The CLIMATE of BRITISH COLUMBIA and the YUKON TERRITORY

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Foreword

This climatological report is one of a series covering the greater part of Canada. The need for a comprehensive study of the climate of Canada has been realized for some time, and as a result the following initial reports were produced:

Central and Southern British Columbia
by Donald Kerr, presently Associate Professor, Department of Geography, University of Toronto.

Northern British Columbia and Yukon
by Donald Kerr.

Mackenzie Basin and Keewatin
by Balfour Currie, presently Head of the Department of Physics, University of Saskatchewan.

Eastern Canadian Arctic and Sub-Arctic
by Kenneth Hare, presently Head of the Department of Geography and Meteorology, McGill University.

Canadian Arctic Archipelago
by William C. Wonders, presently Assistant Professor, Department of Political Economy, University of Alberta.

These reports were in many ways too detailed, and it was decided that a condensation of these reports would be made available to the public. The first three reports were rewritten by W. G. Kendrew, formerly Reader in Climatology, University of Oxford and author of "Climatology" (Oxford U.P.), and "Climates of the Continents" (Oxford U.P.). The reports on Central and Southern British Columbia and on Northern British Columbia and Yukon were combined and comprise the present study. Sections of the report on Eastern Canadian Arctic and Sub-Arctic were rewritten by Richmond W. Longley of the Meteorological Division and will comprise the climatological study on Northern Quebec and Labrador. An interim study on the Canadian Arctic Archipelago written by R. W. Rae of the Meteorological Division has already been published and is available to the general public.

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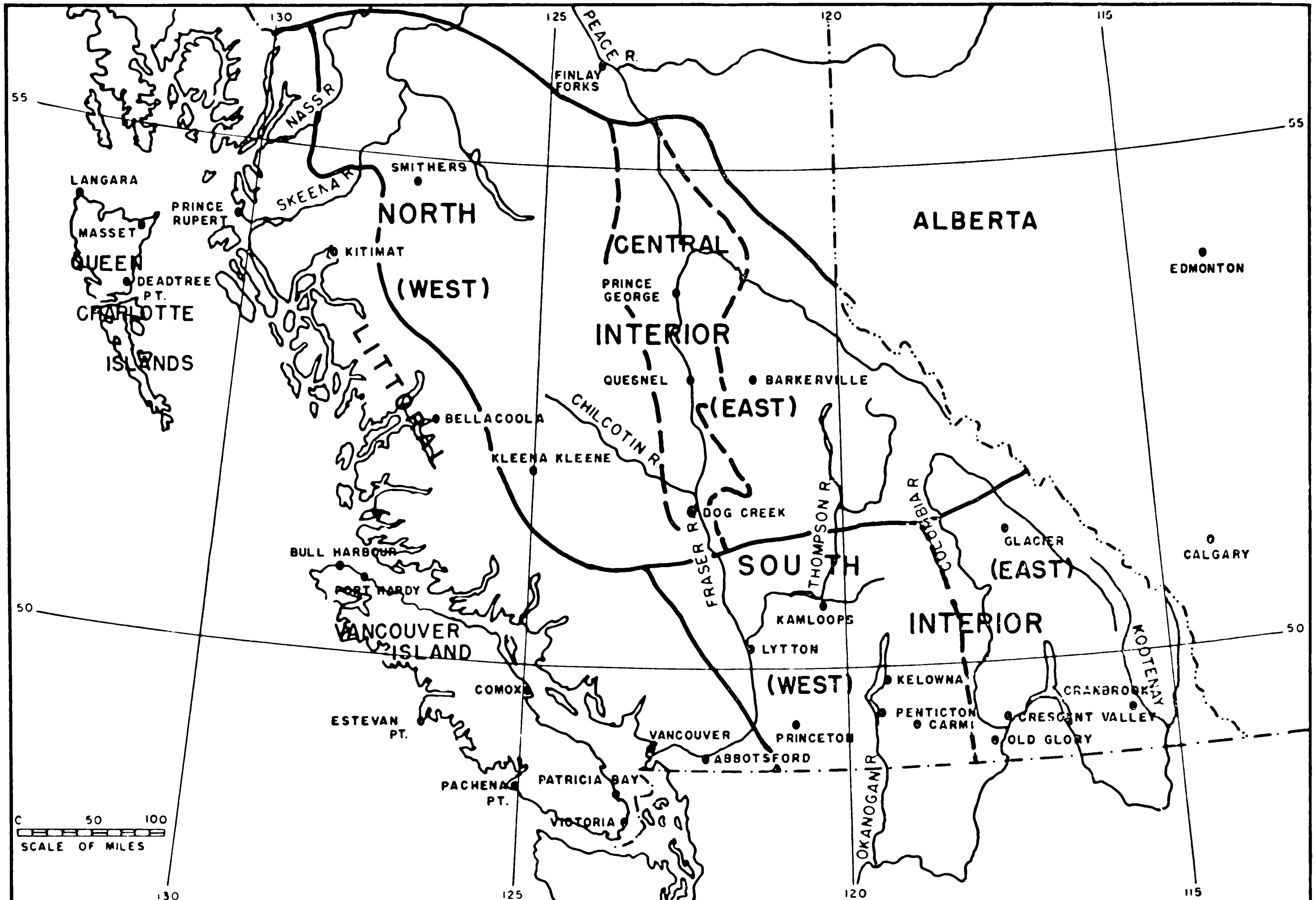
Fig. 1



Climatic Divisions of Southern British Columbia

PART I

The Climate of Southern British Columbia

CHAPTER 1

Major Regions of Southern British Columbia and Their Climates

1.1 Topography

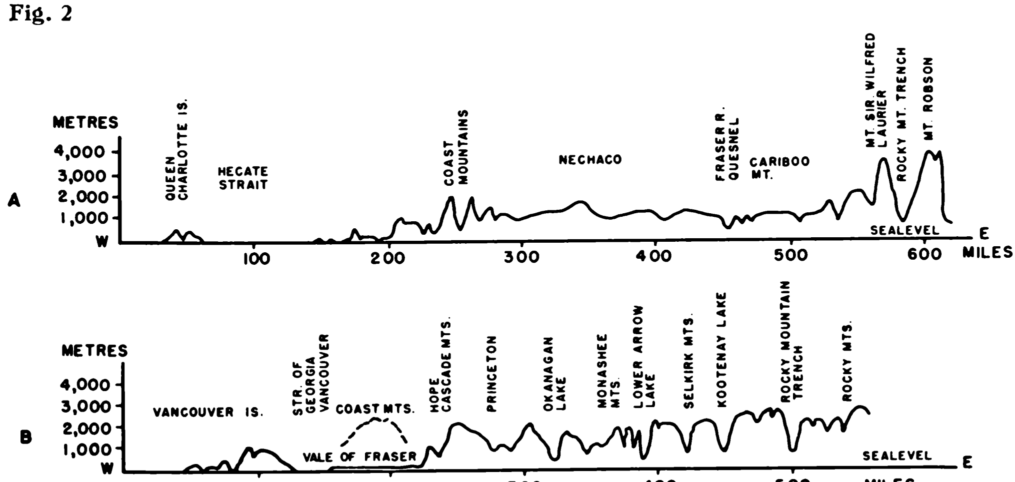
British Columbia is a land of great variety, all of it with strong relief and bold topography. For purposes of description some division is required and a scheme is shown in Fig. 1 which forms the basis used in this Chapter. But no such scheme can represent 'climatic regions', for differences are larger vertically than horizontally in this mountainous country and even a small area may contain climates of much diversity (see fig. 2 for profiles). Only the more general climatic controls, mainly in the horizontal, are considered; vertical subdivisions by altitude, and the differences due to direction of slope, must be omitted in any small map and their detailed study would have to be based on far more long-period meteorological records than exist.

Nearly all the life of the country—agriculture, settlements, communications—is on the floors and the lower slopes of the valleys; but an exception is mining, the source of most of the wealth, for the mines are high up.

The Littoral. The Littoral includes the coasts and the west slopes and uplands of the Coast Mountains.

The coast is extraordinarily articulated along the open ocean and still more round the innumerable islands (remnants of the uplands now drowned and separated by intricate channels) and in the remarkable series of long narrow fiords, inlets of deep water cutting far back, some of them nearly a hundred miles into the uplands. The coast, in the sense of the low tract fringing the sea,

Fig. 2



West-east profiles across Southern British Columbia—A—53°N., B—49·5°N.

is narrow almost everywhere, and in places is crushed out by the abrupt rocky ascent to the uplands and ranges on both islands and mainland, but its length compensates for narrowness to make up a considerable area.

The coastal mountains, an extension of the similar feature in the U.S.A., continue along all the 500 miles of British Columbia and through Alaska to the Aleutian Islands. They form a barrier, a massive rampart between ocean and interior, broken only by a few narrow valleys, ravines thousands of feet deep cut by rivers flowing from the interior, and by one wider lowland, the vale of the Lower Fraser River. Most of its ranges exceed 7,000 feet, in considerable areas 10,000, and the highest summit Mount Waddington attains 13,260 feet.

The Coast Mountains at approximately latitude 52°N. Elevation of the mountains is about ten thousand feet above sea level

The system is a complex of dissected highlands rather than one of fold-mountains like the Rockies. After a long geological history most of the higher levels now consist of very hard igneous rock intruded in the late Jurassic period. The whole area has undergone movements of elevation and subsidence, the effect of recent (quaternary) subsidence being still prominent in the drowning of the Continental Shelf, only the higher parts of which remain as islands of all sizes which form an important part of the Province. Vancouver Island is 300 miles long and has large tracts of mountains above 3,000 feet and peaks above 7,000 feet. The Queen Charlottes are 200 miles long.

From the climatological point of view the Littoral is at once very compact and remarkably indented: compact in its major features in that it forms a wide and almost complete barrier between ocean and interior, without seas or gulfs of size to carry the maritime climate far inland; indented in its minor topography with its innumerable deep ravines, narrow and intricate valleys, long fiords, islands large and small, separated by channels many of them wide, some too narrow for navigation except in small boats. So complicated is the map that few save the local residents know even the names of most of the natural features, each large enough to form an important element structural, scenic, economic, in lands with less rugged coasts.

The Interior, South. The Interior Uplands (Interior Plateau, its official name, is less suited to the topography) include the interior from the top of the Coast Mountains to the Rockies, from the international border to beyond Prince George—so long a tract that it must be divided for description into South and North. As a whole it has the general form of an uplifted saucer, shallow and elongated, with its sides rising to heights of 7,000 feet and more on the Coast Mountains and the Rockies. Its geological history forms a simple approach to a topographical description. It is built of sedimentary rocks, with thick volcanic intrusions and outpourings of the Jurassic and Miocene periods. It was then elevated (with the Coast Mountains) but long continued subsidence, and erosion by many rivers, had worn it down almost to sea-level when another elevation in Pliocene times raised it again several thousand feet. But the rivers maintained their old courses, and with their enormously greater speed and eroding power due to increase of volume and height, they cut such deep valleys in the uplifted plateau that the traveller unversed in geology who journeys in the valleys sees only the steep valley sides and is hardly conscious of the plateau above. But the flattish upland now at an altitude of about 5,000 feet in the west, and the higher plateau and mountains in the east, are obvious enough from an elevated view-point, best from an aircraft, whence the structure stands out clearly, a tableland dissected by comparatively narrow, steep-sided parallel valleys with rushing rivers and many long deep lakes. The valleys and the whole grain of the land in the South Interior are aligned N - S (NNW -SSE in the east).

A geologically very recent chapter in the sculpture remains to be mentioned, the Pleistocene glaciation. The ice-sheets and glaciers have left their impress in the widening and smoothing of the valley-sides and in the veneer on the floors, in most valleys very prominent, of drift-deposits, boulder-clay (or till) and moraines, through which the rivers tumble over waterfalls and rapids. The many terraces ('benches') of soft silty deposits, which line the sides of most valleys and are very valuable sites for agriculture and settlements, are results, direct or indirect, of the same geological episode.

The Interior Uplands end in the east where the Rocky Mountain Trench rises to the Rocky Mountains, another direct continuation of the feature lines of the U.S.A., which here form the border between British Columbia and Alberta. They consist largely of sedimentary rocks, sandstones, clays, limestones, which were more or less contorted, in places overthrust, during the 'Laramide' earth-storm which marked the close of the Secondary geological era. But in some places the strata have remained nearly horizontal. After reduction of its height by long continued erosion the tract underwent uplift more than once in the Tertiary era, in the course of which long deep valleys were excavated, and finally the quarternary glaciation has added many minor features due to both erosion and deposit which are conspicuous to-day. The ranges are highest in the South, maintaining altitudes of 10,000 feet in long reaches between the international border and Mt. Robson, the highest summit of the Rockies in Canada, which from its lofty summit of 12,972 feet overlooks the Yellowhead Pass. The passes used by the railways are the Crowsnest, 4,459 feet, Kickinghorse, 5,338 feet, and Yellowhead, 3,700 feet.

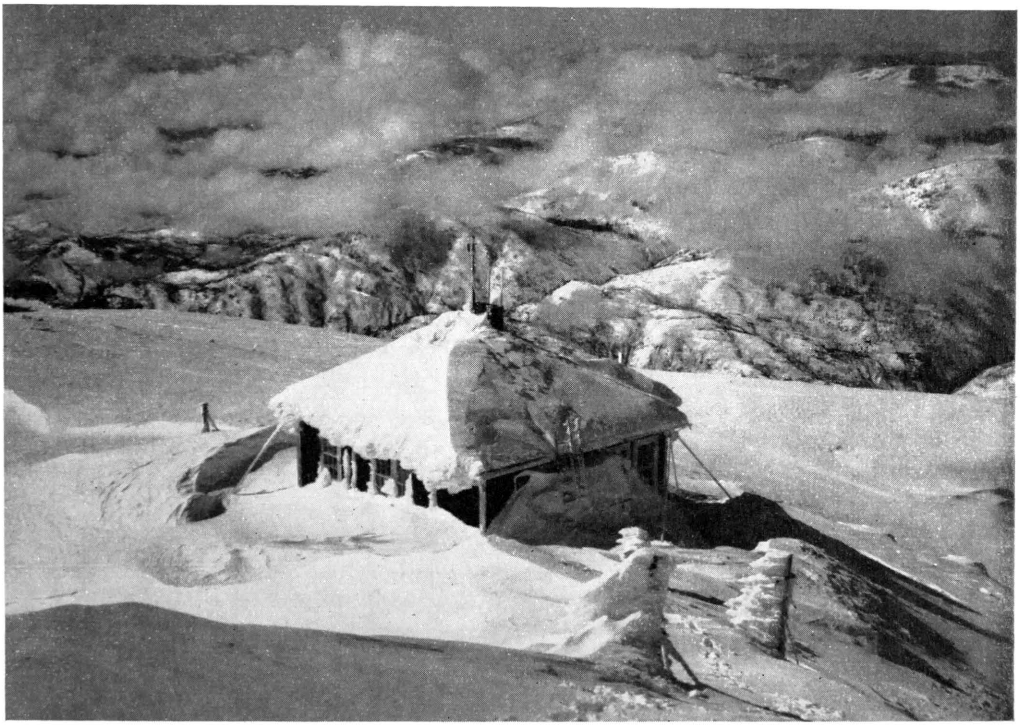
The South Interior may be conveniently subdivided into west and east. In the west the uplands are lower and many of the valleys wider and famous, not in Canada only, for orchards and other specialised agriculture. The climate

An irrigated orchard near Marmata in the Okanagan Valley. The average annual precipitation is about ten inches.

is in some respects less continental than in the rest of the interior. The Okanagan and adjacent valleys are the chief fruit (mostly apples) areas of British Columbia and one of the largest in Canada. The warm summer with fairly low humidity is a great climatic advantage. Precipitation is indeed low, but irrigation from the uplands is easy; it is said that 90 per cent of the fruit trees are irrigated. Spring frosts occur but they are moderated in many localities by the topography, and the benches round the south end of Okanagan Lake are noted for apricot and peach orchards. But inversion-frosts can be severe enough to do much damage, especially on low ground with poor air-drainage. More serious, but fortunately rare, are spells of cold in winter due not to inversion conditions but to long-continued freezing winds carrying polar air from the north, to which the benches and slopes are most exposed. Many fruit trees have been frost-killed even in the south of the Okanagan valley.

Some dairy-farming is possible on the moister valley-bottoms, and is increasing.

The east has its most characteristic expression in the Monashee Mountains, the Selkirks, and the other rugged highlands and mountains of the Kootenays (Old Glory, highest meteorological station in Canada, is on one of the heights), lofty uplands divided by narrow valleys with rapid rivers and picturesque



Old Glory Mountain, the highest meteorological station in Canada, altitude 7,700 feet.

ribbon lakes. Agriculture finds little scope and most of the valley-sides are still densely forested up to 4,000 feet, but reclamation of the deltaic flats at the south end of Kootenay Lake is now adding much valuable agricultural land. Large orchards, apple, cherry and other, flourish on the neighbouring slopes and benches. The climate in general is more continental than in the west and the upland type preponderates. The region is outstanding for its beauty and many-sided interest.

The subdivision into west and east suggested above is a reminder of the increase of continentality in the interior behind its screen of the Coast Mountains. Northward the change of climate is more prominent, and the 'North Interior' must form another Region. These divisions illustrate the contrast between the variety in the interior and the remarkable uniformity along the littoral.

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The Interior, North. The traveller coming from the south can hardly fail to notice when he passes beyond Lillooet or Ashcroft or Kamloops that he has entered another region, distinctive in topography, climate, and most aspects of life. It is the North Interior, about 350 miles long and 250 miles wide.

It resembles the South in its geological structure and history but differs much in the more conspicuous aspects of topography. We miss the prominent N - S grain of the south, for the north is a land of rolling hilly uplands of grass and forest, the ranching country of British Columbia. Valleys are many, but much less regular in pattern and direction, and most of them far more open, less steep-sided, than those in the south.

The Region may be conveniently divided into west, central, and east, but meteorological records are too few to delineate the climatic differences clearly. The central section is lowest. Its major feature, the wide open depression or vale of the Fraser River south of Prince George, the channel which collects the rivers from both west and east, may be regarded as the topographical axis of the North Interior. In parts of its course down the vale the Fraser has cut very deep gorges with almost precipitous sides, forming in places a barrier hardly less formidable for passage across from west to east and for navigation than its more famous canyon below Lytton in the South Interior. But the central division is the natural corridor for passengers and freight between north and south. Along it run the Pacific Great Eastern Railway (now continued to Prince George) a short reach of the Grand Trunk Pacific (Canadian National Railway) north of Prince George, and the major and only through highroad, successor for automobile transport to the Old Cariboo trail. The less turbulent reaches of the Fraser were used for navigation in the old days of explorers, miners, and settlers, but long ago lost importance and navigation is now entirely given up.

The west division is the largest and it comprises a great expanse of rolling uplands, partly grass-covered but mostly forest of Engelmann spruce and Alpine fir. In the north it is drained by the Skeena River and its many tributaries through a very deep gorge beyond Hazelton to the Pacific, and by the Nechako River which runs east to join the Fraser at Prince George. The Skeena and the Nechako drain the largest group of lakes in the Region; the longest lake, Babine, is drained by the Babine River which takes a circuitous course to the Skeena at Hazelton. The Bulkley (tributary of the Skeena) and Nechako valleys contain most of the towns and larger settlements of the Region, Prince George, Vanderhoof, Burns Lake, Houston, Smithers, Hazelton. Some farming round and west of Prince George is the northernmost arable agriculture in west Canada. Moisture is adequate and indeed sometimes rain in late summer spoils the harvest. But winter frost goes down 6 feet and often kills perennials; even the hardiest fruit trees are eliminated. Forage crops and especially hay supply the dairy-farming, the major agriculture. Oats are grown and a little wheat.

Most of the rest of the Region is the basin of the Chilcotin River and its tributaries and is called the Chilcotin Country. Here the rolling uplands sweep to boundless horizons in the north, but south of the Chilcotin River they narrow to an apex south of Dog Creek; their elevation is about 4,000 feet. The valley-floors are at about 2,000 feet in their middle courses and are grassland up to about 3,000 feet. The wide uplands and valleys contain valuable ranches of thousands of head of cattle which find their food in the rich bunch-grass, their shelter in the scattered forests and clumps of trees. Forage crops for winter-feed are grown in the valleys. It is the source of most of the meat-supply of British Columbia and in good years enough is left over for export to the Western States. The chief road of the district runs west from Williams Lake up the wide vale of the Chilcotin River which contains much of the scanty population.

The eastern division rises, irregularly but fast, from the Fraser corridor towards the Rocky Mountains as if intending to join them. But the plateau ends abruptly within sight of that goal at the Rocky Mountain Trench, where its loftiest tract, the Premier Mountains, attains 11,750 feet in Mount Sir Wilfrid Laurier opposite Mount Robson, giant of the Rockies. East of the upper Thompson River the division contains the north of the Monashee and Selkirk Mountains. The plateau as a whole is called the Cariboo Mountains. The climate is more continental than in the Chilcotin country, and its west-facing slopes get good precipitation (Barkerville 40 inches) which feeds many rivers and lakes and waters many ranches; other large areas might be developed for ranching if irrigation from the deeply-incised rivers were less difficult. Gold-mining, the first and great industry, has been almost defunct for many decades and Barkerville, centre of the Quesnel gold-fields, has long fallen from its old prosperity.

Scenic Contrasts. In middle latitudes the change from windward coast to interior tends everywhere to be abrupt but perhaps nowhere is it more abrupt than in British Columbia, particularly in winter when it is very impressive.

The Littoral with its belt of mountain-ranges on mainland and islands, a tract about 100 miles wide, faces the warm ocean. The mild open winters and copious rains clothe the slopes up to about 4,000 feet (but the tree-line varies locally) with dense forests of the giants of the tree-world, Douglas firs up to 200 feet in height and 15 feet in girth at man's height (Douglas Firs are numerous only in the south half of the Littoral where the summers are warmer and drier than in the north), hemlocks to 150 feet, red cedars and in the Charlottes and other islands Sitka spruce over 100 feet, all flourishing on the first three thousand feet of the slopes, and above them alpine fir and mountain hemlock. Smaller trees and shrubs add a carpet of thick undergrowth. The tree-line is about 4,500 feet. The great mass of vegetation is a riot of luxuriance 'dark at noonday, dank in the rain of winter, dry and cracking in the summer drought, panting beneath the autumn fires; man cannot live long under its oppression, beside the giants that reduce him to a creeping pigmy' (Hutchison). Above the highest trees are mountain scrub and rough grass, and to cap all perennial snow above 6,000 feet; but in winter the snow lies deep in the forests also down almost to sea-level. The forests are evergreen. Green too, but with a brighter green, are the grass-covered flats of the vale of the lower Fraser.

The vale of the lower Fraser is the widest of the few entries to the interior, and a journey up it brings the traveller to a new land in the Interior less than 100 miles from the sea. Much of the vale was forested before man cleared it with axe and faggot for his orchards and agriculture, but the forests were lighter, the trees smaller, than near the coast.

In striking contrast to the trees mentioned above are two broad-leaf species, the madrona (*arbutus Menziesii*) and the Garry-oak (*quercus Garryana*), which are indigenous in only a small area of British Columbia, on the relatively dry southeast coast of Vancouver Island and on the coast of the mainland south of

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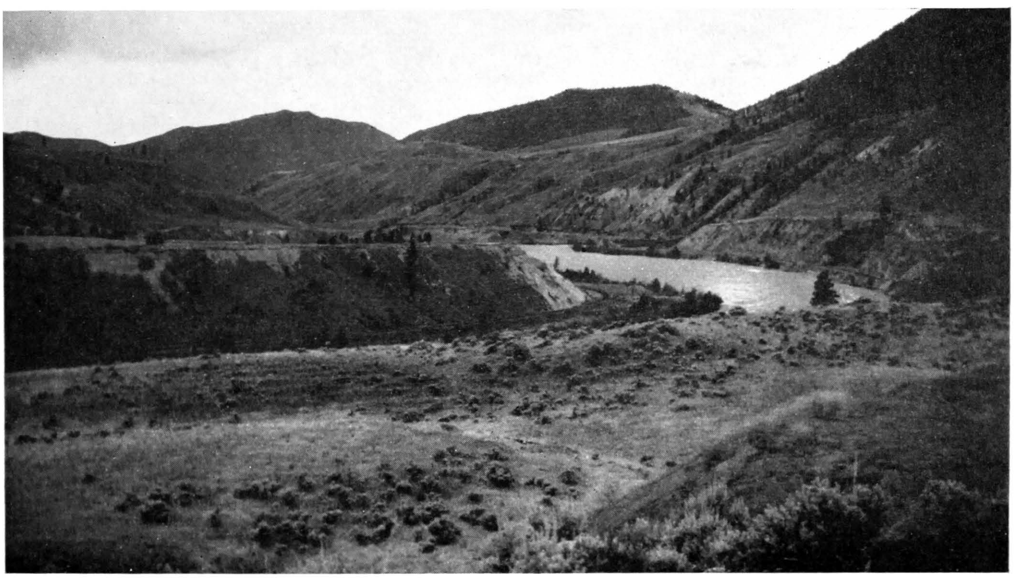
Jervis Inlet. They are elements of the 'Mediterranean' flora of the littoral of California, and have been able to spread north as far as the dry warm summers extend.

A stand of red cedar on Vancouver Island where the average annual precipitation is more than 80 inches.

In the South Interior natural grass covers the dry valley bottoms and lower slopes, varied with poplars on the damp tracts. The uplands above 3,000 feet have light, open forest of Douglas fir (trees about half the size of those on the Littoral), lodgepole pine and western yellow pine, and the highest levels mostly Engelmann spruce and Alpine fir.

Orchards flourish on the flat and fertile benches of the valley-sides which can be irrigated from mountain streams. The apple orchards are the most renowned throughout Canada. Peaches also, and other fruits sensitive to cold are grown in favoured spots, but they suffer in the coldest spells.

We must ascend the Fraser through its canyon to the confluence of the Thompson River to find the climax of the aridity of the South Interior. Here in the deep enclosed valleys of the lower Thompson between Kamloops and Lytton, the Fraser between Lillooet and Lytton, and the Nicola the mean precipitation of not much more than 7 inches a year is the least in the Province, a fact faithfully reflected in the plant-life. Of forests there are none and the trees are few save scattered clumps of stunted jack-pine, mere bushes after the great trees of the Littoral. The almost treeless land, steep slopes and flat benches on the valley-sides, is covered with clumps of grey sage-brush and dwarf cactus. Cultivation is possible only on parts of the benches which can be irrigated by runnels of water coming from the moist depths. Much of the ground is bare but some can be grazed (and over-grazing is in part responsible for the spread of



Sage-brush and grass covering in the Thompson River valley near Ashcroft. The average annual precipitation is 10 inches.

sage-brush). The mild, equable, cloudy climate of the littoral, humid to saturation much of the year, is changed for sunshine and drought, air dry and pungent with the fragrance of sage-brush and at times with alkali-dust. Here the drought loving rattlesnake finds a favourite habitat and multiplies. Ascroft is the metropolis of this dry belt and round it the dry terraced valleys run for many miles. Kamloops marks its eastern end but is essentially a town of the dry belt, for its welcome patch of bright verdure, trees, orchards, gardens, flowers, is based on the water of the Thompson River and round about are the arid bare slopes and benches where scanty local precipitation is master.

The Interior, even the valley-floors, is usually snow-covered in winter. The air is much colder and drier than on the Littoral. The sky is often clouded, but with clouds which are lighter, higher, less oppressive, than the massive canopy which nearly always hides at least the upper slopes of the Coast Mountains. In summer the contrast of sky and vegetation is less impressive, for the snow has gone and the sky may even be less cloudy on the Littoral in its dry summer months than in the Interior.

Farther east, in the higher and more rugged uplands and less cultivated valleys of the Kootenays, forests become more dense, trees higher, than in the west though still much inferior to those of the Coast. Douglas firs and yellow pine appear again but no longer as giants of the tree-world; white pine, western hemlock, and red cedar are other common species. In the drier Rocky Mountain Trench Douglas fir and pines, yellow and other, find congenial conditions but the broad floor of the Trench may be described as being now good grass land interspersed with woods and clumps of trees. The forest spreads more extensively on the slopes of the Rocky Mountains, too remote to encourage the lumberer, up to 5,000 feet to 7,500 feet, the highest tree-line in the west of Canada.

The heavy snow in winter recalls the Coast Mountains. It lies very deep on the Selkirks and the Rockies, large snowfields remaining throughout the year and feeding small glaciers.

The mountains east of the upper Thompson River are black with almost unbroken forest of fir, cedar and spruce, variegated with poplars and cottonwoods on the moist valley-floors.

The North Interior resembles the Rocky Mountain Trench of the southeast more than the rest of the South Interior, but it varies considerably over its large area. Its wide open expanses, bright (rather than cloudless) skies, clear air, and wonderfully distant views from the uplands, charm settler and visitor alike.

The land is snow-covered from November to March, but in the lower valleys of the south the snow is not usually more than a foot deep.

The valleys are carpeted with grass, but trees, scattered in clumps or in forests, cover most of the uplands, in varying abundance. Of conifers, black and white spruce, lodgepole pine in the drier and more open habitats, and alpine fir are the common species; and the broad-leafed aspen and balsam-poplar flourish on the damp lowlands. Little arable agriculture is carried on, none north of the Nechako River.

Clearly British Columbia is a land of mountains and uplands and valleys. Flat ground of any area is exceptional. But two such areas to which reference has been made in the preceding description are—the one so important the other so striking, as to call for a few paragraphs.

The Vale of the Lower Fraser. The lower Fraser lowlands and delta, which may be named the Vale of Fraser, form only a very small part of British Columbia, but nevertheless it is by far the largest of the scanty flats west of the Rockies and in 1951 it contained more than half of the population of the Province (530,728 in the Vancouver Metropolitan Area alone). The Vale is bounded sharply on the north by a transverse section of the Coast Mountains mostly over 4,000 feet, and in the south it spreads beyond the international border between the sea and Chilliwack but east of Chilliwack the Coast Mountains close in on the south as well as the north. It is widest below Abbotsford, with large tracts of delta on mainland and island liable to flood from both tide and river. Rich farms of lush pasture on the flats, arable on the drier ground, extend east to Hope, gateway to the Interior uplands, but the mountains already intrude as bold detached islets in the flat plain above Chilliwack, Sumas rising to almost 3,000 feet. At Hope the Fraser River makes the last of its many remarkable bends. After its tumultuous torrential course from north to south through its famous canyon below Hell's Gate between the Coast Mountains and the Cascades, it swings round towards the west for its last and comparatively peaceful reach of 90 miles to the Strait of Georgia.

The Vale was heavily forested, but most has been cleared in the last hundred years.

The climate is maritime and much influenced by the Coast Mountains. Mild polar Pacific air is nearly always present and may be saturated with vapour for days or weeks in winter. The annual precipitation, mostly rain but a good deal of it snow in the east, exceeds 60 inches near the mountains but decreases fast towards the south. Winter is warm for the latitude and the land is green all the year, with interruptions by snow in winter and by scorching to brown in summers more than usually hot and dry.

The Rocky Mountain Trench. This in one of the most remarkable of the natural features of British Columbia. It extends as a remarkably straight longitudinal depression, its floor about 5 miles wide, from the international border to the north of the Province, on past the Liard River, far into Yukon Territory—a great trench between the Rockies on the east and the Selkirks, Purcell Ranges, the Cariboo Mountains and other uplands, on the west. It is well named 'trench' rather than valley. The former glaciers and the present rivers have deepened the structural channel they found ready for them, in which river now follows river for many a league till it finds an exit to the west. It is Nature's own trench, offered to man as a route for road and rail, but man has made little use of the gift for it still contains no large towns and very few small ones; no major roads or railways follow the natural 'cutting' for more than a few miles, for unfortunately neither its position nor its direction is suited to most of man's present needs.

Open pine forest of the Rocky Mountain Trench, twenty miles north of Kimberley.

Climatically it is the most continental of the valleys of the Province and in the south perhaps the most pleasant for man, blessed with bright skies, pure clear air, cold but crisp winters, dry invigorating summers, precipitation rather scanty but eked out in times of drought by the streams from the melting snow and ice on great ranges on each side. A small amount of mixed farming is carried on, and it attains some importance around Cranbrook.

1.2 The Major Regions and their Climates

The whole Province lies full in the Westerlies. The Westerlies circle the middle latitudes of both hemispheres and their major climatic features are repeated in several regions, south Chile, Norway, the mountainous littorals of northwest Europe and New Zealand, as well as in British Columbia. The distinctive features on and near the oceans are the mild humid winters, the warm but not hot summers, and the small range of temperature. Frequent irregularities of barometric pressure, high and low pressure systems, bring air-masses from distant and diverse regions to give notoriously variable weather.

The mild winters are a result of the oceanic conditions in the Pacific. The North Pacific Drift which washes the coasts is a continuation of the Kuroshio, the Pacific counterpart of the Gulf Stream of the Atlantic, but considerably less effective as a heating agent for British Columbia than the Gulf Stream for northwest Europe. The Kuroshio carries the very warm water of the North Equatorial Current (temperature over 80°F.) in a massive stream north and northeast, till off Japan it spreads widely and loses its intensity. Its temperature has by then fallen to about 70° in summer, 60° in winter. Caught up by the prevailing westerly winds the surface water is driven east as a warm Drift (the North Pacific Drift) and crosses the ocean to meet the North American coast off the State of Washington where it divides, one branch going north and giving British Columbia its mild winters, the other south as the cool California Current. A measure of the oceanic warmth is the temperature of the air over the water, which about midway between Japan and America is more than 20° above the mean for the latitude round the globe. Atmospheric pressure shows its usual tendency to be low over a damp heated surface in the Aleutian low-pressure system, scene of the irregularities of pressure mentioned above.

Mountain influences increase the general rainy tendency and the windward slopes of the littoral of British Columbia have precipitations among the largest on the globe.

East of the Coast Mountains is a pronounced rain-shadow. Precipitation decreases abruptly and continental conditions appear, cold winters with snow, hot summers, larger range of temperatures.

Littoral. The outstanding feature is the mildness and humidity of the winters for the latitude, and the heavy precipitation increasing to enormous depth on the mountains. On the low ground frost is usually slight, zero readings being very exceptional but not unknown when continental polar air makes its rare appearance. Snow falls on a few days in most winters but it is damp and soon melts, but the mountains, even their lower slopes down almost to sea-level, are under many feet of snow from November to March.

The rains decrease after March and are least in July and August which form a pronounced dry season with bright sunny days recalling lower latitudes and making amends for the weeks of oppressively gloomy sky and drenching rains in winter. The air is warm but the sea-breeze checks any great heat in the afternoon.

Autumn may be said to begin towards the end of September, the nights become cool (and damp and sometimes foggy on the flats) and the rains begin.

The south of the Littoral contains nearly half of the cultivated land of the Province. The flat tracts of the east and south coasts of Vancouver Island and of the coast of the mainland south of Powell River, including the Vale of Fraser, have great agricultural assets in their open winters and good precipitation, offset, however, by liability to long drought in summer. It is the great country for dairy- and poultry- farming, the production of early vegetables and soft fruits, and near Victoria bulbs and flowers.

South Interior. The climate is a continental one, of a mild form in the west, medium intensity in the east. Winters are cold and the land is under snow (usually of no great depth in the valleys) during most of December and January. Temperature rises fast in March and spring is a pleasently dry and bracing season, summer warm with many hot days but cool and occasionally cold nights. Precipitation is light and well distributed over the year; it is notably light in the 'dry belt' round Ashcroft. Summer and winter get most, spring is definitely dry and in the west autumn is almost as dry. Of the months June is noticeably more cloudy and rainy than its neighbours, September (in some valleys October) notably dry. Most of the precipitation is snow in December, January, and February. In summer heavy showers, many of them in thunderstorms, provide much of the rain, but the showers are soon over and summer is a season of bright skies, by far the least cloudy season in contrast to the rather bleak cloudy winters. The uplands are cool in summer cold in winter, and have more precipitation than the valleys, but west of the Selkirks even the uplands do not get excessive amounts (e.g. Old Glory, 24 inches) and their skies are not more cloudy than in the valleys. The Selkirks and Rockies get much more, including great depths of snow in the winter half-year; Old Glory may have a day or two with snow in July and August as well as in the cooler months.

The east of the South Interior tends to be more continental in temperature than the west, particularly the Rocky Mountain Trench. Winter is colder and summer warmer altitude for altitude. But most of the valleys and still more the uplands are higher than those of the west and their actual mean temperatures are about the same. The east is nearer the hot western plateau of U.S.A. whence heat waves of continental tropical air arrive in summer, so that even the highest valley stations record maxima as high as stations in the west one and two thousand feet lower. After appropriate reduction to sea-level the summer temperatures in the southeast are the highest in west Canada (Fig. 17).

North Interior. The North Interior is more uniform in climate as in topography than the South, but the effect of altitude is hardly less though it is less abrupt than between the deep valleys and the uplands of the South.

The chief characteristic is the long cold winter, liable to intense cold when continental polar air sweeps out of the north and storms over the rampart of the Rockies. Summers are short and much cooler than in the South.

The warm tropical air to which the South of British Columbia owes its summer heat very rarely makes its way into the North, and the July and August means are about the same as in the valleys at the same altitude in the Yukon near the Artic circle where long days compensate lower sun.

Precipitation is not heavy. It is least in the west most closely shadowed under the Coast Mountains, but there the streams are fed by the copious rains and melting snow of the heights. Unfortunately this water in the deep valleys is not easily accessible for use on the uplands, a serious limitation to the area of profitable ranching. Snow replaces rain in October, and the white blanket covers the land till April with few interruptions, but it is not usually deep in the lower vales. The Cariboo plateau gets more precipitation but here too the possibilities of irrigation which would greatly increase the ranching country are disappointing.

The great open spaces of grassland or light woods, the bright skies, the dry and bracing air thanks to which the cool summers are pleasant and even the winter cold tolerable, the wonderfully clear atmosphere which seems to offer no obstacle to vision for tens of leagues—all combine to make these ranches a very attractive as well as profitable home for their owners, and the whole region a favourite holiday resort for residents in the humid, cloudy, rainy littoral.

1.3 Meteorological Stations

Table 1 contains a list of the stations used in this Chapter with their positions and altitudes. They are numerous on the Littoral and in the valleys of the south of the Province, many having a long series of records. Elsewhere, in the valleys of the North Interior and on the uplands everywhere, they are quite inadequate to delineate the climate of a land of such strong relief. Many stations of the earlier years of settlement have long been abandoned and their records are short. Of the better-equipped later stations few were established before 1935, most since 1940, to serve the needs of air navigation. In some places an older station in the town has been continued with a new one at the neighbouring airport, but owing to the usually much more exposed position of the airport, the records of the two stations, though they may be not far apart, are not strictly comparable. In some cases where the difference does not seem to be large the two records have been combined in this Section to form one long series, but in others that is not possible since the differences are serious, as between Vancouver City and Vancouver Airport.

The paucity of stations on the uplands makes the most unfortunate gap in our knowledge of the Province, so much of which is mountain or plateau. The only station above 7,000 feet is on Old Glory Mountain, 7,700 feet; it was set up in 1944, but has provided full observations only since 1949.

At the airports complete eye-observations are taken at the 4 synoptic hours (0030, 0630, 1230 and 1830 G.M.T.) and continuous automatic records are maintained of pressure, wind, temperature, and at some stations other elements. The observations at 0430 and 1630 L.S.T. (1230 and 0030 G.M.T.) are used in this Chapter to represent the night and early morning and the afternoon conditions.

In some Tables the percentages (e.g. of frequencies) do not add to exactly 100, and the totals of numbers of days in the monthly columns may exceed or fall short of the number of days in the month. Most of such discrepancies arise from the smoothing of values to their nearest unit.

Several Tables give the number of hours in which phenomena are observed. The phenomenon was counted if it occurred at any time, even for only a few minutes, during the hour; it need not have continued throughout the hour.

Table 1

Position and altitude of stations mentioned in the text

Station	Latitude N. °	′	Longitude W. °	′	Altitude feet
Abbotsford (A)	49	1	122	22	198
Agassiz	49	14	121	46	52
Alberni (Beaver Creek)	49	16	124	49	300
Ashcroft	50	42	121	19	1,600
Barkerville	53	2	121	35	4,180
Bella Bella	52	10	127	9	60
Bella Coola	52	20	126	52	10
Big Creek	51	44	123	0	3,100
Bralorne	50	51	122	55	3,500
Britannia Beach	49	39	123	11	160
Bull Harbour	50	55	127	57	15
Campbell River	50	1	125	24	50
Canal Flats	50	9	115	49	2,653
Cape St. James	51	56	131	1	292
Carmi	49	30	119	5	4,084
Chilliwack	49	10	121	57	21
Chute Lake	49	44	119	31	3,916
Clayoquot	49	9	125	55	25
Comox (A)	49	43	124	54	75
Copper Mountain	49	18	120	34	3,946
Cranberry Lake	52	50	119	20	2,460
Cranbrook (A)	49	32	115	46	3,013
Crescent Valley	49	27	117	34	2,000
Creston	49	5	116	31	1,990
Daisy Lake (Garibaldi)	50	0	123	5	1,200
Deadtree Point	53	22	131	56	47
Dease Lake	58	25	130	0	2,678
Dog Creek (A)	51	38	122	15	3,370
Dome Creek	53	45	121	5	2,200
Elko	49	20	115	8	3,000
Esquimalt	48	26	123	25	45
Estevan Point	49	23	126	32	20
Fernie	49	30	115	4	3,305
Field	51	23	116	29	4,064
Finlay Forks	56	0	123	49	1,900
Fort St. James (Stuart Lake)	54	28	124	12	2,280
Gerrard	50	30	117	18	2,350
Glacier	51	14	117	29	4,094
Golden	51	16	116	55	2,583
Grand Forks	49	0	118	28	1,746
Greenwood	49	5	118	41	2,466
Hedley	49	21	120	5	1,771
Hedley (Nickle Plate Mine)	49	20	119	59	5,800
Henderson Lake (Kildonan)	49	2	125	1	20
Hope	49	23	121	26	152
Hope (Little Mountain)	49	25	121	25	580
Invermere	50	30	116	2	2,650
Ivory Island	52	16	128	24	50
Kamloops	50	42	120	22	1,133
Kelowna	49	52	119	28	1,160
Keremeos	49	13	119	50	1,165
Kimberley (A)	49	44	115	47	3,016
Kleena Kleene	51	59	124	59	2,950
Langara	54	15	133	3	134
Lillooet	50	41	121	56	740
Lytton	50	14	121	34	574
Masset	54	2	132	8	10
Masset (A)	54	0	132	10	42
McCulloch	49	48	119	12	4,100
Merritt	50	6	120	47	1,940

Table 1—Cont.

Position and altitude of stations mentioned in the text

Station	Latitude N. °	′	Longitude W. °	′	Altitude feet
Nanaimo	49	10	123	57	100
Nelson	49	29	117	21	2,035
Newgate	49	2	115	10	2,800
New Westminster	49	13	122	54	50
Ocean Falls	52	23	127	40	16
Okanagan Centre	50	5	119	28	1,155
Old Glory Mountain	49	9	117	55	7,700
Oliver	49	11	119	34	995
Pachena Point	48	43	125	6	150
Patricia Bay (A)	48	39	123	26	66
Penticton (A)	49	28	119	36	1,121
Port Alberni	49	13	124	50	140
Port Hardy (A)	50	41	127	23	74
Powell River	49	53	124	34	176
Premier	56	3	130	1	1,371
Prince George (A)	53	54	122	40	2,218
Prince Rupert	54	17	130	23	170
Princeton (A)	49	28	120	31	2,283
Quatsino	50	32	127	40	8
Quesnel (A)	53	2	122	31	1,787
Revelstoke	51	0	118	12	1,497
Rossland	49	4	117	48	3,305
Seymour Falls	49	26	122	57	674
Sinclair Pass	50	38	115	55	3,840
Smithers (A)	54	50	127	10	1,718
South Slocan	49	27	117	31	1,638
Steveston (Garry Point)	49	6	123	11	6
Summerland (Exp. Farm)	49	34	119	40	1,600
Terrace	54	42	128	35	225
Tunnel Camp	49	39	123	11	2,200
Vancouver (City)	49	17	123	5	45
Vancouver (A)	49	11	123	10	22
Vavenby	51	42	119	45	1,545
Vernon	50	15	119	16	1,383
Victoria	48	25	123	19	228
Warfield (Trail)	49	7	117	42	1,367

CHAPTER 2

Pressure Systems, Air Masses and Frontal Zones

2.1 Pressure Systems

The great pressure systems, which have a strong tendency to persist in their appropriate latitudes and control the major movements of the atmosphere, stand out clearly in the charts of mean pressure (Figs. 3-6 and 7, 8)[1]. The dominant systems for west Canada are:

- the sub-tropical high pressures of the North Pacific
- the low pressures of middle latitudes, in particular the Aleutian south and east of the Aleutian Islands
- the high pressures over the Arctic
- the high pressures (in winter) over northwest Canada, centered in the Mackenzie valley

These systems are not constant in position or intensity, but they are persistent enough to form definite entities and to constitute 'centres of action', mainsprings of the wind systems. They must now be treated in more detail.

The axis of the sub-tropical high pressures is about 30° N. in the North Pacific in winter. Pressure is about 1020 mb. in the east, but across most of the ocean there is only a belt of little intensity connecting the anticyclone over the southwest of the U.S.A. and the much larger and more intense one over Asia.

The low pressures of middle latitudes are specially prominent in winter, centered in January south of the Aleutian Islands with mean pressure below 1002 mb., whence they extend east in a wide belt covering much of British Columbia and Yukon Territory.

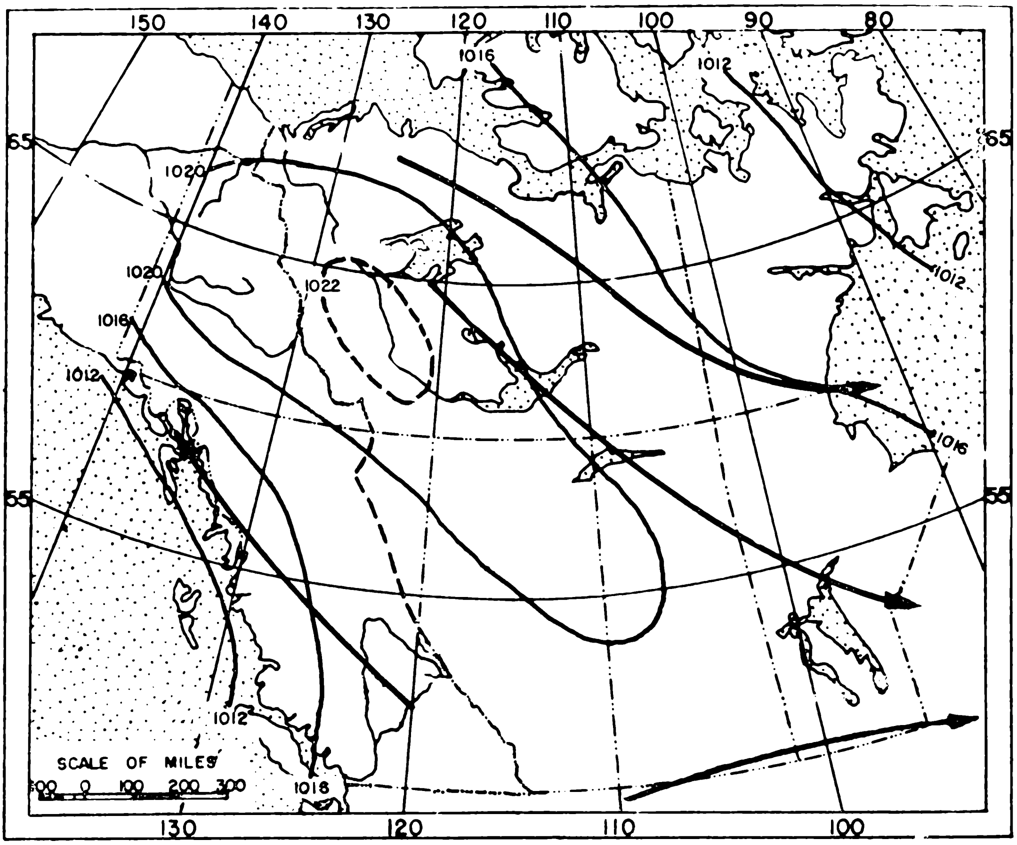
The Arctic high pressures form a shallow 'cold' anticyclone.

The continental anticyclone over northwest Canada is another 'cold' anticyclone, an extension of the Arctic high pressures resulting from the intense winter cold. The system is elongated NW—SE, and the isobars over British Columbia show the same trend.

In the winter distribution the low temperature imposes a strong thermal modification on the 'Planetary' pressure systems, increasing the pressure over the cold land and decreasing it over the relatively warm ocean. In summer the land is hot and the ocean cool, so that the thermal modification is reversed. It is most obvious in the sub-tropical high pressures. The narrow oceanic belt of winter is intensified into a vast ('warm') anticyclone which extends so far north that it annihilates the Aleutian Low, and dominates the whole ocean. The closed anticyclone of winter over the southwest of the U.S.A. is dissipated by the heat, and replaced by shallow surface low pressures. The change in actual pressure from winter to summer in the east of British Columbia is remarkably small, the 1016 mb. isobar traversing the district in both January and July, but the gradient is reversed.

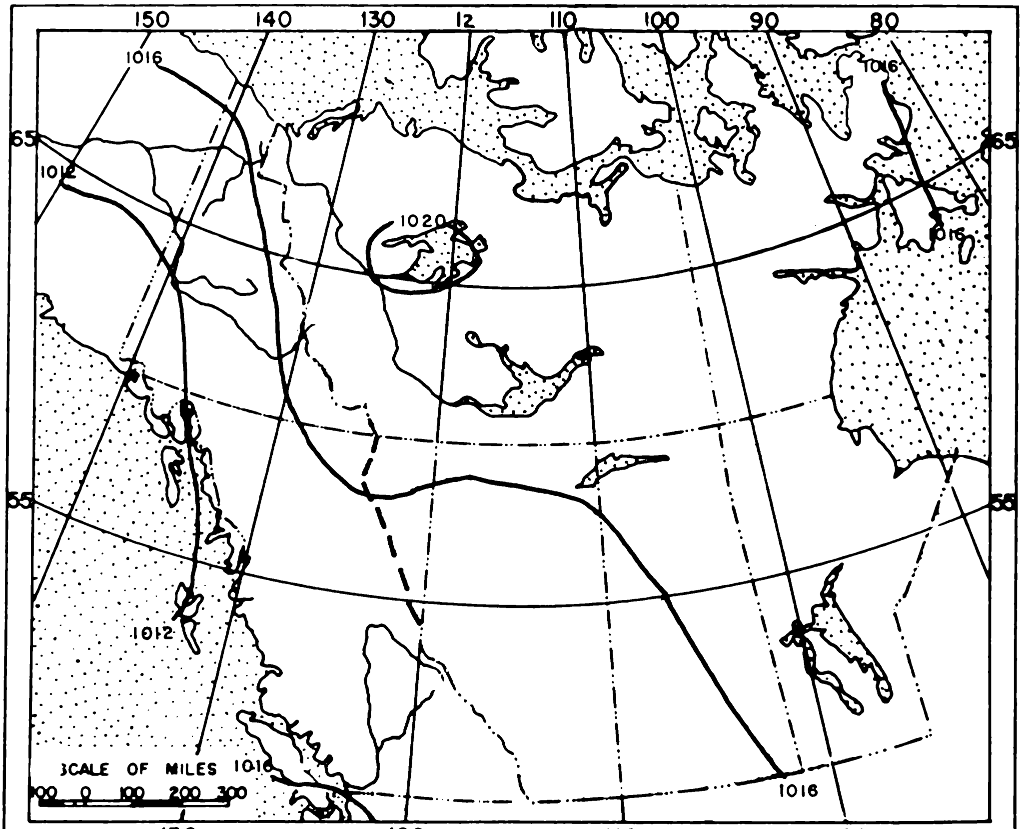
[1] All pressures in this Section are 'corrected to sea-level', a necessary adjustment to eliminate the effect of altitude which modifies and may even reverse the true atmospheric distribution.

Figure 3



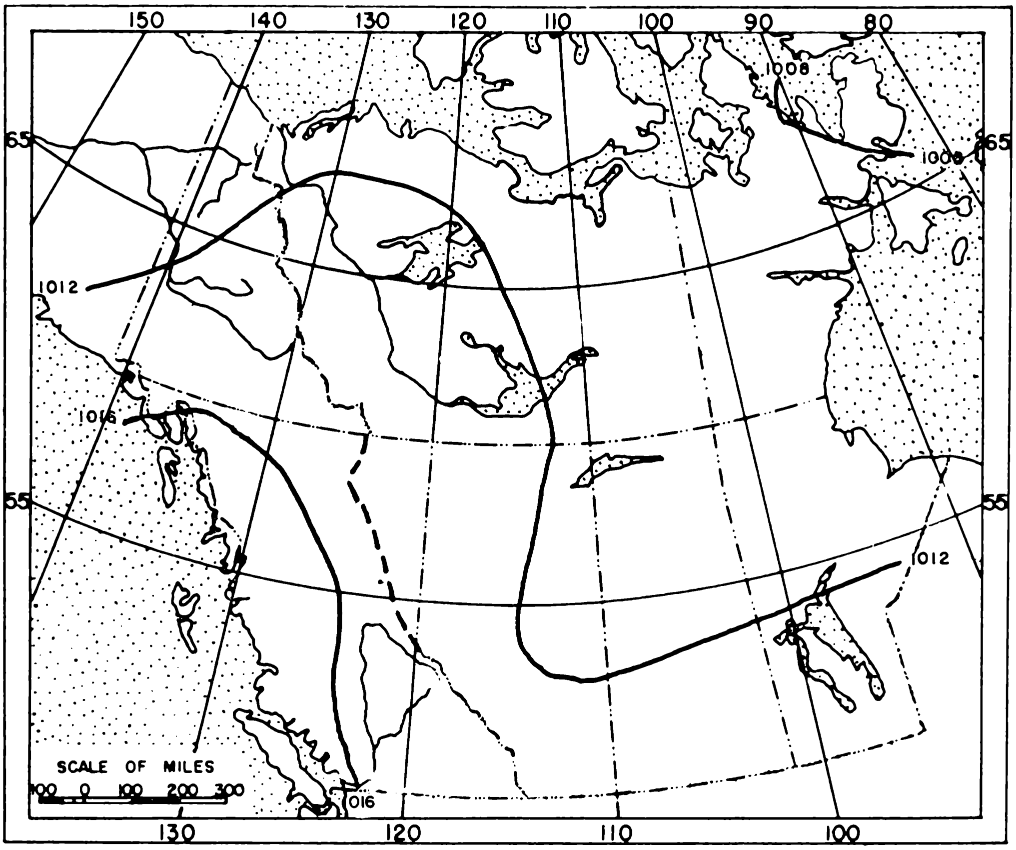
Mean January pressure (millibars) at sea-level. The arrows indicate the direction of the prevailing wind.

Figure 4



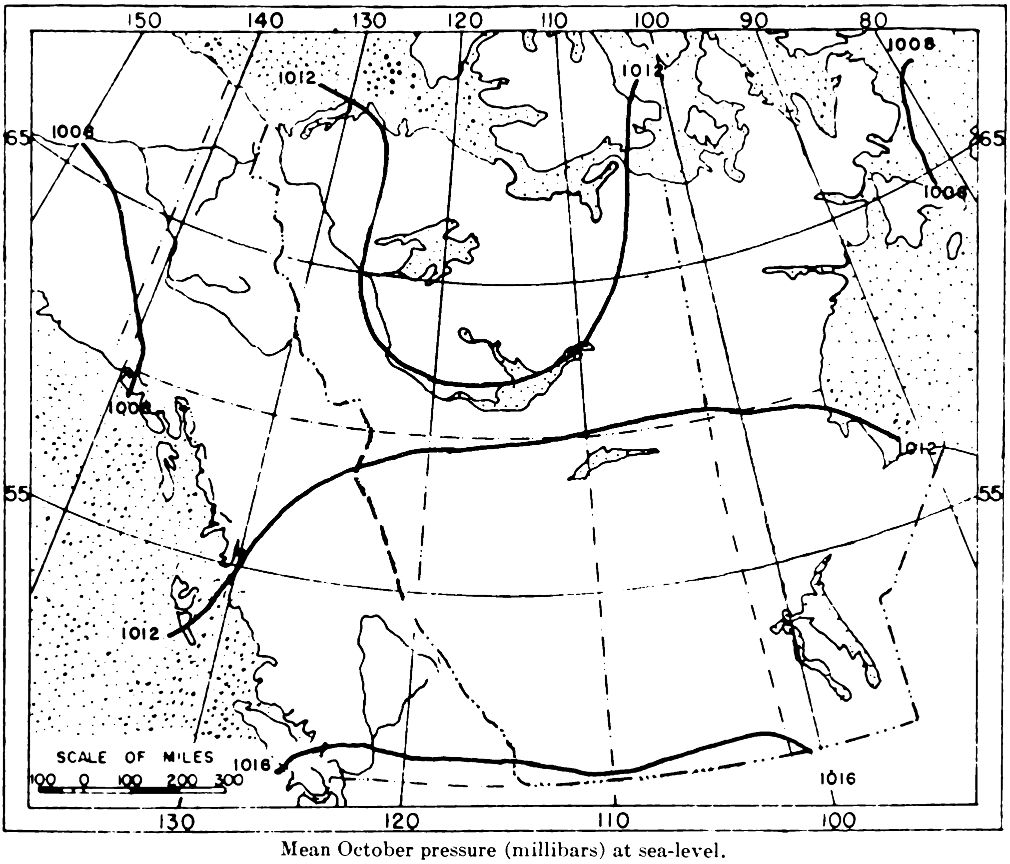
Mean April pressure (millibars) at sea-level.

