

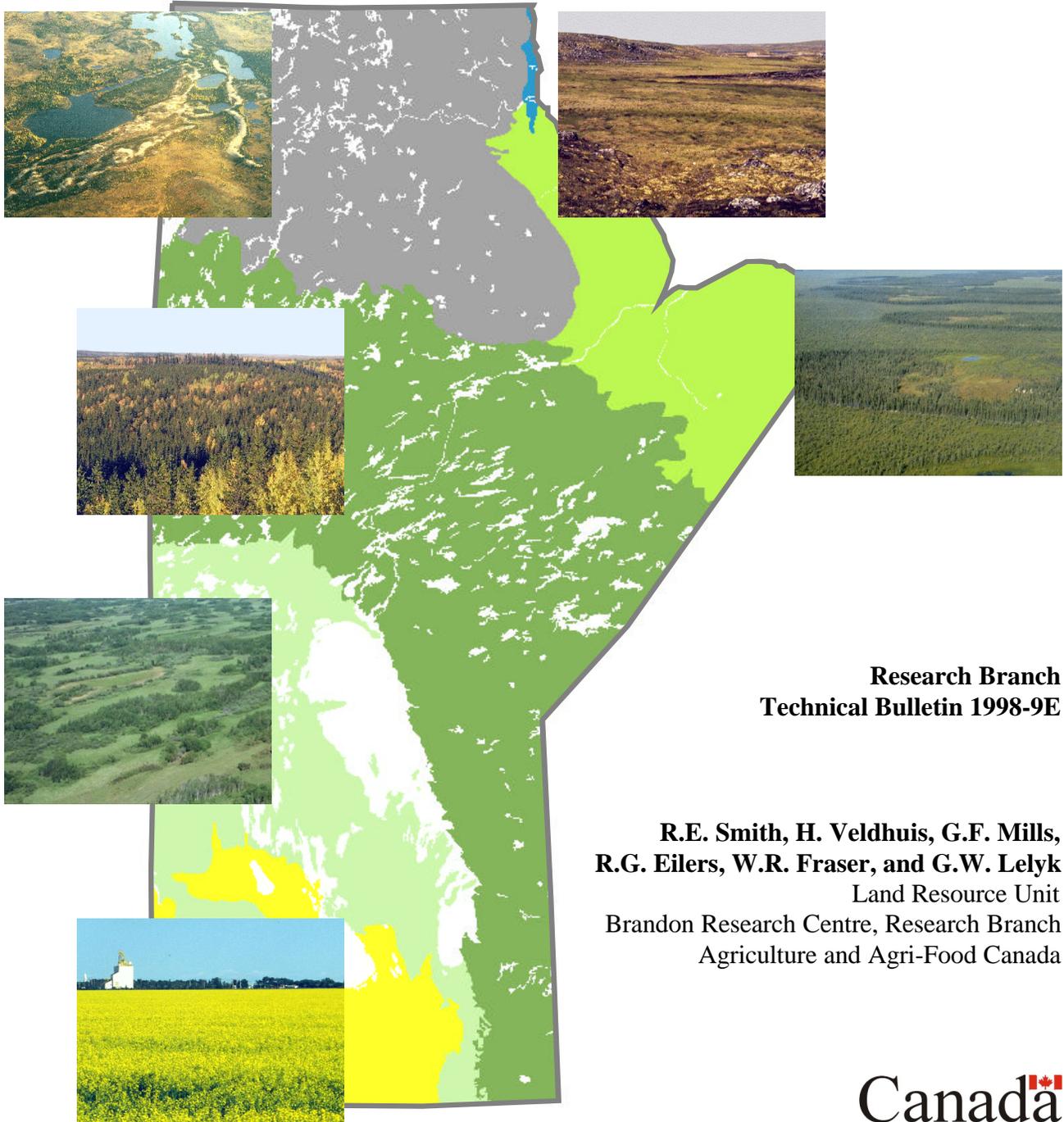


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Terrestrial Ecozones, Ecoregions, and Ecodistricts of Manitoba

An Ecological Stratification of Manitoba's Natural Landscapes



**Research Branch
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Canada 

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Southern Arctic Ecozone

Maguse River Upland Ecoregion

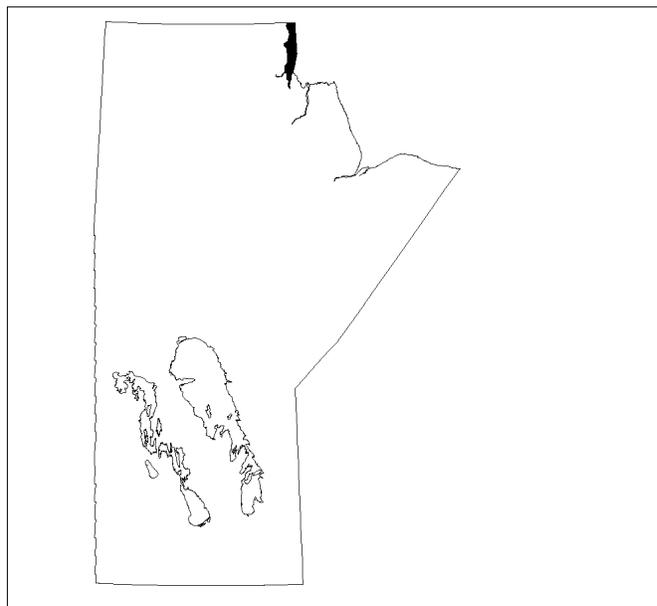
45. Maguse River Upland Ecoregion

This ecoregion spans the boundary between Manitoba and the Northwest Territories along the west coast of Hudson Bay. Only the most southern extension of the ecoregion lies within Manitoba. The effect of the cold waters of Hudson Bay extends arctic climate conditions south in a narrow strip along the west coast of the bay.

The ecoregion is underlain by continuous permafrost except for areas recently emerged along the coast and areas below deeper lakes. Soils remain generally frozen within shallow depth (less than 100 cm) for all or most of the growing season.

Climate

The regional climate, classified as Low Arctic Ecoclimate, is marked by summers that are short, moist and cool, and winters that are long and extremely cold. The cold water of Hudson Bay, which doesn't become ice-free until late July, has a strong influence on the climate along the coast. In summer, a shift in wind direction may cause significant changes in air temperature. Mean annual air temperature for the ecoregion is about -12.0°C, average growing season about 100 days, and the number of growing degree-days ranges from about 300 to 400, and slightly higher in the most southern portion.



Average annual precipitation is about 250 mm, but is higher along the coast. It varies greatly from year to year and is highest during the growing season. The average yearly moisture deficit is less than 50 mm.

The ecoregion has an extremely cold, humid, Arctic soil climate. Temperature and precipitation data are available for two stations in the region. Both stations are located along the northern boundary of the region, Baker Lake is located inland and Chesterfield is situated on the coast.

Selected Climate Data¹ for Baker Lake

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yr.
Temp. °C	-33.0	-32.6	-27.9	-17.3	-6.4	4.1	11.0	9.7	2.3	-7.7	-20.3	-28.2	-12.2
Precip. mm	7.7	4.9	7.6	13.8	12.0	20.9	38.1	37.3	37.0	30.6	16.5	8.2	234.6
Growing degree-days	0.0	0.0	0.0	0.0	0.1	37.6	186.3	148.6	19.2	0.0	0.0	0.0	391.8

Selected Climate Data¹ for Chesterfield

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yr.
Temp. °C	-31.5	-31.6	-26.5	-16.5	-6.0	2.9	8.9	8.4	2.5	-5.7	-17.4	-26.4	-11.6
Precip. mm	7.6	46	8.3	12.0	15.1	23.1	41.2	38.7	40.6	33.8	19.9	14.0	258.9
Growing degree-days	0.0	0.0	0.0	0.0	0.0	23.3	126.1	108.7	11.8	0.1	0.0	0.0	270.0

¹ Canadian Climate Normals, 1951-1980. Atmospheric Environment Service, Environment Canada

Surficial deposits and landforms

The ecoregion lies within the Kazan Upland. It consists of crystalline Archaean massive rocks forming broad sloping uplands and lowlands. Elevations range from 210 masl along its western boundary to sea level at Hudson Bay. The upland slopes gently and drains eastward to Hudson Bay via many rivers, creeks and tributaries. The largest rivers crossing the region include the Seal and Caribou rivers in the Manitoba portion and the Thiewiaza, Ta-Anne, McConnell, Maguse and Wilson Rivers in Nunavut.

The ecoregion consists of deep drumlinoid and fluted sandy till in the east and loamy till in the northwest. Eskers and outwash materials are locally prominent. In the section along Chesterfield Inlet, till deposits are very thin resulting in extensive exposed bedrock outcropping. Along the coast, the more common unconsolidated deposits are marine silts and clays. Crevasse fillings and ribbed moraines are common in the area along the Northwest Territories - Manitoba boundary.

As most of the ecoregion was submerged by the Tyrrell Sea after deglaciation, terraces and beaches associated with drumlins, eskers and hills are locally common. Bouldery lag deposits are also locally significant.

Very small, small and medium size lakes are common throughout. The area along Hudson Bay, between the 30 masl contour and the shore extending some distance north of the Maguse River outlet, consists of a marine sand and silt plain with few glacial features. On the bay side this area is bordered by tidal mud-flats and also has many very small, shallow lakes, of which many are ephemeral.

Soils

Most soils in the ecoregion are shallow and weakly developed on sandy and loamy till. The soils are largely Turbic and Static Cryosols, with minor areas of other soil types. Turbic Cryosol soils are especially widespread on the loamy till of the northwest section, and have profiles that exhibit discontinuous, uneven and disturbed soil horizon development, and incorporation of organic material in the form of smears and pockets. They are frequently associated with patterned ground like sorted and non-sorted nets and circles (mud boils). Static Cryosols are permanently frozen soils which lack significant horizon distortion. They are most common on sandy till and other coarse textured deposits.

Dystric Brunisolic soils occur in areas where active layers (thickness of summer thaw) are deep. This condition generally only occurs on coarse textured deposits such as beaches and eskers. Along the coast on extensive areas of newly emerged land, soil development is lacking or weak, and permafrost has not yet formed, Regosolic and Gleysolic soils are common. Organic Cryosols occur in areas of shallow to deep organic materials.

Vegetation

This ecoregion has a nearly continuous cover of dwarf-shrub tundra vegetation usually less than 30 cm tall and includes dwarf birch, willow shrubs, northern Labrador tea and bilberry. Taller (up to 2 m) birch, willow and alder occur on south facing sites, along streams, and in sheltered locations where snow accumulates. Poorly drained areas may have willow shrub vegetation, but more often the vegetation is dominated by sedges and cotton-grass. Herbs, lichens and mosses are also widespread and are often interspersed with shrub cover. Distribution varies with aspect, exposure and drainage.

Wildlife

This ecoregion provides important summer range for barren-ground caribou and breeding habitat for snow geese, Canada geese and other waterfowl. Other wildlife includes polar bear in coastal areas, arctic fox, arctic ground squirrel, masked shrew, brown lemming, arctic wolf, weasel, snowy owl, willow and rock ptarmigan, several species of shorebird, and rough-legged hawk. There are walrus, white whale and various seals in the adjacent marine environment.

Land use

This ecoregion is sparsely populated, but contains four communities: Arviat, Whale Cove, Rankin Inlet and Chesterfield Inlet, which are in the Nunavut portion of the ecoregion. Rankin Inlet (population 1700) is the largest and is the trading and administrative centre for an area extending well beyond the ecoregion boundaries. Most of the population is Inuit and land use activities are generally centred around sustenance hunting, fishing, trapping and sealing. Other occupations are in construction and in providing private and government services.

There is only one ecodistrict within the Maguse River Upland Ecoregion in Manitoba.

Taiga Shield Ecozone

Kazan River Upland Ecoregion

70. Kazan River Upland Ecoregion

The Kazan River Upland Ecoregion spans the boundary between Nunavut and northern Manitoba, and stretches from the Seal River in Manitoba to near the East Arm Hills in the Northwest Territories. This region is part of the broad area of tundra and boreal transition extending from Labrador to Alaska.

Climate

The ecoregion has a High Subarctic Ecoclimate marked by short, cool summers and long, very cold winters. The mean annual air temperature is approximately -8.0°C . For the Manitoba portion of the ecoregion, the average growing season ranges from 95 to 117 days, while the number of growing degree-days ranges from about 450 to slightly over 600.

Mean annual precipitation ranges from about 380 to 425 mm, with about two-fifths falling as snow. Precipitation is highest during the growing season, but shows great variation from year to year. The average yearly soil moisture deficit is less than 50 mm.

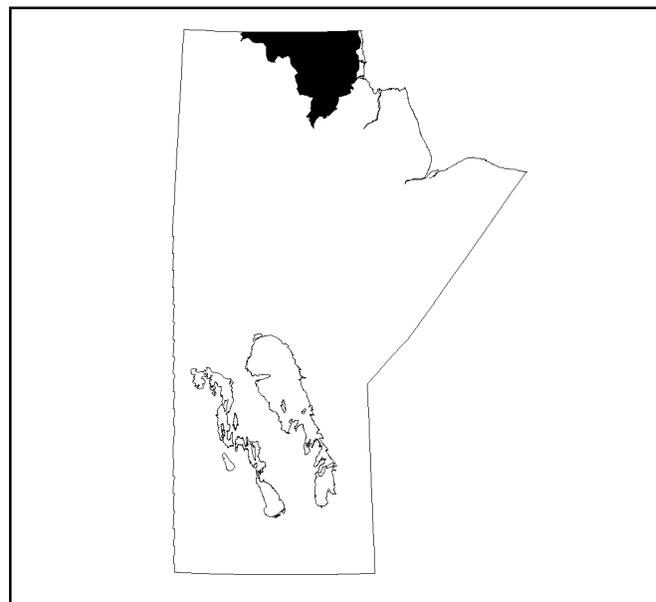
Selected Climate Data¹ for Ennadai Lake

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yr.
Temp. $^{\circ}\text{C}$	-30.9	-29.1	-23.8	-13.1	-2.7	7.2	13	11.5	3.9	-5.0	-17.3	-25.8	-9.3
Precip. mm	10.3	6.4	11.7	15.3	19.6	30.7	51.9	41.7	44.7	33.2	16.4	12.6	294.5
Growing degree-days	0.0	0.0	0.0	0.1	8.7	97.0	247.7	201.1	39.8	0.9	0.0	0.0	595.3

¹ Canadian Climate Normals, 1951-1980. Atmospheric Environment Service, Environment Canada.

