

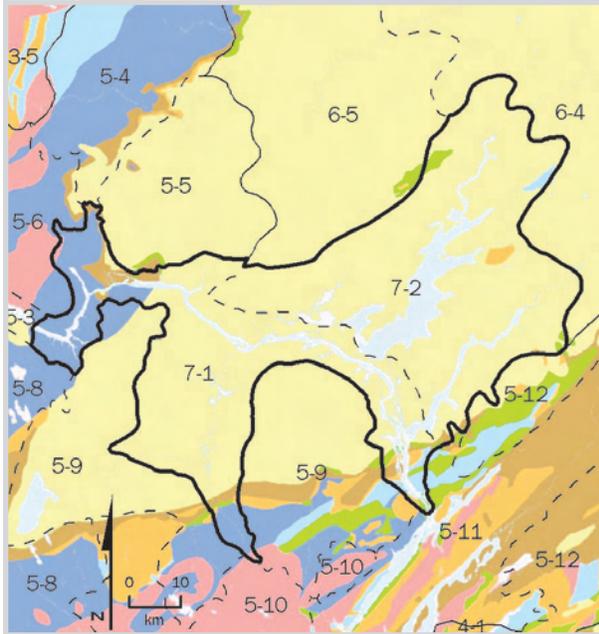
Among the most striking features of the Grand Lake Lowlands Ecoregion are the extensive, shrub-dominated and forested alluvial wetlands, pictured above. Also shown is Old Government House in Fredericton.

Chapter 13

7. Grand Lake Lowlands Ecoregion

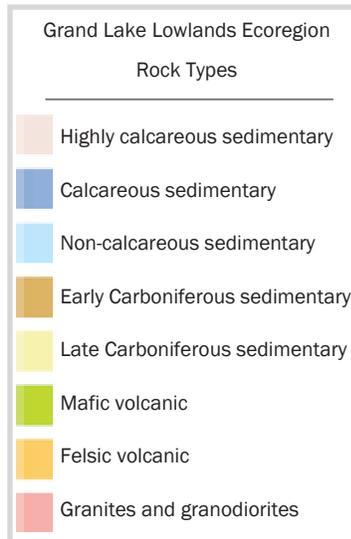
The Grand Lake Lowlands Ecoregion in central New Brunswick encompasses the Grand Lake basin, the Oromocto River watershed, and the floodplains surrounding the mid-section of the lower Saint John River between Prince William and Evandale. This region is distinguished by its widespread alluvial floodplains and the warmest climate in New Brunswick.

The moist, rich soils, combined with the lengthy growing season, have yielded a unique assemblage of southern vegetation species that depend on regular inundations by the silty, nutrient-laden waters.



Geology and Landscape

The ecoregion is composed almost entirely of Carboniferous, non-calcareous sedimentary rocks, ranging from fine siltstones through sandstones to coarse conglomerates. The western and southern extremities are underlain by small sections of calcareous and non-calcareous sedimentary rocks of Ordovician and Silurian age. The topography forms a low-lying trough centred on Grand Lake, with expansive, shallow river valleys. Elevation ranges from about 150 m, west of Fredericton to just above sea level along the floodplains of the lower Saint John River. Three waterways dominate the landscape: Grand Lake, the Saint John River, and the Oromocto River, which enters the Saint



John through a maze of wetlands. Although tidal effects reach up the Saint John River as far as Fredericton, they are overridden in spring by the greater influence of widespread flooding. The spring floods affecting the Saint John and Oromocto rivers carry the accumulated meltwater from the entire Saint John River watershed and create an extensive floodplain along the Saint John and Oromocto rivers. The waters creep over bottomland forests, fields, marshes, peatlands, and open water wetlands. Water normally recedes by late May or early June, leaving behind a thin, new layer of soil. The constantly replenished soil plus the fluctuating water levels together are partly responsible for the ecoregion's diversity in vegetation and wetland types.

Climate

The Grand Lake Lowlands Ecoregion represents the provincial hot spot, with the longest growing season and warmest summer temperatures in New Brunswick. Grand Lake covers about 165 sq km and acts as a huge heat sink for the area. It stores heat over the summer and releases it slowly over the fall and early winter, thus moderating the climate and bringing an extended frost-free period to the surrounding land.

Forest Cover

This ecoregion of rich alluvial soils, unusually warm climate, and extended growing season contains the province's largest number of tree species and greatest abundance of southerly species. Heat-loving trees such as ironwood, basswood, white ash, green ash, northern red oak, and silver maple are relatively common here.

Spring flooding is integral to the cycle of many floodplain species, as exemplified by the silver maple, whose seeds require wet soil to germinate. Silver maple swamps are especially prevalent in floodplains of the Saint John and Oromocto rivers and some of their tributaries. The tree is one of three floodplain species—bur oak and butternut being the other two—that are well adapted to sites with high flooding frequency, and that are scarce in New Brunswick outside the ecoregion.

