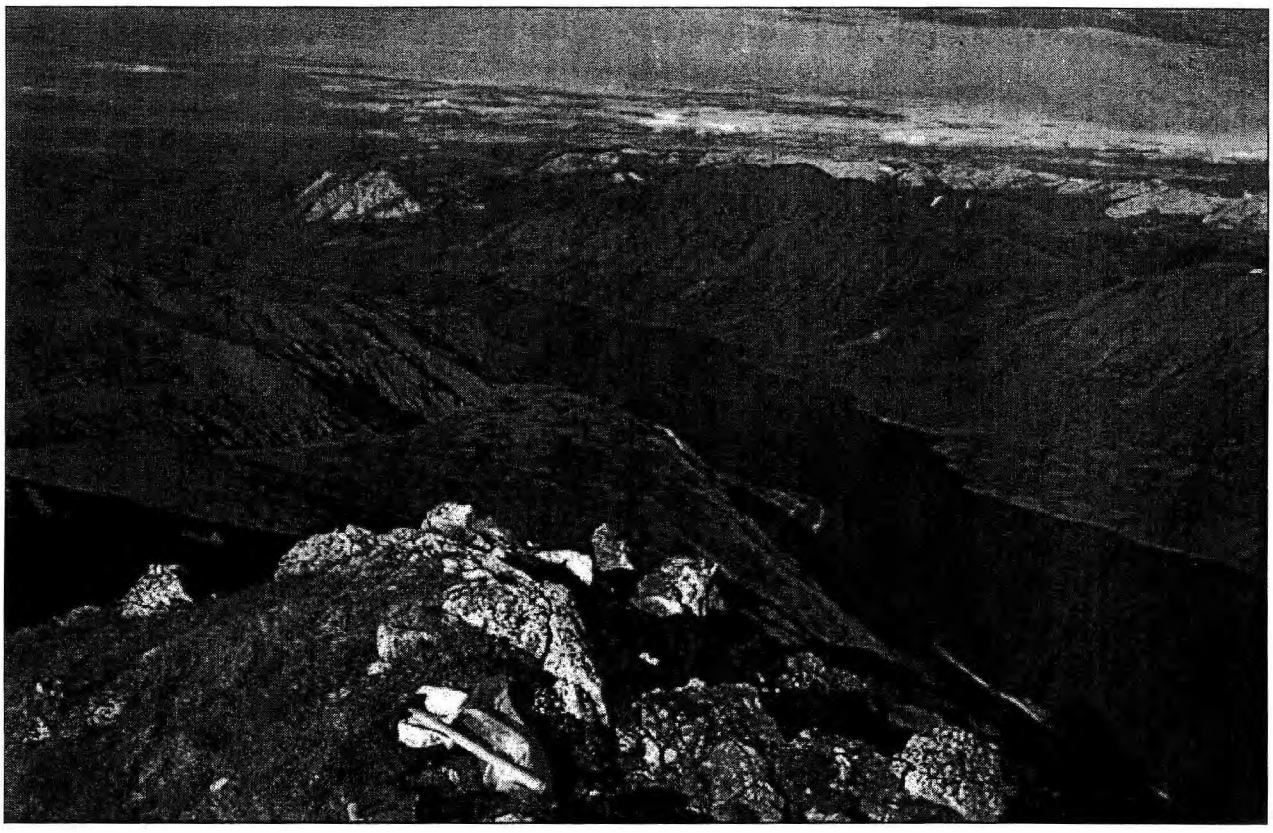
Boreal Mountains and Plateaus

Taiga Cordillera Ecozone

ECOREGION 180B

DISTINGUISHING CHARACTERISITICS: This is an ecoregion of northern British Columbia with only minor presence within Yukon boundaries.



C. Roots

Figure 74. *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, 60%
alpine tundra, 35%
alpine rockland, 5%

TOTAL AREA IN CANADA
102,840 km²

TOTAL AREA IN THE YUKON
948 km²

ECOREGION AREA AS A PROPORTION OF THE YUKON
<1%

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

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 though it only includes two small pieces of the Yukon. These are the areas surrounding and including Tagish, Nares and Atlin Lakes, and a small part of the Swift River drainage.

In the Yukon, this ecoregion is part of the Teslin Plateau and a small incursion of the Nisutlin Plateau into the Cassiar Mountains (Mathews, 1986). Both are part of the Yukon Plateau and the large, diverse Northern Plateau and Mountain area described by Bostock (1948) and Hughes (1987b).

