Fort McPherson Plain

Taiga Plain Ecozone

ECOREGION 53

DISTINGUISHING CHARACTERISTICS: Only a small portion of this low relief, low elevation ecoregion occurs within the Yukon Territory. It includes the only part of the territory that lies on the floor of the Mackenzie Valley. Perennially frozen peatlands are extensive, covering over 25% of the ecoregion. The mean annual runoff is extremely low because of the very low relief (Fig. 53-1). The mean seasonal and summer stream flows of rivers are the lowest per unit area among all the Yukon ecoregions.

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Figure 53-1. A view of the nearly level topography of the Fort McPherson Plain. The light coloured areas are covered in lichens that grow on the relatively dry surface of elevated peatlands called peat plateaus.

APPROXIMATE LAND COVER
subarctic coniferous and mixed forest, 85%
small lakes and non-treed wetlands, 15%

TOTAL AREA OF ECOREGION IN CANADA
30,180 km^2

TOTAL AREA OF ECOREGION IN THE YUKON
2,840 km^2

ECOREGION AREA AS A PROPORTION OF THE YUKON
1%

ELEVATIONAL RANGE
35–440 m asl
mean elevation 150 m asl

CORRELATION TO OTHER ECOLOGICAL REGIONS: Northwestern portion of **Peel River Ecoregion** (Oswald and Senyk, 1977) • Portion of **Taiga Plains Region** (CEC, 1997) • Portion of the **Northwest Territories Taiga Ecoregion** (Ricketts *et al.*, 1999)

PHYSIOGRAPHY

The northern half of the Fort McPherson Plain Ecoregion corresponds to the Peel Plain physiographic unit though the ecoregion also includes part of the Peel Plateau (Mathews, 1986; Hughes, 1987b; Bostock, 1948) (Fig. 2). The plain is an extensive level surface with little or no exposed rock. The ecoregion begins on the east bank of the Peel River and extends to the east and southeast into the Northwest Territories along the Mackenzie River Valley. Only the western margin of the ecoregion lies within the Yukon Territory.

The ecoregion slopes generally in a northeasterly fashion from an elevation of just over 440 m asl in the south to approximately 35 m asl in the north along the Peel River.

BEDROCK GEOLOGY

This area lacks exposed bedrock, but is part of the Northern Interior Platform succession (Norris, 1981h; Morrow, in press). Beneath the veneer of surficial deposits is the horizontal Cretaceous Arctic Red Formation of shale and sandstone, which is 350 to 400 m thick (Dixon, 1992). An unconformity separates the Cretaceous rock from underlying Devonian to Carboniferous sandstone and shale. Several exploratory gas wells have been drilled along the lower Trail River.

SURFICIAL GEOLOGY

Surficial deposits are dominantly moraine with small patches of discontinuous glaciolacustrine sediments (Duk-Rodkin and Hughes, 1992b,c). The remaining 10% of the area is comprised of colluvium, alluvium and organic deposits. Peatlands are most commonly developed on lacustrine deposits and moraine (Fig. 53-2).

Modern processes include rotational slides, debris flows, mudflows and retrogressive thaw flow slides along valley sides due to slope instability related to postglacial downcutting. Retrogressive thaw flow slides are also common where ground ice has been exposed by forest fire, debris flows and regressive erosion. Debris flows are most commonly triggered

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Figure 53-2. Wetland complexes composed of shallow water, basin fens and peat plateau bogs occur throughout the ecoregion. During dry summers, the taiga forest and shrublands can become dry enough to support forest fires. The resultant burns (dark area surrounding the light-coloured fen) can be extensive.

by summer storms that expose the active layer and eventually develop into retrogressive thaw flow slides. Thermokarst processes are widespread on glacial lacustrine and morainel pediments.

GLACIAL HISTORY

The ecoregion was completely covered by the Late Wisconsinan Laurentide Ice Sheet, which blocked drainage and formed temporary lakes between glacier ice and mountain slopes. The rivers that border this ecoregion to the south and west formed part of a meltwater system that marked the western margin of the Tutsieta Lake Phase of the Laurentide Ice Sheet (ca. 13 ka; Hughes, 1987a; Duk-Rodkin and Hughes, 1995). At this time, the Mackenzie and Wernecke Mountain drainages and meltwater flowed to the Arctic Ocean via the Peel River. This flow established the present courses of the Snake and Peel rivers. The Cranswick and Arctic Red rivers were established following continued eastward retreat of the ice margin about 12,000 years ago. When the margin of the Laurentide Ice Sheet retreated from the uplands in the southern Anderson Plains east of the Mackenzie Valley, forming a large glacial lake. The outlet of this lake was west into the Mackenzie Delta area (Duk-Rodkin and Hughes, 1995), which is thought to have established the Mackenzie River in its present location.

