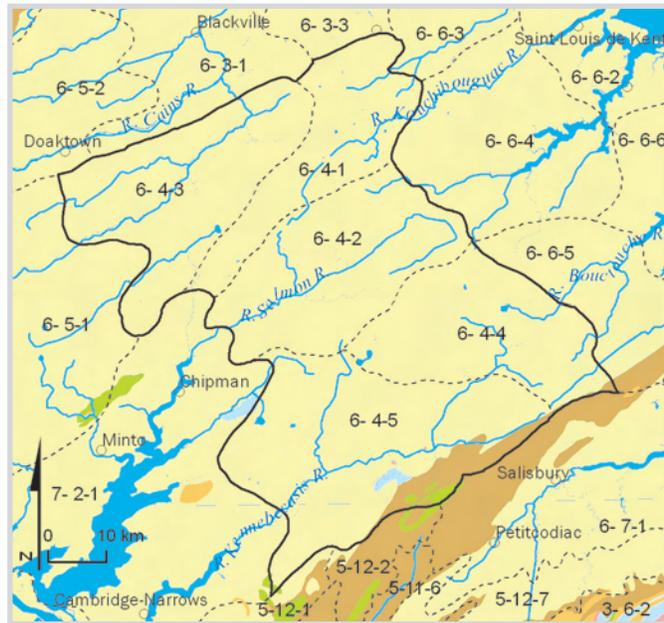
The Salmon River flows southwest into the Saint John River via Grand Lake, draining much of the central part of the ecodistrict. The Canaan River lies farther south and enters Washademoak Lake, also within the Saint John watershed. The Cains River, skims the northern corner of the ecodistrict before joining the Southwest Miramichi River.

Lakes here are small and round, as they have little in the way of bedrock, geological lineaments, or topography to persuade them into more elongate forms. Relief rarely exceeds 60 m, and peak elevations reach only 160 m. Without exception, the lakes appear as suspended bodies of water fed by, and lying within, an almost continuous array of peat bogs, and other wetlands.

Soils

The Pennsylvanian bedrock weathers easily to produce deep, fine-textured, acidic soils of low inherent fertility, which combine with the poor regional drainage to limit forest growth in the ecodistrict.

The dominant soil is red, fine-textured, clay loam of the Stony Brook Unit. The clay-rich layers effectively limit the infiltration of precipitation, giving the area a wet and boggy aspect. In many areas, a thin layer of medium- to coarse-textured, grey soil of the Harcourt



Unit overlies the red tills. Several peat deposits yielding organic soil are found near Lake Stream Lake and Meadow Lake.



The Castaway Ecodistrict is underlain by clay loam subsoils of low permeability such as the one pictured here. Forest productivity is low overall, except where very gentle slopes contribute to improved drainage.

The Cains River basin is covered with compact sandy loam to loamy soils with a medium-coarse texture. They derive from olive green sandstone and belong to the Reece Unit. The slopes of the river, are dominated by non-compact, stony Sunbury Unit soils.

Biota

Black spruce with jack pine is common on all ecosites, a consequence of fire and acidic, poorly drained soil. These communities occur on a variety of sites including moist flatlands (2), dry valley bottoms (1), and areas of impeded drainage (3). Cedar also grows in flat, swampy areas, such as Lake Stream and Fulton Brook.

White pine dominates over red pine in this area of the province, but at several locales, such as the banks of the West Branch Sabbies River, the two species can be found together.

Hemlock is absent from tracts exposed to repeated wildfire, but can be observed in more fire-protected zones. The land southeast of Shinnickburn near the Sabbies River contains patches of large, old hemlock, which, thus far, have managed to avoid both flame and chainsaw. Hemlock also prevails on woodlots along the eastern border, where roads and fields serve as fire breaks.

Stands of mixed forest occupy the low ridges (5) and valley slopes (4) and are dominated by red maple, trembling aspen, birch, red spruce, white spruce, and white pine. As in all of the Eastern Lowlands Ecoregion, forests of sugar maple, yellow birch, and beech are uncommon. One site near New Scotland, however, has remarkably large beeches that are free of the ubiquitous canker disease. As well, the Cranberry Lake Ecological Reserve protects an unusual community of mature red oak and red maple. Native hop recently was discovered at Sabbies Forks, just north of the hemlock stand. It had not been confirmed in New Brunswick since the 1880s and was believed to have been extirpated.

Settlement and Land Use

The Castaway Ecodistrict lies primarily within traditional Maliseet territory, but was used by both Maliseet and Mi'kmaq for

overland passage between the Northumberland coast and the Saint John River. The most popular route was up the Richibucto River to a short portage, which led, to the Salmon River, Grand Lake, and the Saint John River. A number of ancient encampments dating back 3000 years have been found along the Salmon River. As well, archaeologists have uncovered some of the earliest pottery fragments in New Brunswick from this ecodistrict.

The area produced large volumes of timber in the early 1800s, much of which was felled along valleys of the Cain, Canaan, and Salmon Rivers. Sawmills were operating along the Sabbies River by at least the 1820s.

Lumber camps aside, the widespread wetlands of the ecodistrict precluded much historic non-aboriginal habitation. A few villages arose elsewhere, including at Castaway, which was named for an island at the mouth of the Salmon River where two men fell off their scow in the early 1800s. The 1870s arrival of the Intercolonial Railway created railside communities, such as Coal Branch, Canaan, and Rogersville. Rogersville grew into a thriving agricultural centre alongside a Trappist Monastery, which was established in 1902. Rogersville is called the Brussel Sprout Capital of Canada in recognition of the large brussel sprout plantation established in 1966. It also derives economic benefit from nearby peat harvesting operations.



The peatland-forest mosaic pictured here is typical of the plateau captured in the Castaway Ecodistrict.

6.4 Castaway Ecodistrict at a Glance

Ecoregion: Eastern Lowlands

Area: 424, 618 ha

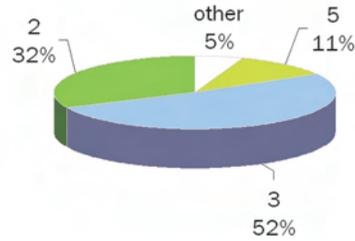
Average elevation above sea level: 71 m

Average May-September precipitation: 400 - 425 mm

Average annual degree-days above 5°C: 1700

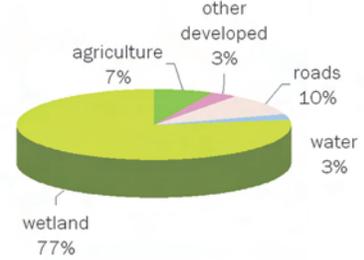
95% of Castaway Ecodistrict has forest cover

ecosite coverage of forest area



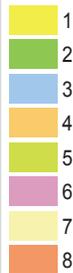
5% of Castaway Ecodistrict is not forested