The slightly higher intervale locations were covered by American elm in former times, with red oak, red maple, and white ash also occurring on better drained gravel bars, levees or beaches. On beach sites where ice scour is more prevalent, green and black ash also occur.

The low relief of the region makes for few tolerant hardwood ridges. Tolerant hardwood stands containing ironwood, beech, white ash, sugar maple, yellow birch, and occasionally basswood, occur on well drained soils beside lakes and on a few higher elevation sites. Significant stands of butternut still remain on a few islands below the Mactaquac Dam.

Upland areas surrounding the lakes and river valleys are covered with communities of red maple, red spruce, hemlock, beech, sugar maple, and white ash. White pine appears on well drained, glaciofluvial deposits in the region, although repeated lumbering has greatly lessened its populations in those locales. White pine also makes a significant showing where the ecoregion borders the Eastern Lowlands Ecoregion, as do such as black spruce, red spruce, red pine, and jack pine.

Characteristic understorey species in the Grand Lake Ecoregion tend to be associated with aquatic habitats or otherwise damp conditions. Their common names reveal this watery affinity: swamp milkweed, riverbank grape, waterweed, and water-plantain.

Wetlands

The striking diversity of wetlands in this ecoregion results from three factors: the presence of Grand Lake, the extensive floodplains

along the Saint John and Oromocto rivers, and the span of water levels over the growing season. Wetland types range from non-peatlands (such as swamp, marsh, and shallow water) to floodplain peatlands that feature extensive fen or minerotrophic vegetation. Extensive areas of marshlands, including seasonally flooded meadows, occur along the Saint John River, mainly within the floodplain. Lakeshores have widespread cover vegetation, featuring sweet gale and other shrubby species. Streamside alder swamps are also present here, although the diversity of wetlands in this ecoregion relegates them to a less prominent feature than in the Northern Uplands or Highlands ecoregions.

7.1. Aukpaque Ecodistrict

The Aukpaque Ecodistrict lies in south-central New Brunswick, encompassing much of the broad, low-lying valleys of the Saint John and Oromocto Rivers.

Geology

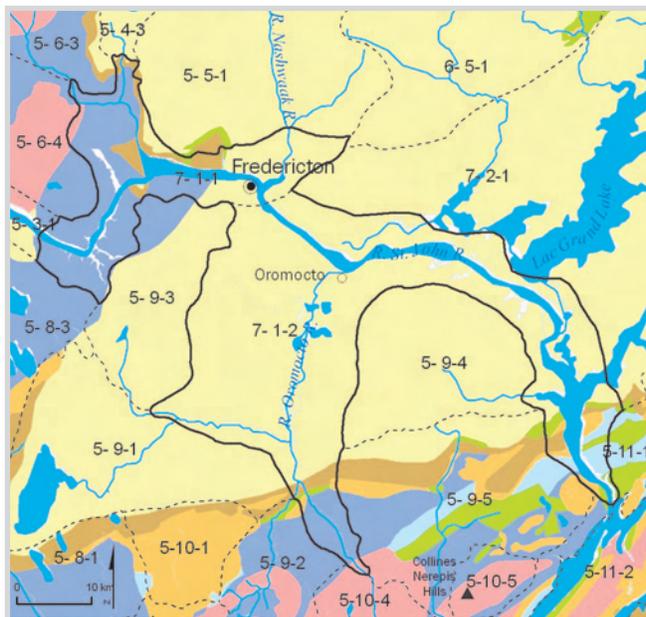
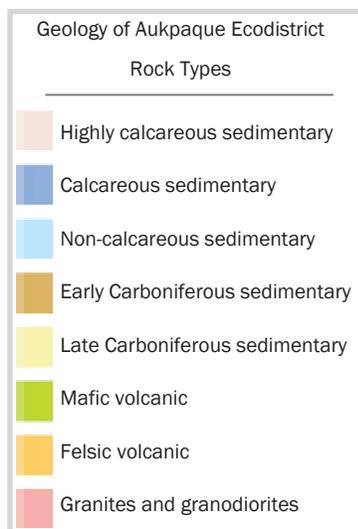
The bedrock is composed mainly of Pennsylvanian sedimentary rocks, including grey sandstone, conglomerate, and red mudstone of the Petitcodiac Group. It also includes three areas of older rocks: these occur south of Washademoak Lake, northwest of Fredericton, and around Enniskillen.

The terrain south of Washademoak Lake consists of sedimentary and volcanic rocks ranging in age from Silurian to

Mississippian, with an intrusive stock of Devonian granite in the vicinity of Evandale. Upriver from Fredericton, Silurian to Mississippian calcareous and non-calcareous sedimentary strata occur with isolated plugs of basic volcanic rock. Silurian to Mississippian sedimentary and volcanic rocks also underlie the landscape around Enniskillen. Plant fossils are visible in Pennsylvanian sandstone outcrops just below the Highway 101 bridge over the North Branch Oromocto River at Fredericton Junction.

