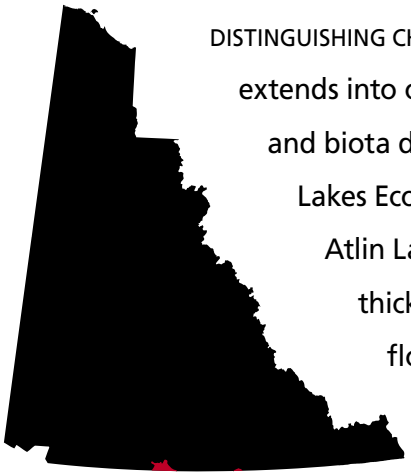
Boreal Mountains and Plateaus

Boreal Cordillera Ecozone

ECOREGION 180



DISTINGUISHING CHARACTERISTICS: This ecoregion, centred in northern British Columbia, extends into only two small areas in southern Yukon. In these, the landscape and biota differ little from the highlands of the neighbouring Yukon Southern Lakes Ecoregion. The relatively long and narrow arms of Tagish Lake and Atlin Lake reflect the northward flow of Pleistocene glaciers, as do the thick, well-drained deposits of sand and gravel remaining on the valley floors. Wetlands and subalpine forest support a diverse bird population, particularly during spring and fall.

C.F. Roots, Geological Survey of Canada

Figure 180-1. The Boreal Mountains and Plateau and adjacent Yukon Southern Lakes ecoregions have extensive areas of alpine tundra and remnants of an erosion surface at about 1700 m asl. This view is over Windy Arm of Tagish Lake looking northeast toward Lime Mountain.

APPROXIMATE LAND COVER
boreal/subalpine coniferous forest, 55%
alpine tundra, 35%
alpine rockland, 5%
lakes and wetlands, 5%

ELEVATIONAL RANGE
660–1,700 m asl
mean elevation 1,050 m asl

TOTAL AREA OF ECOREGION IN CANADA
102,840 km^2

TOTAL AREA OF ECOREGION IN THE YUKON
948 km^2

ECOREGION AREA AS A PROPORTION OF THE YUKON
<1%

CORRELATION TO OTHER ECOLOGICAL REGIONS: Portion of **Coast Mountains Ecoregion** (Oswald and Senyk, 1977) • Portion of **Cordillera Boreal Region** (CEC, 1997) • Northwestern portion of **Northern Cordilleran Forests** (Ricketts et al., 1999)

PHYSIOGRAPHY

The Boreal Mountains and Plateaus Ecoregion occupies a large block of north-central British Columbia; only two small projections enter southern Yukon. One of these surrounds and includes Tagish, Nares and Atlin lakes (in British Columbia portion of the ecoregion), and the other is a small part of the Swift River drainage, about 250 km to the east.

In the Yukon, the western part of ecoregion belongs to the Teslin Plateau and the eastern projection is part of the Nisutlin Plateau in the Cassiar Mountains (Mathews, 1986). Both are components of the Yukon Plateau, the large, diverse Northern Plateau and Mountain area described by Bostock (1948) and Hughes (1987b).

This is an area of tablelands of up to 1,700 m in elevation dissected by large valleys (Fig. 180-1). In the west part, the valleys are occupied by Tagish Lake (655 m) and Nares Lake (668 m), in the eastern part by the Swift River (less than 900 m), all of which are components of the Yukon River watershed.

BEDROCK GEOLOGY

The northern half of the ecoregion almost exactly coincides with the distribution of metamorphosed volcanic and carbonate rocks. The rocks in the two prongs of the ecoregion that lie within the Yukon are shown on 1:250,000 scale geological maps by Wheeler (1961) and Poole *et al.* (1960), with updated correlations by Gordey and Makepeace (compilers, 2001).

The northwestern prong of the ecoregion is part of Slide Mountain Terrane, which was thrust over adjacent Stikinia to the west (Gordey and Stevens, 1994a) in Middle Jurassic time (175 Ma), and subsequently faulted against Quesnellia to the east. In contrast, the eastern prong of the ecoregion is underlain by the Dorsey Assemblage (Stevens and Harms, 1995; Roots *et al.*, 2000) of Dorsey Terrane, which is separated from the granitic Cassiar batholith to the east by a major fault zone. Both terrane associations are summarized in the Overview section of this report, and in Gabrielse and Yorath (editors, 1991).

