

Eastern Boreal Forest



General Description

The *Eastern Boreal Forest* zone covers an area of approximately 1,125,000 km² in eastern Canada. It extends from southeastern Manitoba to insular Newfoundland, and includes the islands in the Gulf of St. Lawrence and the highest elevations of the Gaspé Peninsula and Cape Breton Island. The climate of the eastern part of the zone is significantly influenced by maritime effects of the Atlantic Ocean, creating a distinct ecological gradient from west to east. Landcover is dominated by forests, but numerous lakes, rivers and wetlands contribute to a complex landscape mosaic.

Vegetation

Productive closed forests dominate most upland sites, although open forests and woodlands are commonly associated with very dry sites or repeated severe disturbances. Forest canopies can be dominated by evergreen coniferous, cold-deciduous broad-leaved or a mixture of conifer – broad-leaved species. Understory structure varies from dense to sparse, and is usually dominated by cold-deciduous broad-leaved shrubs, conifer regeneration, perennial herbs and bryophytes. A continuous feathermoss ground layer is characteristic of these forests, especially under conifer canopies.

Stand-replacing fires and insect outbreaks are the most widespread forms of natural disturbance, creating a diverse landscape mosaic comprising forest stands of varying age and composition. Following fire, individual stands are typically even-aged with a simple structure. The fire regime reflects

the climatic humidity gradient, with longer fire cycles in the more humid eastern portion of the zone. In these areas, insect outbreaks typically play a greater role in forest dynamics, creating a multi-aged, multi-storied stand structure. Forest harvesting, other industrial activities (e.g., mining), agricultural conversion and settlement clearance are also significant disturbance factors in some areas.

Dominant tree species include balsam fir (*Abies balsamea*), black spruce (*Picea mariana*), paper birch (*Betula papyrifera*), trembling aspen (*Populus tremuloides*), white spruce (*Picea glauca*) and jack pine (*Pinus banksiana*). Species dominance patterns vary from west to east. Generally, black spruce, jack pine and trembling aspen are more prevalent in Manitoba, Ontario and western Quebec, where fire cycles are shorter, while balsam fir and paper birch dominate in the eastern portion of the zone. Balsam poplar (*Populus balsamifera*) occurs on moist, nutrient-rich sites. Alluvial forests dominated by balsam poplar, black ash (*Fraxinus nigra*), eastern white cedar (*Thuja occidentalis*), paper birch and white spruce occur on stable floodplain terraces.

Understories vary from dense, species-rich shrub and herb conditions to a continuous feathermoss or lichen ground cover with only a few erect vascular plants. Common understory species include common Labrador tea (*Rhododendron groenlandicum*), velvet-leaved blueberry (*Vaccinium myrtilloides*), early lowbush blueberry (*V. angustifolium*), mountain ashes (*Sorbus* spp.), mountain maple (*Acer spicatum*), creeping snowberry (*Gaultheria hispidula*), bunchberry (*Cornus canadensis*), yellow clintonia (*Clintonia borealis*), northern starflower

(*Lysimachia borealis*), wild sarsaparilla (*Aralia nudicaulis*) and red-stemmed feathermoss (*Pleurozium schreberi*). In the eastern part of the zone, sheep laurel (*Kalmia angustifolia*) is a prominent shrub species on nutrient-poor sites.

Wetlands are common and often extensive in poorly drained locations and in areas with a very humid climate. On level terrain and in maritime-influenced areas of eastern Quebec and Newfoundland, peat accumulation also occurs on upland sites. Nutrient-poor bogs, fens and swamps are the predominant wetland classes.

Bogs, poor fens and poor swamps include common Labrador tea (*Rhododendron groenlandicum*), leatherleaf (*Chamaedaphne calyculata*), velvet-leaved and early lowbush blueberries, cranberries (*Vaccinium oxycoccus*, *V. microcarpon*, *V. macrocarpon*), pale bog laurel (*Kalmia polifolia*), cloudberry (*Rubus chamaemorus*) and glaucous-leaved bog rosemary (*Andromeda polifolia* var. *latifolia*). Black spruce and tamarack (*Larix laricina*) are the main tree species, occurring in stunted form on the poorest sites. Peat mosses (*Sphagnum* spp.) dominate the moss layer, with red-stemmed feathermoss and lichens on the tops of hummocks.

Treed swamps with richer nutrient status are dominated by balsam poplar, black ash, eastern white cedar, white birch or white spruce. Shrub swamps and annually active floodplains include speckled alder (*Alnus incana* ssp. *rugosa*), mountain holly (*Ilex mucronata*) and a variety of willow species (e.g. Bebb's willow [*Salix bebbiana*], satiny willow [*S. pellita*], tea-leaved willow [*S. planifolia*]).

Broad-leaved cattail (*Typha latifolia*) and hard-stemmed bulrush (*Schoenoplectus acutus*) marshes occur on the margins of shallow water bodies. Shallow marshes and wetter fens are dominated by sedges (e.g., water sedge [*Carex aquatilis*], mud sedge (*C. limosa*)), common spikerush (*Eleocharis palustris*), water horsetail (*Equisetum fluviatile*), bluejoint reedgrass (*Calamagrostis canadensis*) or northern reedgrass (*C. stricta* ssp. *inexpansa*). Where water tables fluctuate and some root zone drying occurs during the growing season, fens include bog birch (*Betula pumila*), willows (e.g., bog willow [*Salix pedicellaris*]) and stunted tamarack. Brown mosses such as ribbed bog moss (*Aulacomnium palustre*), golden fuzzy fen moss (*Tomentypnum nitens*) and

hook mosses (*Drepanocladus* spp.) are usually dominant between *Sphagnum* hummocks.