uses of non-forest area

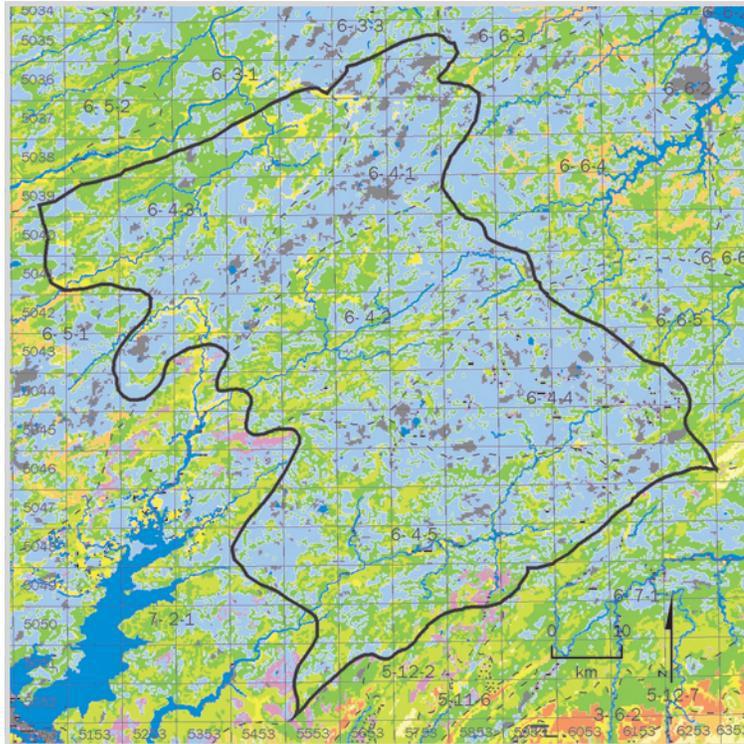
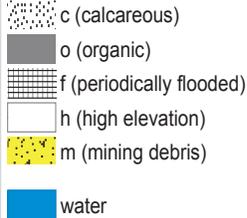


Ecosite map legend

ecosite

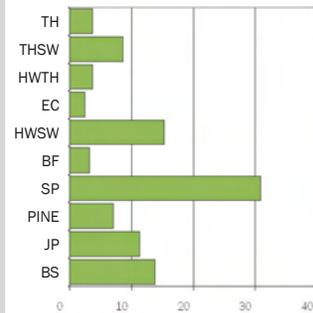


ecosite modifiers

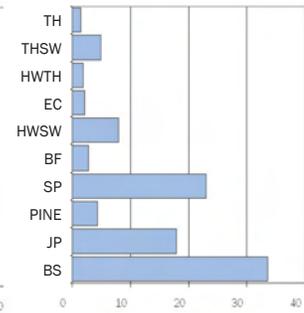


Percent cover of forest stand types by ecosite

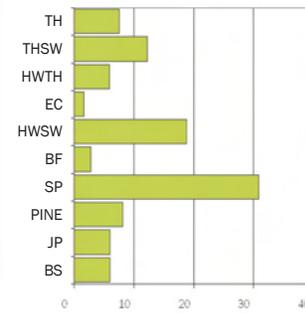
ecosite 2



ecosite 3



ecosite 5



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.

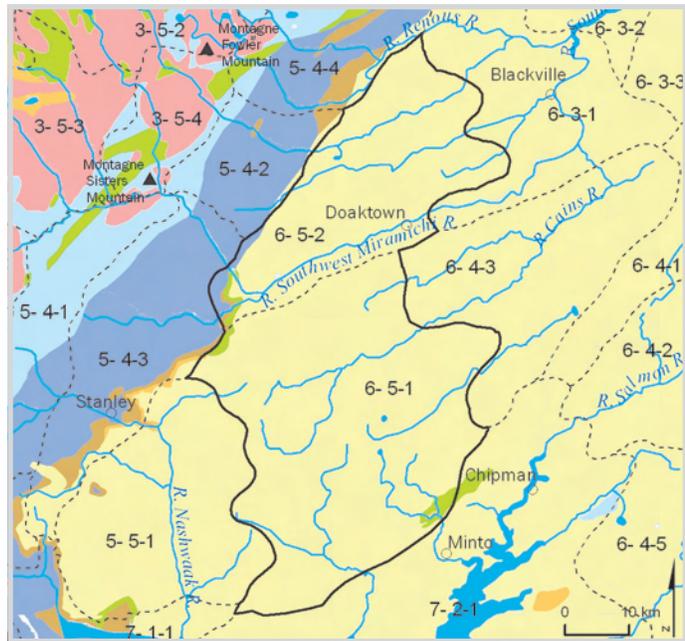
6.5. Bantalor Ecodistrict

The Bantalor Ecodistrict is a flat to gently rolling area located on the edge of the Eastern Lowlands Ecoregion where they abut the Valley Lowlands Ecoregion.

Geology

Geological formations in this ecodistrict are composed mainly of Pennsylvanian non-calcareous grey to red sandstone, mudstone, and conglomerate. Roadcuts near Astle display typical Pennsylvanian strata with conglomerate, grading up into cross bedded sandstone, a sequence indicative of ancient river channels. Plant fossils can be seen at the site.

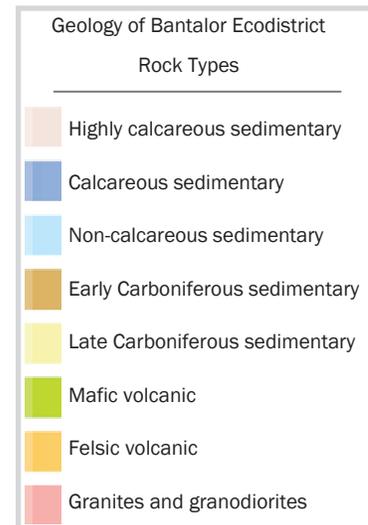
The bedrock throughout is flat lying and easily eroded, characteristics that have combined to create an unusual feature on Newcastle Creek between Mount Pleasant and Hurley Brooks. Here, waters of the creek have undercut a steep bank by almost 8 m to produce an overhang known locally as the Devil's Oven.



Landscape and Climate

The Southwest Miramichi River is the dominant physiographic feature. It transects the terrain as a wide, island-filled watercourse with steep sides that in places rise 60 m to attain an average elevation of 150 m. A few streams leading into the Southwest Miramichi, such as Betts Mills Brook and Burnt Land Brook, are also deeply incised. Relief elsewhere in the ecodistrict scarcely exceeds 40 m. Betts Mills was named after Ephraim Betts, who is credited with being the earliest non-aboriginal resident in the upper Miramichi area. His settlement near Doaktown dates from 1795.

Many streams and brooks entering the Southwest Miramichi are important salmon spawning grounds. Most of the major rivers (the Dungarvon, Bartholomew, Cains, Muzoll and Gaspereau) flow in northeast, parallel to the Southwest Miramichi River rather than draining directly into it, at least in this ecodistrict. The phenomenon seems related to the fact that the landscape lacks any defining topographic features, such as mountains or deep valleys, to affect



river flow direction. Instead, the waters simply follow the northeasterly structural trend of the bedrock that dominates most of New Brunswick.