Surficial deposits and landforms

In Manitoba, this ecoregion encompasses a portion of the Kazan River Upland which is composed of crystalline Archaean massive rocks forming broad sloping uplands and lowlands. This section of the upland lies between 350 masl along its western boundary near Nueltin Lake and 30 masl along its eastern boundary near the coastal lowland of Hudson Bay. Although hummocky bedrock outcrops are common, most of the region is covered with acidic sandy and sandy loam granitic till in the form of veneers and blankets and drumlins. Slopes range from 5 to 30 percent.



The ecoregion has a very cold, humid, Subarctic soil climate. The data most relevant is from the station at Ennadai Lake, which is now closed.

Fluvioglacial deposits in the form of prominent eskers with significant local relief (occasionally as high as 50 m), and outwash aprons are common. Side slopes of eskers may be as steep as 60 percent. Fields of coarse fragments are frequently found as boulder lag material, marking former shores and drainage ways, and as frost-heaved block fields.

The Kazan Upland slopes gently eastward and drains to Hudson Bay via the Seal and Caribou rivers. A network of secondary streams and drainage ways tributary to the primary rivers, as well as numerous small to medium size lakes are also characteristic of the region.

Soils

Due to the widespread occurrence of permafrost, Cryosolic soils are dominant in this ecoregion. Most of the permanently frozen soils developed on sandy loam to loamy sand textured till have profiles exhibiting discontinuous and distorted horizons (cryoturbated horizons) and are classified as Turbic Cryosols. Patterned ground in the form of circles, stripes and nets is usually associated with these soils. Static Cryosols, which are permanently frozen soils that lack strong cryoturbation features but have permafrost within 100 cm of the surface, are associated with sand, coarse sand and gravelly glaciofluvial and till deposits. Both Static and Turbic Cryosols are also associated with poorly drained sites on a wide variety of materials.

On warm and/or very dry sites, where near surface permafrost is lacking or where the active layer is very deep, Dystric Brunisolic soils are present. These sites are usually associated with glaciofluvial deposits such as eskers.

Permafrost is continuous in the peatlands and often occurs within 20 to 30 cm of the surface. Therefore shallow and deep Organic Cryosols are the soils associated with these sites.

Vegetation

This is the ecoregion where, in Manitoba, the latitudinal limit of tree growth is reached.

The main vegetative distinction between this ecoregion and the Selwyn Lake Ecoregion to the south and west is that trees here are significantly more stunted and stands are much more open. Open, very stunted stands of black spruce and tamarack, with secondary quantities of white spruce and ground cover of dwarf birch, willow, northern Labrador tea, cotton grass, lichen and moss are dominant on well to imperfectly drained sites. Drier sites may be dominated by open stands of white spruce with a ground cover of low ericaceous shrubs, dwarf birch, mosses and lichens. Stands of white spruce, and paper birch are common along rivers. Poorly drained sites usually support tussock vegetation of sedge, cotton grass and sphagnum moss.

Although forested areas are dominant, when including those areas which only support a very sparse cover of dwarf trees, significant areas support low-shrub tundra vegetation. This vegetation may be intermixed with forested tracts or it may occur as extensive areas uninterrupted by trees.

Wildlife

Characteristic wildlife includes the barren-ground caribou, as this ecoregion forms part of its winter range. Other animals in the region include black bear, occasionally grizzly bear, arctic fox, willow ptarmigan, sandhill crane and waterfowl, including ducks and geese. The rivers and lakes contain fish species such as arctic grayling, northern pike, and lake trout.

Land use

There are no permanent settlements in this ecoregion. Most land use is associated with wildlife trapping and subsistence hunting. Some water-oriented recreation and tourism are other activities taking place in this region.

The Seal River has been declared a Canadian Heritage River.

There are three ecodistricts within the Kazan River Upland Ecoregion within Manitoba.

Taiga Shield Ecozone

Selwyn Lake Upland Ecoregion

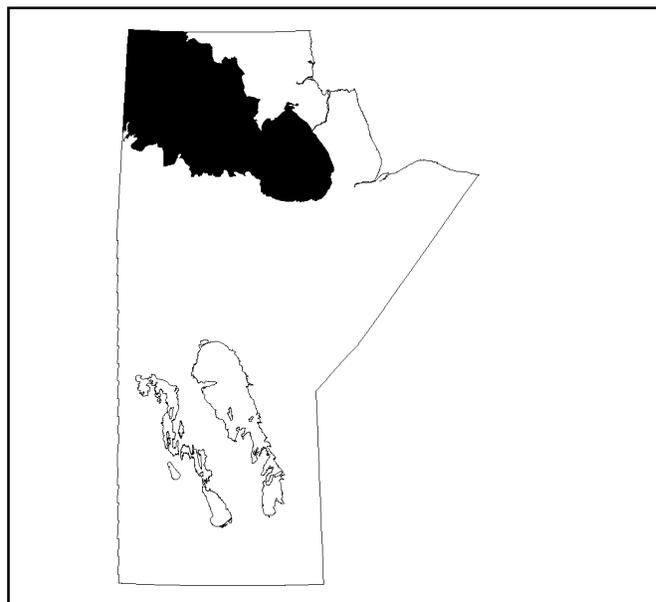
71. Selwyn Lake Upland Ecoregion

The Selwyn Lake Upland Ecoregion is located in the northwest corner of Manitoba and spans the boundaries with Saskatchewan, Nunavut and the Northwest Territories. It is part of a broad area of coniferous forest transition lying between the sparsely forested region to the north and the closed Boreal forest to the south. This ecoregion extends from east of the Churchill River in Manitoba to the East Arm Hills east of Great Slave Lake.

Climate

This ecoregion has a Low Subarctic Ecoclimate, which is marked by short, cool summers and long, very cold winters. Mean annual air temperatures range from about -5.0°C to -3.4°C. The average growing season varies from about 124 to 137 days, and the number of growing degree-days ranges from about 750 to 950.

Mean annual precipitation varies from about 430 mm to more than 500 mm and fluctuates greatly from year to year. Precipitation is highest during the growing season. The ecoregion has average yearly moisture deficits ranging from less than 40 mm to slightly less than 70 mm. The ecoregion has a very cold, subhumid to humid, Cryoboreal, soil climate.



Climate stations are few in the ecoregion. The climate stations at Ennadai Lake along the northern border of the ecoregion and Brochet Airport located on its southern border, are the most relevant to the Manitoba portion of the ecoregion.

Selected Climate Data¹ for Ennadai Lake

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yr.
Temp. °C	-30.9	-29.1	-23.8	-13.1	-2.7	7.2	13.0	11.5	3.9	-5.0	-17.3	-25.8	-9.3
Precip. mm	10.3	6.4	11.7	15.3	19.6	30.7	51.9	41.7	44.7	33.2	16.4	12.6	294.5
Growing degree-days	0.0	0.0	0.0	0.1	8.7	97.0	247.7	201.1	39.8	0.9	0.0	0.0	595.3

¹ Canadian Climate Normals, 1951-1980. Atmospheric Environment Service, Environment Canada.

Selected Climate Data¹ for Brochet Airport

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yr.
Temp. °C	-28.5	-24.0	17.1	-5.3	3.6	11.4	15.6	14.0	6.9	-0.3	-13.0	-22.6	-4.9
Precip. mm	19.2	13.9	18.3	18.3	32.4	55.1	66.4	52.1	59.2	38.2	29.9	24.1	427.1
Growing degree-days	0.0	0.0	0.0	4.7	43.5	196.2	331.7	280.1	86.4	9.8	0.0	0.0	952.4

¹ Canadian Climate Normals, 1961-1990. Atmospheric Environment Service, Environment Canada.

² Canadian Climate Normals, 1951-1980. Atmospheric Environment Service, Environment Canada.

Surficial Deposits and Landforms

Within Manitoba, this ecoregion is part of the Kazan Upland with its underlying bedrock of crystalline Archean massive rocks that form broad sloping uplands and lowlands. The elevation of this upland lies between 510 masl along the Saskatchewan - Manitoba border and 120 masl along its border with the Hudson Bay Lowland and the Coastal Hudson Bay Lowland ecoregions.

Surficial deposits vary across the Manitoba part of the ecoregion. In the western section, ridged to hummocky bedrock outcrops covered with discontinuous veneers and blankets of acidic, bouldery, sandy granitic till are dominant. The southeastern section has significant areas of calcareous loamy till. This till is generally thick enough to mask most of the underlying bedrock, but is itself often overlain by peat deposits and lacustrine sediments. Significant clayey lacustrine veneers and blankets occur at lower elevations around lakes as well. Prominent fluvio-glacial ridges, some with maximum relief of 50 m or more and steep side slopes, are found throughout the ecoregion.

Bog-fen sequences are the dominant wetlands, and are very prevalent in the southeastern section where they cover between 25 and 50 percent of the terrain.

The upland tilts gently and drains northeastward to Hudson Bay via the Churchill and Seal rivers and their network of secondary streams and drainage ways. Numerous small, medium and large lakes are common and drain directly, or through stream and creeks, into the major drainage ways. Small to medium lakes are very numerous in the northwest part of the Manitoba section.

Permafrost is widespread and discontinuous. Most of the permafrost is associated with peat plateau bogs, areas with impeded drainage, and fine textured soils. Ice content in mineral soils is generally low to medium. Ice wedges occur sporadically throughout the region. Permafrost becomes much less widespread towards the southern boundary of the ecoregion, especially in the mineral deposits.

Soils

Dystric Brunisols, and to lesser extent Static Cryosols, associated with upland sandy morainal deposits are dominant in the western section of the region. In the eastern section, Organic Cryosols, typical of peatlands, are more widespread. Significant soil inclusions are Gray Luvisols on calcareous silty to clayey sediments near Southern Indian Lake and elsewhere, Eutric Brunisols on calcareous till and Turbic Cryosolic soils on loamy to clay textured materials distributed throughout the ecoregion. The Turbic Cryosols have profiles exhibiting uneven and often discontinuous or distorted soil horizon development as a result of past and present cryoturbation.

Periglacial features such as active and relic sorted and non-sorted circles on coarse loamy to sandy till material, and earth hummocks (a form of non-sorted circle) on clayey sediments occur throughout the ecoregion.

Climatic conditions are too severe for forestry or agriculture. Lack of rooting depth to permafrost or bedrock, limited water and nutrient holding capacity and excessive stoniness adds additional constraints to the use of mineral soils. Natural drainage and slow heat conductance properties are specific limitations to the usefulness of organic soils.

Vegetation

In this ecoregion, the typical closed coniferous boreal forest gives way to open stands of low black spruce with understories of dwarf birch, Labrador tea, lichens, and mosses. This change in forest cover is one of the main differences between this ecoregion and the Churchill River Upland and Hayes River Upland ecoregions bordering to the south. Although black spruce is the climax species in the ecoregion, drier sites can be dominated by open stands of white spruce and paper birch, with a discontinuous understory of ericaceous shrubs like bearberry and rock cranberry. White spruce, birch and aspen also occur on warmer protected sites.

Bog vegetation is dominated by sphagnum mosses, ericaceous shrubs and black spruce, whereas fens have a vegetation of sedges and brown mosses, with a minor shrub component.

Taiga Shield Ecozone

Selwyn Lake Upland Ecoregion

Wildlife

Characteristic wildlife includes barren-ground caribou, for which the region provides important winter range. Other wildlife characteristic of the region are black bear, arctic fox, snowshoe hare, spruce grouse, osprey, waterfowl including ducks, geese and swans.

Land use

The ecoregion is only sparsely populated. The Northlands and Barrenland First Nations, Sayisi Dene First Nation (Tadoule Lake) and Lac Brochet are the only settlements in the Manitoba part of the ecoregion. Economic activity is very limited. Trapping, hunting, water-oriented recreation and tourism are the dominant land uses.

The Seal River has been declared a Canadian Heritage River.

There are six ecodistricts within the Selwyn Lake Upland Ecoregion in Manitoba.

88. Churchill River Upland Ecoregion

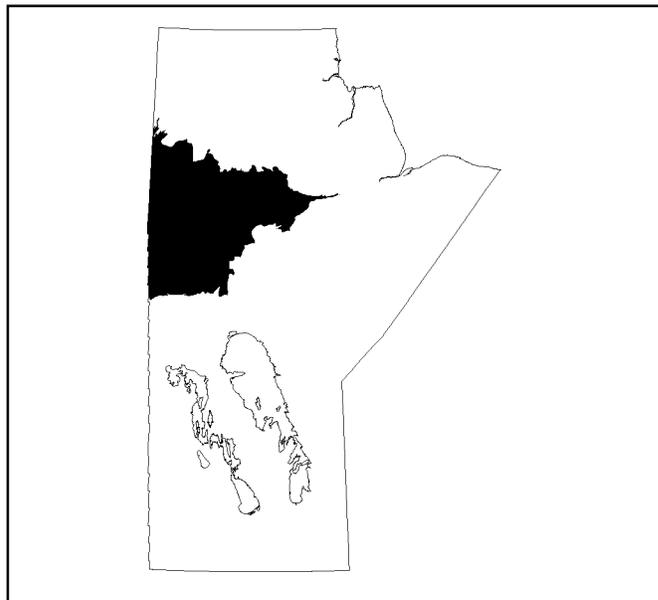
This ecoregion is located along the southern edge of the Precambrian Shield in north-central Saskatchewan and Manitoba. In Manitoba, it extends westward from the Grass River to the Saskatchewan border.

Climate

The Churchill River Upland Ecoregion lies in the continuous subhumid, High Boreal Ecoclimatic Region that extends from northwestern Ontario to Great Slave Lake in the southern Northwest Territories. It has a climate marked by short, cool summers and long, very cold winters. The mean annual air temperature ranges from -0.9°C to -3.5°C. The average growing season varies from 135 to 164 days, and the number of growing degree-days ranges roughly from 940 to 1300.

Average annual precipitation is approximately 460 to 525 mm, of which about one-third falls as snow. Precipitation fluctuates greatly from year to year, and is highest during the growing season. Average yearly moisture deficits are between 50 to 100 mm. The region has a cold, subhumid to humid, Cryoboreal soil climate.