Figure 5



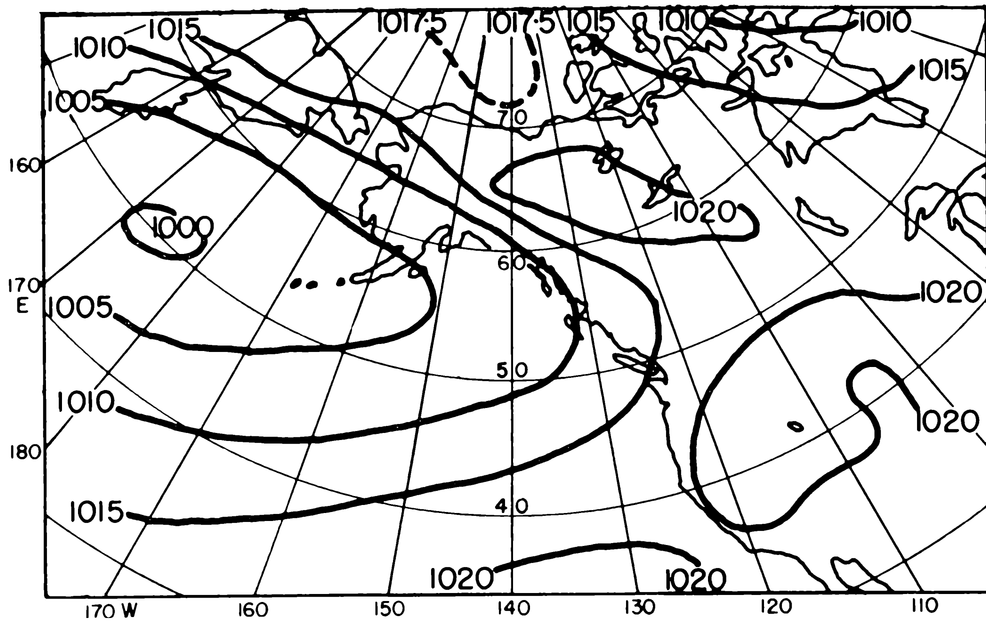
Mean July pressure (millibars) at sea-level.

Figure 6



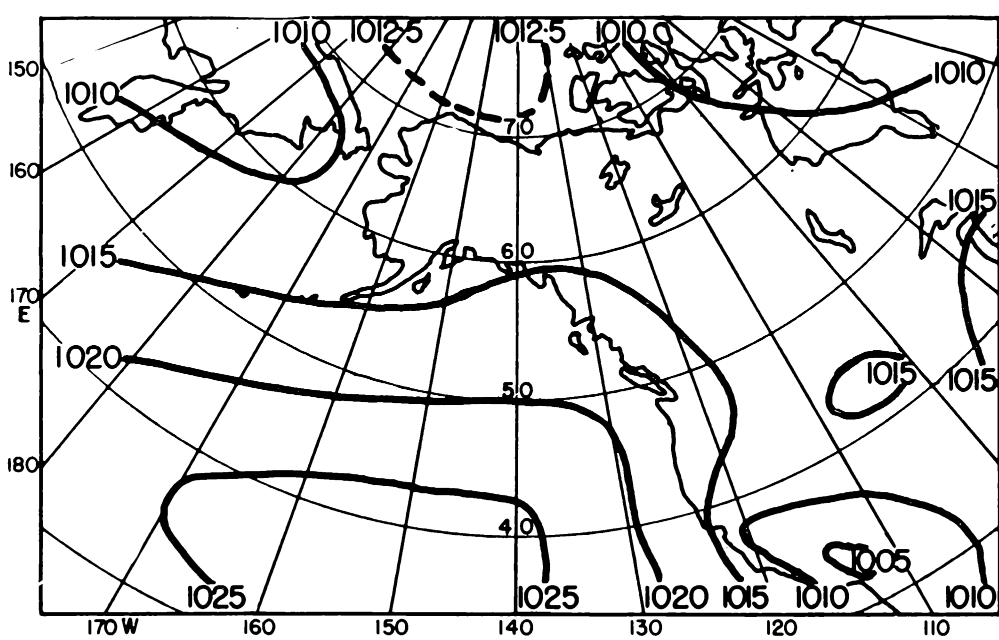
Mean October pressure (millibars) at sea-level.

Figure 7



Mean January pressure (millibars) at sea-level, for Western Canada and the North Pacific Region.*

Figure 8



Mean July pressure (millibars) at sea-level, for Western Canada and the North Pacific Region.*

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* Mostly from Normal Weather Charts for the Northern Hemisphere: U.S. Weather Bureau 1952.

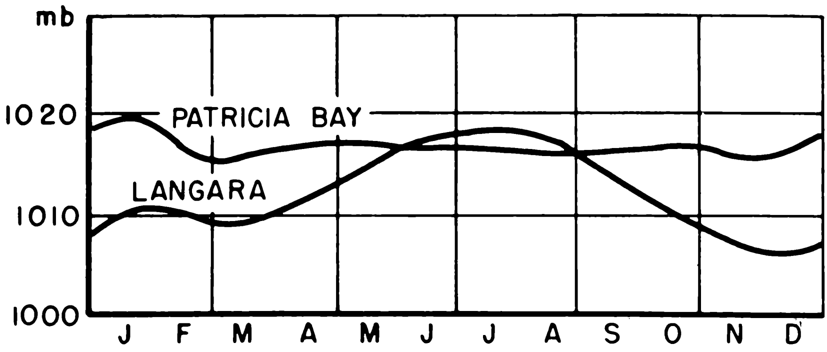
The Arctic high pressures persist, but their winter extension south as a 'cold' anticyclone in northwest Canada is broken down by the heated land and its place is taken by the low pressures which cover most of the interior (in the west by weak high pressures from the North Pacific).

The January and July distributions are, of course, the culminations of changes which are going on all the year. The winter distribution is dominant, with varying intensity, in the period October to April, the summer from mid-May to mid-September.

In the preceding paragraphs the pressure-systems have been described as though more or less permanent in form and position. But even the most simplified description must add that the great high and low pressûre-systems outlined by the mean isobars are scenes of great atmospheric activity in two respects. Firstly the systems (it still being assumed that they are definite entities) are always oscillating in position and changing their intensity. The most regular oscillation is seasonal, a result of the swing of the overhead sun between Capricorn and Cancer, and it is largely responsible for the seasonal change of weather conditions in the regions affected. Secondly, superimposed on this seasonal oscillation are almost daily minor oscillations, now north, now south, all the year round, and the shift in any one system generally has far-reaching effects; it is often the immediate cause of the setting in of a spell of weather, long or short. The day to day weather is associated directly with the smaller pressure-systems, anticyclones and depressions of various forms. Depressions travel more or less rapidly, speed 20—30 m.p.h., in a generally W-E direction, each dominating the weather in any district within reach usually for not more than 2 or 3 days. But they often come in series, interconnected families of four or five, and a series may hold sway for a fortnight or more. Such depressions are regular constituents of the Aleutian Low; indeed it may be said that, in part but only in part, that system, as outlined by the mean isobars, is merely a composite generalization of the passing depressions. In winter many depressions enter British Columbia from the ocean and continue their eastward course over the western mountains into the Plains, meeting no effective resistance in the continental high pressures, and some even being rejuvenated. Similarly the sub-tropical high-pressure belt is the favoured path of separate travelling 'warm' anticyclones, which intensify (or form) the high pressure normal to the latitude. Some of these warm anticyclones wander into the westerlies, and are well known even in winter in British Columbia. They are larger than depressions, and they move more slowly and erratically. Most give settled weather, usually light winds, no precipitation, and little cloud, but in some the weather is cloudy, possibly with light rain.

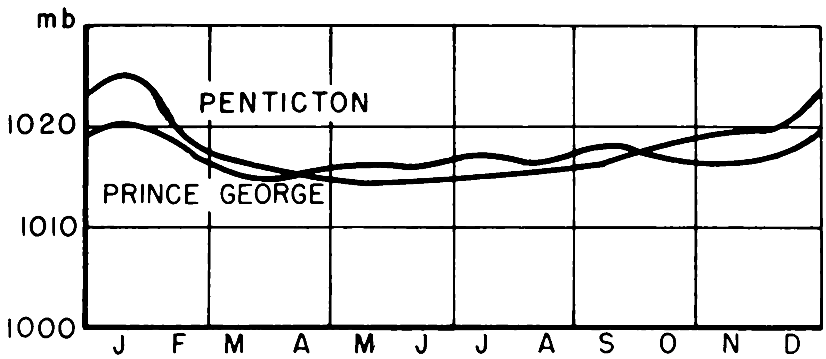
The mean annual range of pressure (i.e. the difference between the highest and lowest monthly means) is not large, indeed it seems very small in comparison with the large changes from day to day both on the ocean and inland. At Langara (Fig. 9) pressure is high in summer low in winter, the station being well within the Pacific anticyclone in summer and the Aleutian Low in winter. Patricia Bay (Fig 9) farther from the centres of the pressure-systems has remarkably constant means except for a rise in winter when the anticyclone over the west of U.S.A. is nearest and most intense. Penticton (Fig. 10) represents the South Interior of British Columbia, with highest pressures in winter in the outskirts of the cold anticyclone over Central Canada, lowest in summer when pressure is low over the heated continent. Prince George (Fig. 10) has a similar curve but a rise appears in September when the summer low pressures of the

Fig. 9



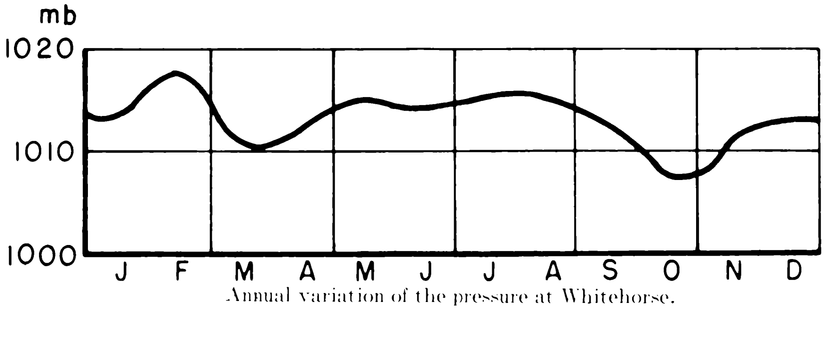
Annual variation of the pressure at Patricia Bay and Langara.

Fig. 10



Annual variation of the pressure at Penticton and Prince George

Fig. 11



Annual variation of the pressure at Whitehorse.

interior are filling up, and the Aleutian Low of winter is not yet fully developed. The graph for Whitehorse (Fig.11) is representative of a large area in the north of British Columbia and most of the Yukon; the two maxima, in winter and summer, are effects of the proximity of the continental anticyclone in winter and the North Pacific anticyclone in summer, the mean pressure at Whitehorse being much the same in the two seasons. Equally prominent are the minima at the equinoxes which may be called 'residuals', the Pacific high pressures having retreated and the winter continental anticyclone not yet formed.

2.2 Prevailing Winds

The high-pressure systems are the sources of the great wind-systems of the globe. They are best developed and most easily recognized over the oceans, and the summary description that follows will provide some foundation for the consideration in later Sections of the air movements on land.

Since our region is well north of the sub-tropics the greatest wind-systems on the globe, the trade winds, which have their source in the sub-tropical high pressures but stream away equatorward, are outside our survey.

Winter. Between the sub-tropical high pressures and the Aleutian Low are the westerlies, very variable in direction and speed. The mean speed of the wind is 12—20 m.p.h., but much higher speeds, often gales, are frequent. Directions between S and W are most frequent, but SE'lies increase near the British Columbia coast, a result of the barometric gradient on that side of the Aleutian Low, and of the strong deflection of the surface winds by the Coast Mountains. There is a considerable proportion of NW'lies some distance seaward but not on the coast itself. On the north of the Aleutian Low, along the Alaska coast, E and W are the prevailing directions (of small constancy however) again imposed by both barometric gradient and topography. The westerlies are notoriously stormy in winter, gale force is frequent, and successions of storms may continue with little break for a week or longer. The storminess continues right on to the exposed coasts of British Columbia. Off Vancouver Island, the mean frequency of gale force (speed ≥ 32 m.p.h.) is

Nov. 10 days	Jan. 12 days	Mar. 9 days
Dec. 15 "	Feb. 12 "	

The off-shore islands give shelter in some weathers, but winds blowing along-shore may be funnelled to great strength in the narrow channels with mountainous sides; Hecate Channel between the Queen Charlotte Islands and the mainland is notorious.

The winds of the high-pressure systems of the Arctic and northwest Canada are most prominent in the interior and east of Canada, where they are strong and persistent from NW. On the west the pressure-gradient indicates air movement from S and SE, but the surface winds are light and the mountain ranges so high and continuous that there is no definite circulation, as is shown by the records in the interior of British Columbia. But the invasions of very cold continental polar and arctic air from N and NE in British Columbia and the Yukon come from the Mackenzie Valley and the Arctic.

Summer. In summer cyclonic activity is much reduced, anticyclones more numerous. The winds over the east Pacific are much lighter and gales are few. They are almost as variable as in winter, but W and NW are more frequent and easterlies less frequent. On the littoral of British Columbia the 'true' prevailing winds are probably NW, with a considerable proportion of SE; the records at the most exposed stations confirm this, but at many places the surface winds are so much deflected by the coasts and mountains that the true directions are not apparent.

In the interior of British Columbia and most of the Yukon the barometric gradients (round the north of the North Pacific anticyclone) indicate SW'lies in the west of the Yukon, N'lies in British Columbia. But the very light winds appropriate to the gentle gradients are evidently overcome by the bold topography and the gradient directions do not appear in the means.

2.3 Air Masses

Tropical air originates in the high-pressure belts of the sub-tropics, maritime Tropical over the Pacific Ocean, continental Tropical over the southwest of the U.S.A. Maritime Tropical is a deep air mass; it is warm and (in its surface layers) humid, and in its northward passage over the ocean its stability is increased by surface cooling. It occasionally reaches British Columbia in winter in the warm sector of depressions from the southwest, but usually only in the upper levels after occlusion of the warm sector over the ocean. It is traced more rarely, and in the upper levels only, in the south of Yukon Territory.

Continental Tropical air, conditioned over the hot arid deserts of the western plateau of U.S.A., sometimes invades the south of British Columbia, on the surface as well as aloft, in summer. It has high temperature, low vapour-content, very low relative humidity, lapse-rate between dry and saturated adiabatic but near the dry. It is responsible for the hottest spells of weather. It spreads north (in the upper levels, rarely on the surface) into the middle of British Columbia and possibly farther. In late summer and autumn it may be carried by south or southeast winds at high levels over the south Littoral of the Province and is a cause of the few thunderstorms that occur there, all in the mid-troposphere. In winter this air mass in unimportant.

Maritime Polar, maritime Arctic and continental Arctic air masses are all common in west and/or northwest Canada. Both the maritime (Pacific) and the continental types require attention, the former in view of its frequency and the great area covered by it, the latter rather because of its impressively low temperatures and vapour-content in winter. They constitute major climate elements.

In winter the cold maritime air masses may be considered to originate as continental Arctic in the very cold dry interior of northeast Asia. When, in obedience to the pressure-gradients, it moves away to the Pacific it is rapidly warmed and humidified by the relatively warm ocean, and becomes unstable, with the formation of much cumuliform cloud. The degree of the modification depends on the length of sojourn over the relatively warm water and hence mainly on the trajectory followed. A short, fast, passage across the north latitudes and a return north may make the air almost Tropical in character by the time it reaches British Columbia. Obviously the possible stages are numberless, but a broad distinction between two types of maritime air is useful. Both are prominent in

British Columbia, and occasionally in Yukon Territory. The cold type, direct from its short northern passage across the Pacific, is still cold and has much instability cloud. It is called maritime Arctic air. The warm, on the other hand, may attain considerable warmth and humidity, and is identified as maritime Polar; its clouds tend to be stratiform and less showery. The two at times differ so much that a definite frontal discontinuity often separates them and is known as the maritime Arctic front.

At the coast the eastward advance of these maritime air masses is impeded by the Coast Mountains, but the narrow valleys and lower ranges admit a little of the surface air and much of the upper. In winter they are stabilised in the interior by the cold snow-covered surface on which they rest; at first the sky clears, but low stratiform cloud develops later with light snow, especially on the west-facing upper slopes; such cloud is mainly nocturnal, but sometimes persists throughout the day. More impressive are the great masses of cloud and the heavy precipitation on the Coast Mountains, in the unstable air and frontal activity of many depressions.

In summer the land is warm and ingress easier; surface heating increases stability and cumuliform cloud gives showery weather, sometimes thunderstorms.

Maritime Polar air is a large element in the south of the Yukon Territory, both on the surface and aloft in occlusions, as well as in British Columbia.

Continental Arctic air is essentially a product of the winter half-year. It is the coldest air known in winter in America. Conditioned in the long polar night over snow surface of northern Canada and the Arctic, it is very cold at all levels and especially in the lowest few thousand feet; its lapse rate is consequently small. It often builds up a 'cold' anticyclone in and around the Mackenzie River valley, including Yukon Territory, which is the immediate source of the Arctic air that streams out. As a consequence of the extreme coldness of continental Arctic air, it is frequently noted that following the recession of the air mass at upper levels it remains as a shallow layer near the surface, particularly in valleys where it forms "pockets" which may be surrounded on all sides by a maritime air mass. British Columbia is protected by the Rocky Mountains against invasion from the east. On occasion, however, urged by an appropriate pressure-gradient and strengthened by a depth greater than normal, the cold air overrides the barrier and sweeps into the north interior of the Province, distributing lowest temperatures experienced; sometimes it continues south and west, gradually losing intensity, but the coldest spells of weather occur whenever it appears. About 5 such invasions a year may be expected in the North Interior, only one in the South Interior, 2 on the north Littoral and one in 2 winters around Strait of Georgia.

Passage over, or sojourn on, a water surface warms the lower layers but the higher layers much less, so that the lapse-rate is increased. After 12-24 hours over a body of water the surface temperature will have reached 32°F. or higher and the air mass will now exhibit a steep lapse rate; the modified air is called maritime Arctic. A similar modification occurs in Arctic air when it moves south over a snow-free, moist land surface and frequently it will be impossible to distinguish between an air mass so modified and true maritime Arctic air.

In summer the ice of the polar sea is breaking up and the polar islands have lost much of their snow, so that the surface layers of the Arctic air are much warmed, while the upper remain very cold. This is the origin of much of the maritime Arctic air, characterized by temperatures near freezing point in the surface layers and very low above 15,000 feet. considerable humidity, and a steep lapse-rate.

If this air moves south over the continent it is so rapidly modified by the warm land that climatically it loses its Arctic character, but is still cold enough to cause frost even in the warmest month.

2.4 Frontal Zones

The frontal zones are of interest in delimiting the air masses they separate, and of importance as being a birthplace of travelling low-pressure systems which originate as waves in the interaction of adjacent air masses with different densities and movements.

In the North Pacific and west Canada the frontal zones recognized (Fig. 12) are (a) the Polar front, between Tropical air (maritime or continental) on the south and maritime Polar air on the north, (b) the maritime Arctic front, between maritime Polar and maritime Arctic air; the continental Arctic front, between maritime Arctic and continental Arctic air, (c) at times a fourth front, of local significance, separates cool maritime Arctic from cold maritime Arctic air; it lies between the maritime Arctic and continental Arctic fronts, roughly parallel with them.

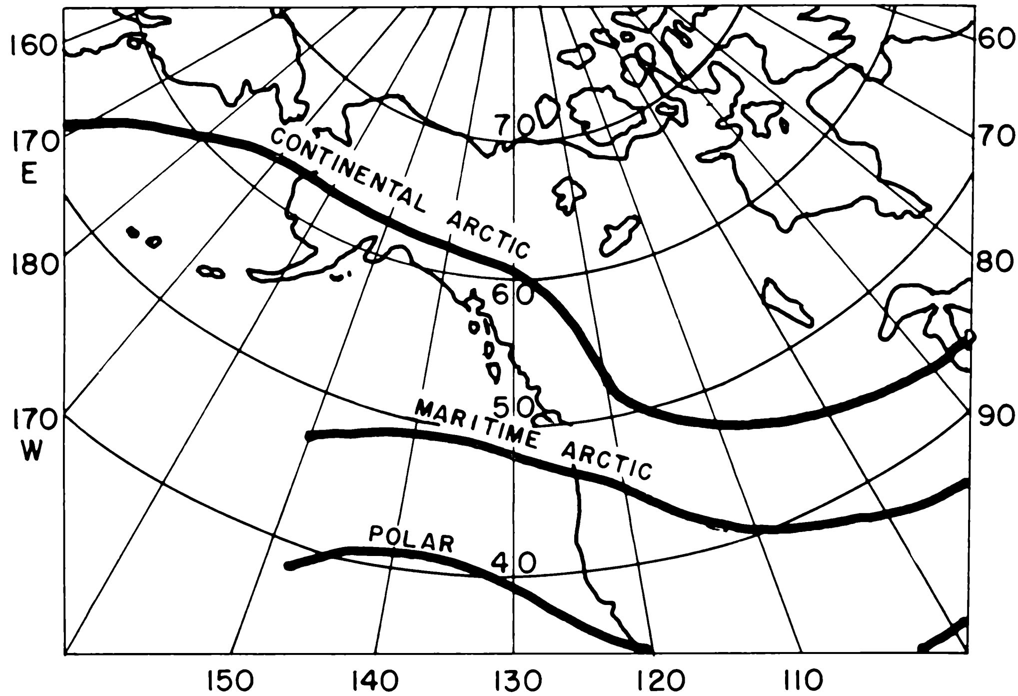
All air masses change size and position irregularly and erratically (within limits), as well as having a definite seasonal displacement, mostly north-south. Consequently the frontal zones cannot have a fixed position, and indeed often cannot be traced at all, for they are as variable as weather itself in their wide and remarkably rapid movements. But their use in meteorological theory and daily practice calls for some indication of their normal positions.

In winter the Polar front, as separating Tropical and Polar air, might be expected to lie over the North Pacific roughly between the Hawaiian Islands and the south of British Columbia, but it is seldom recognizable with confidence in such synoptic charts as can be compiled from the observations available on the ocean. The maritime Arctic front, however, can often be traced from surface to tropopause (when observations are available), but its position varies so much that its line in Fig. 12 is only a rough indication.

The continental Arctic front seems to be more localized, partly, perhaps, thanks to its position over south Alaska and Yukon Territory, with meteorological stations. In its mean position it enters Alaska from the Bering Sea, follows the Alaska Range and the general direction of the Alaska Highway to the Rocky Mountains in the north of British Columbia, and continues southeast along them. Its fairly stable position there is determined largely by the rampart the ranges form against the extremely cold air on the north and east, a feature of much value for the climate of British Columbia.

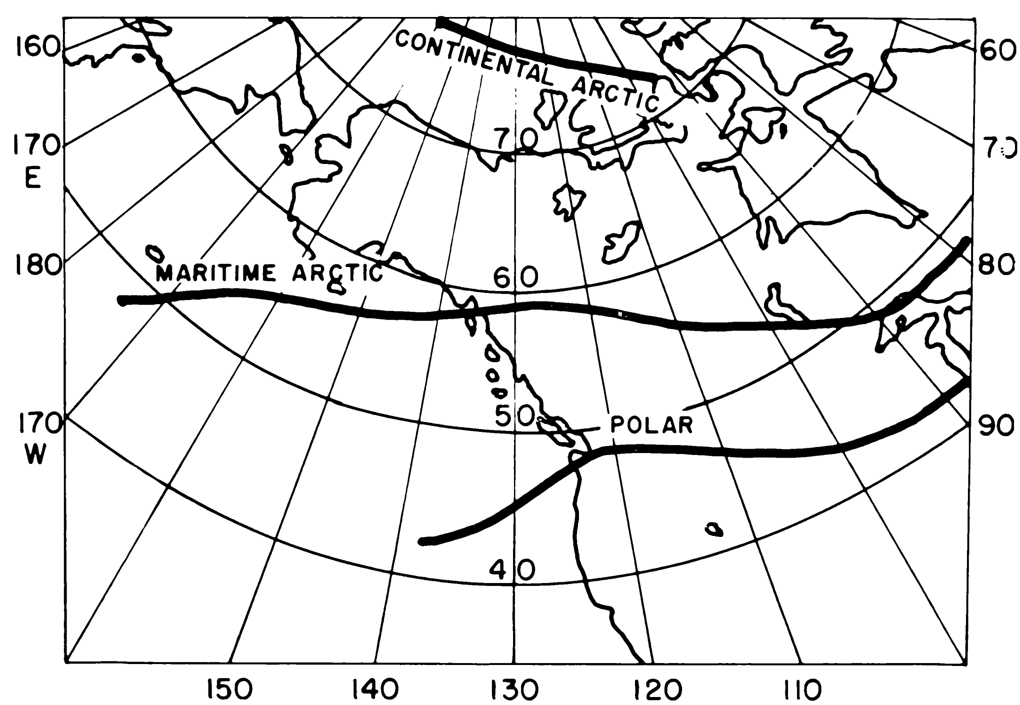
In summer all air masses and fronts have shifted north, the Polar front to the State of Washington. The maritime Arctic front is usually in northern British Columbia and west through the Gulf of Alaska. The continental Arctic front is tentatively shown over the Canadian Archipelago.

Figure 12a



Mean winter position of the frontal zones in Western Canada and the North Pacific Region.

Figure 12b



Mean summer position of the frontal zones in Western Canada and the North Pacific Region.

2.5 Depressions and their Tracks

In winter all the many vigorous depressions that reach British Columbia come from the Pacific. Despite ubiquity of origin and trajectories at least two main groups can be recognized. The southern group start as waves on the Polar front between Tropical and maritime Polar air, develop rapidly into closed depressions and move northeast towards the south of British Columbia. Off the coast some slow down and fill, others alter course and follow the coast towards the northwest, others continue east over the south of British Columbia and cross the Rockies into the Prairie Provinces, or southeast to the western plateau of the U.S.A. With few exceptions they are occluded before their landfall and contain Tropical air only in their upper levels, rarely on the surface.

A northern group is very numerous. Most first appear on our synoptic charts in the north of the Pacific, nearly all far west off Kamchatka or Japan, on the maritime Arctic front, where maritime Polar air overruns maritime Arctic. But possibly many originate much farther south on the Polar front. A few take a northerly course up the Bering Sea into the Arctic; but most travel east through the Gulf of Alaska. On approaching the mainland with its mountain-ramparts some become stationary and die out, others swing southeast along the British Columbia coast which is swept by their eastern sectors. Very few pass through Alaska and the Yukon. Like the southern group nearly all are occluded over the ocean.

A third group is large enough to deserve classification; they originate in the inter-maritime Arctic front between warm and cold maritime Arctic air. Many are first identified in the west of the ocean, travelling towards British Columbia, and like the other groups they suffer occlusions on the passage.

It will be gathered that in winter low-pressure systems are the rule over the ocean, and anticyclones the exception—a conclusion corroborated by any series of daily synoptic charts.

In summer the North Pacific anticyclone dominates the ocean, where the strong cyclonic activity of winter is very much reduced. Depressions approaching the anticyclone from the west between latitudes 45°N and 55°N seem to be unable to penetrate it and most remain beyond about 170°W. Weak depressions enter, or form over, Alaska and travel slowly east through Yukon Territory between the Pacific and Arctic high-pressure systems.

British Columbia is invaded by many weak fronts from all sides, and a few shallow closed depressions of warmer humid climates, give a good deal of cloud and some rain.

Anticyclones are more numerous than depressions on the ocean, but on land the higher temperature favours low pressures, and frontal activity is at least as vigorous as in winter.

The summer conditions last till mid-September and change abruptly about the end of that month to the winter type.

CHAPTER 3

Surface Winds

3.1 Surface Winds in the Littoral

To represent the surface winds the following Tables are given:

Climatological Tables, mean percentage frequencies of directions, (Appendix 1)
Table 3,7,11 mean monthly speeds,
Table 4,8,12 extreme speeds,
Table 5, 9, 13 mean speeds by directions,
Table 6, 10, 14 mean speeds in morning and afternoon.

Outstanding features of the winds of the Littoral are:

(1) their strength particularly in winter and spring, not specially high for an ocean coast facing the westerlies, but notably higher than in the interior,
(2) their divergence from the gradient direction, a result of the strong topographic influence, considered in more detail below.

Mainland, north. Prince Rupert is a sheltered station, but the only one with satisfactory records. The most frequent wind is SE, strongly predominant all the year and especially in the months October—April (over 40 per cent); N and W are next in frequency. Calms are probably rare on the open coast, but Prince Rupert reports the high annual mean of 14 per cent (about 20 per cent in the months June—September, 10 per cent in winter).

The mean speed is 8 m.p.h. in winter, 4 m.p.h. in summer, far less, especially in summer, than on the exposed coast. SE winds are much the strongest, N. the weakest. The highest monthly means on record are only 12 m.p.h. in January, 11 m.p.h. in April, 5 m.p.h. in July, 10 m.p.h. in October, figures similar to the mean values at stations on the littoral of the south of the Province. The highest records for 1 hour also are lower (in many months) than at the southern stations; in nearly all months SE winds give these highest records.

Table 6 shows that in January the difference between night and day in both direction and speed is small. In July N and S winds are much more frequent and NW much less frequent in the early morning. The winds are stronger in the afternoon, speeds 1–12 m.p.h. being more frequent and calms much less frequent. Land-and sea-breezes are very appreciable in summer.

Queen Charlotte Islands. Eye-observations are available from Langara Island off the north point of Graham Island, and from Deadtree Point on the east coast of the same island. Langara has predominant SE winds in January, followed by E, S, and SW; these comprise 70 per cent of the whole. In July S and SW predominate, followed by W and NW, the 4 directions accounting for 73 per cent. Calms are very rare in January but increase to 7 per cent in July.

The winds are strong in winter, much stronger, according to the estimates of the observer, than at any of the stations on the coast with an anemometer. In January 50 per cent are in the group 13–38 m.p.h. and 3 per cent more than 38 m.p.h.; in July 32 per cent are 13 to 38 m.p.h. and 1 per cent more than 38. Gales from E and SE are frequent in winter.

The directions change little with time of day in summer, but more in January, when E and SE winds, the most frequent at all the observing hours, have their largest predominance in the night.

Deadtree Point also has strong winds but less strong than Langara. Calms are notably frequent for the coast. SE winds predominate strongly in summer and winter. Time of day seems to exert little control in winter, and even in July only a small increase in SE and S at 2230 over 1630 appears in the Table; land- and sea-breezes are but slightly developed.

As will be noted at stations farther south, the shift of wind with the passage of a front is not prominent, but on the most exposed coasts a shift from SE to SW is usual.

Vancouver Island, West Coast. Estevan Point on the most seaward projection of the coast and midway along it, and Pachena Point halfway between Estevan Point and the south of the island, are taken as representative stations.

The winds obey the barometric gradients more closely than at other stations on the west littoral. The mean directions are remarkably similar at the two stations, SE in the months October to April (49 per cent in November, 40 per cent in January, at Estevan Point), NW in the rest of the year; SE and NW together make up 65 per cent of the annual total. SW'lies are least frequent with the very small annual mean of 3 per cent, and NE and W have only 5 per cent each.

The winds are strong (for British Columbia) at Estevan Point, mean speed 10 m.p.h. in the months November to June, about 8 m.p.h. in July to October; these are rather less than at Entrance Island (off Nanaimo, east coast of Vancouver Island) and Victoria. Much the strongest winds all the year blow from NW but winds from SE are not much behind. NE winds are notably weak, E and N but little stronger. Calms are very rare. In the years 1940–51 a January had the highest mean monthly speed, 16 m.p.h.; at the other extreme 8 m.p.h. was the lowest (in a January and an October). 60 m.p.h. (from SE) is the highest record in 1 hour. The winds do not differ much from night to day, but the land- and sea-breeze can be detected in the means of Table 6.

Even on this exposed coast large wind-shifts with the passage of a front are uncommon, they do occur in spring and autumn in fronts moving down from the northwest and occasionally in very sharp fronts moving from west, the wind veering from SE to strong from NW.

Vancouver Island, E and SE Coast. Local topography imposes many modifications. Of the two stations for which data are given Comox, most exposed seaward to SE, landward to NW, has a strong preponderance of winds from those directions. The mean speed ranges from 7 m.p.h. in late summer to 9 m.p.h. in winter and spring. SE winds are by far the strongest all the year, about twice as strong as NW (which however are the most frequent); the highest records for 1 hour in all seasons are from SE. The speed in autumn and winter varies greatly from year to year, the January mean ranging from 13 to 5 m.p.h. in the 7 years of records.

Both direction and speed change considerably from night to afternoon, especially in summer when the sea-breeze blows home. In July calms fall off from 11 per cent at 0430 to 1 per cent at 1630, and the percentage of winds between 13 and 38 m.p.h. rises from 6 to 19; SE winds increase from 6 to 27 per cent, and NW decrease from 38 to 19.

Patricia Bay on the east shore of its long N–S gulf gets most winds from SE and W (SE especially in summer, W mostly in the other seasons); N and S winds are rare.

The mean speed is highest, about 6 m.p.h., in the winter half-year; rather less, 5 m.p.h., in summer and early autumn. Throughout the year SE'lies are the strongest (mean about 9 m.p.h.), NW'lies weakest (4 m.p.h.), but N'lies average only 2 m.p.h. in July. The highest mean for a month in the years 1942-51 was 12 m.p.h. (in a January), the lowest 3 m.p.h. (in an October), and the highest record for 1 hour, also in January, was 38 m.p.h. from NE; in all 4 months January, April, July, and October, the strongest winds for 1 hour were from NE or SE.

The diurnal change of speed is hardly appreciable in January, but prominent in July, the wind blowing much more strongly in the afternoon than at night. The direction also changes most in summer, the night predominance of W and SW in July changing to almost constant SE and E winds in the afternoon.

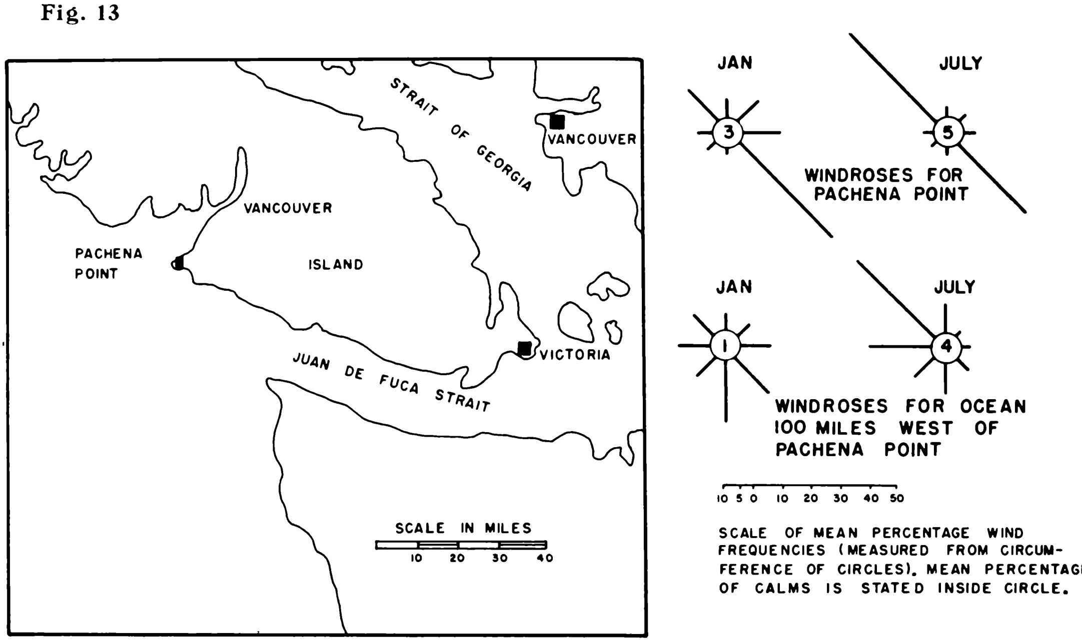
All gales (in advance of sharp fronts) blow from SE. After the passage of the front the wind on the east coast very rarely shifts from SE to NW (except in the extreme south of the Island), usually only to SW, the SW wind sometimes blustering in with gale force though the SE wind ahead of the front was light. In summer NW winds blow when a wedge of high pressure covers interior of British Columbia.

The winds are deflected, in places widely, from the barometric gradient by the topography. The divergence is as prominent on the daily synoptic charts as in the mean values. In some districts the topographical control seems obvious, but in many it is by no means easy to understand. An easy case is Pachena Point. Fig. 13 shows that the winds 100 miles or more out to sea obey the cyclonic control characteristic of the Westerlies, the commonest directions being those appropriate to the mean barometric gradients. But the oceanic directions are greatly modified by the bold relief of Vancouver Island, which imposes an almost irresistible trend from SE in winter, NW in summer at Pachena Point.

More complicated relations appear at Victoria. N and NE are the most frequent directions in the months October to February, SW and W in the rest of the year. NW is very rare. The mean speed is high, about 12 m.p.h. except in September, speeds almost twice those at Patricia Bay. Calms are exceptional. Far the strongest winds are from SW and W in January (mean speed of SW 20 m.p.h.), April, and July. In October W and SE are stronger than SW, but their mean is only 12 m.p.h. NW'lies are weakest, averaging about one third the speed of SW'lies. The highest speeds for 1 hour in the period examined were from SW, rising to 68 m.p.h. in January and April. The sea-breeze is very prominent on summer afternoons, coming in from SW with almost gale force under a favourable general pressure-gradient; the land-breeze from NE is only light.

A detailed analysis of the local deflection at Victoria, as indicated by the relation between the general winds (assumed to be the geostrophic direction, along the isobars of the daily synoptic charts) and the observed winds in 1941–3, has been made by D. P. McIntyre (Q.J.R. Met. Soc., 1942 April). The major topographical control is shown to be the Strait of Juan de Fuca, oriented WNW–ESE and bounded on both sides by mountainous land, which deflects general winds from NW and W (the dominant directions on the ocean) into WNW, and those from SE (from the continent) into ESE. The other, more localized, control is exerted in the immediate neighbourhood of Victoria by the indentation on Vancouver Island just southwest of the city with its shore trending SW–NE, which leads in winds (including the sea-breeze) from the Strait of Juan de Fuca as SW'lies at Victoria, and turns those from the continental side (including the land-breeze) into NE'lies. The daily synoptic charts for the years examined provided about 400 suitable cases for each of the synoptic hours, only winds over 3 m.p.h. being considered. The 0430 (L.S.T.) charts contained 94 cases of

Fig. 13



Wind Roses for Pachena Point and for the Pacific 100 miles to the West.

geostrophic winds from W, WNW, NW or NNW, in 72 of which the surface wind at Victoria was SW or WSW; and 125 cases of geostrophics from ESE, SE, SSE or S, in 80 of which Victoria had N, NNE or NE. The afternoon (1630) charts gave 217 cases of geostrophics from WNW, NW, NNW or N, in 192 of which Victoria had SSW, SW, or WSW; and 80 cases of geostrophics from ESE, SE, SSE, or S, in 62 of which Victoria had N, NNE, or NE.

It is indeed remarkable that Victoria, in the midst of a region with strong gradients for SE in winter NW in summer, gets hardly any winds appropriate to those gradients and of the few it does get, NW is the least frequent in summer, the season of its general maximum (Table 2).

In McIntyre's paper attention is also directed to an interesting tendency to easterly winds at Victoria at 1030, when the geostrophic wind is NW'ly. It is suggested that they are sea-breezes from the Strait of Georgia to Vancouver Island, a local feature which is almost eliminated in the afternoon by the more general sea-breeze from Pacific to continent.

Table 2

Victoria, mean percentage frequency of wind-directions by groups

	N + NE + E	S + SW + W	Others
January	62	25	13
April	31	59	10
July	12	84	4
October	47	40	13

Squamishes. Squamish is a settlement at the head of Howe Sound, a north-south fiord which joins Burrard Inlet west of Vancouver. It has given name to strong, often violent, winds of cold polar air which is derived from anticyclones up-country and bluster down the fiords. They lose strength when they get free from the confining mountain-walls and are not notable 15 or 20 miles outside. Off-shore winds tend to be frequent in winter on the coasts of countries in middle and high latitudes with cold winters, especially if highland backs the coast, and squamishes are merely local topographical intensifications. Their strength makes them a source of damage on land and a danger to navigation at sea and in the air. They may be only about 3,000 feet deep but have been observed up to 8,000 feet, and turbulence can be serious for aircraft.

Squamishes are well known in many fiords of the British Columbia coast, but only in those oriented from between NE and E so that they funnel the polar outflow westward. They are important in Jervis, Toba, and Bute Inlets, Dean Channel, and Portland Canal.

The required conditions are both topographical and meteorological. The topography must be such that cold polar air is collected in the interior, and long narrow fiords oriented about NE–SW funnel it out to the coast. Meteorologically, a high-pressure system over the central and north interior, with steep barometric gradient to direct the polar air west and south, is required; these conditions are frequent in the winter half-year. The cold snow-covered uplands add their katabatic influence.

An investigation of the winds seaward of Portland Canal, as observed at Green Island Lighthouse, 8 miles southwest of the end of the Canal in 1949-50, gives evidence of the frequency of Squamishes[1]. In the period 1 Sept. 1949–31 March, 1950, the wind was NE on 192 occasions, 46 per cent of the whole, and of gale force on 73 of the 192 occasions. They continued at gale force for 12 to 24 hours in September, October, and March, and some for 2 to 3 days in December and January. One blew from 27 December till 3 January and on only one day fell to less than 40 m.p.h. In January 1950 the wind was continuously NE. It must be pointed out, however, that the season was exceptionally favourable for squamishes since extremely cold continental polar air covered central and north British Columbia during much of it.

NW winds on the Littoral. NW winds merit special mention.[2] They are often strong, to gale force, particularly in the south of the Strait of Georgia where

[1] *An investigation into the frequency of offshore winds at Green Island, British Columbia*, by R. Tyner (Meteorological Division, Canada, 1950).

[2] *An investigation into the development of the northwest wind at Vancouver*, by K. F. Harry and J. B. Wright. Meteorological Division, Canada, 1951.

they are funnelled along the strait between shores with ranges rising steeply several thousand feet on both sides. Probably they are often intensified by offshore winds blowing down the inlets of the mainland. They have caused considerable damage on land at Vancouver airport and elsewhere, and to small craft. Their occurrence is erratic and forecasts are uncertain.

The NW wind blows behind a cold front aligned SW – NE which is moving down the coast. The front belongs to a depression which has come in from the ocean and is travelling slowly E or NE into the continent. It is often followed by a strong ridge of high pressure, the gradient in front of which produces the NW wind (which is thus anticyclonic in character). Some fronts, however, have no definite ridge behind them, and the NW wind is merely the polar current of the depression, a cyclonic wind.

In the synoptic situation most often responsible for NW winds all along the coast of British Columbia a large depression covers the Gulf of Alaska, remaining almost stationary or moving slowly NE into the north of British Columbia or the south of Yukon Territory. Its cold front trails SW and a wide ridge of high pressure follows it. The front lies NE–SW across the coast, and moves south; in front of it the wind is SW, in rear NW or N. This is the most prominent type of NW wind at Vancouver airport, where on the average it persists for about 10 hours without intermission. Sometimes the depression is farther south, at times even off the State of Washington. And the ridge of high pressure behind the cold front may be narrow, or ill-defined and of little intensity. The strength and duration of the NW wind depend on the conditions behind the cold front.

The northwesterlies described above are strong winds which blow without relation to the time of day. They are quite different from the sea-breeze of summer afternoons, also NW on many coasts but usually of no great force and restricted to the hot hours of the day.

The Lower Fraser Valley. Position and topography (described in Section 1) make this a debatable district, subject to strong oceanic and less strong continental influences. It is an expanse of flats, mostly deltaic, from the Strait of Georgia to Abbotsford, 40 miles, above which it narrows, to 8 miles at Chilliwack. Hope, 30 miles above Chilliwack, 80 miles from the Strait, is conveniently taken as the end of the valley, the reach between it and Chilliwack being a narrow NE – SW valley, very different from the wide and open vale below. The vale is walled very abruptly on the north by the bold and picturesque Vancouver Heights which trend WNW – ESE from the Strait of Georgia to Chilliwack; several deep valleys, some with lakes, others fiords, descend to the vale. Pronounced land- and sea-breezes, and probably mountain- and valley-winds, complicate the air movements which are already much deflected by the relief.

The best series of records are from Vancouver airport, a well-exposed coastal station on the deltaic flats of Sea Island at the mouth of the Fraser, and Vancouver city 6 miles north, on Burrard Inlet close under the Vancouver Heights and containing many high buildings which form local obstacles to air movement. At Vancouver airport the prevailing winds in every month are E and SE, which make up 60 per cent in December and January, 50 per cent in July and August. SW winds are rare, only 5 per cent in winter and 7 per cent in summer. NW, the mean geostrophic direction in summer, provides only 16 per cent in that season. Vancouver city has similar frequencies. Evidently air-movements from the south are deflected by the Vancouver Heights, and appear as SE and E winds not only on the surface but for several thousand feet above. N winds are rare and light. W and SW are few all the year though the mean isobars suggest considerable frequency. NW winds also are much less frequent in summer than the isobars would suggest, and it is difficult to explain their eclipse by SE and E.

For the rest of the vale we have records for a few years at Agassiz and Abbotsford, and at Hope. They show increasing continental influence up-vale in winter. At Abbotsford N and NE winds are frequent in January, SE few; in July SW and S are dominant. N and S winds here may be mountain- and valley-winds generated in the Stave valley on the north. Agassiz with its strong predominance of NE in January, SW in July, shows the topographical influence that might be expected. At Hope also the easterlies and westerlies are a result of the trend of the valleys.

The speed of the wind is least in the seaward end of the vale. At Vancouver airport the annual mean is 9 m.p.h. with little seasonal change. At Vancouver city shelter reduces it to 4 m.p.h. Calms are rare at both these stations. NW and W have the highest mean speeds at the airport and also the highest records for 1 hour, 55 m.p.h. in January and 39 m.p.h. in October; in the city SW and W are strongest, but the highest record for 1 hour is only 19 m.p.h. in January (in, however, only 5 years' observations). Abbotsford and Agassiz have much stronger winds in winter than in summer (mean at Agassiz in January 10 m.p.h., in June and July only 3 m.p.h., and the windiest month in the 4 years of observations was a January with 19 m.p.h. mean speed). The strongest winds at Agassiz blow from NE and N, the highest records for 1 hour rising to 45 (NE) in January, 25 (N) in July, April, and October. At Hope winter seems to be the windiest season, but the wind is usually strong also in the afternoon in summer; the strongest winds are from NE (mean 17 m.p.h. in January), and S and SE are very light all the year.

Time of day is a strong influence on both direction and speed in summer and not negligible in winter, at most stations. At Vancouver airport in January E winds are twice as frequent at 0430 as at 1630 and W winds less than half as frequent; land- and sea-breezes are naturally most prominent in summer, when the means rise to 77 per cent from NE, E, and SE at 0430, 68 per cent from S, SW, and W at 1630. But the diurnal change in speed is small, hardly appreciable in January and in July seen chiefly in the reduction of calms from 7 per cent at 0430 to 1 per cent at 1630.

Abbotsford shows little diurnal change in either direction or speed in January, but in July the large increase in S and SW winds, and the fall in the number of calms in the afternoon, seem to reflect both sea-breeze and valley-breeze. The change from night to day is larger at Hope in summer (in winter it is inappreciable); the most frequent direction at 0430 is E (30 per cent), at 1630 W (68 per cent), and calms drop from 36 per cent at night to 0 in the afternoon.

In general, the outstanding feature of the air movements in the lower Fraser vale is the dominance of E'ly winds. So effective is the shelter of the Coast Range (and particularly the Vancouver Heights) that the few winds from points between NW and NE are light. E'ly winds persist even in and behind strong fronts, NW'lies being remarkably rare in synoptic situations that would seem likely to produce them. But behind the SE winds which attain gale force. (3 or 4 times each winter) in advance of fronts a shift to W'ly does usually occur.

Land- and sea-breezes. Land- and sea-breezes are prominent in summer in fine settled weather, and they are strongly reinforced by mountain-and valley-winds in the Fraser valley itself and the many deep tributary valleys entering it on the north. The sea breeze sets in on the coast about 1000, strengthens till afternoon, and dies away before sunset; at its strongest it usually reaches 10 to 15 m.p.h. The land-breeze is lighter, 3 to 8 m.p.h. But both can be much stronger under favouring general pressure-gradients, the sea-breeze occasionally rising to 30 m.p.h. and persisting far into the evening. Their prominence is such that a statement of the mean winds for the whole day is misleading; the directions in the early morning and in the afternoon are required.

Table 3

Mean monthly speed of wind (m.p.h.)

Littoral	J	F	M	A	M	J	J	A	S	O	N	D	Year
Prince Rupert (1939-52)..	8	7	7	6	5	4	4	4	5	7	8	8	6
Estevan Point (1940-52)..	10	9	10	11	11	10	9	8	8	9	10	10	10
Comox (1945-52).........	9	10	9	9	8	8	8	7	7	8	9	8	8
Entrance Island (1922-39)	15	14	14	12	12	12	13	12	12	13	13	16	13
Patricia Bay (1942-52)...	7	6	6	6	6	5	5	5	5	5	6	6	6
Victoria (1939-52)........	12	12	12	12	12	12	12	11	9	9	11	13	11
Vancouver (A) (1939-52).	8	8	9	9	8	8	8	8	7	8	8	8	9
Vancouver City (1922-42)	4	4	4	4	4	4	4	3	3	3	3	4	4
Agassiz (1948-52)........	10	7	6	5	4	4	3	3	4	5	6	7	5

Table 4

Extreme wind speeds (m.p.h.)

Littoral		January	April	July	October
Prince Rupert (1939-51)...	Highest mean for month............	12	11	5	10
	Lowest mean for month.............	4	2	2	6
	Highest record for 1 hour...........	54SE	45SE	22SE	48SE
Estevan Point (1940-51)...	Highest mean for month............	16	14	12	12
	Lowest mean for month.............	8	10	9	8
	Highest record for 1 hour...........	60SE	50SE	39NW	49SE
Comox (1945-51)..........	Highest mean for month............	13	10	9	12
	Lowest mean for month.............	5	7	7	6
	Highest record for 1 hour...........	58SE	39SE	31SE,N	41SE
Patricia Bay (1942-51)....	Highest mean for month............	12	8	7	7
	Lowest mean for month.............	5	4	4	3
	Highest record for 1 hour...........	38NE	30NE 30SE	29SE	33SE
Victoria (1939-51).........	Highest mean for month............	14	13	13	12
	Lowest mean for month.............	9	10	10	8
	Highest record for 1 hour...........	67SW	68SW	43SW	58SW
Vancouver (A) (1938-51)..	Highest mean for month............	10	10	9	10
	Lowest mean for month.............	6	8	7	6
	Highest record for 1 hour...........	55NW	33NW W	31W	39NW
Vancouver (city) (1938-42)	Highest mean for month............	4	4	4	3
	Lowest mean for month.............	2	3	3	2
	Highest record for 1 hour	19SW	15W 15SW	16W	16W
Agassiz (1948-51).........	Highest mean for month............	19	7	3·2	5
	Lowest mean for month.............	6	4	2·7	4
	Highest record for 1 hour...........	45NE	25N	23NE	25N

Table 5

Mean speed of wind (m.p.h.) by directions

Littoral		N	NE	E	SE	S	SW	W	NW
Prince Rupert (1939-52).....	Jan.......	3	4	9	14	7	5	3	4
	Apr......	3	4	7	11	6	5	4	4
	July......	2	2	4	6	5	4	4	4
	Oct.......	3	4	10	12	6	4	3	2
Estevan Point (1940-52).....	Jan.......	5	4	4	12	12	11	12	14
	Apr......	5	3	4	13	10	8	7	14
	July......	4	3	4	9	6	4	5	12
	Oct.......	4	3	4	12	8	6	4	12
Comox (1945-52)............	Jan.......	6	6	4	20	8	4	4	8
	Apr.......	9	6	7	15	8	6	4	8
	July......	9	6	7	11	6	5	5	8
	Oct.......	6	5	7	15	9	4	4	7
Entrance Island (1922-39)...	Jan.......	15	20	17	14	8	12	14	10
	Apr......	6	14	14	11	9	13	14	11
	July......	5	11	12	8	7	14	19	13
	Oct.......	4	17	15	12	6	12	15	11
Patricia Bay (1942-52)......	Jan.......	5	11	8	11	7	7	4	4
	Apr......	5	6	6	9	5	7	6	4
	July......	2	5	4	8	3	4	5	4
	Oct.......	4	6	4	8	6	6	5	4
Victoria (1939-52)...........	Jan.......	10	13	8	16	11	20	16	7
	Apr......	9	9	7	12	8	16	14	6
	July......	6	6	5	5	8	15	13	4
	Oct.......	9	7	6	12	7	11	12	5
Vancouver (A) (1939-52)....	Jan.......	4	6	8	8	10	9	10	12
	Apr......	4	6	8	9	9	9	9	11
	July......	4	5	6	8	7	6	8	11
	Oct.......	3	6	7	8	10	8	9	10
Vancouver (city) (1922-42)..	Jan.......	2	4	4	4	3	5	5	3
	Apr......	2	3	4	5	4	6	6	5
	July......	2	2	3	4	3	4	5	5
	Oct.......	2	3	3	4	4	4	4	4
Agassiz (1948-52)...........	Jan.......	5	17	5	2	2	4	2	12
	Apr.......	8	8	2	3	3	5	3	6
	July......	2	5	2	2	2	4	3	3
	Oct.......	6	9	3	1	1	3	2	7

Table 6

Wind—Direction and speed (percentage frequencies) according to time of day

	Hour LST	Directions, percentage frequencies								Speed, m.p.h., percentage frequencies			
		N	NE	E	SE	S	SW	W	NW	Calm	1-12	13-38	>38
Langara Is. (1941-51).... Jan.....	0330	5	4	25	28	16	11	4	5	1	52	44	3
	0930	4	9	17	22	14	14	10	9	1	42	53	4
	1530	6	8	17	19	15	16	9	7	3	39	54	4
	2130	4	10	17	19	14	15	10	11	1	49	47	2
July....	0330	0	1	5	12	20	17	22	17	5	61	34	0
	0930	1	6	5	11	19	19	17	14	9	66	27	0
	1530	2	6	4	8	19	23	19	13	5	62	31	0
	2130	0	3	5	10	21	21	14	15	9	56	37	1

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Table 6—Concluded

Wind—Direction and speed (percentage frequencies) according to time of day.