Once beyond the borders of the Bantalar Ecodistrict, some rivers angle to join the Southwest Miramichi, some flow directly into it, while others head southward into Grand Lake.

The area is relatively warm, but receives limited moisture because it lies in a rain shadow of the Central Uplands Ecoregion. The dry climatic conditions have contributed to frequent fires in the past, the most famous being the 1825 Miramichi Fires.

Soils

As with most of the Eastern Lowlands Ecoregion, the Bantalar Ecodistrict's combination of poor drainage plus droughty, coarse-textured, and acidic soils has limited forest productivity. Most of its soil units are derived from grey, lithic-feldspathic sandstone.

Coarse-textured soils of the Sunbury Unit are found around North Cains, Timber Lake, and on upper slopes of the Cains and Miramichi rivers. Shallow, residual soils of the Fair Isle Unit are associated with the more strongly dissected slopes along brooks feeding the Miramichi and Cains rivers.

The relatively deep, loamy, acidic soils of the Reece Unit have slow internal drainage and produce numerous wet sites. Several extensive peat deposits near Gaspereau and Muzroll Lakes have contributed to soils of the Organic Unit.

A small area of glaciofluvial deposits with deep, coarse-textured, gravelly soil and belonging to the Gagetown Unit occurs near Boiestown along the Taxis River. These soils derive mainly from volcanic bedrock, and likely reflect a tiny zone of Mississippian basic volcanic rock that touches the western edge of the ecodistrict.

Biota

Tolerant hardwood stands of sugar maple, yellow birch, beech, and red maple occur only on slopes and ridgetops (7) along the western border. The steep slopes of the Southwest Miramichi River possess good drainage in an ecodistrict that otherwise is poorly drained, except in scattered patches.

Moist slopes (5) are dominated by black spruce with red spruce, balsam fir, hemlock, red maple, and yellow birch. The moist flatlands (2) have more black spruce and less hardwood. Black spruce also occurs with tamarack in areas of lower elevation and poorer drainage (3), an expression of their tolerance for wet, poorly

oxygenated, and acidic soils.

The widespread stands of early successional species reflect a high fire frequency; they consist of red maple, grey, and white birch, with some jack pine. Elsewhere, black spruce and red spruce are prominent.

White pine tends to grow on coarse-textured soils (1) along the Miramichi, Dungarvon, and Bartholomew Rivers. Cedar is more common at slightly higher elevations in the west, possibly reflecting an association with nutrient-rich seepage areas of calcareous bedrock.

Several sites here are important staging areas for migratory waterfowl. These include Burnt Land Brook Lake, the east branch of lower Otter Brook, and Cranberry Bog.

The most significant bog for rare or uncommon flora is located at Bull Pasture Plains. It is the first New Brunswick site for a rare moss (*Splachnum pennsylvanicum*) and also hosts the attractive orchid, grass-pink.



The Southwest Miramichi River, near Doaktown.

Settlement and Land Use

The Bantalor Ecodistrict encompasses traditional territories of both the Maliseet and Mi'kmaq. Although ancient native settlements have yet to be found here, the area has a high potential for the discovery of early aboriginal villages at major river confluences. The land was used regularly for hunting trips and also for overland passage between the Saint John and Miramichi river systems.

Two popular portage routes existed. The first led from the Saint John River up the Nashwaak River to Cross Creek, crossed a portage to the Taxis River, and from there linked to the Southwest Miramichi River. The second route began with paddling up Grand Lake to the Gaspereau River, portaging to the Cains River, and then canoeing to the Miramichi River.

The major communities in the ecodistrict are Boiestown and Doaktown, which had their origins at the turn of the 19th century. The first non-aboriginal settlers were dissatisfied Loyalists, who, in 1795, opted to move from their original land grants up to what they thought were greener pastures along the upper Miramichi River.

Unfortunately, the soils of the land were little suited for agriculture.

Not until the 1820s arrival of American capitalist Thomas Boies did their settlement begin to boom. He established a thriving business with a farm, grain mills, carding mills, and lumber works, creating the basis for what is now Boiestown. Around the same time, Scottish capitalist Robert Doak set up business just downriver with shops, mills, and kilns; the settlement evolved into the village of Doaktown.

Both Doaktown and Boiestown faltered in the 1840s, largely because the surrounding forests had been depleted of the best wood. Visitors to both communities in 1851 found little but abandoned fields and inactive mills. Fortunes, changed with the 1887 completion of the Canada Eastern Railway between Chatham and South Devon. The railroad opened new areas for timber development, and also conveyed American sportsmen into the area.

The economic livelihoods of Doaktown and Boiestown today rely on outfitting, salmon fishing, tourism, and timber. Their central location along Highway 8 also enables residents to find employment in the larger centres of Fredericton and Miramichi City.

The most common economic mineral in the area is coal, which formerly was excavated from several locations along the southern border of the ecodistrict.

6.5. Bantalor Ecodistrict at a glance

Ecoregion: Eastern Lowlands

Area: 250, 072 ha

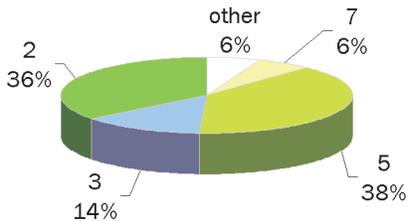
Average elevation above sea level: 140 m