Stations at Lynn Lake Airport and Flin Flon Airport provide typical climate data for this ecoregion.



Selected Climate Data¹ for Lynn Lake Airport

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yr.
Temp. °C	-25.2	-21.2	-13.7	-2.3	6.2	12.5	15.8	14.0	6.9	-0.3	-12.5	-22.5	-3.5
Precip. mm	20.4	16.0	16.2	23.0	44.0	65.2	77.4	73.2	59.4	43.5	31.3	22.8	492.5
Growing degree-days	0.0	0.0	0.0	14.0	89.5	228.4	335.6	282.5	84.8	9.4	0.0	0.0	1044.0

¹ Canadian Climate Normals, 1961-1990. Atmospheric Environment Service, Environment Canada.

Selected Climate Data¹ for Flin Flon Airport

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yr.
Temp. °C	-22.0	-17.0	-10.0	0.7	8.9	14.7	17.8	16.4	9.4	2.6	-8.4	-19.0	-0.5
Precip. mm	19.3	14.6	20.8	28.7	41.0	70.2	67.1	74.3	60.2	37.1	27.0	23.8	484.0
Growing degree-days	0.0	0.0	0.3	23.5	140.0	291.0	397.0	354.0	144.0	27.8	0.7	0.0	1379.0

¹ Canadian Climate Normals, 1961-1990. Atmospheric Environment Service, Environment Canada.

Boreal Shield Ecozone

Churchill River Upland Ecoregion

Surficial deposits and landforms

The ecoregion occupies a portion of the Kazan Upland and is underlain by massive crystalline Precambrian (Proterozoic) rocks that form broad sloping uplands and lowlands. Elevations range from 450 masl in the Reindeer Lake area near the Saskatchewan border to 150 masl along its eastern boundary near Grass River.

Ridged to hummocky bedrock outcrops covered with discontinuous veneers and blankets of acidic sandy granitic till are dominant in the western section. Depressed to hummocky clayey lacustrine deposits of variable depth are common in the eastern section. However, many of these clays are overlain by peat deposits of varying thicknesses, with the deeper peat usually found in the depressional areas.

Locally prominent fluvioglacial (lateral moraine) deposits, with relief of up to 60 m, border the ecoregion in the east. The upland slopes gently and drains northeastward to Hudson Bay via the Churchill, Grass and Nelson rivers and their bedrock-controlled network of tributary streams and drainage ways. Numerous small to medium lakes are linked by the Churchill and Grass rivers. There are also many large lakes in this ecoregion.

Soils

Dystric Brunisolic soils are dominant on sandy acidic till, while Gray Luvisolic soils dominate on well to imperfectly drained clay deposits. Granitic rock outcrops are co-dominant in the area. Significant areas of shallow and deep organic Mesisols, Fibrisols and Cryosols are associated with basin bogs, peat plateau and veneer bogs. Gray Luvisols, and to a lesser extent Static and Turbic Cryosols, are prevalent on clayey lacustrine deposits along the Churchill River and around Southern Indian Lake, while Eutric Brunisols occur on silty fluvioglacial ridges and on calcareous loamy till.

Permafrost is widespread in organic deposits in the north, but diminishes to sporadic along the southern boundary. Permafrost in mineral soils is much less widespread, and confined mainly to fine textured sediments in the northern half of the ecoregion.

Vegetation

The ecoregion lies between the colder, drier, open coniferous forest region of the Low Subarctic in the north and the warmer, Mid-Boreal, mixed forest region in the south.

The dominant forest cover consists of medium to tall closed black spruce and jack pine stands. White spruce, white birch and especially trembling aspen often form an important component of stands on warm sites in the north and on a variety of sites in the southern part of the region. Understorey vegetation consists of feather mosses, rock cranberry, blueberry, Labrador tea and lichen.

The widespread distribution of jack pine, white birch and trembling aspen is largely due to the frequent occurrence of forest fires. Well to rapidly drained sandy sites support pure or mixed open stands of black spruce and jack pine. Bedrock exposures have patchy tree cover and are generally covered with lichens.

Closed and open stands of stunted black spruce, with a ground cover of Labrador tea, blueberry, bog rosemary and sphagnum mosses dominate poorly drained basin bogs and peat plateau bogs. Fen vegetation is dominated by sedges and brown mosses, and may also include tamarack stands and swamp birch shrub cover.

Wildlife

The ecoregion provides habitat for moose, woodland caribou, black bear, lynx, wolf, beaver, muskrat and snowshoe hare as well as winter range for barren-ground caribou. Besides sandhill crane, grouse, waterfowl such as ducks, geese and pelicans, many other birds use the ecoregion.

Land use

Forests in the southern section of the ecoregion contribute significantly to the pulpwood industry and to a lesser degree, local sawlog operations. Mining activities occur throughout, but at present are most prevalent in the southern section. Trapping, hunting, water-oriented recreation and tourism are other important land uses in this ecoregion.

Ten Ecodistricts occur within the Manitoba portion of the Churchill River Upland Ecoregion

89. Hayes River Upland Ecoregion

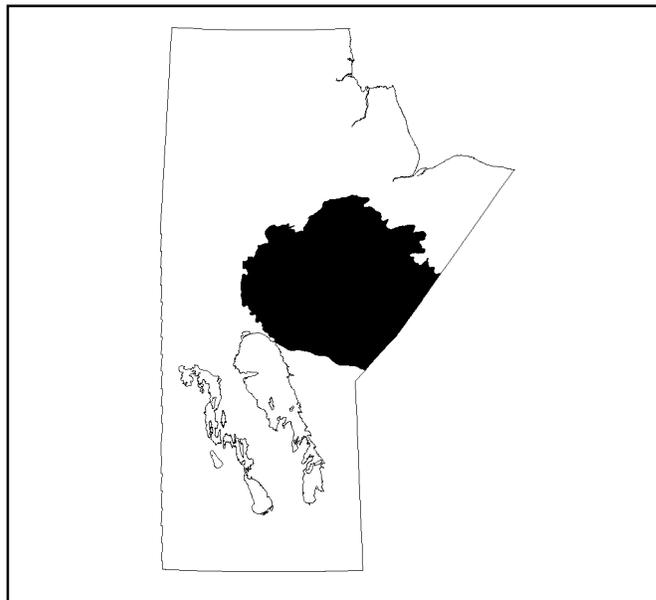
This ecoregion extends from the Grass River Basin in east-central Manitoba to Sandy Lake in northwestern Ontario.

Climate

The Hayes River Upland Ecoregion is part of the subhumid, High Boreal Ecoclimatic Region that forms a continuous, extensive belt from northwestern Ontario, across central Saskatchewan to Great Slave Lake in the southern Northwest Territories. It has a climate marked by short, cool summers and long, very cold winters. The mean annual air temperatures range from -0.8 °C to -4.1 °C, the average growing season varies from 131 to 160 days, and the number of growing degree-days ranges from about 880 to 1400.

The mean annual precipitation ranges from 435 to 580 mm and varies greatly from year to year. While precipitation is highest during the growing season, average yearly moisture deficits range from less than 40 mm to almost 100 mm. The region has a cold, subhumid to humid, Cryoboreal soil climate.

Climatic data from stations at Gillam in the north, and at now-closed Wabowden in the southwest, is presented.



Selected Climate Data¹ for Gillam Airport

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yr.
Temp. °C	-25.7	-22.5	-15.4	-4.8	4.3	11.1	15.3	13.6	6.7	-0.3	-12.0	-23.2	-4.4
Precip. mm	17.8	16.6	19.9	27.7	45.9	53.7	83.5	75.5	53.5	37.9	35.8	26.7	494.4
Growing degree-days	0.0	0.0	0.0	9.7	65.7	189.7	318.0	267.7	81.5	11.7	0.0	0.0	944.0

¹Canadian Climate Normals, 1961-1990. Atmospheric Environment Service, Environment Canada.

Selected Climate Data¹ for Wabowden

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yr.
Temp. °C	-24.6	-19.4	-12.6	-2.0	6.3	13.3	16.9	15.1	8.4	2.2	-10.0	-19.4	-2.2
Precip. mm	18.0	16.2	17.2	23.5	43.2	61.3	74.2	59.9	59.0	34.4	30.7	26.6	464.2
Growing degree-days	0.0	0.0	0.0	13.3	87.2	250.8	368.9	313.2	117.7	23.6	0.1	0.0	1174.8

¹Canadian Climate Normals, 1951-1980. Atmospheric Environment Service, Environment Canada.

Boreal Shield Ecozone

Hayes River Upland Ecoregion

Surficial deposits and landforms

In Manitoba this ecoregion, which encompasses part of the Severn Upland, is underlain by crystalline Archean massive rocks that form broad sloping uplands and lowlands. It lies between 285 masl along the Manitoba-Ontario boundary to 210 masl along the Grass and Nelson rivers to the west.

Strongly glaciated, the ecoregion is characterized by ridged to hummocky bedrock outcrops covered with discontinuous veneers and blankets of acidic sandy till in the south, and calcareous, sandy to loamy cobbly glacial till in the north. Veneer bogs, flat bogs and gently sloping clayey glaciolacustrine blankets and veneers occupy large areas. Local areas of prominent, ridged fluvio-glacial deposits (local relief can exceed 30 m) also occur. Slopes range from 10 to 30 percent.

The ecoregion contains many small to medium sized lakes and a large number of medium to large lakes which are linked by the Nelson, Stupart, Hayes and Gods rivers and their tributaries.

Soils

Organic Cryosols associated with veneer and peat plateau bogs are dominant in the northern half of the ecoregion, while in the southern half, Organic Mesisols and Fibrisols are the dominant organic soils. Eutric and Dystric Brunisols on loamy fluvio-glacial and glacial till and Gray Luvisols on exposed silty to clayey glaciolacustrine and fluvio-glacial deposits are more prevalent in the southern section. Granite bedrock outcrops occur throughout the ecoregion.

Permafrost is widespread in the northern peatlands, but is only sporadically distributed in the south. Permafrost in mineral soils is much less common and is only found in the northern half of the ecoregion. Mineral soil profiles often exhibit uneven, discontinuous or distorted soil horizon development. These properties and such peri-glacial features as relic earth hummocks and non-sorted circles are evidence of past and present effects of permafrost on the landscape surface.

Vegetation

This ecoregion lies between the colder, peatland-dominated Hudson Bay Lowland Ecoregion to the north, and the warmer Lac Seul Upland Ecoregion to the south.

The forest in this ecoregion is dominated by medium to tall closed stands of black spruce, jack pine and some paper birch, with understoreys of feather moss, rock cranberry, blueberry, Labrador tea and lichen. White spruce, balsam fir and trembling aspen occur in the warmer, moister sites in the southern sections, especially along rivers. Black spruce is the climax species, but frequent forest fires have reduced the distribution of mature stands. Drier sites support black spruce and/or jack pine stands with more open canopies. Bedrock exposures have few trees and are covered with lichens.

Stunted closed and open stands of black spruce with Labrador tea, blueberry, bog rosemary and sphagnum mosses form the vegetation on bogs. Sedges, brown mosses, shrubs and tamarack in varying mixtures form the dominant vegetation on fens.

Wildlife

The ecoregion provides habitat for moose, black bear, woodland caribou, lynx, wolf, beaver, muskrat and snowshoe hare. Waterfowl including ducks, geese and pelicans use the region. Other common bird species found include sandhill crane, spruce grouse, willow ptarmigan, raven, Canada jay and many passerine bird species.

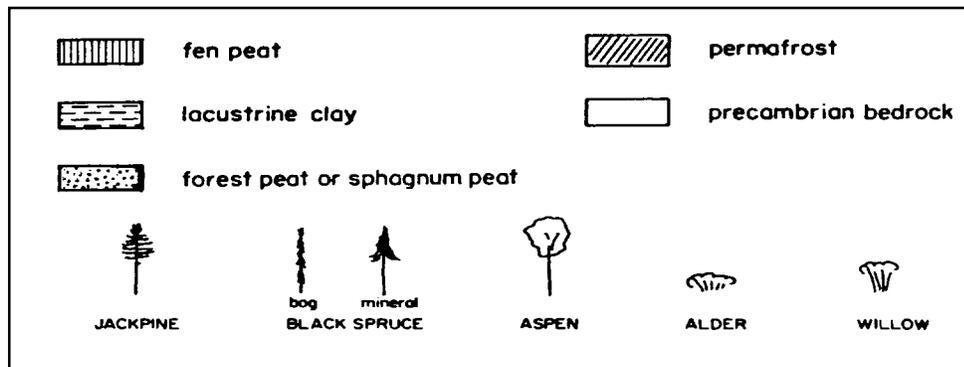
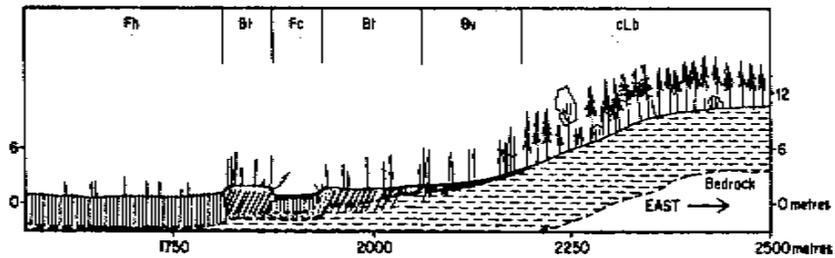
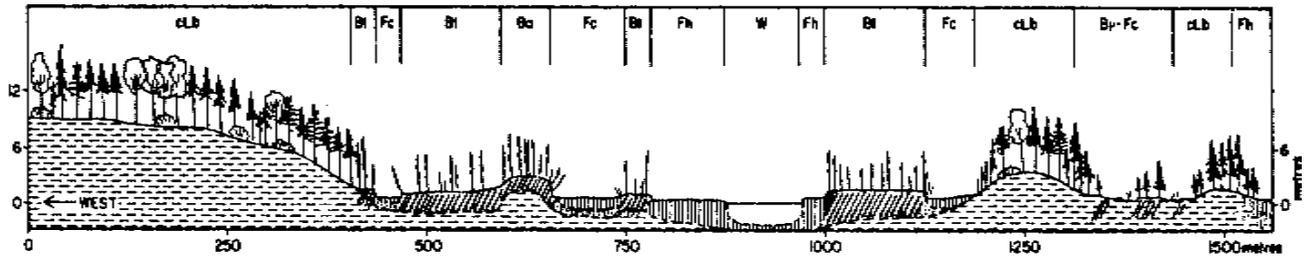
Land Use

The ecoregion is generally sparsely populated. However, there are several communities, including a number of First Nation settlements.