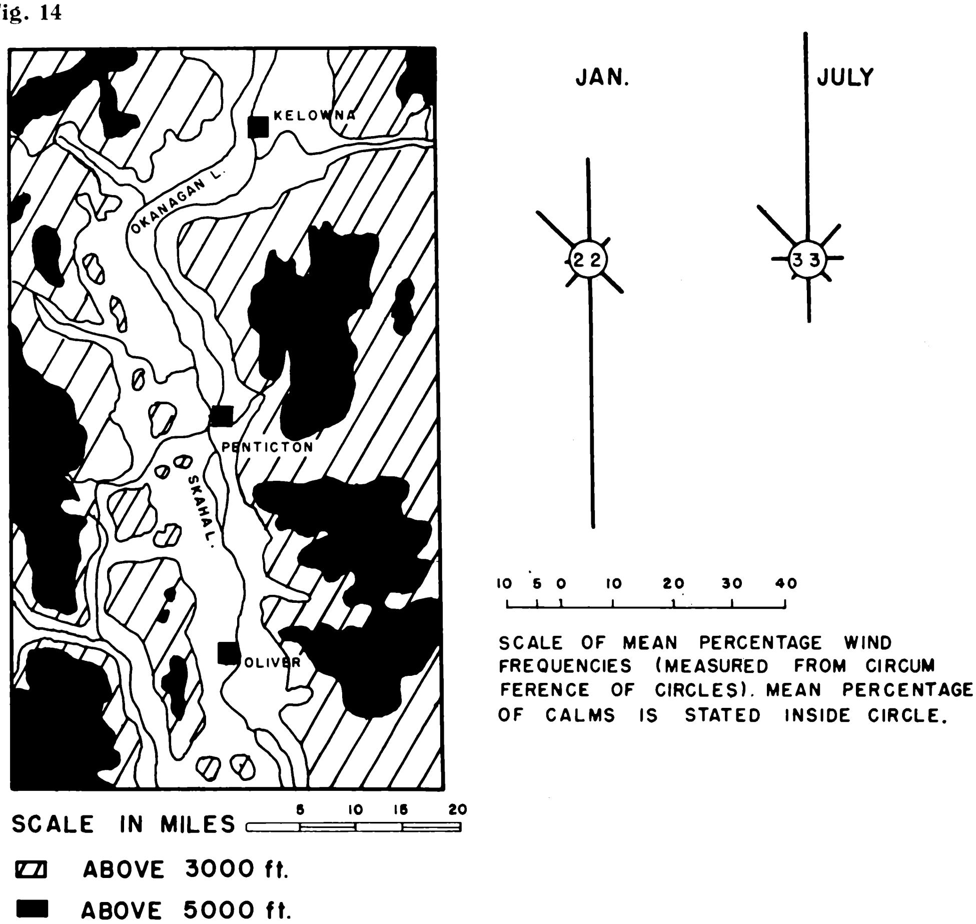
	Hour LST	Directions, mean percentage frequencies								Speed, m.p.h., percentage frequencies			
		N	NE	E	SE	S	SW	W	NW	Calm	1-12	13-38	>38
Deadtree Pt.													
(1941-48).... Jan.....	1630	3	4	3	38	3	8	7	9	25	49	23	3
	2230	4	2	3	37	7	7	2	6	31	44	22	2
July....	1630	1	10	11	29	5	6	2	9	26	61	13	0
	2230	2	8	17	35	6	8	0	5	18	61	20	0
Prince Rupert													
(1941-50).... Jan.....	0430	19	8	4	42	8	4	4	12	19	59	19	3
	1630	11	7	4	52	7	4	4	11	16	56	25	3
July....	0430	28	5	6	28	17	5	6	6	39	58	3	0
	1630	7	4	4	26	7	15	11	26	13	80	7	0
Estevan Point													
(1941-51).... Jan.....	0430	9	8	19	37	7	3	4	9	5	63	29	1
	1630	6	2	12	46	6	2	6	17	4	54	40	1
July....	0430	12	7	9	18	3	1	6	37	10	65	24	0
	1630	1	<1	1	25	8	4	11	51	0	62	38	0
Comox													
(1944-51).... Jan.....	0430	0	<1	2	18	8	12	37	12	11	67	22	0
	1630	4	2	7	25	8	4	13	23	14	60	25	0
July....	0430	2	1	2	6	6	6	28	38	11	83	6	0
	1630	14	12	17	27	5	2	2	19	1	79	19	0
Patricia Bay													
(1941-51).... Jan.....	0430	4	8	5	14	7	14	32	16	7	80	13	0
	1630	13	12	8	20	8	10	13	15	9	80	11	0
July....	0430	2	4	7	13	5	21	42	7	29	70	2	0
	1630	2	11	37	39	3	3	3	2	1	82	16	0
Vancouver (A)													
(1941-51).... Jan.....	0430	3	15	49	11	2	3	7	2	8	76	14	<1
	1630	2	13	25	11	8	4	17	10	9	75	16	0
July....	0430	2	8	59	10	1	1	5	8	7	88	4	0
	1630	0	1	7	16	19	18	31	6	1	92	7	0
Vancouver (city)													
Jan.....	0730	5	16	39	24	2	3	4	3	4	records not available		0
	1430	1	14	22	22	5	8	15	12	1			0
July....	0730	3	16	26	32	3	2	7	9	2			0
	1430	0	4	9	17	6	17	30	17	0			0
Abbotsford													
(1945-51).... Jan.....	0430	22	16	7	3	16	7	3	1	25	59	16	0
	1630	16	19	10	6	13	10	3	1	22	59	18	0
July....	0430	3	3	0	1	10	13	3	3	65	35	0	0
	1630	3	1	1	1	23	44	13	6	7	87	6	0
Hope													
(1941-51).... Jan.....	0430	2	7	67	1	0	4	11	0	8	67	24	0
	1630	1	7	58	3	0	6	16	0	9	70	21	0
July....	0430	0	3	30	3	3	11	12	1	36	58	6	0
	1630	0	0	1	1	3	22	68	4	0	44	56	0

3.2 Surface Winds in the South Interior

Air movements at the stations with records differ so much that little generalization is possible.

In the valleys the wind almost always blows along the valley, that is in most cases from north or south, e.g. Penticton (Fig. 14) but from NE and SW at Ashcroft, E and W at Kamloops, SE and NW at Windermere in the Rocky Mountain Trench. Calms are remarkably frequent in the deep valleys particularly in winter and at night, exceeding 30 per cent at many stations in winter, 20 per cent in summer; in January Ashcroft has 83 per cent in the early morning, 72 per cent in the afternoon, and in July the corresponding figures are 75 and 19. The air tends to stagnate at night but being warmed after sunrise it rises and is replaced by more rapidly moving air from aloft.

Fig. 14



Wind Roses for Penticton.

Mountain- and valley-winds reinforce the up- and down-valley movements, as is shown by the strong tendency to up-valley winds in the afternoon at Ashcroft, Lytton, and Trail. The almost constant W and SW wind on July afternoons at Hope seems to show the same influence, probably strengthened by the sea-breeze in the lower Fraser valley.

Apart from the many calms winds are very light at most of the valley stations, averaging 3 or 4 m.p.h. They are lightest in winter, strongest in spring and summer. At Princeton the mean speed in January is only 1 m.p.h. At most stations S and SW winds are the strongest (but NW at Summerland on Okanagan Lake) in respect of both means and highest records for 1 hour.

Southerly winds are usual when a depression is approaching the coast, northerlies when high pressures cover the interior of the Province. The records do not show any definite general seasonal preference for S or N winds.

To represent the highest uplands our only station is Old Glory, 7,700 feet, overlooking the Columbia River valley in the extreme south of British Columbia; unfortunately its records are complete for only 3 years. The most notable feature is the speed of the wind, the mean in winter being almost 20 m.p.h. (about twice the speed at Estevan Point) and in summer 12 m.p.h. The highest speed for any month was 26 m.p.h. (January), the lowest 11 m.p.h. (July), and the highest records for 1 hour rose to 62 m.p.h. (SW) in April, 54 m.p.h. (N) in January. The most frequent directions are NW and SW in autumn and winter, NW and SE in spring, NW, SW and SE in summer; calms are very rare.

The records do not indicate much difference in direction or speed between day and night in winter, but in summer the winds are definitely stronger at night.

Old Glory and Trail provide an interesting contrast between isolated mountain-top and the bottom of the trench-like valley of the neighbouring Columbia River. The valley canalises the air-movements, over 70 per cent of the winds being SE and NW; in winter time of day makes little difference, but in summer down-stream winds preponderate strongly at night up-stream by day. On the exposed top of Old Glory the differences between seasons and between morning and afternoon are smaller and less definite.

Carmi, 4,084 feet, on a ridge between the Okanagan and Lower Arrow Lakes is our only representative of middle levels. The predominance of S and SE winds in winter, N, NE and NW in summer, blowing along the topographical lines show the surface control. The mean speed is little if at all more than in the valley-bottoms. The highest records for 1 hour (44 m.p.h. SW in April, 37 m.p.h. SW in October) corroborate the impression given by the mean values that the winds are only of moderate strength.

Little difference of direction or speed is found in winter, but in July northerlies at night give place to stronger westerlies in the afternoon.

The Interior with its light winds contrasts strongly with the stormy Littoral. Its strongest and physiologically most trying winds are the bitterly cold and dry blasts of polar air from the snowy wastes of the Northwest Territories.

Table 7

Mean monthly speed of wind (m.p.h.)

	J	F	M	A	M	J	J	A	S	O	N	D	Year
South Interior													
Ashcroft (1945-52)	2	3	5	7	7	7	7	6	5	4	2	2	4
Princeton (1939-52)	1	1	3	4	4	4	4	4	3	2	1	1	3
Summerland (1922-41)	7	7	7	7	7	7	8	7	7	7	7	7	7
Carmi (1940-52)	3	4	5	5	5	5	5	5	5	5	4	3	4
Old Glory (1950-52)	18	19	16	16	15	12	12	11	12	15	18	20	15
Cranbrook (1939-49)	5	5	6	8	7	6	7	6	6	6	5	4	6
Windermere (1930-40)	3	4	6	6	6	6	6	6	5	5	4	4	4

Table 8

Extreme Wind Speeds (m.p.h.)

		January	April	July	October
South Interior					
Ashcroft (1945-51)	Highest mean for month	4	9	9	5
	Lowest mean for month	1	6	6	2
	Highest record for 1 hour	44SW	35SW 35S	32S	39S
Princeton (1939-51)	Highest mean for month	3	5	5	3
	Lowest mean for month	0·6	3	4	1
	Highest record for 1 hour	23NW	27NE	25W	22NW 22W 22SW
Penticton (1945-51)	Highest mean for month	16	8	8	12
	Lowest mean for month	7	5	4	4
	Highest record for 1 hour	43S	48S	34S 34W 34N	48S
Carmi (1940-51)	Highest mean for month	5	8	6	6
	Lowest mean for month	2	3	4	3
	Highest record for 1 hour	33SW	44SW	26NW	37SW
Old Glory (1950-51)	Highest mean for month	26	16	12	16
	Lowest mean for month	16	15	11	13
	Highest record for 1 hour	54N	62SW	31NW 31N	42NW
Cranbrook (1939-49)	Highest mean for month	8	9	8	8
	Lowest mean for month	3	6	6	5
	Highest record for 1 hour	26SW	27SW	35SE	27SW

Table 9

Mean speed of wind (m.p.h.) by directions

			N	NE	E	SE	S	SW	W	NW
South Interior										
Ashcroft (1945-52)	Jan.		8	6	2	2	3	4	3	8
	Apr.		7	6	3	3	13	9	4	6
	July		6	6	3	4	11	9	5	6
	Oct.		5	6	2	2	7	8	3	5
Princeton (1939-52)	Jan.		2	2	2	2	2	4	2	3
	Apr.		3	4	4	4	5	9	7	5
	July		3	4	3	3	4	6	7	6
	Oct.		2	2	3	2	3	6	4	3
Summerland (1922-41)	Jan.		5	5	5	9	6	6	6	10
	Apr.		7	6	5	10	6	9	6	10
	July		7	5	6	7	6	7	8	11
	Oct.		5	6	4	9	6	6	7	8
Carmi (1940-52)	Jan.		4	3	2	3	3	6	6	6
	Apr.		5	5	4	6	4	7	6	6
	July		5	5	5	6	4	7	5	5
	Oct.		4	5	4	6	4	6	5	5
Old Glory (1950-52)	Jan.		18	11	15	23	21	20	16	16
	Apr.		18	8	12	17	19	15	11	16
	July		14	9	10	12	12	10	9	13
	Oct.		10	7	16	15	17	15	12	15
	LST									
Trail (1945-50)	Jan.	0430	4	2	4	5	1	4	2	7
		1430	20	5	7	5	3	5	4	8
	Apr.	0430	1	4	6	4	4	3	4	6
		1430	4	9	9	8	(none)	8	7	8
	July	0430	2	3	1	4	1	3	3	6
		1430	5	6	8	9	7	8	10	8
	Oct.	0430	4	3	3	5	2	3	3	6
		1430	12	6	6	7	6	6	6	9
Cranbrook (1939-49)	Jan.		3	4	2	8	8	6	3	3
	Apr.		5	6	6	8	8	9	7	6
	July		5	5	6	5	7	8	5	6
	Oct.		5	4	4	6	8	7	5	4
Windermere (1930-40)	Jan.		2	3	2	9	3	2	1	2
	Apr.		4	4	5	9	5	5	4	6
	July		4	3	7	11	8	4	3	5
	Oct.		6	4	6	7	11	4	2	4

Table 10

Wind—Direction and speed (percentage frequencies) according to time of day

	Hour LST	Directions, percentage frequencies								Speeds, m.p.h., percentage frequencies			
		N	NE	E	SE	S	SW	W	NW	Calm	1-12	13-38	>38
South Interior													
Ashcroft (1944-51).... Jan.....	0430	5	2	<1	<1	2	4	<1	2	83	12	4	0
	1630	5	4	3	1	5	6	1	2	72	23	5	0
July....	0430	2	2	1	0	2	13	3	2	75	22	3	0
	1630	4	4	4	3	29	28	4	5	19	90	31	0
Lytton (1944-51).... Jan.....	0430	27	4	1	0	19	3	0	9	36	53	10	0
	1630	29	4	1	0	25	3	<1	12	24	59	16	0
July....	0430	0	1	1	0	62	2	0	0	33	51	16	0
	1630	3	<1	0	0	82	10	0	2	3	60	37	0
Princeton (1941-51).... Jan.....	0430	12	4	9	1	<1	1	3	8	63	37	<1	0
	1630	15	8	8	1	2	1	6	4	55	43	<1	0
July....	0430	8	1	2	<1	1	1	7	12	68	32	0	0
	1630	7	10	7	1	3	9	35	24	4	73	23	0
Penticton (1941-51).... Jan.....	0430	13	1	<1	12	38	2	0	9	24	37	39	0
	1630	7	1	<1	9	45	2	1	15	21	35	44	0
July....	0430	21	5	0	0	1	0	1	11	62	38	1	0
	1630	38	3	2	5	20	2	5	16	8	72	20	0
Carmi (1941-51).... Jan.....	0430	14	4	6	7	18	3	2	6	40	57	<1	0
	1630	10	5	3	12	29	4	4	4	31	65	5	0
July....	0430	20	17	4	2	2	2	7	20	26	72	<1	0
	1630	7	11	3	14	14	22	7	11	10	78	11	<1
Old Glory (1945-51).... Jan.....	0430	14	<1	5	10	22	7	12	30	0	19	71	10
	1630	7	1	3	7	14	17	12	37	<1	19	75	3
July....	0430	12	2	6	18	17	15	9	18	<1	37	52	0
	1630	5	1	4	9	28	14	17	21	<1	70	26	3
Trail (1945-50).... Jan.....	0430	1	3	14	47	2	2	4	27				
	1430	2	3	11	50	2	3	5	24				
Apr....	0430	1	1	9	40	1	5	7	36				
	1430	2	5	6	50	0	10	5	22				
July....	0430	2	1	6	17	2	6	6	60				
	1430	1	6	9	45	1	11	2	25				
Oct.....	0430	3	1	4	36	3	11	4	38				
	1430	<1	2	7	42	2	9	4	34				
Cranbrook (1941-49).... Jan...	0430	9	4	1	3	20	34	6	3	19	77	8	0
	1630	27	7	2	1	16	13	3	10	22	68	10	0
July...	0430	2	0	1	1	42	33	8	1	12	87	2	0
	1630	9	7	9	4	27	31	5	4	3	63	36	0

3.3 Surface Winds in the North Interior

Stations are few and records short. Only Prince George and Quesnel have recording anemometers; the estimates from eye-observations at the other stations are not always quite reliable.

The strong control of the surface air movement by topography is as obvious here as in the rest of British Columbia. By far the most frequent and strongest winds are along the valleys (all the stations are in valley-bottoms); other directions are rare at most stations and winds from them very light.

A (rather uncertain) generalization of directions is that southerly winds are most frequent in winter, northerly in summer but there are exceptions. Wind speed is highest in winter but tends to be low generally. Calms are very frequent in the night and early morning as represented by the 0430 readings—at Williams Lake 45 per cent in July, Smithers 57 per cent, Kleena Kleene 60 per cent, Quesnel 80 per cent. The speed as well as the direction of the wind is evidently much influenced by the surrounding obstructions, natural and man-made, a good illustration being at Prince George where the well-exposed airport has winds almost twice as strong as the town station (but the periods of observations are not quite the same at the two stations).

The wind at most stations in summer is considerably stronger in the afternoon than in the night and early morning and calms are much fewer. Direction does not show much change even in summer at most stations when allowance is made for the afternoon decrease in calms; at Prince George northerlies increase and southerlies decrease in the afternoon in July.

Table 11

Mean monthly speed of wind (m.p.h.)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
North Interior													
Prince George (A) (1943-52)	8	9	9	8	8	6	6	6	6	8	8	8	7
Prince George (town) (1938-45)	4	4	5	4	4	4	3	3	3	4	5	4	4
Quesnel (1947-52)	5	4	4	5	4	4	3	3	3	4	3	4	4

Table 12

Extreme wind speeds (m.p.h.)

		January	April	July	October
North Interior					
Prince George (A) (1943-51)	Highest speed for month	11	9	7	9
	Lowest speed for month	5	7	5	6
	Highest record for 1 hour	41S	32N	35NW	40S
Quesnel (1947-51)	Highest mean for month	5	5	4	5
	Lowest mean for month	3	4	2	3
	Highest record for 1 hour	26S	25SW 25NW	18N 18NW	25SE

Table 13

Mean speed of wind (m.p.h.) by directions

		N	NE	E	SE	S	SW	W	NW
North Interior									
Prince George (A)...........	Jan......	7	4	3	5	12	9	6	8
(1943-52)	Apr.....	8	8	6	7	9	8	8	8
	July.....	6	5	4	5	6	6	7	7
	Oct......	6	6	3	8	10	8	8	6
Prince George (town)........	Jan......	3	2	2	4	9	2	2	2
(1938-45)	Apr.....	4	3	4	4	6	3	4	2
	July.....	3	2	3	4	4	3	4	2
	Oct......	3	2	3	4	7	3	3	2
Quesnel......................	Jan......	2	2	2	7	4	3	1	8
(1947-52)	Apr.....	4	2	3	7	5	7	6	7
	July.....	3	2	2	4	3	3	3	5
	Oct......	3	2	2	6	4	4	2	6

Table 14

Wind—Direction and speed (percentage frequencies) according to time of day

	Hour LST	Directions, percentage frequencies								Speed, m.p.h., percentage frequencies			
		N	NE	E	SE	S	SW	W	NW	Calm	1-12	13-38	>38
North Interior													
Smithers													
(1942-51)..... Jan....	0430	2	0	12	33	4	2	2	3	41	54	4	0
	1630	3	1	11	33	4	4	3	6	37	58	5	0
July...	0430	1	2	11	10	5	3	5	7	57	42	<1	0
	1630	11	2	7	11	4	5	19	27	14	81	6	0
Prince George													
(1941-5,1951). Jan....	0430	24	12	4	10	19	5	10	8	7	82	10	0
	1630	24	16	5	8	25	3	5	3	11	82	8	0
July...	0430	10	6	<1	3	34	16	15	5	10	91	0	0
	1630	15	11	3	7	23	15	12	14	0	95	5	0
Quesnel													
(1946-51)..... Jan....	0430	3	1	2	22	3	0	0	10	58	37	5	0
	1630	7	1	2	21	6	1	0	15	48	48	5	0
July...	0430	4	1	2	6	2	0	0	6	80	20	0	0
	1630	9	3	4	24	9	7	5	24	15	80	5	0
Williams Lake													
(1941-47)..... Jan....	0430	6	<1	1	43	6	2	<1	16	24	67	9	0
	1630	9	<1	4	41	7	0	7	27	7	79	13	0
July...	0430	5	5	2	23	4	1	0	14	45	55	<1	0
	1630	3	5	1	40	5	3	4	28	9	77	13	0
Dog Creek													
(1944-51)..... Jan....	0430	9	5	6	12	14	3	6	16	30	61	8	0
	1630	7	1	2	9	20	9	9	22	21	71	8	0
July...	0430	4	6	1	5	12	13	10	22	27	72	1	0
	1630	7	6	4	9	20	10	7	32	4	85	11	0
Kleena Kleene													
(1942-51)..... Jan....	0430	14	3	9	17	2	10	2	9	34	66	0	0
	1630	4	3	3	19	6	14	5	5	42	53	4	0
July...	0430	7	2	0	2	3	12	8	8	60	38	2	0
	1630	11	2	2	4	8	35	24	10	6	66	28	0

CHAPTER 4

Temperature and Humidity

4.1 Temperature: General

Charts of mean temperature 'reduced to sea-level' are commonly used in climatic descriptions. But they fail seriously to portray actual conditions in British Columbia, a land full of mountain-ranges and uplands rising in many places more than 7,000 feet above the sea, and vales and valleys cut down almost to sea-level even in the far interior. Unfortunately meteorological records are too few except in some of the valleys, and the topography much too varied, for satisfactory mapping of the actual temperatures, and maps of temperatures reduced to sea-level (Figs. 15-18) are given to form a preliminary view.

A comparison with northwest Europe is instructive. The temperatures of the littorals of the two regions are not dissimilar, with their warm winters, cool summers, and small range. But a great difference appears beyond the littorals, for instead of the abrupt change in British Columbia a journey of 1,800 miles, to central Russia, is required in Europe to reach the same mean in January as is found in British Columbia only 300 miles from the ocean; if actual, not sea-level, temperatures are considered mountainous British Columbia gives the same temperature much nearer the coast, for most of Europe is lowland only a few hundred feet above sea-level.

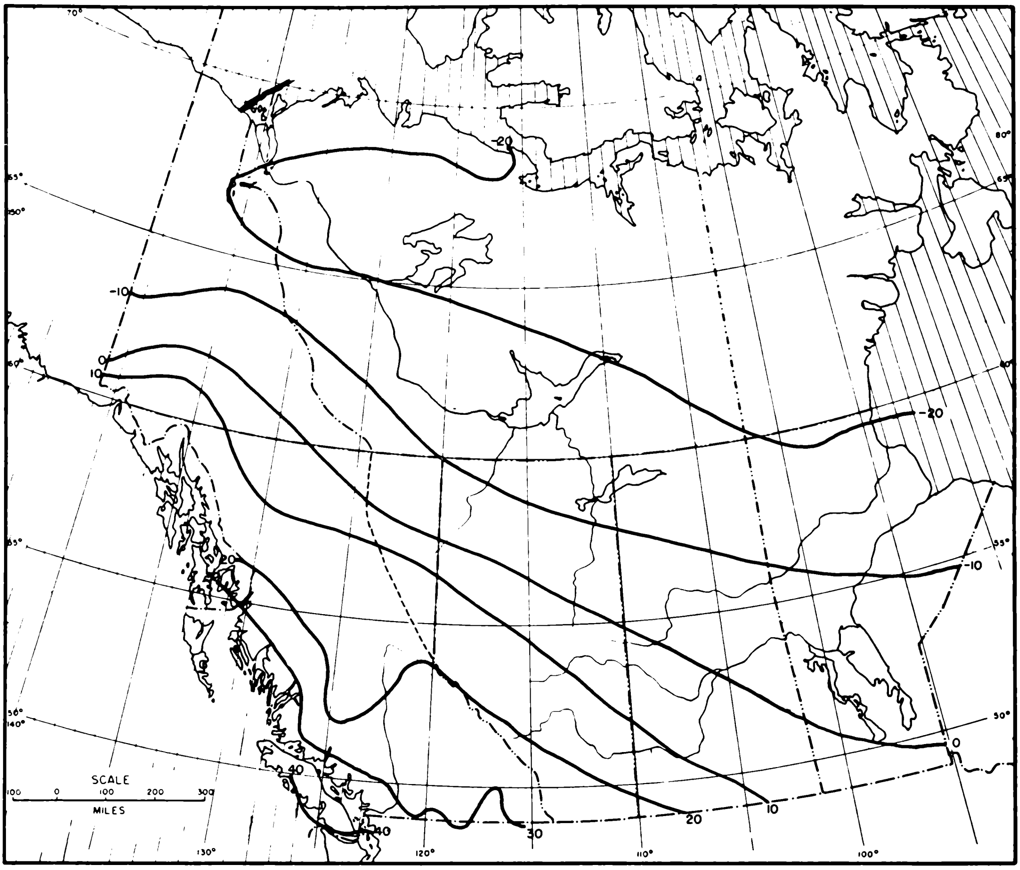
Both position and relief tend to make the mean sea-level isotherms in all seasons run parallel to the coast, particularly near the coast itself. Astronomical control is outweighed by terrestrial, by juxtaposition of ocean and continent, and by the pronounced 'grain' of the land.

The NW-SE trend is very strong in winter (Fig. 15), the 32° isotherm following the coast with striking fidelity. In the interior the isotherms diverge in wide curves indicating the southward spread of cold air between the Coast Mountains and the Rockies. Except in the Littoral the whole Province has a mean temperature in January below freezing-point, and most of the interior below 20°; the change from the warmth of the Littoral, a warmth remarkable for the latitude, to the more normal temperatures of the interior is abrupt. All along the Littoral the rapid change of temperature across the coast and the very slight change along it are the striking feature.

In summer temperature is more uniform. The Littoral is now the coolest part of the Province (the effect of altitude being again eliminated) but the uniformity from north to south is as prominent as in winter. The interior is much warmer, the favoured Kootenays enjoying July means above 70°, sub-tropical heat.

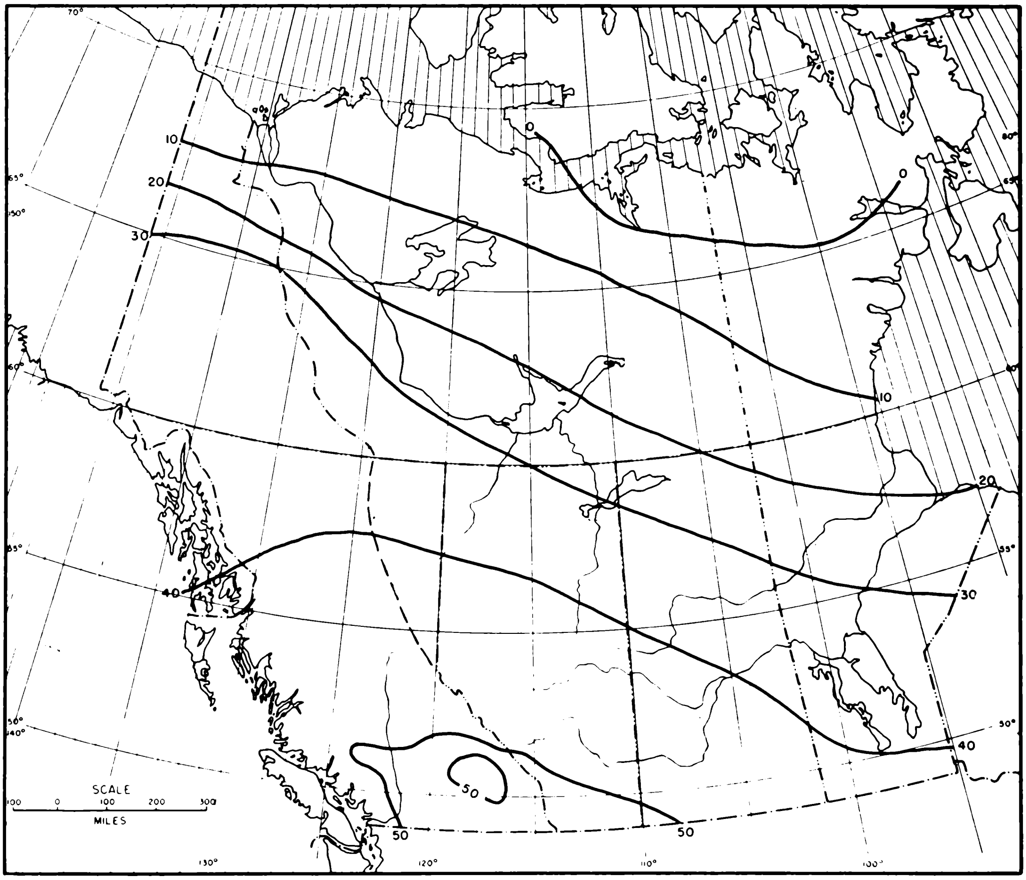
The influences described above are equally prominent in the mean annual range (Fig. 19) and in the extreme temperatures, particularly the absolute minima (Figs. 20-22).

Figure 15



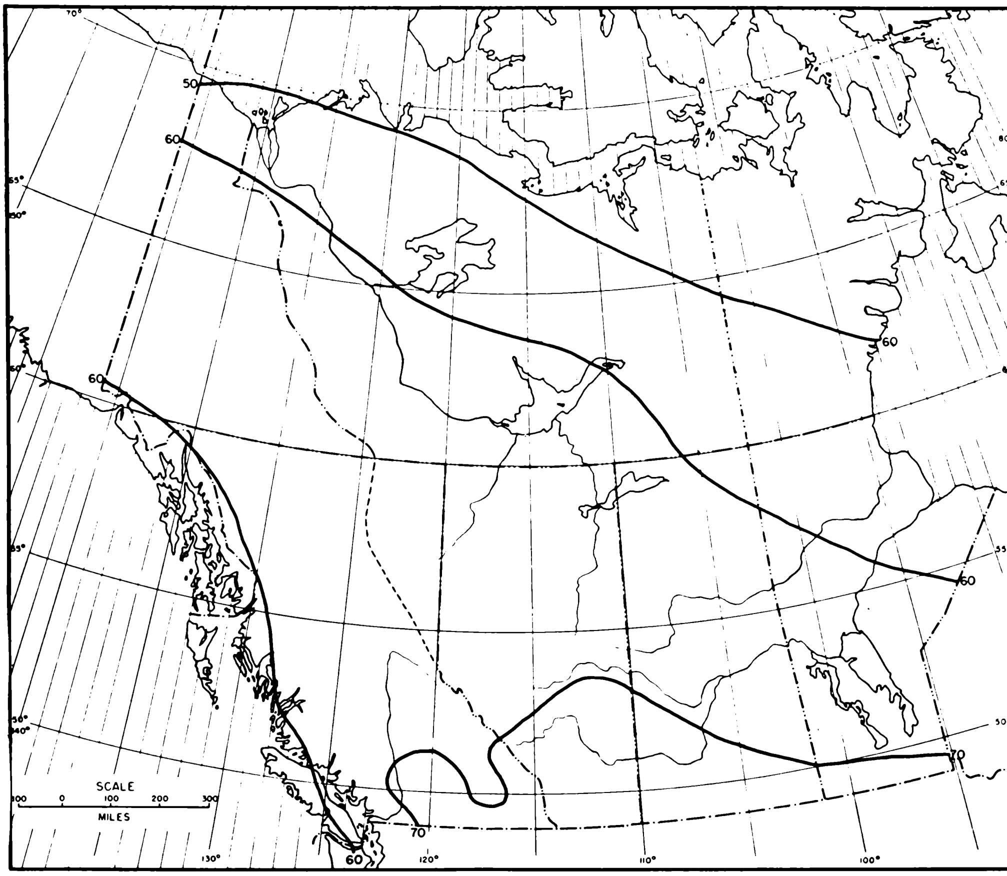
Mean January temperature (°F.) reduced to sea-level.

Figure 16



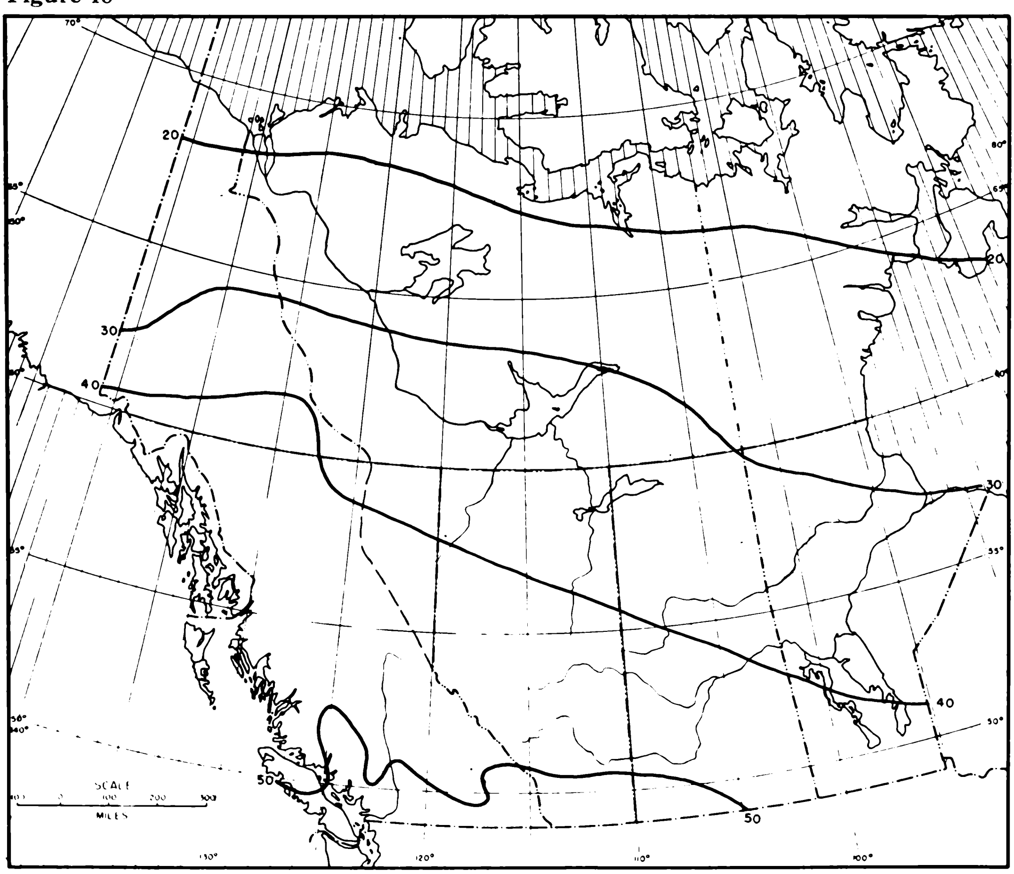
Mean April temperature (°F.) reduced to sea-level.

Figure 17



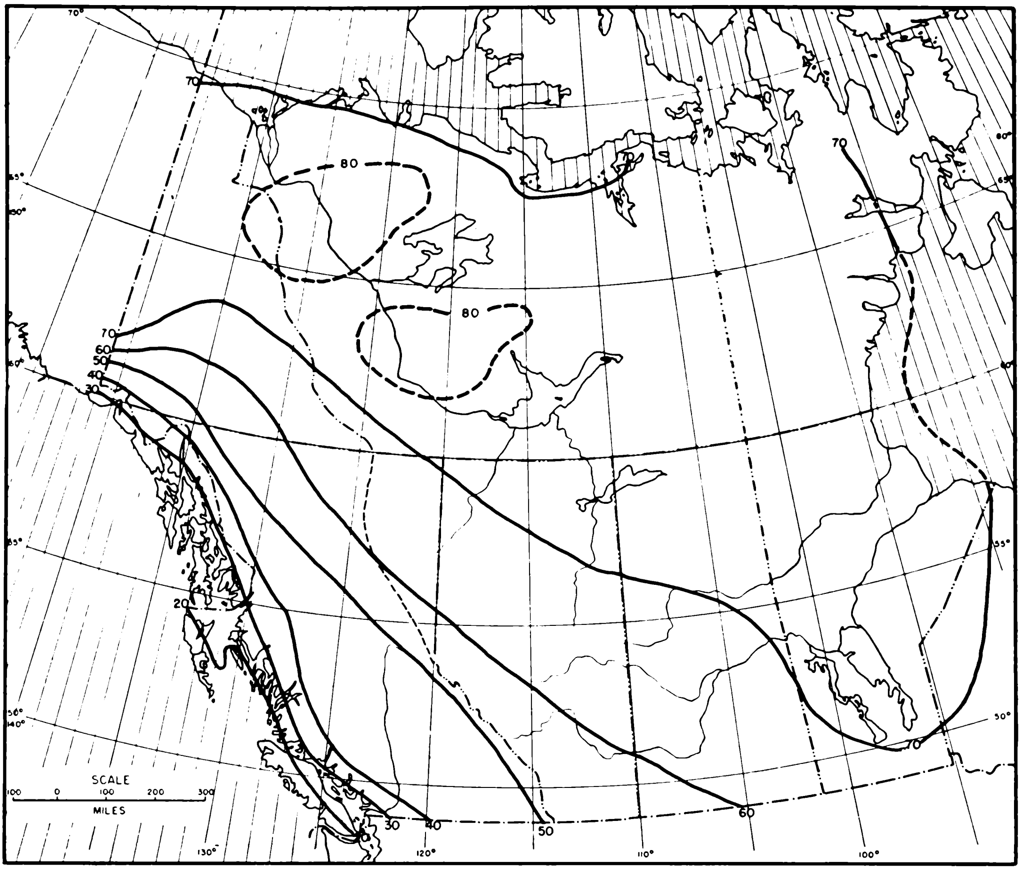
Mean July temperature (°F.) reduced to sea-level.

Figure 18



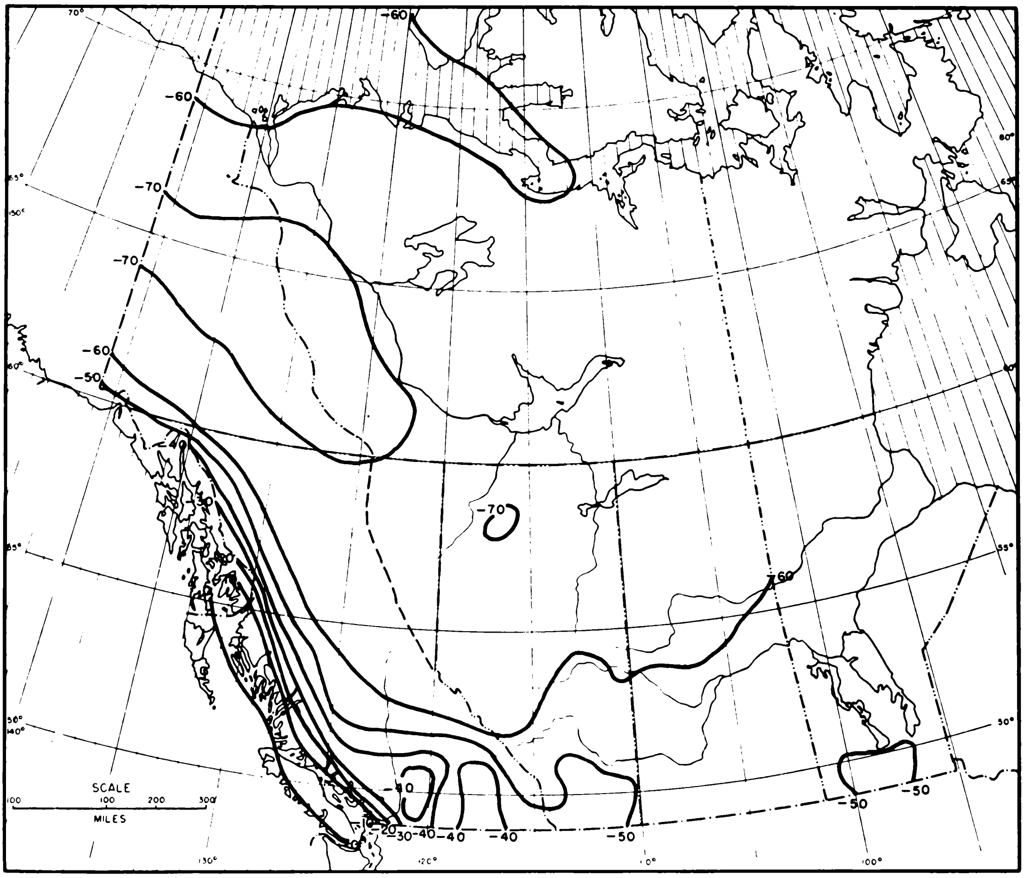
Mean October temperature (°F.) reduced to sea-level.

Figure 19



Mean annual range of temperature (°F.). The annual range is the difference between the mean temperatures of the warmest and coldest months.

Figure 20



Extreme lowest temperature (°F.).

In the foregoing paragraphs the effect of altitude has been eliminated. For their practical applications actual temperatures must now be used. The positions and altitudes of the meteorological stations are given in Section 1.3 and a selection of them is used in Tables 15-17 (Table 15, for convenience, contains data of precipitation as well as temperature). More details for some of these, and other, stations may be found in the Climatological Tables (Appendix I). The arrangement in Table 15 (and most other Tables in Part I) is by Regions, Littoral, South Interior, (valleys and uplands), North Interior (valleys and uplands), and the short description that follows is based on this order. All the stations in the Littoral are near sea-level. Those in the Interior differ greatly in altitude, but all the valley-stations are on the valley-floors, which are lowest in the west (about 600 feet above the sea in the Fraser valley), 1,200 to 2,000 feet in the middle Interior and 2,500 feet in the Rocky Mountain Trench; despite the differences of altitude their monthly means are surprisingly similar in summer and not very different in winter; the extreme difference of mean annual range between the valley-stations from west to east is only 4°. The differences between the few upland stations with their different altitudes are naturally much larger.

Altitude plays its usual part in reducing temperature, an important factor in a region with long and lofty mountain-ranges; a few series of records are given in Table 17. The deep snows that cover the uplands in the winter months testify clearly to the cold.

Most of the Littoral is a narrow strip between sea and mountain, but the strong tendency of the climate to continentality which is always present in these latitudes appears on the east of Vancouver Island and the Queen Charlottes which are sheltered by the mountain-backbones of the islands, as is shown by a comparison of Comox and Estevan Point, of Masset and Lanagara. The only lowland of any area that extends east is the valley, or vale, of the lower Fraser and here the continental tendency has more scope as the temperatures at Victoria, Vancouver, Abbotsford and Hope show.

Table 15

Mean temperature and precipitation at representative stations, in valleys and on uplands

		Mean Temperature °F						Mean Precipitation (inches)			
		Warmest month			Coldest month			Year †			
—	Alt. ft.	m.d.* max.	m.d. min.	mean for mo.	m.d. max.	m.d. min.	mean for mo.	Total	Snow	Season with most and amount	Season with least and amount
Littoral											
Estevan Point	20	63	52	57	45	35	40	107·2	9	Winter 40	Summer 10
Prince Rupert	170	64	51	57	40	31	35	95·6	37	Autumn 33	Summer 14
Victoria	228	68	52	60	43	35	39	26·9	14	Winter 12	Summer 2
Vancouver (city)	45	74	54	64	41	32	37	57·9	27	Winter 23	Summer 5
Valleys											
Fraser											
Lillooet	740	88	55	71	33	19	26	12·3	24	Winter 3·8	Spring 2·1
Lytton	574	84	58	71	31	21	27	17·1	44	Winter 7·3	Summer 2·2
Hope	580	75	54	64	33	25	29	56·6	72	Winter 23·6	Summer 4·7
Similkameen											
Princeton	2,283	81	45	63	26	7	16	13·1	47	Winter 5·8	Spring 2·3
Keremeos	1,165	84	58	71	31	18	24	9·9	22	Autumn 2·7	Spring 2·1

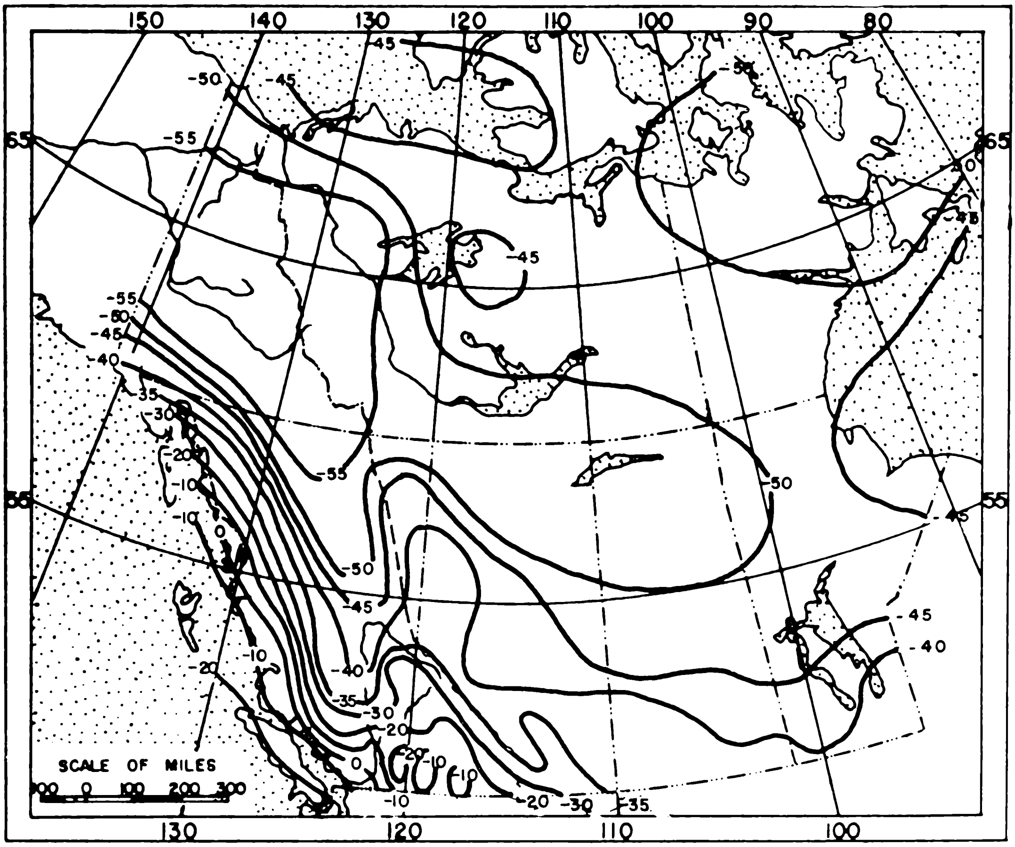
Table 15—Concluded

Mean temperature and precipitation at representative stations, in valleys and on uplands.

——	Alt. ft.	Mean Temperature °F: Warmest month m.d.* max.	m.d. min.	mean for mo.	Coldest month m.d. max.	m.d. min.	mean for mo.	Mean Precipitation (inches): Year † Total	Snow	Season with most and amount	Season with least and amount
Valleys											
Okanagan											
Vernon	1,383	84	54	69	28	17	22	15·3	48	Winter 4·7	Spring 2·8
Kelowna	1,200	81	53	67	31	19	25	12·4	35	Winter 3·7	Spring 2·4
Penticton	1,121	84	53	68	32	21	27	11·4	22	Summer 3·1	Spring 2·6
Kettle											
Beaverdell	3,000			no records				17·1	70	Winter 5·6	Spring 3·4
Midway	1,800	85	45	65	29	12	20	12·6	30	Spring 4·0	Winter 2·7
Grand Forks	1,746	86	52	69	26	13	19	16·3	48	Winter 4·9	Spring 3·4
Columbia											
Revelstoke	1,497	80	49	65	26	14	20	40·3	143	Winter 15·4	Summer 6·6
Nakusp	1,412	78	49	64	28	20	24	28·9	103	Winter 10·2	Summer 5·4
Trail (Warfield)	1,367	85	57	71	29	20	25	26·0	80	Winter 9·1	Summer 4·4
Kootenay											
Kaslo	1,930	77	52	65	30	20	25	26·7	80	Winter 9·8	Summer 4·7
Nelson	2,235	86	47	66	30	19	24	28·0	89	Winter 9·5	Summer 5·5
Creston	2,000	82	50	66	30	16	23	18·4	58	Winter 6·2	Summer 3·6
Rocky Mt. Trench											
Golden	2,583	79	47	63	20	2	11	18·0	76	Winter 5·8	Spring 2·7
Invermere	2,650	79	47	63	22	3	13	11·3	32	Summer 4·0	Spring 2·1
Cranbrook	3,013	81	45	63	25	8	17	14·3	57	Winter 4·6	Spring 2·7
Fernie	3,305	78	47	63	25	9	17	39·6	132	Winter 14·3	Summer 6·1
Thompson											
Vavenby	1,545	81	47	64	26	10	18	15·6	40	Summer 4·7	Spring 2·9
Kamloops	1,133	84	56	70	28	16	22	10·2	29	Summer 3·4	Spring 1·8
Ashcroft	1,180	82	54	68	24	8	16	7·2	17	Summer 2·4	Spring 1·3
Merritt (Nicola)	1,947	79	49	64	29	12	21	9·0	34	Winter 3·0	Spring 1·8
Coast Mountains											
Premier	1,371	64	48	56	28	20	24	87·4	455	Winter 30·4	Summer 9·9
Daisy Lake	1,200			no records				60·8	131	Winter 27·2	Summer 4·8
Bralorne	3,500	74	45	60	27	13	20	25·9	79	Winter 9·2	Summer 3·9
Seymour Falls	674			no records				147·0	91	Winter 58·2	Summer 11·3
Princeton Uplands											
Copper Mountain	3,946	75	46	60	28	14	21	17·7	81	Winter 5·1	Spring 3·9
Hedley, N.P. Mine	5,800	69	42	55	24	8	16	23·8	160	Spring 6·8	Autumn 5·1
Monashee Mts											
McCulloch	4,100	75	40	57	25	7	16	27·0	..	Winter 8·2	Summer 5·8
Chute Lake	3,911			no records				24·3	13	Winter 8·0	Summer 4·7
Carmi	4,084	73	47	60	23	10	16	21·1	103	Winter 6·0	Spring 4·5
Old Glory	7,700	56	42	49	15	6	10	24·0	164	Summer 7·3	Winter Spring 5·3
Selkirks											
Gerrard	2,347	82	43	63	28	21	24	34·0	158	Winter 14·4	Summer 4·8
Glacier	4,094	71	45	58	20	8	14	53·5	390	Winter 21·5	Summer 8·3
Rocky Mts.											
Field	4,072	74	44	59	19	5	12	23·2	102	Summer 6·7	Spring 4·0
Sinclair Pass	4,000	74	42	58	20	5	12	21·2	79	Summer 6·4	Autumn 4·7
Elko	3,000			no records				20·1	52	Winter 5·5	Spring 4·2

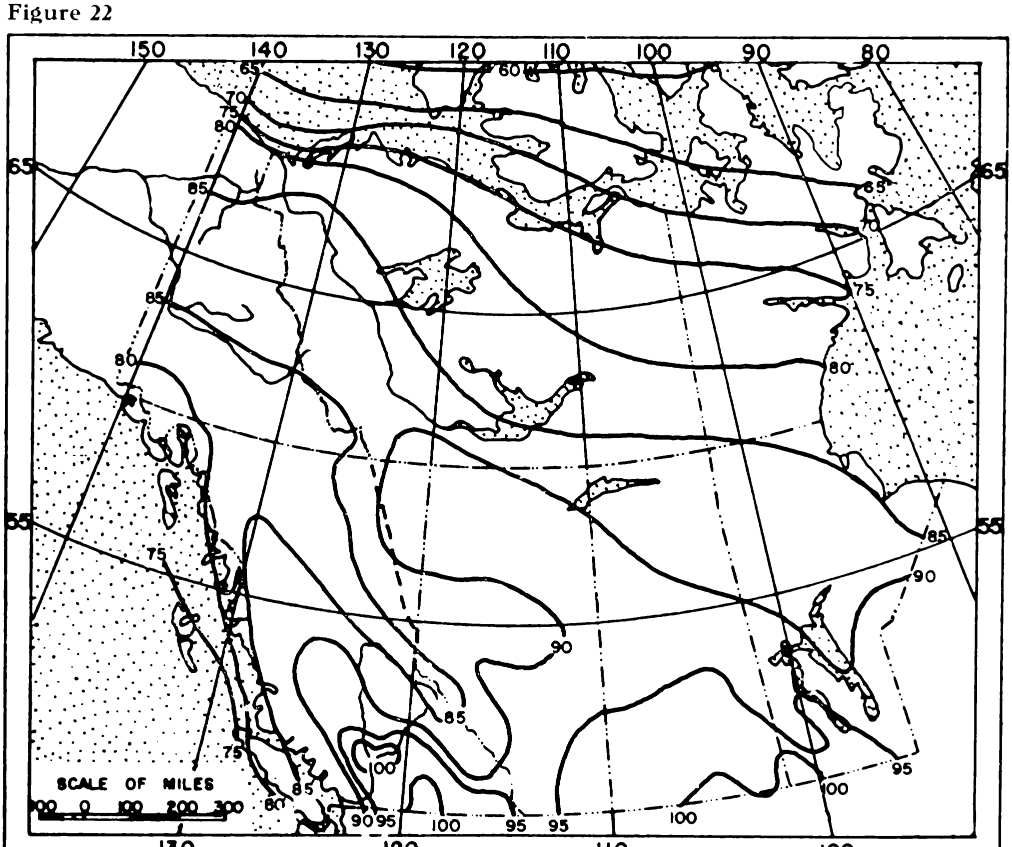
* m.d.—mean daily.
† Total precipitation is the sum of the rainfall and one-tenth of the snowfall.

Figure 21



Mean annual minimum temperature (°F.).

Figure 22

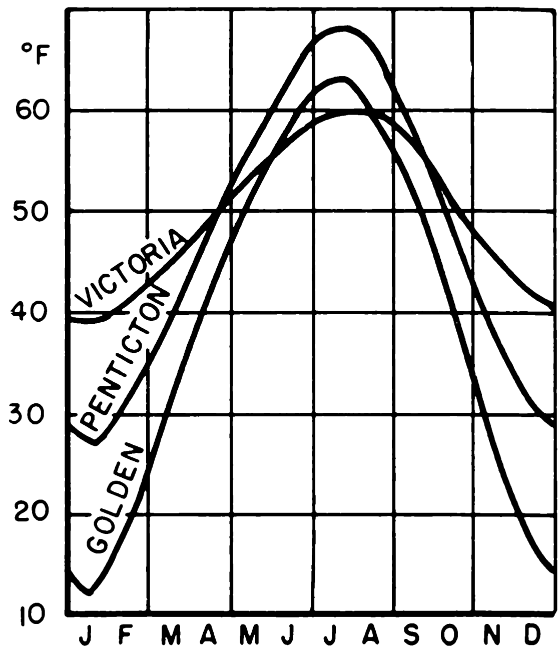


Mean annual maximum temperature (°F.).

Temperature: By Regions

Littoral Temperatures are remarkably similar from south to north, a distance of 500 miles. The distinguishing features are the mild winters (January mean 30°- 40°), the warm, but not hot summers (July mean about 60°), the long transition seasons (autumn and spring each 3 months), and the small range of temperature (Fig. 23, Victoria). The course of the January and July isotherms proves the dominating control of temperature by the ocean, not by direct insolation. Table 16 illustrates these features at stations along the coast. As showing the long drawn-out transition seasons it may be noted that the mean monthly temperature rises only about 10° from March to May and falls only about 12° from September to November, half as much as in the interior of the Province and a third as much as in the south of Saskatchewan. And Table 16 is a reminder that even the narrow Littoral is wide enough to be appreciably more extreme in the east than on the exposed coast.

Fig. 23



Annual variation of the mean monthly temperature at Victoria, Penticton and Golden.

Table 16

Temperatures on the Littoral, west-east series of stations showing increasing continentality towards the east

—	Mean temp. Warmest month	Mean temp. Coldest month	Mean annual range	No. of months with mean temp. ≥ 60°	No. of months with mean temp. ≤ 40°
Estevan Point	56	40	16	0	1
Victoria	60	39	21	2	1
Vancouver (city)	64	36	28	3	3
Chilliwack	64	34	30	3	3
Ivory Island	54	32	22	0	0
Ocean Falls	62	34	28	2	3
Bella Coola	61	27	34	2	3

The Littoral is sheltered by its Coast Mountains from the very cold waves of polar air that sometimes penetrate the defence of the Rocky Mountains and break into the interior of the Province. The few that do approach the coast have by then lost their keenest edge, so that the lowest temperatures are much less low than those east of the Coast Mountains. The summers hardly ever give uncomfortable heat even for a few hours, their safeguard being the cool sea-breeze which is frequent and is likely to set in if the land begins to warm up unduly, high temperatures tending to bring about their own undoing.

The mean daily maxima and minima, the absolute extremes and their ranges, given in the Climatological Tables are proof of the remarkable equability for the latitude. The lowest recorded temperatures on the Littoral in January are about the mean daily minima in the same month in the Interior.

British Columbia has great variety of temperature, contrasting sharply with Central Canada with its monotonous uniformity over vast expanses. The transition from the mild oceanic Littoral to the Interior is the more rapid owing to the barrier presented by the Coast Mountains to oceanic winds. Superposed on the major distinction between oceanic and continental are the differences due to altitude, slope, and topography. The outer coasts (like the British Isles) enjoy the equable maritime temperatures of the oceanic Westerlies with their remarkably warm winters and cool summers, but the east of the Province (like Central Europe) has definitely continental conditions, cold winters and, in the valleys, warm to hot summers, resembling the south of the prairies beyond the Rocky Mountains (Fig. 20).

Three considerations give guidance in an attempt at description of the Interior. Firstly, the effect of latitude is large enough to justify a division into north (north of about the latitude of Ashcroft) and south—the divisions being called the North Interior and South Interior, the line of separation a little north of Ashcroft; in the Littoral the latitudinal effect is eclipsed by the oceanic. Secondly, continentality increasing eastward shows its impress by the colder winters and hotter summers in the east. And thirdly, orography is a control everywhere, uplands, all containing different altitudes, separating the many valleys. In view of this bold and complicated relief the simplest basis of description is by individual valleys and intervening uplands. In the South Interior that basis indeed seems to be the only possible one, and in the North Interior it is convenient. But the number of suitable meteorological stations even in the valleys is far from adequate.