Average May–September precipitation: 400–475 mm

Average annual degree-days above 5°C: 1650

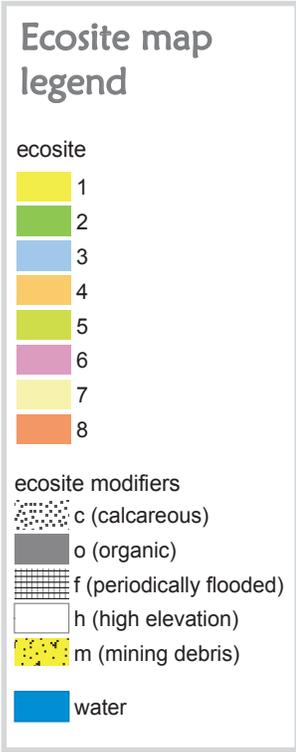
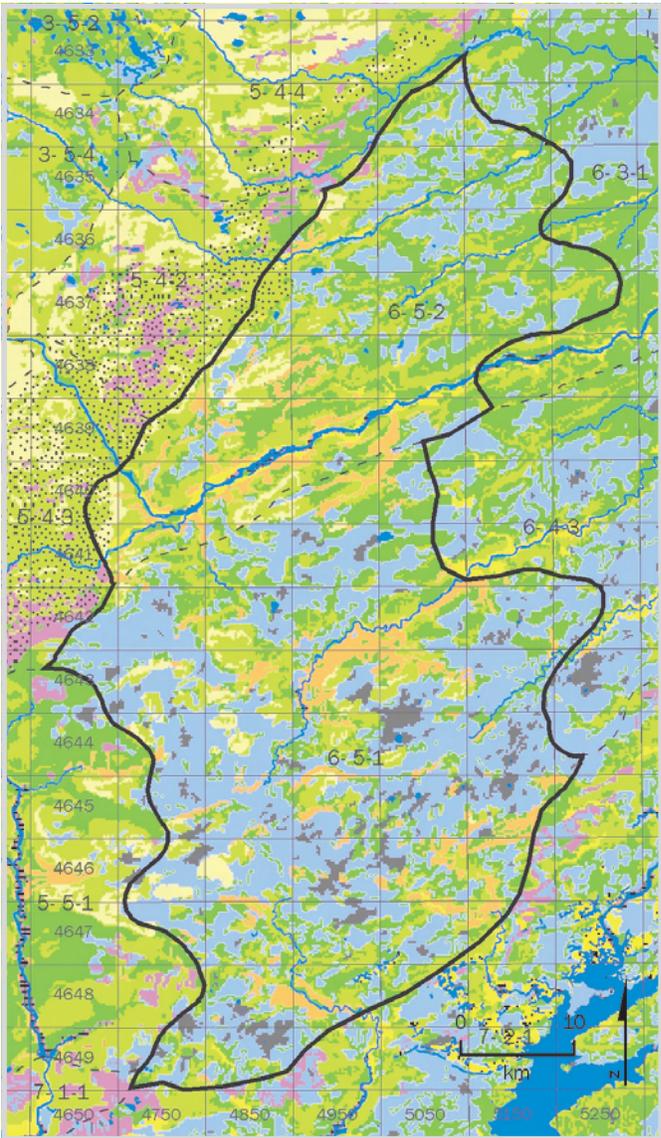
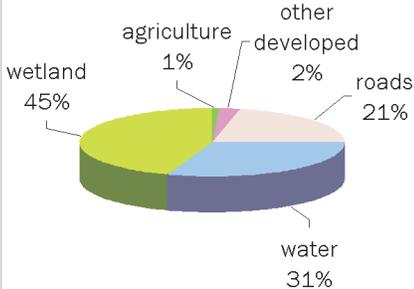
87% of Bantalar Ecodistrict has forest cover

ecosite coverage of forest area

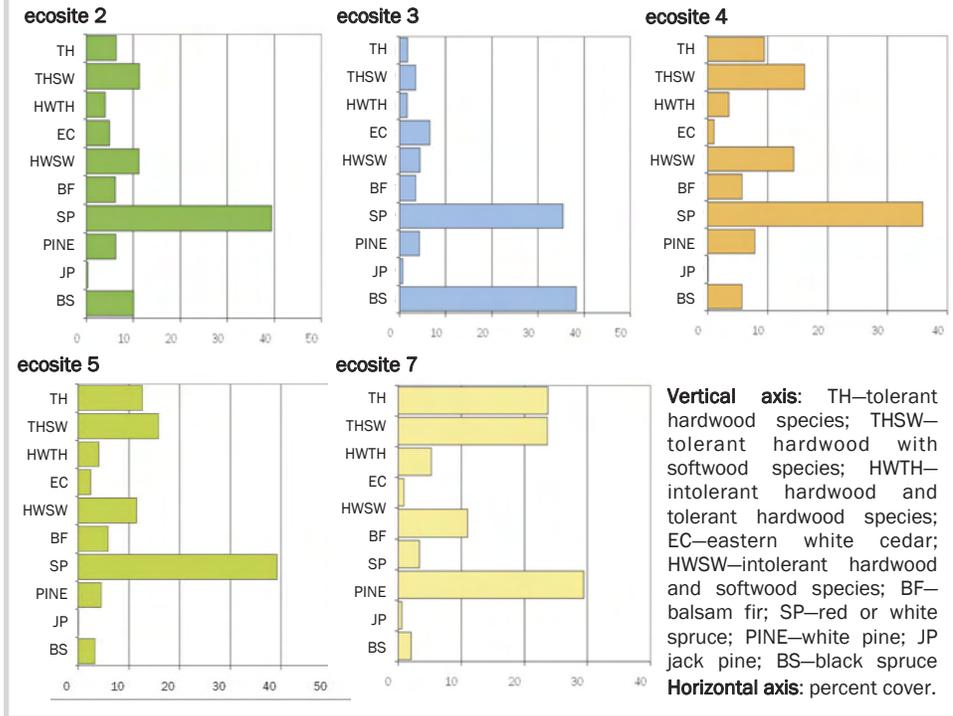


17% of Bantalar Ecodistrict is not forested

uses of non-forest area



Percent cover of forest stand types by ecosite



6.6. Kouchibouguac Ecodistrict

The Kouchibouguac Ecodistrict encompasses the eastern coastline of the province reaching from Miramichi Bay to Cape Tormentine, and is dominated by river estuaries, sand dunes, and peat bogs.

Geology

The bedrock is composed entirely of Pennsylvanian grey and red sandstone, mudstone, and conglomerate. Rocks on the Cape Tormentine Peninsula contain red micaceous sandstone and slightly calcareous mudstone that are similar to redbed lithologies found in parts of Prince Edward Island.

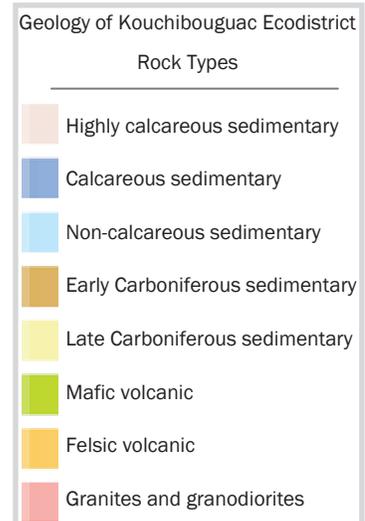
Landscape and Climate

The elevation of this flat, low ecodistrict is less than 60 m near the coast, then gently rises upward to the west until achieving a maximum of 90 m along the border. The terrain is divided by sprawling river valleys so shallow that the riverbank seldom reaches 25 m above the watercourse.

River estuaries are a dominant feature of the landscape, penetrating up to 30 km inland from the Northumberland Strait. Those associated with the Richibucto, Cocagne and Buctouche rivers are particularly invasive and reflect, in part, the degree of coastal land subsidence that has occurred since the last glacial retreat. The rivers historically were rich in salmon and other fish species.

The Miramichi River estuary straddles this ecodistrict and the Red Bank Ecodistrict (see the Red Bank Ecodistrict for more information on its natural history).