Landscape and Climate

The lower Saint John River flows southeastward through the terrain, flanked



by lushly vegetated floodplains. The river overflows annually, laying alluvial debris over older sediments that were deposited 10,000 to 12,000 years ago by glacial Lake Acadia.

Glacial Lake Acadia occupied much of the lower Saint John River valley and was formed by an ice near present-day Saint John. When the dam broke, the lake emptied into the Bay of Fundy.

The Saint John River constantly reworks its riverine and old lacustrine sediments into a shifting chain of alluvial islands that stretches from Upper Shores Island in the north to Spoon Island in the south. These islands are a defining feature of the landscape and, in summer, are dotted with cattle quietly grazing on community pasture lands.



Portobello Creek, in the Portobello National Wildlife Area, is a protected area administered by the Canadian Wildlife Service.

Several major rivers enter the Saint John in this region, most notably the Naskwaak, Mactaquac, Keswick, and Oromocto rivers. The Oromocto River displays a series of glacially derived ponds, marshes and bogs that constitute the Oromocto River Wetland Complex. The complex represents important habitat for resident and migrating waterfowl, as well as for aquatic mammals. Two Eastern Habitat Joint Venture sites occur within the complex: Shaw Creek and Oromocto West. Washademoak Lake, farther south, is actually the widened lower reach of the Canaan River, which arises in swampland far to the east in the Castaway Ecodistrict.

Elevations east of Fredericton tend to be less than 100 m, whereas those west of the city are somewhat higher. Relief is generally low, except in the west where steep river valleys incise the upland surface by up to 150 m. Isolated plugs and stocks of igneous rock also provide some topographic variety. Currie Mountain in Douglas, is formed of mafic volcanics, and the hills around Evandale are underlain by resistant granitic bedrock.

The Aukpaque Ecodistrict has a relatively warm and dry climate. The huge volumes of water in the river basins act as a heat reservoir and extend the frost-free season beyond what it would be otherwise.

Soils

The landscape south and east of Fredericton is covered with compact loams to clay loams derived from the easily weathered red mudstone and grey sandstone. These acidic, poorly drained soils

belong to the Stony Brook and Harcourt units and are characterized by stands of red spruce, balsam fir, and hemlock.

The floodplains of the Saint John River east of the Mactaquac Dam and along portions of the Keswick River and the Oromocto River valley possess thick beds of alluvial sand and gravel, overlain by silt or fine sand of the Interval Unit. Spring floods that deposit nutrient-rich sediment over the floodplain replenish the interval zone annually. Where cleared for agriculture, these combined soils sustain fruit, vegetable, poultry, and livestock production.

Shallow loams derived from zones of harder, but slightly calcareous bedrock are found west of Fredericton along the relatively steep slopes of the Saint John River valley and over Keswick Ridge. These fertile soils of the Thibault Unit tend to be covered by tolerant hardwood stands of sugar maple, yellow birch, beech, and white ash.

Biota

The dominant forest is a mixture of red spruce, balsam fir, sugar maple, and beech, with significant white pine and hemlock (5). Currie Mountain, west of Fredericton supports a representative forest this type. It is covered by sugar maple, red oak, hemlock, and mature white pine, with a rich understorey that includes round-leaved hepatica and several species of fern. Odell Park, in nearby Fredericton protects 400-year-old hemlock, with beech and sugar maple.

Communities of sugar maple, red maple, ironwood, basswood, and red oak occur on better drained soils at low elevations (7c, 8c), and black cherry occurs locally throughout. White ash and red oak, in particular, are found on raised, sandy beaches along the shores of Grand Lake and the Saint John River, and also on more upland sites.

White pine is associated with the drier, glaciofluvial deposits that are not subject to flooding (1). By contrast, eastern white cedar stands tend to prefer seepage slopes over calcareous bedrock (4c, 6c) and moist to wet sites, such as bogs. Tower Lake near Fredericton is good example of a bog lake and is surrounded by cedar, tamarack, red maple, and black spruce, with a ground cover of small cranberry and pitcher plants.

The original forest has been altered dramatically by agriculture on the Interval Unit soils, and by forest harvesting and clearing for settlement and agriculture along valley slopes and peripheral

flatlands. Stands of red maple, white birch, grey birch, balsam fir, and trembling aspen are typical of these disturbed areas.