South Interior. The series of valley and upland stations in Table 15 are arranged from west to east. In both series the increasing continentality towards the east is the major control but the effect of altitude also must be remembered. The differences due to continentality are larger in winter than summer, as is shown by a comparison of the Okanagan valley with the Rocky Mountain Trench (which is affected by its greater altitude as well as continentality). The differences due to altitude are largest in summer, but few groups of stations with suitable positions and records are available to show the relationship; Hedley and Hedley Mine, Table 17, illustrate it, but the factors involved at Revelstoke, Glacier, and Golden (in the same Table) are less simple (Table 19).

Table 17

Mean temperature and precipitation at neighbouring stations, showing effect of altitude and exposure

	Alt. ft.	Mean Temperature Jan.	Apr.	July	Oct.	Year	Mean Precipitation (in.) Jan.	Apr.	July	Oct.	Year
Littoral											
Britannia Beach	160	35	47	64	50	49	9·5	5·2	2·1	9·6	75·7
Tunnel Camp	2,200	(no records)					11·2	7·0	2·8	11·7	95·6
South Interior											
Hedley	1,700	22	47	68	47	46	1·2	0·6	1·0	0·8	11·5
Hedley (N.P. Mine)	5,600	16	31	54	36	35	1·9	2·6	1·8	1·7	23·8
Revelstoke	1,497	20	44	65	44	44	5·6	1·9	2·1	3·9	40·3
Glacier	4,094	14	36	58	37	36	8·5	2·6	2·4	4·7	56·9
Golden	2,583	11	42	63	41	39	2·1	0·7	1·4	1·6	18·0

The Okanagan and neighbouring valleys contain many large orchards, most of them apple, among the best in Canada, but weather hazards are serious and losses can be heavy. Rain is always liable to fail (the dry belt with its arid valleys is not far away to the north), but irrigation channels fed by the rains and melting snow on the mountains are an easy remedy in most places. The serious hazard is rather the liability to frost, both inversion-frost on clear calm nights in spring, which damages the young fruit (hence the importance of careful choice of site), and worse, the cutting icy winds of abnormally cold winters, against which there is no satisfactory defence. The trees of whole sections of carefully tended orchards may be frost-killed in winter by the (fortunately rare) invasions of unusually cold polar air, most recently in the winter of early 1950.

Few stations have means much above 70° in July; nearly all have mean daily maxima in the eighties in that month, but the cool or even cold nights give a large daily range and rather low daily means—continental characteristics natural in deep narrow valleys. The lower Fraser valley has the warmest summers, thanks to its narrowness and low altitude, but the Okanagan follows it closely. The Rocky Mountain Trench has the coolest (the nights being relatively cooler than the days, a result of the draining of cold air from the high mountain-walls), and far the coldest nights in winter.

Most of the valley stations have recorded temperatures above 100° on summer days (Kamloops and Princeton 107°, Lytton in its deep valley close under the lee of the Coast Mountain 112°), and night minima in winter below −30° (Princeton −49°, a very low figure but its period of observations, 58 years, is the longest of our series). At the upland stations maxima of 100° must be rare and indeed 100° has been recorded only at Copper Mountain, 3,946 feet.

The lowest minima and the spells of coldest weather are brought by invasions of continental arctic air, which succeeds on the average 3 or 4 times a year in crossing the Rockies from its source in the Northwest Territories. The hottest spells in summer occur when a suitable barometric gradient sends continental Tropical air into the Province from the sun-baked plataux of the south-western States: naturally the south-east of the Province gets most.

The daily range of temperature is very large in summer in the valleys, increasing from about 15° in July in the Fraser valley to 35° in the south of the Rocky Mountain Trench. It is much less in winter.

Table 18

Temperature data for stations in the North Interior

Stations (period of records in brackets)	Alt. ft.	Mean Temperature Warmest month m.d.* max.	m.d. min.	mean	Coldest month m.d. max.	m.d. min.	mean	Absolute extremes max.	min.	No. of months with mean temp. ≥ 60°	≤ 32°
Fraser Valley											
Dome Creek (1918-38)	2,200	76	43	60	24	5	15	108	−53	1	5
Prince George (1912-51)	2,218	71	45	58	21	2	11	102	−58	0	5
Quesnel (1895-51)	1,787	78	46	62	24	5	15	105	−52	2	5
Dog Creek (1944-50)	3,370	72	47	60	21	6	13	91	−39	1	5
Skeena Valley											
Smithers (1938-47)	1,632	70	43	57	27	11	16	99	−48	0	5
Klinaklini Valley											
Kleena Kleene (1942-51)	2,950	72	41	56	22	3	10	92	−58	0	5
Cariboo Uplands											
Barkerville (1890-48)	4,180	67	42	54	23	9	16	96	−52	0	5

* m.d.—mean daily.

The paucity of stations in this large Region precludes detailed description, but some points stand out clearly (Table 18). Winter is the most distinctive season, being longer and colder than in the south. The summers are shorter and cooler. Most stations have at least 5 months with mean temperature 32° or under, and only the lowest and most sheltered valleys have summer months with mean above 60°. In contrast, most of the valley stations in the South Interior have 3 summer months with means well above 60°, and most have only 3 (or 2) months below 32°. The temperatures of the upland stations in the South Interior are similar to those in the valleys of the North. The longer summer days in the North favour high maxima, very high on the rare occasions when continental tropical air makes its way so far north and skies are clear. Records over 100° have occurred (absolute maximum at Quesnel 105°). But the long winter nights can be much colder than in the South, most stations in the valleys as well as on the uplands having recorded temperatures well below −50°; in the South even −30° is rare. The North has several very cold spells in most winters during incursions of Polar air from the Northwest Territories which may give several days of intense cold. And occasionally similar visitations give freezing temperatures even in summer, and damage crops in the Nechako valley.

An interesting example of ' inversion of temperature' is seen in the temperatures of the winter months at Quesnel and Barkerville (Fig. 24). Though Barkerville, well up in the Cariboo Mountains, is 2,400 feet higher than Quesnel its January mean is 1° above Quesnel's and mean daily minimum in the same month 4° above. The explanation is largely the gravitation of the surface-cooled air to valley-bottoms in calm clear weather; another factor may be the shallowness of the layer of continental arctic air from the northeast, which is responsible for very cold spells in the valleys but often fails to rise to Barkerville. Probably other uplands in the North Interior enjoy a similar advantage, but there are no

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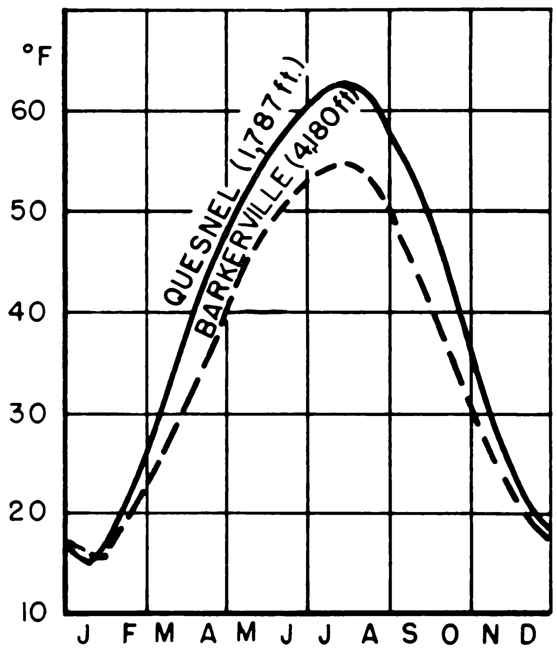
suitable stations to prove it. The relationship described is restricted to the winter; in the other seasons Barkerville has lower means than Quesnel. The South Interior is too seldom flooded by continental Polar air to have such strong inversions. For it the data in Table 19 may be fairly representative, and they suggest that continentality is a strong influence in winter. The 3 stations in the Table lie roughly W-E, Glacier 35 miles east of Revelstoke, Golden 25 miles east of Glacier. Revelstoke is in the valley of the Columbia River, Glacier in an open upland valley of the Selkirk Range, Golden in the bottom of the Rocky Mountain Trench.

Fig. 24



Annual variation of the mean monthly temperature at Quesnel and Barkerville.

Table 19

Temperature data for stations in the South Interior.

—	Alt. ft.	Mean monthly temp. Jan.	July	Mean annual range
Revelstoke	1,497	20	65	45
Glacier	4,094	14	58	44
Golden	2,583	11	63	52

The January mean falls 6° from Revelstoke to Glacier, an ascent of 2,600 feet, and 3° from Glacier to Golden, a descent of 1,500 feet. Thus the lapse-rate between Revelstoke and Glacier is 1° in 430 feet, between Glacier and Golden −1° in 500 feet, the inversion in the latter case being largely due to continentality reinforcing the influences described above for the North. The means for July show approximately the mean normal lapse-rate.

The transitions between winter and summer are short. Winter lasts for 5 months, November to March, summer for 3, June to August, but spring and autumn only 2 months each, April and May, and September and October.

4.3 Temperature: Variability

The increase of variability from the equable Littoral to the continental Interior stands out in all the Tables, the differences being much larger between west and east than between south and north.

The variability is expressed from several aspects in the Climatological Tables and in Tables 20-27, 31.

The absolute extremes in each month are in the Climatological Tables. The probability of much widening of their range at stations with long periods of observations, 30 years or more, is small. The data are amplified for some stations in Table 20 by the addition of the highest minimum on record in January and the lowest maximum in July.

Table 20

Variability of minimum temperature in January, maximum in July; the highest and lowest records in the two months are given, with years of occurrence; period of records in brackets after name of station

	January minimum		July maximum	
	Highest	Lowest	Highest	Lowest
Littoral				
Victoria (1915-52)	44(1952)	6(1950)	92(1924) (1951)	59(1951)
Prince Rupert (1915-52)	41(1952)	−6(1916)	87(1934)	56(1951)
Vancouver (city) (1915-43)	31(1934)	4(1943)	91(1926)	77(1932)
Abbotsford (1937-52)	45(1951)	−6(1950)	100(1944)	61(1949)
South Interior				
Oliver (1941-52)	33(1952)	−23(1950)	(1941) 104(1942) (1944)	70(1951)
Penticton (1941-52)	35(1952)	−16(1950)	105(1941)	63(1951)
Kelowna (1931-52)	33(1952)	−24(1950)	102(1941)	61(1949)
Kamloops (1915-52)	35(1952)	−37(1950)	107(1941)	69(1951)
Glacier (1893-52)	29(1952)	−32(1909) (1943)	98(1947)	63(1951)
Golden (1903-52)	32(1952)	−51(1907)	104(1941)	61(1951)
Creston (1913-52)	34(1952)	−27(1924)	103(1941)	62(1951)
North Interior				
Prince George (1913-45)	6(1926)	−57(1928)	102(1941)	62(1951)

The influence of distance from the ocean is evident. The extreme range at Estevan Point is 73°; the maxima increase amd minima decrease rapidly in the Interior (range 143° at Cranbrook), more in the enclosed valleys than on the uplands, e.g.:

	Abs. max.	Abs. min.	Abs. range
Grand Forks (1912-38)	109	−33	142
Carmi (1939-51)	95	−31	126

The range also increases from north to south, the maxima changing much less than the minima, e.g.:

	Abs. max.	Abs. min.	Abs. range
Prince George (1912-51)	102	−58	160
Penticton (1907-51)	105	−16	121

Table 21 shows not the absolute extremes but the mean daily maxima and minima in Januarys and Julys; the highest and lowest records are given, and the long-period means can be found in the Climatological Tables.

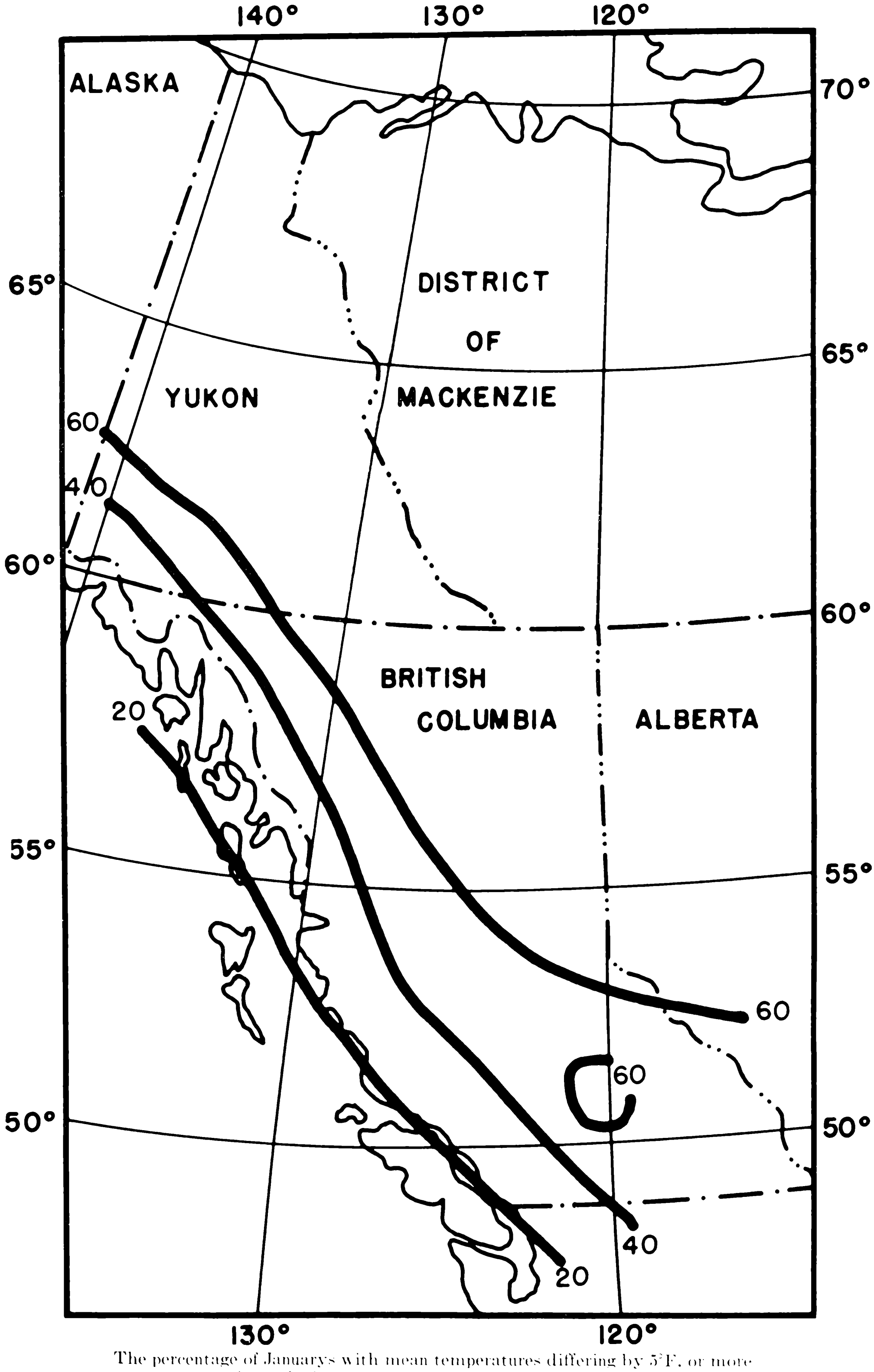
Table 21

Variability of mean daily maximum and minimum temperatures in January and July. The highest and lowest means in the two months are given, with dates of occurrence; period of records in brackets after name of station

	January				July			
	Mean daily				Mean daily			
	Maximum		Minimum		Maximum		Minimum	
	Highest	Lowest	Highest	Lowest	Highest	Lowest	Highest	Lowest
Littoral								
Victoria (1915-52)	48 (1941)	31 (1950)	42 (1931)	22 (1950)	72 (1942)	64 (1932)	55 (1941)	51 (1919 1949)
Prince Rupert (1915-52)	48 (1942)	25 (1950)	39 (1931)	13 (1950)	68 (1931)	60 (1933 1946)	52 (1915 1942)	46 (1933)
Vancouver (city) (1915-43)	49 (1941)	31 (1916)	39 (1931)	21 (1916)	77 (1931 1926)	69 (1916)	58 (1942)	52 (1919)
Abbotsford (1937-52)	48 (1941)	24 (1950)	35 (1939 1941)	10 (1950)	82 (1941)	72 (1948 1949)	55 (1942)	48 (1949)
South Interior								
Oliver (1941-52)	38 (1941)	39 (1950)	29 (1941)	2 (1950)	91 (1945)	81 (1948)	56 (1941)	51 (1948)
Penticton (1941-52)	37 (1946)	12 (1950)	28 (1945)	1 (1950)	86 (1941)	79 (1948)	68 (1951)	51 (1945)
Kelowna (1931-52)	40 (1934)	12 (1950)	29 (1931 1941)	−4 (1950)	86 (1938 1941)	77 (1932)	57 (1941)	50 (1932)
Kamloops (1915-52)	39 (1931)	1 (1950)	30 (1931)	−14 (1950)	90 (1941)	76 (1932)	59 (1938)	53 (1916)
Glacier (1893-52)	28 (1934)	−1 (1950)	19 (1941)	−13 (1950)	79 (1920 1925)	64 (1912)	48 (1925)	37 (1929)
Golden (1903-52)	32 (1931)	−1 (1950)	18 (1941)	−26 (1930)	86 (1936 1947)	72 (1915)	55 (1924)	42 (1932)
Creston (1913-52)	38 (1934)	14 (1937)	26 (1931)	−3 (1937)	90 (1926)	73 (1912)	54 (1941)	47 (1924 1929 1933 1946)
North Interior								
Prince George (1913-45)	38 (1931)	−1 (1916)	20 (1931)	−23 (1916)	80 (1920 1927)	65 (1914)	50 (1941)	41 (1913 1918)

The variability of the mean monthly temperature is expressed in Table 22 by the percentage frequencies of excesses and deficits of 5-10° and >10°. Departures of less than 5° are ignored. The items in the group >10° may be much above 10°, and at most stations the total numbers of excesses and deficits are not equal. Fig. 25 shows the increase of variability towards north and east.

Fig. 25



The percentage of Januarys with mean temperatures differing by 5°F. or more from the long-period mean January temperature.

Table 22

Percentage frequencies of departures of monthly temperatures from long-period means (periods in brackets)

	January				July			
	Excess		Deficit		Excess		Deficit	
	5°-10°	> 10°	5°-10°	> 10°	5°-10°	> 10°	5°-10°	> 10°
Littoral								
Victoria (1885-1934)	4	0	12	0	2	0	0	0
Prince Rupert (1915-50)	17	0	3	6	0	0	0	0
Vancouver (A) (1900-43)	16	0	14	0	0	0	0	0
South Interior								
Princeton (1901-50)	24	4	8	14	2	0	0	0
Penticton (1908-40)	27	0	6	9	0	0	0	0
Kamloops (1896-1950)	35	5	9	15	2	0	2	0
Glacier (1908-50)	23	0	7	14	2	0	2	0
Golden (1903-50)	23	6	10	15	4	0	0	0
Cranbrook (1910-50)	24	2	10	15	7	0	0	0
North Interior								
Prince George (1929-50)	19	43	5	15	9	0	0	0
Dome Creek (1918-50)	30	6	15	9	3	0	0	0
Barkerville (1890-1930)	12	0	5	10	5	0	0	0

The departures are much larger in winter than in summer in all Regions. In July none of the stations has a departure exceeding 10° and only 2 have deficits of more than 5°. In January excesses are more frequent than deficits at most stations, most being less than 5°, but most deficits exceed 10°. The large deficits are an effect of the invasions of polar air (which occasionally reach Prince Rupert on the coast). The south Littoral has never recorded a deficit of more than 10°; in the Interior such deficits seem to be as frequent in the South as in the North.

In summer excesses are more frequent in the South than in the North since they are usually associated with continental Tropical air from the western States, which appears most frequently in the southeast, nearest the source region.

Successive Januarys—or other months—rarely, if ever, have the same temperature. Table 23 sets out the frequency of specified differences of the monthly means for January and for July in the periods of observations. The much larger variability in January is again evident, almost all the differences exceeding 5° in the Interior, and 20° is not unknown; in July the difference is nearly always less than 5°.

Table 23

Number of cases with specified differences of mean temperature between pairs of successive Januarys and between pairs of successive Julys; period of records in brackets (a few of the series have short breaks)

	January									July								
	Differences (°F.)									Differences (°F.)								
	<1	1	2	3	4	5-10	11-15	16-20	>20	<1	1	2	3	4	5-10	11-15	16-20	>2
Littoral																		
Victoria (1915-34)	1	5	4	1	3	3	2	0	0	5	7	6	0	1	0	0	0	0
Prince Rupert (1915-50)	2	5	3	6	2	11	4	0	1	9	12	4	5	3	0	1	0	0
Vancouver (A) (1915-34)	1	4	2	4	1	4	2	0	0	3	6	5	2	2	0	0	0	0
South Interior																		
Princeton (1931-50)	0	2	1	1	2	7	5	0	2	7	5	6	1	0		0	0	0
Penticton (1921-40)	0	0	2	3	1	9	1	2	0	2	5	6	2	2	1	0	0	0
Kamloops (1931-50)	0	3	0	1	0	7	2	4	1	2	5	4	6	0	1	0	0	0
Glacier (1931-50)	0	1	1	1	1	8	4	1	1	2	1	7	4	0	3	0	0	0
Golden (1931-50)	1	2	0	0	0	5	5	2	2	3	2	3	4	3	1	0	0	0
Cranbrook (1931-50)	1	0	2	0	0	8	3	3	1	5	8	2	1	0	2	0	0	0
North Interior																		
Prince George (1931-50)	0	1	1	1	1	7	2	4	1	2	7	6	1	2	0	0	0	0
Dome Creek (1931-50)	2	0	2	0	0	6	2	4	2	3	7	4	1	1	0	0	0	0
Barkerville (1910-29)	1	0	1	0	1	9	4	0	2	3	6	4	1	3	1	0	0	0

Not consecutive months as in Table 23, but consecutive days are considered in Table 24. The difference of mean temperature of consecutive days (known as the interdiurnal variability) for January and July at the two stations shows the same general principles, the much larger variability in winter than in summer and the increase with continentality.

The data for stations in Eurasia are inserted as providing an interesting comparison with British Columbia.

Table 24

Mean interdiurnal variability of mean temperature; corresponding data for Eurasia are given for comparison

Station (period of records in brackets)	January	July
Vancouver (A), (5)	3·6	1·8
Penticton (5)	4·2	2·7
		Year
Scilly Islands		2·0
Southport (Lancs.)		2·4
Vienna		4·1
West Siberia		6·5

Tables 25-28, 31, giving the mean frequency of days with temperatures within specified limits, contain also the highest and lowest records—another measure of variability—with some relevant notes.

The increase in the number of very cold days from west to east and from south to north in Tables 25 and 26 illustrates the controls by continentality and latitude already emphasized. No stations in the Littoral have days within these categories.

Table 25

Mean number of arctic (min. ≤ −40°), sub-arctic (max. ≤ 0°), and cold winter days (min. ≤ 0°); in brackets the highest and lowest records in period

		Nov.	Dec.	Jan.	Feb.	Mar.
South Interior						
Penticton (1946-51)	Arctic	0(0,0)	0(0,0)	0(0,0)	0(0,0)	0(0,0)
	Sub-arctic	0(0,0)	0(0,0)	1(7,0)	0(0,0)	0(0,0)
	Cold winter	0(0,0)	1(2,0)	4(18,0)	1(4,0)	0(1,0)
Kamloops (1946-51)	Arctic	0(0,0)	0(0,0)	0(0,0)	0(0,0)	0(0,0)
	Sub-arctic	0(0,0)	<1(1,0)	3(15,0)	0(0,0)	0(0,0)
	Cold winter	<1(2,0)	4(13,0)	8(23,0)	4(9,1)	1(5,0)
Golden (1946-51)	Arctic	0(0,0)	0(0,0)	0(3,0)	0(0,0)	0(0,0)
	Sub-arctic	0(0,0)	1(2,0)	4(20,1)	<1(1,0)	0(0,0)
	Cold winter	1(3,0)	8(16,1)	16(29,6)	11(14,4)	4(10,0)
North Interior						
Prince George (1946-51)	Arctic	0(0,0)	<1(1,0)	2(12,0)	<1(2,0)	0(0,0)
	Sub-arctic	0(0,0)	3(6,0)	6(25,0)	1(2,0)	0(0,0)
	Cold winter	3(8,0)	9(16,1)	14(30,6)	10(16,5)	4(11,0)

The warm summers in the South Interior stand out clearly in Table 26. In the valleys nearly every day in July and August has maximum temperature 77° or higher and more than half the days rise to 86° or above. In the North Interior tropical days are rare and summer temperature can be expected only once a week in June and August, twice a week in July; but on nearly all days in June, July, and August the thermometer reaches 60°. In the Littoral tropical days are unknown in the north (Prince Rupert in Table 26) and very rare in the south. Even summer days are very rare in the north and not frequent in the south. The temperate category is more suited to the Littoral, in the south of which it includes every day in June, July and August and most days in May and September.

Table 26

Mean number of tropical (max. ≥ 86°), summer (max. ≥ 77°), and temperate (max. ≥ 60°) days; in brackets the highest and lowest records in period

		May	June	July	August	September
Littoral						
Prince Rupert (1946-51)	Tropical	0(0,0)	0(0,0)	0(0,0)	0(1,0)	0(0,0)
	Summer	<1(2,0)	1(3,0)	0(0,0)	1(2,0)	<1(1,0)
	Temperate	8(17,0)	14(21,2)	20(24,16)	25(29,20)	14(18,9)
Victoria (1946-51)	Tropical	0(0,0)	<1(1,0)	<1(2,0)	0(0,0)	<1(1,0)
	Summer	1(2,0)	2(4,0)	2(3,1)	2(6,0)	3(5,1)
	Temperate	20(26,10)	28(30,26)	30(31,29)	30(31,28)	26(28,24)
Vancouver (A) (1946-51)	Tropical	0(0,0)	0(0,0)	<1(1,0)	0(0,0)	0(0,0)
	Summer	<1(2,0)	2(4,0)	4(7,1)	2(7,0)	1(2,0)
	Temperate	22(29,14)	29(30,28)	31(31,31)	31(31,31)	36(30,20)
South Interior						
Penticton (1946-51)	Tropical	<1(1,0)	2(7,0)	12(18,5)	6(12,0)	1(2,0)
	Summer	6(12,2)	15(22,8)	26(28,22)	22(26,14)	9(17,4)
Kamloops (1946-51)	Tropical	3(8,0)	5(11,1)	13(20,7)	6(18,1)	4(8,1)
	Summer	11(19,2)	16(25,7)	25(28,22)	24(29,13)	14(22,7)
Golden (1946-51)	Tropical	2(7,0)	4(10,0)	13(17,10)	6(13,2)	2(4,0)
	Summer	9(17,3)	12(19,6)	24(28,21)	18(23,11)	12(23,6)
North Interior						
Prince George (1946-51)	Tropical	0(0,0)	1(3,0)	1(3,0)	<1(1,0)	0(0,0)
	Summer	2(5,0)	4(12,0)	7(9,3)	5(12,1)	2(6,0)
	Temperate	20(28,13)	28(30,22)	30(31,27)	27(29,24)	18(23,13)

A rise of temperature above freezing-point during the period when it is normally well below, the ground frozen hard and snow-covered and all water turned to ice so that transport is easy on the snow and the passage of the rivers and lakes presents little difficulty, brings discomfort, even if only mental, to everyone and may be a source of danger to wayfarers if the ice melts fast. Some estimate of the number of such days may be formed from Table 27, though accuracy cannot be expected since the criterion used, the dry-bulb temperature, is only one of the factors. Thaws are naturally most frequent in the South Interior, fewest (for valley-stations) in the cold Rocky Mountain Trench. They are more frequent at Prince George in the North Interior than at Golden.

Table 27

Mean number of 'thaw-days' (i.e. days with maximum temperature ≥ 33° in winter); in brackets the largest and smallest records in period

			December	January	February
South Interior					
Penticton (1946–51)			19(29,10)	15(26,2)	20(25,11)
Kamloops (1946–51)			15(26,7)	12(23,0)	18(24,11)
Golden (1946–51)			7(11,3)	4(9,0)	14(22,7)
	December	January	February	November	March
North Interior					
Prince George (A) (1946-51)	10(18,3)	7(16,0)	11(19,4)	19(30,7)	24(28,18)

The last four Tables of this Section are based on dates of occurrence, not on numbers of occasions like the previous three.

The limiting temperatures used in Table 28 are chosen as being of significance in many practical operations. The differences due to increasing continentality, between valleys and uplands, and between the South Interior and the North Interior, are evident; no data are included for the Littoral in view of its small range of temperature. None of the stations has a period with temperature below 0° (but sporadic days have means far below 0°). At the other extreme, the uplands above 3,000 feet in the South, and all the stations in the North Interior, have no period with mean temperature above 60°.

Table 28

Mean dates of periods with specified daily temperatures

	Below 0°	Above 32°	Above 42°	Above 60°
Littoral				
Hope	None	7 Feb.–15 Dec.	19 Mar.– 6 Nov.	23 June– 9 Sept.
South Interior				
Penticton	None	21 Feb.–9 Dec.	28 Mar.–3 Nov.	3 June–11 Sept.
Carmi	None	19 Mar.–5 Nov.	23 Apr.–15 Oct.	13 July–3 Aug.
Kamloops	None	1 Mar–27 Nov.	26 Mar.–1 Nov.	28 May–11 Sept.
Glacier	None	5 Apr.–28 Oct.	5 May –3 Oct.	None
Golden	None	19 Mar.–7 Nov.	17 Apr.–15 Oct.	23 June–17 Aug.
North Interior				
Prince George	None	27 Mar.–3 Nov.	25 Apr.–11 Oct.	None
Dog Creek	None	3 Apr.–22 Oct.	27 Apr.–7 Oct.	None

The mean durations of periods indicate the controlling influences;

Below 32°					
Hope	53 days	Carmi (4,084 feet)	133 days	Prince George	143 days
Penticton	73 days	Glacier (4,094 feet)	158 days	Dog Creek	161 days
Kamloops	94 days				
Golden	131 days				
Above 60°					
Hope	77 days	Carmi	20 days	Prince George	None
Penticton	99 days	Glacier	None	Dog Creek	None
Kamloops	105 days				
Golden	54 days				

Tables 29 and 30 are of agricultural interest since the limiting temperatures of which they give mean dates, viz. mean daily maximum $\geq 43°$ and mean daily minimum $\geq 32°$ seem to be related to the growing season of many plants of the Region; but 'vagrant' frosts, which may be severe enough to cause damage in the growing season, are ignored.

Table 29

Mean dates of periods with mean daily maximum temperature 43° or over

Prince George	25 March to 1 Nov	(221 days)
Terrace	20 March to 2 Nov	(227 days)
Barkerville	16 April to 18 Oct	(185 days)
Dome Creek	24 March to 30 Oct	(220 days)

Table 30

Mean dates of periods with mean daily minimum temperature 32° or over

Prince George	5 May to 7 Oct	(155 days)
Vanderhoof	13 May to 20 Sept	(130 days)
New Hazelton	27 April to 18 Oct	(174 days)
Barkerville	15 May to 29 Sept	(137 days)
Dome Creek	21 May to 4 Oct	(136 days)

4.4 Frost-Free Period

Mean and extreme dates are given in Table 31 for many stations in each Region. Considered regionally, frosts are earliest in the Peace River district, appear next round Prince George, next in the East Kootenays, soon after in the West Kootenays, and still later in the Okanagan. The last frosts leave the region in the reverse order. In general the dates follow naturally from the principles of temperature distribution in the Province already described. The open winters of the Littoral, especially on the outer coast, appear in the long frost-free period of about 200 days, rising to 282 days on the Gonzales Heights near Victoria. The length decreases rapidly as the coast is left, Chilliwack in the lower Fraser valley having only 184 days, Bella Coola, farther north on a narrow fiord about the same distance from the open sea, only 143 days. The valleys of the South Interior have about 150 days in the west, but only 100 in the Rocky Mountain Trench. Naturally the uplands have much shorter periods, Old Glory only 17 days. The long cold winters of the North Interior leave only short frost-free periods at Prince George (68 days), Smithers (50), Barkerville (52); Quesnel is favoured with 103 days. At some stations if the latest recorded date of frost in spring and the earliest in autumn happened to occur in the same year there would be no frost-free period.

Table 31

Dates and duration of frost-free period

Station (No. of years' records in brackets)	Date of last frost in spring			Date of first frost in autumn			Mean duration of frost-free period
	Mean	Earliest	Latest	Mean	Earliest	Latest	(days)
Littoral							
Victoria (Gonzales Heights) (36)	28 Feb.	None	8 Apr.	7 Dec.	24 Oct.	None	282
Vancouver City (45)	1 Apr.	19 Feb.	30 Apr.	5 Nov.	23 Sept.	5 Dec.	218
Abbotsford (24)	25 Apr.	21 Mar.	31 May	20 Oct.	11 Sept.	19 Nov.	178
Chilliwack (33)	20 Apr.	12 Mar.	24 May	21 Oct.	24 Sept.	7 Dec.	184
Ocean Falls (27)	2 Apr.	11 Feb.	27 Apr.	21 Nov.	15 Oct.	25 Jan.	233
Bella Coola (52)	11 May	27 Mar.	11 June	1 Oct.	24 Aug.	5 Nov.	143
Kitimat (4)	8 May	1 May	15 May	10 Oct.	2 Oct.	19 Oct.	155
Prince Rupert (41)	19 Apr.	1 Mar.	19 May	3 Oct.	17 Sept.	6 Dec.	198
Terrace (37)	19 May	6 Apr.	13 June	30 Sept.	18 Aug.	11 Nov.	134
Oliver (27)	3 May	30 Mar.	26 May	30 Sept.	7 Sept.	22 Oct.	150
Penticton (33)	7 May	8 Apr.	7 June	3 Oct.	23 Aug.	29 Oct.	149
Summerland (Exp. Farm) (35)	25 Apr.	4 Apr.	24 May	19 Oct.	24 Sept.	13 Nov.	177
Kelowna (53)	12 May	15 Apr.	1 July	2 Oct.	8 Sept.	13 Nov.	143
Vernon (30)	5 May	8 Apr.	29 May	3 Oct.	12 Sept.	13 Nov.	151
Kamloops (47)	25 Apr.	28 Mar.	29 May	8 Oct.	18 Sept.	30 Oct.	166
Ashcroft (6)	29 Apr.	21 Apr.	5 May	23 Sept.	12 Sept.	2 Oct.	147
Lytton (23)	13 Apr.	12 Mar.	8 May	22 Oct.	19 Sept.	13 Nov.	192
Grand Forks (39)	20 May	15 Apr.	30 June	25 Sept.	17 Aug.	23 Oct.	128
Old Glory Mtn. (6)	4 July	29 June	11 July	21 July	16 July	29 July	17
Glacier (40)	10 June	13 May	13 July	8 Sept.	27 July	6 Oct.	90
Golden (47)	5 June	6 May	13 July	8 Sept.	17 July	6 Oct.	95
Creston (38)	22 May	30 Apr.	28 June	20 Sept.	29 Aug.	13 Oct.	121
Cranbrook (32)	10 June	17 May	7 July	27 Aug.	19 July	20 Sept.	78
North Interior							
Prince George (32)	17 June	13 May	14 July	24 Aug.	24 July	27 Sept.	68
Fort St. James (56)	29 June	19 May	14 July	5 Aug.	16 July	17 Sept.	37
Smithers (13)	22 June	19 May	8 July	11 Aug.	28 July	26 Aug.	50
Quesnel (55)	2 June	7 May	11 July	13 Sept.	22 July	8 Oct.	103
Williams Lake (9)	21 May	11 May	1 June	17 Sept.	2 Sept.	10 Oct.	119
Kleena Kleene (10)	3 July	12 June	15 July	2 Aug.	16 July	28 Aug.	30
Barkerville (58)	25 June	23 May	15 July	16 Aug.	16 July	19 Sept.	52
Dome Creek (30)	19 June	19 May	15 July	24 Aug.	26 July	24 Sept.	66
Cranberry Lake (34)	25 June	29 May	15 July	13 Aug.	16 July	22 Sept.	49
Vavenby (38)	30 May	11 May	25 June	13 Sept.	14 Aug.	14 Oct.	106

But the dates depend nearly as much on site and surroundings as on the more general factors, and differ widely at stations almost within sight of each other. A hollow, river-valley or other depression, may trap and hold the coldest air if good air-drainage is lacking, forming a frost hole with frequent inversions of temperature and liability to frost even in summer. At the other extreme a valley-side in an open, atmospherically well-drained, valley, high enough to be above stagnating cold air but not as high so to have an altitude climate exposed to the full onslaught of bleak cold winds, is likely to have a much shorter frost-hazard. The shore of a lake is a favoured site (if the lake does not remain frozen long in spring). The groups of stations in Table 32 illustrate the possible differences at stations in the same neighbourhood.

Table 32

Frost-free period, showing influence of topography

	Alt. ft.	Length of frost-free period (days)	Site
Okanagan Centre	1,155	180	Shore of Okanagan Lake
Oliver	995	150	Valley-bottom, no lake
Princeton, town	1,650	85	Deep enclosed valley
Princeton, airport	2,283	100	Deep enclosed valley
Penticton	1,200	149	End of Okanagan Lake
Summerland	1,600	177	Valley-side, 480 feet above shore of Okanagan Lake
Kaslo	1,930	156	Shore of Kootenay Lake
Boswell	1,785	173	Shore of Kootenay Lake
Creston	1,990	121	Valley-bottom 8 miles south of Kootenay Lake

4.5 Humidity

The Climatological Tables give mean monthly relative humidity in the afternoon, and more details are given for some representative stations, early morning and afternoon, in Table 33:

Table 33

Humidity; mean dew-point (and dry-bulb temperature), relative humidity (%), and mixing ratio (g/kg). Periods of records in brackets. Hours are L.S.T.

Littoral	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Victoria (1941-50)												
0430						No records						
1630												
Temp, dry bulb	39	44	48	52	58	61	65	63	61	53	46	42
Dew-point	35	38	40	43	47	51	54	54	52	47	44	38
Rel. humidity	83	78	73	71	67	69	68	72	73	80	92	86
Mixing ratio	4·2	4·8	5·1	5·8	6·9	8·0	8·8	8·8	8·2	6·8	6·0	4·8
Patricia (1941-50)												
0430												
Temp. dry bulb	35	37	39	42	47	51	54	54	51	46	41	38
Dew point	32	35	36	40	44	48	51	52	48	44	39	36
Rel. humidity	91	91	91	90	90	90	90	92	91	93	92	92
Mixing ratio	3·8	4·3	4·5	5·1	6·1	7·2	8·0	8·1	7·1	6·1	5·1	4·4
1630												
Temp. dry bulb	40	45	49	54	61	65	70	69	64	55	46	42
Dew-point	34	37	39	43	48	52	56	55	52	47	41	38
Rel. humidity	81	74	67	65	63	63	61	63	64	74	83	86
Mixing ratio	4·1	4·7	4·9	5·8	7·1	8·3	9·4	9·3	8·2	6·8	5·5	4·7
Prince Rupert (1941-50)												
0430												
Temp. dry bulb	34	36	37	40	45	50	52	53	50	46	41	37
Dew-point	31	32	33	36	42	48	51	51	49	43	37	33
Rel. humidity	87	85	86	87	91	92	95	96	94	89	86	87
Mixing ratio	3·6	3·8	3·9	4·5	5·7	6·9	7·7	8·0	7·3	5·8	4·6	4·0
1630												
Temp. dry bulb	37	40	43	47	55	58	60	62	58	50	43	38
Dew-point	33	34	35	38	45	50	53	54	51	44	38	34
Rel. humidity	83	79	72	71	71	75	77	76	79	81	82	86
Mixing ratio	3·9	4·2	4·3	4·9	6·4	7·6	8·6	8·9	7·9	6·2	4·8	4·1

Table 33—Continued

Humidity; mean dew-point (and dry-bulb temperature), relative humidity (%), and mixing ratio (g/kg). Periods of records in brackets. Hours are L.S.T.

Littoral	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Hope (A) (1941–50)												
0430												
Temp. dry bulb	28	33	37	42	48	53	56	56	52	46	38	34
Dew-point	25	30	34	39	45	50	53	54	49	43	36	31
Rel. humidity	88	88	89	91	90	90	91	90	90	92	91	89
Mixing ratio	2·8	3·4	4·1	5·1	6·2	7·6	8·5	8·7	7·3	5·9	4·4	3·5
1630												
Temp. dry bulb	32	40	49	56	64	67	73	73	68	54	42	36
Dew-point	28	33	37	43	49	54	58	58	54	47	38	32
Rel. humidity	82	76	65	61	59	63	59	60	63	78	85	84
Mixing ratio	3·1	3·9	4·7	5·8	7·4	8·9	10·3	10·3	9·0	6·9	4·9	3·8
South Interior												
Penticton (1942–50)												
0430												
Temp. dry bulb	22	28	32	38	45	51	54	54	47	42	36	30
Dew-point	19	25	27	33	40	47	49	48	42	37	31	26
Rel. humidity	86	86	18	81	82	86	82	81	83	84	84	86
Mixing ratio	2·0	2·7	3·0	3·9	5·1	6·8	7·3	7·2	5·7	4·7	3·6	2·9
1630												
Temp. dry bulb	26	35	45	56	66	72	80	77	69	53	40	32
Dew-point	21	27	29	35	43	51	55	55	49	41	33	27
Rel. humidity	80	73	53	44	44	48	43	46	48	63	76	82
Mixing ratio	2·2	3·0	3·3	4·2	5·9	7·9	9·2	9·2	7·2	5·5	3·9	3·0
Kamloops (1941–50)												
0430												
Temp. dry bulb	20	26	33	40	47	54	58	56	48	42	32	27
Dew-point	17	22	27	33	40	48	50	50	45	37	27	24
Rel. humidity	85	85	80	77	77	80	76	82	90	84	82	89
Mixing ratio	1·8	2·4	3·0	4·0	5·2	7·0	7·7	7·7	6·4	4·7	3·0	2·6
1630												
Temp. dry bulb	25	36	48	60	69	74	82	80	71	55	37	32
Dew-point	19	27	31	35	42	49	52	51	47	40	31	26
Rel. humidity	77	71	52	39	38	42	35	37	42	58	79	79
Mixing ratio	2·1	3·0	3·4	4·3	5·5	7·3	8·2	8·0	6·7	5·2	3·7	2·8
Old Glory Mountain (1945–50)												
0430												
Temp, dry bulb	13	14	16	21	31	36	44	43	36	27	17	13
Dew-point	11	14	14	19	27	32	35	34	30	23	16	12
Rel. humidity	91	97	94	91	86	87	70	69	77	87	95	94
Mixing ratio	1·4	1·6	1·6	2·0	3·0	3·8	4·2	4·1	3·4	2·5	1·8	1·4
1630												
Temp, dry bulb	11	15	21	26	38	42	52	51	43	29	20	15
Dew-point	9	13	17	22	30	35	40	39	33	25	18	13
Rel. humidity	93	91	85	85	73	76	62	62	69	95	91	93
Mixing ratio	1·3	1·5	1·9	2·4	3·4	4·3	5·1	4·9	4·0	2·7	1·9	1·5

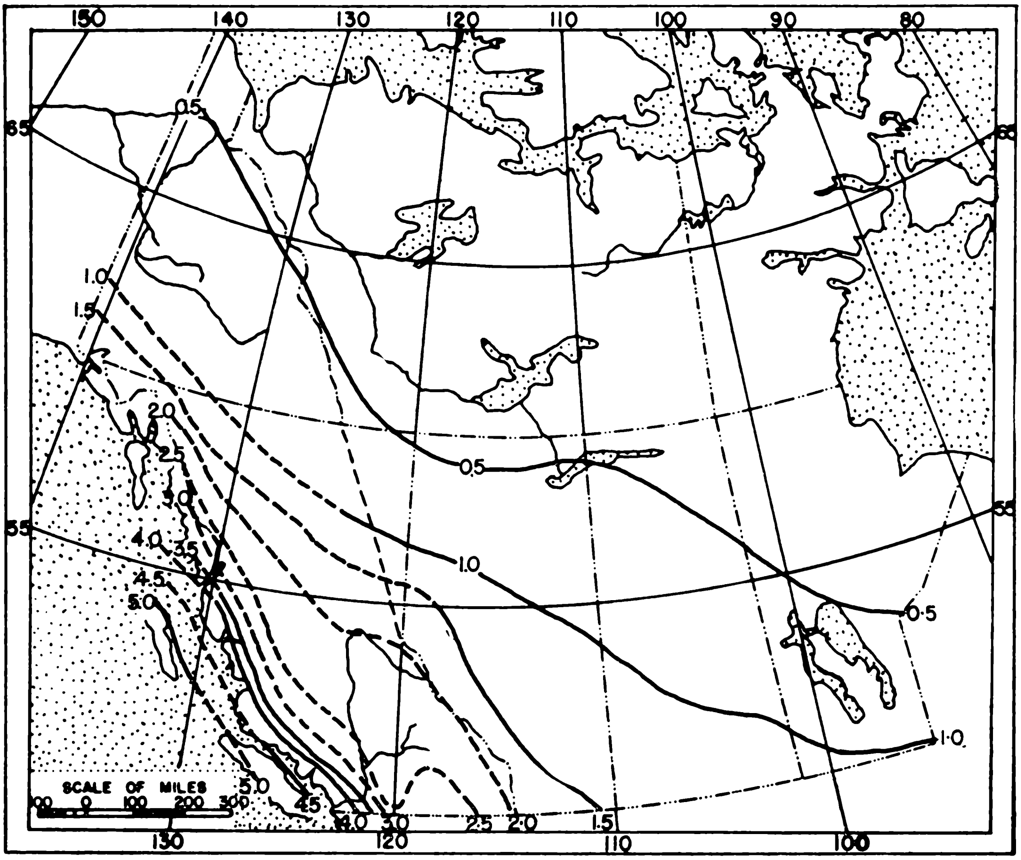
Table 33—Concluded

Humidity; mean dew-point (and dry-bulb temperature), relative humidity (%), and mixing ratio (g/kg). Periods of records in brackets. Hours are L.S.T.

North Interior	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Prince George (1944-50)												
0430												
Temp, dry bulb	14	25	25	31	39	45	47	46	40	35	24	17
Dew-point	9	14	19	28	35	42	46	45	38	32	22	16
Rel. humidity	81	61	79	89	86	88	96	96	93	90	93	96
Mixing ratio	1·2	1·6	2·1	3·1	4·2	5·6	6·6	6·3	4·8	3·8	2·4	1·8
1630												
Temp, dry bulb	17	26	36	47	60	65	68	67	61	46	29	21
Dew-point	14	21	25	30	39	47	50	50	46	36	26	19
Rel. humidity	87	80	64	52	45	51	53	53	58	67	86	92
Mixing ratio	1·6	2·2	2·7	3·5	5·0	6·8	7·7	7·4	6·5	4·4	2·8	2·0
Kleena Kleene (1943-50)												
0430												
Temp, dry bulb						No record						
Dew-point												
Rel. humidity												
Mixing ratio												
1630												
Temp, dry bulb	18	31	39	48	59	64	69	69	63	48	30	19
Dew-point	14	23	25	29	35	43	46	47	43	36	24	17
Rel. humidity	84	72	56	48	40	46	43	46	48	63	79	92
Mixing ratio	1·6	2·5	2·7	3·3	4·3	5·8	6·5	6·8	5·9	4·4	2·6	1·9

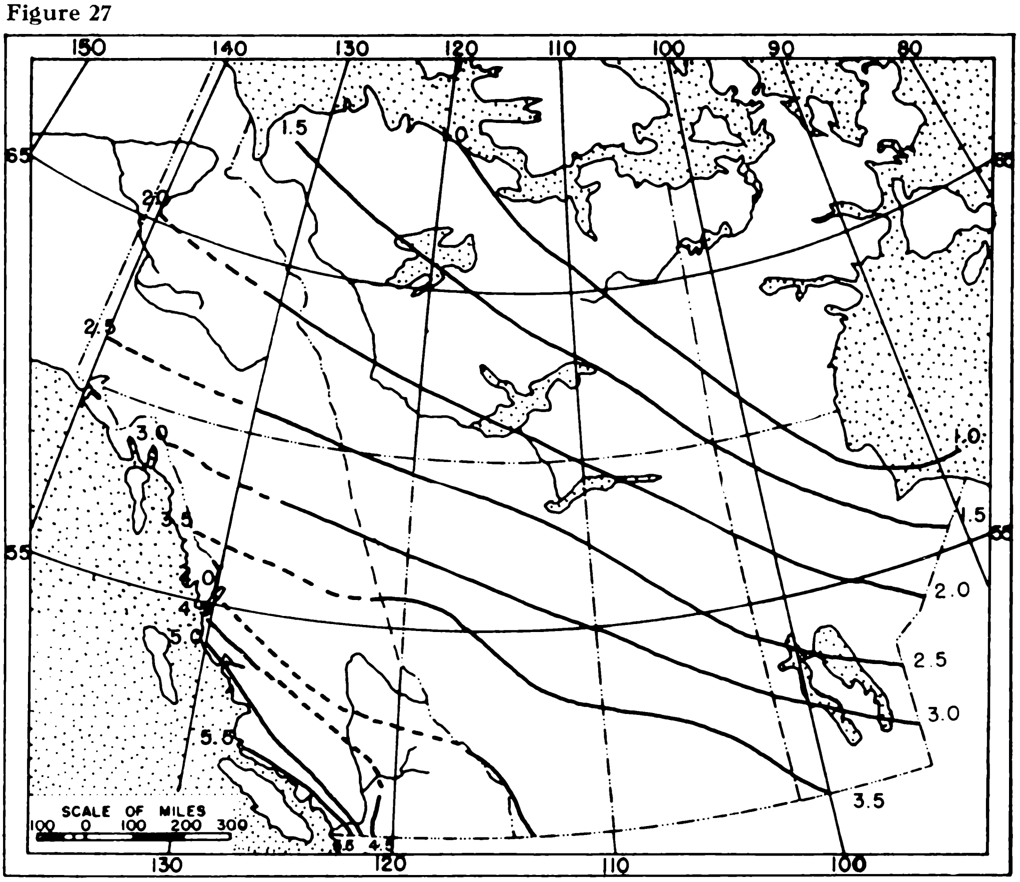
Figs. 26-29 show the distribution of mixing ratio over the region.

Figure 26



Mean January mixing ratio, (grams of water vapour per kilogram of dry air).*

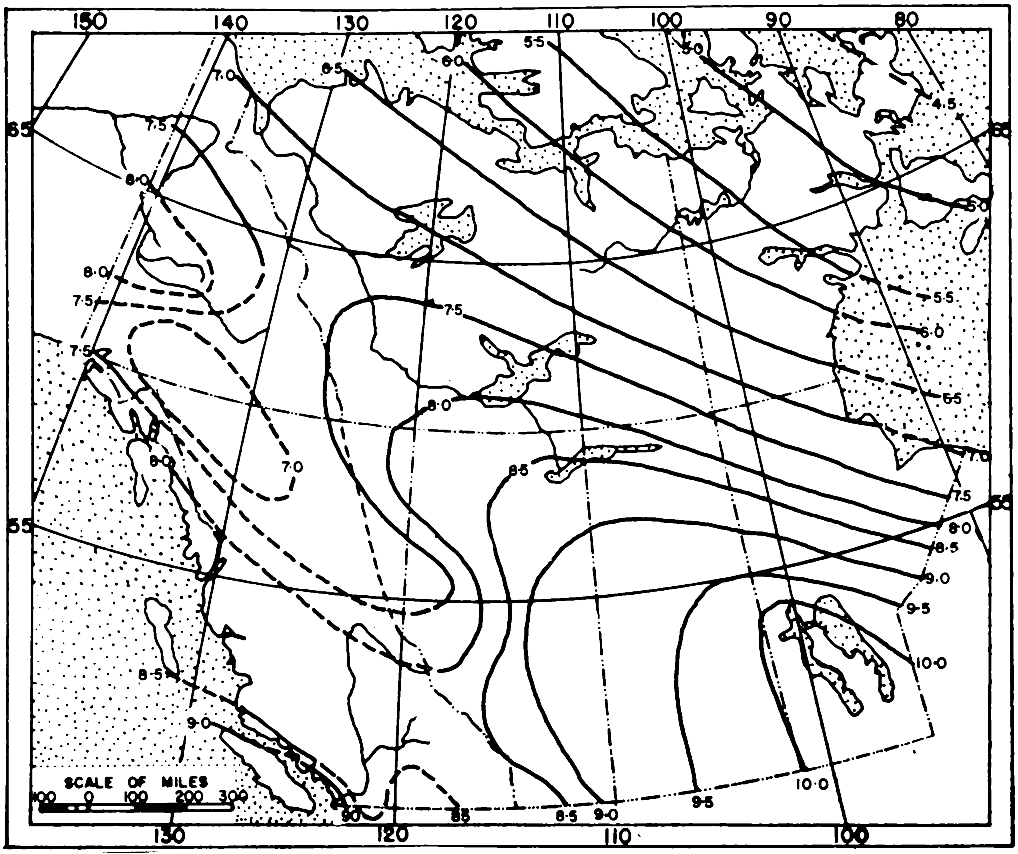
Figure 27



Mean April mixing ratio, (grams of water vapour per kilogram of dry air).*

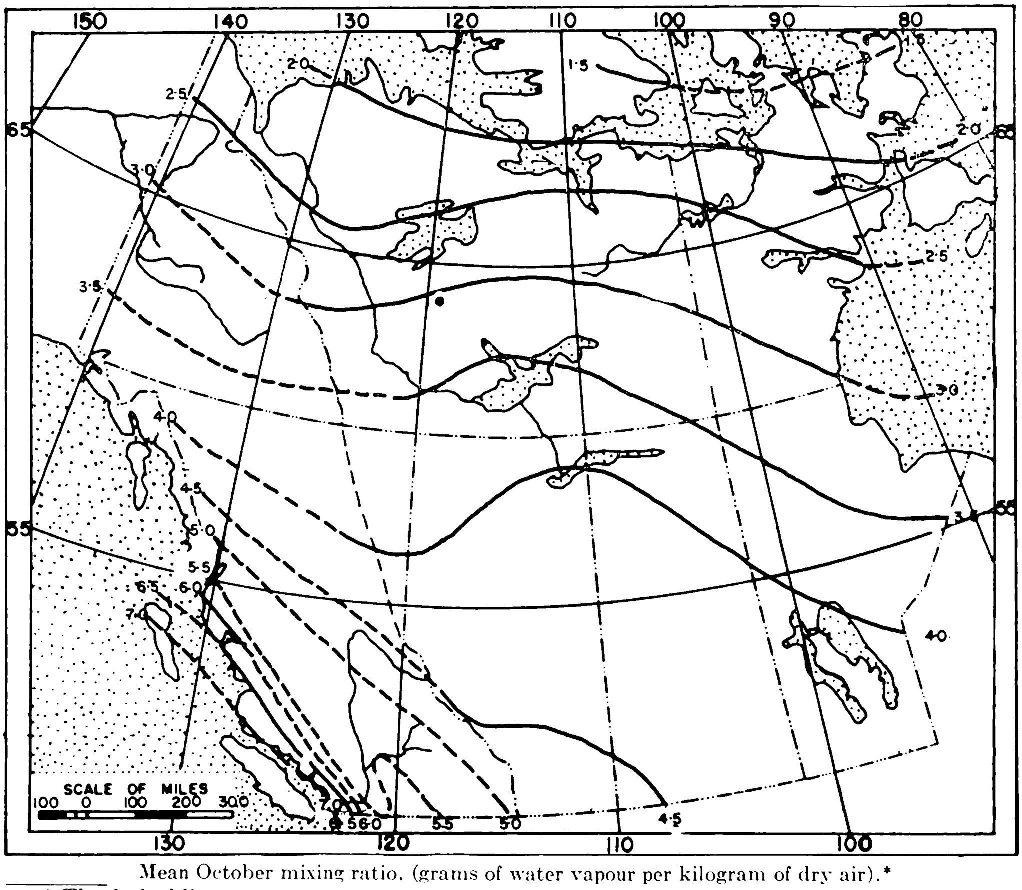
* The dashed lines are over areas where the data are doubtful.

Figure 28



Mean July mixing ratio, (grams of water vapour per kilogram of dry air).*

Figure 29



Mean October mixing ratio, (grams of water vapour per kilogram of dry air).*

* The dashed lines are over areas where the data are doubtful.

CHAPTER 5

Cloud, Sunshine

5.1 Cloud: General

The following Tables contain data for representative stations:

Climatological Tables, (mean cloud amount at the 4 synoptic hours and the mean for the day; percentage of time with clear and with overcast sky)

Table 34, mean numbers of days with specified amounts in the early morning and in the afternoon

Table 35, mean number of hours with low cloud, by amounts

Table 36, mean number of hours with specified cloud-forms.

The Regions of the Province differ in their distribution of cloud as in other elements. Unfortunately the mountain and upland stations are too few for much knowledge and discussion of those usually cloudier areas.

