Atlantic Maritime Heathland

General Description

The *Atlantic Maritime Heathland* zone consists of two disjunct geographic subunits in insular Newfoundland and eastern Labrador, where vegetation conditions similar to those in arctic-alpine environments develop at low latitudes and low elevations. Altogether, the zone covers an area of approximately 43,000 km². The northern subunit includes low elevation coastal areas at the northern tip of Newfoundland and on the eastern coast of Labrador. The larger southern subunit includes most of the southern and eastern parts of insular Newfoundland, extending up to 100 km inland from the south coast. Strong winds, fog and low summer temperatures characterize the climate. Landcover is a mosaic of shrublands, krummholtz, peatlands and low tundra-like vegetation. Discontinuous permafrost occurs sporadically.

Vegetation

Vegetation is distributed according to micro-environmental conditions; cover can be sparse in harsh environments, grading to continuous on favourable sites. Near the coast, upland vegetation is characterized by low and dwarf shrubs. Trees are either absent from coastal areas or occur as patches of krummholtz (wind-stunted trees) on sites where snowbeds establish. Inland or in sheltered coastal valleys, scrubby coniferous forests can be very dense. Bedrock and surficial geology, as well as permafrost action, affect vegetation distribution and species composition, especially along the coastlines of the Strait of Belle Isle.

On dry to moist acidic mineral substrates with wind exposure and minimal winter snow cover, vegetation is dominated by pink and black crowberries (*Empetrum eamesii; E. nigrum*), together with Lapland diapensia (*Diapensia lapponica*), alpine azalea (*Kalmia procumbens*), moss campion (*Silene acaulis*), alpine bearberry (*Arctous alpina*), mountain cranberry (*Vaccinium vitis-idaea*) and alpine bilberry (*V. uliginosum*). Prostrate occurrences of common Labrador tea (*Rhododendron groenlandicum*), glandular birch (*Betula glandulosa*), black spruce (*Picea mariana*) and cloudberry (*Rubus chamaemorus*) intertwine in the crowberry mat. Various lichen species form small patches on these sites, including reindeer lichens (*Cladina* spp.), Easter foam lichen (*Stereocaulon paschale*), crinkled snow lichen (*Flavocetraria nivalis*), globe ball lichen (*Sphaerophorus globosus*), true Iceland lichen (*Cetraria islandica*), green witch's hair lichen (*Alectoria ochroleuca*) and grey witch's hair lichen (*Gowardia nigricans*). Bryophytes are generally uncommon in these harsh conditions, however on hypermaritime extremities of the Burin and Avalon Peninsulas, dense carpets of hoary rock moss (*Racomitrium lanuginosum*) occur.

Along the coastlines of the Strait of Belle Isle, especially on the Newfoundland side, the combination of cold climate and calcareous parent materials favours a unique assemblage of species for this latitude and elevation. Species include entire-

leaved mountain avens (*Dryas integrifolia*), Lapland rosebay (*Rhododendron lapponicum*), purple mountain saxifrage (*Saxifraga oppositifolia*), yellow mountain saxifrage (*S. aizoides*), white mountain saxifrage (*S. aizoon*) and red-tipped lousewort (*Pedicularis flammea*). Snowbed communities are dominated by American cow parsnip (*Heracleum maximum*), purple-stemmed angelica (*Angelica atropurpurea*) and Canada burnet (*Sanguisorba canadensis*). Soapberry (*Shepherdia canadensis*), net-veined willow (*Salix reticulata*), beautiful willow (*S. glauca* var. *cordifolia*), hairy willow (*S. vestita*), Lake Huron tansy (*Tanacetum bipinnatum* ssp. *huronense),* dwarf scouring-rush (*Equisetum scirpoides*), long-stalked starwort (*Stellaria longipes*) and Rand's eyebright (*Euphrasia randii*) occur in small patches.

In sheltered coastal valleys and inland, stunted forests develop. In the northern subunit, the dominant tree species is black spruce (*Picea mariana*); in the southern subunit, balsam fir (*Abies balsamea*) dominates. Tamarack (*Larix laricina*), white spruce (*P. glauca*) and paper birch (*Betula papyrifera*) are occasional associates. The understory includes early lowbush blueberry (*Vaccinium angustifolium*), common Labrador tea, black crowberry, northern comandra (*Geocaulon lividum*), cloudberry, goldthread (*Coptis trifolia*), wild lily-of-the-valley (*Maianthemum canadense*), bunchberry (*Cornus canadensis*), northern starflower (*Lysimachia borealis*), creeping snowberry (*Gaultheria hispidula*) and twinflower (*Linnaea borealis*). The ground layer consists of a lush feathermoss carpet dominated by red-stemmed feathermoss (*Pleurozium schreberi*) and, in the southern subunit, stairstep moss (*Hylocomium splendens*). In the southern subunit, due to the high frequency of fog, forests are characterized by an abundance of pendulous epiphytic lichens, including Methuselah's beard lichen (*Usnea longissima*), burred horsehair lichen (*Bryoria furcellata*) and common witch's hair lichen (*Alectoria sarmentosa*).

In the southern subunit, where disturbance has removed forests and tree regeneration has failed, dense low shrub heaths dominated by sheep laurel (*Kalmia angustifolia*) cover extensive areas. Rhodora (*Rhododendron canadense*), common Labrador tea, early lowbush blueberry and, in moist depressions, mountain holly (*Ilex mucronata*) and wild raisin (*Viburnum nudum* var. *cassinoides*) are common associates. Red-stemmed feathermoss, stairstep moss and large patches of reindeer lichens dominate the ground layer.