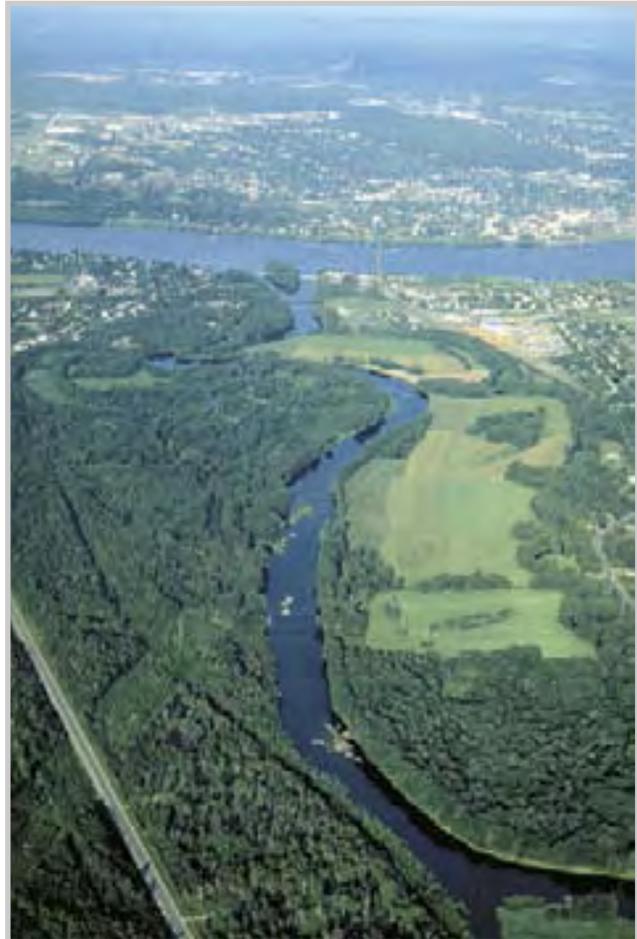
Some of the most distinctive ecosites in the area are the most intriguing from an arboreal standpoint, and help to define the ecodistrict. They occur on Interval soil and floodplains and are characterized by tree species that usually display warmer, more southern affinities. These species include silver maple, American elm, butternut, bur oak and green ash, all of which thrive on the sheltered, seasonally flooded lands of the Saint John River. They are especially evident on islands in the vicinities of Douglas and Jemseg (6b, 7b). Gilbert Island near McGowans Corner, for instance, has silver maple, butternut, and American elm.

The wetlands and floodplain islands also possess a rich floral diversity, a function, in part, of their repeated flooding, rich soils, and moderated climate. Shore Island is one of several islands with shore vegetation that remains in a state of early succession due to flooding; it harbours such rarities as yellow oxytropis and Brunet's milk-vetch. Tall drop-seed was rediscovered on Shore Island in 1993. Other rare plants located in this ecodistrict are pine drops at Keswick Ridge, early saxifrage at Douglas, and fringed violet along an old railway line in North Fredericton.

Many alluvial islands along the Saint John and Oromocto rivers and their associated wetlands represent significant habitat for waterfowl, shorebirds, gulls, osprey, and black tern. The largest and most crucial wetland is Grand Lake Meadows, which is used heavily by inland waterfowl during spring migration and sees several breeding species of ducks each summer.

Sandbars along this lower portion of the Saint John River and its tributaries harbour one of only a few known Canadian populations of yellow lampmussel.

Just downriver from Shore Island, at Barkers Point, is the annually flooded Hyla Park Nature Preserve, which shelters clammy hedge-hyssop and purple milkwort. Hyla Park is also home to three



The Nashwaak River flows into the Saint John River at Fredericton. This area provides alluvial forest habitat, agricultural products, timber, and important recreational and cultural opportunities for Fredericton residents.

species of salamanders, plus seven species of toads and frogs, including a disjunct population of the eastern gray treefrog. This former gravel pit is the most northeasterly known habitat for the eastern gray treefrog in North America and is Canada's first park set aside to conserve amphibian species.

Settlement and Land Use

The Aukpaque Ecodistrict lies within traditional Maliseet territory. Many Maliseet encampments existed along the Saint John River, including ones at Gagetown, Oromocto, Jemseg, and Maugerville.

A more recent Maliseet community lay on the outskirts of present-day Fredericton and occupied part of Hartts and Savage islands, plus the south riverbank opposite the islands. It was called Aukpaque and was settled in the early 18th century by aboriginals who had moved downriver from an older village at Meductic. When Aukpaque was granted to a Loyalist in 1794, the natives shifted upriver to Kingsclear and beyond.

The French made their first attempts to inhabit the lower Saint John River valley during the mid-1600s, and, in 1695, constructed the province's first sawmill at the mouth of the Nashwaak River.

By the mid-1800s, the rich intervale lands, warm climate and natural resources had attracted successive waves of French, Acadians, Planters, Loyalists, English, Irish, and Scots. The valley became one of the most heavily settled areas in the province, with residents relying mainly on farming and logging. Many people in the Hampstead area also worked at the local granite quarries.

A view of the Mactaquac hydroelectric dam with Keswick Ridge rising behind it. The ridge is underlain by slightly calcareous sedimentary rocks. Photograph © Ron Garnett–AirScapes.ca.