Barrier beaches also are characteristic of the area; the most dramatic appear at Kouchibouguac National Park and the Buctouche Dunes. Peat bogs occur throughout the terrain and in places actually abut the seacoast, where they are being eroded by waves from rising sea levels. The bogs, like the dunes and estuaries, provide varied and valuable habitat for plants and animals. The area has one of the warmest and driest climates in New Brunswick, and a growing season that is exceeded only by that of the Central Lowlands Ecoregion. At Point Escuminac, an eroded bog reveals tree fragments from a forest dating back 4300 years ago.



Soils

Forest productivity is restricted by poor drainage and marine exposures. Even so, the more fine-textured soils, that have a lower



The barrier beach pictured here is part of Kouchibouguac National Park.

content of coarse fragments can be well suited to farming. Most local soils have resulted from a combination of marine deposits near the coastline and glacial tills farther inland.

Compact loams to clay loams of the Stony Brook and Harcourt Units are abundant inland. Adjacent to the Northumberland Strait, the sandier quartzose beach soils of the Barrieau-Buctouche and Riverbank Units are more common.

The sandy loam to loamy soils near Cape Tormentine belong to the Parry and Salisbury Units; they are slightly calcareous and are coarser than glacial tills found farther north. Glaciolacustrine deposits occur as fine-textured, clayey deposits of the Tracadie Unit and are situated near the Black and Bay du Vin Rivers.

Biota

Three hundred years of settlement in this ecodistrict have resulted in widespread early successional hardwood forests with trembling aspen, red maple, and white birch. Later successional forests consist primarily of coniferous stands and mixed forests. Forests of red maple, sugar maple, and beech, together with spruce and hemlock grow in localized enclaves.

Black spruce stands grow on the widespread areas of poorly drained soils (3), whereas pure jack pine stands commonly occur along the rivers, where soils are sandier (1). Forests in the immediate vicinity of the Northumberland Strait are dominated by white spruce. The trees often are stunted with deformed and damaged crowns, reflecting repeated exposure to wind and salt spray. Cape Tormentine to the south has extensive stands of tamarack.

Communities of tolerant hardwoods with red maple and balsam fir tend to grow on the better drained slopes on sites with fine-textured soils (5); the communities possess a higher proportion of red spruce where soils are more coarsely textured (2).

Forest fragmentation by human settlement has tended to

inhibit fire in much of the area, leading to a scarcity of pine. Hemlock and cedar, however, are fairly abundant. Red oak grows within a cedar stand on an island at Cape Jourmain, and is an unusual species in this area of low fire frequency.

Two protected natural areas have been designated in the Kouchibouguac Ecodistrict: Kouchibouguac National Park, in the north, and the Cape Jourmain National Wildlife Area, in the south. In addition, the Bouctouche Dunes have become an area managed for tourism and conservation. All three locales are remarkable for their diversity of unusual plants. Among other species, Cape Jourmain contains a saltmarsh aster and Green's rush, both of which are very rare.

However, it is in the realm of bird habitat that these protected areas—and, indeed, the entire coastline of this ecodistrict—achieve world recognition. The dunes at Kouchibouguac National Park and Bouctouche are favoured nesting sites by piping plover. This shorebird and its habitat are recognized as nationally endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and are protected under the provincial *Endangered Species Act*. In addition, large numbers of waterfowl, seabirds, and shorebirds use Cape Jourmain, the Richibucto estuary, Kouchibouguac, Bouctouche Bar, and other locations along this coast as staging areas for seasonal migrations, performing a ritual far more ancient than human civilization itself.

Settlement and Land Use

The ecodistrict encompasses much of the traditional Mi'kmaq territory of Sigenigteoag. Many important villages or burial grounds were located at the mouths of rivers such as the Scoudouc, Bouctouche, Richibucto, Black, and Aldouin, and on Shediac Island. For about 3000 years before European contact, the people relied on the area's plentiful marine resources throughout much of the year, moving inland only for brief winter hunting expeditions.

The Northumberland coastline was one of the earliest areas in the province to be inhabited by non-aboriginals. The first settlers likely were French or Acadian and were later joined by British



Peat harvesting near Pointe-Sapin.
Photograph © Ron Garnett--
AirScapes.ca.

immigrants. Lumbering proceeded vigorously in the area after 1800 as its rivers provided easy access for loggers and adequate transport for felled timber.

By the 1850s, the villages of Shediac, Bouctouche, Cocagne, and Richibucto were well established with sawmills, shipbuilding factories, and an active agricultural industry. The 1860 completion of the European and North American Railway between Saint John and Shediac connected the region to larger markets in Saint John and other centres.

The landscape and people of this ecodistrict have been immortalized in the work of Acadian author Antonine Maillet. The Pays de la Sagouine brings many of the characters in her fictional work to life on an island in Buctouche Bay.

Today, lumbering and agriculture remain important contributors to the local economy, along with tourism, fishing, and peat harvesting. Agricultural activities occur on about 9% of the land area. They consist mainly of mixed farming, with beef cattle dominating over pasture, forage, grain, and horticultural crop production.

Mining once played a significance role here, partly because of coal mines in the Beersville area, but mainly because of the Smith sandstone quarry near Shediac. The operation opened around 1810 and, for the next 140 years, produced dimension stone and grindstones for markets across eastern Canada.

6.6. Kouchibouguac Ecodistrict at a Glance

Ecoregion: Eastern Lowlands

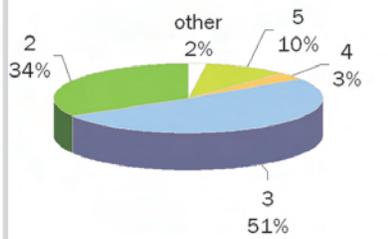
Area: 518, 929 ha

Average elevation above sea level: 48 m

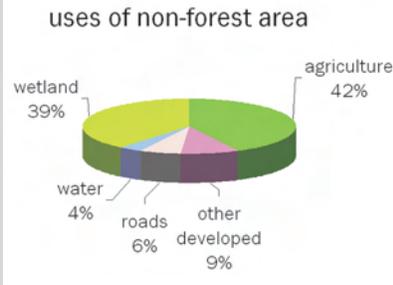
Average May-September precipitation: 375 - 425 mm

Average annual degree-days above 5°C: 1600 - 1800

75% of Kouchibouguac Ecodistrict has forest cover
ecosite coverage of forest area