The Climatological Tables show that the Littoral, and in particular the outer coasts and the north, is the cloudiest Region, heavily clouded everywhere in autumn and in winter, but at some places, e.g., Masset, Pachena, Prince Rupert, more heavily in summer. In every month overcast or nearly overcast sky is more frequent than clear. The less exposed districts, however, including the east of Vancouver Island and the vale of the lower Fraser, have notably bright skies in summer, a natural feature of the fine weather of that season in contrast to the cloudy and often overcast winter days.

The South Interior (valleys) has hardly less cloudy winters than the Littoral, but summer brings a welcome clearing to a mean of about 4 tenths. The uplands enjoy almost as clear skies in summer, and according to the few recording stations their winters are little if any more cloudy than in the valleys. Much of the comparatively heavy rainfall in summer falls in heavy showers and the sky does not remain heavily clouded for long.

The North Interior has less change from winter to summer than the South, the mean being about 7 tenths in both seasons.

An interesting feature at most stations (in all the Regions) is the small amount of cloud in September (at some stations August), which at many is the clearest month of the year. The other equinoctial month, March, also has less cloud than its neighbours. In contrast, June is everywhere a cloudy as well as a rainy month.

5.2 Cloud: Diurnal Variation

Table 34

Percentage frequencies of the specified mean cloud amounts (all forms) in early morning and afternoon

		Tenths	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Littoral														
Estevan Point...	0430	0-2	31	35	34	30	31	29	34	43	45	33	24	30
1941-51)		3-7	11	5	11	11	13	11	7	7	5	8	13	10
		8-10	60	59	55	59	57	59	58	51	50	59	63	59
	1630	0-2	16	21	22	22	25	30	38	38	29	23	14	16
		3-7	13	15	20	16	18	19	13	13	14	11	16	14
		8-10	70	65	58	62	57	51	48	50	57	66	70	70

62898—6½

Table 34—Continued

Percentage frequencies of the specified mean cloud amounts (all forms) in early morning and afternoon

		Tenths	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Littoral														
Comox..........	0430	0–2	22	25	30	29	37	27	38	43	52	33	14	19
(1944-51)		3–7	11	11	11	19	17	13	17	14	10	10	11	8
		8–10	66	65	59	52	46	59	45	43	38	56	75	73
	1630	0–2	14	17	17	18	29	29	37	35	40	21	11	12
		3–7	11	11	12	16	17	13	12	19	13	10	9	10
		8–10	75	73	71	66	54	59	51	46	48	70	80	78
Patricia Bay....	0430	0–2	21	26	31	30	30	26	47	48	48	32	20	18
(1941-51)		3–7	11	12	15	16	16	16	14	15	10	14	11	14
		8–10	67	62	54	53	54	57	39	37	42	54	69	68
	1630	0–2	14	16	18	18	24	31	47	47	33	22	11	14
		3–7	10	10	14	16	18	17	14	15	15	13	9	9
		8–10	76	73	69	65	58	52	39	38	51	65	81	77
Vancouver (A)...	0430	0–2	22	21	27	25	28	22	35	39	43	24	18	19
(1941-51)		3–7	8	10	12	14	16	17	18	14	10	7	7	8
		8–10	70	69	61	61	56	61	47	47	47	69	75	73
	1630	0–2	13	20	20	23	28	30	42	44	38	22	13	13
		3–7	10	10	14	15	16	18	19	19	16	12	8	10
		8–10	77	70	66	62	56	51	39	37	46	66	79	77
Abbotsford......	0430	0–2	29	20	24	28	36	24	42	41	51	33	20	19
(1944-51)		3–7	9	7	8	11	9	15	11	12	10	10	8	11
		8–10	63	73	68	60	55	61	47	47	38	57	72	69
	1630	0–2	18	18	10	14	24	24	39	39	36	19	11	14
		3–7	6	6	15	15	15	20	18	18	18	13	9	10
		8–10	76	77	75	71	61	55	43	43	47	68	79	76
Hope............	0430	0–2	25	21	22	23	25	19	41	35	50	28	20	20
(1941-51)		3–7	8	9	8	9	7	10	12	11	8	10	11	9
		8–10	67	70	70	69	68	71	47	54	42	62	70	72
	1630	0–2	17	17	13	14	20	19	40	38	32	17	8	13
		3–7	8	7	11	10	15	17	17	14	15	11	8	8
		8–10	75	76	77	76	65	63	42	46	53	72	85	77
South Interior														
Ashcroft........	0430	0–2	29	31	41	29	38	29	44	41	56	35	25	23
(1945-51)		3–7	17	13	12	15	18	27	23	22	14	17	14	10
		8–10	54	55	47	56	44	44	33	37	30	49	61	67
	1630	0–2	19	17	19	19	19	11	28	26	35	21	17	16
		3–7	14	15	17	16	18	30	28	21	19	15	18	13
		8–10	67	68	64	65	63	59	43	53	46	64	65	70
Carmi...........	0430	0–2	25	31	39	34	31	25	53	53	55	37	28	22
(1941-51)		3–7	11	7	10	15	17	20	18	20	14	11	8	7
		8–10	64	62	51	51	52	55	29	28	32	52	64	70
	1630	0–2	15	15	16	12	11	10	23	24	32	24	13	18
		3–7	14	12	14	18	23	21	31	26	20	12	11	12
		8–10	71	74	70	70	66	68	47	50	48	65	76	70
Cranbrook......	0430	0–2	32	41	43	35	24	24	55	54	47	48	28	23
(1941-48)		3–7	10	9	15	16	17	17	16	15	16	11	11	14
		8–10	59	50	42	49	59	59	29	31	39	41	61	64
	1630	0–2	22	21	18	13	13	8	23	22	25	28	14	17
		3–7	16	17	20	25	25	30	39	39	20	19	18	12
		8–10	63	63	62	63	62	62	38	39	55	53	68	71
Copper Mt.......	0430	0–2	29	27	43	35	31	22	54	54	50	46	30	33
(1941-46)		3–7	11	17	20	18	15	19	14	19	16	12	11	15
		8–10	60	57	36	45	55	59	32	27	34	41	59	52
	1630	0–2	16	17	14	12	17	9	30	26	27	26	11	21
		3–7	15	20	26	27	22	30	34	41	29	21	19	19
		8–10	68	65	60	61	60	60	35	34	43	53	70	59

Table 34—Concluded

Percentage frequencies of the specified mean cloud amounts (all forms) in early morning and afternoon

		Tenths	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
South Interior														
Lytton..........	0430	0–2	30	22	34	38	34	30	45	39	46	31	23	28
(1944-51)		3–7	12	15	12	12	21	28	26	22	17	15	12	9
		8–10	57	62	54	49	44	42	29	38	37	54	65	63
	1630	0–2	25	16	16	18	19	20	34	29	37	22	15	19
		3–7	13	12	18	24	26	26	32	31	24	18	17	12
		8–10	62	71	66	58	55	54	34	40	40	60	68	69
Old Glory.......	0430	0–2	25	27	26	27	31	25	57	51	47	33	21	24
(1945-51)		3–7	8	7	9	15	18	14	17	17	16	7	10	4
		8–10	67	66	65	58	51	61	26	32	37	60	69	72
	1630	0–2	19	15	12	12	10	8	18	20	27	16	11	17
		3–7	9	12	12	16	22	18	28	24	16	14	10	10
		8–10	72	73	76	72	69	74	54	56	57	70	79	73
Princeton........	0430	0–2	20	18	33	26	28	23	49	39	51	29	16	15
(1941-51)		3–7	9	11	18	18	18	15	18	19	13	13	10	10
		8–10	71	70	50	55	54	62	34	42	36	58	75	75
	1630	0–2	16	16	18	15	16	15	33	27	30	21	11	15
		3–7	13	13	15	20	24	24	23	26	21	16	14	15
		8–10	71	70	67	65	61	61	44	47	49	63	75	70
Penticton........	0430	0–2	12	23	35	33	27	24	55	50	49	33	17	13
(1941-51)		3–7	10	12	13	21	23	21	18	24	17	13	12	10
		8–10	78	65	52	46	50	55	27	26	34	54	71	77
	1630	0–2	12	14	17	15	18	16	32	32	34	18	10	10
		3–7	13	14	18	21	23	21	29	23	19	16	14	9
		8–10	75	72	65	64	59	63	39	45	47	66	76	81
North Interior														
Prince George(A)	0430	0–2	26	21	35	24	30	20	22	33	40	25	21	25
(1942-51)		3–7	8	12	13	14	12	20	18	19	13	12	10	11
		8–10	66	66	51	62	58	60	60	48	47	63	69	64
	1630	0–2	16	16	14	10	14	7	15	17	26	12	14	13
		3–7	10	12	16	15	16	19	20	23	15	13	8	11
		8–10	74	72	70	75	70	74	65	61	59	75	78	76
Dog Creek......	0430	0–2	34	29	38	28	31	24	30	32	45	38	32	32
(1944-51)		3–7	13	12	14	22	21	20	20	14	16	14	16	13
		8–10	54	59	48	50	48	56	49	54	38	48	52	55
	1630	0–2	16	16	12	11	16	5	11	17	31	18	15	18
		3–7	24	15	18	20	19	23	29	25	19	18	19	16
		8–10	60	69	70	70	65	72	60	58	50	64	65	66
Kleena Kleene...	0430	0–2	46	49	58	53	47	33	47	42	58	42	44	49
(1943-45)		3–7	2	4	3	12	5	6	7	17	12	9	1	12
		8–10	52	47	39	35	48	61	46	41	30	49	55	39
(1942-51)	1630	0–2	30	24	29	26	24	21	25	31	33	26	27	31
		3–7	7	11	11	11	14	15	16	18	16	10	11	13
		8–10	63	65	60	63	62	64	59	51	51	64	62	56
Quesnel..........	0430	0–2	32	24	35	21	24	14	19	18	32	18	19	16
(1946-51)		3–7	15	16	17	14	19	22	11	15	8	12	11	12
		8–10	53	60	48	65	57	64	70	67	60	70	70	72
	1630	0–2	16	16	13	7	13	3	7	15	28	14	13	12
		3–7	19	12	12	17	17	25	26	25	20	16	12	10
		8–10	65	72	75	76	70	72	67	60	52	70	75	78
Williams Lake...	0430	0–2	24	24	34	29	26	14	28	32	24	22	21	26
(1941-47)		3–7	15	15	18	17	16	12	22	17	9	11	18	16
		8–10	61	62	47	55	59	74	50	51	66	67	61	58
	1630	0–2	12	20	14	9	16	8	18	26	25	25	12	13
		3–7	12	12	15	22	19	25	26	26	16	11	11	16
		8–10	77	68	72	69	65	67	56	47	59	64	77	72

Littoral. The amounts differ little from morning to afternoon. In winter the afternoons have a little more cloud than the early mornings, in summer the relation is reversed, the mornings being the cloudier.

South Interior. The valley stations record large amounts more frequently than small except in the early morning in July, August and September; in the afternoons of those months large and small amounts are equally frequent. The uplands are distinguished by their cloudy afternoons in summer, with sky overcast with thick cumulus. Old Glory is perhaps an extreme case; in July and August overcast skies are about 3 times as frequent as clear in the afternoon but in the early morning clear skies are twice as frequent as overcast.

North Interior. Cloud amount varies less than in the South Interior all the year, but afternoon is appreciably more cloudy than morning in all months. On summer afternoons clear skies are quite the exception, notably in June.

Two interesting features are prominent at nearly all stations in the Interior. The first is the broken weather of June, already mentioned. It appears in Table 34 in the persistence of a high frequency of overcast skies through June, to fall abruptly in July. On the other hand September and, to a less degree, March tend to have clear skies.

The second prominent feature is the rarity of medium (3-7 tenths) amounts of cloud everywhere, on the Littoral and in the Interior. The sky is nearly always overcast or almost clear, rarely dappled as is the most frequent condition in most countries.

5.3 Cloud: Annual Variation

Table 35

Mean monthly duration (hours) of low cloud (in tenths of sky covered), and of sky obscured (by fog, precipitation, smoke)

	Tenths	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Littoral													
Port Hardy	0–2	28	23	25	31	36	34	34	35	33	28	21	19
(1945-51)	3–7	23	25	28	26	21	25	22	21	18	28	24	25
	8–10	44	48	46	42	41	39	42	42	41	42	53	52
Sky obscured		5	4	1	1	2	2	2	2	8	2	2	4
Comox (A)	0–2	37	39	45	54	66	63	68	69	69	48	32	33
(1944-51)	3–7	12	17	19	21	16	18	18	14	12	16	17	14
	8–10	46	43	35	25	17	19	14	16	18	35	48	49
Sky obscured		5	1	1	<1	<1	0	<1	1	1	1	3	4
Patricia Bay	0–2	41	43	50	57	68	68	73	74	72	53	40	34
(1944-51)	3–7	17	19	20	22	17	16	14	13	12	16	20	18
	8–10	40	37	29	21	15	16	12	13	15	30	38	46
Sky obscured		2	1	1	0	<1	0	1	<1	1	1	2	2
Vancouver (A)	0–2	42	43	49	54	64	63	70	68	67	47	36	32
(1944-51)	3–7	13	14	16	19	15	17	13	12	11	15	15	15
	8–10	39	40	34	27	21	20	16	19	19	33	44	43
Sky obscured		6	3	1	<1	0	<1	1	1	3	5	5	10
Abbotsford	0–2	47	42	45	50	57	54	67	66	66	53	40	43
(1944-51)	3–7	9	10	14	17	13	19	12	11	11	10	12	10
	8–10	40	46	40	33	29	27	20	23	22	36	47	44
Sky obscured		4	2	1	<1	<1	0	1	<1	1	1	1	3

Table 35—Concluded

Mean monthly duration (hours) of low cloud (in tenths of sky covered), and of sky obscured (by fog, precipitation, smoke)

		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
South Interior													
	Tenths												
Princeton	0–2	50	44	50	54	57	46	64	62	66	55	40	40
(1944–51)	3–7	13	15	19	22	21	26	17	19	14	15	14	12
	8–10	32	35	28	23	22	28	19	19	19	26	39	40
Sky obscured		5	6	3	1	<1	<1	<1	<1	1	4	7	8
Penticton	0–2	39	47	57	64	66	59	76	75	75	57	40	30
(1944–51)	3–7	19	16	20	22	20	26	16	17	14	18	21	19
	8–10	38	31	21	14	14	15	8	8	11	25	36	45
Sky obscured		4	6	2	<1	0	0	0	0	0	0	3	6
Kamloops	(Observations for 16 hours per day only)												
(1945–51)	0–2	57	57	65	61	64	54	66	67	76	65	52	47
	3–7	22	26	25	32	30	39	29	26	19	24	26	26
	8–10	20	16	9	7	6	7	5	7	5	10	20	25
Sky obscured		1	1	<1	0	0	0	0	0	<1	1	2	2
Cranbrook	0–2	57	58	58	54	55	47	74	67	67	64	44	41
(1944–49)	3–7	15	16	21	28	25	30	19	21	17	14	18	17
	8–10	23	20	19	17	20	23	7	12	15	21	31	37
Sky obscured		5	6	2	1	0	<1	0	<1	<1	1	7	5
North Interior													
Prince George	0–2	57	55	59	53	62	52	53	57	64	56	48	47
(1944–51)	3–7	8	11	13	17	18	25	23	21	15	14	11	10
	8–10	25	25	24	28	20	23	23	20	18	25	33	31
Sky obscured		10	9	4	2	<1	<1	1	2	3	5	8	12
Quesnel	0–2	61	60	63	61	58	49	46	50	63	55	49	50
(1944–51)	3–7	9	12	14	18	21	29	29	22	14	14	10	10
	8–10	20	20	19	19	20	21	22	22	15	22	28	25
Sky obscured		10	8	4	2	1	1	3	6	8	9	13	12
Dog Creek	0–2	69	69	67	62	58	48	53	55	72	67	65	65
(1944–51)	3–7	7	8	12	18	24	26	27	23	13	13	10	8
	8–10	19	17	16	18	17	25	19	22	14	17	20	19
Sky obscured		5	6	5	2	1	<1	<1	0	1	3	5	8
Smithers	0–2	43	42	44	45	48	42	38	47	48	35	27	36
(1944–51)	3–7	15	17	21	25	22	29	30	29	22	23	20	19
	8–10	35	32	30	29	29	29	32	24	29	38	43	34
Sky obscured		7	9	5	1	<1	<1	<1	1	1	4	10	11

Littoral. On the outer coasts low cloud is thick and abundant in all months, with little seasonal change. At the sheltered stations (Patricia Bay, Vancouver) it is very frequent in winter, but summer brings a welcome clearance.

South Interior. Low cloud is frequent in winter, almost covering the sky for a mean of over 40 hours in December at Princeton and Penticton, but in summer there is much less, usually only in scattered patches. The abrupt decrease from June to July and increase from September to October again illustrate the cloudy skies of June and the persistence of the bright skies of summer through September.

North Interior. The North is distinguished from the South Interior by the remarkably uniform distribution of low cloud over the year; winter has more than the average, September (in places August) rather less.

5.4 Cloud: Occurrence of various cloud forms

Table 36

Mean number of hours with specified cloud-forms (St = Stratus, Cu = Cumulus, Cu+ = Heavy Cumulus, Cb = Cumulonimbus, Sc = Stratocumulus, Ns = Nimbostratus, Fs = Fractostratus, Fc = Fractocumulus, Ac = Altocumulus, As = Altostratus, Acc = Altocumulus Castellatus

		St	Cu	Cu+	Cb	Sc	Ns	Fs	Fc	Ac	As	Acc	Mean no. of obs.
Littoral													
Patricia Bay...... (1942-51)	Jan......	46	14	12	4	340	35	73	91	160	78	0	
	Apr......	3	72	43	7	272	24	31	54	224	101	<1	
	Jul......	5	50	31	2	192	6	13	21	255	29	5	
	Oct......	36	24	20	4	276	28	75	56	212	73	<1	
Vancouver (A)..... (1942-51)	Jan......	44	10	10	3	326	75	80	56	176	82	0	
	Apr......	6	63	48	8	294	53	40	63	225	102	2	
	Jul......	6	57	37	5	208	15	19	52	254	37	4	
	Oct......	30	22	17	1	292	60	86	63	192	97	0	
South Interior													
Penticton.......... (1942-51)	Jan......	102	11	2	<1	338	19	54	29	146	116	0	
	Apr......	6	83	48	18	212	20	17	15	205	142	<1	
	Jul......	<1	111	63	32	137	6	5	8	239	41	5	
	Oct......	32	35	11	3	255	25	33	36	213	110	0	
Kamloops......... (1945-51)	(Observations for 16 hours per day only)												
	Jan......	43	5	<1	5	191	34	14	6	157	189	0	
	Apr......	3	55	4	27	169	16	7	13	193	137	0	
	Jul......	<1	120	5	40	115	8	2	17	169	68	0	
	Oct......	19	39	0	23	142	18	28	21	224	129	0	
Kimberley........ (1944-51)	Jan......	127	10	6	<1	9	5	21	15	134	85	0	
	Apr......	30	117	65	12	207	12	25	26	173	88	<1	
	Jul......	4	185	92	32	148	2	7	12	186	35	2	
	Oct......	60	30	21	4	269	19	31	33	163	67	0	
Old Glory Mt..... (1945-51)	(Note, many observations missing; see last column)												
	Jan......	23	3	2	2	43	2	1	1	45	29	0	572
	Apr......	30	70	31	6	82	0	1	5	65	29	0	617
	Jul......	3	108	99	49	96	2	1	5	81	18	4	535
	Oct......	8	18	16	3	58	<1	1	4	57	30	<1	566
North Interior													
Prince George..... (1943-51)	Jan......	72	4	4	1	159	27	24	10	188	155	0	
	Apr......	29	96	47	18	185	17	28	21	220	174	<1	
	Jul......	20	144	97	53	206	12	34	42	305	87	5	
	Oct......	38	40	16	5	193	33	36	17	257	152	<1	
Smithers.......... (1944,45,47-51)	Jan......	119	6	2	<1	260	10	19	26	162	97	0	
	Apr......	62	100	34	6	298	13	23	33	202	137	0	
	Jul.......	26	159	77	21	342	22	34	86	254	95	<1	
	Oct......	76	42	11	2	380	27	43	38	185	85	0	

Littoral. Stratocumulus and altocumulus are much the commonest clouds all the year, stratocumulus especially in winter and autumn, altocumulus in summer. Altostratus comes next in frequency, but it is not common in summer. Cumulus is comparatively rare except in spring and summer, and much less common than in the Interior since summer is the dry season without much low cloud of any kind.

South Interior. Here also stratocumulus and altocumulus predominate, with much altostratus except in summer. Cumulus is rare in winter, but it increases fast in spring as the land heats, to become the typical cloud of summer afternoons. In the hottest months convection is active enough to produce cumulonimbus, source of much of the rain and many thunderstorms.

The remarkably small figures for the cloud forms at Old Glory, one of the cloudiest stations in the Province, is explained by the frequency of very low cloud (often reported as fog) which obscures the clouds above; the sky is reported as 'obscured' in 2,509 hours out of 5,864 (means) observed; the mean duration of 'obscured sky' at Port Hardy is only 35 hours, Penticton 21, Cranbrook 27.

North Interior. The North is very similar to the South in its relative frequencies of cloud-forms, but the actual durations are longer in the cloudier north.

5.5 Sunshine

Most of British Columbia has large records, eclipsed in Canada (which as a whole is a sunny country) only in the south of the Prairie Provinces. The southeast of Vancouver Island gets most, and the 'dry belt' of the South Interior almost as much.

Table 37

Sunshine; mean monthly number of hours of bright sunshine (period of records in brackets)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Littoral													
Victoria (1898-50)........	66	94	148	197	252	263	322	287	205	130	72	57	2,092
Prince Rupert (1921-50)..	40	59	81	103	138	125	125	128	97	54	40	31	1,019
Vancouver (city)(1908-50)	48	80	126	168	226	222	280	254	178	110	53	38	1,783
Agassiz (1891-50)........	50	73	98	120	160	160	219	197	134	96	51	40	1,397
South Interior													
Oliver (1924-50).........	44	80	143	189	226	236	306	264	193	121	56	36	1,894
Summerland (1917-50)...	52	90	150	198	238	247	312	279	204	140	59	40	2,010
Kamloops (1906-50)......	60	99	170	200	244	253	316	282	209	141	66	46	2,086
North Interior													
Prince George (1930-50)..	57	88	133	175	242	240	254	244	161	100	53	38	1,784
Smithers (1938-50).......	48	82	125	139	219	218	208	212	145	78	49	34	1,555

The almost invariable astronomical excess in summer over winter in middle and high latitudes is exaggerated on the Littoral by the climatic change from gloomy winter to bright summer. But even the summers are cloudy in parts of the Littoral, as at Prince Rupert which has less than half Victoria's mean annual sunshine.

In the South Interior July, August, and September are sunny although they are among the months with most precipitation, but in winter the skies are almost as sunless as on the Littoral.

The North Interior gets less sunshine than the South owing to its cloudier summers. Smithers show the decrease in the broken highlands of the northwest nearer the ocean.

Table 38 gives the number of days with sunshine within the specified percentages of the possible at few stations:

Table 38

Mean number of days with duration of sunshine within the specified percentages of the possible

		<25%	25-75%	>75%
Littoral				
Victoria (1946-50)	January	17	8	6
	July	4	11	16
Vancouver (A) (1946-51)	January	21	6	4
	July	8	11	12
South Interior				
Kamloops (1946-51)	January	19	10	2
	July	5	13	13
North Interior				
Prince George (1946-51)	January	19	9	3
	July	10	15	6

CHAPTER 6

Precipitation

6.1 Mean Precipitation

The major controls of climatological elements by latitude and wind system, continental and relief, described in Section 1.1 are seen very clearly in the distribution of precipitation in British Columbia. In these sections we give some particulars of:

(a) the mean distribution of precipitation (including both rain and snow) over the Province,

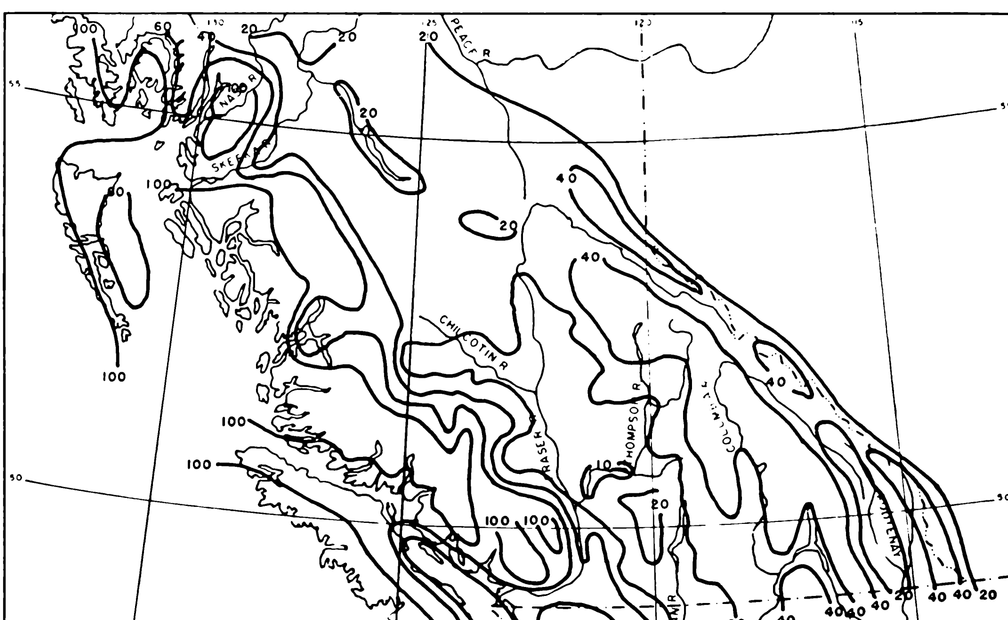
(b) its mean regime (i.e. distribution over the year),

(c) amount of snowfall, and

(d) the variabilities which have been recorded in the past and are likely to recur.

The chart of mean precipitation (Fig. 30) shows clearly the outstanding and very prominent features, the extremely heavy totals on the whole length of the littoral, the decrease towards the interior generally and particularly on the deep valley-floors of the south (Bella Bella, Ocean Falls, Bella Coola, in Table 39),

Fig. 30



Mean annual precipitation (inches) for Southern British Columbia.

the increase on the ranges of the Interior. The abrupt transition from windward ocean slopes to dry interior valleys is a salient feature of the climate of British Columbia. On the major contrast between littoral and interior are superposed the details of the minor, but important, features in all three regions.

Table 39

Precipitation, monthly means at Bella Bella (coast), Ocean Falls (30) miles inland and Bella Coola (65 miles inland), showing effect of distance from the sea

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Rainfall													
Bella Bella	10·9	5·4	11·0	7·5	6·6	6·1	5·7	6·3	8·4	13·5	16·5	14·3	112·2
Ocean Falls	15·9	13·9	15·0	11·4	8·9	7·5	7·6	9·3	12·9	24·0	23·6	23·4	173·4
Bella Coola	3·9	3·0	3·8	2·4	2·0	1·9	2·0	2·3	4·2	7·2	7·7	5·8	46·2
Snowfall													
Bella Bella	5·8	9·0	4·5	0·2	0	0	0	0	0	T	2·7	4·7	27
Ocean Falls	16·6	9·9	7·9	2·5	0	0	0	0	T	0·3	2·3	15·2	55
Bella Coola	17	12	6	1	0	0	0	0	0	1	5	15	57
Total Precipitation													
Bella Bella	11·5	6·3	11·5	7·5	6·6	6·1	5·7	6·3	8·4	13·5	16·8	14·8	115·0
Ocean Falls	17·6	14·9	15·8	11·6	8·9	7·5	7·6	9·3	12·9	24·0	23·8	24·9	178·8
Bella Coola	5·6	4·2	4·4	2·5	2·0	1·9	2·0	2·3	4·2	7·3	8·2	7·3	51·9

Littoral and South Interior. The Coastal ranges condense much of the vapour in the westerlies, but the air that passes on into the interior is by no means dry since the mountains are of only moderate height, and moreover considerable volumes of air penetrate through the deep river-valleys and at higher levels over the lower parts of the ranges, so that the series of minor uplands get considerable rain or snow on the west slopes but little on the east and in the valleys, ascent and condensation of vapour being repeated on each but precipitation getting successively less, to increase again, however, on the lofty Selkirks. Unfortunately stations are far too few for the drawing of a detailed chart but Table 15 (Section 4.1) and Fig. 30 indicate clearly enough the relation between topography and precipitation.

Table 17 is arranged to show the effect of altitude and slope on precipitation (also on temperature, which is considered in Section 4.1). Groups of suitable stations with meteorological records are few. The first is on the windward side of the Coast Range on the east of Howe Sound (near Vancouver), Britannia Beach being on the shore of the Sound, Tunnel Camp at the Britannia Mine, 2,000 feet above; Tunnel Camp gets about 26 per cent more precipitation in the year (but there is little difference between the two stations in summer). Hedley and Hedley Mine are inland in the Similkameen valley the former on the floor of the valley, the Mine 4,000 feet above on the mountain-side overlooking it on the east; the high station has about twice the precipitation of the low. Of the third group, Revelstoke is at the west foot of the Selkirk Mountains, Glacier high up on the middle of the range but much below the highest parts, and Golden in the Rocky Mountain Trench which bounds the Selkirks on the east. The high station has the largest precipitation, but Revelstoke is not far behind; Golden shows its sheltered position by having only 18 inches.

The windward side of Vancouver Island, most of it with an annual mean exceeding 100 inches, is one of the rainiest tracts of the globe. Henderson Lake on the west coast has over 200 inches, the highest record in North America.

Leeward of the backbone of the island the totals fall off very fast, to less than 50 inches (only 24 inches at the Dominion Observatory, Victoria). Beyond the Strait of Georgia the Coast Mountains raise the precipitation again to well over 100 inches on some of the loftier ranges.

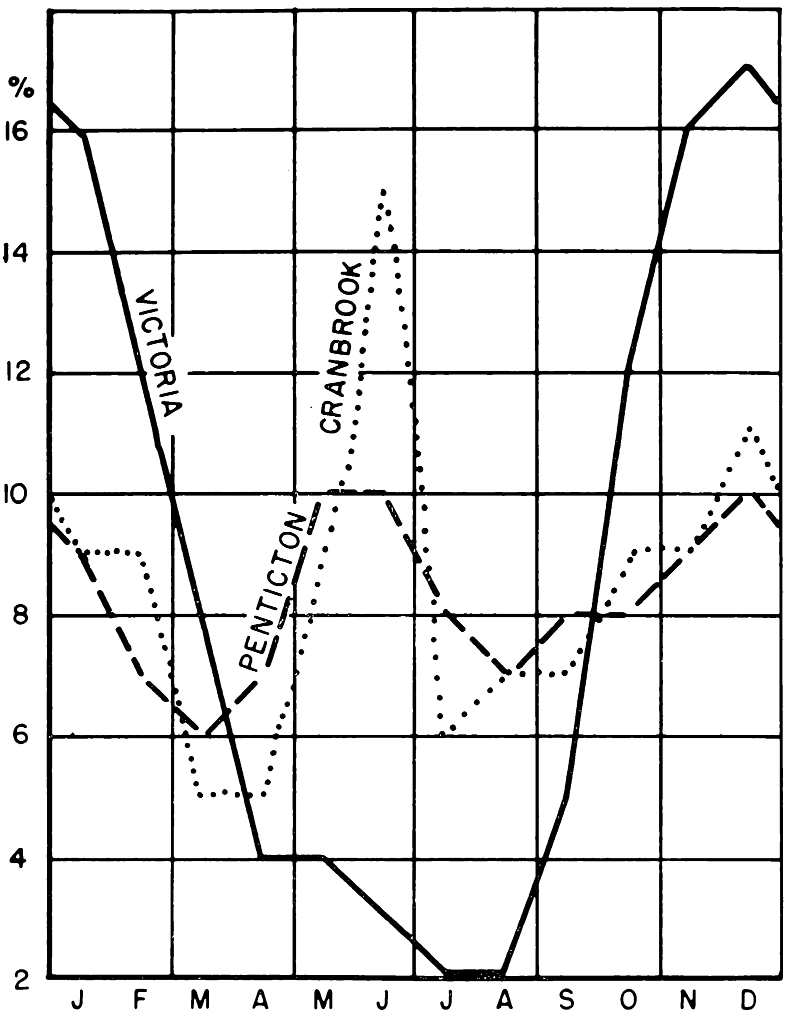
A west-east traverse in any latitude repeats the alternation of rainy windward and drier lee slopes. In the north the Queen Charlottes repeat Vancouver Island, their western mountains, drenched by copious rains all the year, giving an annual mean of more than 100 inches. The middle of the islands has about half as much (Masset 56 inches, Queen Charlotte City 66 inches) and the east coast still less (Deadtree Point 44 inches). Beyond Hecate Strait the forested slopes of the Coast Ranges face us with annual means over 140 inches (Ocean Falls 166 inches), and these stations are not on the exposed upper slopes which must have much more. Stations are few on the east slopes, but Smithers in the Bulkley River valley with 18 inches, Kleena Kleene (Dean Valley) 11 inches, and Alexis Creek (Chilcotin) 8.5 inches, show the decrease clearly, but they are far east from the coast.

Descent into the middle Fraser Valley repeats the decrease on the east of Vancouver Island, now to less than 20 inches (Lytton 17 inches). The Coast Mountains however are a large feature, of more than merely local importance, for they divide the littoral from the interior so effectively that the whole interior may be regarded as the rain-shadow. But the contrast between west and east slopes in the littoral is still large though less prominent (Table 15). On the average the west slopes increase the precipitation to over 20 inches and it falls away in the valleys to under 12 inches; the amounts are in general larger on the windward sides farther north, smaller in some of the deeply incised and sheltered valleys, the lowest for the whole Province, under 10 inches, being in the valleys of the lower Thompson, middle Fraser, and Nicola Rivers. A system of closely spaced stations would be required to give the detail in such hilly country. The large amount, 57 inches, at Hope is a 'spill-over' from the littoral, for the west winds carry vapour up the Lower Fraser Valley, and ascent where the mountainous sides close in is the cause of the heavy condensation. At the other extreme the lower Thompson and the Nicola valleys are very effectively screened, and Ashcoft with 7.2 inches and Merritt with 9.0 inches, on the valley-floors, are among the driest stations in the whole of Canada. The Rocky Mountain Trench is another prominent rain-shadow with about 15 inches (Invermere only 11 inches); Fernie with 40 inches is in the valley leading up to Crowsnest Pass. The Selkirk Mountains have the highest precipitation of the Interior, and their influence extends to Revelstoke (40 inches), Nakusp, Kaslo, and Nelson, all with over 20 inches.

From the uplands records are naturally few, but series in Table 40 indicate annual means of 30 to 50 inches on the highest parts of the central uplands, 50 to 70 inches on the Kootenays and the Selkirk Mountains, and (probably) less than 50 inches on the highest ranges of the Rockies.

The littoral has a pronounced 'Westerlies, oceanic' régime (Table 40) with maximum in winter and minimum in summer (which may claim to be a dry season); autumn has much more precipitation than spring (Fig. 31 Victoria). The difference in amount (not percentage) between the seasons is largest on the mountains.

Fig. 31



Mean monthly precipitation at Victoria, Penticton, and Cranbrook (percentage of annual mean).

Fig. 32

Mean monthly precipitation at Prince George (percentage of annual mean).

Table 40

Mean annual precipitation and seasonal distribution

	Mean annual precipitation (inches)	Spring	Seasonal percentages Summer	Autumn	Winter
Littoral					
Prince Rupert	95·6	21	15	34	30
Estevan Point	107·2	24	9	30	37
Victoria	26·9	16	7	32	45
Daisy Lake (Garibaldi)	60·8	18	8	29	45
South Interior					
Kamloops	10·2	17	33	24	26
Penticton	11·4	23	27	25	25
Nelson	28·0	21	19	26	34
Invermere	11·3	18	35	22	23
Cranbrook	14·3	19	26	23	32
Hedley (N.P. Mine)	23·8	29	25	21	25
Old Glory	24·0	22	31	25	22
Glacier	56·9	18	14	28	40
North Interior					
Prince George	21·9	18	29	29	24
Williams Lake	13·8	20	38	22	20
Dog Creek	15·6	17	41	20	22
Smithers	18·1	19	25	28	28
New Hazelton	18·6	14	30	33	23
Kleena Kleene	14·0	15	38	24	23
Barkerville	40·2	20	28	26	26
Dome Creek	27·6	18	28	28	26

The interior of British Columbia is a transition belt between the Littoral with its strong winter maximum and Central Canada with maximum in summer. Its precipitation is well distributed over the year, no season being specially dry (Fig. 31). In most of the South winter has most; its excess is largest in the west, but in several valleys summer is not much behind. Spring is the driest season (summer at a few stations). The winter half-year has more than the summer. Of the months December (or January) and June have most; at many stations June gets more than twice as much as May and July. This June increase of precipitation (and also of cloud and humidity) occurs over most of the South Interior. In the North Interior the most prominent feature is the comparatively dry spring (Fig. 32).

With temperatures well below freezing point much of the winter precipitation in the interior is snow, and the mean snowfall is considerably over 40 inches in most valleys especially in the east (Revelstoke 143 inches, Nelson 89 inches, Golden 76 inches, Fernie 132 inches). Much of the summer precipitation in the east falls in heavy thundershowers.

The contrast between humid rainy littoral and dry interior is as bold in respect of number of days as of amount of precipitation. Approximate mean numbers of days with precipitation (rain and snow, the numbers of snow-days brackets) are:—

Littoral, windward coasts and slopes, 220 (4); 317 (21) at Langara

Littoral, lee side, 160 (6)

South Interior, valleys, 110 (20-40)

Littoral, uplands, 140 (50); 205 (104) at Glacier and probably many more on the highest ground.

North Interior. The chart of mean precipitation is similar in its major features in north and south, but it reflects the simpler relief of the North Interior.

The Coast Mountains maintain the excessive totals, probably over 100 inches in some areas, that prevail in the south, and the rain-shadow immediately east is hardly less prominent; Kleena Kleene, in a valley only 120 miles from the Pacific, has an annual mean of only 14 inches, the most favoured parts of the Chilcotin uplands about 30 inches. But the rain-shadow in the deep valleys reduces the totals to less than 20 inches in the Fraser valley between Prince George and Lillooet (Quesnel, altitude 1,750 feet, 16 inches, Williams Lake 1,945 feet, 13 inches, Dog Creek 3,370 feet, 17 inches) and its tributary the Chilcotin valley below Alexis Creek (which has only 8.5 inches according to its short-period mean). East of this tract of lowest elevation precipitation increases again on the Cariboo Highlands, to 40 inches at Barkerville, altitude 4,180 feet, and probably over 50 inches in the Premier Mountains which rise to 12,000 feet opposite Mount Robson in the Rockies. It falls abruptly with the drop into the deep, narrow, valley of the upper Fraser (part of the Rocky Mountain Trench) with altitudes of about 2,000 feet, to 18 inches at Cranberry Lake, 20 inches at McBride, 28 inches at Dome Creek.

The extensive rolling country, upland and valley, west and northwest of Prince George probably has between 20 and 30 inches a year, but the deep trench of Bulkley River less than 20 inches (Smithers and New Hazelton each 19 inches), and the highlands and ranges which buttress the Coast mountains much more than 30 inches.

The precipitation is fairly evenly spread over the year, but spring is definitely the driest season though by no means without precipitation. Summer and autumn have most. Sometimes in late summer heavy rain interfers with harvest on the farms west of Prince George. Means of the number of days with precipitation range from about 85 days (rain and snow, 40 being snow) in the sheltered valleys of the west, to 170 (26 snow) and more on the uplands. Prince George has 123 days (43 snow).

According to Table 41 rainfall is far more often light or moderate than heavy in all the Regions. Indeed 'heavy' precipitation is very exceptional outside the rainiest parts of the littoral, and 'moderate' occurs only about once a week in winter. But it must be pointed out that the procedure of observing and computing almost certainly makes the data of 'moderate' and 'heavy' a good deal too low.

Extremely heavy falls in 24 hours seem to be rare, the largest records being les than 2·5 inches, and most less than 1·5 inches. Nearly all have been in June or July.

Table 41

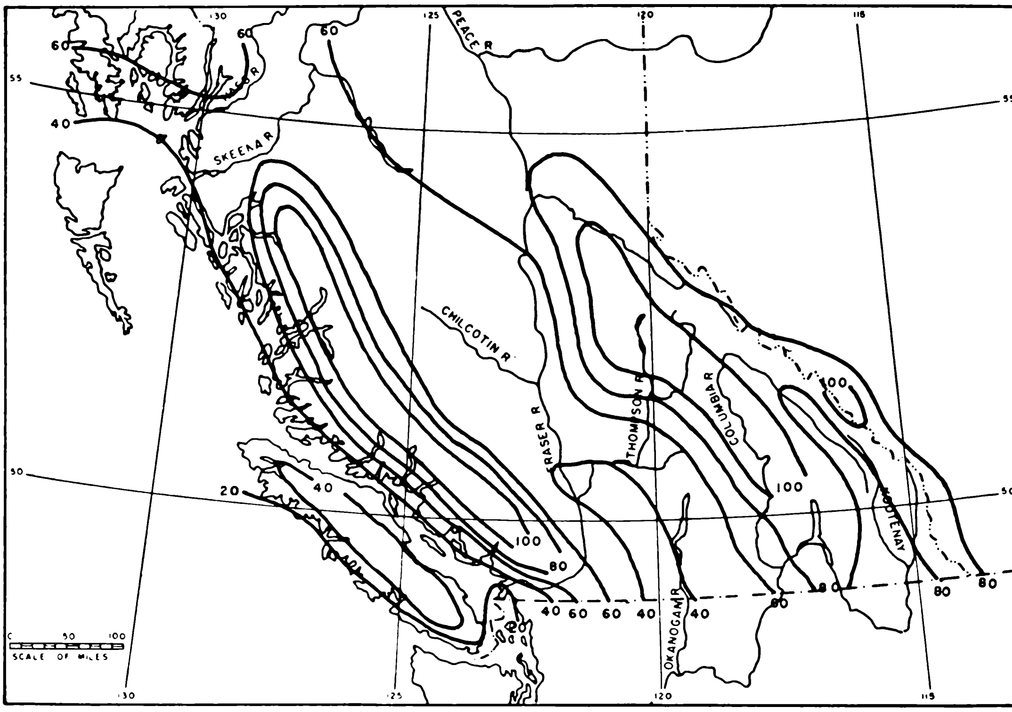
Intensity of precipitation, mean number of hours. For rain, light indicates rate of fall < 0·1 inches an hour, moderate more than 0·1 and up to 0·3 inches an hour, heavy more than 0·3 inches an hour. For snow, light indicates snowfall reducing visibility to not less than 5/8 mile, moderate, visibility less than 5/8 mile but not less than 5/16 mile, heavy, visibility less than 5/16 mile

		Rain			Snow			
Littoral		Light	Moderate	Heavy	Light	Moderate	Heavy	
Prince Rupert (1943-6,1949)...	Jan.	204	12	<1	20	1	1	
	July	219	8	0	0	0	0	
Patricia Bay (1944-51).......	Jan.	116	3	<1	32	3	2	
	July	27	1	0	0	0	0	
Vancouver (A) (1944-51).....	Jan.	128	4	1	42	2	1	
	July	37	2	<1	0	0	0	
Abbotsford (1945-51)........	Jan.	119	4	0	39	2	0	
	July	28	1	0	0	0	0	
South Interior								
Penticton (1944-51)..........	Jan.	20	<1	0	80	2	0	
	July	19	<1	<1	0	0	0	
Kamloops (1945-51)..........	Jan.	4	<1	0	23	1	<1	
	July	7	3	0	0	0	0	
		(Observations at 16 hours per day only)						
Old Glory (1946-51).........	Jan.	0	0	0	170	9	2	572
	July	17	1	0	4	<1	0	535
		(Note: many observations missing; see last column for number of hours observed)						
Kimberley (1944-51).........	Jan.	8	0	0	113	5	1	
	July	15	<1	0	0	0	0	
North Interior								
Prince George (1944-50)......	Jan.	13	0	0	152	5	1	
	July	60	<1	<1	0	0	0	
Smithers (1944,5, 47-51)......	Jan.	16	1	0	138	3	0	
	July	70	1	<1	0	0	0	

6.2 Snowfall

Amount of snowfall depends on both temperature and humidity, other conditions being the same. Only with the surface air below, or little above, 32° can snowfall be appreciable, and then only if humidity is high enough; it is not heavy with very low temperature since the vapour capacity of the air is too small. These factors are evident in British Columbia Fig. 33). The littoral has abundant vapour, but the temperature is usually well above 32°; snow is not frequent. Temperature, however, decreases with increase of height, so that the Coast Mountains satisfy requirements of both temperature and humidity. Most of the precipitation above 3,000 feet is snow, which begins to be frequent in October and lies deep through the winter, the snowline then retreating spasmodically as warmer spells hasten melting. About 5,000 feet annual snowfall sometimes exceeds 250 inches, and at one place a fall of 48 inches occurred in 24 hours. Even in the south of British Columbia the heights above about 6,000 feet bear snow and ice all the year. Their snow-fields testify to both heavy precipitation and fairly low temperature aloft, but the forests of giant evergreen trees on the lower slopes indicate the absence of extreme cold there.

Fig. 33



Mean annual snowfall (inches) for Southern British Columbia.

Table 42 gives data illustrating these points:

Table 42

Snowfall on Littoral and Coast Mountains

	Altitude feet	Mean snowfall Amount (in.)	No. of days
Langara	134	22	18
Estevan Point	20	9	5
Victoria	228	14	5
Premier	1,371	455	76
Daisy Lake	1,200	131	37

In the interior the winters are cold enough but the vapour-content of the air is too low for much snow. In the valley-bottoms the annual mean is 30 to 50 inches (but Ashcroft has less, only 17 inches, and the valleys of the Kootenays much more, Nelson 89 inches, Nakusp 103 inches). The west slopes and tops of the uplands get between 80 and 150 inches at the recording stations, and the mean rises to 164 inches at Old Glory and 390 inches at Glacier.

On the littoral snow hardly ever falls outside the months December to March. The snowy season is longer in the interior but only to the extent of including November, except on the uplands which are liable to have snow in all months except July and August, and the highest west slopes in every month of the year.

In the valleys nearly all the snow is the 'light' type (Table 41) and even at Old Glory 'moderate' intensity is recorded in only 5 per cent, 'heavy' in only 1 per cent of the hours with snow (but see paragraph on Intensity of rainfall).

The large mean difference between high- and low-water levels in the lakes, due mainly to the rise caused by the melting of the snow in spring and early summer, is an indication of the large snowfall round the upland sources of the rivers:

Okanagan Lake	15 ft.	Slocan Lake	26 ft.
Shuswap Lake	16 ft.	Kootenay Lake	15 ft.
Upper Arrow Lake	32 ft.		

In the North Interior, the winters are considerably colder than in the South, an adverse factor for heavy precipitation, but their greater length compensates so that the mean snowfall in the valleys averages 50 to 60 inches, and on the west slopes of the uplands, represented by Barkerville, at least three times as much (Table 43).

Table 43

Snowfall in North Interior

	Altitude feet	Mean annual snowfall Amount (in.)	No. of days
Prince George	2,218	66	43
Smithers	1,632	55	42
Quesnel	1,787	45	31
Dog Creek	3,370	60	57
Barkerville	4,180	182	94
Dome Creek	2,200	104	45

Snow has fallen at most stations in the North Interior in all months except July and August, and normally falls in the months September to May, November to March being the snowiest; in December, January, and February rain is rare. Almost all the snowfall is classified as 'light' (Table 41), 'moderate' is rare and 'heavy' quite exceptional.

Practically all snow in the west falls from moist air aloft through cold polar air below. The moist air comes in from the Pacific in an occlusion and overrides the polar air which has spread west in an incursion from beyond the Rockies. The massive condensation of vapour gives heavy snow even on the Littoral, but the precipitation soon turns to rain and the snow does not lie long. The Interior gets snow, flurries and continuous falls, from disturbances within polar air-masses.

6.3 Annual Precipitation: Variability

The mean deviation is low, that of the annual total being about 18 per cent at Kamloops, one of the driest stations which might be expected to have high figures: Barkerville, a rainy station for the interior, has only 11 per cent. The lowest values are in the very rainy parts of the littoral, the least being probably at Queen Charlotte City, 8 per cent; Victoria however has a high figure, 17 per cent.

The mean monthly deviations are, as is usual, much larger than the annual. In January they range from about 60 per cent in the dry belt of the lower Thompson valley and in the south of the Rocky Mountain Trench to 20 per cent on the coast. In July the largest is in southeast of Vancouver Island, over 70 per cent, but all the south of the Province from the international border to lat. 50°N. is almost as variable with 60 – 70 per cent; the values decrease in general from south to north, to less than 40 per cent on the north Littoral and less than 30 in the upper Fraser Valley.

Table 44

Highest and lowest records of precipitation (inches); period of records in brackets

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Littoral													
Victoria (1915-50)													
Highest	13·3	7·1	5·4	2·9	2·9	4·3	1·9	2·2	3·6	5·0	7·4	13·0	37·2
Lowest	0·8	0·4	0·6	0·3	0·1	<0·1	<0·1	<0·1	0·1	1·0	0·8	0·8	17·3
Prince Rupert (1915-50)													
Highest	23·0	18·8	16·8	14·7	9·3	10·0	11·0	13·4	16·6	21·4	28·1	21·9	132·1
Lowest	2·4	1·8	3·4	2·2	1·1	1·0	0·8	0·8	1·0	7·2	4·4	2·9	72·2
Vancouver (city) (1900-51)													
Highest	20·6	10·5	14·6	8·2	6·1	6·1	5·3	5·9	10·4	10·8	15·7	15·9	72·3
Lowest	0·8	1·2	0·9	0·5	0·3	0·2	<0·1	0·1	0·3	1·8	1·8	2·8	37·8
South Interior													
Kelowna (1931-49)													
Highest	2·3	2·6	1·6	2·4	2·7	2·3	2·1	4·0	2·7	3·6	4·3	3·5	18·1
Lowest	0·3	0·1	0·2	<0·1	0·2	0·3	0·2	0·1	0·1	0·3	0·1	0·5	7·8
Glacier (1913-49)													
Highest	14·1	14·2	9·0	4·6	5·4	5·5	6·2	6·8	8·2	8·2	11·0	18·6	75·5
Lowest	1·4	1·8	0·6	0·8	1·0	0·7	0·5	0·5	0·9	1·0	1·0	3·4	38·7
Golden (1925-49)													
Highest	5·7	3·9	3·7	2·0	2·4	3·6	2·6	3·5	2·9	3·8	4·2	8·3	26·3
Lowest	0·2	0·2	0·2	<0·1	0·2	0·3	0·4	0·1	0·2	0·1	0·1	0·8	12·6
North Interior													
Prince George (1929-50)													
Highest	3·2	3·4	3·2	3·0	2·9	4·0	5·1	3·9	6·1	3·6	4·5	5·0	31·3
Lowest	0·5	0·5	0·6	0·2	0·7	0·4	1·1	0·2	0·5	1·4	1·2	1·0	14·5

A feature that stands out clearly in Table 44 is the erratic distribution of extreme precipitations—a characteristic of the absolute extremes of all climatic elements. None of the stations has recorded a (calendar) month without any precipitation. In the Littoral the summer months have had the lowest records, as might be expected from the normal régime; the very heavy precipitation in the winter half-year is illustrated by October at Prince Rupert, its lowest record, 7.2 inches, being much larger than the highest for that month at Victoria.

Tables 45, 46 contain more detail. Table 44 gives the extreme monthly records in the period (the means may be found in the Climatological Tables), Table 45 the extreme annual records; since the significance of the extremes is relative to the means, the difference between them (the range of the annual precipitation) is expressed as a percentage of the annual mean (M_d in the last column). Table 46 indicates the variability of annual precipitation by percentages of years with amounts within specified ranges. The stations are arranged in three categories, grouped by annual means;

(1) those with very large mean, over 60 inches, in the Littoral,
(2) those with medium mean, 20-60 inches, in the South Interior,
(3) those with small mean, less than 20 inches, in the North Interior.

Table 45

Mean annual precipitation and extreme records (period of records in brackets); M_d is the difference between the extremes expressed as a percentage of the mean

	Mean annual precipitation (inches)	Highest record	Lowest record	M_d
Littoral				
Estevan Point (1923-50)	109·3	137·5	73·9	58
Clayoquot (1898-1950)	106·1	148·7	58·2	85
Quatsino (1895-1950)	95·9	146·3	62·4	88
Alberni (1894-1950)	67·8	92·2	30·4	91
Victoria (1915-1950)	26·9	37·2	17·3	74
Nanaimo (1892-1950)	37·2	56·2	22·0	92
Garry Point (1897-1945)	37·0	47·6	21·8	70
Bella Coola (1898-1950)	54·5	86·5	37·8	89
Prince Rupert (1915-1950)	96·0	132·1	72·2	62
Masset (1897-1950)	55·3	82·5	36·0	84
Vancouver (City) (1900-48)	58·8	72·3	37·8	59
Agassiz (1889-1950)	62·9	90·6	30·5	96
Hope (1878-1950)	56·6	78·0	40·9	66
Mean	66·0	....	....	78
South Interior				
Princeton (1894-1950)	12·8	21·1	8·6	98
Hedley (1905-50)	11·5	17·8	5·8	104
Kelowna (1899-1950)	12·4	18·1	7·8	83
Vernon (1919-1950)	15·7	20·7	11·3	60
Kamloops (1878-1950)	10·2	18·0	6·4	114
Greenwood (35 yrs.)	17·0	26·7	6·5	119
Nelson (1898-1950)	28·0	38·9	15·4	84
Revelstoke (1898-1949)	40·3	49·4	21·9	68
Glacier (1894-1950)	53·5	75·5	38·7	69
Golden (1909-1950)	18·0	26·3	12·6	76
Rossland (1916-49)	28·5	37·5	13·8	83
Mean	22·0			87
North Interior				
Big Creek (1904-49)	12·3	17·5	9·1	68
Quesnel (1895-1950)	16·4	25·0	10·6	88
Prince George (1923-1950)	20·0	31·3	14·5	84
Fort St. James (55 yrs.)	15·8	22·5	8·7	87
Mean	16·0			82

Of the three groups the first, stations in the Littoral, the region with largest precipitation, has the lowest M_d (mean 78 per cent) and the stations with the largest means tend to have the smallest variability, but with many exceptions. In the next group, the South Interior, the mean M_d is 87 per cent; this group includes the largest values of M_d three, being over 100 per cent. Here again M_d tends to be least at the stations with the largest means (including Glacier, the only upland station available); it is notably high at Greenwood, Kamloops, Hedley, and Princeton. M_d is still lower for the group of stations in the North Interior which has the lowest mean precipitation.