The quarries first opened in the 1830s and today provide material for the local market. The granite appears in many New Brunswick structures, including the Old York County Gaol and the piers of old Carleton Street Bridge, both in Fredericton.

The southern extension of the ecodistrict east of the Oromocto River is part of the Canadian Forces Base Gagetown. The village of Gagetown is recognized as an important centre for artisans; it originally was known as Grimross, a name derived from the

Maliseet *eklimlass* meaning *settlement place*.

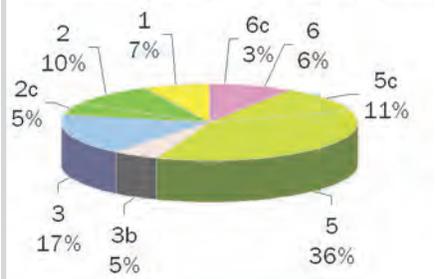
Sand and gravel deposits and crushed rock quarries are worked here to fulfil the ecodistrict’s increasing demand for highway and building aggregate. Agriculture also is an important land-use activity, especially in the Keswick and Saint John river valleys, where farm operations provide fruits, vegetables, meat, and dairy products for the larger Fredericton market.

7.1. Aukpaque Ecodistrict at a Glance

Ecoregion: Grand Lake Lowlands
 Area: 168, 552 ha
 Average elevation above sea level: 54 m
 Average May–September precipitation: 425–450 mm
 Average annual degree-days above 5°C: 1650–1800

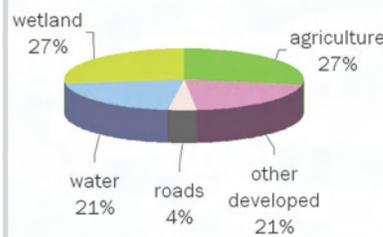
62% of Aukpaque Ecodistrict has forest cover

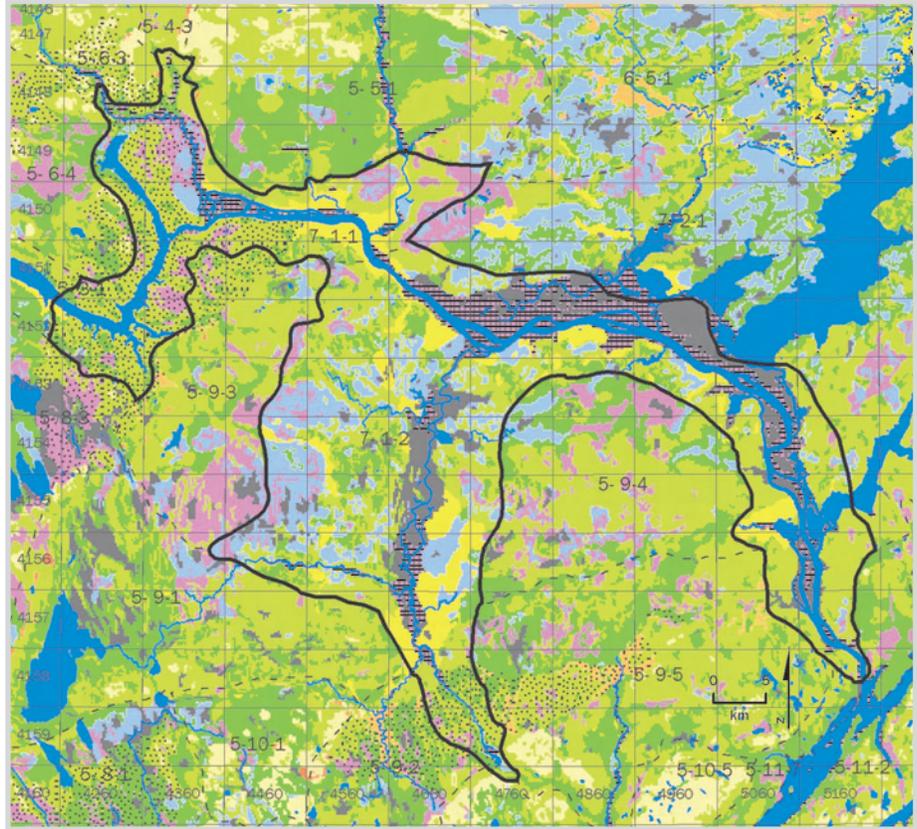
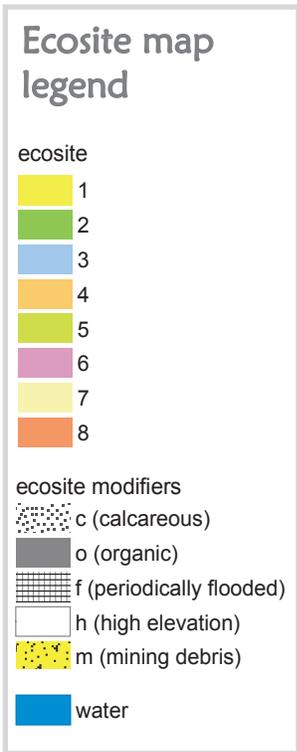
ecosite coverage of forest area