The northwestern prong includes tablelands surrounding Tagish Lake and islands within the lake. Abundant bedrock protrudes through thin soil cover. Cliffs and ridges on Lime Peak, White Mountain and Jubilee Mountain are light-grey dolostone and recrystallized bioclastic limestone of Horsefeed Formation, as well as black limestone and ribbon chert of Kedahda Formation (Monger, 1975). Both units contain Permian fusilinids, fossils that resemble concentric-cored kernels of wheat. These fossils are similar to those found in Japan and China, which indicates a West Pacific origin for these rocks. Dark-green amphibolite, or greenstone, of the Mississippian Nakina Formation, represents the underwater basaltic flows and breccia included in the Cache Creek Group. Where the Atlin Road crosses the British Columbia–Yukon border, there are outcrops of biotite–hornblende monzodiorite of the Middle Jurassic Fourth of July batholith (Mihalynuk *et al.*, 1992).

In the northeast prong of the ecoregion, subdued ground is underlain by argillite, phyllite, quartzite and chert. The edge of the ecoregion north of the Alaska Highway includes the rim of the 100-million-year-old Seagull batholith and interlayered chert and black slate, minor chert pebble conglomerate and a limestone band in which Pennsylvanian crinoids and conodonts have been found (Stevens and Harms, 1995). The valley of the Swift River also contains outcrops of relatively recent basaltic lava (Rancheria flows, about 6 Ma) which were extensively used in the Alaska Highway construction and stabilization projects.

Mineral potential is moderate in the Yukon portion of this ecoregion. Copper showings surround a small dunite lens on Jubilee Mountain; typically the surrounding altered carbonate hosts gold-bearing vein occurrences (e.g. Hart, 1996), and chromite, although there is no indication that this pod has any vertical extent. On Lime Mountain are showings of native copper in the altered volcanics, molybdenite in a small granitic plug and silver–gold vein occurrences. The Rancheria district contains numerous lead, zinc and silver vein occurrences. The eastern portion of this ecoregion lies immediately east of the Seagull Creek tin and tungsten district (Abbott, 1981a).

SURFICIAL GEOLOGY

The main sources of information for this section are Morison and Klassen (1991) and Klassen (1982b) who describe the surficial geology of the Yukon part of the ecoregion.

The surface deposits of this ecoregion are similar to those of the Southern Lakes Ecoregion. They are associated with the most recent Cordilleran ice sheet, the McConnell, believed to have covered the south and central Yukon between 26.5 ka and 10 ka. Most of the Yukon portion of the ecoregion was covered by the Cassiar lobe, which flowed towards the northwest from the Cassiar Mountains.

The distribution of Quaternary deposits in this area follows a general pattern. High elevation slopes are covered with colluvium or moraine veneer over bedrock. At high elevations, the exposed bedrock is weathered and frost-shattered.

A veneer of glacial till, as well as colluvial fans or aprons, covers most mid-elevation slopes. The general composition of the till matrix in adjoining map sheets (Jackson, 1994) indicates a wide range of sand and silt content (20 to 80%). Isolated lenses of ice-rich permafrost may be present on north-facing slopes. At high elevations the Quaternary sediments contain permafrost were overlain by thick organic deposits. Drumlins indicating a northerly ice flow are found on the west shore of Taku Arm.

Glaciofluvial sand and gravel terraces flank the valley sides and pitted or hummocky deposits of sand and gravel deposits line the bottom of some valleys (Fig. 180-2). Usually these deposits are free of permafrost and have stable surfaces, but may contain undesirable, weak lithologies for potential use as aggregate.

C.F. Roots, Geological Survey of Canada

Figure 180-2. A mosaic of lakes and ponds forms in the Jennings Lake valley in hummocky glaciofluvial materials deposited during deglaciation. These ice-contact deposits are composed of sands and gravels and are common in the larger valleys in the ecoregion.

Floods related to ice jams, snowmelt and summer rainstorms are possible hazards in lower reaches of most streams in the area. Because of this flood risk, the steep portions of alluvial fans have the potential to release mudflows and debris flows associated with rapid increases in water discharge.

GLACIAL HISTORY

This upland region was the source area for the part of the Cordilleran Ice Sheet that drained east toward the Mackenzie Valley and north into the Yukon River Basin (Ryder and Maynard, 1991). Uplands were subjected to intense glacial erosion, with the highest peaks sculpted into classical alpine landforms such as horns, arêtes and cirques. A single thin till mantles upland areas.

CLIMATE

The two portions of this ecoregion within the Yukon near Tagish Lake and Atlin Lake have a climate similar to the Yukon Southern Lakes Ecoregion. A climate station representative of the lower valleys of this area is Atlin Lake, British Columbia,

The eastern section near Swift River has a climate similar to the Pelly Mountains Ecoregion. A climate station representative of this section is Swift River, Yukon.