Table 46

Variability of Annual Precipitation; percentage of years with amounts within the specified ranges; the groups contain stations with large, medium and small means respectively

	Mean annual precip.	Percentage of years with precipitation within the limits (inches):— <50	50·1 to 60·0	60·1 to 70·0	70·1 to 80·0	80·1 to 90·0	90·1 to 100·0	100·1 to 110·0	110·1 to 120·0	120·1 to 130·0	>130
Group 1											
Alberni (48)	67·8	6	25	23	31	15	0	0	0	0	0
Clayoquot (41)	106·1	0	2	2	10	6	18	20	12	15	15
Estevan Point (26)	107·2	0	0	0	4	0	19	23	27	15	12
Prince Rupert (36)	95·6	0	0	0	14	28	25	22	8	0	3
Quatsino (46)	95·9	0	0	9	15	29	20	9	7	7	4
Mean preciptation	94·5										
Mean percentage of deviations		1	5	7	15	16	16	15	11	7	7

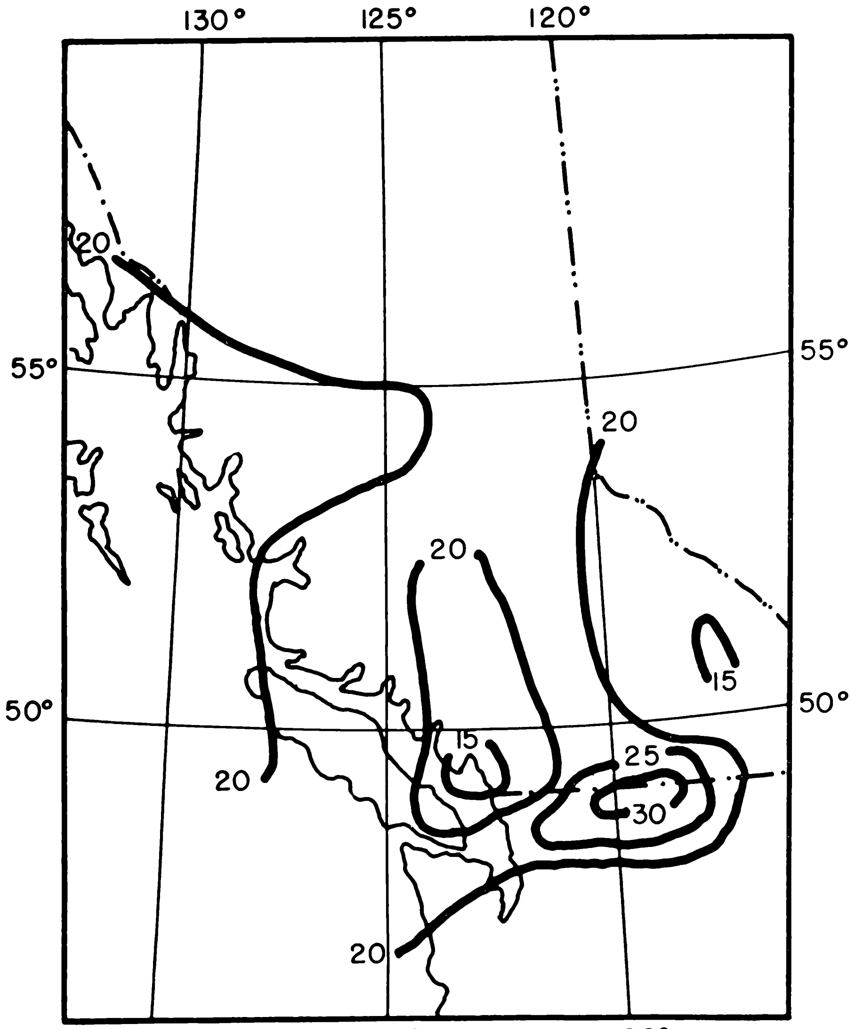
	Mean annual precip.	<15	15·1 to 20·0	20·1 to 25·0	25·1 to 30·0	30·1 to 35·0	35·1 to 40·0	40·1 to 45·0	45·1 to 50·0	50·1 to 55·0	55·1 to 60·0	60·1 to 65·0	65·1 to 70·0	>70
Group 2														
Agassiz (57)	62·9	0	0	0	0	2	2	2	7	18	12	19	14	24
Barkerville (40)	40·2	0	0	2	8	28	30	20	12	0	0	0	0	0
Bella Coola (45)	54·5	0	0	0	0	0	11	11	16	13	24	11	7	7
Garry Point (49)	37·0	0	0	2	10	31	31	20	6	0	0	0	0	0
Glacier (38)	56·9	0	0	0	0	0	3	3	16	21	23	13	16	5
Hope (36)	56·6	0	0	0	0	0	0	3	33	17	11	17	8	11
Masset (45)	55·3	0	0	0	0	0	9	7	9	25	29	13	4	4
Nanaimo (49)	37·2	0	0	4	8	25	25	20	12	4	2	0	0	0
Nelson (44)	28·0	0	14	29	34	16	7	0	0	0	0	0	0	0
Prince George (33)	21·9	9	25	33	30	3	0	0	0	0	0	0	0	0
Revelstoke (33)	40·3	0	0	3	6	18	25	21	27	0	0	0	0	0
Rossland (39)	28·5	3	8	10	36	33	10	0	0	0	0	0	0	0
Vancouver (A) (14)	40·3	0	0	0	0	29	7	35	29	0	0	0	0	0
Vancouver (city) (47)	57·9	0	0	0	0	0	2	4	11	15	28	17	21	2
Victoria (36)	26·9	17	19	36	22	6	0	0	0	0	0	0	0	0
Mean precip.	42·9													
Mean percentage of deviations		1	4	7	11	14	11	10	12	7	9	6	5	3

Station, with no. of yrs obs.	Mean annual precip.	<8	8·1 to 10·0	10·1 to 12·0	12·1 to 14·0	14·1 to 16·0	16·1 to 18·0	18·1 to 20·0	20·1 to 22·0	22·1 to 24·0	24·1 to 26·0	26·1 to 28·0	28·1 to 30·0	>30
Group 3														
Big Creek (42)	12·3	2	10	40	26	17	5	0	0	0	0	0	0	0
Fort St. James (55)	15·8	0	2	9	22	29	13	14	7	4	0	0	0	0
Golden (35)	18·0	0	0	0	14	11	18	20	23	11	0	3	0	0
Greenwood (35)	17·0	6	9	11	9	9	13	9	11	11	3	6	0	3
Hedley (39)	11·5	3	33	23	28	5	5	0	3	0	0	0	0	0
Kamloops (55)	10·2	16	21	36	11	4	2	0	0	0	0	0	0	0
Kelowna (46)	12·2	2	17	26	36	13	4	2	0	0	0	0	0	0
Princeton (53)	13·1	2	11	26	23	23	9	2	4	0	0	0	0	0
Quesnel (46)	16·4	0	0	9	15	20	27	10	15	2	2	0	0	0
Vernon (49)	14·8	0	6	6	25	35	14	12	0	2	0	0	0	0
Mean precip.	14·1													
Mean percentage of variations		3	12	19	21	17	11	7	6	3	<1	1	0	<1

Table 46 gives the percentage of years with annual precipitation within the limits specified. In the first and third groups (the largest means and smallest means) the percentages are largest within the limits which include the means; the second group has two modes, arising from the larger and smaller annual means respectively.

Figs. 34-36 express the variability, annually and for the months of December and July, by the coefficient of variation,[1] not mean deviation which has been used in this Section. The isopleths have a distinct SE–NW trend in winter, the highest values running along the middle of the Province, but a W–E trend in summer with the highest values in the south.

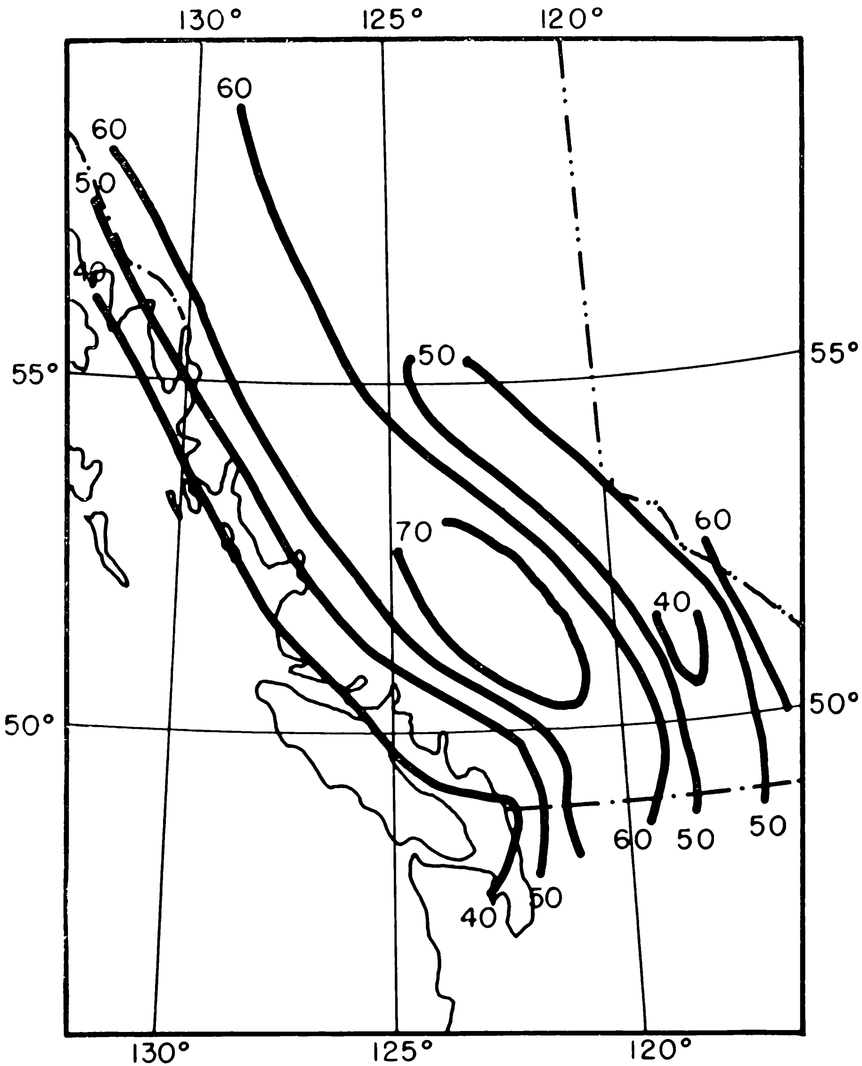
Fig. 34



The coefficient of variation of the annual precipitation for Southern British Columbia. (R. W. Longley

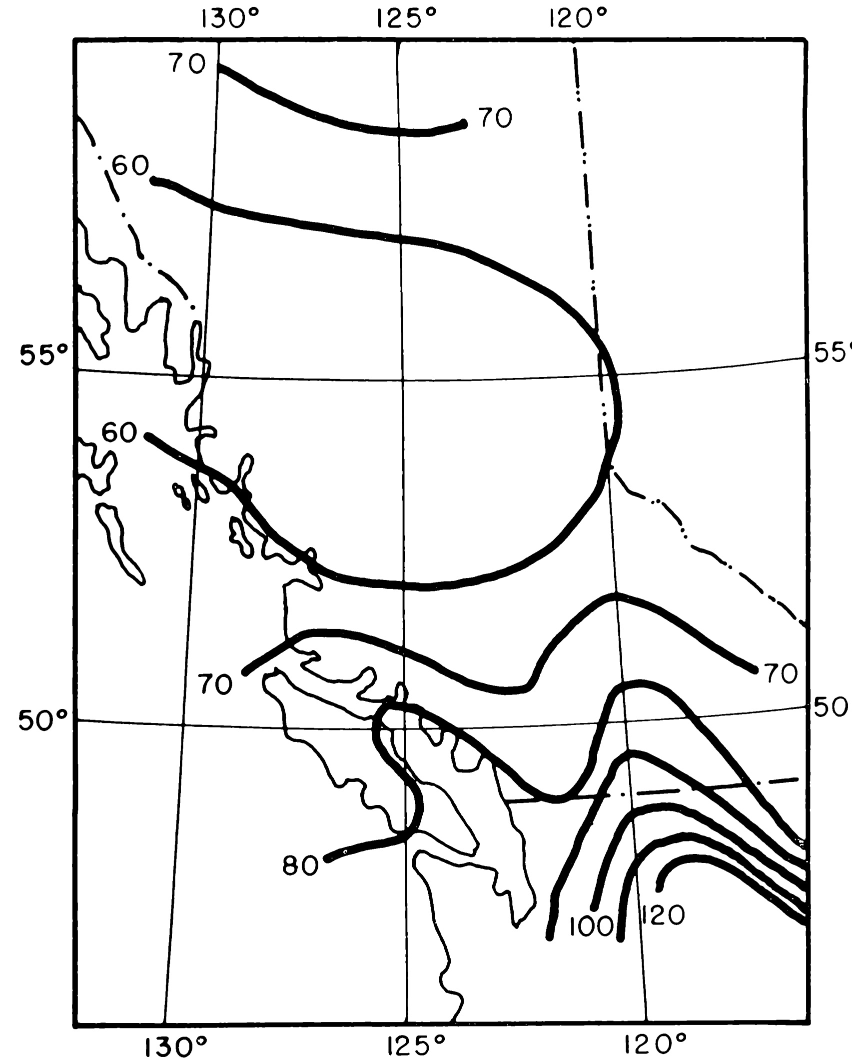
[1]The coefficient of variation is the standard deviation divided by the mean. For a fuller discussion see Longley, R. W. Measures of the variability of precipitation. Monthly Weather Review, 80, July, 1952.

Fig. 35



The coefficient of variation of the December precipitation for Southern British Columbia. (R. W. Longley)

Fig. 36



The coefficient of variation of the July precipitation for Southern British Columbia. (R. W. Longley)

6.4 Snowfall: Variability

Snow is a most variable element, as is shown by Tables 47, 48, 49.

Table 47 gives the extreme monthly and annual records at representative stations,

Table 48 gives the frequencies (expressed as percentages of monthly snowfalls) within the specified ranges,

Table 49 gives for the whole year the percentages which Table 48 gives for the months, the ranges adopted for the year being higher than those for the months.

Table 47

Snowfall, highest and lowest records (inches); period in brackets

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Littoral													
Victoria (1915-50)													
Highest	37·3	46·4	5·5	1·3	0	0	0	0	0	0	8·5	16·7	78·2
Lowest	0	0	0	0	0	0	0	0	0	0	0	0	T
Prince Rupert (1915-50)													
Highest	20·9	27·4	34·0	31·6	0·5	0	0	0	0	2·0	19·0	57·6	133·5
Lowest	0	0	0	0	0	0	0	0	0	0	0	0	0·5
Vancouver(City)(1915-48)													
Highest	38·1	36·5	16·2	9·7	0	0	0	0	0	3·7	9·2	27·0	80·5
Lowest	0	0	0	0	0	0	0	0	0	0	0	0	0
South Interior													
Penticton (1941-50)													
Highest	12·7	20·3	9·0	0·5	0	T	0	0	0	T	9·9	26·1	56·5
Lowest	0·3	2·0	T	0	0	0	0	0	0	0	0	0·6	12·2
Vernon (1938-50)													
Highest	24·5	18·4	4·3	2·7	0	0	0	0	0	4·6	17·9	32·3	61·6
Lowest	0·4	1·5	0	0	0	0	0	0	0	0	0	4·0	15·0
Kamloops (1915-50)													
Highest	36·8	23·8	10·7	1·2	0	0	0	0	0·5	11·7	20·0	39·2	84·8
Lowest	0·7	0	0	0	0	0	0	0	0	0	0	1·6	9·5
South Interior													
Nelson (1938-43)													
Highest	45·1	26·0	9·7	0	0	0	0	0	0	1·0	11·3	31·7	107·6
Lowest	1·5	3·8	0	0	0	0	0	0	0	0	0	5·5	32·8
Cranbrook (1939-49)													
Highest	37·7	27·8	10·3	12·9	15·2	0	0	0	1·3	4·5	37·9	27·0	76·1
Lowest	3·6	3·7	0	0	0	0	0	0	0	0	0	1·5	19·2
Glacier (1913-50)													
Highest	140·5	142·3	90·0	53·0	27·0	0	0	0	11·0	49·0	110·0	186·3	561·0
Lowest	14·5	23·0	5·5	0	0	0	0	0	0	0	24·0	33·0	230·1
Golden (1917-50)													
Highest	48·7	37·2	14·0	11·6	3·2	0	0	0	5·7	32·5	30·5	79·5	162·1
Lowest	2·2	2·2	0	0	0	0	0	0	0	0	1·0	1·3	35·4
North Interior													
Prince George (1929-50)													
Highest	31·9	33·8	19·0	9·0	1·0	1·0	T	0	0	16·1	26·7	47·7	106·2
Lowest	0	4·1	1·5	0	0	0	0	0	0	0	1·1	5·0	27·9

Table 47 shows that at all three stations in the Littoral no snow has fallen in the months June to September (May to October at Victoria and Vancouver). Every month has been snow-free at least once (though not all in the same year). At least one year has passed without snow at Vancouver city, and also at Victoria (except for a 'trace'); even Prince Rupert on the north Pacific Coast has had a year with only 0.5 inches.

On the other hand Victoria and Vancouver have had nearly 40 inches in January; Prince Rupert's largest fall, 58 inches, was in December.

In the South Interior (valleys), so far as they are represented by the stations tabulated, the months May to September are without snow except in the east (Golden, June, July, and August only). No year has been snowless. Each of the months December, January, and February has always had at least 1 inch at nearly all stations.

The uplands naturally have far larger figures; Glacier (3,778 feet) has had 561 inches in a year (its lowest record is 230 inches), and more than 100 inches in each of the months November, December, January, and February. But snow never falls in June, July, and August.

The North Interior with its long cold winters has a shorter snowless period, only August and September.

Table 48

Percentage frequencies of monthly snowfalls within the specified ranges; period of records in brackets

	Range (in.)	J	F	M	A	M	J	J	A	S	O	N	D
Littoral													
Victoria.........	....< 0·1	36	58	67	100	100	100	100	100	100	100	78	50
(1915-50)......	0·1– 4·0	31	22	28	0	0	0	0	0	0	0	19	33
	4·1– 6·0	6	0	6	0	0	0	0	0	0	0	0	6
	6·1–10·0	11	6	0	0	0	0	0	0	0	0	3	6
	>10·0	17	14	0	0	0	0	0	0	0	0	0	6
Prince Rupert...	....< 0·1	17	19	25	58	100	100	100	100	100	94	59	22
(1915-50)	0·1– 4·0	25	25	22	28	0	0	0	0	0	6	26	28
	4·1– 6·0	6	0	17	3	0	0	0	0	0	0	3	8
	6·1–10·0	11	22	11	6	0	0	0	0	0	0	6	14
	....>10·0	42	34	25	6	0	0	0	0	0	0	6	28
Vancouver(city).	....< 0·1	24	35	35	88	100	100	100	100	100	97	61	26
(1915-48)	0·1– 4·0	26	26	35	12	0	0	0	0	0	3	27	35
	4·1– 6·0	6	3	18	0	0	0	0	0	0	0	6	6
	6·1–10·0	12	3	6	0	0	0	0	0	0	0	6	6
	>10·0	32	32	6	0	0	0	0	0	0	0	0	26
South Interior													
Penticton........	....< 0·1	0	0	33	78	100	100	100	100	100	100	50	0
(1941-50)	0·1– 4·0	22	44	56	22	0	0	0	0	0	0	20	30
	4·1– 6·0	22	22	0	0	0	0	0	0	0	0	10	20
	6·1–10·0	33	22	11	0	0	0	0	0	0	0	20	20
	>10·0	22	11	0	0	0	0	0	0	0	0	0	30
Vernon..........	....< 0·1	0	0	8	92	100	100	100	100	100	84	31	0
(1938-50)	0·1– 4·0	15	23	77	8	0	0	0	0	0	8	31	8
	4·1– 6·0	8	0	15	0	0	0	0	0	0	8	8	8
	6·1–10·0	23	31	0	0	0	0	0	0	0	0	0	38
	>10·0	54	46	0	0	0	0	0	0	0	0	31	46
Kamloops.......	....< 0·1	0	15	25	90	100	100	100	100	100	100	25	0
(1915-50)	0·1– 4·0	28	50	60	10	0	0	0	0	0	0	45	10
	4·1– 6·0	14	10	10	0	0	0	0	0	0	0	5	15
	6·1–10·0	28	20	0	0	0	0	0	0	0	0	10	35
	>10·0	31	5	5	0	0	0	0	0	0	0	15	40
Nelson..........	....< 0·1	0	0	33	100	100	100	100	100	100	67	33	0
(1938-43)	0·1– 4·0	17	17	17	0	0	0	0	0	0	33	17	0
	4·1– 6·0	0	17	17	0	0	0	0	0	0	0	17	17
	6·1–10·0	0	17	33	0	0	0	0	0	0	0	33	17
	>10·0	83	50	0	0	0	0	0	0	0	0	0	67

Table 48—Concluded

Percentage frequencies of monthly snowfalls within the specified ranges; period of records in brackets

	Range (in.)	J	F	M	A	M	J	J	A	S	O	N	D
South Interior													
Cranbrook......	....< 0·1	0	0	9	27	91	100	100	100	91	36	9	0
(1939-49)	0·1– 4·0	9	9	55	46	0	0	0	0	9	55	27	9
	4·1– 6·0	27	9	18	18	0	0	0	0	0	9	9	9
	6·1–10·0	36	36	9	0	0	0	0	0	0	0	9	46
	>10·0	27	46	9	9	9	0	0	0	0	0	46	36
North Interior													
Prince George...	....< 0·1	0	0	0	42	90	95	100	100	100	45	0	0
(1929-50)	0·1– 4·0	5	0	33	47	10	5	0	0	0	32	27	0
	4·1– 6·0	5	10	14	5	0	0	0	0	0	14	0	5
	6·1–10·0	14	25	29	5	0	0	0	0	0	5	27	23
	>10·0	76	65	24	0	0	0	0	0	0	5	45	73

Table 48 brings out a point of climatological interest and practical importance. At the stations in the Littoral and most of those in the South Interior the snowfall in January and in February is usually either large or small rather than medium, being less than 4 or more than 6 inches (at many stations more than 10 inches); December has a similar but smaller tendency. Prominent examples are Victoria, with 80 per cent of February snowfalls not exceeding 4 inches and 20 per cent exceeding 6 inches, but none between 4 and 6 inches; Prince Rupert, where 44 per cent of Februarys have 4 inches or less, 56 per cent over 6 inches, but none between 4 and 6 inches. In the interior Kamloops has 65 per cent of its February totals under 4 inches, 25 per cent over 6 inches, and only 10 per cent between 4 and 6 inches.

The spring and autumn frequencies are more regular, the percentages decreasing from the small to the large ranges.

At Victoria, Vernon, Kamloops, Nelson, and Prince George the most frequent yearly totals are in the interval which contains the annual mean (Table 49). But that is not the case everywhere; at Prince Rupert the annual mean is 29 inches, but the most frequent total is 20 inches or less; Cranbrook gets only 18 per cent of its falls in the interval which includes its annual mean, 57 inches. It cannot be assumed that the most frequent snowfall at any station is very close to the annual mean.

Table 49

Percentage frequencies of yearly snowfall within specified ranges; period of records in brackets

	Range (inches)				
	<20·1	20·1-30·0	30·1-40·0	40·1-60·0	>60·0
Littoral					
Victoria (1915-34)	80	3	8	6	3
Prince Rupert (1915-34)	31	14	19	19	17
Vancouver (city) (1915-48)	50	24	3	18	6
South Interior					
Pentincton (1941-50	33	33	22	11	0
Vernon (1938-50)	8	15	8	54	15
Kamloops (1915-50)	30	35	15	15	5
Nelson (1938-43)	0	0	33	17	50
Cranbrook (1939-49)	9	0	27	18	46
North Interior					
Prince George (1929-50)	5	5	0	27	63

6.5 Thunder

The frequency of thunder is shown in the Climatological Tables (mean number of days), in Table 50 (mean number of hours and in Figs. 37-41). It occurs only in the summer half-year at most places, but occasionally in October and March (in November also on the Littoral); June, July, and August are much the most thundery months.

Table 50

Thunder, mean number of hours within which thunder is heard

	Jan.	Feb.	Mar.	Apr.	May	Jun.	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Littoral													
Masset (1944-50).........	0	0	0	1	0	0	0	0	0	0	<1	0	1
Port Hardy (1944-50)....	0	0	0	0	<1	0	<1	1	<1	<1	<1	0	2
Comox (1944-50).........	0	<1	<1	1	1	<1	2	7	1	0	0	0	13
Patricia Bay (1942-50)...	0	0	0	0	2	1	1	1	<1	<1	<1	0	6
Vancouver (A) (1942-50).	0	0	<1	<1	1	1	2	1	<1	<1	<1	0	7
Abbotsford (1945-50)....	0	0	1	1	1	2	2	1	1	0	<1	<1	10
South Interior													
Ashcroft (1944-50).......	0	0	0	<1	3	2	4	7	1	0	0	0	17
Kamloops (1945-51)...... (Obs. in 16, day hrs. only)	0	0	0	<1	1	3	2	3	1	<1	0	0	11
Princeton (1942-50)......	0	0	0	1	2	5	8	9	1	<1	0	0	26
Penticton (1942-50)......	0	0	<1	1	4	10	10	11	1	1	0	0	38
Carmi (1943-50).........	0	0	0	1	3	8	11	14	1	1	0	0	39
Crescent Valley (1943-50)	0	0	<1	2	4	14	22	15	3	1	0	0	61
Old Glory* (1945-50)....	0	0	0	1	8	26	29	22	3	1	0	0	>90
Cranbrook (1943-50).....	0	0	0	1	3	13	10	11	1	0	0	0	39
North Interior													
Prince George (1943-50)..	0	0	<1	1	4	5	8	7	1	<1	0	0	26
Smithers (1942-50).......	0	0	0	0	2	3	5	2	0	0	0	0	12
Quesnel (1946-50)........	0	0	0	1	5	12	11	12	2	0	0	0	43
Dog Creek (1945-50).....	0	0	0	0	3	7	5	12	1	<1	0	0	28
Kleena Kleene (1943-51).	0	0	0	0	2	3	1	1	<1	0	0	0	8
*Broken; mean hrs. with obs:..................	572	497	607	617	545	522	535	524	505	566	639	608	

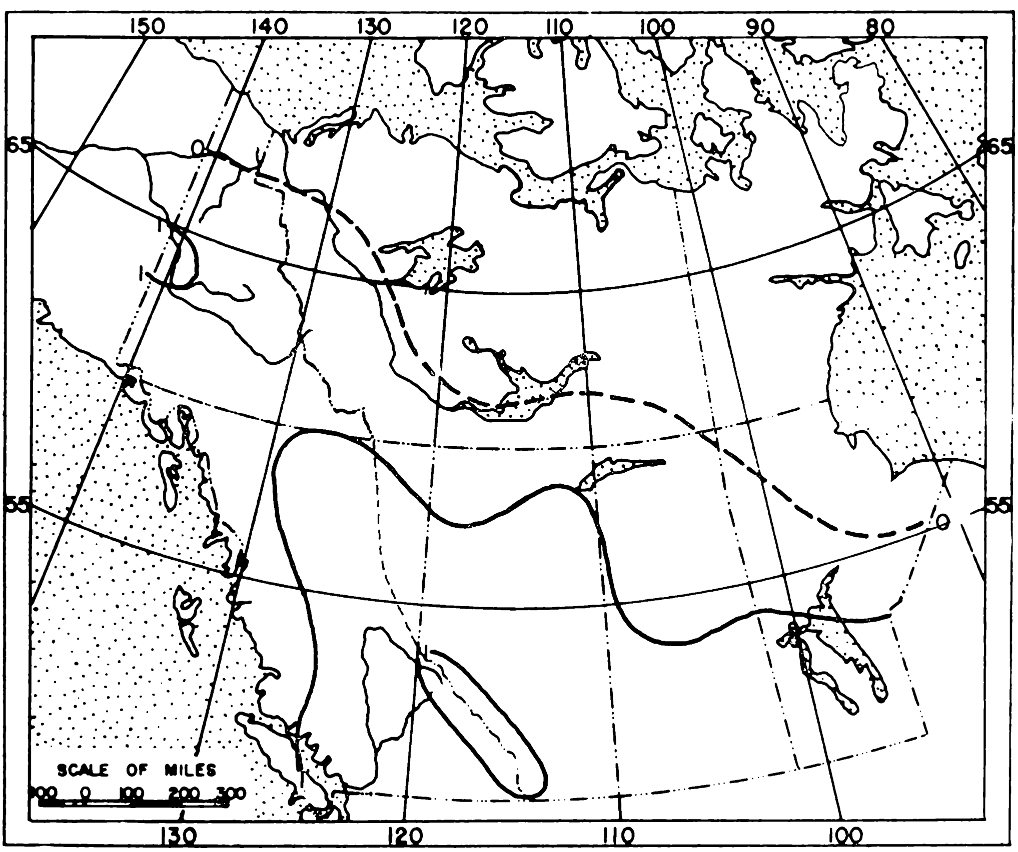
Thunder is very rare on the west coast, the mean number of days being 0 at Estevan Point, and rising to only 4 at Vancouver Airport (exceptionally many at Vancouver city, 8). Many years pass with none.

It is much more frequent in the South Interior (except in the very dry valleys of the Lower Thompson River and its tributaries, e.g. only 2 days at Ashcroft), the average being about 12 days in the west, over 20 in the Kootenays. And, to judge by Old Glory with its 23 days, the mountain-tops have at least as much as the valleys. Not a little of the summer rain, including many of the heaviest falls, occurs with thunder.

Most thunderstorms develop in maritime polar air in rear of depressions. This air is often unstable enough to give showers on the littoral, and in summer the heating of its surface layers during its passage over the hot land may increase the instability to thunderstorm intensity in the afternoon in the South Interior. On the coast the instability is greatest in the cold hours, and cloud and showers (occasionally with thunder) are at a maximum in the night and early morning. The more intense thunderstorms of the South Littoral (the North is rarely visited) are in the high levels of the troposphere, when strong S and SE upper winds bring unstable air from the west interior of U.S.A. This may happen in the South Interior also in late summer and early autumn.

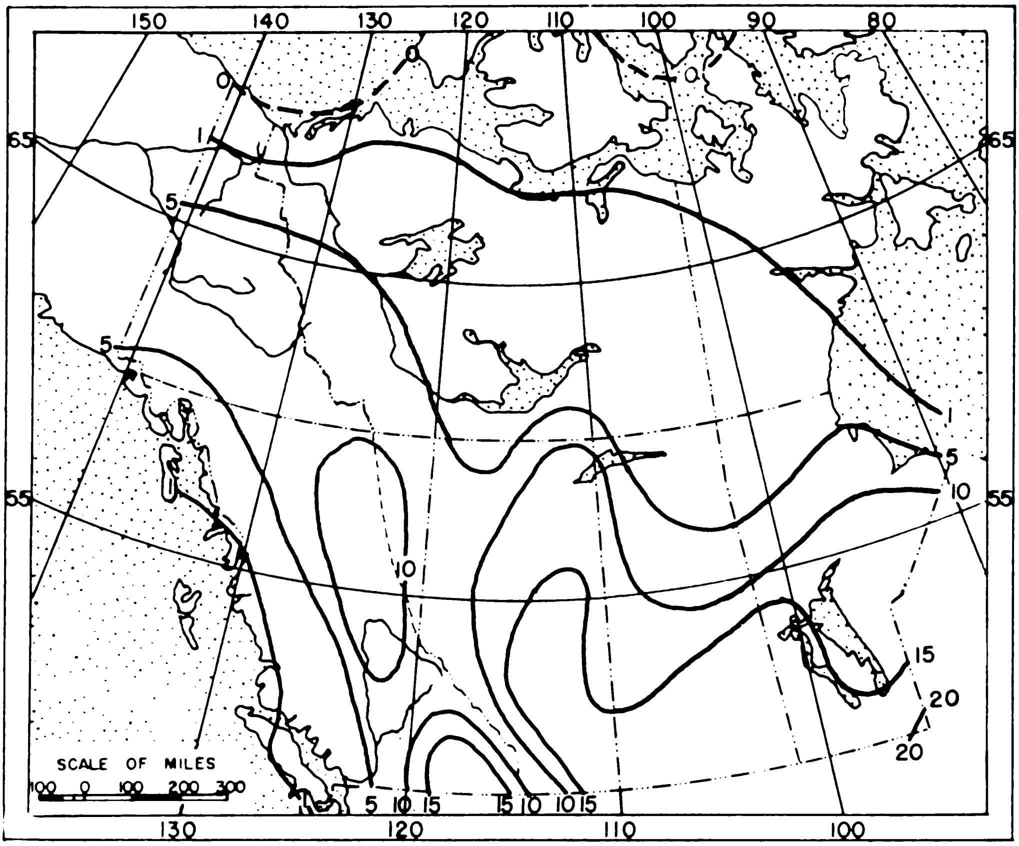
The North Interior with its cooler summers has less thunder, but it is not rare except in the deep and sheltered valleys of the west, e.g. at Smithers only 3 days, Kleena Kleene 4.

Figure 37



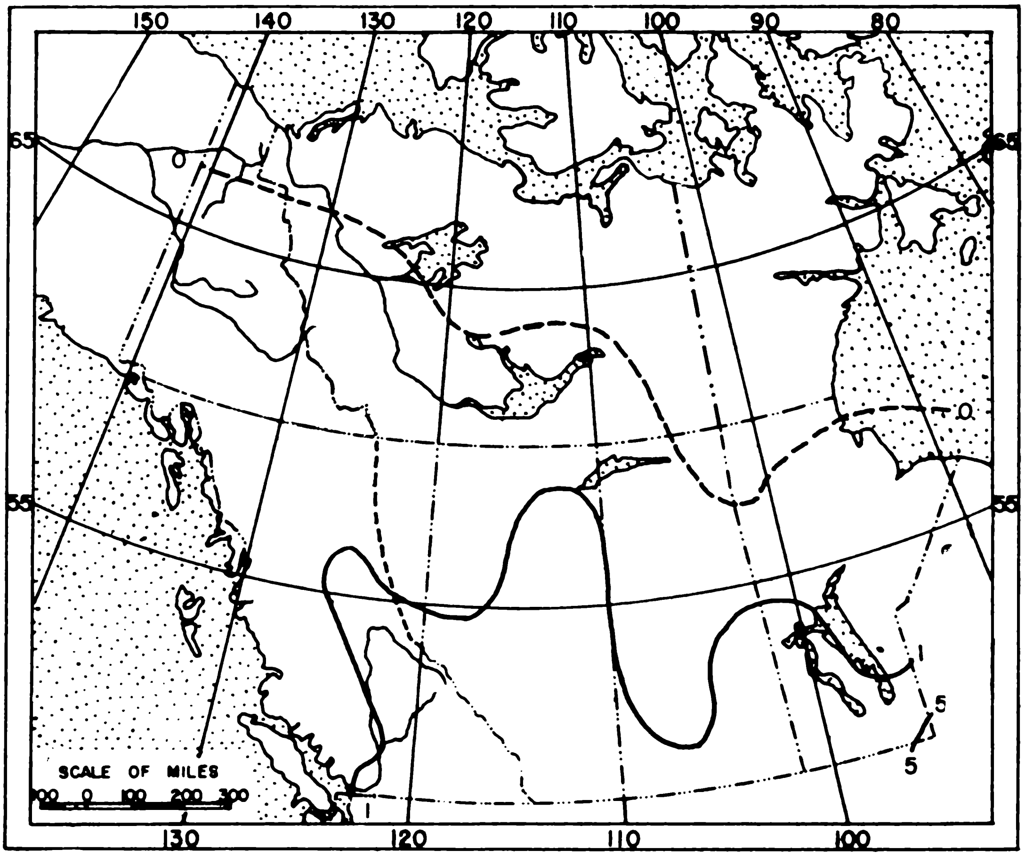
Mean number of Spring (March to May) days with thunderstorms.

Figure 38



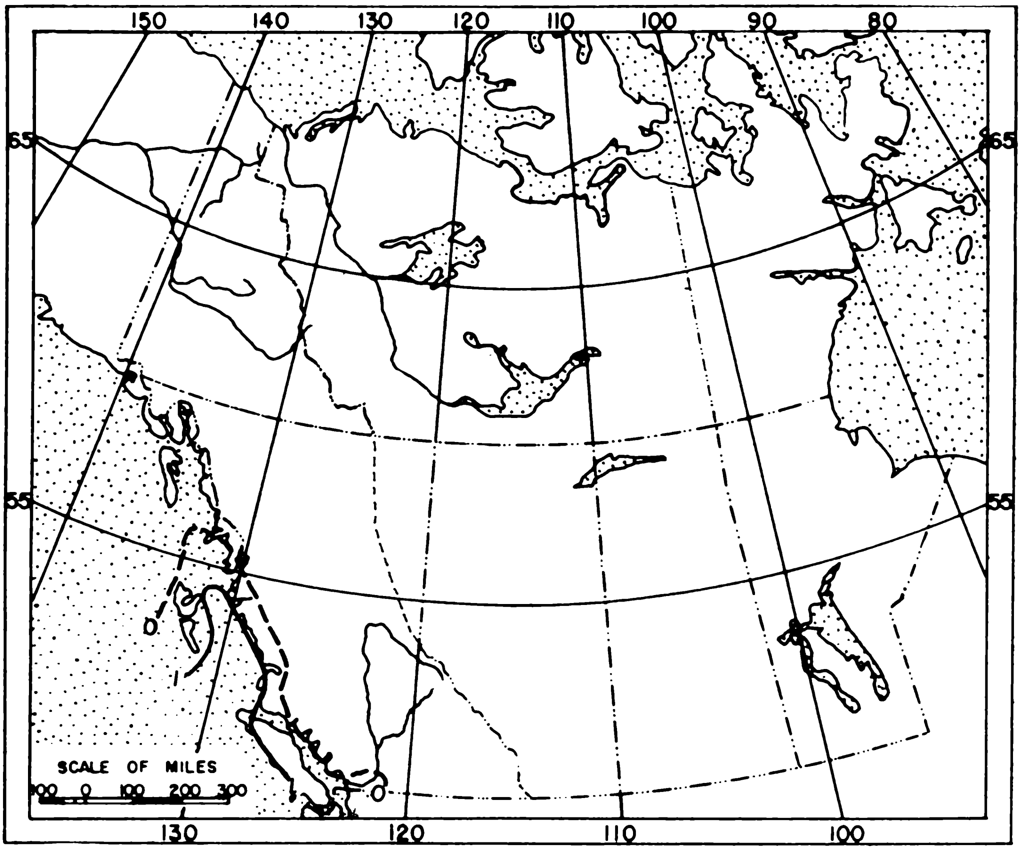
Mean number of Summer (June to August) days with thunderstorms.

Figure 39



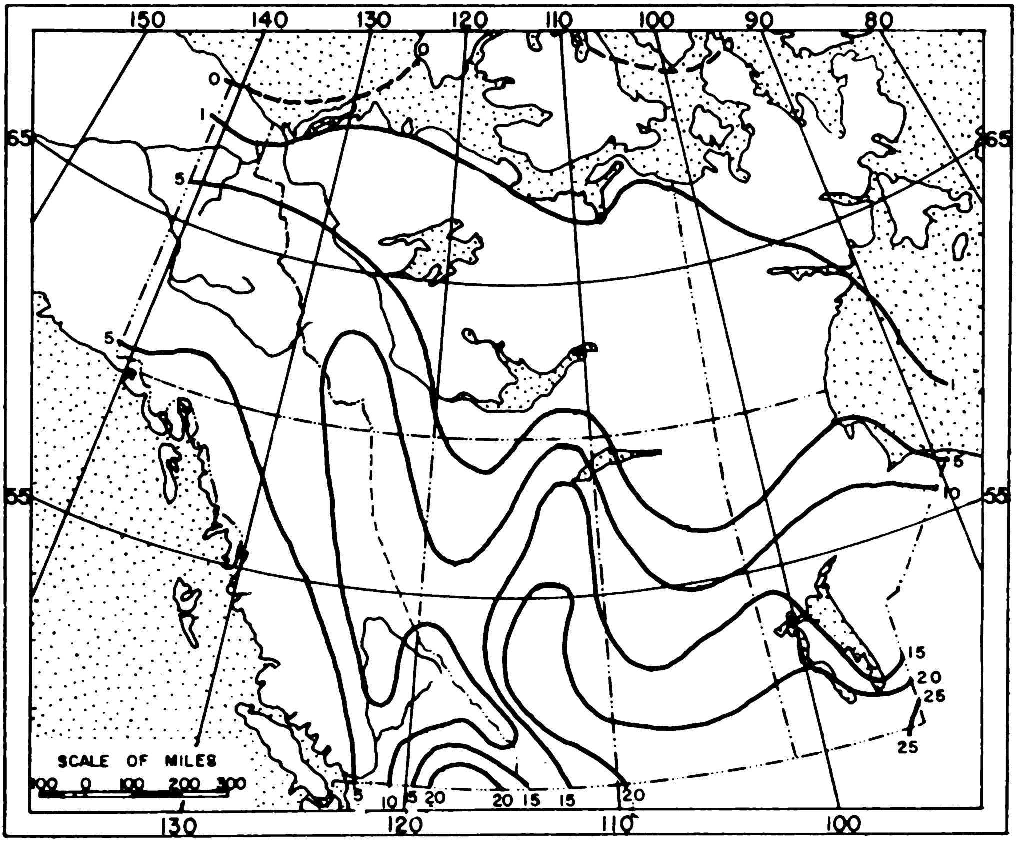
Mean number of Autumn (September to November) days with thunderstorms.

Figure 40



Mean number of Winter (December to February) days with thunderstorms.

Figure 41



Mean annual number of days with thunderstorms.

6.6 Hail, Freezing Rain, Sleet

Tables 51 and 52 show that hail is rare, but has been recorded at all stations, most often at Old Glory. It can be heavy in severe thunderstorms in the South Interior. Freezing rain (or drizzle) and sleet are liable to occur in the winter half-year.

Table 51

Hail, number of hours, mean, highest, and lowest records; periods in brackets

	Jan.	Feb.	Mar.	May	June	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Patricia Bay (1944-50)												
mean	0	0	<1	<1	<1	0	0	0	0	<1	<1	0
highest and lowest	0,0	0,0	1,0	2,0	1,0	0,0	0,0	0,0	0,0	1,0	1,0	0,0
Abbotsford (1945-51)												
mean	<1	0	0	<1	<1	0	<1	<1	0	0	0	0
highest and lowest	1,0	0,0	0,0	1,0	1,0	0,0	1,0	1,0	0,0	0,0	0,0	0,0
Vancouver (A) (1944-51)												
mean	0	<1	1	1	0	0	0	0	0	0	<1	<1
highest and lowest	0,0	1,0	2,0	3,0	0,0	0,0	0,0	0,0	0,0	0,0	1,0	2,0
Kamloops (1945-51)			(obs. for 16 hours per day only)									
mean	0	0	<1	0	0	0	<1	0	0	0	0	0
highest and lowest	0,0	0,0	1,0	0,0	0,0	0,0	1,0	0,0	0,0	0,0	0,0	0,0
Penticton (1944-51)												
mean	0	0	0	<1	<1	<1	0	0	0	<1	0	0
highest and lowest	0,0	0,0	0,0	1,0	2,0	1,0	0,0	0,0	0,0	1,0	0,0	0,0
Old Glory* (1946-51)												
mean	0	0	0	0	0	2	3	1	1	0	0	0
highest and lowest	0,0	0,0	0,0	0,0	0,0	4,0	10,0	2,0	3,0	0,0	0,0	0,0
Kimberley (1944-51)												
mean	0	0	0	<1	<1	0	<1	<1	0	<1	0	0
Highest and lowest	0,0	0,0	0,0	2,0	1,0	0,0	1,0	1,0	0,0	1,0	0,0	0,0
Prince George (1944-51)												
Mean	0	0	0	<1	<1	1	<1	1	<1	<1	0	0
Highest and lowest	0,0	0,0	0,0	2,0	2,0	2,0	2,0	3,0	1,0	3,0	0,0	0,0
Smithers (1944-51)												
Mean	0	0	<1	<1	0	0	0	0	0	<1	0	0
Highest and lowest	0,0	0,0	1,0	2,0	0,0	0,0	0,0	0,0	0,0	1,0	0,0	0,0

* Broken record; the mean number of hours observed:—

572	497	607	617	545	522	535	524	505	566	639	608

Table 52

Freezing rain (or drizzle) and sleet, mean number of hours within which recorded

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Littoral												
Masset (1944-50)	0	1	14	0	0	0	0	0	0	0	0	0
Port Hardy (1944-50)	2	0	0	0	0	0	0	0	0	0	0	1
Comox (1944-50)	0	0	0	0	0	0	0	0	0	0	0	1
Patricia Bay (1942-50)	5	1	<1	0	0	0	0	0	0	0	<1	1
Vancouver (A) (1942-50)	4	1	<1	0	<1	0	0	0	0	0	1	1
Abbotsford (1945-50)	6	4	0	0	0	0	0	0	0	0	1	3
South Interior												
Ashcroft (1944-50)	0	1	0	0	0	<1	0	0	0	0	1	0
Kamloops (1945-50) (Obs. in 16, day, hrs. only)	0	0	0	0	0	0	0	0	0	0	0	0
Princeton (1942-50)	4	0	<1	0	<1	0	0	0	0	0	2	1
Penticton (1942-50)	2	1	4	0	0	0	0	0	0	0	1	1
Carmi (1943-50)	2	1	1	0	<1	0	0	0	0	1	3	1
Crescent Valley (1943-50)	2	1	1	0	0	0	0	0	0	0	1	1
Old Glory* (1945-50)	0	3	2	0	1	0	1	0	4	4	5	2
Cranbrook (1943-50)	0	1	0	0	0	0	0	0	0	0	1	1
North Interior												
Prince George (1943-50)	2	1	1	0	0	0	0	0	0	1	5	2
Smithers (1942-50)	0	0	<1	0	<1	0	0	0	<1	0	<1	0
Quesnel (1946-50)	2	0	1	0	0	0	0	0	0	0	3	1
Dog Creek (1945-50)	1	0	0	<1	<1	0	0	<1	0	<1	3	<1

*Broken; mean no. of hours of observations:—

572	497	607	617	545	522	535	524	505	566	639	608

CHAPTER 7

Visibility

7.1 Visibility: General

The Province as a whole enjoys good to very good visibility. Exceptional, but at times serious, deterioration is caused by:

(1) sea-fog—on the coasts, and the rarer or less important land-fog in the valleys of the interior.

(2) hill-fog—usually low cloud, which often envelops the Coast Mountains and also the uplands of the Interior.

(3) smoke, from two sources, (a) forest-fires which are seriously frequent and their smoke may be carried hundreds of miles by the wind, spreading widely as it goes, and (b) industrial activities which are of a magnitude to cause very serious atmospheric pollution only in Vancouver, the smoke is often carried across the Strait of Georgia on mornings with light wind from the land, and far up the flats by the sea-breeze in the warm hours of the day.

Mean data of the frequency of various ranges of visibility and of atmospheric obscurity of different forms, are given in the following Tables:

Climatological Tables, number of days with fog in each month
Table 53, frequencies of specified ranges of visibility
Table 54, number of hours with moderate and dense fog
Table 55, number of hours with fog of various intensities and types
Table 56, number of hours with blowing or drifting snow
Table 57, number of hours with smoke
Table 58, number of hours with ceiling 500 ft. or less
Table 59, ranges of visibility and simultaneous ceilings.

Table 53 shows that at almost all the stations the largest range of visibility, >10 km., is by far the most frequent, and the lowest range, fog, is rare but may occur in all seasons.

Visibility is everywhere better in the afternoon than in the early morning (an almost universal feature over the globe).

7.2 Obstruction to Visibility: Fog

Littoral. On the open coasts the liability to dense or moderate sea-fog is shown by the frequency of visibility <1 km. in summer and <10 km. in autumn and winter, both in morning and afternoon, at Estevan Point. Off this coast the mean frequency of fog is 10 days in August and in September, and over the west of Juan de Fuca Strait about 45 days a year. Comox and Patricia Bay are more sheltered and have much less fog, but visibility is frequently (on the average more than once a week) less than 10 km. Land-fog sometimes spreads from the mainland in autumn (8 days at Victoria) and winter. Conditions are similar in the Fraser Flats (Abbotsford and Hope).

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The fogs off the coast were a serious obstacle to exploration and a hazard to the early navigators. In part because of 'those thick mists and most stinking fogges' Sir Francis Drake gave up his search for the sea-passage that was believed to connect the Atlantic with the north of the present British Columbia. In 1778 Cook passed off the Strait of Juan de Fuca without seeing it; and later, Vancouver sailed past the mouth of the Fraser River but again the fog prevented discovery. Modern data certainly indicate that fogs are not infrequent, but the early explorers seem to have been unlucky.

Table 53

Mean number of days with specified ranges of horizontal visibility at morning and afternoon observations

		Range of visibility	Jan.	Apr.	July	Oct.
Littoral						
Estevan Point (1941-51)	0430 L.S.T.	<1 km.	1	1	3	2
		1-10 "	7	3	4	5
		>10 "	23	26	24	24
	1630 L.S.T.	<1 km.	1	1	1	2
		1-10 "	5	3	2	6
		>10 "	25	26	28	23
Comox (1944-51)	0430 L.S.T.	<1 km.	1	0	<1	1
		1-10 "	4	<1	<1	6
		>10 "	26	30	30	24
	1630 L.S.T.	<1 km.	1	<1	0	<1
		1-10 "	5	<1	<1	5
		>10 "	25	29	31	26
Patricia Bay (1941-51)	0430 L.S.T.	<1 km.	1	0	<1	2
		1-10 "	4	2	1	8
		>10 "	26	28	30	21
	1630 L.S.T.	<1 km.	1	0	0	<1
		1-10 "	3	1	1	6
		>10 "	27	29	30	25
Vancouver (A) (1941-51)	0430 L.S.T.	<1 km.	4	<1	<1	6
		1-10 "	9	4	4	7
		>10 "	18	26	27	18
	1630 L.S.T.	<1 km.	1	<1	0	<1
		1-10 "	11	1	<1	8
		>10 "	19	28	31	23
Abbotsford (1944-51)	0430 L.S.T.	<1 km.	1	<1	<1	3
		1-10 "	5	2	1	4
		>10 "	25	28	30	24
	1630 L.S.T.	<1 km.	1	0	0	<1
		1-10 "	3	1	<1	4
		>10 "	27	29	31	27
Hope (1941-51)	0430 L.S.T.	<1 km.	1	<1	<1	<1
		1-10 "	6	6	4	7
		>10 "	24	23	27	24
	1630 L.S.T.	<1 km.	1	0	0	0
		1-10 "	4	2	1	4
		>10 "	26	28	30	27
South Interior						
Lytton (1944-51)	0430 L.S.T.	<1 km.	1	0	0	2
		1-10 "	1	<1	<1	1
		>10 "	29	30	31	28
	1630 L.S.T.	<1 km.	<1	0	0	0
		1-10 "	2	0	0	0
		>10 "	29	30	31	31
Princeton (1941-51)	0430 L.S.T.	<1 km.	2	<1	<1	2
		1-10 "	5	1	<1	3
		>10 "	24	29	31	26
	1630 L.S.T.	<1 km.	<1	0	0	<1
		1-10 "	3	<1	0	<1
		>10	28	30	31	30

Table 53—Continued

Mean number of days with specified ranges of horizontal visibility at morning and afternoon observations

		Range of visibility	Jan.	Apr.	July	Oct.
South Interior						
Copper Mountain (1941-46).......	0430 L.S.T........	<1 km.	4	0	<1	1
		1-10 "	3	2	1	2
		>10 "	24	27	30	28
	1630 L.S.T........	<1 km.	2	0	0	1
		1-10 "	2	1	<1	<1
		>10 "	27	29	31	30
Penticton (1941-51)..............	0430 L.S.T........	<1 km.	<1	0	0	0
		1-10 "	3	0	0	<1
		>10 "	28	30	31	31
	1630 L.S.T........	<1 km.	0	0	0	0
		1-10 "	2	<1	0	<1
		>10 "	29	29	31	31
Carmi (1941-51)..................	0430 L.S.T........	<1 km.	4	1	1	3
		1-10 "	5	2	<1	1
		>10 "	22	27	30	27
	1630 L.S.T........	<1 km.	2	<1	0	1
		1-10 "	3	<1	<1	2
		>10 "	26	29	31	28
Ashcroft (1945-51)...............	0430 L.S.T........	<1 km.	<1	0	0	0
		1-10 "	2	<1	<1	<1
		>10 "	29	30	31	31
	1630 L.S.T........	<1 km.	<1	0	0	<1
		1-10 "	2	<1	0	<1
		>10 "	29	30	31	31
Old Glory (1945-51).............	0430 L.S.T........	<1 km.	16	10	3	15
		1-10 "	1	0	1	0
		>10 "	14	20	27	16
	1630 L.S.T........	<1 km.	14	8	3	14
		1-10 "	<1	1	0	<1
		>10 "	16	21	28	16
Cranbrook (1941-48).............	0430 L.S.T........	<1 km.	1	<1	<1	1
		1-10 "	4	<1	<1	1
		>10 "	26	29	31	29
	1630 L.S.T........	<1 km.	<1	0	0	0
		1-10 "	2	<1	0	1
		>10 "	29	30	31	30
Trail (1945-50)...................	0430 L.S.T........	<1 mile	10	4	6	8
		1-2·5 "	11	17	16	18
		2·6-4·5 "	8	8	8	4
		>4·5 "	2	1	1	1
	1430 L.S.T........	<1 mile	3	<1	1	3
		1-2·5 "	10	2	1	7
		2·6-4·5 "	11	11	11	14
		4·5> "	7	17	18	7
North Interior						
Prince George (1941-45)..........	0430 L.S.T........	<1 km.	<1	<1	1	2
		1-10 "	5	1	3	4
		>10 "	26	29	27	25
	1630 L.S.T........	<1 km.	0	0	0	0
		1-10 "	4	<1	0	2
		>10 "	27	30	31	29
Smithers (1942-51)..............	0430 L.S.T........	<1 km.	<1	0	1	2
		1-10 "	4	2	3	4
		>10 "	27	28	27	25
	1630 L.S.T........	<1 km.	<1	0	0	<1
		1-10 "	5	1	1	2
		>10 "	26	29	30	29

Table 53—Concluded

Mean number of days with specified ranges of horizontal visibility at morning and afternoon observations

		Range of visibility	Jan.	Apr.	July	Oct.
North Interior						
Terrace (1944-45)	0430 L.S.T.	<1 km.	2	2	0	2
		1-10 "	11	5	4	8
		>10 "	18	23	27	21
	1630 L.S.T.	<1 km.	1	0	0	2
		1-10 "	10	3	3	10
		>10 "	20	27	28	19
Quesnel (1946-51)	0430 L.S.T.	<1 km.	2	1	4	6
		1-10 "	5	2	4	3
		>10 "	24	27	23	22
	1630 L.S.T.	<1 km.	1	0	0	0
		1-10 "	2	<1	0	1
		>10 "	28	30	31	30
Williams Lake (1941-47)	0430 L.S.T.	<1 km.	2	<1	1	4
		1-10 "	1	<1	2	3
		>10 "	27	29	28	24
	1630 L.S.T.	<1 km.	<1	0	0	0
		1-10 "	2	<1	0	<1
		>10 "	29	30	31	31
Dog Creek (1945-51)	0430 L.S.T.	<1 km.	1	<1	<1	<1
		1-10 "	3	2	<1	<1
		>20 "	27	28	30	30
	1630 L.S.T.	<1 km.	1	0	0	<1
		1-10 "	3	1	0	1
		>10 "	27	29	31	30
Kleena Kleene	0430 L.S.T.	<1 km.	1	<1	<1	5
		1-10 "	2	1	<1	2
		>10 "	28	28	30	24
	1630 L.S.T.	<1 km.	1	<1	0	1
		1-10 "	3	1	<1	1
		>10 "	27	29	30	29

South Interior. In many of the valleys visibility is much better than in the Littoral, but inversion-fog is not rare in the night and early morning in autumn and winter. Penticton and Ashcroft rarely suffer from fog, though visibility is frequently only moderate in autumn and winter. Crescent Valley has 150 hours a year of dense fog, 30 hours in each of the months October—January.

The much poorer visibility on the uplands is shown by Carmi with fog about once a week in autumn and winter in the early morning, usually clearing by mid-day, and by Old Glory Mountain. The records of Old Glory are unique in the Province, showing fog to occur on the average every other day except in summer and often persisting throughout the 24 hours; most days without fog have good visibility, moderate visibility being exceptional.

Industrial haze and fog (visibility < 1 mile) are frequent at Trail (it must be noted that ranges of visibility for this station are not the same as for the others); visibility is less than 2.5 miles on more than 2 mornings in 3. Conditions are much better in the afternoon, but even then visibility is usually less than 4.5 miles except in spring and summer when it exceeds 4.5 miles rather more often than not.

North Interior. All the stations are in valleys. Visibility is very good in spring and summer in the afternoon, but less good in the night and early morning. Autumn and winter have a good deal of inversion-fog, often very dense in the valleys; of the stations in Table 53 Quesnel has most, and the liability to frequent fog, lying as a dense white sheet, in the morning between Prince George and Williams Lake is notorious. But Kleena Kleene has fog almost as frequently.

Table 54

Fog, moderate and dense (visibility ⅝ mile or less); mean, highest, and lowest number of hours. Period of observations in brackets

	Jan.	Feb	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Littoral												
Masset (1945–49)												
Mean	2	7	10	3	5	1	4	54	6	6	7	6
Highest and lowest	4,1	27,0	24,1	9,0	12,0	3,0	12,0	68,40	19,0	21,0	12,0	19,0
Port Hardy (1944–50)												
Mean	8	2	2	1	18	12	31	23	79	15	13	7
Highest and lowest	46,0	8,0	10,0	4,0	42,0	42,0	150,0	43,0	169,0	95,0	34,0	29,0
Comox (1944–50)												
Mean	13	6	1	0	1	0	1	<1	9	17	21	30
Highest and lowest	198,23	33,0	3,0	0,0	3,0	0,0	3,0	2,0	17,0	41,0	53,0	128,0
Vancouver (A) (1942–50)												
Mean	70	42	14	3	2	2	1	11	55	81	82	122
Highest and lowest	134,3	109,14	66,0	10,0	8,0	5,0	4,0	21,4	100,23	181,16	164,2	254,33
South Interior												
Ashcroft (1945-50)												
Mean	3	0	<1	0	0	0	0	0	0	1	5	6
Highest and lowest	17,0	0,0	1,0	0,0	0,0	0,0	0,0	0,0	0,0	4,0	13,0	23,0
Princeton (1943-50)												
Mean	18	20	9	3	1	0	1	1	2	28	43	32
Highest and lowest	50,1	52,2	30,0	7,0	3,0	0,0	4,0	4,0	5,0	78,2	130,11	93,4
Carmi (1943-50)												
Mean	61	56	29	26	14	10	2	8	10	56	111	81
Highest and lowest	131,31	98,14	61,9	59,2	46,0	23,0	12,0	48,0	26,5	106,18	214,34	255,23
Cranbrook (1943-50)												
Mean	6	2	1	1	1	1	1	1	1	31	16	8
Highest and lowest	28,0	7,0	6,0	4,0	3,0	7,0	4,0	4,0	3,0	81,0	45,5	14,0
North Interior												
Quesnel (1946–50)												
Mean	28	16	13	7	9	16	21	53	76	67	68	48
Highest and lowest	66,0	43,1	19,1	24,1	14,5	28,6	45,5	88,25	116,23	91,40	145,14	166,1
Dog Creek (1945–50)												
Mean	8	3	8	3	1	2	2	5	4	11	22	17
Highest and lowest	39,0	9,1	20,1	6,1	2,0	10,0	7,0	29,0	13,0	43,0	55,0	31,10

This Table 54 gives a general idea of the liability to fog at a few representative stations. It exemplifies the usual variability from station to station and at any one station (shown by the wide differences between the highest and lowest frequencies), and a comparsion with the other Tables will show cases of the discrepancies that tend to occur.