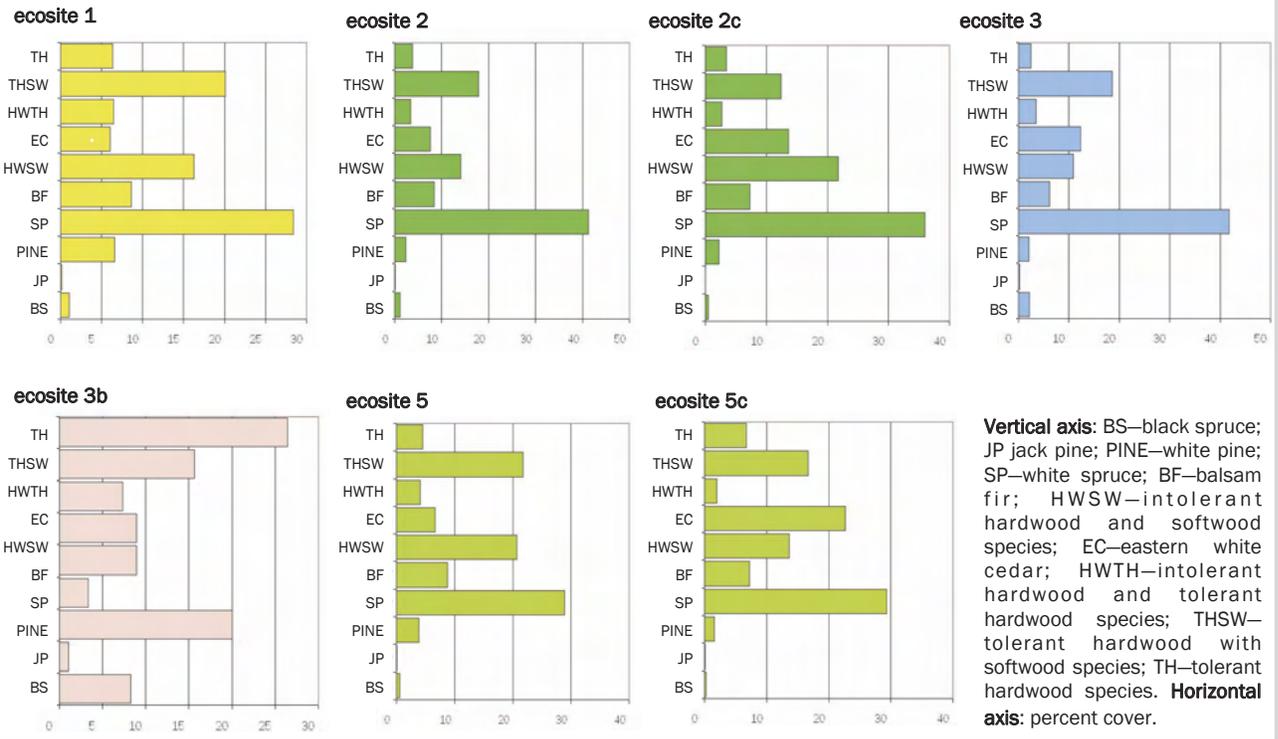
38% of Aukpaque Ecodistrict is not forested

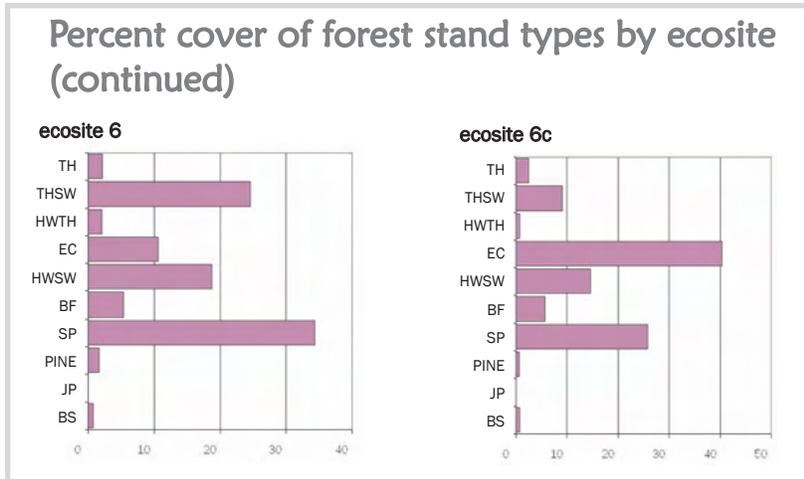
uses of non-forest area





Percent cover of forest stand types by ecosite





7.2. Maquapit Ecodistrict

The Maquapit Ecodistrict in south-central New Brunswick forms a flat, low-lying basin area that encloses the waters of Grand, Maquapit, and French Lakes and the major coalfields of New Brunswick.