Upland grasslands and shrublands are rare on the landscape, other than immediately following forest removal and on some very dry sites. In the eastern part of the zone, shrublands dominated by sheep laurel may develop on formerly forested sites when tree regeneration fails.

Climate

The *Eastern Boreal Forest* zone occurs within the mostly humid and continental, boreal macroclimate of eastern Canada, characterized by long, cold winters and short, cool to moderately warm summers. Maritime influences become pronounced in the eastern part of the zone, and some coastal areas of Newfoundland, Nova Scotia and the Quebec North Shore have hypermaritime climates with persistent fog and cloud. These areas experience cooler summers, milder winters and higher year-round precipitation. In otherwise temperate parts of Quebec and the Maritime Provinces, boreal climates occur at the highest elevations.

Mean annual temperatures vary from approximately 0.7°C in more continental parts of the zone to >3.5°C in areas near the Atlantic Ocean. Temperature extremes are moderated in maritime locations. The growing season averages about 1300 growing degree days above 5°C (GDD), with the longest growing season (approximately 1600 GDD) in southeastern Manitoba and northwestern Ontario. Mean annual precipitation generally follows a strong west to east gradient, increasing from approximately 600 mm near the Manitoba border, to 825 mm in northeastern Ontario and western Quebec, to 980 mm in central and eastern Quebec and Labrador, to >1800 mm in parts of Cape Breton Island and insular Newfoundland. Rainfall significantly exceeds snowfall, except at higher elevations in the eastern portion of the zone where much of the overall annual precipitation falls as snow.

Physiography, Geology, Topography, Soils and Land Cover

This zone occurs primarily in the James and Laurentian physiographic regions of the east-central Precambrian Shield; it also occupies the southeastern portion of the Hudson region of the Shield. South of the Shield, in the Appalachian physiographic region, the zone occurs on insular Newfoundland as well as at higher elevations of the Notre Dame Mountains and Chaleur Uplands of the Gaspé Peninsula, and of the Cape Breton Island highlands. Boreal conditions occur at elevations approximately >400 mASL in Gaspésie and, on Cape Breton Island approximately >350 mASL. In the St. Lawrence Lowlands physiographic province, this zone includes Anticosti Island, the Magdalen Islands and other islands of the Gulf of St. Lawrence.

Most of the Shield landscapes in Ontario and western Quebec comprise rolling terrain containing numerous wetlands and lakes, with elevations largely below 500 mASL and local relief rarely exceeding 100 m. However, in the Laurentian physiographic region of Quebec and Labrador, the topography is considerably more rugged and dissected, with elevations up to 1000 mASL. Here, areas approximately >900 mASL (>600 mASL for the Mealy Mountains) are in the *Eastern Alpine Tundra* zone. The geology consists of Precambrian sedimentary and crystalline rocks. On the Hudson Bay Lowland, Paleozoic carbonate-rich strata overlie the Precambrian rocks creating a level plain with low relief and extensive wetlands.

The Appalachian physiographic region is more diverse, with many subdivisions. Highland and mountainous areas on the Gaspé Peninsula, Cape Breton Island and western Newfoundland are generally rugged, often deeply dissected plateaux with steep slopes, developed in Precambrian or Paleozoic rocks. Subalpine transition to treeline begins at approximately 1000-1150 mASL in the Chic-Choc and McGerrigle Mountains of Gaspésie; in western Newfoundland, the subalpine begins at about 500-650 mASL. The central and northern parts

of Newfoundland consist of low elevation, generally rolling terrain with low relief.

The entire zone was affected by late Pleistocene glaciation, and surficial landscape expression is dominated by glacial features and bedrock-controlled terrain. The predominant parent material is glacial till, often occurring as shallow veneers overlying bedrock on upland sites while deeper deposits fill landscape depressions. On the Shield, coarse-textured glaciofluvial materials (e.g., eskers) are common. An extensive area of glaciolacustrine sediments occurs in the Clay Belt of northeastern Ontario and western Quebec. Mineral soils are typically Podzols, Brunisols and Luvisols, with Gleysols occurring on moist, poorly drained sites. Peatlands dominated by Organic soils are common and often extensive in poorly drained areas; peat depths can be >4 m. Paludification may occur on cool imperfectly drained sites, especially in the Clay Belt and on insular Newfoundland. Discontinuous permafrost occurs sporadically at the northern edge of the zone. Numerous water bodies are a characteristic of the landscape.

Notes

The *Eastern Boreal Forest* zone is mostly bounded to the north by the *Northern Boreal Woodland*, except in northwestern Ontario and southeastern Manitoba where it borders the *West-Central Boreal Forest*. Over the majority of its extent, the southern boundary is with the *Eastern Temperate Mixed Forest*, except on insular Newfoundland where the southern boundary is with the *Atlantic Maritime Heathland*. In some areas of Quebec, insular Newfoundland and Labrador, at higher elevations it adjoins the *Eastern Alpine Tundra*.