The city of Thompson is by far the largest community with a population of approximately 15,000 which varies with the fortunes of the Inco mining and smelting operation. The western section of the ecoregion supports pulpwood and local sawlog forestry. Trapping and hunting, water-oriented recreation and tourism are other significant natural resource uses in this ecoregion.

There are nine ecodistricts within the Hayes River Upland Ecoregion in Manitoba.

Cross-sections through part of Ecodistrict 363, Sipiwesk Lake



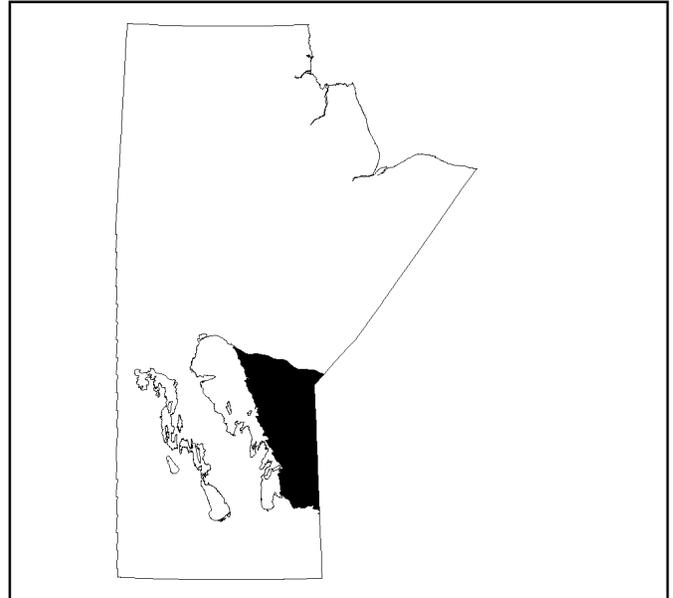
Ba - palsa bog	cLb - clayey, glaciolacustrine blanket
Bt - peat plateau bog	Fc - collapse fen
Bv - veneer bog	Fh - horizontal fen
	W - open water

90. Lac Seul Upland Ecoregion

In Manitoba, the Lac Seul Upland Ecoregion extends from the eastern shore of Lake Winnipeg to the Manitoba-Ontario border. Only about twenty-five percent of the region lies within Manitoba.

Climate

This ecoregion forms a portion of the Mid Boreal Ecoclimatic Region that extends westward from Lac Seul in northwestern Ontario, across central Manitoba and Saskatchewan to the foothills of the Rocky Mountains in northern Alberta and southern Yukon. The climate is marked by short, warm summers and very cold winters. In the Manitoba portion of the ecoregion, the mean annual air temperature ranges from 0.3 °C to 1.1 °C. The average length of the growing season varies from 166 to 173 days. The number of growing degree-days ranges from about 1400 to 1475.



The average annual precipitation varies from about 540 mm in the northwest to over 580 mm in the southeast and varies greatly from year to year. About one-third of the precipitation falls as snow. Precipitation is highest during the growing season. Moisture deficits range from less than 20 mm to about 60 mm. The ecoregion has a moderately cold to cold, subhumid to humid, Cryoboreal soil climate. The ecoregion has few climate stations. The only long

term climate data in the Manitoba part of the ecoregion is from the now-closed station at Bissett. The Ontario portion has several stations, among them Red Lake Airport, Sioux Lookout Airport and Pickle Lake. The data from these stations is likely not representative of the more northern sectors. Below is data from Bissett and Red Lake, which are both located in the southern part of the ecoregion.

Selected Climate Data¹ for Red Lake Airport

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yr.
Temp. °C	-21	-16.8	-8.9	1.4	9.2	15.3	18.2	16.9	10.8	4.5	-5.8	-15.8	0.7
Precip. mm	28.7	20.6	26.1	34.1	48.4	84.0	86.9	78.1	62.7	50.5	39.9	28.5	588.5
Growing degree-days	0.0	0.0	0.4	27.4	151.4	302.8	423.3	368.2	187.9	55.8	2.7	0.0	1519.9

¹ Canadian Climate Normals, 1951-1980. Atmospheric Environment Service, Environment Canada.

Selected Climate Data¹ for Bissett

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yr.
Temp. °C	-20.9	-16.7	-9.2	1.8	10.0	15.3	18.3	16.7	10.7	4.9	-5.8	-16.1	0.8
Precip. mm	29.4	18.7	25.4	42.1	59.7	93.8	71.3	77.9	67.3	47.3	33.7	22.3	588.9
Growing degree-days	0.0	0.0	0.2	30.1	180.0	313.7	409.3	358.5	178.9	60.9	1.8	0.0	1533.4

¹ Canadian Climate Normals, 1951-1980. Atmospheric Environment Service, Environment Canada.

Boreal Shield Ecozone

Lac Seul Upland Ecoregion

Surficial Deposits and Landforms

The Lac Seul Upland Ecoregion takes in a portion of the southwestern section of the Severn Uplands of the Canadian Shield. Bordering on the eastern shore of Lake Winnipeg, that marks the boundary of the Interior Plains to the west, the Severn Plain is a region consisting of crystalline Archaean massive rocks that form broad sloping uplands and lowlands. This section of the upland lies between 335 masl along the Manitoba-Ontario boundary to 218 masl along the shore of Lake Winnipeg.

Ridged to hummocky bedrock outcrops covered with discontinuous veneers and blankets of acidic, sandy to coarse loamy granitic till are dominant along the provincial border. Level to gently undulating organic deposits overlying clayey glaciolacustrine sediments, broken by local bedrock ridges and knolls, are characteristic of the terrain approaching Lake Winnipeg. Permafrost, which is very likely relic, is very sporadically distributed in peatlands in the northern section of the ecoregion.

Small, medium and large lakes are numerous in the eastern, bedrock-dominated section. Lakes of significant size are few in the peatland-dominated western section, but small lakes and pools collectively cover a significant surface area.

The Manitoba portion of the ecoregion lies within the Nelson River watershed. Drainage is into Lake Winnipeg via a large number of streams which are irregular, bedrock-controlled in the eastern section, but evolve into slower, westward-flowing drainage ways crossing the peatland-dominated terrain along Lake Winnipeg. Major rivers are the Bloodvein, Pigeon, Berens and Poplar.

Soils

In the eastern section, rock outcrops and shallow and deep Dystric Brunisolic soils developed on well to rapidly drained, sandy glacial till are co-dominant. Deep organic Mesisols and Fbrisols are dominant on peatlands that developed in bedrock-controlled depressional areas.

Towards the west, Gray Luvisols associated with well to imperfectly drained calcareous loamy to clayey textured glaciolacustrine soils become co-dominant with shallow and deep organic Mesisols and Fbrisols, although bedrock outcrops and Dystric Brunisols associated with glacial till remain as significant inclusions. The most west-

erly section is dominated by shallow and deep Mesisols and Fbrisols associated with extensive peatlands, and Gleysolic soils developed on poorly drained glaciolacustrine sediments. Significant inclusions of Gray Luvisolic soils are associated with moderately well to imperfectly drained glaciolacustrine blankets and veneers overlying bedrock.

Vegetation

The forest cover is dominated by coniferous species, but is more mixed than the forest farther north. Black spruce is the dominant tree species and is especially widespread on imperfectly drained uplands and bog peatlands. But due to extensive and repeated fires, the forest cover is very fragmented. As a result, jack pine, and to a lesser extent trembling aspen, are common on upland sites. Where drainage is good, and where soil and climate conditions are more favourable, as in river valleys, around lakes and on south-facing slopes, white spruce, balsam fir, trembling aspen and balsam poplar may form mixed stands of good growth. Deciduous species tend to be less abundant in the Manitoba section of the ecoregion.

On uplands, deciduous and mixed stands have diverse understories of shrubs and herbs, while coniferous stands tend to have a feather moss ground cover. Bedrock outcrops have patchy tree growth, which is often dominated by jack pine with a understory of low shrubs and a groundcover of low ericaceous shrubs, mosses and lichens.

Poorly to very poorly drained fens have sedge and brown moss vegetation and may have a shrub layer, or may support a tamarack-dominated tree cover with varying components of shrubs, herbs and sedges. Poorly drained bogs generally support open to closed stands of stunted to medium tall black spruce, with understories of dwarf birch, ericaceous shrubs, and a moss ground cover. Peatlands that are transitional in development from fen to bog are common and the vegetation reflects the transitional aspects in its community composition.

Wildlife

Characteristic wildlife includes moose, black bear, wolf and woodland caribou. White-tail deer has been expanding its range into the more southern areas in recent years. Other wildlife in the region includes lynx, ermine, fisher, mink, red squirrel, beaver, muskrat and snowshoe hare. Birds include waterfowl such as ducks and geese, raptors such as bald eagle, great horned owl and red-tailed hawk, as well as spruce grouse, herring gull, double crested cormorant and turkey vulture.

Land use

The major communities are Bissett in Manitoba and Red Lake and Sioux Lookout in Ontario. The Manitoba portion of the ecoregion has several First Nation communities, a number of which are located on the shore of Lake Winnipeg.

The most significant economic land use is forestry. Pulpwood and local sawlog forestry are extensively developed in the southern section. Mining is another important activity. Tourism and water-oriented recreation, such as sport fishing and boating are significant uses of natural resources in the region. The Berens, Bloodvein and Poplar rivers provide excellent canoeing opportunities. The Bloodvein has been declared a Heritage River. Other important land use activities are hunting, trapping and fishing, and the gathering of herbs for various uses by the First Nations people.

There are three ecodistricts within the Lac Seul Upland Ecoregion in Manitoba.

Headframe of mine



Mining for gold has been a long time activity in Ecoregion 90. The headframe shown in the picture is from the mine at Bissett as it appeared about 25 years ago.

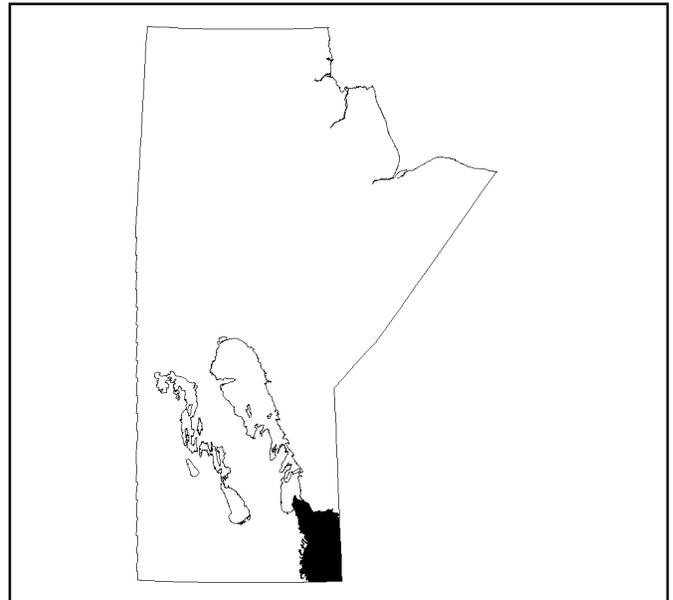
91. Lake of the Woods Ecoregion

The Lake of the Woods Ecoregion encompasses the southeastern corner of Manitoba and extends a considerable distance into northwestern Ontario. The region is more closely identified with the warmer, more humid southeastern mixed forest region than with the colder, drier, closed, mixed Boreal forest to the north.

Climate

The geographic extent of the ecoregion results in significant variation in climate between the western and eastern sectors.

The Manitoba portion of the ecoregion has a climate marked by short, warm summers and long, cold winters. The mean annual air temperature ranges from about 1.9°C to 2.3°C. The average growing season is around 180 days. The number of growing degree-days is about 1600.



The average annual precipitation ranges from about 540 to 650 mm, and varies greatly from year to year. Precipitation is highest during the growing season. Moisture deficits range from about 45mm to around 95 mm. The ecoregion has a moderately cold, subhumid to humid, Cryoboreal soil climate.

There are several climate stations located within the ecoregion. Data for two stations in Manitoba is presented below.

Selected Climate Data¹ for Pine Falls

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yr.
Temp. °C	-19.1	-16.0	-7.5	3.2	11.1	16.1	19.3	17.7	11.8	5.5	-4.4	-15.2	1.9
Precip. mm	21.8	17.3	19.2	28.6	58.3	83.6	70.3	72.9	60.5	42.4	25.6	21.9	522.5
Growing degree-days	0.0	0.0	1.4	45.6	208.3	336.1	451.5	393.3	214.3	68.4	4.6	N	N

¹ Canadian Climate Normals, 1961-1990. Atmospheric Environment Service, Environment Canada

Selected Climate Data¹ for Indian Bay

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yr.
Temp. °C	-19.2	-16.0	-7.4	2.5	10.6	15.9	18.8	17.2	11.3	5.2	-4.8	-15.2	1.6
Precip. mm	29.8	23.0	28.4	35.8	59.7	97.2	93.7	79.8	59.7	36.1	30.1	29.5	602.9
Growing degree-days	0.0	0.0	1.2	34.4	182.9	324.5	427.9	373.3	192.6	61.8	3.8	0.0	1603.0

¹ Canadian Climate Normals, 1961-1990. Atmospheric Environment Service, Environment Canada.

Boreal Shield Ecozone

Lake of the Woods Ecoregion

Surficial deposits and landforms

The Lake of the Woods Ecoregion occupies the southwestern section of the Severn Uplands and, along its western boundary, a small portion of the flat, limestone-dominated Manitoba Plain. Therefore, the ecoregion's underlying bedrock consists mainly of massive crystalline Archean rocks that form broad sloping uplands and lowlands, but it also contains some prominent Palaeozoic limestone erosion remnants along its northwestern boundary.

The ecoregion lies between the 215 masl (Whitemouth Lowland) and 390 masl (Bedford Hills) elevations. It is mantled with thick to thin glacial till, fluvioglacial, and dominantly peat-covered, glacial Lake Agassiz deposits. Bedrock outcroppings occur throughout the region, but are increasingly more frequent in the central and eastern portions.