CLIMATE

Little or no climate data are available from within the ecoregion. This ecoregion is east of the continental divide and, therefore, climatic controls are different from those for the rest of the Yukon. Winters are relatively long, October to late May, with frequent intrusions of arctic air up the Mackenzie Valley. Summers are short but fairly warm, in part due to the influence of continental air masses from interior plains to the south. Precipitation is light to moderate, enhanced by the redevelopment of Pacific storms in the Mackenzie Valley.

Mean annual temperatures are near –8°C. Average February temperatures range from –25 to –30°C. Extreme minimum temperatures are near –55°C, somewhat less cold than the interior of the Yukon. Although not common, above freezing temperatures can occur in any winter month. May temperatures are variable, ranging from –25 to 30°C. July is the warmest month with mean temperatures near 15°C, mean minimums near 10°C and mean maximums near 20 to 25°C. Frost can be expected at any time, however, even during summer.

Precipitation is light to moderate with annual amounts near 300 mm. July and August are the wettest months with mean monthly amounts near 40 mm, although over 100 mm in these months can occur. The driest period is November through May, but generally 15 to 20 cm of snow can be expected each month. Winds are expected to be light to moderate with mean values from 10 to 15 km/hr, with prevailing directions probably from the northwest and south.

No climate stations occur within the Yukon portion of this ecoregion but relevant data from Fort McPherson, Northwest Territories characterize the climate of this part of the Mackenzie Valley.

HYDROLOGY

Drainage from this very flat, low-lying ecoregion is into the Peel River. On the eastern side, the low divide between the Peel and Arctic Red River drainage basins makes up the political boundary with the Northwest Territories. Other than the Peel River, which forms the western boundary of the ecoregion, there are no large or intermediate-sized streams within the Yukon portion of the ecoregion. Smaller representative streams include the Satah River and Brown Bear and Georges creeks, all flowing into the Peel River. While there are no intermediate or large lakes, the ecoregion contains numerous small pothole lakes and ponds. The largest lakes are the Tabor Lakes, and the Seguin and Chi Itree complex.

Two historical representative hydrometric stations, Weldon and Jackfish Creek, are both within the Northwest Territories portion of the ecoregion. Monitored streams with similar characteristics were selected from adjacent ecoregions to supplement the available data to characterize the hydrologic response. Annual streamflow has an increase in discharge in May due to snowmelt, rising to a peak towards the latter part of the month. Summer rain events will occasionally produce secondary peaks on some streams, and infrequently the annual stream flow peak. Fall (September) streamflow is often higher than post-freshet summer levels. Because of the very low relief, mean annual runoff is extremely

low with an estimated ecoregion average of 99 mm, while mean seasonal and summer flows are the lowest of all ecoregions (on a unit-area basis) with values of 5 X 10^{-3} and 2.7 X 10^{-3} $m^3/s/km^2$. The mean annual flood is moderately high, while the mean maximum summer flow is extremely low with values of 73 X 10^{-3} and 9.2 X 10^{-3} $m^3/s/km^2$, respectively. The minimum annual and summer flows are near 0, and 0.28 X 10^{-3} $m^3/s/km^2$, respectively. Due to the dominant role of winter temperatures and permafrost on streamflow, all ecoregion streams experience zero winter flows from December to April most years.

PERMAFROST

The Fort McPherson Plain Ecoregion is in the continuous permafrost zone. Geophysical data indicate the permafrost thickness may be up to 320 m, although temperature records from near Fort McPherson suggest the base of permafrost lies between 90 and 150 m from the surface (Geological Survey of Canada, unpubl. data).

Ground ice is found in all terrain units within the ecoregion, but ice wedges and thick accumulations of ice lenses are especially frequent in the moraine that blankets parts of the ecoregion (Geocon, 1986). There are numerous thermokarst lakes in these deposits (Harris *et al.*, 1983a). The ground surface in such terrain is usually hummocky and underlain by aggradational ice lenses (see Mackay, 1983).

SOILS

The soils of this ecoregion have formed on level to gently undulating topography composed of various glacial and organic parent materials. This is the only ecoregion in the territory that lies completely outside of the Cordilleran environment. As the ecoregion is within the zone of continuous permafrost, Cryosols dominate the landscape. Upland soils typically show earth hummock formations that underlie open forests of black spruce. These soils are classified as either Orthic or Brunisolic Turbic Cryosols (Pettapiece *et al.*, 1978). A surface of mossy peat up to 40 cm thick may be present. The permafrost table undulates beneath the surface producing an active layer 30 to 80 cm thick. The mossy forest floor materials tend to be acidic. Well-drained upland soils, particularly coarse-textured soils and shallow soils associated with bedrock outcrops, may be without near-surface permafrost, and are classified as Eutric Brunisols. Forest fires affect the thickness of the active layer and may result in a temporary drop of the permafrost table to a depth below 2 m, in which case the soils are classified as Brunisols rather than Cryosols.