On the Littoral late summer, autumn, and winter are the foggy seasons, and poor visibility may then be persistent (on the east of Vancouver Island at any rate).

The South Interior has notably clearer weather. Autumn and winter have the least good records owing to the inversion-fogs in the valleys. Carmi illustrates the much worse visibility on the uplands.

The North Interior is more foggy than the South owing mainly to the frequent inversion-fogs of autumn and winter.

Table 55

Number of hours with obstruction to vision, mean, highest, and lowest records.

Definitions:—

Fog, dense, objects not visible at 660 yards
Fog moderate, objects visible at 660 yards, but not at 1,000 yards
Fog light, objects visible at 1,100 yards but not at 7 miles
Shallow fog, fog lying on ground, of depth not exceeding 6 feet; very light shallow fogs are ignored
Ice-fog, an obscurity in the surface layers due to minute crystals of ice, which cause haloes, pillars of light above strong lights, and glinting (most at an angle of 22° from the source of light)

Littoral	Jan	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Patricia Bay (1944-51)												
Fog, dense												
Mean	3	4	3	0	2	<1	4	4	10	9	11	5
Highest and lowest	14,0	16,0	9,0	0,0	7,0	1,0	2,0	13,0	20,3	24,0	35,0	16,0
Fog, moderate												
Mean	2	1	1	<1	1	1	<1	2	3	4	6	5
Highest and lowest	8,0	4,0	4,0	1,0	5,0	2,0	2,0	11,0	7,0	11,0	20,0	16,0
Fog, light												
Mean	75	61	43	22	13	21	13	24	56	106	88	95
Highest and lowest	119,30	93,36	56,10	45,3	66,0	51,3	25,1	53,1	74,45	198,54	140,27	148,77
Shallow fog												
Mean	2	2	2	2	1	<1	0	2	8	8	2	2
Highest and lowest	7,0	6,0	17,0	4,0	3,0	2,0	0,0	6,0	36,0	28,0	3,0	3,0
Ice-fog												
Mean	0	0	0	0	0	0	0	0	0	0	0	0
Highest and lowest	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Vancouver (A) (1944-51)												
Fog, dense												
Mean	28	13	7	1	0	1	0	4	24	40	41	57
Highest and lowest	75,1	51,1	32,0	5,0	0,0	5,0	0,0	13,0	45,0	119,2	94,0	172,16
Fog, moderate												
Mean	7	5	3	<1	<1	0	0	2	3	5	9	12
Highest and lowest	14,1	9,1	12,0	1,0	1,0	0,0	0,0	6,0	6,0	11,1	21,0	28,2
Fog, light												
Mean	107	83	53	25	15	9	11	26	48	98	111	115
Highest and lowest	167,29	124,19	77,11	75,2	47,0	24,0	23,0	51,13	59,0	168,71	187,66	149,81
Shallow fog												
Mean	30	11	6	4	2	1	2	8	22	36	19	31
Highest and lowest	99,1	36,0	32,0	9,0	7,0	2,0	3,0	14,2	52,0	85,0	41,0	85,0
Ice-fog												
Mean	0	0	0	0	0	0	0	0	0	0	0	0
Highest and lowest	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Abbotsford (1944-51)												
Fog, dense												
Mean	13	2	2	<1	1	1	1	4	8	9	4	4
Highest and lowest	75,0	8,0	11,0	3,0	4,0	3,0	3,0	9,0	16,2	21,0	12,0	12,0
Fog moderate												
Mean	7	2	1	1	<1	0	1	1	2	3	5	5
Highest and lowest	31,0	5,0	5,0	2,0	1,0	0,0	3,0	5,0	3,0	9,0	21,0	13,0
Fog light												
Mean	77	81	49	22	16	16	12	37	51	70	63	80
Highest and lowest	118,38	123,36	111,8	80,3	32,4	30,7	38,0	93,13	84,13	116,33	101,28	148,32
Shallow fog												
Mean	2	2	1	2	1	0	1	2	10	13	3	2
Highest and lowest	11,0	5,0	2,0	3,0	1,0	0,0	1,0	5,0	16,1	34,0	6,0	7,0
Ice-fog												
Mean	0	0	0	0	0	0	0	0	0	0	0	0
Highest and lowest	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0

Table 55—Continued

Number of hours with obstruction to vision, mean, highest, and lowest records.

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
South Interior												
Kamloops (1945-50)	(Observations for 16 hours per day only)											
Fog, dense												
Mean	0	1	0	0	0	0	0	0	0	<1	<1	0
Highest and lowest	0,0	0,8	0,0	0,0	0,0	0,0	0,0	0,0	0,0	1,0	3,0	0,0
Fog moderate												
Mean	<1	1	0	0	0	0	0	0	0	<1	1	0
Highest and lowest	3,0	6,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	1,0	4,0	0,0
Fog light												
Mean	7	3	1	0	0	0	0	0	<1	1	4	9
Highest and lowest	27,0	9,0	4,0	0,0	0,0	0,0	0,0	0,0	2,0	3,0	16,0	28,0
Shallow fog												
Mean	0	1	0	0	0	0	0	0	<1	0	0	0
Highest and lowest	0,0	8,0	0,0	0,0	0,0	0,0	0,0	0,0	1,0	0,0	0,0	0,0
Ice-fog												
Mean	<1	0	0	0	0	0	0	0	0	0	0	0
Highest and lowest	1,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Penticton (1944-51)												
Fog, dense												
Mean	<1	6	1	0	<1	0	0	0	0	<1	6	1
Highest and lowest	2,0	47,0	4,0	0,0	1,0	0,0	0,0	0,0	0,0	1,0	51,0	10,0
Fog moderate												
Mean	1	1	2	0	0	0	0	0	<1	0	3	1
Highest and lowest	6,0	4,0	13,0	0,0	0,0	0,0	0,0	0,0	1,0	0,0	22,0	7,0
Fog light												
Mean	5	9	4	1	1	1	1	<1	<1	5	14	12
Highest and lowest	14,0	25,1	18,0	5,0	8,0	4,0	5,0	1,0	1,0	15,0	67,2	72,0
Shallow fog												
Mean	0	2	2	0	0	0	0	0	0	<1	<1	0
Highest and lowest	0,0	4,0	8,0	0,0	0,0	0,0	0,0	0,0	0,0	1,0	1,0	0,0
Ice-fog												
Mean	<1	0	0	0	0	0	0	0	0	0	0	0
Highest and lowest	1,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Old Glory (1946-51)	Many observations missing, see last line*											
Fog, dense												
Mean	306	286	283	195	126	135	61	67	93	276	328	382
Highest and lowest	411,262	410,120	455,214	361,78	252,66	176,86	118,23	139,31	118,59	486,97	419,219	468,300
Fog moderate												
Mean	1	<1	1	<1	<1	<1	0	0	1	0	1	<1
Highest and lowest	3,0	1,0	2,0	1,0	2,0	2,0	0,0	0,0	3,0	0,0	3,0	1,0
Fog light												
Mean	9	3	3	5	3	4	1	2	3	2		1
Highest and lowest	22,0	12,0	7,0	15,0	12,0	12,0	3,0	3,0	10,0	9,0	13,0	8,0
Shallow fog												
Mean	0	0	0	0	0	0	0	0	0	0	0	1
Highest and lowest	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Ice-fog												
Mean	0	0	0	0	0	0	0	0	0	0	0	0
Highest and lowest	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
* Mean no. of hourly obs.	572	497	607	617	545	522	535	524	505	566	639	608
Kimberley (1944-51)												
Fog, dense												
Mean	7	2	<1	1	<1	<1	1	1	1	3	11	10
Highest and lowest	17,0	8,0	1,0	2,0	1,0	2,0	10,0	2,0	7,0	14,0	49,0	18,0
Fog moderate												
Mean	3	1	1	1	0	1	<1	<1	<1	1	5	
Highest and lowest	13,0	2,0	4,0	2,0	0,0	2,0	1,0	1,0	1,0	5,0	22,0	7,0
Fog light												
Mean	25	18	5	8	4	6	2	3	3	15	24	36
Highest and lowest	76,5	48,0	10,0	27,0	14,0	19,0	10,0	14,0	9,0	34,0	53,1	108,5
Shallow fog												
Mean	1	2	<1	1	<1	<1	<1	1	1	2	2	2
Highest and lowest	2,0	3,0	1,0	6,0	1,0	2,0	1,0	2,0	4,0	10,0	3,0	4,0
Ice-fog												
Mean	0	0	0	0	0	0	0	0	0	0	0	0
Highest and lowest	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0

Table 55—Concluded

Number of hours with obstruction to vision, mean, highest, and lowest records.

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
North Interior												
Prince George (1944-51)												
Fog, dense												
Mean	8	7	2	3	4	2	7	13	23	20	13	9
Highest and lowest	33,0	14,0	7,0	10,0	8,0	6,0	16,0	40,0	74,5	33,4	26,1	27,0
Fog moderate												
Mean	3	2	1	<1	<1	1	3	2	3	4	3	4
Highest and lowest	6,0	8,0	2,0	1,0	1,0	2,0	4,0	6,0	7,0	9,0	8,0	9,0
Fog light												
Mean	15	9	6	3	2	3	11	13	12	15	20	20
Highest and lowest	39,0	21,0	13,0	6,0	11,0	13,0	27,0	41,0	29,4	26,5	54,3	44,2
Shallow fog												
Mean	3	2	2	<1	2	1	2	[illegible]	8	4	5	4
Highest and lowest	6,0	11,0	10,0	3,0	4,0	4,0	7,0	7,1	28,0	13,0	19,0	11,0
Ice-fog												
Mean	13	2	<1	0	0	0	0	0	0	<1	0	2
Highest and lowest	98,0	17,0	1,0	0,0	0,0	0,0	0,0	0,0	0,0	1,0	0,0	9,0
Smithers (1944-5,1947-51)												
Fog, dense												
Mean	7	2	1	<1	1	<1	2	4	14	6	10	4
Highest and lowest	17,0	5,0	8,0	2,0	3,0	1,0	5,0	9,0	27,0	16,0	22,0	17,0
Fog moderate												
Mean	2	1	<1	<1	1	0	<1	1	10	4	9	3
Highest and lowest	8,0	4,0	1,0	1,0	5,0	0,0	2,0	4,0	7,0	4,0	26,0	6,0
Fog light												
Mean	12	12	7	6	6	8	10	5	25	24	29	16
Highest and lowest	25,0	33,2	20,2	19,0	24,0	17,1	27,0	12,0	37,1	48,5	57,6	39,3
Shallow fog												
Mean	2	2	1	1	1	1	2	3	5	3	3	3
Highest and lowest	6,0	3,0	2,0	1,0	3,0	3,0	9,0	7,0	13,1	8,0	7,0	7,0
Ice-fog												
Mean	0	0	0	0	0	0	0	0	0	0	0	<1
Highest and lowest	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	1,0
Kleena Kleene (1945-51)						Many observations missing; see last line*						
Fog, dense												
Mean	1	1	1	1	<1	<1	0	1	4	5	5	3
Highest and lowest	5,0	2,0	4,0	5,0	1,0	1,0	0,0	5,0	6,1	9,1	17,0	10,0
Fog moderate												
Mean	1	1	<1	<1	<1	0	1	0	2	1	1	3
Highest and lowest	7,0	2,0	2,0	2,0	1,0	0,0	4,0	0,0	8,0	2,0	3,0	9,0
Fog light												
Mean	2	1	3	2	4	0	<1	<1	1	1	1	<1
Highest and lowest	11,0	2,0	15,0	15,0	23,0	0,0	1,0	1,0	6,0	5,0	3,0	1,0
Shallow fog												
Mean	0	1	<1	0	0	0	1	<1	2	<1	1	<1
Highest and lowest	0,0	2,0	1,0	0,0	0,0	0,0	2,0	1,0	2,0	1,0	2,0	2,0
Ice-fog												
Mean	0	0	0	0	0	0	0	0	0	0	0	0
Highest and lowest	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
* Mean no. of hourly obs.	367	335	370	349	344	334	363	373	355	319	324	331

The Littoral again shows its liability to fog of all intensities in late summer and autumn (winter also at Vancouver and Abbotsford in Table 55). Ice-fogs are unknown on the Littoral with its mild winters.

In the South Interior fog is much less frequent than on the Littoral and it is usually light. But Old Glory represents the more severe conditions on the uplands with long spells of dense fog in all months (least in late summer).

Ice-fog has been reported, but only very rarely, in January, from a few stations.

The North Interior stands out in this Table as in the preceding ones for its liability to valley-fogs, often dense, in autumn and winter. Ice-fog is frequent at Prince George in winter, a sign of the very cold weather of these higher latitudes.

7.3 Obstruction to Visibility: Blowing Snow

Table 56

Blowing or drifting snow, mean number of hours

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Littoral												
Masset (1944-50)	1	1	0	0	0	0	0	0	0	0	0	0
Port Hardy (1944-50)	11	5	0	0	0	0	0	0	0	0	0	1
Comox (1944-50)	0	0	0	0	0	0	0	0	0	0	0	0
Patricia Bay (1942-50)	12	1	0	0	0	0	0	0	0	0	0	<1
Vancouver (A) (1942-50)	7	0	0	0	0	0	0	0	0	0	0	0
Abbotsford (1945-50)	12	0	0	0	0	0	0	0	0	0	0	0
South Interior												
Ashcroft (1944-50)	4	1	0	0	0	0	0	0	0	0	0	0
Kamloops (1945-50) (Obs. in 16, day, hours only)	9	<1	0	0	0	0	0	0	0	0	0	0
Princeton (1942-50)	1	0	0	0	0	0	0	0	0	0	0	0
Penticton (1942-50)	8	4	0	0	0	0	0	0	0	0	0	1
Carmi (1943-50)	1	1	0	<1	0	0	0	0	0	0	<1	1
Crescent Valley (1943-50)	1	1	<1	0	0	0	0	0	0	0	0	0
Old Glory * (1945-50)	42	52	59	54	14	4	0	0	4	16	40	26
Cranbrook (1943-50)	1	<1	0	0	0	0	0	0	0	0	0	0
North Interior												
Prince George (1943-50)	7	11	<1	0	0	0	0	0	0	0	4	5
Smithers (1942-50)	3	5	2	0	0	0	0	0	0	0	0	1
Quesnel (1946-50)	8	10	0	0	0	0	0	0	0	0	1	3
Dog Creek (1945-50)	7	13	3	0	0	0	0	0	0	0	1	3
* Broken; mean no. of hours of observations	572	497	607	617	545	522	535	524	505	506	639	608

Blowing snow is not unknown even on the Littoral, but it is not frequent enough to be a serious element in the south of British Columbia. It is more frequent in the cold North Interior, as is shown by all the stations of that Region in the Table, without being frequent or thick enough to be of great practical importance.

7.4 Obstruction to Visibility: Smoke

The importance of smoke is mainly as an indication of the destructive forest-fires from which nearly all of it is derived. But the great expanse over which it spreads (smoke from the forests of the Coast Mountains often reaches Central Canada and sometimes the south-western States), and its persistence, make it a very real climatic factor in causing bad visibility for the navigator in the air and on the sea. When long continued the haze, accompanied in bad cases by the smell, are adverse to aesthetic attractions of landscape, as was the case in the lower Fraser valley and far into the Interior in the months May to September 1951.

Forest-fires are most frequent in the hot dry summers of the Littoral. The records are highest in August and September.

Industrial atmospheric pollution is now a serious factor at Vancouver, and it has been increasing for many years. The haze, or fog, due to the volumes of smoke from industrial works, is intensified in the humid air of the locality.

After any night with calm air or light wind dawn shows a dense pall of smoke, densest over the many miles of the city itself,but often streaming away in the light breeze down Burrard Inlet to the Strait of Georgia and at times across to Vancouver Island. An increase in the wind, the setting in of the sea-breeze (which may carry the smoke far inland), or the approach of a storm with less stable air, clears the atmosphere, but haze frequently persists even in the afternoon. The smoke-pall is favoured by the atmospheric conditions both in summer with its calm, clear nights, and in winter with its high humidity. The mean annual number of days with fog is 29, most of them in autumn and winter, and the fog usually consists at any rate in large part of smoke. And smoke, thick enough to be unpleasant, is present on many nights and days when it is not so dense as to be recorded as fog.

Table 57

Smoke; number of hours, mean, highest, and lowest, in which atmospheric obscurity due to smoke was recorded. Period of records in brackets

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Littoral												
Patricia Bay (1944-51)												
Mean	12	10	14	3	4	1	5	20	76	103	17	4
Highest	32	46	43	11	26	7	31	128	162	241	48	9
Lowest	0	0	0	0	0	0	0	0	0	17	1	0
Abbotsford (1944-51)												
Mean	<1	2	5	14	3	2	4	49	83	42	4	4
Highest	1	8	28	92	13	9	30	156	184	198	12	25
Lowest	0	0	0	0	0	0	0	0	3	0	0	0
Vancouver (1944-51)												
Mean	244	235	182	123	66	31	36	84	152	220	231	225
Highest	339	373	283	232	125	43	49	150	256	301	342	347
Lowest	157	172	67	95	25	16	22	35	0	118	154	130
South Interior												
Kamloops (1945-51) (Obs. for 16 hours per day only)												
Mean	1	1	<1	0	0	0	0	<1	<1	0	0	<1
Highest	6	4	2	0	0	0	0	2	2	0	0	1
Lowest	0	0	0	0	0	0	0	0	0	0	0	0
Penticton (1944-51)												
Mean	0	<1	<1	1	<1	9	5	1	4	1	1	0
Highest	0	1	1	6	1	69	42	8	31	7	6	0
Lowest	0	0	0	0	0	0	0	0	0	0	0	0
Old Glory (1946-51) (Many observations missing, see line below)												
Mean	0	0	0	0	3	0	0	18	15	10	0	0
Highest	0	0	0	0	9	0	0	99	80	59	0	0
Lowest	0	0	0	0	0	0	0	0	0	0	0	0
(Mean number of hourly observations)	572	497	607	617	545	522	535	524	505	566	639	608)
Kimberly (1944-51)												
Mean	0	0	<1	0	2	0	0	3	2	1	<1	0
Highest	0	0	1	0	13	0	0	27	13	5	2	0
Lowest	0	0	0	0	0	0	0	0	0	0	0	0
North Interior												
Prince George (1944-51)												
Mean	1	<1	0	<1	4	3	2	24	9	2	0	<1
Highest	2	2	0	1	30	19	15	136	36	10	0	1
Lowest	0	0	0	0	0	0	0	0	0	0	0	0
Smithers (1944-51)												
Mean	0	0	0	0	1	0	5	4	0	0	0	0
Highest	0	0	0	0	6	0	32	26	0	0	0	0
Lowest	0	0	0	0	0	0	0	0	0	0	0	0

7.5 Visibility and Cloud Ceiling

Mean data for ceilings are given in Table 58, and for visibilities and simultaneous ceilings in Table 59.

Table 58

Mean number of hours with ceiling 500 feet or less

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Littoral												
Prince Rupert (1942-5 broken)	4	18	25	7	26	48	68	85	56	24	16	34
Masset (1945-9)	23	24	19	4	29	11	14	8	25	24	7	14
Port Hardy (1944-50)	36	23	18	5	35	25	38	48	103	38	42	31
Comox (1944-50)	50	36	9	4	4	2	4	3	12	33	47	69
Patricia Bay (1942-50)	53	20	10	4	6	4	2	7	22	27	37	43
Vancouver (A) (1942-50)	63	29	8	4	4	7	2	10	33	54	60	79
Abbotsford (1944-50)	37	15	6	4	2	2	3	11	9	14	16	24
South Interior												
Ashcroft (1945-50)	9	7	2	1	0	<1	0	0	0	3	19	6
Kamloops (Obs. at 16, day, hours only) (1945-50)	2	2	0	0	0	0	0	0	0	1	5	4
Princeton (1942-50)	35	27	12	4	3	1	<1	1	3	30	51	54
Penticton (1942-50)	5	11	5	<1	<1	0	0	0	0	2	18	10
Carmi (1943-50)	94	73	45	37	18	12	3	8	11	68	153	151
Crescent Valley (1943-50)	28	35	17	9	2	3	6	5	5	44	61	43
Old Glory (1945-50)	381	385	363	289	236	258	115	119	162	353	412	438
(Broken, total mean number of hours observed:	572	497	607	617	545	522	535	524	505	566	639	608)
Cranbrook (1943-50)	12	7	1	2	1	1	0	1	1	2	31	19
North Interior												
Prince George (1942-50)	22	29	9	6	5	3	10	18	22	41	40	40
Smithers (broken, 1942-50)	19	8	10	2	3	1	3	3	10	20	35	28
Quesnel (1946-50)	25	14	13	9	11	16	25	64	69	71	80	51
Dog Creek (1944-50)	18	8	6	7	<1	4	3	3	5	12	24	26

Table 59

Mean monthly number of hours with specified ceilings and associated visibilities

Visibility	Ceiling (feet)	Jan.	Apr.	July	Oct.	Jan.	Apr.	July	Oct.
		Patricia Bay				Comox			
0 to ¾ mile	0-200	6	0	1	11	14	0	*	9
	300-500	2	0	0	4	11	0	2	4
	600-1,000	7	0	1	2	7	*	*	3
1 to 2½ miles	0-200	1	0	*	5	1	0	0	4
	300-500	6	*	1	12	6	0	1	10
	600-1,000	10	3	2	13	10	2	1	8
0 to 2½ miles	1,100-2,000	2	2	1	6	5	*	0	6
	over 10,000	4	1	*	34	*	*	0	22
		Vancouver Airport				Abbotsford			
0 to ¾ mile	0-200	29	*	0	29	16	*	1	7
	300-500	6	1	*	5	6	*	1	1
	600-1,000	5	*	0	2	3	0	*	2
1 to 2½ miles	0-200	*	0	*	1	1	0	0	1
	300-500	10	0	1	7	4	*	0	1
	600-1,000	19	3	2	6	11	1	2	7
0 to 2½ miles	1,100-2,000	25	5	3	16	10	1	1	6
	over 10,000	62	19	6	75	9	4	2	33
		Penticton				Prince George			
0 to ¾ mile	0-200	1	0	0	0	9	2	7	23
	300-500	1	*	0	0	5	0	1	4
	600-1,000	3	0	0	0	10	1	*	3
1 to 2½ miles	0-200	*	0	0	0	1	*	*	2
	300-500	1	0	0	0	2	4	*	3
	600-1,000	5	*	0	1	16	3	1	3
0 to 2½ miles	1,000-2,000	6	*	0	0	23	2	1	4
	over 10,000	*	0	0	0	17	*	2	10

*Indicates a mean occurrence equal to or less than ½, but greater than 0.

APPENDIX I

Climatological Tables for Meteorological Stations in Southern British Columbia

Climatological Table for ABBOTSFORD (A). Lat. 49° 1'N. Long. 122° 22'W. Altitude above MSL 198 ft.

Month	Pressure	Air Temperature at Station Level							Relative Humidity	Precipitation			Number of days of						Percentage of Time with		Cloud amount, tenths of sky covered					Wind Directions — Percentage frequencies means of 4 hourly observations daily								
			Mean of daily		Mean of monthly		Absolute extremes																											
	Mean at M.S.L.	Daily Mean	Max.	Min.	Max.	Min.	Highest recorded	Lowest recorded	1630 L.S.T.	Mean Total, all forms	Max. fall in 24 hours	Mean Snowfall (in. of snow)	Rain, ≥ ·01 in.	Snow, depth ≥ ·1 in.	Frost (in screen)	Fog (vis. ≤ 1 km.)	Gale ≥ 39 m.p.h.	Thunder	Clear sky (≤ 2/10 covered)	Overcast sky (≥ 8/10 covered)	Mean for four synoptic hours	0430 L.S.T.	1030 L.S.T.	1630 L.S.T.	2230 L.S.T.	N	NE	E	SE	S	SW	W	NW	Calm
	mb.	°F	°F	°F	°F	°F	°F	°F	%	in.	in.	in.																						
Jan.	1020	32	38	26			55	−6	83	6·0	2·7	8	13	6	20	0	<1	0	25	67	7·0	6·6	7·4	7·7	6·4	20	19	7	3	13	6	3	3	26
Feb.	1016	38	45	31			63	−2	75	8·5	2·8	7	16	4	14	1	<1	0	18	75	7·8	7·8	8·2	8·0	7·2	23	16	6	6	13	7	3	3	23
Mar.	1015	43	50	35			73	11	67	6·9	2·0	<1	19	1	13	1	0	<1	23	67	7·3	7·2	7·8	8·0	6·2	13	19	6	3	19	10	3	1	26
Apr.	1018	47	56	38			79	25	64	4·5	2·4	<1	18	1	5	1	0	1	16	72	7·8	7·2	8·6	8·5	6·9	9	13	3	3	19	19	6	3	25
May.	1016	54	65	43			89	29	59	2·6	1·1	0	11	0	1	1	0	1	33	55	6·1	6·0	7·1	6·5	4·7	9	6	3	3	16	22	6	3	32
Jun.	1017	59	70	48			92	36	58	2·3	1·8	0	12	0	0	1	0	1	21	62	7·0	7·2	7·5	6·7	6·6	6	3	<1	3	19	26	6	3	33
Jul.	1017	62	74	50			96	36	56	1·7	1·1	0	8	0	0	1	0	2	39	45	5·3	5·5	6·2	5·4	4·2	3	3	<1	<1	16	29	7	3	39
Aug.	1017	62	74	50			97	38	56	1·8	1·5	0	9	0	0	3	0	1	41	47	5·3	5·5	6·4	5·3	4·0	6	3	<1	<1	16	22	9	6	37
Sep.	1017	58	70	46			92	31	62	2·6	1·6	0	9	0	<1	5	0	1	42	44	5·1	4·5	5·9	5·6	4·2	10	10	<1	3	10	16	7	3	40
Oct.	1017	49	58	40			77	24	43	7·5	3·3	0	15	0	4	7	0	0	28	62	6·7	6·2	7·3	7·5	6·0	13	14	3	3	14	10	3	3	37
Nov.	1017	41	48	35			69	16	81	7·6	2·3	3	19	2	10	20	<1	0	16	75	7·8	7·4	8·3	8·3	7·4	12	21	6	3	15	12	3	<1	27
Dec.	1017	37	43	31			59	7	84	8·4	2·9	5	19	4	20	2	<1	<1	19	72	7·6	7·2	8·2	8·0	7·0	14	27	7	3	17	7	2	3	30
Mean.	1017	48	58	39					68										27	62	6·7	6·5	7·4	7·1	5·9	11	13	4	3	16	15	5·	3	30
Extreme or total.							97	−6		60·4	3·3	23	168	18	87	43	<0	7																
Number of years' observations	5	7	7	7			7	7	6	7	8	7	7	7	8	8	8	8	8	8	←		8		→	←				7				→

Climatological Table for BARKERVILLE. Lat. 53° 2′N. Long. 121° 35′W. Altitude above MSL 4,180 ft.

Month	Pressure: Mean at M.S.L.	Air Temperature at Station Level: Daily Mean	Mean of daily: Max.	Mean of daily: Min.	Mean of monthly: Max.	Mean of monthly: Min.	Absolute extremes: Highest recorded	Absolute extremes: Lowest recorded	Relative Humidity: 1630 L.S.T.	Precipitation: Mean Total, all forms	Max. fall in 24 hours	Mean Snowfall (in. of snow)	Number of days of: Rain, ≥ ·01 in.	Snow, depth ≥ ·1 in.	Frost (in screen)	Fog (vis. ≤ 1 km.)	Gale ≥ 39 m.p.h.	Thunder	Percentage of Time with: Clear sky (≤ 2/10 covered)	Overcast sky (≥ 8/10 covered)	Cloud amount, tenths of sky covered: Mean for four synoptic hours				Wind Directions (Percentage frequencies means of 24 hourly observations daily): N	NE	E	SE	S	SW	W	NW	Calm
	mb.	°F	°F	°F	°F	°F	°F	°F	%	in.	in.	in.																					
Jan.......	1014	16	23	9	34	−16	49	−52		3·8	1·5	32		16							6												
Feb.......	1015	19	28	10	37	−14	55	−46		3·0	2·0	26		13							6												
Mar.......	1013	26	35	16	43	−4	63	−32		3·2	1·9	27		16							6												
Apr.......	1013	34	45	24	53	8	82	−15		2·4	0·9	16		9							6												
May......	1012	44	56	32	61	19	88	6		2·6	0·8	5		1							6												
Jun.......	1013	50	62	38	67	26	87	20		4·0	2·3	1		0							7												
Jul........	1015	54	67	42	70	28	96	25		3·6	1·1	0		0							6												
Aug.......	1013	53	66	41	68	28	93	18		3·4	1·6	<1		0							6												
Sep.......	1014	45	56	34	62	20	87	8		3·5	1·1	2		1							6												
Oct.......	1013	37	46	28	53	11	80	−8		3·3	1·0	12		6							6												
Nov......	1010	25	33	18	41	−2	66	−27		3·8	2·0	28		16							7												
Dec.......	1013	19	26	12	34	−11	58	−32		3·7	1·2	33		16							7												
Mean.....	1013	35	45	25	52	12															6												
Extreme or total.							96	−52		40·2	2·3	182		94																			
Number of years' observations	30	59	51	51	55	55	61	61		59	18	58		11							16												

Climatological Table for BELLA COOLA. Lat. 52° 20′N. Long. 126° 52′W. Altitude above MSL 10 ft.

Month	Pressure: Mean at M.S.L.	Air Temperature at Station Level: Daily Mean	Mean of daily: Max.	Mean of daily: Min.	Mean of monthly: Max.	Mean of monthly: Min.	Absolute extremes: Highest recorded	Absolute extremes: Lowest recorded	Relative Humidity: 1630 L.S.T.	Precipitation: Mean Total, all forms	Precipitation: Max. fall in 24 hours	Precipitation: Mean Snowfall (in. of snow)	Number of days of: Rain, ≥ ·01 in.	Number of days of: Snow, depth ≥ ·1 in.	Number of days of: Frost (in screen)	Number of days of: Fog (vis. ≤ 1 km.)	Number of days of: Gale ≥ 39 m.p.h.	Number of days of: Thunder	Percentage of Time with: Clear sky (≤ 2/10 covered)	Percentage of Time with: Overcast sky (≥ 8/10 covered)	Cloud amount, tenths of sky covered: Mean for four synoptic hours				Wind Directions, Percentage frequencies means of 24 hourly observations daily: N	NE	E	SE	S	SW	W	NW	Calm
	mb.	°F	°F	°F	°F	°F	°F	°F	%	in.	in.	in.																					
Jan.		27	32	23			55	−20		6·0	3·5	17	10	6																			
Feb.		33	37	24			62	−11		4·2	3·4	12	9	5																			
Mar.		38	46	29			75	1		4·6	3·2	6	12	2																			
Apr.		45	55	35			85	15		2·7	1·7	1	13	<1																			
May		52	62	41			92	24		2·1	1·0	0	9	0																			
Jun.		56	68	46			97	30		2·0	1·6	0	11	0																			
Jul.		60	72	50			99	34		2·0	1·3	0	12	0																			
Aug.		60	72	49			100	30		2·5	1·9	0	11	0																			
Sep.		54	65	44			92	24		4·2	3·3	0	11	0																			
Oct.		46	53	39			77	15		7·9	3·2	1	18	0																			
Nov.		37	42	32			62	1		8·7	4·6	5	15	3																			
Dec.		31	35	27			60	−12		7·6	3·7	15	11	7																			
Mean		45	53	37																													
Extreme or total.							100	−20		54·5	4·6	57	142	23																			
Number of years' observations		52	52	52			55	55		52	20	41	10	10																			

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Climatological Table for BULL HARBOUR. Lat. 50° 55′N. Long. 127° 57′W. Altitude above MSL 15 ft.

Month	Pressure: Mean at M.S.L.	Air Temperature at Station Level: Daily Mean	Mean of daily: Max.	Mean of daily: Min.	Mean of monthly: Max.	Mean of monthly: Min.	Absolute extremes: Highest recorded	Absolute extremes: Lowest recorded	Relative Humidity: 1630 L.S.T.	Precipitation: Mean Total, all forms	Max. fall in 24 hours	Mean Snowfall (in. of snow)	Number of days of: Rain, ≥ ·01 in.	Snow, depth ≥ ·1 in.	Frost (in screen)	Fog (vis. ≤ 1 km.)	Gale ≥ 39 m.p.h.	Thunder
	mb.	°F	°F	°F	°F	°F	°F	°F	%	in.	in.	in.						
Jan.	1016	38	43	34			61	9	87	7·7	6·3	3	21	3		<1		<1
Feb.	1013	40	45	35			68	14	84	5·7	6·2	2	18	2		1		0
Mar.	1014	42	49	37			72	16	78	5·9	1·8	1	19	<1		1		0
Apr.	1015	46	52	39			71	26	79	4·3	1·6	<1	18	0		<1		0
May	1017	50	57	44			78	28	81	3·1	1·8	0	14	0		3		0
Jun.	1018	54	60	47			100	38	84	2·0	1·3	0	12	0		3		<1
Jul.	1019	56	62	50			78	40	84	2·5	1·4	0	14	0		4		<1
Aug.	1018	57	63	50			86	41	83	2·8	1·8	0	12	0		5		<1
Sep.	1016	54	60	47			84	32	86	4·3	1·6	0	14	0		8		<1
Oct.	1014	49	56	43			77	21	86	8·8	3·2	<1	22	0		3		<1
Nov.	1012	44	49	39			68	25	89	9·7	2·8	1	24	<1		1		<1
Dec.	1013	40	45	36			58	10	88	10·4	3·9	5	23	1		<1		<1
Mean	1015	47	53	42					84									
Extreme or total							100	9		67·1	6·3	12	211	6		29		<1
Number of years' observations	10	30	30	30			29	29	10	29	11	17	12	12		10		10

Month	Percentage of Time with: Clear sky (≤ ²⁄₁₀ covered)	Overcast sky (≥ ⁸⁄₁₀ covered)	Cloud amount, tenths of sky covered: Mean for four synoptic hours	0430 L.S.T.	1030 L.S.T.	1630 L.S.T.	2230 L.S.T.	Wind Directions (Percentage frequencies means of 4 hourly observations daily): N	NE	E	SE	S	SW	W	NW	Calm
Jan.	15	70	7·7	7·3	7·9	8·1	7·3	2	1	11	50	4	2	2	13	15
Feb.	21	66	6·9	6·8	7·0	7·6	6·3									
Mar.	21	65	7·1	6·7	7·7	7·6	6·2									
Apr.	17	66	7·4	7·3	7·9	8·0	6·2	2	1	4	35	7	2	13	17	19
May	19	64	7·1	7·2	7·8	7·2	6·3									
Jun.	12	71	7·8	8·2	8·4	7·6	7·1									
Jul.	17	69	7·6	7·9	7·9	7·5	6·9	1	<1	1	13	3	5	34	21	22
Aug.	21	67	7·3	7·4	8·2	7·5	6·2									
Sep.	22	65	7·3	7·9	7·9	7·1	6·3									
Oct.	21	64	7·2	6·2	7·9	7·9	6·7	2	1	6	41	8	4	8	11	19
Nov.	12	73	8·0	7·5	8·3	8·5	7·6									
Dec.	18	68	7·5	6·9	7·9	8·0	7·0									
Mean	18	67	7·4	7·3	7·9	7·7	6·7	2	1	5	35	6	3	14	15	19
Extreme or total																
Number of years' observations	10	10	←		10		→	←				10				→

Climatological Table for CARMI. Lat. 49° 30′N. Long. 119° 5′W. Altitude above MSL 4,084 ft.

Month	Pressure	Air Temperature at Station Level							Relative Humidity	Precipitation			Number of days of						Percentage of Time with		Cloud amount, tenths of sky covered					Wind Directions — Percentage frequencies means of 24 hourly observations daily								
	Mean at M.S.L.	Daily Mean	Mean of daily Max.	Mean of daily Min.	Mean of monthly Max.	Mean of monthly Min.	Absolute extremes Highest recorded	Absolute extremes Lowest recorded	1630 L.S.T.	Mean Total, all forms	Max. fall in 24 hours	Mean Snowfall (in. of snow)	Rain, ≥ ·01 in.	Snow, depth ≥ ·1 in.	Frost (in screen)	Fog (vis. ≤ 1 km.)	Gale ≥ 39 m.p.h.	Thunder	Clear sky (≤ 2/10 covered)	Overcast sky (≥ 8/10 covered)	Mean for four synoptic hours	0430 L.S.T.	1930 L.S.T.	1630 L.S.T.	2230 L.S.T.	N	NE	E	SE	S	SW	W	NW	Calm
	mb.	°F	°F	°F	°F	°F	°F	°F	%	in.	in.	in.																						
Jan.	1024	16	23	10	39	−10	48	−31	93	1·8	1·2	18	<1	16	31	9	0	0	21	67	7·2	6·8	7·7	7·6	6·6	11	6	8	13	32	5	4	7	12
Feb.	1019	23	31	15	43	−5	49	−22	80	1·9	0·6	19	1	14	28	6	0	0	23	67	7·1	6·5	7·8	7·7	6·3	15	5	5	15	35	5	5	10	5
Mar.	1018	30	39	21	53	1	61	−8	70	1·2	1·0	10	2	8	30	6	0	<1	28	59	6·4	5·5	7·1	7·7	5·4	13	6	4	18	22	9	8	11	9
Apr.	1017	40	50	29	68	19	76	10	57	1·4	1·1	7	5	5	23	4	0	<1	24	60	6·7	6·1	7·8	8·0	5·1	13	9	6	14	15	13	11	11	8
May	1017	48	59	37	77	27	82	24	53	1·9	0·9	2	10	2	9	3	0	2	27	54	6·3	5·9	7·3	7·6	4·7	14	13	6	13	12	12	10	14	6
Jun.	1017	53	64	42	81	33	85	28	57	2·4	1·2	<1	13	<1	1	3	0	4	21	61	6·9	6·5	7·8	7·9	5·4	18	16	8	10	9	10	10	13	6
Jul.	1019	60	73	47	88	38	95	34	47	1·6	1·4	0	7		0	1	0	5	42	35	4·7	4·1	5·2	6·3	3·1	19	17	6	9	8	12	9	15	5
Aug.	1018	59	72	46	86	37	90	31	49	1·3	1·6	0	7		<1	1	0	4	44	34	4·4	3·6	5·0	6·3	2·8	17	19	5	9	7	12	8	18	5
Sep.	1019	52	64	40	80	29	87	25	54	1·3	0·8	<1	8	<1	3	2	<1	1	45	40	4·7	3·7	5·5	5·9	3·9	17	14	3	14	14	9	7	15	7
Oct.	1020	41	49	33	66	12	79	14	65	1·9	2·2	8	9	4	17	8	0	<1	32	57	6·1	5·5	7·0	6·9	5·1	12	10	4	23	21	7	5	12	6
Nov.	1021	28	34	23	47	7	64	−5	88	2·1	1·1	18	3	12	28	12	<1	0	19	71	7·6	7·0	8·2	8·2	7·0	10	5	5	24	28	5	4	8	11
Dec.	1020	22	27	16	39	1	46	−20	96	2·3	0·7	21	1	16	31	11	0	0	20	71	7·5	7·4	8·0	7·7	7·0	11	5	7	16	30	5	4	8	14
Mean	1019	39	49	30	63	16			67										29	56	6·3	5·7	7·0	7·3	5·2	14	10	6	15	19	9	10	12	8
Extreme or total							95	−31		21·1	2·2	103	66	77	201	66	<1	16																
Number of years' observations	10	12	12	12	12	12	12	12	9	12	10	12	12	12	10	10	10	10	10	10	←		10		→	←				10				→

Climatological Table for COMOX. Lat. 49° 43′N. Long. 124° 54′W. Altitude above MSL 75 ft.

Month	Pressure	Air Temperature at Station Level							Relative Humidity	Precipitation			Number of days of						Percentage of Time with		Cloud amount, tenths of sky covered					Wind Directions — Percentage frequencies means of 24 hourly observations daily								
			Mean of daily		Mean of monthly		Absolute extremes																											
	Mean at M.S.L.	Daily Mean	Max.	Min.	Max.	Min.	Highest recorded	Lowest recorded	1630 L.S.T.	Mean Total, all forms	Max. fall in 24 hours	Mean Snowfall (in. of snow)	Rain, ≥ ·01 in.	Snow, depth ≥ ·1 in.	Frost (in screen)	Fog (vis. ≤ 1 km.)	Gale ≥ 39 m.p.h.	Thunder	Clear sky (≤ 2/10 covered)	Overcast sky (≥ 8/10 covered)	Mean for four synoptic hours	0430 L.S.T.	1030 L.S.T.	1630 L.S.T.	2230 L.S.T.	N	NE	E	SE	S	SW	W	NW	Calm
	mb.	°F	°F	°F	°F	°F	°F	°F	%	in.	in.	in.																						
Jan.	1021	33	39	28			54	−6	82	6·0	1·9	21	12	5	22	2	<1	0	21	69	7·4	7·2	8·1	7·9	6·5	2	1	1	21	7	9	17	30	12
Feb.	1015	38	44	31			57	3	79	5·2	1·7	10	13	4	17	2	<1	<1	20	71	7·6	7·1	8·1	7·9	7·2	5	2	2	32	8	9	12	22	8
Mar.	1014	41	48	34			64	7	69	4·2	2·2	1	16	1	16	1	<1	<1	23	64	7·1	6·5	7·8	7·7	6·3	7	4	3	30	8	7	12	24	5
Apr.	1017	45	53	37			69	24	65	2·6	1·6	1	12	<1	7	<1	0	<1	20	63	7·2	6·7	7·8	8·0	6·2	7	6	4	28	9	7	9	24	6
May	1015	54	64	44			88	28	58	1·3	0·5	0	8	0	1	1	0	1	36	48	5·6	5·5	6·2	6·0	4·7	10	7	5	23	6	4	6	34	5
Jun.	1017	59	68	50			86	38	59	1·7	1·2	0	9	0	<1	<1	0	0	25	59	6·7	6·9	6·9	6·8	6·1	10	6	4	20	5	4	5	41	5
Jul.	1017	62	72	52			90	43	56	1·3	1·3	0	7	0	0	<1	<1	1	37	47	5·4	5·6	5·7	5·7	4·7	12	6	5	18	5	3	6	40	5
Aug.	1016	62	71	52			86	40	59	1·2	1·1	0	8	0	0	<1	0	<1	38	45	5·3	5·3	5·7	5·7	4·5	14	6	4	16	4	2	7	41	6
Sep.	1016	56	66	47			87	31	63	1·7	0·8	0	8	0	<1	2	0	1	45	44	4·8	4·0	5·8	5·5	3·9	12	6	4	19	6	3	8	33	9
Oct.	1016	48	55	40			71	26	84	4·9	1·6	0	16	0	5	3	<1	<1	27	62	6·7	6·1	7·3	7·4	6·1	7	3	3	25	11	4	11	25	11
Nov.	1016	42	47	36			64	23	85	7·2	2·6	3	19	1	9	2	1	0	14	76	8·1	7·9	8·4	8·5	7·5	4	1	1	30	11	8	15	17	13
Dec.	1016	37	43	32			57	12	91	7·1	2·5	11	18	4	17	2	<1	0	14	76	8·1	7·7	8·6	8·4	7·5	2	1	1	22	10	10	18	22	14
Mean	1016	48	56	40					71										27	60	6·7	6·8	7·2	7·1	5·9	8	4	3	24	8	6	10	29	8
Extreme or total							90	−6		44·4	2·6	46	146	15	94	15	<1	3																
Number of years' observations	6	7	7	7			8	8	7	7	8	7	7	7	8	8	8	8	8	8	←		8		→	←				8				→

Climatological Table for COPPER MOUNTAIN. Lat. 49° 18′N. Long. 120° 34′W. Altitude above MSL 3,946 ft.

Month	Pressure	Air Temperature at Station Level							Relative Humidity	Precipitation			Number of days of						Percentage of Time with		Cloud amount, tenths of sky covered					Wind Directions — Percentage frequencies means of 24 hourly observations daily								
			Mean of daily		Mean of monthly		Absolute extremes																											
	Mean at M.S.L.	Daily Mean	Max.	Min.	Max.	Min.	Highest recorded	Lowest recorded	1630 L.S.T.	Mean Total, all forms	Max. fall in 24 hours	Mean Snowfall (in. of snow)	Rain, ≥ ·01 in.	Snow, depth ≥ ·1 in.	Frost (in screen)	Fog (vis. ≤ 1 km.)	Gale ≥ 39 m.p.h.	Thunder	Clear sky (≤ ²⁄₁₀ covered)	Overcast sky (≥ ⁸⁄₁₀ covered)	Mean for four synoptic hours	0430 L.S.T.	1030 L.S.T.	1630 L.S.T.	2230 L.S.T.	N	NE	E	SE	S	SW	W	NW	Calm
	mb.	°F	°F	°F	°F	°F	°F	°F	%	in.	in.	in.																						
Jan.	1022	21	28	14	43	10	47	−29	84	1·5	1·5	13	1	11	31	7	0	0	23	63	6·8	6·5	7·8	7·5	6·0									
Feb.	1019	26	34	17	46	3	54	−15	76	1·6	0·8	14	1	12	28	4	0	0	22	59	6·7	6·4	7·5	7·1	5·8									
Mar.	1017	32	42	22	57	7	66	− 3	63	1·2	1·0	10	2	9	30	1	<1	0	28	47	5·8	4·6	6·8	7·1	4·9									
Apr.	1017	40	51	29	71	21	83	13	52	1·2	0·6	6	5	7	24	<1	0	0	25	53	6·3	5·7	6·8	7·3	5·5									
May	1018	47	59	35	79	27	84	23	49	1·5	0·6	2	11	2	12	2	0	1	26	54	6·2	6·1	6·7	6·9	5·2									
Jun.	1018	52	64	40	86	33	100	28	51	2·2	0·8	<1	12	<1	2	2	0	<1	20	26	6·6	6·6	6·9	7·3	5·8									
Jul.	1019	60	75	46	90	37	97	34	42	1·1	0·6	0	6	0	0	<1	0	2	45	34	4·4	3·9	4·8	5·2	3·7									
Aug.	1018	60	74	45	88	36	94	33	43	0·9	1·1	<1	6	<1	0	1	0	1	45	31	4·4	3·7	5·0	5·5	3·4									
Sep.	1019	52	65	40	81	30	87	26	48	0·9	0·6	<1	8	<1	3	1	0	1	40	40	4·8	4·2	5·7	5·6	3·9									
Oct.	1020	43	52	34	71	21	81	10	60	1·7	2·1	6	8	3	15	2	<1	0	35	46	5·5	4·6	6·5	6·3	4·6									
Nov.	1019	29	36	22	49	8	56	− 8	84	1·9	0·7	13	3	7	30	9	0	0	21	64	7·1	6·5	7·6	7·6	6·7									
Dec.	1019	24	30	17	47	−9	54	−16	86	2·0	1·8	17	3	9	31	4	0	0	26	56	6·4	5·8	7·2	6·8	5·7									
Mean	1019	40	51	30	66	19			61										30	48	5·9	5·4	6·6	6·7	5·1									
Extreme or total							100	−29		17·7	2·1	81	66	60	206	33	<1	5																
Number of years' observations	6	9	9	9	9	9	9	9	6	9	9	9	9	9	6	6	6	6	6	6	←	—	6	—	→									

Climatological Table for CRANBROOK (town till 1941, then airport). Lat. 49° 32′N.* Long. 115° 46′W.* Altitude above MSL 3,013 ft.*

Month	Pressure: Mean at M.S.L.	Air Temperature at Station Level: Daily Mean	Mean of daily: Max.	Mean of daily: Min.	Mean of monthly: Max.	Mean of monthly: Min.	Absolute extremes: Highest recorded	Absolute extremes: Lowest recorded	Relative Humidity: 1630 L.S.T.	Precipitation: Mean Total, all forms	Precipitation: Max. fall in 24 hours	Precipitation: Mean Snowfall (in. of snow)	Number of days of: Rain, ≥ ·01 in.	Number of days of: Snow, depth ≥ ·1 in.	Number of days of: Frost (in screen)	Number of days of: Fog (vis. ≤ 1 km.)	Number of days of: Gale ≥ 39 m.p.h.	Number of days of: Thunder	Percentage of Time with: Clear sky (≤ ²⁄₁₀ covered)	Percentage of Time with: Overcast sky (≥ ⁸⁄₁₀ covered)	Cloud amount, tenths of sky covered: Mean for four synoptic hours	Cloud amount: 0430 L.S.T.	Cloud amount: 1030 L.S.T.	Cloud amount: 1630 L.S.T.	Cloud amount: 2230 L.S.T.	Wind Directions (Percentage frequencies means of 24 hourly observations daily): N	NE	E	SE	S	SW	W	NW	Calm
	mb.	°F	°F	°F	°F	°F	°F	°F	%	in.	in.	in.																						
Jan.	1025	15	24	5			50	−41	88	1·4	0·6	12	1	9	25	6	0	0	26	62	6·8	6·3	7·4	7·1	6·4	21	5	2	4	20	26	3	14	5
Feb.	1020	22	32	11			52	−35	76	1·4	1·5	12	2	9	27	2	0	0	30	56	6·2	5·5	6·8	7·0	5·7	19	4	3	6	23	23	4	14	4
Mar.	1017	33	44	22			69	−21	59	0·8	0·5	6	3	5	27	1	0	0	31	52	5·9	4·9	6·6	7·2	5·2	10	5	4	11	34	21	4	10	1
Apr.	1016	44	57	31			87	4	48	0·8	0·6	2	6	2	19	1	0	<1	25	55	6·4	5·7	7·6	7·3	5·0	8	8	5	7	35	28	3	5	1
May	1015	52	66	38			91	18	45	1·5	1·3	1	9	<1	9	1	0	1	23	58	6·6	6·6	7·2	7·3	5·3	9	8	6	9	36	22	3	6	1
Jun.	1015	58	71	44			98	24	49	2·4	1·1	0	12	0	<1	1	0	5	20	58	6·8	6·6	7·4	7·6	5·7	8	9	5	9	34	23	3	8	1
Jul.	1016	65	82	47			102	29	40	0·9	0·6	0	7	0	<1	<1	0	6	46	29	4·1	3·7	4·4	5·6	2·7	8	9	4	8	37	25	3	5	1
Aug.	1016	62	80	45			98	23	40	1·1	1·0	0	7	0	<1	<1	0	6	44	33	4·4	3·8	4·8	5·8	3·3	9	10	4	6	35	27	3	6	<1
Sep.	1017	54	70	39			92	10	49	1·1	0·8	<1	7	<1	7	1	0	1	39	44	5·2	4·5	5·9	6·4	4·0	14	9	2	8	30	25	3	8	1
Oct.	1018	43	54	31			85	−3	64	1·4	0·9	1	8	1	20	1	0	0	38	46	5·4	4·6	6·3	6·1	4·6	15	5	1	5	32	31	2	7	2
Nov.	1021	29	37	20			65	−23	85	1·5	1·7	10	4	7	28	4	0	0	20	66	7·3	6·6	8·2	7·5	6·9	16	5	2	5	28	25	4	11	4
Dec.	1020	21	29	14			56	−38	91	1·7	0·8	13	4	11	29	4	0	0	20	68	7·4	7·0	8·0	7·6	7·0	19	4	1	5	23	26	3	13	6
Mean	1018	42	54	29					61										30	52	6·0	5·5	6·6	6·9	5·2	13	7	3	7	31	25	3	9	2
Extreme or Total							102	−41		16·0	1·7	57	70	44	191	22	0	19																
Number of years' observations	10	13	13	13			42	42	10	13	11	13	12	12	10	10	10	10	10	10	←		10		→	←				8				→

* Till 1941, Lat. 49° 30′N. Long. 115° 47′W. Alt. 3,060 ft.

Climatological Table for CRESCENT VALLEY. Lat. 49° 27′N. Long. 117° 34′W. Altitude above MSL 2,000 ft.

Month	Pressure: Mean at M.S.L.	Air Temperature at Station Level: Daily Mean	Mean of daily: Max.	Mean of daily: Min.	Mean of monthly: Max.	Mean of monthly: Min.	Absolute extremes: Highest recorded	Absolute extremes: Lowest recorded	Relative Humidity: 1630 L.S.T.	Precipitation: Mean Total, all forms	Max. fall in 24 hours	Mean Snowfall (in. of snow)	Number of days of: Rain, ≥ ·01 in.	Snow, depth ≥ ·1 in.	Frost (in screen)	Fog (vis. ≤ 1 km.)	Gale ≥ 39 m.p.h.	Thunder	Percentage of Time with: Clear sky (≤ 2/10 covered)	Overcast sky (≥ 8/10 covered)	Cloud amount, tenths of sky covered: Mean for four synoptic hours	0430 L.S.T.	0930 L.S.T.	1630 L.S.T.	2230 L.S.T.	Wind Directions, Percentage frequencies means of 4 hourly observations daily: N	NE	E	SE	S	SW	W	NW	Calm
	mb.	°F	°F	°F	°F	°F	°F	°F	%	in.	in.	in.																						
Jan.	1025	23	30	16			48	−28	97	3·1	1·6	26	3	14		8		0	16	74	7·8	7·6	8·3	7·7	7·8	6	1	2	2	1	8	2	1	77
Feb.	1020	29	38	20			55	−25	78	3·3	1·1	24	6	13		8		0	22	70	7·3	6·9	7·9	7·9	6·5									
Mar.	1017	36	48	24			73	−5	63	2·0	1·3	8	7	7		4		<1	28	60	6·5	5·8	7·1	7·4	5·5									
Apr.	1016	46	60	33			82	16	49	1·6	0·9	1	11	1		3		1	25	60	6·8	6·3	7·6	8·0	5·4	4	1	5	4	3	7	4	6	66
May	1015	54	69	39			89	19	49	2·0	0·9	<1	12	<1		2		2	24	56	6·6	6·4	7·0	7·6	5·3									
Jun.	1015	59	73	45			93	27	53	2·5	1·0		14	0		3		6	20	61	7·0	6·9	7·5	7·9	5·7									
Jul.	1016	65	84	47			100	32	52	1·4	1·0		8	0		2		9	40	34	4·6	4·3	4·9	6·1	3·1	3	1	2	2	3	9	2	1	77
Aug.	1015	64	82	45			98	31	44	1·0	0·9		7	0		2		6	43	35	4·7	4·2	5·3	6·0	3·2									
Sep.	1017	57	72	40			95	22	50	2·1	1·0		8	0		1		1	41	44	5·1	4·4	5·6	6·3	4·0									
Oct.	1019	44	56	33			78	14	71	3·4	1·3	2	12	1		9		1	27	62	6·7	6·1	7·6	7·2	5·7	4	1	1	1	1	4	1	1	86
Nov.	1021	33	40	27			57	4	88	3·1	1·4	15	10	8		9		0	12	77	8·2	7·8	8·6	8·7	7·7									
Dec.	1021	28	33	22			53	−10	85	4·1	1·0	24	8	14		8		0	10	82	8·9	9·6	8·9	8·4	8·4									
Mean	1018	45	57	33					65										26	60	6·7	6·4	7·2	7·4	5·7	4	1	3	2	2	7	2	2	77
Extreme or total							100	−28		29·4	1·6	99	106	58		59		26																
Number of years' observations	11	11	11	11			13	13	10	12	12	12	12	12		10		10	10	10	←		10		→	←				10				→

Climatological Table for DOG CREEK. Lat. 51° 38′N. Long. 122° 15′W. Altitude above MSL 3,370 ft.