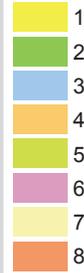


25% of Kouchibouguac Ecodistrict is not forested
uses of non-forest area

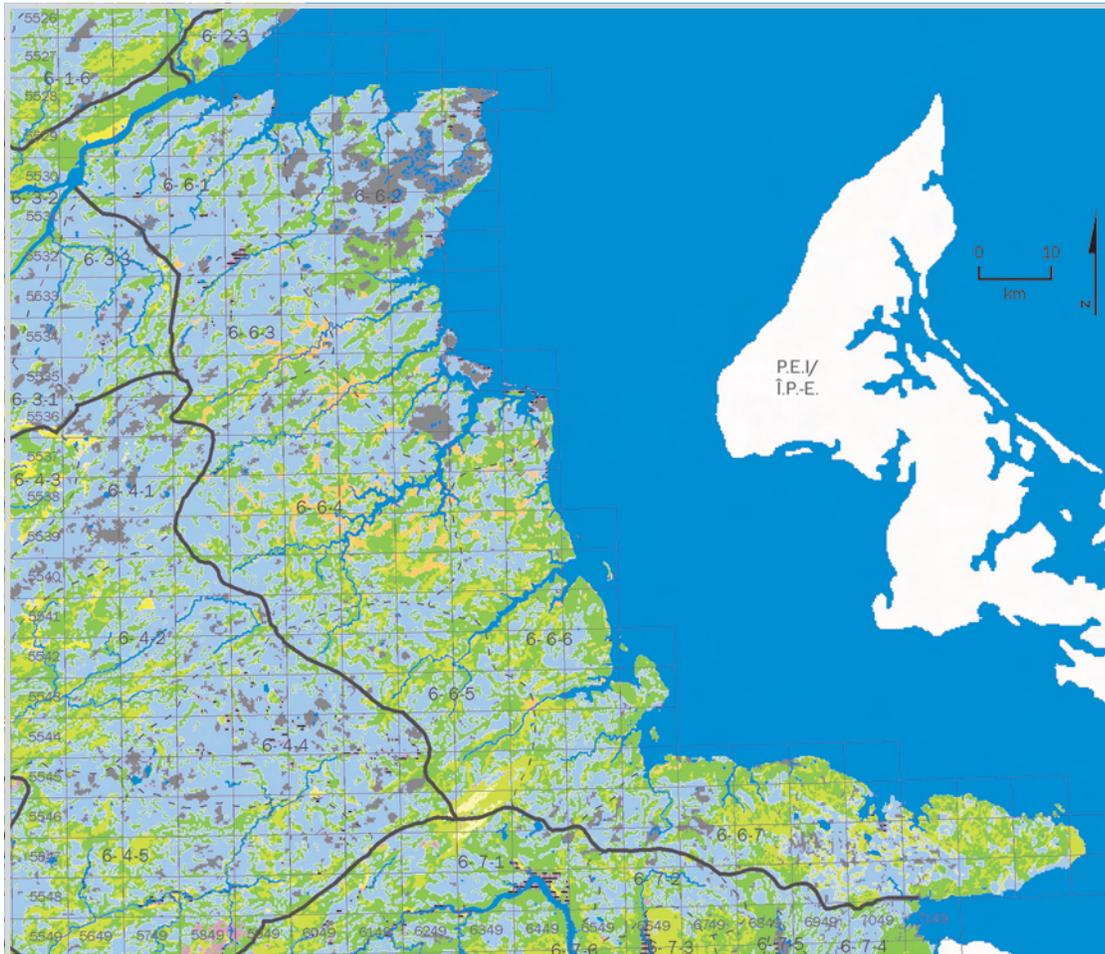
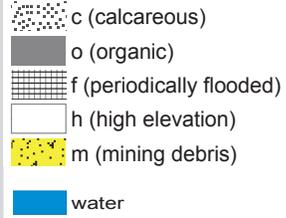


Ecosite map legend

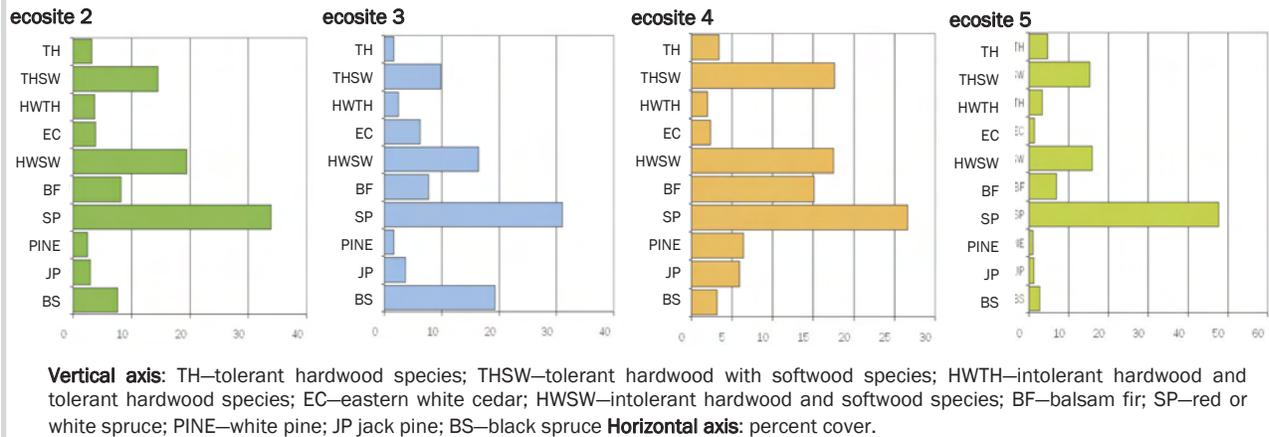
ecosite



ecosite modifiers



Percent cover of forest stand types by ecosite



6.7. Petitcodiac Ecodistrict

The Petitcodiac Ecodistrict is a low-lying, gently rolling area with ridges and valleys that encompass the broad Petitcodiac River basin.

Geology

The predominant rocks in this ecodistrict are non-calcareous Pennsylvanian sandstone, conglomerate, and mudstone that range from grey to red. Redbeds tend to occur near Port Elgin, where sedimentary rocks typically are reddish, slightly calcareous, and micaceous.

Mississippian strata occur patchily across the ecodistrict. They consist mainly of red and grey sandstone with conglomerate, overlain by limestone, gypsum, and other evaporites.

The Mississippian rocks appear in four main areas. The largest zone forms a band paralleling the ecodistrict's northwest border between Cornhill and Lutes Mountain. A roughly circular pocket straddles the Petitcodiac River between Memramcook in the east and Beech Hill in the west. Two patches occur on the southern tip of the Maringuoin Peninsula and farther east in the vicinity of Aulac. A small plug of Precambrian granite outcrops just east of Calhoun, where it is quarried and crushed for aggregate.