The English, Winnipeg, and Rainy rivers are the dominant drainage ways. The ecoregion contains many small to large lakes with bedrock-controlled shores in the northern part.

Soils

Poorly drained Organic Mesisols and Fbrisols are widespread due to the many, frequently extensive, peatlands. Limited areas of Eutric Brunisols occur in the western section and are associated with calcareous mixed till and calcareous glaciofluvial deposits. Dystric Brunisols are widespread and are associated with the neutral to slightly acidic coarse till derived from the Precambrian bedrock, and with acidic glaciofluvial deposits. Gray Luvisols are also widespread and are associated with well and imperfectly drained clayey to loamy calcareous glaciolacustrine sediments. Significant inclusions are well to imperfectly drained Dark Gray Chernozemic soils in the west, and poorly drained Gleysolic soils on calcareous, loamy to clayey glaciolacustrine deposits.

Besides moderate climatic constraints, the more severe limitations to agriculture are dense subsoils and poor structure of clay soils, poor nutrient retention and water-holding capacity, coarse fragments, and coarse surface texture of till soils. Organic soils have poor natural drainage and are slow to warm, severely reducing their usefulness to agriculture.

Vegetation

The forest cover is very mixed, characterized by tall, closed stands of jack pine, trembling aspen, paper birch, white spruce, eastern white cedar, black ash and white elm. Red pine and eastern white pine are also present in the Manitoba section. Bur oak, trembling aspen, red (green) ash and jack pine are more common on warmer, drier sites in western section of the ecoregion.

Poorly to very poorly drained sites, especially areas of shallow and deep peat, have a tree cover dominated by black spruce and/or tamarack.

Wildlife

Characteristic wildlife includes mammals such as moose, black bear, wolf, lynx and snowshoe hare. Birds in the region include ruffed grouse, hooded merganser, pileated woodpecker, bald eagle, turkey vulture, herring gull as well as many waterfowl and songbird species.

Land use

Pulpwood extraction and the associated paper product industry, and local sawlog forestry, are the dominant uses of the natural resources. Camping, cottaging and water-oriented recreation, especially fishing and boating, are also very important activities in the ecoregion. Trapping and hunting are the significant land uses, and of special importance to First Nations people.

Arable agriculture is limited to small holdings on mainly clayey glaciolacustrine soils in the lowlands along rivers and streams where drainage has been improved. Grains for livestock feed, oilseeds and hay crops are the crops most likely grown in the region.

There are five ecodistricts within the Lake of the Woods Ecoregion in Manitoba.

Boreal Plains Ecozone

Mid-Boreal Lowland Ecoregion

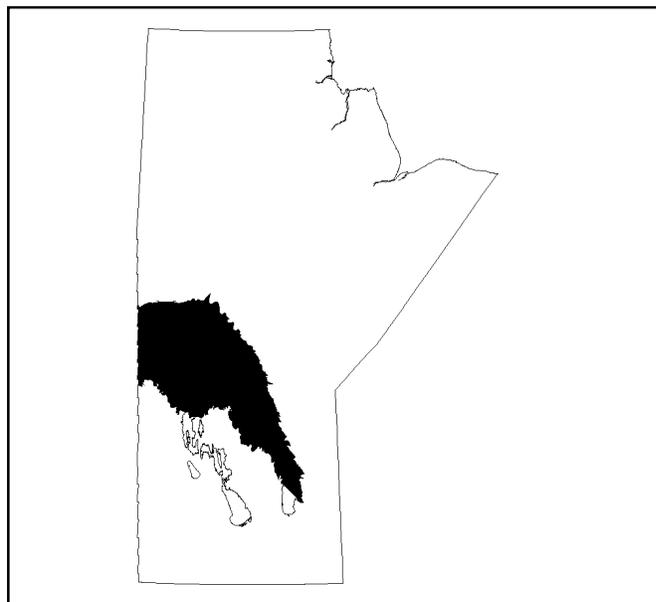
148. Mid-Boreal Lowland Ecoregion

The Mid-Boreal Lowland Ecoregion occupies the northern section of the low-lying Manitoba Plain from the western shore of Lake Winnipeg to the Cumberland Lowlands in Saskatchewan.

Climate

This ecoregion is part of the Subhumid Mid-Boreal Ecoclimatic Region that forms a continuous belt extending from Lac Seul in northwestern Ontario, across central Manitoba and Saskatchewan to the foothills of the Rocky Mountains in northern Alberta and the southern Yukon Territory. The ecoregion has short, moderately warm summers and long, cold winters. The mean annual air temperature ranges from -0.4°C to 1.2°C . The average growing season ranges from 162 to 172 days, and the number growing degree-days ranges from nearly 1300 to over 1500.

The average annual precipitation ranges from about 450 mm to about 575 mm. Precipitation varies greatly from year to year and is highest during the growing season. Average moisture deficits range from nearly 60 mm to about 125 mm. The region has a moderately cold to cold,



subhumid to humid, Cryoboreal soil climate.

Climate data from The Pas Airport and Grand Rapids Hydro is given below.

Selected Climate Data¹ for The Pas Airport

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yr.
Temp. $^{\circ}\text{C}$	-21.4	-17.5	-10.0	0.5	8.7	14.8	17.7	16.4	9.9	3.5	-7.7	-18.0	-0.3
Precip. mm	16.6	15.1	21.0	26.2	33.6	63.1	69.1	65.0	58.3	37.5	26.6	19.8	451.9
Growing degree-days	0.0	0.0	0.0	24.0	138.0	294.0	395.0	352.0	155.0	37.0	1.0	0.0	1395.0

Selected Climate Data¹ for Steinbach

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yr.
Temp. $^{\circ}\text{C}$	-19.8	-17.7	-9.1	0.5	8.3	14.9	18.8	17.5	11.2	4.0	-6.9	-16.6	0.5
Precip. mm	16.4	12.8	24.8	24.6	38.9	75.2	75.1	67.2	60.7	41.5	26.8	19.4	483.4
Growing degree-days	0.0	0.0	0.0	24.0	127.0	298.0	426.0	388.0	188.0	42.0	1.0	0.0	1494.0

¹ Canadian Climate Normals, 1961-1990. Atmospheric Environment Service, Environment Canada.

Surficial Deposits and Landforms

In Manitoba, this ecoregion is underlain by flat-lying, low relief Palaeozoic limestone rock and is covered almost entirely by glacial deposits of variable thickness. Lime-

stone bedrock is at or near the surface along escarpments, erosion channels and drumlinoid ridges. Lower and smoother than the Saskatchewan Plain to the west, this

plain has an elevation ranging from about 350 masl near the Saskatchewan border to 218 masl at Lake Winnipeg. Its surface is generally level with a distinct, north to south trending drumlinoid or ridged topographic pattern with slopes ranging from 1 to 5 percent.

Portions of this lowland plain have been smoothed over by the deposition of clays, silts and sands of glacial Lake Agassiz which have subsequently been covered by organic deposits in the form of poorly drained flat bogs and horizontal fens. More pronounced topography in the form of limestone domes with slopes ranging from 5 to 10 percent occur north of Clearwater Lake. Beaches marking the successively lower water levels of Lake Agassiz wind along the prominent The Pas Moraine and along a bare bedrock escarpment that lies north of Grand Rapids near the north-western shoreline of Lake Winnipeg.

The most northern part of the ecoregion lies within the discontinuous permafrost zone. Permafrost is patchy but widespread in peatlands. The widespread occurrence of collapse features (thermokarst) indicates that the permafrost is barely in equilibrium with the climate.

Large to very large lakes dominate the ecoregion including the northern basin of Lake Winnipeg, the northern half of Lake Winnipegosis, as well as Cedar, Moose, Cormorant, Clearwater and Athapapuskow lakes. The Saskatchewan and Carrot rivers are the major drainage ways. The ecoregion is part of a number of watersheds including those of the Minago, Hargrave and William rivers, which are all part of the Nelson River drainage system.

Soils

Eutric Brunisols on loamy glacial till, and shallow to deep Organic Mesisols and Fbrisols are co-dominant in the area. Other soils of significance include Gray Luvisolic soils that have developed on well to imperfectly drained, very stony, calcareous, loamy to clayey textured glacial till and on calcareous, stone-free, clayey and silty glaciolacustrine deposits.

Eutric Brunisols are present and are associated with ancient, subdued sandy beaches of former glacial Lake Agassiz. Limestone bedrock outcroppings, covered by rubble, are common throughout the ecoregion.

Vegetation

In Manitoba, this ecoregion is characterized by mixed boreal forest. Medium to tall, closed stands of black spruce, trembling aspen, balsam polar and jack pine are common on well to imperfectly drained clayey and loamy tills and glaciolacustrine deposits. Black spruce is the dominant species in older stands.

After fire, extremely overstocked stands of jack pine often develop on well drained sites, while on better sites, trembling aspen may be the dominant regeneration. Good mixed stands of black spruce, white spruce, balsam fir and trembling aspen may be found on suitable sites along lake shores and on alluvial deposits along rivers. Poorly drained soils support black spruce and shrub vegetation.

Vegetation in bogs consists of black spruce and ericaceous shrubs and mosses. Fens are dominated by sedges, brown mosses and varying amounts of swamp birch and tamarack.

Wildlife

Characteristic wildlife includes moose, black bear, wolf, lynx, red fox and snowshoe hare. This ecoregion also provides habitat for waterfowl including various ducks, geese, white pelican and cormorant. Other birds include various raptors, sandhill crane and ruffed grouse.

Land Use

The largest centres are The Pas and Grand Rapids. There are also a number of First Nation communities.

A significant part of the ecoregion, especially around Cedar Lake, was flooded as a result of the construction of the hydro-electric dam on the Saskatchewan River at Grand Rapids.

Significant pulpwood and local sawlog forestry provides employment in the ecoregion, with most of the pulpwood and timber being processed in the mill at The Pas. Water-oriented recreation, trapping and hunting are also important land uses. Servicing the tourist industry provides seasonal employment during the summer. Arable agriculture is limited to small holdings on clayey glaciolacustrine soils in the lowlands along rivers and streams, where drainage has been improved. Grains for livestock feed, oilseeds, and hay are the common crops.

There are fourteen ecodistricts that occur either wholly or in part within the Mid-Boreal Lowlands Ecoregion in Manitoba.

Boreal Plains Ecozone

Boreal Transition Ecoregion

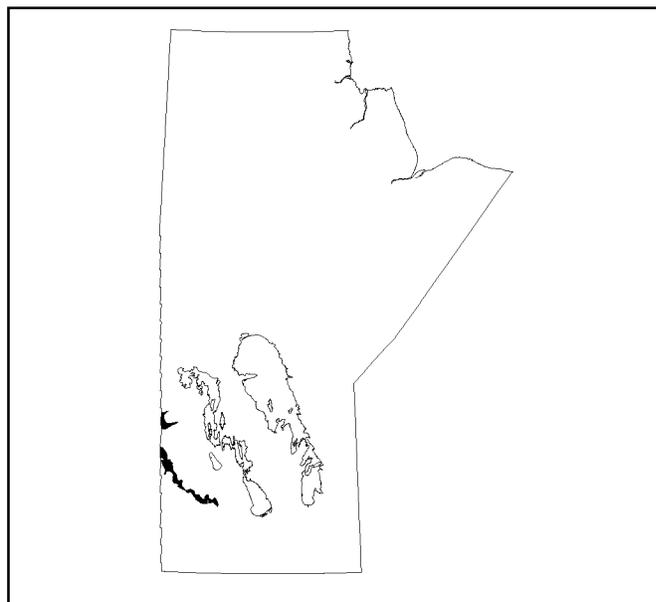
149. Boreal Transition Ecoregion

In Manitoba, the Boreal Transition Ecoregion consists of a narrow belt of wooded upland bordering Riding Mountain, Duck Mountain and part of the gap between Duck Mountain and Porcupine Hills. It forms a portion of the extensive deciduous forest belt that extends from southeastern Manitoba to the Peace River in north-central Alberta. The ecoregion presents a mosaic of farmland and forest, and marks the southern limit of closed boreal forest and the northern advance of commercial arable agriculture in the prairie provinces.

Climate

In Manitoba, this ecoregion is part of the Subhumid Low Boreal Ecoclimatic Region which is characterized by short, warm summers and long, cold winters. The mean annual air temperature is around 0.6 °C, the mean growing season varies with elevation but averages 171 days, and the number of growing degree-days is around 1400.

The average annual precipitation is about 480 mm. Precipitation varies greatly from year to year and is highest during the growing season. The average yearly moisture



deficit is about 150 mm. The ecoregion has a subhumid, moderately cold, Cryoboreal to subhumid, cool, Boreal soil climate.

The only climate station in the ecoregion was at Roblin.

Selected Climate Data¹ for Roblin

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yr.
Temp. °C	-21.7	-17	-10.2	1.9	10.2	14.8	17.5	16.1	10.0	4.0	-6.9	-16.4	0.2
Precip. mm	26.6	16.6	23.9	20.7	48.0	79.4	65.8	52.0	66.8	31.5	24.6	20.8	476.7
Growing degree-days	0.0	0.0	0.4	31.4	171.8	296.1	387.4	345.8	161.5	48.6	1.3	0.0	1444.3

¹ Canadian Climate Normals, 1951-1980. Atmospheric Environment Service, Environment Canada.

Surficial Materials and Landforms

In Manitoba, this upland is comprised of Cretaceous shale, which is covered almost entirely by thick, kettle to hummocky, calcareous glacial till and fluvio-glacial deposits. In Manitoba, this region encircles the prominent uplands comprising the Mid-Boreal Uplands Ecoregion and ranges in elevation from 350 masl in the gap between Duck Mountain and Porcupine Hills to 640 masl along the boundary with Riding Mountain. Associated with the rough topography of the morainic deposits are a large number of small lakes, ponds and sloughs occupying shallow depressions. These are especially common in the area south of Riding Mountain.

Soils

Well drained Dark Gray Chernozemic soils are predominant and associated with all types of deposits. Local areas of Gray Luvisols also occur in these uplands and are generally associated with clayey till and glaciolacustrine sediments, especially those found at the higher elevations. Other soils are peaty Gleysols and Organic Mesisols found in low-lying areas.