Excessive precipitation in this low-relief landscape has promoted the development of extensive peatlands in both the northern and southern subunits. Shallow fens dominate inland portions of the zone on the northern tip of Newfoundland. Shrubby cinquefoil (*Dasiphora fruticosa*), bog birch (*Betula pumila*), Newfoundland dwarf birch (*B. michauxii*), sweet gale (*Myrica gale*) and creeping juniper (*Juniperus horizontalis*) are the main shrub species. Forbs include alpine meadow-rue (*Thalictrum alpinum*), Canada burnet, balsam groundsel (*Packera paupercula*) and New York aster (*Symphyotrichum novi-belgii*). The primary peat-forming species are graminoids, including livid sedge (*Carex livida*), water sedge (*C. aquatilis*), alpine clubrush (*Trichophorum alpinum*) and tufted clubrush (*T. caespitosum*).

In the southern subunit, peatlands are primarily slope and blanket bogs, dominated by sedges and ericaceous shrubs. Sedges include tufted clubrush, tussock cottongrass (*Eriophorum vaginatum*) and meagre sedge (*Carex exilis*). The dominant shrubs are sheep laurel, common Labrador tea, leatherleaf (*Chamaedaphne calyculata*), glaucous-leaved bog rosemary (*Andromeda polifolia* var. *latifolia*) and early lowbush blueberry. Near the coast, black huckleberry (*Gaylussacia baccata*) and bog huckleberry (*G. bigeloviana*) sometimes occur on bog hummocks. Brown and red peat mosses (*Sphagnum fuscum*; *S. rubellum*) are the most common hummock-forming mosses; red-stemmed feathermoss and lichens occupy the drier tops of hummocks. Peat accumulations are derived primarily from *Sphagnum* mosses.

Climate

The *Atlantic Maritime Heathland* zone occurs at low elevations in areas exposed to extreme maritime climatic conditions. Fog frequency is high, creating an overall moist climate, lowering summer temperatures and effectively reducing the length of the growing season. Persistent strong winds, regularly with sustained velocities >100 km/hr, stunt or eliminate tree growth on all but the most sheltered sites. Snow, which provides protection for vegetation from extreme winter cold and abrasion by wind-driven ice particles, is significantly re-

distributed from exposed locations. In the near-coastal environment, trees can only persist as krummholtz in isolated patches where micro-topography favours snow accumulation.

In the northern subunit, summers are cool and winters are cold. Fog occurs less frequently than in the south (approximately 25% of days in the June to August period). Mean July temperature is about 12°C. Sea ice carried by the Labrador Current persists in adjacent coastal waters until mid-June, reducing growing degree days above 5°C (GDD) to between 500 and 600. Mean annual precipitation is approximately 900-950 mm; most winter precipitation falls as snow.

In the southern subunit, summers are cool and winter temperatures fluctuate around the freezing point. Fog occurs on approximately 70% of days in the June to August period. Mean July temperature is about 14°C. GDD for the southern subunit, where sea ice is rare, vary between 1000 and 1200. Mean annual precipitation is approximately 1200-1700 mm; less than 40% of winter precipitation falls as snow.

Physiography, Geology, Topography and Soils

Most of the northern subunit of this zone occurs in the St. Lawrence Lowlands physiographic region, but its northern extent on the Labrador coast lies on the Mecatina and George Plateaux of the Precambrian Shield. Elevations are generally <250 mASL. The southern subunit occurs in the Appalachian physiographic region. It occupies the Avalon Peninsula, the Burin Peninsula, most of the Bonavista Peninsula, and all but the western portion of south-central Newfoundland.

In the St. Lawrence Lowlands, on both sides of the Strait of Belle Isle, calcareous Paleozoic limestones, dolostones and shales are the dominant bedrock formations underlying the northern subunit. The terrain is a combination of undulating coastal plain and low hills dissected by broad valleys and fjords. For the portion of the northern subunit on the Shield, the geology is Precambrian igneous and metamorphic rocks. The southern subunit is underlain by acidic Precambrian or Paleozoic igneous and sedimentary rocks. The terrain is generally rolling, although near the coast north-south running fjords with steep cliffs dissect the coastline and elevation rises to 300 mASL.

The entire zone was affected by late Pleistocene glaciation. The predominant surficial materials are stony glacial till and peat. On upland sites, till often occurs as shallow veneers overlying bedrock. Soils are calcareous in the coastal lowlands of the northern subunit, and limestone pavement with pockets of frost-shattered boulders and gravel is a common feature. Mineral soils are typically Podzols and Regosols, with Gleysols occurring on moist, poorly drained sites. Peatlands dominated by Organic soils are common in poorly drained areas, but peat depths are generally shallow (<2m). Especially in the southern subunit, the cool humid environment is conducive to paludification resulting in extensive peatlands on both lowland and upland topographic positions.

Discontinuous permafrost, with Cryosolic soils, occurs in some locations. Sorted soil polygons on the northern tip of Newfoundland are likely the southernmost sea level occurrences of these permafrost features in North America.

Notes

The *Atlantic Maritime Heathland* zone occurs from the Atlantic coast inland to the *Eastern Boreal Forest*.