Geology

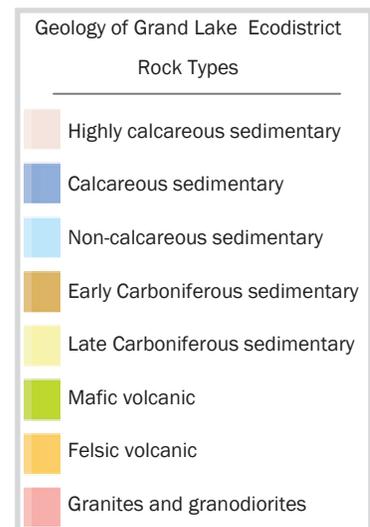
The bedrock consists almost entirely of Pennsylvanian red and grey sandstone, conglomerate and red mudstone, interbedded with coal horizons of variable width. Small plugs of Mississippian volcanic rock occur south of Cumberland Bay and in the vicinity of Hardwood Ridge. As well, the bedrock south of Washademoak Lake merges into a more resistant zone of Silurian volcanic rocks that continues beyond the ecodistrict boundary.

Landscape and Climate

The landscape presents a gently sloping basin filled with Grand Lake, Washademoak Lake, and their feeder streams. Elevations are less than 120 m at the ecodistrict perimeter and drop gradually inwards toward Grand Lake.

The flat sedimentary strata remain unbroken by major faults or lineaments. Nonetheless, the lakes and their associated waterways course roughly northeasterly, following the prevailing structural grain of bedrock.

The volcanic intrusion near Cumberland Bay



has resulted in Cumberland Bay Hill, which stands above the uniform Pennsylvanian terrane. Only in the extreme south of the ecodistrict, beyond Washademoak Lake, does the landscape begin to undulate upwards in anticipation of the higher plateau beyond the border. Otherwise, relief seldom exceeds 30 m, except where streams have managed to erode the soft bedrock surface. The rivers here tend to meander across the countryside before flowing into Grand Lake. The ones draining into Washademoak Lake are somewhat more sprightly, especially those originating in uplands to the south. A single noteworthy waterfall in the region occurs on a tributary of Chase Brook, northwest of Chipman, where the stream cascades 5 m over irregular bedrock structure.

The Maquapit Ecodistrict is moderately dry and has the warmest climate in the province. The large volumes of water in Grand Lake and the adjacent lower Saint John River act as a heat reservoir to prolong the frost-free period.

Soils

The red, non-calcareous Pennsylvanian strata disintegrate rapidly to yield deep horizons of acidic soil. They occur over much of the ecodistrict and have given rise to widespread areas of red, compact clay loams and loams of the Stony Brook and Harcourt units.

These reddish soils are moderately fertile on the better drained slopes and, around Grand Lake, support crops of vegetables and small fruits. However, the land's lack of relief and the soil's fine texture combine to impede drainage, which limits the growth rate of overlying vegetation.

Shallow, soils of the Sunbury Unit occur sparsely across the ecodistrict in areas underlain by grey, lithic-feldspathic sandstones. Coarse, alluvial soils of the Riverbank Unit overly lower stretches of the Gaspereau and Salmon rivers where they support white pine stands. Fertile soils of the Interval Unit occur along the western boundary where it meets the Aukpaque Ecodistrict.

Biota

The ecodistrict has a large number of tree species. Mixed stands of red spruce and hemlock, with red maple, white birch, and trembling aspen, form the most common forest cover and are associated with the better drained upland soils (5). Hemlock also occurs in more diverse forest communities, such as the Big Cove

Forest on Washademoak Lake, where twenty tree species have been identified, including hemlock, black ash, white ash, ironwood, cedar, and pine.

White pine grows throughout but is particularly dominant on lower slopes and flatlands (1, 2). Large mature specimens grow along the banks of the Little River, which flows into Indian Lake. Jack pine, is more abundant in the east where repeated fires have affected forest composition. The Phillipstown Ecological Reserve northeast of Coles Island is an example of typical lowland forest with of jack pine, black spruce, and red spruce.

Black spruce is rare in the adjacent Aukpaque Ecodistrict, but prevails on the acidic, poorly drained upland soils (3) and numerous bogs (3b) of this ecodistrict. The Acadia Forest Experiment Station north of Indian Lake contains an excellent example of upland black spruce, whereas the marsh at Northeast Branch Long Creek supports a representative bog black spruce community.

The few forest communities with sugar maple, yellow birch, and beech (4,7, 8) are restricted to higher elevation sites bordering the Anagance Ecodistrict to the south and the Bantalor Ecodistrict to the north. Bronson Ridge near Shipman is a notable exception.