Landscape and Climate

The name Petitcodiac derives from the Mi'kmaq *epetkutgoyek*

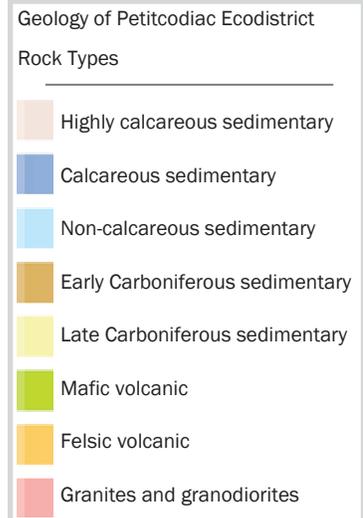
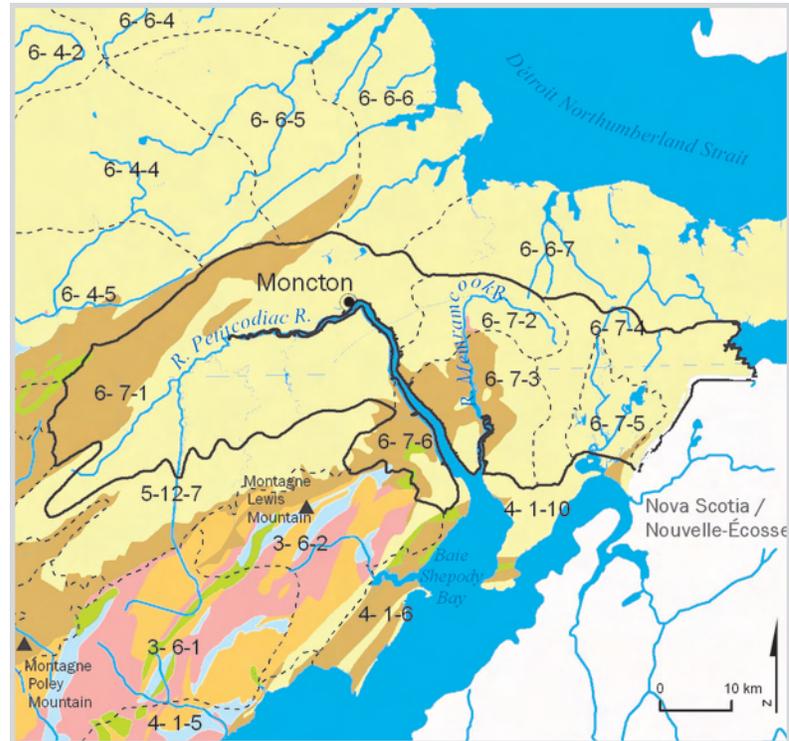
meaning ‘the river bends around in a bow’. Petitcodiac River dominates the landscape. It begins as North River in the boggy plateau of the Castaway Ecodistrict and flows southwest to meet the Anagance River at the village of Petitcodiac. There, it becomes known as the Petitcodiac River and turns abruptly northeast to parallel the regional bedrock structure until reaching Moncton, where it angles sharply again to pour southward into a huge river estuary and Shepody Bay. In the days of brigs and schooners, its outgoing tide was so powerful that a ship could be carried from upriver out to the open sea without hoisting a sail.

To the east, the Memramcook and Tantramar rivers also arise in wetlands before flowing south through estuaries into Shepody Bay. The former river travels through the village of Memramcook and the latter, along the outskirts of Sackville. The combined effects of the three rivers - the Tantramar, Memramcook and Petitcodiac - is to define two peninsulas of land that jut into Chignecto Bay to create Shepody Bay on the west and Chignecto Bay on the east.

Karst topography is a distinctive feature of the ecodistrict. The deposits of gypsum and limestone in areas of Mississippian bedrock are susceptible to solution in circulating groundwater, which results in the formation of caves, sinkholes, and funnel-shaped depressions. Petitcodiac has a rare honeycombed karst occurrence west of town, where sinkholes the size of a small car tire alternate with ridges just wide enough for a footstep. One of the longest gypsum cave networks in eastern Canada is near Hillsborough and is an important habitat for hibernating bats.

Elevations here generally are less than 75 m, except north of Moncton where Steeves Mountain and Indian Mountain peak at about 165 m. Lutes Mountain sits 150 m above the city of Moncton, which is flanked on its south side by the famous Magnetic Hill.

The area’s climate is transitional between the warm, dry



Eastern Lowlands Ecoregion and the cool, wet Fundy Coast Ecoregion.

Soils

Relatively rich soils in this ecodistrict are represented by alluvial material of the Interval Unit and tidal deposits of the Acadia Unit.



Looking southward, we see the Petitcodiac River south of Moncton near St-Anselme and Lower Coverdale. Photograph © Ron Garnett–AirScapes.ca.

These soils occur along the Petitcodiac and Memramcook rivers and have been intensively farmed.

The Parry and Salisbury units contain fine-textured soils derived from red, slightly calcareous sandstone and mudstone. These clay loams to loams have good granular structure and, if well drained, are the most fertile glacial tills in the ecodistrict. Where the bedrock is locally more conglomeratic, soils tend to form the coarser, sandy loam to loam material of the Parleeville-

Tobique Unit, which is less fertile.

North of Dorchester, a bedrock of grey sandstone and red mudstone has produced strongly acidic, medium-textured loams to sandy loams of the Harcourt and Stony Brook units, which are only moderately fertile.

Biota

Red spruce dominates the forest here, together with white spruce, black spruce, balsam fir, red maple, white birch, and trembling aspen (2, 3, 5). Other species such as tamarack, white pine and hemlock, may be present. Hemlock can also occur in tiny, but pure, stands.

Black spruce grows in scattered patches in the vicinity of peat bogs (3o) on soils of the Organic Unit and in the coastal marsh. Jack pine tends to be present in areas affected by repeated fires. Cedar occurs in bogs (3b) and also over limestone and gypsum bedrock. Roadsides near Mannhurst and Kinnear Settlement support calcareous-loving plants, including rufous bulrush.

Tolerant hardwood stands of sugar maple, beech, and yellow birch are found only on ridgetops or upper slopes (7), especially over slightly calcareous soils. The high frequency of disturbed sites

dominated by aspen stands reveals the degree of historical and recent human disturbance along the Petitcodiac River.

Freshwater and saltwater marshes provide valuable habitat for many species of waterfowl and other birds. Two areas are particularly significant: the Tantramar Marshes and the Shepody Bay Ramsar site.

The Tantramar Marshes are a tidal area covering some 10,000 ha near Sackville. Their maroon and buff-coloured grasses echo the red and grey soils beneath, an aesthetic detail that has been appreciated by various New Brunswick poets and painters.

The Tantramar area encompasses Ram Pasture and Coles Island Marsh at the Tantramar River mouth, the Sackville Waterfowl Park in east Sackville, and the Upper Tantramar Marsh farther north. Birdwatchers visit the area each year for the Sackville Waterfowl Festival, eager for views of willet, rail, American bittern, shorebirds, and waterfowl. The Upper Marsh is one of New Brunswick's few confirmed nesting sites for marsh wren and Virginia rail.

One of the more exotic features in the ecodistrict is a bog in the Upper Tantramar Marshes. It contains springs and pools so rich in copper that coniferous seedlings die before reaching a height of 10 cm. Specialized mosses and algae, however, seem to thrive around the seepage areas.

The Tantramar area is also one of very few confirmed New Brunswick sites for the bronze copper butterfly, whose larvae feed on great water dock growing in the marsh. Another butterfly visitor is the crowberry blue, which frequents coastal bogs and while in its larval stage eats black crowberry.