Vegetation

A closed cover of tall trembling aspen with secondary quantities of balsam poplar and an understory of mixed herbs and tall shrubs is the predominant vegetation. White spruce and balsam fir are the climax species but are not well represented because of forest fires and logging. Water-filled depressions and poorly drained sites are usually covered with sedges, willow, some black spruce and tamarack.

Land Use

In Manitoba, this ecoregion remains for the most part in its native state. Limited production of spring wheat, other cereals, oilseeds and hay crops are characteristic in other portions of the region. Native hay and pasture are more prevalent on the steeper slopes. The ecoregion provides habitat for white-tailed deer, black bear, moose, ruffed grouse, beaver, coyote, rabbit and waterfowl.

There is only one ecodistrict within the Boreal Transition Ecoregion in Manitoba.

Boreal Plains Ecozone

Mid-Boreal Uplands Ecoregion

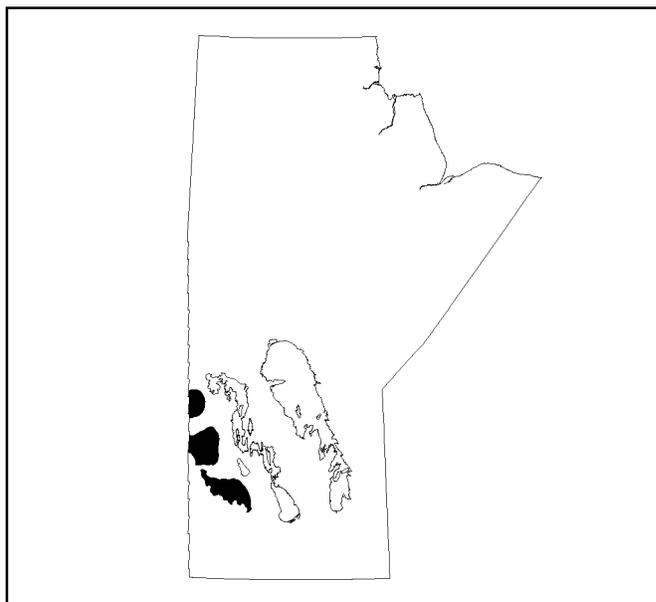
152, 153, 154. Mid-Boreal Uplands Ecoregion

The Manitoba portion of the Mid-Boreal Uplands Ecoregion occurs as three separate elevated uplands along the Manitoba Escarpment known as the Porcupine Hills, Duck Mountain and Riding Mountain.

Climate

These three uplands are part of the extensive Subhumid Mid-Boreal Ecoclimatic Region that extends from Lac Seul in northwestern Ontario, across central Manitoba and Saskatchewan to the foothills of the Rocky Mountains in northern Alberta and southern Yukon Territory. The climate is marked by short, warm summers and long, cold winters. The mean annual air temperature ranges from 0.4 to 1.2°C. The average growing season is about 173 days, while the number of growing degree-days ranges from about 1400 to 1500.

The average annual precipitation is around 500 mm. It varies greatly from year to year and also varies greatly across the uplands. Precipitation is highest during the growing season. Average yearly moisture deficits range from less than 100 mm to over 130 mm. The regions have a moderately cold to cold, subhumid to humid Cryoboreal soil climate.



The only continuous long-term climate station in Manitoba is located at Wasagaming on the Riding Mountain Upland. Data from this station is relevant for that area, but not for the uplands farther north. The station at Birch River is located a short distance outside the Porcupine Hills and at a lower elevation, but is probably still moderately relevant for this most northern component of the ecoregion.

Selected Climate Data¹ for Wasagaming

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yr.
Temp. °C	-20.0	-16.0	-9.2	1.3	8.9	13.8	16.5	14.9	9.2	3.0	-7.2	-16	0.0
Precip. mm	18.6	18.4	2.2	33.4	45.8	82.4	70.9	72.9	58.7	36.7	23.2	21.8	508.0
Growing degree-days	N	0.0	0.1	N	N	263.0	356.0	310.0	N	29.3	N	N	N

¹ Canadian Climate Normals, 1961-1990. Atmospheric Environment Service, Environment Canada.

Selected Climate Data¹ for Birch River

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yr.
Temp. °C	-21.2	-16.3	-10.2	1.9	9.9	14.7	17.5	15.9	10.2	4.9	-6.4	-16.1	0.4
Precip. mm	19.3	23.6	35.3	32.3	33.0	77.2	58.4	57.5	45.5	26.6	35.5	30.3	474.5
Growing degree-days	0.0	0.0	0.2	36.2	165.1	293.5	386.7	338.9	162.0	56.9	2.2	0.0	1441.7

¹ Canadian Climate Normals, 1951-1980. Atmospheric Environment Service, Environment Canada.

Surficial Materials and Landforms

In Manitoba, this ecoregion occupies the higher parts of the Riding Mountain (405 to 720 masl), Duck Mountain (the highest upland at 540 to 830 masl) and Porcupine Hills (400 to 780 masl). These Cretaceous shale outliers occur along the dip slope of the Manitoba Escarpment and are covered entirely by kettled and dissected, deep, loamy to clayey textured glacial deposits. Overlying some of these glacial deposits are clayey glaciolacustrine sediments and coarse textured and gravelly glaciofluvial deposits. Depressional areas may contain shallow to deep, largely moderately decomposed peat materials. Slopes range from about 10 to over 30 percent. Associated with the topographically rougher, morainal deposits are a large number of small lakes, ponds and sloughs occupying deep to shallow depressions.

Drainage for these upland areas is multi-directional via creeks draining into larger rivers skirting the uplands. Although these uplands are part of many smaller watersheds, at a broader level, the south half of Riding Mountain upland is part of the Assiniboine River watershed, and the northern half is part of the Dauphin River watershed. Both the Duck Mountain and Porcupine Hills uplands are part of the Dauphin River watershed. Both watersheds are part of the Nelson River drainage system.

Soils

Well drained Gray Luvisolic soils are dominant in the ecoregion and are associated with moderately calcareous, fine loamy to clayey till and the more limited calcareous clayey glaciolacustrine sediments. Significant inclusions are peaty phase Humic Gleysols, and shallow to deep Organic Mesisols in poorly drained depressions. Eutric Brunisols and Dark Gray Chernozems are associated with coarse textured to gravelly glaciolacustrine deposits.

Vegetation

This mixed forest ecoregion is characterized by medium to tall closed stands of trembling aspen and balsam poplar and extensive white spruce, balsam fir and black spruce stands occurring throughout, but especially as stands in later successional stages. Jack pine occurs throughout, but generally is more prevalent on drier sites while white birch is locally significant. Deciduous species tend to be more abundant in the more southerly Duck and Riding mountains sections. Deciduous and mixed stands generally have diverse understories of shrubs and herbs, while coniferous stands tend to promote feather moss-dominated groundcover. Cold and poorly drained fens and bogs respectively support tamarack and black spruce stands of varying densities.

Wildlife

The uplands comprising the ecoregion provide extensive and good quality habitat for many species of wildlife. Wapiti, moose, black bear, wolf, lynx, snowshoe hare and beaver are common throughout. Several species of raptors, including bald eagle, and many species of songbirds are present. Wetlands provide habitat for ducks and geese.

Land Use

Most of these uplands are held as national park land (Riding Mountain), and as provincial park and forest reserve land (Duck Mountain and Porcupine Hills). Sawlog forestry has a long history in the Duck Mountain and Porcupine Mountain areas. The use of trembling aspen for the manufacture of oriented strandboard is a recent additional use of the forest resource. Recreation in the form of cottaging is generally concentrated around the lakes, and is associated with water recreation such as boating, fishing and water skiing. Recreational, and to some extent, subsistence hunting, are additional land uses. These areas are generally not used for agriculture.

There are three ecodistricts within the Mid-Boreal Uplands Ecoregion in Manitoba.

Boreal Plains Ecozone

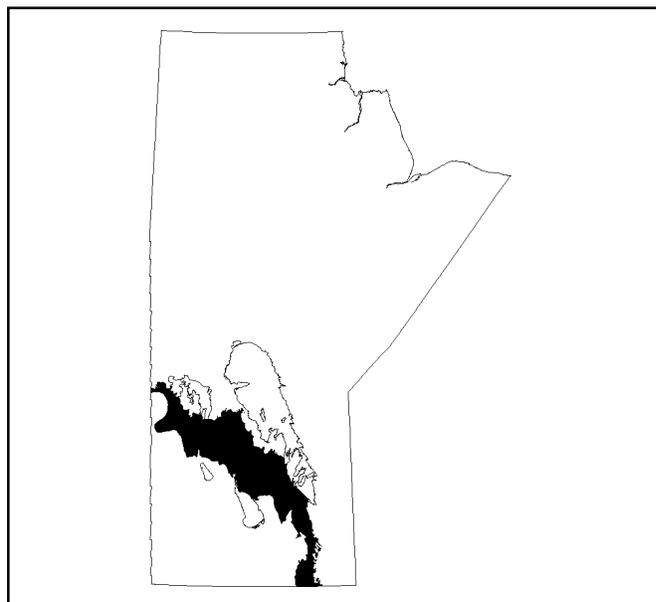
Interlake Plain Ecoregion

155. Interlake Plain Ecoregion

The Interlake Plain Ecoregion extends in a broad arc from the USA-Canada border at the southeastern edge of the Manitoba Plain, northwestward across the southern Interlake/Westlake region to the Saskatchewan border at Red Deer Lake. It is a mosaic of farmland and forest marking the southern limit of closed, mixed boreal forest and northern and eastern extent of commercial agriculture.

Climate

This ecoregion forms a portion of the extensive Subhumid Low Boreal Ecoclimatic Region that extends from southeastern Manitoba to the Peace River in north-central Alberta. The climate is marked by short, warm summers and fairly long, cold winters. In Manitoba, the mean annual air temperature ranges from 1.1 to 2.4°C, the average growing season varies from 173 to 184 days, and the number of growing degree-days ranges from about 1400 to 1700.



The average annual precipitation ranges from slightly less than 500 to near 525 mm, and varies greatly from year to year. Precipitation is highest during the growing season. Average yearly moisture deficits range from 85 to nearly 175 mm. The ecoregion is characterized by a subhumid, moderately cold to cold, Cryoboreal soil climate.

Climatic data for three stations are presented. The Steinbach station represents the southern part of the ecoregion, the Gypsumville station represents the central and northeastern portion, and the Swan River station represents the northwestern part. The data from the Gypsumville station only covers the period 1966 to 1980.

Selected Climate Data¹ for Gypsumville

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yr.
Temp. °C	-20.7	-16.8	-8.7	1.9	10.1	15.1	18.0	16.3	11.1	4.3	-5.8	-16.1	0.7
Precip. mm	22.1	13.8	18.9	17.3	34.0	58.8	63.6	63.6	51.3	25.1	25.9	24.0	418.4
Growing degree-days	0.0	0.0	0.5	35.3	167.1	299.1	405.6	358.0	179.2	59.3	3.4	0.0	1507.5

¹ Canadian Climate Normals, 1951-1980. Atmospheric Environment Service. Environment Canada

Selected Climate Data¹ for Steinbach

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yr.
Temp. °C	-18.0	-14.7	-6.7	3.9	11.5	16.7	19.5	18.1	12.1	5.8	-4.4	-14.3	2.4
Precip. mm	23.4	13.3	20.8	31.8	63.2	86.1	75.0	65.6	56.0	34.5	19.9	20.0	509.7
Growing degree-days	0.0	0.0	1.8	57.1	208.5	347.3	454.1	403.0	218.0	76.5	4.3	0.0	1771.0

¹ Canadian Climate Normals, 1961-1990. Atmospheric Environment Service. Environment Canada

Surficial Deposits and Landforms

Lying within the Manitoba Plain, this ecoregion is underlain by low relief, flat-lying Palaeozoic limestone rock and is lower and smoother than the Saskatchewan Plain to the west. The surface of the plain has an elevation rang-

ing from about 410 masl near the Manitoba Escarpment at its northwestern extreme to 218 masl at Lake Winnipeg. Its general surface form is that of a level to ridged lake terrace complex.

Selected Climate Data¹ for Swan River

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yr.
Temp. °C	-18.8	-15.1	-7.9	2.5	10.6	16.0	18.5	17.1	10.9	4.7	-6.0	-15.5	1.4
Precip. mm	24.3	17.8	29.7	29.6	46.2	71.9	79.7	63.9	55.3	30.4	24.5	25.5	498.9
Growing degree-days	0.0	0.0	0.6	41.1	186.6	331.1	419.7	374.6	179.9	54.6	2.0	0.0	1590.0

¹ Canadian Climate Normals, 1961-1990. Atmospheric Environment Service. Environment Canada

Much of the Interlake/Westlake section has a distinct, low relief, north to south trending drumlinoid or ridge and swale topographic pattern with slopes that range from 1 to 3 percent. Surface deposits are comprised of extremely calcareous, very stony, water-worked loamy glacial till. The till materials are deep (>30 m) to very shallow (<20 m) over limestone bedrock.

East and southeast of this lowland region, the water-worked till has been smoothed over by thin, discontinuous veneers and blankets of sandy to clayey glaciolacustrine sediments as well as sandy to gravelly beach materials and bouldery near-shore deposits. Till-covered, thick, coarse textured fluvioglacial deposits also occur in places from Birds Hill south to the USA border. Limestone bedrock is at or near the surface of erosional remnants, scarps and drumlinoid ridges.

The ecoregion contains a number of large to very large lakes including lakes Winnipeg, Winnipegosis and Manitoba, as well as all of Waterhen, St. Martin and Red Deer lakes. Beaches marking successively lower water levels of glacial Lake Agassiz wind along the lower slopes of Duck Mountain and Porcupine Hills. The Red River flows through the area from the south into Lake Winnipeg, and the Swan and Red Deer rivers enter this plain from the escarpment in the northwest section of the region.

Soils

Well to imperfectly drained Chernozemic Dark Gray soils are predominant in the ecoregion. Significant inclusions are well to imperfectly drained Chernozemic Black soils, especially in the southern and northwestern parts of the ecoregion. These soils are associated with both the very to extremely calcareous, clayey glaciolacustrine overlays. Eutric Brunisols, shallow Gray Luvisols on till and some glaciolacustrine deposits, Organic Mesisols on the peatlands and peaty phase Humic Gleysols in transitional

areas occupy significant portions of the central and northern sections. The central portion is also characterized by locally widespread, very shallow Eutric Brunisols over limestone bedrock.