HYDROLOGY

Two small areas of the ecoregion protrude northward into the southern Yukon. The larger western portion is within the Western Hydrologic Region. It includes Tagish and Atlin lakes that are part of the upper Yukon River drainage. The smaller eastern portion is within the Interior Hydrologic Region and includes a portion of the upper Swift River, which drains into the Teslin River. The western portion of the ecoregion in the Yukon, which drains the western foot slopes of the Coast Mountains, has higher relief and subsequently higher runoff and peak flows, than the eastern portion that drains the Cassiar Mountains. Within British Columbia, the ecoregion contains many major streams including the Stikine and Dease rivers while the Yukon portion contains only smaller representative streams including the Swift and Tutshi rivers. The Atlin River is within this ecosystem; however, it is not representative of hydrologic response, because it includes glacier melt inputs from upstream of the ecosystem. A relatively large portion of this small area is water in several large lakes including Tagish and Atlin.

There are seven representative active, historical continuous, and seasonal hydrometric stations within the ecoregion: Wann, Fantail, Atlin, Swift and Tutshi rivers, and Pine and Partridge creeks. Annual streamflow is characterized by a rapid increase in snowmelt discharge to a peak in June, with secondary rainfall peaks later in the summer. Peak flow events on smaller streams may be generated by intense summer rain storm events. Mean annual runoff is the highest of all Yukon ecoregions with a range in values of 236 to 980 mm and an ecosystem mean value of 577 mm. Mean seasonal and summer flows are similarly the highest of all Yukon ecoregions with values of 39×10^{-3} and 36×10^{-3} $m^3/s/km^2$, respectively. The mean annual flood and mean maximum summer flow are moderately high and relatively high with values of 92×10^{-3} and 78×10^{-3} $m^3/s/km^2$, respectively. Minimum streamflow generally occurs during April, with the relative magnitude higher than other Yukon ecoregions due to the moderating influence of the Gulf of Alaska on winter temperatures and subsequent groundwater contributions. The minimum annual and summer flows are the highest of all Yukon ecoregions with values of 2.6×10^{-3} and 11×10^{-3} $m^3/s/km^2$, respectively. Only very small streams experience zero winter flows during cold winters.

PERMAFROST

Permafrost in the ecoregion is sporadic and the distribution is controlled mainly by elevation. Above an elevation of about 1,800 m, permafrost is likely continuous (Harris, 1986), but in valleys its occurrence depends on site wetness and the thickness of the organic layer. Isolated palsas have been reported (Tallman, 1973; Seppala, 1980), but overall, there is little permafrost in the valleys (Hoggan, 1992b). There is no permafrost at the Cassiar townsite at 1,060 m, but it is widespread at the abandoned asbestos mine at 1,820 m (Brown, 1967). Here, the thickness of the organic layer likely controls active layer development to a greater extent than elevation, as recorded by Harris (1987) in the Kluane Front Range.

There is extensive evidence of frost action on the plateaus of this ecoregion. Alley and Young (1978)

describe well-developed blockfields, patterned ground, and frost boils from plateau surfaces, and solifluction lobes from mountainsides in southern Stikina Plateau. They also report ice-rich zones developed at depth in valley-bottom glaciolacustrine sediments.

SOILS

The soils in this ecoregion have formed under relatively mild and somewhat moist climatic conditions. Therefore, they tend to be well leached and show stronger chemical weathering than most other soils in the Yukon. The topography in the Yukon portion of this predominantly northern British Columbia ecoregion is mountainous. The predominant soil parent material is colluvium formed from the mixed lithologies present.

At higher elevations, above 1,500 m in the portion of the ecoregion around Tagish Lake, Regosols formed on talus from rock outcrops are common. Beneath extensive areas of alpine tundra vegetation, the soils are most commonly Orthic Turbic Cryosols and show evidence of patterned ground. This is the only environment where near-surface permafrost is common in the ecoregion. On mountain slopes, soils are formed under coniferous and mixed vegetation. Orthic, Eutric and Dystric Brunisols are the most common soil types of the area (Davies *et al.*, 1983a). The acidic Dystric Brunisols are most common at subalpine elevations, adjacent to the 60th parallel where precipitation is highest.

In the British Columbia portion of the ecoregion adjacent to Swift River, soils tend to be predominantly Dystric Brunisols formed on a landscape composed primarily of moraine and colluvium (Luttmerdig *et al.*, 1995) on the more subdued terrain of the Cassiar Mountains south of the Yukon border.

VEGETATION

The vegetation of the Boreal Mountains and Plateaus Ecoregion varies from boreal forest in the lowlands and valleys to subalpine shrublands and alpine tundra on the rolling plateaus and higher mountains (Davis *et al.*, 1983a).