The ecodistrict's unusually warm climate has encouraged the growth of tree species usually associated with more southerly regions. The resultant oak, green ash, butternut, and silver maple are especially prevalent on rich Interval soils (7b).

Sites at low elevation with infrequent flooding often display sugar maple, red maple, basswood, ironwood, white ash, and red oak, whereas the sandier shorelines are dominated by red oak and white ash. Cox Point Peninsula on the cobbly north shore of Grand Lake demonstrates several of these elements: its forest hosts cedar, red oak, red maple, silver maple, and hemlock.

Although this ecodistrict hosts a diversity of tree species and stand types, harvesting and agriculture have considerably altered the original forest, resulting in widespread tracts of red maple, grey birch, white birch, and trembling aspen, with scattered spruce and fir.

In addition to its diversity of tree species, the Maquapit Ecodistrict encompasses a variety of habitat features associated with shoreline and lowlands. For example, the Pickerel Pond Nature Preserve northeast of Scotchtown includes a sandspit, marshes with wild rice and amphibian habitat, plus a forest a black spruce, silver maple, bur oak, red maple, and large red oak. The unusual halberd-

leaved tearthumb also occurs here.

Other significant plants occur across the ecodistrict: starved



The Jemseg River is seen here as a narrow band in the centre of the photograph, joining Maquapit Lake and Grand Lake. In the distance, the Saint John River flows toward the observer, past Gilbert Island.

panic grass in Lakeside Provincial Park, buttonbush in the Grand Lake Meadows, pentagon dodder at Grand Lake, and Massachusetts fern at Princess Park.

The Portobello Creek Floodplain area west of French Lake harbours a truly remarkable grove of mature and massive red oaks. The area's most outstanding feature, is its extensive wetlands that contain crucial habitat for breeding ducks and migratory

waterfowl. Over 250 bird species have been sighted in these marshes, along with 35 of the roughly 55 species of terrestrial mammals in the province.

Grand Lake also is a prime birding spot for many uncommon species, including black tern. Grand Lake Meadows, west of the lake, straddle both this and the adjoining Aukpaque Ecodistrict, and represent one of the most important bird habitat areas in the Maritimes. The meadows are used heavily by inland waterfowl during spring migration and host several breeding species of ducks each summer.

Settlement and Land Use

The Maquapit Ecodistrict lies within traditional Maliseet territory and was used regularly before the arrival of Europeans. It possessed marshes, lakes, and rivers with abundant fish, waterfowl, wild rice and other food sources, and also lay along major native portage routes between the Saint John River, the Miramichi River, and the Northumberland coast. Archaeologists have uncovered numerous burial sites, encampments, and other evidence of habitation dating back at least 4000 years. One site suggests an aboriginal presence as long as 9000 years ago.

The earliest Europeans arrived in the ecodistrict sometime in the middle to late 1600s and, over time, settled the shores of Grand Lake, Washademoak Lake, the Jemseg River, and other places that were favourable for farming. Logging and fishing were the other primary occupations. In addition, shipbuilding took place in Cumberland Bay and Douglas Harbour, and at Cambridge Narrows.

Washademoak Lake formed part of a crucial French communication route between the forts at Québec City and Beauséjour. After messengers from Québec had navigated the Saint John River, they paddled up Washademoak Lake to the Canaan River and from there portaged overland to the North River, which led to the Petittcodiac River and, hence, to Fort Beauséjour at the head of Cumberland Bay.

Mixed farming takes place here on the better soils. Since the early 1800s however, the main socioeconomic base of this ecodistrict, has been coal mining. The first coal shipment left for Boston in 1630s and represented the modest beginnings of what has become almost 300 years of continuous coal removal. Large-scale production began after the railroads reached the coalfields in the early 1900s. Although coal was excavated all along the north shore of Grand Lake, the largest operations lay near Minto. The ecodistrict's significance as a coal-mining centre is reflected in its place names, such as Coal Creek, Cumberland Point, and Newcastle Stream.

7.2. Maquapit Ecodistrict at a Glance

Ecoregion: Grand Lake Lowlands

Area: 209, 388 ha

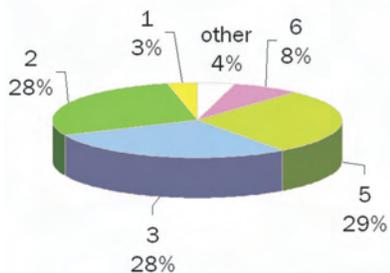
Average elevation above sea level: 53 m

Average May–September precipitation: 425–450 mm

Average annual degree-days above 5°C: 1700–1800

76% of Maquapit Ecodistrict has forest cover

ecosite coverage of forest area



24% of Maquapit Ecodistrict is not forested

uses of non-forest area