Vegetation

A closed cover of trembling aspen of varying quality with secondary quantities of balsam poplar and an understory of mixed herbs and tall shrubs is predominant. In the Interlake, trembling aspen stands are often of poor growth with poorly formed trees, likely due to the extreme calcareousness of the soils. White spruce and balsam fir are the climax species but are not widely represented because of fires. However, they do exhibit moderate to good growth through most of the ecoregion except on very dry sites or sites with very shallow soils. Open stands of medium to tall jack pine occur on dry, sandy sites. Water filled depressions and poorly drained sites are usually covered with sedges, willow, some black spruce and tamarack.

Wildlife

The ecoregion contains extensive habitat for white-tailed deer, black bear, moose, ruffed grouse, beaver, coyote, snowshoe hare and waterfowl. White-tailed deer populations have benefited from the development of arable agriculture which provides a varied habitat for this species.

Land Use

Production of spring wheat, other cereal grains, oilseeds and hay crops dominate the agriculture of the ecoregion on the more suitable glaciolacustrine soils. Native hay and pasture are more prevalent on the stony, glacial till soils of the Interlake and Westlake sections of the plain.

There are six ecodistricts within the Interlake Plain Ecoregion.

Prairies Ecozone

Aspen Parkland Ecoregion

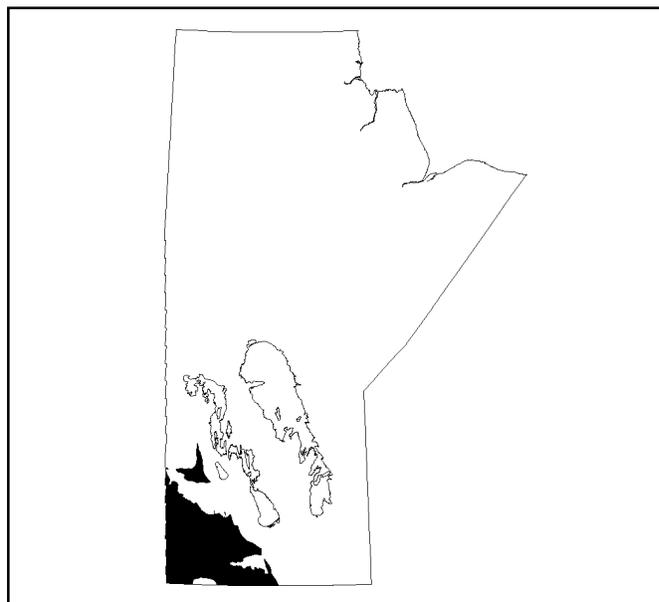
156, 161. Aspen Parkland Ecoregion

In Manitoba, the Aspen Parkland Ecoregion occupies the southwestern corner of the province and a small area nestled between the Riding and Duck mountains. It forms part of the extensive parkland belt between the closed boreal forest cover to the north and northeast and the treeless grasslands to the west. A mosaic of trembling aspen and oak groves and rough fescue grasslands extends in a broad arc from southwestern Manitoba northward through Saskatchewan to its northern apex in north-central Alberta.

Climate

This ecoregion lies in the Transitional Grassland Ecoclimatic Region, which is characterized by a continental climate marked by short, warm summers and long, cold winters. In Manitoba, the mean annual air temperature ranges from 1.2°C to 2.8°C. The average growing season ranges from 173 days in the northern section to 183 days in the southwest. The number of growing degree-days ranges from 1470 to almost 1700 depending on location.

The average annual precipitation ranges from about 440 to 530 mm and varies greatly from year to year. Precipitation is highest during the growing season. Average yearly moisture deficits in Manitoba range from less than 140 mm in north to about 300 mm in the southwestern corner of the province. Poorly drained soils may remain saturated for prolonged periods after snowmelt, but during



the growing season they are usually only saturated for short periods after heavy rains.

This ecoregion has a subhumid, cool to moderately cool Boreal soil climate.

The data from the three stations shown below illustrates the range of climatic conditions found in the ecoregion.

Selected Climate Data¹ for Gilbert Plains

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yr.
Temp. °C	-18.7	-15.8	-8.6	2.1	10.4	15.8	18.2	16.8	10.8	4.5	-6.0	-15.7	1.2
Precip. mm	18.9	17.0	30.4	33.8	48.4	71.9	70.8	67.2	60.0	29.8	23.2	25.5	497.0
Growing degree-days	0.0	0.0	0.8	41.2	185.0	325.0	409.7	366.6	181.4	56.3	2.5	0.0	1569.0

¹ Canadian Climate Normals, 1961-1990. Atmospheric Environment Service, Environment Canada.

Selected Climate Data¹ for Brandon CDA

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yr.
Temp. °C	-18.0	-15.0	-7.1	-3.7	11.4	17.7	19.2	18.0	11.8	5.4	-5.1	-15.0	2.2
Precip. mm	20.6	19.2	22.9	37.5	48.6	70.4	71.6	70.9	50.5	23.6	16.2	20.7	473.0
Growing degree-days	0.0	0.0	2.1	52.1	207.0	351.0	442.0	400.0	209.0	68.4	2.8	0.0	1733.0

¹ Canadian Climate Normals, 1961-1990. Atmospheric Environment Service, Environment Canada.

Selected Climate Data¹ for Morden CDA

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yr.
Temp. °C	-16.0	-12.8	-5.5	4.5	12.3	17.6	20.4	19.1	13.2	6.8	-3.5	-12.7	3.6
Precip. mm	20.1	18.4	28.1	41.8	65.7	78.4	70.3	67.7	51.6	33.5	22.2	22.6	520.3
Growing degree-days	0.0	0.0	2.7	64.3	233.6	377.3	477.8	437.9	249.0	97.1	8.2	0.0	1948.0

¹ Canadian Climate Normals, 1961-1990. Atmospheric Environment Service, Environment Canada.

Surficial Deposits and Landforms

In Manitoba, the eastern boundary of this ecoregion is marked by the Manitoba Escarpment that forms the dip slope of the Saskatchewan Plain. Lower and smoother than the Alberta Plain to the west, it is composed of Upper Cretaceous shaly sediments and is covered almost entirely by glacial deposits. Elevations range from 320 masl near the Manitoba Escarpment to about 600 masl in the hilly uplands to the west. Its surface deposits range from kettled to gently undulating loamy glacial till, to level to gently undulating sandy glaciofluvial and glaciolacustrine deposits. Areas with eolian dunes contain some of the roughest topography of the region with slopes that range to 30 percent and occasionally steeper. Associated with the rougher morainal deposits are a large number of small lakes, ponds and sloughs occupying shallow depressions. The larger flat basins are the bottoms of former glacial lakes.

The ecoregion slopes gently eastward and is drained by the Souris, Assiniboine, Qu'Appelle and Pembina rivers. These are undersized streams flowing in deeply incised broad valleys carved by glacial meltwaters.

Soils

Well drained Chernozemic Black soils developed on relatively stone-free to moderately and very strongly calcareous glacial till are dominant in the region. Significant associated soils include excessively drained sandy Regosols and poorly drained humic Gleysols.

Vegetation

In Manitoba, trembling aspen and shrubs occur on moist sites, bur oak and grassland communities occupy increasingly drier sites. Dominant grasses include fescues, wheat grasses, June grass and Kentucky bluegrass. A great variety of deciduous shrubs and herbs is also characteristic. Poorly drained sites support slough grasses, marsh reed grass, sedges, cattails and shrubby willows.

Wildlife

The wildlife has been affected by agricultural development. Grassland and wetland habitat loss has affected both the distribution of species and populations. In the Manitoba portion of the ecoregion, wapiti is largely confined to the Spruce Woods area, while pronghorn antelope is sighted only very rarely. On the other hand, white-tailed deer are widespread, especially in areas which provide both grazing and cover habitat. Coyote and red fox are widespread throughout the area, as are ground squirrel, cottontail rabbit, hare, striped skunk, redback vole and deer mice.

Many bird species are still found throughout this ecoregion. Various raptors, such ferruginous hawk, sparrow hawk and red-tailed hawk are still fairly common. Other birds include mourning dove, black-billed magpie, red-winged blackbird, killdeer and meadowlark. Various species of ducks are found in wetlands. Red-sided and western plains garter snakes and various frogs are also common.

Land Use

Production of spring wheat and other cereal grains by continuous cropping and dryland methods dominate the agriculture of the region. Oilseeds and hay are also grown. Potato production has increased dramatically in Manitoba, especially on sandy soils where irrigation is feasible.

There are twelve ecodistricts within the Aspen Parkland Ecoregion in Manitoba.

Prairies Ecozone

Lake Manitoba Plain Ecoregion

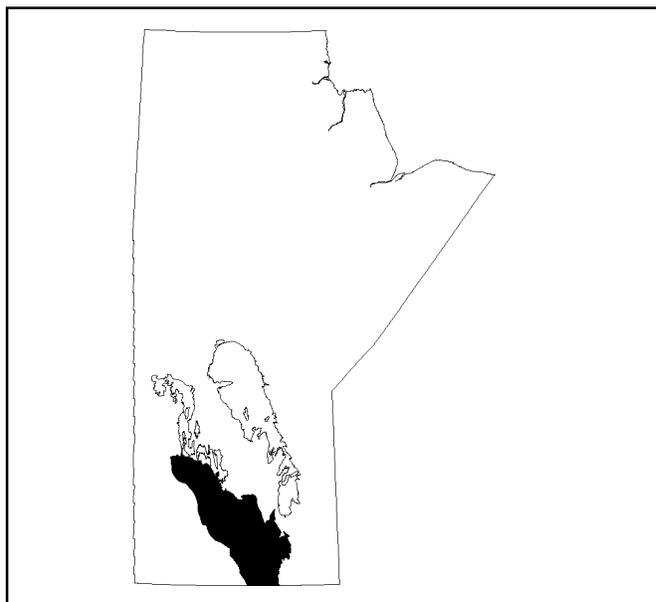
162. Lake Manitoba Plain Ecoregion

The Lake Manitoba Plain Ecoregion stretches northwestward from the International Boundary to Lake Dauphin in southern Manitoba. The Manitoba Escarpment marks its western boundary. Before settlement this ecoregion was a mosaic of trembling aspen/oak groves and rough fescue grasslands.

Climate

This ecoregion forms a portion of the extensive Grassland Transition Ecoclimatic Region which extends in a broad arc from southern Manitoba northward through Saskatchewan to its most northern extent in central Alberta. It is one of the warmest and most humid ecoregions on the Prairies. Short, warm summers and long, cold winters are characteristic of the regional climate. The mean annual average air temperature ranges from 1.7°C in the north to 3.3°C along the Canada-United States border. The mean annual temperatures vary from 1.8°C to 3.1°C, with mean summer temperatures around 16°C and the mean winter temperatures of about -12.5°C.

The mean annual precipitation ranges from 485 to 540 mm and varies greatly from year to year. Precipitation is highest during the growing season. Mean yearly moisture deficits range from 100 to 210 mm. About one-quarter of the precipitation falls as snow. The average growing sea-



son varies from 177 to 187 days, and the number of growing degree-days ranges from 1550 to about 1840.

This ecoregion has a cool, subhumid, Boreal to moderately cold, subhumid to humid, Cryoboreal soil climate.

The climate data from the stations at Dauphin and Winnipeg illustrates the range of climate conditions encountered.

Selected Climate Data¹ for Dauphin

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yr.
Temp. °C	-18.0	-14.9	-7.7	2.6	10.5	16.0	18.6	17.3	11.3	5.3	-5.3	-14.9	1.7
Precip. mm	19.3	16.1	25.7	31.7	52.7	77.5	69.3	63.3	62.0	31.2	22.7	20.5	491.9
Growing degree-days	0.0	0.0	1.4	44.4	184.2	330.7	422.1	380.0	195.6	68.3	4.8	0.0	1631.0

Selected Climate Data¹ for Winnipeg

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yr.
Temp. °C	-18.3	-15.1	-7.0	3.8	11.6	16.9	19.8	18.3	12.4	5.7	-4.7	-14.6	2.4
Precip. mm	19.3	14.8	23.1	35.9	59.8	83.8	72.0	75.3	51.3	29.5	21.2	18.6	504.4
Growing degree-days	0.0	0.0	1.8	54.1	214.0	357.8	457.6	413.6	224.0	74.9	4.3	0.0	1802.0

¹ Canadian Climate Normals, 1961-1990. Atmospheric Environment Service, Environment Canada.

Surficial Deposits, Landforms, Soils

This ecoregion is situated in the Manitoba Plain, the lowest and most level of the three prairie steps. It is underlain by low-relief, flat-lying Paleozoic limestone bedrock and is covered by glacial till and by silts and clays deposited by glacial Lake Agassiz. Lake Dauphin and the southern half of Lake Manitoba are part of this ecoregion. Lower and smoother than the Saskatchewan Plain to the west, the plain has an elevation ranging from about 410 masl near the Manitoba Escarpment to about 240 masl near Lake Winnipeg.

The northern half has a distinct, north-south trending, drumlinoid or ridge and swale topographic pattern. The fluted, and often grooved, ridges are about 400 to 800 m wide and are separated by broad swales or depressions up to 800 m wide. Following the retreat of the continental glacier, the surface of this ridged till plain was modified by wave action and by icebergs scouring the ridges as glacial Lake Agassiz retreated. Wave action has resulted in local textural differentiation; the ridges are moderately coarse textured, as well as cobbly and gravelly, and the depressions are finer textured. Iceberg scouring has created strongly intersecting micro-grooves or flutes that are usually curvi-linear in shape.

The southern half of the lowland has been smoothed by thick, generally varved deposits of clays and silts of glacial Lake Agassiz. Relic beaches wind along the lower part of the Manitoba Escarpment, marking successively lower water levels or stages of Lake Agassiz.

Soils

The soils of the ecoregion are dominantly Black Chernozemic soils developed on loam and clay-loam till materials, and Humic Vertisolic, Black Chernozemic and Gleysolic soils developed on clay glaciolacustrine sediments. Areas of Black Chernozemic soils are also present on sandy-loam and sandy glaciolacustrine sediments, and on sandy-loam to clay-loam alluvial materials.