Below treeline, white spruce dominates mature forests. Willow, soapberry, kinnikinnick, lowbush cranberry, crowberry and feathermoss are common understory species. Because of frequent fires, lodgepole pine and trembling aspen are also common in the forest canopy. Lodgepole pine is common on well-drained sites that have burned in the last 100 years. Aspen or mixed spruce and aspen forests cover southerly slopes. Balsam poplar may be found along creeks and lakeshores. On steep, south-facing slopes, stunted aspen grows with grass, sagewort, kinnikinnick and juniper; these species reflect the drought conditions of these slopes.

At higher elevations, subalpine fir is common in valleys around treeline, but shrub birch and willow, underlain by ericaceous shrubs and lichen, dominate most of the subalpine. Dwarf willow, *Dryas* spp. and ericaceous shrubs dominate the alpine areas.

WILDLIFE

Mammals

Mountain goats and Dall sheep, common in the Boreal Mountains and Plateaus Ecoregion in British Columbia, are absent in the Yukon portion. The Carcross and Atlin woodland caribou herds use the Tagish Lake and western Atlin Lake area (Fig. 30). The herds are small and fragmented, numbering about 300. They are exposed to predation by many wolf packs. Grizzly bears, wolves, wolverine, and lynx are common. Isolated populations of marten exist in climax forests, most commonly at higher elevations. Mammal species known or expected to occur in this ecoregion are listed in Table 4.

Birds

During migration, staging waterbirds and shorebirds occurring in wetland areas include Red-throated and Pacific Loons, Tundra and Trumpeter Swans, small numbers of geese, Northern Pintail, scaup, scoters, Bufflehead, and many shorebirds (Swarth, 1936; Dennington, 1985; Hawkings, 1994). Breeders include Common Loon; Mallard; Green-winged Teal; scaup; scoters; Barrow's Goldeneye; Red-breasted and Common Mergansers; Bald Eagle; Bonaparte's, Mew, and Herring Gulls; Arctic Tern; Semipalmated Plover; Killdeer; Lesser Yellowlegs; Solitary, Spotted and Least Sandpipers; and Belted Kingfisher (Swarth, 1936; Godfrey, 1951; Canadian Wildlife Service, 1979a; Nixon *et al.*, 1992). Common Snipe and Rusty Blackbird are common breeders

in marshy areas (Swarth, 1936). Songbirds such as Yellow Warbler, Northern Waterthrush, Common Yellowthroat, and Savannah, Fox, and Lincoln's Sparrows nest in shrubby wetland areas (Godfrey, 1951). During the breeding season, Common Nighthawk and Tree and Cliff Swallows commonly forage over marshes, forest openings and lakes (Swarth, 1936). The rare Rufous Hummingbird is a regular summer visitor in open areas with suitable flowering plants, although breeding has not been confirmed (Godfrey, 1951).

Year-round residents of lowland forests include Northern Goshawk; Spruce Grouse; Great Horned Owl; Three-toed Woodpecker; Gray Jay; Common Raven, Black-capped, Mountain and Boreal Chickadees; and Pine Grosbeak (Swarth, 1936; Godfrey, 1951). In summer, resident species are joined by breeding Sharp-shinned and Red-tailed Hawks; Merlin; Olive-sided Flycatcher; Western Wood-Pewee; Ruby-crowned Kinglet; Yellow-rumped, Townsend's and Blackpoll Warblers; and Dark-eyed Junco (Swarth, 1936; Godfrey, 1951). Pockets of deciduous and mixed forests on warmer slopes provide breeding habitat for Ruffed Grouse, Northern Flicker, Hammond's Flycatcher, and Swainson's Thrush (Williams, 1925; Swarth, 1936; Soper, 1954). Red Crossbill and Pine Siskin also nest in these forests in some years (Swarth, 1936; Godfrey, 1951). Say's Phoebe, Mountain Bluebird, American Robin, and Chipping Sparrow share the shrubby forest openings that commonly occur in these valleys (Swarth, 1936).

Blue Grouse are year-round residents of the subalpine forest, joined by Willow Ptarmigan that move to lower elevations in winter (Swarth, 1936). Subalpine forests also provide breeding habitat for Townsend's Solitaire and Dark-eyed Junco, with Willow Ptarmigan, Alder Flycatcher, Dusky Flycatcher, Northern Shrike, Wilson's Warbler, American Tree, Brewer's, and Golden-crowned Sparrows occurring in shrubby areas (Clarke, 1945; Godfrey, 1951; Canadian Wildlife Service, unpubl.).

At higher elevations, resident species such as Rock and White-tailed Ptarmigan are joined in the breeding season by Golden Eagle, Horned Lark, American Pipit, and the coastal race of Gray-crowned Rosy Finch (Swarth, 1936; Sinclair, 1995).