This is an area of tablelands of 1,400 to 1,500 m dissected by large valleys (Figure 74). In the west part, the valleys are occupied by Tagish Lake (655 m), Nares Lake and Atlin Lake (668 m), in the eastern part by the Swift River (less than 900 m), all of which are components of the Yukon River Basin.

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, for 105D-Whitehorse) and Poole et al. (1960, for 105B-Wolf Lake), with updated correlations by Gordey (in prep.). 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. The eastern prong of the ecoregion is referred to as Dorsey Assemblage (Stevens and Harms, 1995) of Dorsey Terrane, which is separated from the granitic Cassiar batholith to the east by a major fault zone. The terrane associations are summarized in the introductory chapter, and in Gabrielse and Yorath (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, that 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 B.C.-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).

Mineral potential is moderate in the Yukon portion of this ecoregion. Copper showings surround a small dunite, or olivine granite, lense on Jubilee Mountain (Yukon Minfile, 105D 001); typically the surrounding altered carbonate hosts listwaenite 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, there are showings of native copper in the altered volcanics, rosettes of molybdenite in a small granitic plug and silver-gold vein occurrences (Yukon Minfile, 105D 002,3,4). The Rancheria district contains numerous lead, zinc and silver vein occurrences (Yukon Minfile, 105B 10, 11, 15, 96 and 129), and the eastern Yukon prong of this ecoregion lies immediately east of the Seagull Creek tin and tungsten district (Abbott, 1981a). Regional stream sediment and water geochemistry is available in Geological Survey of Canada, Open Files 1218 (for 105D) and 1289 (for 105B).

SURFICIAL GEOLOGY

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

The surface deposits of this ecoregion are similar to the one in 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 26,500 and 10,000 years ago. Most of the area on the map sheet 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. In most cases, at high elevations, the exposed bedrock is weathered, frost-shattered, or covered by colluvium.

Moraine, often streamlined or gullied, covers most mid-elevation slopes, the base of which can be mixed moraine blankets and colluvial fans or aprons. Moraine covers large portions of the surface. 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 percent). Isolated lenses of ice-rich permafrost may be present on north-facing slopes and at high elevations where thick organic deposits are present over the Quaternary sediments. 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. Usually these deposits are free of permafrost and have stable surfaces, but may contain undesirable, weak lithologies for potential use as aggregate.

Floods related to ice-jams, snow melt 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 small representative 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, B.C.

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 inclusion is within the Western Hydrologic Region and includes Tagish and Atlin Lakes which are part of the upper Yukon River drainage. The smaller eastern inclusion is within the Interior Hydrologic Region and includes a portion of the upper Swift River drainage 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 node that drains the Cassiar Mountains. The British Columbia portion of the ecosystem 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, since it includes glacier melt inputs from upstream of the ecosystem. A relatively large portion of the small area is made by water. As noted the ecoregion contains 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 and an ecosystem mean value of 577 mm. Mean seasonal

and summer flows are similarly the highest of all Yukon ecoregions with values of 0.039 and 0.036 $m^3/s/km^2$ respectively. The mean annual flood and mean maximum summer flow are moderately high and relatively high with values of 0.092 and 0.078 $m^3/s/km^2$ 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 0.0026 and .011 $m/s/km^2$ respectively. Only very small streams may 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 K. McKenna

The vegetation of the Boreal Mountains and Plateaus Ecoregion varies from boreal forest in the lowlands and valleys along the lakes and rivers to subalpine shrublands and alpine tundra on the rolling plateaus and higher mountains.

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 hundred 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, alpine 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 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. The Carcross/Squanga woodland caribou herd uses the Tagish and western Atlin lake area. The herd is small and fragmented, numbering about 300. It is not restricted to smaller winter ranges by snowfall, and thereby is exposed to predation by a large number of wolf packs. Grizzly bears, wolves, wolverine, and lynx are common. Isolated populations of marten exist in climax forests, most commonly at higher elevations. A complete list of mammal species known or expected to occur in this ecoregion is given 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, 1979; Nixon et al., 1989). 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 Sparrow 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 (Godfrey, 1951; Swarth, 1936). 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 (Godfrey, 1951; Swarth, 1936). 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 (Godfrey, 1951; Swarth, 1936). 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; Birds of the Yukon Database, CWS).

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).