Some of the most productive agricultural soils in Manitoba are found in this ecoregion. The soils associated with the fine-textured glaciolacustrine sediments are especially suited to a wide variety of crops including cereals, oilseeds and pulses.

Vegetation

In Manitoba, trembling aspen and shrubs occur on moist sites, while bur oak and grassland communities occupy increasingly drier sites. Dominant grasses include fescue grasses, wheat grasses, June grass and Kentucky bluegrass. A wide variety of deciduous shrubs and herbs are abundant. Poorly drained sites support slough grasses, marsh reed grass, sedges, cat-tails, sedge and shrubby willow.

Wildlife

The region includes habitat for white-tailed deer, coyote, rabbits, ground squirrels, and waterfowl.

Land use

Production of spring wheat and other cereal grains by continuous cropping and dryland methods dominates the agriculture of the ecoregion. Oilseeds and hay are more prevalent in the northern section of the plain.

There are twelve ecodistricts within the Lake Manitoba Plain Ecoregion in Manitoba.

Hudson Plains Ecozone

Coastal Hudson Bay Lowland Ecoregion

215. Coastal Hudson Bay Lowland Ecoregion

This ecoregion straddles the Ontario border and encompasses the flat, wet lowlands that border Hudson Bay in northeastern Manitoba and northwestern Ontario. Within Manitoba, this portion of the Subarctic forms part of a zone of transition between the tundra region to the north and the boreal forest to the south. The latitudinal limits of tree growth (the tree line) is reached in this ecoregion.

Climate

This ecoregion is part of the very extensive High Subarctic Ecoclimatic Region which extends from the highlands of Newfoundland and Labrador, across northern Quebec, Ontario, Manitoba and Saskatchewan into Nunavit and the Northwest Territories and to the Yukon-Alaska border. The climate is marked by short, cool summers and long, very cold winters. The mean annual air temperature ranges from about -7.1°C to -2.6°C . The average growing season varies from 100 to 143 days, and the number of growing degree-days ranges from about 500 to 1000.

The average annual precipitation ranges from about 400 mm to over 600 mm and varies greatly from year to year. About two-fifths to one-third of the precipitation falls as snow. Precipitation is highest during the growing season. Yearly moisture deficits average from 15 to 20 mm.

Selected Climate Data¹ for Churchill Airport

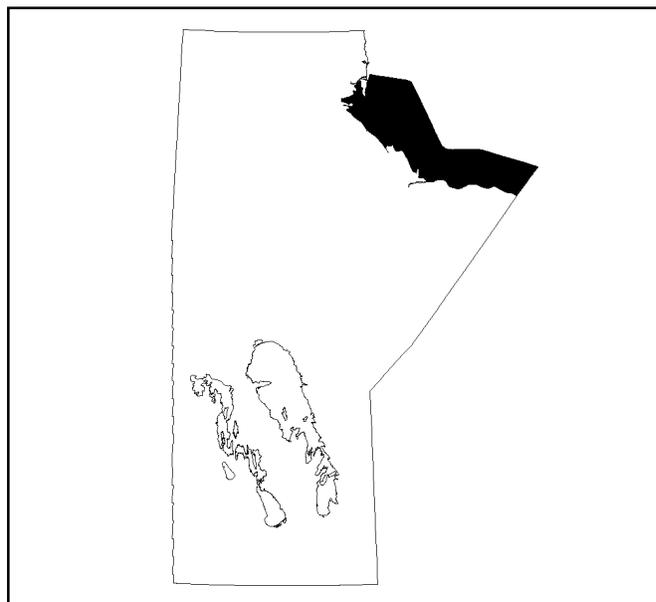
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yr.
Temp. $^{\circ}\text{C}$	-26.9	-25.4	-20.2	-10.0	-1.1	6.1	11.8	11.3	5.5	-1.4	-12.5	-22.7	-7.1
Precip. mm	17.3	12.8	18.3	22.6	30.5	44.5	50.7	60.5	52.6	46.5	35.5	19.7	412.0
Growing degree-days	0.0	0.0	0.0	1.6	14.4	78.0	215.0	195.0	53.7	4.3	0.0	0.0	562.0

¹ Canadian Climate Normals, 1961-1990, Atmospheric Environment Service, Environment Canada.

Surficial deposits and landforms

In Manitoba, the Coastal Hudson Bay Lowland Ecoregion is underlain by flat-lying marine sediments. It is a low, peat-covered plain with subdued glacial features and areas of raised sandy beaches bordering Hudson Bay. Permafrost is widespread and almost continuous in the peatlands in the northwest sector.

The relief of the lowland has been considerably affected by post-glacial marine submergence and isostatic rebound of the land surface. Raised beaches, especially well de-



The region has a very cold, humid Subarctic soil climate. The only climate station in the ecoregion is at Churchill Airport. Although the station is located in the most northerly section of the ecoregion, the data is relevant to the ecoregion as a whole, although more so in the north and along the coast than in southern and inland areas.

veloped and numerous east of the Nelson River, present a striking pattern of parallel lines separated by peat-filled depressions. As the distance from the Hudson Bay coast increases, the raised beaches support increasing numbers of black spruce, and the peat deposits increase in depth. Some distance from the coast, most low-level beaches and calcareous loamy till deposits overlain by silty marine veneers and blankets are covered by peat.

Extensive mudflats are exposed along the coast at low tide. Marine deposits are thickest in lower-lying river valleys and are partially exposed in eroded valley walls. The lowland slopes very gently northeastward and elevations range from about 150 masl along the pronounced Tyrrell Sea beach along the northwest boundary, to sea level at Hudson Bay.

Numerous small unconnected lakes and undrained ponds are characteristic. The Churchill River flows through the northern section, while the Nelson and Hayes rivers flow for a short distance through the ecoregion before emptying into Hudson Bay. Most drainage is provided by the numerous creeks draining directly into Hudson Bay.

Soils

Organic Cryosols dominate and occur on polygonal peat plateau and peat plateau bogs. They are comprised mainly of fibric sphagnum moss peat over sedge peat.

Organic Mesisols and Organic Cryosols developed on moderately decomposed sedge and moss peat associated with horizontal fens are co-dominant. Other significant soils include imperfectly to well drained Regosolic soils found on raised sandy beaches and poorly drained saline Rego Gleysols on silty and clayey mudflats along the coastal shoreline.

The age of beach materials increases with distance from the coast as does the degree of soil development. Near the coast, well drained beaches have Regosolic soils, while farther inland, Brunisolic soils have developed on these beach materials. Therefore, Eutric Brunisols and some Turbic and Static Cryosols are found on older beaches, and on glaciofluvial deposits and till materials.

Vegetation

Open, very stunted stands of black spruce and tamarack, with secondary quantities of white spruce and ground cover of dwarf birch, willow, northern Labrador tea, cotton-grass, lichen and moss are predominant.

Polygonal peat plateaus, widespread in the northern section, lack tree cover. The more recently emerged area along the coast is also devoid of trees or tall shrubs

Where trees are present, cover is generally patchy. Drier sites (especially older beaches) can be dominated by open

stands of white spruce. Farther inland, black spruce dominates on drier sites, with ground covers of rock cranberry, bearberry, crowberry, dwarf birch, moss and lichen. Poorly drained sites usually support tussocks of sedge, cotton grass, brown mosses and sphagnum moss. Balsam poplar, white spruce and paper birch are common along rivers and associated alluvial sediments.

Low-shrub tundra, usually dwarf birch and willow, is common on upland sites.

Wildlife

The polar bear is one of the characteristic mammals of the ecozone and it is common along the coast. The polar bears of the South Coast Lowland population spend July to November on land. They remain along the coast or wander farther inland seeking solace from the summer warmth by excavating dens to the permafrost table in peat banks along creeks and lakes. Pregnant females spend additional time in maternity dens until the cubs are old enough to move out onto the ice in March to April. The bears are common from Cape Churchill to Cape Henrietta Maria.

Beluga whales occur in fairly large numbers in coastal waters during the summer, and are especially common in the area of the mouth of the Churchill River. The region also provides habitat for woodland caribou, arctic fox, osprey, and especially waterfowl, such as snow and Canada geese, and shorebirds.

Land use

Land uses include local trapping and hunting and some water-oriented recreation. Some of these activities are associated with lodges located along the rivers traversing the northern area.

Churchill is connected via rail and air to the rest of Manitoba. Economic activity associated with the harbour in Churchill revolves around shipping grain to European destinations. Important economic activity is also connected with tourism. Significant numbers of people visit the town to participate in polar bear, beluga whale and bird viewing. The rocket range added economic activity in the past, but is not used at present.

There are three ecodistricts within the Coastal Hudson Bay Lowland Ecoregion in Manitoba.

Hudson Plains Ecozone

Hudson Bay Lowland Ecoregion

216. Hudson Bay Lowland Ecoregion

The Hudson Bay Lowland Ecoregion is a wetland-dominated ecoregion extending eastward from the Churchill River in northeastern Manitoba to James Bay in northern Ontario.

Climate

The ecoregion is part of the low Subarctic Ecoclimatic Region which extends westward from the highlands of Newfoundland and Labrador to Nunavit and the Northwest Territories and to the Yukon-Alaska border. It has a climate marked by short, cool summers and long, very cold winters. The mean annual air temperature varies from approximately -4.4°C to -2.5°C . The average growing season varies from 127 to 145 days, with the number of growing degree-days ranging from about 850 to 1000.

The average annual precipitation varies from about 500 to 700 mm, and can vary greatly from year to year. About one-third falls as snow. Precipitation is highest during the growing season. Yearly average moisture deficits range from about 20 to 40 mm.

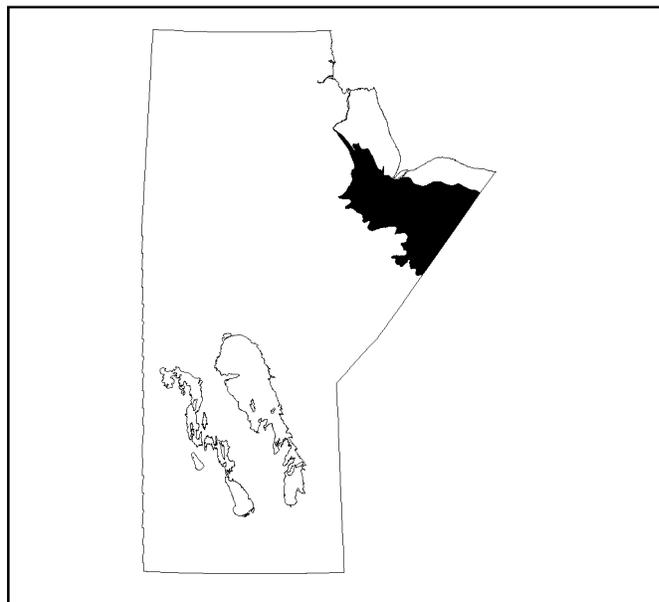
The ecoregion has a very cold, humid, Cryoboreal soil climate.

There are no climate stations in the ecoregion. Data from Churchill Airport and Moosonee (215. Coastal Hudson Bay Lowland Ecoregion) is to some extent relevant.

Surficial deposits and landforms

For the most part, the ecoregion consists of peatlands overlying mostly marine sediments which in turn rest on calcareous till which outcrops occasionally. The underlying bedrock is a flat, low relief Paleozoic limestone. The region borders on the south and west on the Severn and Kazan uplands.

The relief of this lowland has been considerably affected by post-glacial marine submergence and isostatic rebound of the land surface. Permafrost is widespread but discontinuous, and largely associated with organic deposits. Peat plateau bogs, patterned bogs and horizontal and patterned fens overly clayey glaciolacustrine and marine sediments. Veneer bogs cover part or most of the subdued, loamy till uplands.



The Manitoba portion of the ecoregion slopes very gently northward from about 150 masl to 30 masl. Numerous very small, usually unconnected lakes and ponds are characteristic. The Nelson, Hayes and Gods rivers are the primary drainage ways traversing the ecoregion in Manitoba and the Severn and Winisk rivers are the primary rivers draining into Hudson Bay in Ontario. However, most of the ecoregion is drained by the many creeks flowing through, and originating in the ecoregion.

Soils

The dominant soils are organic soils, most of which are deep to very deep, and a large portion of them are permanently frozen. Thus a dominant group of soils in the region is a complex of Organic Mesisols and Organic Cryosols.

Typic (deep) Mesisolic, and to some extent Fibrisolic, Organic soils that have developed on the deep sedge and brown moss peat associated with horizontal and northern ribbed fens are widespread. Shallow Organic Cryosols and Terric (shallow) Mesisolic soils are associated with mesic and fibric woody peat of veneer bogs. Deeper Organic Cryosols are associated with fibric sphagnum peat overlying sedge and brown moss peat which composes the peat deposits of peat plateau bogs and palsa bogs. These are predominant in the Manitoba portion of the ecoregion.

Significant inclusions of Eutric Brunisolic soils are found on the few exposed prominent fluvio-glacial deposits, beaches and calcareous, loamy till deposits.

Vegetation

This ecoregion is part of the transition from the closed boreal forests to the south and the tundra to the north.

The closed cover of typical boreal forest gives way to open stands of low black spruce, with understories of dwarf birch, Labrador tea, lichen and moss. This occurs in part because of climatic constraints, and in part because of the predominance of organic terrain.

Drier mineral sites generally support taller and more closed stands of black spruce, white spruce and paper birch, with a discontinuous low shrub cover of bearberry, bog cranberry and other evergreen species and extensive lichen and moss groundcover typical of the area. White spruce, birch and aspen also occur along rivers and in river valleys.

Bog - fen complexes dominate this poorly drained, peat-filled lowland in Manitoba. Bogs support low black spruce, Labrador tea, blueberry, bog rosemary and cloudberry, and sphagnum moss and lichen vegetation. Fens have a cover of sedge, brown mosses, swamp birch and occasionally stunted tamarack.

Wildlife

The ecoregion provides wildlife habitat for woodland caribou and moose, snowshoe hare, spruce grouse, osprey, waterfowl including ducks, geese, swans, and other birds. Polar bears wander in from the coast along the numerous creeks in search of denning areas.

Land use

Fishing, trapping and hunting, and water-oriented recreation and tourism are the dominant uses of land in this ecoregion.

There are three ecodistricts within the Hudson Bay Lowland Ecoregion in Manitoba.