The Shepody Bay Ramsar site covers much of Shepody Bay and adjoins the Mary's Point Ramsar site, located in the adjacent ecodistrict. Both Ramsar sites protect wetlands of international significance. Together, they constitute the Shepody Bay Western Hemispheric Shorebird Reserve (WHSRN), an area famous for its huge flocks of semipalmated sandpipers, semipalmated plovers, and other shorebirds.

Settlement and Land Use

The Petitcodiac Ecodistrict lies within the traditional Mi'kmaq territory of Sigenigteoag. It intersected the main portage route between the Bay of Fundy and Gulf of St. Lawrence, and possessed multiple resources such as shellfish, waterfowl, seabirds, wild rice, and sweet grass. Although little is known about early native villages

in the area, it likely supported many settlements over its several thousand years of aboriginal habitation.

The first non-aboriginal inhabitants were Acadian families, who settled the area in the 1600s and built dykes to drain the marshes, creating some of the most fertile farmland in the North America. They also constructed the first dry dock in Canada at the confluence of the Aulac and La Coupe rivers, about 8 km from Cumberland Basin.



The cities of Moncton (foreground) and Dieppe (background) occupy "The Bend" of the Petitcodiac River, pictured here. Photograph © Ron Garnett-AirScapes.ca.

In 1766, immigrants from Saxony via Pennsylvania moved onto the dyked and other lands around present-day

Moncton. The Germans subsequently were joined by Planters from New England, as well as by Acadians returning from exile.

By the 1860s, The Bend (later called Moncton) and Sackville had become centres of agriculture, shipbuilding, stove manufacture, and education. In Sackville, Mount Allison University was established in 1839. The Université de Moncton, founded in 1963, has its roots in French language institutions that were created in this region and in northern New Brunswick in the 1860s. Sackville and, especially, Moncton evolved into major railway centres after completion of the Intercolonial Railway in the 1870s.

The Petitcodiac Ecodistrict consistently had among the lowest lumber exports in the province throughout the first half of the 19th century. This appears to have been a result of occupational diversity, including shipbuilding, rather than a lack of timber.

Regional mineral resources also were varied. Gypsum and grindstone quarries were the mainstay mining occupations - the Hillsborough gypsum quarries and local grindstone quarries had operated steadily since the late 1700s - but people also worked deposits of building stone, coal, manganese, oil shale, copper, barite, lead, natural gas, and oil.

Carboniferous sandstone from quarries near Sackville and Dorchester was shipped across the province and the country. The red Sackville stone can be seen in many Mount Allison University buildings and in the Ontario parliament buildings in Toronto.

Mining in the ecodistrict essentially ceased in 1982 with closure of the gypsum quarries, however there is renewed interest in exploration for minerals, oil, and gas. Farming remains economically

important. Agriculture occurs on 17% of the total land area and is predominantly mixed farming, with crop production supplemented by dairy and beef operations. Pasture and hay are the most common crops, followed by alfalfa, oats, and other grains.

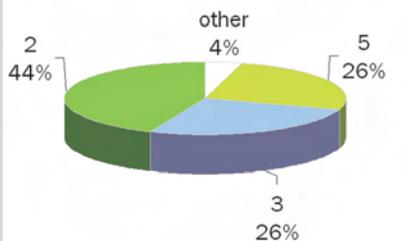
Moncton is the major economic centre, and greater Moncton is now the largest urban area in New Brunswick.

6.7. Petitcodiac Ecodistrict at a Glance

Ecoregion: Eastern Lowlands
 Area: 218, 075 ha
 Average elevation above sea level: 67 m
 Average May-September precipitation: 415 - 450 mm
 Average annual degree-days above 5°C: > 1700

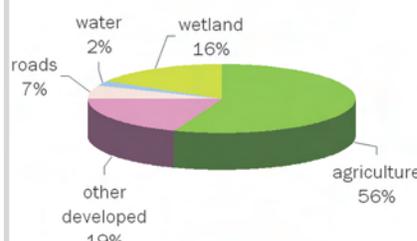
70% of Petitcodiac Ecodistrict has forest cover

ecosite coverage of forest area



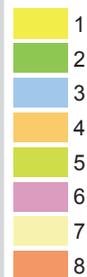
30% of Petitcodiac Ecodistrict is not forested

uses of non-forest area

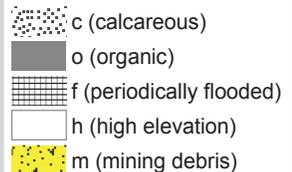


Ecosite map legend

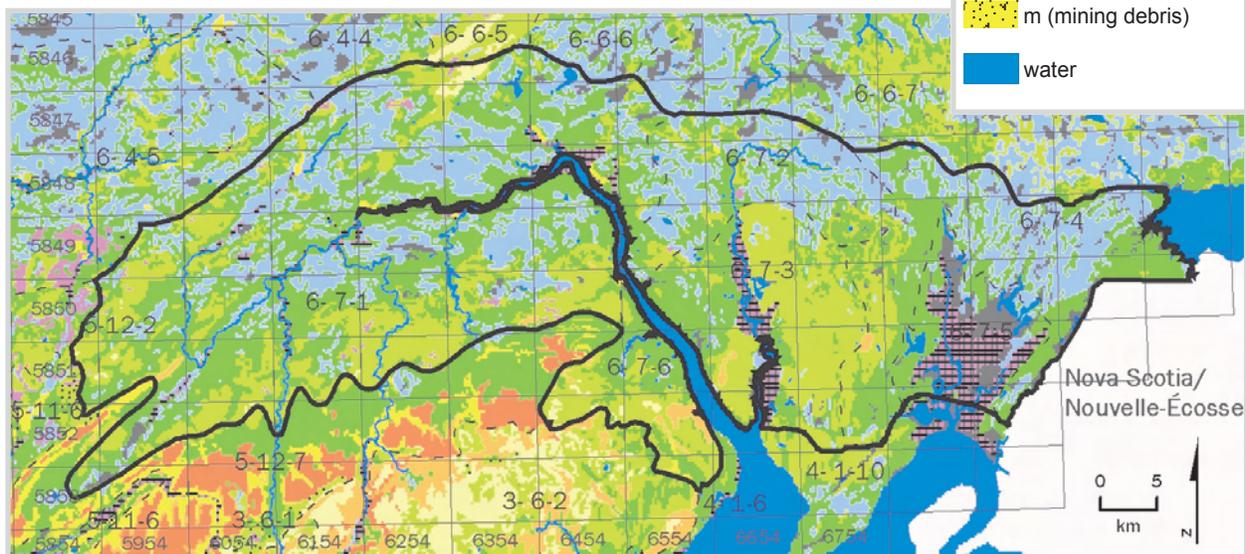
ecosite



ecosite modifiers



water



Percent cover of forest stand types by ecosite