Organic soils developed on peat materials are common in the Mackenzie Valley (Zoltai and Tarnocai, 1975) and particularly so in this ecoregion. For the most part these are Fibric Organic Cryosols that are associated with peat plateaus and palsa peatlands. These features develop mainly from moderately decomposed woody, sphagnum or sedge peat (Tarnocai *et al.*, 1993). It is estimated that a quarter of the ecoregion has a veneer of peat less than 1 m thick, most of which has some open subarctic forest cover.

VEGETATION

Open black spruce–lichen forests growing on imperfectly drained Turbic Cryosols, developed on earth hummocks, dominate the Fort McPherson Plain Ecoregion. Tamarack frequently accompanies the black spruce. Trees are usually less than 10 m tall (Zoltai and Pettapiece, 1973). Common shrubs include blueberry, Labrador tea, and lingonberry Reid and Calder, 1977; (Ritchie, 1984). The plain is dissected by drainages dominated by shallow open water and sedge fens. Stunted tamarack is sometimes associated with the fens.

Extensive areas of peat plateau bogs support stunted black spruce subarctic woodlands, where the tree height is usually 2 to 5 m. The understory is rich in shrubs including Labrador tea, shrub birch, blueberry, willow, lingonberry, cloudberry and bog cranberries, and in mosses dominated by *Aulacomnium* and *Sphagnum*, as well as *Cladina* lichens (Zoltai and Pettapiece, 1973; Reid and Calder, 1977; Ritchie, 1984).

String fens are also typical of the ecoregion and usually associated with Organic Mesisol or Fibrisol soils, though permafrost is present under the larger strings (Zoltai *et al.*, 1988). These fens are dominated by *Carex aquatilis*, often with willow and sparse tamaracks (Reid and Calder, 1977).

On the slightly better drained Peel Plateau portion of the ecoregion, white spruce and paper birch are probably mixed with the black spruce. The warmest sites may sustain some aspen and balsam poplar

as well. The deciduous trees are likely successional post-fire or other disturbance species and will gradually be replaced by spruce in the canopy (Zoltai and Pettapiece, 1973; Ritchie, 1984).

WILDLIFE

Mammals

The Fort McPherson Plain contains essentially the same mammals as are found in the Peel River Plateau Ecoregion. Taiga forest dwellers such as lynx, marten, and wolverine are common. The only ungulate species represented are moose, wintering barren-ground caribou, and a small disparate year-round caribou population (Fig. 53-3).

A list of mammal species known or expected to occur in this ecoregion is given in Table 4. Many of the rodents and ungulates found in the southern Yukon are absent, resulting in a relatively low diversity. There is little known of the mammal populations of the area.

Birds

While the bird life of Fort McPherson Plain is poorly understood, initial investigations show that the area hosts unique and productive bird communities. Eckert *et al.* (2003) recorded a total of 66 species during surveys at Tabor Lakes and the headwaters of Jackfish Creek in late June and early July, 1999.

The most common and widely distributed passerines are American Tree Sparrow, Savannah Sparrow, Yellow-rumped Warbler, Dark-eyed Junco, and Rusty Blackbird. Less common but widely distributed species include Gray Jay, American Robin, Alder Flycatcher, Yellow Warbler, Blackpoll Warbler, Orange-crowned Warbler, White-crowned Sparrow, and Common Redpoll. Gray-cheeked Thrush and Lincoln's Sparrow are restricted in distribution but relatively common in suitable habitat.

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Figure 53-3. The Fort McPherson Plain Ecoregion provides year-round habitat to a disparate caribou population. The range, population size and relationship to other caribou herds is poorly understood. This photo, taken in late June along a wetland margin, illustrates one of the recent burns in the region.

At Tabor Lakes, Swainson's Thrush inhabits the pockets of older white spruce, and Common Yellowthroat occurs at the very edge of its breeding range. Jackfish Creek headwaters hosts breeding Least Sandpipers, along with relatively high densities of Sandhill Cranes (Fig. 32). Open water habitats are productive throughout the region. At Jackfish Creek headwaters, Eckert *et al.* (2003) recorded 14 species of waterbirds (loons, grebes, and waterfowl), and two species of gulls; at Tabor Lakes, they recorded 17 species of waterbirds (loons, grebes, and waterfowl), and an amazing six species of gulls.

Other notable species in the area include both Trumpeter and Tundra swans, Peregrine Falcon, Sharp-tailed Grouse, Short-eared Owl, and the Yukon's first record of Palm Warbler at Tabor Lakes. Further, the Fort McPherson Plain appears to be an interesting place for vagrant birds; Eckert *et al.* (2003) recorded an impressive variety of rarities including Sabine's Gull, Glaucous-winged Gull, Glaucous Gull, Ring-billed Gull, and Eastern Kingbird.