Month	Pressure: Mean at M.S.L	Air Temperature at Station Level: Daily Mean	Mean of daily: Max.	Mean of daily: Min.	Mean of monthly: Max.	Mean of monthly: Min.	Absolute extremes: Highest recorded	Absolute extremes: Lowest recorded	Relative Humidity: 1630 L.S.T.	Precipitation: Mean Total, all forms	Precipitation: Max. fall in 24 hours	Precipitation: Mean Snowfall (in. of snow)	Number of days of: Rain, ≥ ·01 in.	Number of days of: Snow, depth ≥ ·1 in.	Number of days of: Frost (in screen)	Number of days of: Fog (vis. ≤ 1 km.)	Number of days of: Gale ≥ 39 m.p.h.	Number of days of: Thunder	Percentage of Time with: Clear sky (≤ 2/10 covered)	Percentage of Time with: Overcast sky (≥ 8/10 covered)	Cloud amount, tenths of sky covered: Mean for four synoptic hours	0430 L.S.T.	1030 L.S.T.	1630 L.S.T.	2230 L.S.T.	Wind Directions (Percentage frequencies means of 24 hourly observations daily): N	NE	E	SE	S	SW	W	NW	Calm
	mb.	°F	°F	°F	°F	°F	°F	°F	%	in.	in.	in.																						
Jan.	1021	13	21	6			55	−39	82	1·0	0·4	9	1	11	31	2	0	0	25	59	6·7	6·0	7·4	7·5	5·9									
Feb.	1017	21	30	12			50	−26	75	1·2	1·0	11	<1	10	28	1	0	0	23	62	6·8	6·4	7·4	7·6	6·0									
Mar.	1014	29	38	19			58	−15	63	1·0	0·9	9	1	7	30	3	0	0	29	54	6·2	5·4	6·4	7·5	5·4									
Apr.	1016	39	49	28			74	6	48	0·7	0·6	6	3	6	2	2	0	0	18	62	7·0	6·3	7·9	8·2	5·8									
May	1015	51	63	38			86	25	45	0·9	0·6	1	8	1	7	1	0	2	30	49	5·8	5·7	5·8	7·2	4·7									
Jun.	1016	55	66	44			86	31	53	2·9	1·2	<1	13	0	<1	1	0	2	15	64	7·3	6·8	7·3	8·2	6·9									
Jul.	1016	60	72	47			91	30	44	1·4	0·7	0	9	0	<1	1	0	2	22	53	6·5	6·2	6·4	7·4	6·0									
Aug.	1017	59	71	46			90	31	50	2·1	0·9	0	10	0	<1	1	0	4	30	51	6·0	6·0	5·9	7·0	5·0									
Sep.	1018	52	65	40			84	20	49	0·7	0·8	<1	7	<1	6	1	0	<1	40	45	5·1	4·4	5·3	6·1	4·4									
Oct.	1016	41	50	32			79	8	64	1·3	0·7	3	6	3	18	2	0	<1	30	53	6·0	5·3	6·4	7·0	5·3									
Nov.	1016	28	35	20			61	−17	83	1·1	0·6	9	2	9	28	5	0	0	24	61	6·8	5·9	7·6	7·5	6·1									
Dec.	1017	19	26	12			56	−24	86	1·3	0·7	12	1	10	31	4	0	0	24	62	6·8	6·2	7·6	7·5	6·1									
Mean	1017	39	49	29					62										26	56	6·4	5·9	6·8	7·4	5·6									
Extreme or total							91	−39		15·6	1·2	60	61	57	181	24	0	10																
Number of years' observations	7	7	7	7			8	8	7	7	8	7	8	8	8	8	8	8	8	8	←		8		→									

Climatological Table for ESTEVAN POINT. Lat. 49° 23′N. Long. 126° 32′W. Altitude above MSL 20 ft.

Month	Pressure	Air Temperature at Station Level							Relative Humidity	Precipitation			Number of days of						Percentage of Time with		Cloud amount, tenths of sky covered					Wind Directions: Percentage frequencies means of 24 hourly observations daily								
	Mean at M.S.L.	Daily Mean	Mean of daily Max.	Mean of daily Min.	Mean of monthly Max.	Mean of monthly Min.	Absolute extremes Highest recorded	Absolute extremes Lowest recorded	1630 L.S.T.	Mean Total, all forms	Max. fall in 24 hours	Mean Snowfall (in. of snow)	Rain, ≥ ·01 in.	Snow, depth ≥ ·1 in.	Frost (in screen)	Fog (vis. ≤ 1 km.)	Gale ≥ 39 m.p.h.	Thunder	Clear sky (≤ 2/10 covered)	Overcast sky (≥ 8/10 covered)	Mean for four synoptic hours	0430 L.S.T.	1030 L.S.T.	1630 L.S.T.	2230 L.S.T.	N	NE	E	SE	S	SW	W	NW	Calm
	mb.	°F	°F	°F	°F	°F	°F	°F	%	in.	in.	in.																						
Jan.......	1016	40	45	35	52	23	63	7	87	11·5	8·6	3	21	2	12	1	1	<1	24	65	6·9	6·2	7·6	7·5	6·4	9	7	14	46	5	3	3	11	2
Feb.......	1014	41	47	36	54	26	62	15	81	11·2	4·6	2	17	1	0	2	1	<1	28	62	6·7	6·2	7·1	7·2	6·3	8	8	13	39	7	4	4	15	2
Mar.......	1015	42	48	36	55	29	64	18	82	10·9	4·5	2	20	1	8	1	1	<1	29	58	6·4	6·1	6·9	6·8	5·9	9	6	8	36	6	4	5	24	2
Apr.......	1017	46	52	40	59	32	66	26	82	8·6	3·2	<1	18	<1	1	1	1	<1	26	61	6·7	6·5	6·9	7·0	6·2	7	4	6	36	7	5	6	28	1
May......	1018	50	56	44	65	37	73	32	82	5·7	2·0	0	15	0	0	3	<1	<1	29	57	6·3	6·3	6·9	6·6	5·4	5	2	5	28	6	3	6	43	2
Jun.......	1018	54	59	48	66	42	78	37	84	3·5	1·8	0	12	0	0	3	<1	0	29	55	6·3	6·7	6·6	6·2	5·7	4	2	4	23	5	3	9	48	2
Jul........	1019	56	62	51	70	45	80	40	84	3·5	1·6	0	10	0	0	8	0	0	37	51	5·7	6·2	6·4	5·4	4·8	3	2	4	25	4	3	6	51	2
Aug.......	1018	57	63	52	70	45	77	41	85	3·2	2·0	0	10	0	0	10	0	<1	40	49	5·5	5·4	6·3	5·6	4·7	4	2	4	29	4	3	6	45	3
Sep.......	1017	55	60	49	70	41	77	30	86	5·4	2·2	0	11	0	0	8	0	<1	37	53	5·7	5·3	6·4	6·2	5·0	6	5	8	31	4	2	5	36	3
Oct.......	1016	50	56	45	63	35	70	24	87	12·2	4·4	0	18	0	<1	5	<1	<1	28	61	6·7	6·4	7·2	7·1	5·9	7	7	11	43	3	2	4	21	2
Nov......	1016	46	51	40	58	31	64	23	88	14·6	5·2	<1	22	<1	4	1	1	<1	19	65	7·2	6·8	7·7	7·8	6·7	8	8	12	49	4	3	2	13	1
Dec.......	1014	42	47	37	53	27	57	20	90	16·9	4·6	2	23	1	10	1	1	<1	23	67	7·2	6·6	7·8	7·7	6·7	8	7	15	45	5	4	3	11	2
Mean.....	1016	48	54	43	61	34			78										29	59	6·4	6·2	7·0	6·8	5·8	6	5	9	36	5	3	5	29	2
Extreme or total...							80	7		107·2	8·6	9	197	5	45	44	6	0																
Number of years' observations	15	28	28	28	10	10	28	28	10	28	11	28	10	10	10	10	10	10	10	10	←		10		→	←				24				→

Climatological Table for GLACIER. Lat. 51° 14′N. Long. 117° 29′W. Altitude above MSL 4,094 ft.

Month	Pressure: Mean at M.S.L.	Air Temperature at Station Level: Daily Mean	Mean of daily: Max.	Mean of daily: Min.	Mean of monthly: Max.	Mean of monthly: Min.	Absolute extremes: Highest recorded	Absolute extremes: Lowest recorded	Relative Humidity	Precipitation: Mean Total, all forms	Precipitation: Max. fall in 24 hours	Precipitation: Mean Snowfall (in. of snow)	Number of days of: Rain, ≥ ·01 in.	Snow, depth ≥ ·1 in.	Frost (in screen)	Fog (vis. ≤ 1 km.)	Gale ≥ 39 m.p.h.	Thunder	Percentage of Time with: Clear sky (≤ 2/10 covered)	Overcast sky (≥ 8/10 covered)	Cloud amount, tenths of sky covered					Wind Directions, Percentage frequencies means of 24 hourly observations daily: N	NE	E	SE	S	SW	W	NW	Calm
	mb.	°F	°F	°F	°F	°F	°F	°F	%	in.	in.	in.																								
Jan.		14	20	8	33	−10	37	−32		8·5	2·6	85	0	16																						
Feb.		18	25	11	36	−10	45	−30		5·8	3·0	58	<1	16																						
Mar.		26	34	18	45	0	55	−13		5·7	1·4	56	1	16																						
Apr.		35	44	26	57	12	71	−6		2·6	1·8	19	9	9																						
May		44	56	34	71	25	84	18		2·2	1·1	5	14	2																						
Jun.		52	64	39	80	31	88	25		3·0	1·4	<1	15	0																						
Jul.		58	71	45	85	35	98	30		2·4	1·6	0	15	0																						
Aug.		57	70	44	82	35	87	30		2·5	1·0	<1	16	0																						
Sep.		47	58	37	74	28	84	25		3·6	1·4	1	14	<1																						
Oct.		38	45	30	59	19	67	−3		4·7	1·6	17	13	7																						
Nov.		25	31	20	40	4	49	−8		7·8	1·5	69	3	17																						
Dec.		17	23	12	35	−10	38	−26		8·1	1·2	80	1	21																						
Mean		36	45	27	58	13																														
Extreme or total							98	−32		56·9	3·0	394	101	104																						
Number of years' observations		43	43	43	29	29	21	21		31	21	31	10	10																						

Climatological Table for KAMLOOPS (town till 1941, then airport). Lat. 50° 42′N.* Long. 120° 22′W.* Altitude above MSL 1,133 ft.*

Month	Pressure: Mean at M.S.L.	Air Temperature at Station Level: Daily Mean	Mean of daily: Max.	Mean of daily: Min.	Mean of monthly: Max.	Mean of monthly: Min.	Absolute extremes: Highest recorded	Absolute extremes: Lowest recorded	Relative Humidity 1630 L.S.T.	Precipitation: mean Total, all forms	Precipitation: Max. fall in 24 hours	Precipitation: Mean Snowfall (in. of snow)	Number of days of: Rain, ≥ ·01 in.	Snow, depth ≥ ·1 in.	Frost (in screen)	Fog (vis. ≤ 1 km.)	Gale ≥ 39 m.p.h.	Thunder	Percentage of Time with: Clear sky (≤ 2/10 covered)	Overcast sky (≥ 8/10 covered)	Cloud amount, tenths of sky covered: Mean for four synoptic hours	0430 L.S.T.	1030 L.S.T.	1630 L.S.T.	2230 L.S.T.	Wind Directions, Percentage frequencies means of 24 hourly observations daily: N	NE	E	SE	S	SW	W	NW	Calm
	mb.	°F	°F	°F	°F	°F	°F	°F	%	in.	in.	in.																						
Jan.	1019	22	28	16	46	−8	61	−37	77	1·0	0·7	9	1	7	29	<1	<1	0	20	61	7·0	7·0	7·6	7·2	6·3	1	2	18	2	8	3	24	2	39
Feb.	1017	27	34	20	50	−3	64	−27	71	0·7	0·8	6	1	4	23	1	<1	0	26	52	7·2	6·0	7·0	6·5	5·3	2	4	12	4	5	4	21	3	45
Mar.	1013	39	48	29	62	13	72	−13	52	0·4	0·4	1	3	2	21	0	<1	0	29	41	5·6	5·0	6·1	6·6	4·6	3	3	24	6	7	4	23	4	26
Apr.	1013	50	62	38	76	25	92	13	39	0·4	1·0	<1	5	<1	6	0	<1	<1	22	45	6·0	5·6	6·6	7·0	4·9	2	3	21	7	9	6	22	6	24
May	1012	58	71	46	86	34	100	26	38	0·9	0·6	<1	8	0	1	<1	<1	1	27	38	5·6	5·3	5·9	6·5	4·5	3	4	18	7	12	5	21	6	24
Jun.	1012	64	77	52	92	42	101	33	42	1·4	0·9	0	10	0	0	0	<1	2	22	43	5·9	5·7	5·9	6·7	5·2	3	4	16	9	10	4	23	6	25
Jul.	1013	70	84	56	98	47	107	40	35	1·0	1·1	0	7	0	0	0	0	2	37	27	4·5	4·3	4·3	5·4	3·8	2	4	11	7	7	5	23	9	30
Aug.	1012	68	82	54	94	45	101	35	37	1·0	1·2	0	7	0	0	<1	0	2	38	28	4·5	4·3	4·6	5·3	3·7	2	2	11	4	7	5	25	10	34
Sep.	1014	59	71	47	82	35	95	24	42	0·8	0·5	<1	7	<1	1	<1	0	1	42	31	4·4	3·6	4·8	5·4	3·7	3	4	13	4	7	3	21	6	39
Oct.	1014	48	56	38	72	26	88	11	58	0·7	1·0	<1	7	<1	9	1	<1	<1	29	45	5·7	5·1	6·5	6·5	4·7	2	3	22	3	6	4	20	3	36
Nov.	1016	36	41	30	58	13	72	−22	79	0·9	0·6	5	5	6	19	<1	<1	0	15	64	7·3	7·0	7·9	7·8	6·5	2	4	28	4	7	3	17	4	31
Dec.	1018	28	33	23	49	1	61	−27	79	1·0	0·7	8	3	7	27	<1	<1	0	13	69	7·7	7·4	8·2	8·0	7·1	2	3	25	3	8	3	23	1	32
Mean	1014	47	57	37	72	22			54										24	45	5·9	5·5	6·3	6·6	5·0	2	4	18	5	8	4	22	5	59
Extreme or total							107	−37		10·2	1·2	29	64	26	136	2	<1	8																
Number of years' observations	53	61	61	61	46	46	65	65	10	73	11	73	36	36	10	10	10	10	10	10	←		10		→	←				21				→

* Until 1941, Lat. 50° 41′ N. Long. 120° 20′W. Alt. 1,241 ft.

Climatological Table for KELOWNA. Lat. 49° 52′N. Long. 119° 28′W. Altitude above MSL 1,160 ft.

Month	Pressure: Mean at M.S.L.	Air Temperature at Station Level: Daily Mean	Mean of daily: Max.	Mean of daily: Min.	Mean of monthly: Max.	Mean of monthly: Min.	Absolute extremes: Highest recorded	Absolute extremes: Lowest recorded	Relative Humidity	Precipitation: Mean Total, all forms	Precipitation: Max. fall in 24 hours	Precipitation: Mean Snowfall (in. of snow)	Number of days of: Rain, ≥ ·01 in.	Snow, depth ≥ ·1 in.	Frost (in screen)	Fog (vis. ≤ 1 km.)	Gale ≥ 39 m.p.h.	Thunder	Percentage of Time with: Clear sky (≤ 2/10 covered)	Overcast sky (≥ 8/10 covered)	Cloud amount, tenths of sky covered					Wind Directions, Percentage frequencies means of 24 hourly observations daily: N	NE	E	SE	S	SW	W	NW	Calm
	mb.	°F	°F	°F	°F	°F	°F	°F	%	in.	in.	in.																						
Jan.		24	31	19			53	−24		1·3	1·2	11	3	6																				
Feb.		28	35	20			63	−18		0·9	1·8	6	4	6																				
Mar.		37	47	28			70	−6		0·7	1·2	3	6	1																				
Apr.		46	58	34			82	15		0·6	1·3	<1	8	<1																				
May		55	68	42			91	25		0·9	0·8	0	10	0																				
Jun.		62	74	49			96	30		1·2	1·1	0	11	0																				
Jul.		67	81	53			102	38		0·8	1·6	0	7	0																				
Aug.		65	78	51			95	33		0·9	1·0	0	9	0																				
Sep.		56	68	44			89	21		1·1	1·2	0	7	0																				
Oct.		46	56	36			78	14		1·0	1·2	<1	10	<1																				
Nov.		37	43	30			65	−9		1·3	1·1	4	8	2																				
Dec.		30	34	24			58	−12		1·5	0·9	11	6	6																				
Mean		46	56	36																														
Extreme or total							102	−24		12·2	1·8	35	89	21																				
Number of years' observations		40	40	40			53	53		40	20	40	10	10																				

Climatological Table for KLEENA KLEENE. Lat. 51° 59′N. Long. 124° 59′W. Altitude above MSL 2,950 ft.

Month	Pressure	Air Temperature at Station Level							Relative Humidity	Precipitation			Number of days of						Percentage of Time with		Cloud amount, tenths of sky covered					Wind Directions — Percentage frequencies means of 3 hourly observations daily								
	Mean at M.S.L.	Daily Mean	Mean of daily Max.	Mean of daily Min.	Mean of monthly Max.	Mean of monthly Min.	Absolute extremes Lowest recorded	Absolute extremes Highest recorded	1630 L.S.T.	Mean Total, all forms	Max. fall in 24 hour	Mean Snowfall (in. of snow)	Rain, ≥ ·01 in.	Snow, depth ≥ ·1 in.	Frost (in screen)	Fog (vis. ≤ 1 km.)	Gale ≥ 39 m.p.h.	Thunder	Clear sky (≤ 2/10 covered)	Overcast sky (≥ 8/10 covered)	Mean for four synoptic hours	0430 L.S.T.	1030 L.S.T.	1630 L.S.T.	2230 L.S.T.	N	NE	E	SE	S	SW	W	NW	Calm
	mb.	°F	°F	°F	°F	°F	°F	°F	%	in.	in.	in.																						
Jan.	1020	10	22	3			55	−58	84	1·2	0·8	10	1	7	31	2	0	0	39	53	5·7	5·4	6·5	6·7	4·2	6	5	4	15	7	12	5	5	41
Feb.	1017	18	34	2			54	−34	72	0·8	1·3	8	<1	6	28	1	0	0	33	57	6·0	5·1	6·9	7·0	5·1									
Mar.	1015	26	42	11			64	−39	56	0·6	0·7	5	1	4	31	1	0	0	41	50	5·3	4·1	6·3	6·6	4·1									
Apr.	1014	37	50	23			74	5	48	0·7	0·5	5	3	3	29	1	0	0	36	53	5·6	4·3	6·9	7·2	4·0	8	4	2	8	10	20	14	6	28
May	1016	47	62	31			88	17	40	0·9	0·6	<1	4	1	17	1	0	1	40	49	5·5	5·2	6·0	6·6	4·1									
Jun.	1016	53	67	40			86	24	46	2·3	1·1	0	9	0	5	1	0	1	29	58	6·5	6·5	6·4	7·3	5·7									
Jul.	1017	56	72	41			92	25	43	1·1	1·6	0	7	0	2	1	0	1	36	51	5·5	5·0	5·4	6·4	5·2	12	3	2	3	8	20	15	10	27
Aug.	1016	56	71	40			88	25	46	1·8	1·1	0	8	0	3	2	0	1	41	44	5·3	5·2	6·1	6·5	4·2									
Sep.	1016	50	66	34			89	15	48	0·6	0·8	<1	6	0	15	4	0	0	46	42	4·6	3·6	5·3	5·8	3·6									
Oct.	1014	39	51	26			74	1	63	1·1	0·8	2	7	1	27	5	0	0	35	55	5·9	5·4	6·5	6·8	4·9	7	3	2	7	9	14	9	5	44
Nov.	1015	25	34	15			64	−31	79	1·7	1·1	12	4	6	29	4	0	0	35	58	6·1	5·8	6·7	6·7	5·2									
Dec.	1016	13	24	2			46	−45	92	1·2	1·0	9	1	6	31	3	0	0	38	53	5·6	4·6	6·8	6·2	4·7									
Mean	1016	36	50	22					60										37	52	5·6	5·0	6·3	6·6	4·6	8	4	2	8	8	17	11	7	35
Extreme or total							92	−58		14·0	1·6	51	51	34	248	26	0	4																
Number of years' observations	9	9	9	9			10	10	8	9	10	9	9	9	10	10	10	10	8	8	←		8		→	←				8				→

Climatological Table for LANGARA. Lat. 54° 15′N. Long. 133° 3′W. Altitude above MSL 134 ft.

Month	Pressure	Air Temperature at Station Level							Relative Humidity	Precipitation			Number of days of						Percentage of Time with		Cloud amount, tenths of sky covered					Wind Directions: Percentage frequencies means of 4 hourly observations daily								
	Mean at M.S.L.	Daily Mean	Mean of daily Max.	Mean of daily Min.	Mean of monthly Max.	Mean of monthly Min.	Absolute extremes Highest recorded	Absolute extremes Lowest recorded	1630 L.S.T.	Mean Total, all forms	Max. fall in 24 hours	Mean Snowfall (in. of snow)	Rain, ≥ ·01 in.	Snow, depth ≥ ·1 in.	Frost (in screen)	Fog (vis. ≤ 1 km.)	Gale ≥ 39 m.p.h.	Thunder	Clear sky (≤ 2/10 covered)	Overcast sky (≥ 8/10 covered)	Mean for four synoptic hours	0430 L.S.T.	1030 L.S.T.	1630 L.S.T.	2230 L.S.T.	N	NE	E	SE	S	SW	W	NW	Calm
	mb.	°F	°F	°F	°F	°F	°F	°F	%	in.	in.	in.																						
Jan.......	1010	39	42	36	48	25	53	6	92	7·3	1·9	4	22	3	12	1	2	0	11	72	7·8	7·6	8·2	8·2	7·1	5	8	19	22	15	14	8	8	1
Feb.......	1010	38	41	34	48	23	55	12	91	4·7	1·8	6	17	6	10	1	2	0	15	65	7·3	6·7	7·8	7·5	7·1									
Mar.......	1009	40	44	36	48	30	58	11	86	6·2	2·0	5	20	4	7	1	2	<1	16	64	7·3	7·2	7·7	7·6	6·5									
Apr.......	1011	43	48	38	54	32	61	26	86	5·1	1·7	1	21	1	2	<1	<1	<1	12	66	7·5	6·8	8·0	7·9	7·2									
May......	1015	48	52	43	62	36	77	32	86	3·2	2·6	0	21	0	<1	3	<1	0	12	69	7·3	7·8	7·7	7·4	6·3									
Jun.......	1016	51	56	47	65	42	78	38	95	3·4	1·5	0	17	0	0	4	<1	0	5	81	8·6	9·1	8·7	8·2	8·5									
Jul........	1018	55	59	51	65	46	68	42	89	3·6	1·1	0	18	0	0	3	<1	<1	5	84	8·0	8·4	9·1	8·5	8·8	1	4	5	10	20	20	18	15	7
Aug.......	1017	56	60	52	67	47	75	42	90	4·5	1·6	0	20	0	0	6	<1	<1	14	70	7·8	8·2	7·9	7·5	7·6									
Sep.......	1014	54	58	50	70	40	73	41	89	5·9	1·8	0	19	0	0	4	1	<1	16	66	7·1	6·3	7·7	7·4	7·1									
Oct.......	1010	49	53	45	60	38	68	31	89	9·5	2·3	0	26	0	<1	1	2	<1	12	65	7·5	7·4	8·0	7·7	6·8									
Nov.......	1008	43	46	40	53	31	59	20	92	8·1	1·7	1	25	<1	5	<1	2	<1	11	69	7·8	7·6	8·1	8·0	7·3									
Dec.......	1006	39	42	36	49	27	53	19	92	7·4	1·7	5	23	4	8	1	2	<1	10	69	7·7	7·2	8·1	8·3	7·1									
Mean.....	1012	46	50	42	57	36			90										12	70	7·6	7·3	8·1	7·8	7·3	3	6	12	16	18	17	13	11	4
Extreme or total...							78	6		68·9	2·6	22	249	18	44	25	13	<1																
Number of years' observations	14	14	14	14	15	15	16	16	10	14	11	14	10	10	10	10	10	10	10	10	10	5	10	10	10	←—	——	——	——	10	——	——	——	—→

Climatological Table for LYTTON. Lat. 50° 14′N. Long. 121° 34′W. Altitude above MSL 574 ft.

Month	Pressure	Air Temperature at Station Level							Relative Humidity	Precipitation			Number of days of						Percentage of Time with		Cloud amount, tenths of sky covered					Wind Directions: Percentage frequencies means of 3 hourly observations daily								
			Mean of daily		Mean of monthly		Absolute extremes																											
	Mean at M.S.L.	Daily Mean	Max.	Min.	Max.	Min.	Highest recorded	Lowest recorded	1630 L.S.T.	Mean Total, all forms	Max. fall in 24 hours	Mean Snowfall (in. of snow)	Rain, ≥ ·01 in.	Snow, depth ≥ ·1 in.	Frost (in screen)	Fog (vis. ≤ 1 km.)	Gale ≥ 39 m.p.h.	Thunder	Clear sky (≤ 2/10 covered)	Overcast sky (≥ 8/10 covered)	Mean for four synoptic hours	0430 L.S.T.	1030 L.S.T.	1630 L.S.T.	2230 L.S.T.	N	NE	E	SE	S	SW	W	NW	Calm
	mb.	°F	°F	°F	°F	°F	°F	°F	%	in.	in.	in.																						
Jan.	1024	27	31	21	49	−2	59	−25	80	2·0	1·9	14	5	6	26	2	0	0	30	57	6·3	6·2	7·4	6·5	5·2	31	3	1	<1	21	3	<1	9	31
Feb.	1018	33	40	24	52	2	58	−13	71	1·8	2·2	7	6	6	21	1	0	0	20	65	7·2	7·1	8·0	7·8	5·9									
Mar.	1014	43	52	34	64	20	76	0	54	1·0	0·8	2	6	2	17	2	0	0	28	58	6·3	5·8	7·1	7·3	5·0									
Apr.	1016	52	64	40	79	29	93	18	43	0·7	1·2	<1	7	<1	4	0	0	0	23	56	6·6	6·3	7·4	7·8	4·8	8	1	<1	0	66	10	<1	1	13
May	1014	60	73	47	92	36	104	27	38	0·9	1·4	0	6	0	<1	<1	0	<1	32	45	5·6	5·3	6·2	6·4	4·5									
Jun.	1014	67	77	54	94	45	106	41	38	0·9	1·4	0	8	0	0	0	0	1	22	54	6·6	6·1	6·8	6·9	6·4									
Jul.	1015	71	84	58	101	50	112	44	32	0·6	0·7	0	4	0	0	0	0	0	39	34	4·7	4·5	5·2	5·4	3·7	2	<1	<1	<1	73	8	<1	2	15
Aug.	1014	70	83	57	99	47	102	43	35	0·7	1·2	0	5	0	0	0	0	1	38	37	5·0	5·1	5·4	5·6	3·7									
Sep.	1016	62	73	50	93	38	98	33	40	1·0	0·9	0	6	0	0	1	0	0	46	35	4·4	4·0	4·8	5·2	3·6									
Oct.	1017	51	60	42	71	30	82	12	62	1·7	1·9	<1	10	0	4	3	0	0	30	52	6·0	5·9	6·8	6·6	4·5	11	3	1	1	42	6	<1	1	35
Nov.	1017	39	45	33	58	17	71	0	77	2·2	2·0	3	12	4	13	3	0	0	20	65	7·2	7·4	8·1	7·4	6·0									
Dec.	1017	31	34	25	52	6	58	−13	85	3·5	2·4	18	8	8	25	1	0	0	21	67	7·2	6·7	7·9	7·5	6·8									
Mean	1016	50	60	40	75	26			55										29	52	6·1	6·9	6·8	6·7	5·0	13	2	1	<1	50	7	<1	3	23
Extreme or total							112	−25		17·1	2·4	44	83	26	110	13	0	2																
Number of years' observations	6	25	13	13	7	7	21	21	7	25	21	22	7	7	8	8	8	8	8	8	←—	—	8	—	—→	←—	—	—	—	6	—	—	—	—→

Climatological Table for MASSET. Lat. 54° 0′N.* Long. 132° 10′W.* Altitude above MSL 42 ft.*

Month	Pressure: Mean at M.S.L.	Air Temperature at Station Level: Daily Mean	Mean of daily: Max.	Mean of daily: Min.	Mean of monthly: Max.	Mean of monthly: Min.	Absolute extremes: Highest recorded	Absolute extremes: Lowest recorded	Relative Humidity: 1630 L.S.T.	Precipitation: Mean Total, all forms	Precipitation: Max. fall in 24 hours	Precipitation: Mean Snowfall (in. of snow)	Number of days of: Rain, ≥ ·01 in.	Snow, depth ≥ ·1 in.	Frost (in screen)	Fog (vis. ≤ 1 km.)	Gale ≥ 39 m.p.h.	Thunder	Percentage of Time with: Clear sky (≤ 2/10 covered)	Overcast sky (≥ 8/10 covered)	Cloud amount, tenths of sky covered: Mean for four synoptic hours	0430 L.S.T.	1030 L.S.T.	1630 L.S.T.	2230 L.S.T.	Wind Directions (Percentage frequencies means of 4 hourly observations daily): N	NE	E	SE	S	SW	W	NW	Calm
	mb.	°F	°F	°F	°F	°F	°F	°F	%	in.	in.	in.																						
Jan.	1013	36	41	30	49	20	60	−2	92	5·7	1·8	10	20	3	17	1	1	0	12	74	8·1	7·6	8·9	8·6	7·2	5	3	2	25	24	12	3	5	21
Feb.	1011	37	42	31	50	19	58	8	86	4·4	1·9	6	16	2	17	4	1	0	15	70	7·9	7·8	8·5	8·1	7·0									
Mar.	1010	39	45	32	54	24	64	16	82	4·0	1·4	5	20	<1	14	2	1	0	22	68	7·3	6·4	8·0	8·4	6·4									
Apr.	1014	42	49	36	60	27	69	18	77	4·5	1·6	1	20	0	11	1	<1	<1	16	71	7·7	7·2	8·7	8·6	6·1	5	5	2	22	18	11	4	10	22
May	1016	48	56	40	66	31	76	27	72	3·5	1·9	<1	13	0	3	2	0	0	18	70	7·6	7·7	7·9	7·5	7·2									
Jun.	1017	53	61	45	71	38	81	32	76	2·5	1·0	0	14	0	0	<1	0	0	11	81	8·5	8·9	8·8	8·2	8·0									
Jul.	1017	57	64	50	72	40	83	35	79	3·0	1·9	0	14	0	0	1	0	0	9	81	8·6	8·7	8·9	8·5	8·4	10	6	3	16	16	7	5	17	20
Aug.	1018	58	66	51	73	42	84	38	74	2·8	1·2	0	13	0	0	1	0	0	20	68	7·4	8·0	7·8	7·1	6·5									
Sep.	1015	54	61	46	70	35	75	24	82	4·2	1·9	0	16	0	0	1	<1	<1	16	72	7·8	7·7	8·9	7·8	6·8									
Oct.	1011	47	54	40	64	28	69	17	84	6·8	2·5	<1	22	0	3	1	1	0	14	67	7·6	7·1	8·2	8·4	6·6	3	3	4	29	22	12	5	7	15
Nov.	1009	41	47	35	55	27	66	12	90	7·1	1·9	2	22	1	12	2	1	0	12	74	8·0	7·2	8·6	8·5	7·8									
Dec.	1009	38	43	33	52	21	60	8	94	6·8	1·8	7	20	3	19	3	<1	<1	14	71	7·8	7·3	7·9	8·5	7·4									
Mean	1013	46	52	39	61	30			82										15	72	7·9	7·6	8·4	8·2	7·1	6	4	3	23	20	10	4	10	20
Extreme or total							84	−2		55·3	2·5	31	210	9	96	19	5																	
Number of years' observations	5	53	53	53	16	16	54	54	6	53	20	42	10	10	5	5	5	5	5	5	←		5		→	←				5				→

* Till 1944. Lat. 54° 2′N. Long. 132° 8′. Alt. 10 ft.

Climatological Table for OLD GLORY MOUNTAIN. Lat. 49° 9′N. Long. 117° 55′W. Altitude above MSL 7,700 ft.

Month	Pressure: Mean at Station level	Air Temperature at Station Level: Daily Mean	Mean of daily: Max.	Mean of daily: Min.	Mean of monthly: Max.	Mean of monthly: Min.	Absolute extremes: Highest recorded	Absolute extremes: Lowest recorded	Relative Humidity: 1630 L.S.T.	Precipitation: Mean Total, all forms	Precipitation: Max. fall in 24 hours	Precipitation: Mean Snowfall (in. of snow)	Number of days of: Rain, ≥ ·01 in.	Snow, depth ≥ ·1 in.	Frost (in screen)	Fog (vis. ≤ 1 km.)	Gale ≥ 39 m.p.h.	Thunder	Percentage of Time with: Clear sky (≤ 2/10 covered)	Overcast sky (≥ 8/10 covered)	Cloud amount, tenths of sky covered: Mean for four synoptic hours	0430 L.S.T.	1030 L.S.T.	1630 L.S.T.	2230 L.S.T.	Wind Directions, Percentage frequencies means of 24 hourly observations daily: N	NE	E	SE	S	SW	W	NW	Calm
	mb.	°F	°F	°F	°F	°F	°F	°F	%	in.	in.	in.																						
Jan.......	763	10	15	6			33	−30	93	1·3	0·4	13			31	24	3	0	22	69	7·2	6·4	7·9	7·7	6·8	10	1	3	12	15	21	15	22	<1
Feb.......	762	14	18	9			45	−17	91	1·7	0·4	17			28	22	2	0	20	72	7·5	7·2	7·8	8·0	6·8	11	2	2	12	16	24	16	18	1
Mar.......	762	17	21	12			40	−11	85	1·8	0·9	18			31	23	3	0	23	66	7·1	6·5	7·4	8·2	6·1	16	1	2	19	14	15	9	24	0
Apr.......	764	24	29	19			54	−4	85	2·2	1·1	22			29	19	1	<1	17	68	7·5	6·9	8·2	8·5	6·3	11	1	4	23	13	12	9	27	0
May......	766	35	40	29			63	9	73	1·3	0·7	8			21	15	1	3	26	55	6·5	6·2	7·0	7·8	4·8	21	2	7	13	7	10	10	29	0
Jun.......	767	39	45	34			65	17	76	3·8	1·1	14			14	16	1	8	17	64	7·4	7·2	8·0	8·4	6·1	15	3	14	12	7	12	13	24	0
Jul........	769	49	56	42			71	27	62	1·9	1·1	1			4	8	<1	7	39	39	4·9	3·6	5·8	6·8	3·5	13	3	3	22	10	29	3	17	<1
Aug.......	769	47	54	40			72	21	62	1·6	0·8	1			3	8	<1	4	37	43	5·0	3·9	6·0	6·9	3·3	15	<1	4	19	9	24	5	23	0
Sep.......	768	41	46	35			69	17	69	2·0	1·2	12			13	10	1	1	40	45	5·3	4·7	5·9	6·4	4·1	16	2	10	13	13	12	9	24	0
Oct.......	766	28	32	23			60	6	85	2·7	1·0	21			27	20	1	<1	24	63	6·9	6·3	7·6	7·6	6·1	5	1	2	15	13	22	9	32	0
Nov......	764	19	24	14			52	−12	91	1·4	0·6	14			29	25	3	0	16	74	7·8	7·2	8·1	8·4	7·6	7	<1	1	16	14	21	15	24	0
Dec.......	761	13	18	9			40	−15	93	2·3	0·9	23			31	27	4	0	20	78	7·7	7·5	7·7	7·8	7·7	10	0	2	14	12	20	11	31	0
Mean.....		28	33	23					80										25	61	6·7	6·1	7·3	7·6	5·8	12	1	4	16	12	19	10	25	<1
Extreme or total...							72	−30		24·0	1·2	164			261	217	20	23																
Number of years' observations	5	7	7	7			8	8	6	7	8	7			8	8	8	8	8	8	←		6		→	←				4				→

Climatological Table for PACHENA POINT. Lat. 48° 43′N. Long. 125° 5′W. Altitude above MSL 150 ft.

Month	Pressure	Air Temperature at Station Level							Relative Humidity	Precipitation			Number of days of						Percentage of Time with		Cloud amount, tenths of sky covered					Wind Directions — Percentage frequencies means of 4 hourly observations daily								
			Mean of daily		Mean of monthly		Absolute extremes																											
	Mean at M.S.L.	Daily Mean	Max.	Min.	Max.	Min.	Highest recorded	Lowest recorded	1630 L.S.T.	Mean Total, all forms	Max. fall in 24 hours	Mean Snowfall (in. of snow)	Rain, ≥ ·01 in.	Snow, depth ≥ ·1 in.	Frost (in screen)	Fog (vis. ≤ 1 km.)	Gale ≥ 39 m.p.h.	Thunder	Clear sky (≤ 2/10 covered)	Overcast sky (≥ 8/10 covered)	Mean for four synoptic hours	0430 L.S.T.	1030 L.S.T.	1630 L.S.T.	2230 L.S.T.	N	NE	E	SE	S	SW	W	NW	Calm
	mb.	°F	°F	°F	°F	°F	°F	°F	%	in.	in.	in.																						
Jan.	1019	39	44	35	51	21	58	4	88	13·8	5·6	4	17	3	15	2	1	0	24	62	6·7	6·4	6·7	7·7	5·8	7	10	13	45	3	2	3	14	3
Feb.	1015	40	46	35	53	25	61	13	83	14·3	5·5	1	18	1	12	2	<1	0	24	64	7·1	6·3	7·8	7·3	7·1	7	7	9	46	4	2	2	19	4
Mar.	1016	42	48	37	56	28	63	20	80	11·1	4·3	1	20	<1	11	1	1	0	25	60	6·9	6·0	8·2	7·0	6·5	8	5	8	43	6	2	4	20	4
Apr.	1017	46	53	39	61	31	73	26	81	7·5	10·4	0	18	0	3	2	1	<1	20	64	7·3	6·8	8·5	7·3	6·4	7	5	6	39	6	4	4	26	3
May	1017	50	56	43	68	34	77	31	81	4·6	3·2	0	14	0	<1	4	0	<1	21	63	7·0	7·4	7·5	6·8	6·2	6	3	4	32	7	4	5	34	5
Jun.	1018	53	60	47	72	40	89	34	82	3·5	4·6	0	12	0	0	6	0	0	22	61	6·9	7·5	7·7	6·2	6·3	5	2	4	28	3	2	5	45	6
Jul.	1019	56	62	49	74	44	85	39	85	3·1	5·2	0	11	0	0	14	0	<1	23	64	7·0	8·0	7·6	6·4	5·9	4	3	4	32	2	2	3	45	5
Aug.	1018	56	63	50	71	43	83	40	87	2·8	4·8	0	11	0	0	20	0	0	23	66	7·3	7·7	8·5	6·5	6·4	5	3	4	36	3	1	3	36	9
Sep.	1017	54	60	47	73	38	81	32	83	4·8	3·5	0	11	0	0	15	<1	<1	35	53	5·9	5·9	6·4	6·1	5·0	8	4	4	38	2	2	3	31	8
Oct.	1018	49	55	44	63	33	72	23	86	12·9	4·7	0	18	0	1	8	1	<1	29	58	6·6	6·1	7·5	6·9	6·0	7	6	9	46	4	3	3	18	4
Nov.	1016	45	50	39	56	32	61	20	89	14·6	5·0	<1	21	<1	6	1	1	<1	18	68	7·7	7·0	7·8	7·9	6·9	7	8	12	45	4	3	3	15	3
Dec.	1015	42	46	37	53	26	59	18	91	16·2	4·9	1	22	1	11	1	1	0	19	70	7·5	6·2	8·3	7·8	7·5	8	9	13	42	3	4	2	16	3
Mean	1017	48	54	42	63	33			85										24	63	7·0	6·8	7·7	7·0	6·3	7	5	8	39	4	3	3	26	5
Extreme or total							89	4		109·2	10·4	7	193	5	59	76	6	<1																
Number of years' observations	10	26	14	14	10	10	21	21	10	26	21	14	10	10	10	10	10	10	10	10	10	10	3	10	3	←				10				→

Climatological Table for PATRICIA BAY. Lat. 48° 39′N. Long. 123° 26′W. Altitude above MSL 66 ft.

Month	Pressure	Air Temperature at Station Level							Relative Humidity	Precipitation			Number of days of						Percentage of Time with		Cloud amount, tenths of sky covered					Wind Directions: Percentage frequencies means of 24 hourly observations daily								
	Mean at M.S.L.	Daily Mean	Mean of daily Max.	Mean of daily Min.	Mean of monthly Max.	Mean of monthly Min.	Absolute extremes Highest recorded	Absolute extremes Lowest recorded	1630 L.S.T.	Mean Total, all forms	Max. fall in 24 hours	Mean Snowfall (in. of snow)	Rain, ≥ ·01 in.	Snow, depth ≥ ·1 in.	Frost (in screen)	Fog (vis. ≤ 1 km.)	Gale ≥ 39 m.p.h.	Thunder	Clear sky (≤ 2/10 covered)	Overcast sky (≥ 8/10 covered)	Mean for four synoptic hours	0430 L.S.T.	1030 L.S.T.	1630 L.S.T.	2230 L.S.T.	N	NE	E	SE	S	SW	W	NW	Calm
	mb.	°F	°F	°F	°F	°F	°F	°F	%	in.	in.	in.																						
Jan.	1020	36	42	30	53	17	58	4	81	4·2	1·6	7	14	4	18	2	<1	0	18	71	7·7	7·4	8·2	8·0	7·0	6	11	3	16	6	11	29	15	3
Feb.	1016	40	47	33	56	22	59	5	74	4·1	2·2	3	14	2	16	2	0	0	20	69	7·3	6·8	8·2	7·6	6·7	5	7	4	21	7	13	26	13	4
Mar.	1016	43	51	35	61	27	68	16	67	2·8	2·1	<1	14	<1	13	2	0	0	26	60	6·7	6·1	7·9	7·4	5·4	3	9	4	21	5	17	23	15	3
Apr.	1017	48	56	40	67	31	74	27	65	1·8	1·1	0	14	0	3	1	0	0	23	62	6·9	6·3	7·8	7·6	5·8	2	8	8	23	5	16	24	11	3
May	1016	54	63	44	76	35	85	33	63	1·4	1·5	0	11	0	0	<1	0	1	31	52	6·0	6·3	6·8	6·5	4·5	2	9	10	27	3	11	21	13	4
Jun.	1017	58	67	48	82	41	92	37	63	1·2	1·0	0	8	0	0	1	0	1	28	54	6·2	6·8	6·7	6·2	5·2	2	9	9	33	3	11	15	13	5
Jul.	1017	62	72	51	85	44	97	42	61	0·7	0·6	0	6	0	0	1	0	<1	47	38	4·6	4·8	5·1	4·8	3·7	1	9	12	37	2	7	16	9	7
Aug.	1016	61	71	51	83	45	92	42	63	0·9	1·3	0	7	0	0	1	0	<1	47	38	4·6	4·7	5·6	4·7	3·5	2	9	13	36	3	7	15	8	7
Sep.	1016	57	67	48	80	39	88	36	64	1·2	0·9	0	8	0	0	3	0	<1	40	47	5·4	5·0	6·2	6·0	4·4	2	9	10	27	4	10	22	9	7
Oct.	1017	50	58	43	69	33	78	28	74	3·5	1·9	0	16	0	2	5	0	<1	29	58	6·5	6·2	7·2	7·1	5·4	3	6	7	24	7	11	27	10	5
Nov.	1016	43	49	37	58	28	65	23	83	4·9	2·5	1	19	1	6	3	<1	0	16	74	7·8	7·4	8·5	8·3	7·0	4	6	4	22	6	14	27	14	3
Dec.	1016	40	45	34	56	24	61	16	86	5·4	2·1	2	21	2	17	2	<1	0	17	72	7·7	7·4	8·1	8·1	7·0	4	5	3	20	6	15	27	17	3
Mean	1017	49	57	41	69	32			70												6·5	6·3	7·2	6·9	5·5	3	8	7	25	5	12	22	12	6
Extreme or total							97	4		32·1	2·5	13	152	9	75	23	<1	2	342	695														
Number of years' observations	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	←		10		→	←				10				→

Climatological Table for PENTICTON. Lat. 49° 28′N. Long. 119° 36′W. Altitude above MSL 1,121 ft.

Month	Pressure: Mean at M.S.L.	Air Temperature at Station Level: Daily Mean	Mean of daily: Max.	Mean of daily: Min.	Mean of monthly: Max.	Mean of monthly: Min.	Absolute extremes: Highest recorded	Absolute extremes: Lowest recorded	Relative Humidity: 1630 L.S.T.	Precipitation: Mean Total, all forms	Precipitation: Max. fall in 24 hours	Precipitation: Mean Snowfall (in. of snow)	Number of days of: Rain, ≥ ·01 in.	Snow, depth ≥ ·1 in.	Frost (in screen)	Fog (vis. ≤ 1 km.)	Gale ≥ 39 m.p.h.	Thunder	Percentage of Time with: Clear sky (≤ 2/10 covered)	Overcast sky (≥ 8/10 covered)	Cloud amount, tenths of sky covered: Mean for four synoptic hours	0430 L.S.T.	1030 L.S.T.	1630 L.S.T.	2230 L.S.T.	Wind Directions (Percentage frequencies means of 24 hourly observations daily): N	NE	E	SE	S	SW	W	NW	Calm
	mb.	°F	°F	°F	°F	°F	°F	°F	%	in.	in.	in.																						
Jan.	1025	27	32	21	46	6	57	−16	80	1·0	0·6	7	4	7	27	1	<1	0	13	75	7·9	8·1	8·4	8·0	7·2	15	1	<1	6	44	2	1	9	22
Feb.	1019	31	38	23	52	7	64	−16	73	0·8	0·7	4	5	6	23	1	<1	0	19	68	7·4	7·1	7·9	7·8	6·6	15	1	<1	6	38	2	1	9	28
Mar.	1016	39	50	30	63	18	71	0	53	0·7	1·2	2	6	1	22	1	<1	<1	27	57	6·5	5·7	7·0	7·2	5·9	23	2	1	5	27	2	2	8	30
Apr.	1015	48	61	35	76	24	87	16	44	0·8	1·1	<1	8	<1	10	0	0	<1	21	58	6·7	6·1	7·3	7·9	5·4	22	3	1	3	22	2	3	7	37
May	1014	56	70	42	86	31	94	27	44	1·1	1·1	0	9	0	2	<1	0	2	27	51	6·2	6·0	6·8	7·0	4·9	32	3	1	2	15	2	2	11	32
Jun.	1014	63	77	49	93	40	100	32	48	1·4	1·3	0	11	0	0	1	0	3	24	54	6·4	6·6	6·4	7·3	5·3	29	4	1	2	13	2	2	10	37
Jul.	1015	68	84	53	97	45	105	38	43	0·9	1·5	0	6	0	0	0	0	5	47	32	4·2	3·8	4·6	5·4	3·1	38	4	1	1	9	1	2	11	33
Aug.	1015	66	81	52	93	42	97	32	46	0·8	0·9	0	6	0	0	0	0	4	46	32	4·2	3·8	4·5	5·7	3·0	42	3	1	1	7	1	2	8	35
Sep.	1016	58	71	45	85	33	94	22	48	0·9	0·8	0	6	0	1	<1	<1	1	43	39	4·7	4·0	5·3	5·7	3·8	29	3	1	3	14	1	2	8	39
Oct.	1018	48	59	38	73	25	84	12	63	0·9	1·8	<1	9	0	8	<1	<1	<1	28	57	6·5	6·3	7·0	7·2	5·6	20	2	1	4	26	1	1	7	38
Nov.	1019	38	44	31	56	18	69	1	76	1·0	0·8	2	9	2	16	1	1	0	13	75	8·0	7·8	8·6	8·2	7·6	12	1	<1	7	40	4	1	7	28
Dec.	1020	31	35	26	50	8	60	−8	82	1·1	0·9	7	5	7	23	1	<1	0	10	77	8·4	8·2	8·7	8·5	8·1	8	1	<1	8	43	2	1	5	31
Mean	1017	48	58	37	72	25			58										26	56	6·4	6·1	6·9	7·2	6·5	24	2	1	4	25	2	2	8	32
Extreme or total							105	−16		11·4	1·8	22	84	23	132	6	<1	15																
Number of years observations	6	43	32	32	20	20	45	45	9	43	21	32	10	10	10	10	10	10	10	10	←		9		→	←				8				→

Climatological Table for PORT HARDY. Lat. 50° 41′N. Long. 127° 23′W. Altitude above MSL 74 ft.

Month	Pressure: Mean at M.S.L.	Air Temperature at Station Level: Daily Mean	Mean of daily: Max.	Mean of daily: Min.	Mean of monthly: Max.	Mean of monthly: Min.	Absolute extremes: Highest recorded	Absolute extremes: Lowest recorded	Relative Humidity: 1630 L.S.T.	Precipitation: Mean Total, all forms	Max. fall in 24 hours	Mean Snowfall (in. of snow)	Number of days of: Rain, ≥ ·01 in.	Snow, depth ≥ ·1 in.	Frost (in screen)	Fog (vis. ≤ 1 km.)	Gale ≥ 39 m.p.h.	Thunder	Percentage of Time with: Clear sky (≤ 2/10 covered)	Overcast sky (≥ 8/10 covered)	Cloud amount, tenths of sky covered: Mean for four synoptic hours	0430 L.S.T.	1030 L.S.T.	1630 L.S.T.	2230 L.S.T.	Wind Directions (Percentage frequencies means of 4 hourly observations daily): N	NE	E	SE	S	SW	W	NW	Calm
	mb.	°F	°F	°F	°F	°F	°F	°F	%	in.	in.	in.																						
Jan.	1019	35	39	30			52	6	86	7·9	3·9	9	17	7	17	2	1	<1	11	73	8·0	7·6	8·5	8·3	7·6	<1	1	31	21	10	17	10	4	6
Feb.	1013	38	42	33			53	16	83	6·0	1·6	10	16	5	15	1	2	0	13	75	8·1	7·7	8·6	8·6	7·4									
Mar.	1015	40	46	35			60	9	78	5·7	2·1	3	19	2	11	1	1	0	16	70	7·7	7·2	8·4	8·1	7·0									
Apr.	1017	43	50	37			72	27	78	4·4	1·3	<1	19	1	7	<1	<1	0	12	71	7·9	7·8	8·3	8·4	7·0	5	8	19	13	11	17	6	8	13
May	1017	50	57	43			75	31	70	2·4	1·5	<1	13	0	1	5	0	<1	21	64	7·1	7·8	8·0	6·5	5·9									
Jun.	1018	54	60	47			78	38	74	1·9	0·8		12	0	0	3	0	<1	13	73	8·2	8·3	8·7	8·7	7·1									
Jul.	1019	56	63	50			76	37	54	2·8	1·0		14	0	0	5	0	<1	18	66	7·3	8·3	8·1	6·5	6·4	11	11	6	5	7	13	12	20	15
Aug.	1018	56	63	50			75	40	76	2·6	1·9		12	0	0	5	0	<1	18	68	7·4	8·4	8·1	6·5	6·4									
Sep.	1018	53	59	47			76	33	81	4·2	1·3		15	0	0	8	0	0	21	68	7·2	7·7	8·6	6·0	6·4									
Oct.	1015	47	53	41			68	30	84	8·8	3·3		21	0	3	4	1	<1	14	72	7·8	7·4	8·7	8·1	7·0	3	5	27	17	9	15	7	4	13
Nov.	1012	41	46	37			66	24	90	9·4	1·8	1	24	1	7	2	2	0	8	78	8·4	8·1	8·9	8·8	7·9									
Dec.	1014	38	42	33			55	15	91	8·6	2·6	6	22	3	14	2	1	0	10	78	8·3	7·9	8·9	8·4	7·9									
Mean	1016	46	52	40					79										15	71	7·8	7·8	8·5	7·7	7·0	5	6	21	14	9	15	9	9	12
Extreme or total							78	6		64·7	3·9	29	204	19	75	38	8	1																
Number of years' observations	7	7	7	7			8	8	8	8	8	7	7	7	8	8	8	8	8	8	←		6		→	←				7				→

Climatological Table for PRINCE GEORGE (A). Lat. 53° 54′N. Long. 122° 40′W. Altitude above MSL 2,218 ft.

Month	Pressure	Air Temperature at Station Level							Relative Humidity	Precipitation			Number of days of						Percentage of Time with		Cloud amount, tenths of sky covered					Wind Directions: Percentage frequencies means of 24 hourly observations daily								
			Mean of daily		Mean of monthly		Absolute extremes																											
	Mean at M.S.L.	Daily Mean	Max.	Min.	Max.	Min.	Highest recorded	Lowest recorded	1630 L.S.T.	Mean Total, all forms	Max. fall in 24 hours	Mean Snowfall (in. of snow)	Rain, ≥ ·01 in.	Snow, depth ≥ ·1 in.	Frost (in screen)	Fog (vis. ≤ 1 km.)	Gale ≥ 39 m.p.h.	Thunder	Clear sky (≤ ²⁄₁₀ covered)	Overcast sky (≥ ⁸⁄₁₀ covered)	Mean for four synoptic hours	0430 L.S.T.	1030 L.S.T.	1630 L.S.T.	2230 L.S.T.	N	NE	E	SE	S	SW	W	NW	Calm
	mb.	°F	°F	°F	°F	°F	°F	°F	%	in.	in.	in.																						
Jan.	1020	12	21	3			45	−58	87	2·0	0·7	19	3	11	30	4	0	0	21	70	7·4	7·0	8·1	7·8	6·5	28	9	5	3	32	5	8	4	6
Feb.	1018	19	30	9			56	−46	80	1·8	0·8	17	3	10	27	3	0	0	19	70	7·5	7·1	8·1	7·8	6·9	38	6	3	3	25	4	9	5	7
Mar.	1015	28	38	18			66	−26	64	1·0	0·6	7	8	6	29	2	0	0	27	58	6·5	5·7	7·1	7·7	5·6	24	5	4	3	37	5	12	5	5
Apr.	1015	39	50	29			80	−3	52	0·9	0·5	2	11	1	20	1	0	<1	18	68	7·4	7·1	8·1	8·4	6·0	23	5	6	4	31	8	15	5	3
May	1016	49	63	36			84	19	45	1·5	0·8	<1	11	<1	10	1	0	2	28	58	6·6	6·3	6·6	7·8	5·5	20	4	5	4	35	9	16	4	3
Jun.	1015	56	68	43			93	27	51	1·9	1·0		15	<1	2	1	0	4	15	65	7·2	6·8	7·4	8·2	6·5	17	6	5	4	34	9	17	5	3
Jul.	1017	58	71	45			94	29	53	2·7	1·0	<1	15	0	<1	4	0	5	19	62	7·1	6·9	7·2	7·6	6·6	15	5	5	4	36	10	17	4	4
Aug.	1016	56	69	43			94	25	53	3·0	2·0		14	0	2	5	0	4	28	52	6·1	5·7	6·7	6·9	5·1	15	5	4	4	39	10	15	4	4
Sep.	1018	50	63	37			85	10	58	1·6	1·0	<1	13	<1	8	8	0	1	34	51	5·8	5·4	6·3	6·7	4·6	16	8	4	4	37	8	12	6	5
Oct.	1016	40	49	31			77	−14	67	2·3	0·7	5	16	<1	18	6	0	<1	20	66	7·3	6·8	7·8	8·1	6·3	16	6	5	4	41	9	12	5	2
Nov.	1016	26	33	20			61	−39	86	2·2	1·0	14	9	6	26	4	0	0	19	71	7·6	7·3	8·1	8·2	6·9	24	7	6	4	34	4	10	6	5
Dec.	1017	18	26	11			53	−41	92	2·3	1·1	20	5	9	30	6	0	0	17	72	7·6	6·9	8·1	8·1	7·3	30	6	6	3	32	4	9	6	4
Mean	1017	38	48	27					66										22	64	7·0	6·6	7·5	8·8	6·2	22	6	5	4	34	7	13	5	4
Extreme or total							94	−58		23·2	2·0	84	123	43	202	45	0	16																
Number of years' observations	8	9	9	9			11	11	7	9	9	9	10	10	10	10	10	10	10	10	←		9		→	←				9				→

Climatological Table for PRINCE RUPERT. Lat. 54° 17′N.* Long. 130° 23′W.* Altitude above MSL 170 ft.*

Month	Pressure	Air Temperature at Station Level							Relative Humidity	Precipitation			Number of days of						Percentage of Time with		Cloud amount, tenths of sky covered					Wind Directions: Percentage frequencies means of 24 hourly observations daily								
			Mean of daily		Mean of monthly		Absolute extremes																											
	Mean at M.S.L.	Daily Mean	Max.	Min.	Max.	Min.	Highest recorded	Lowest recorded	1630 L.S.T.	Mean Total, all forms	Max. fall in 24 hours	Mean Snowfall (in. of snow)	Rain, ≥ ·01 in.	Snow, depth ≥ ·1 in.	Frost (in screen)	Fog (vis. ≤ 1 km.)	Gale ≥ 39 m.p.h.	Thunder	Clera sky (≤ 2/10 covered)	Overcast sky (≥ 8/10 covered)	Meanf or four synoptic hours	0430 L.S.T.	1030 L.S.T.	1630 L.S.T.	2230 L.S.T.	N	NE	E	SE	S	SW	W	NW	Calm
	mb.	°F	°F	°F	°F	°F	°F	°F	%	in.	in.	in.																						
Jan.	1011	35	40	31	50	14	62	−6	83	9·6	4·9	10	18	2	16	<1	1	0	21	66	7·2	6·8	7·6	7·6	6·6	13	8	8	42	4	3	4	7	11
Feb.	1012	37	42	31	52	18	66	2	79	7·3	2·7	7	12	3	13	1	<1	0	22	68	7·2	6·9	7·8	7·4	6·8	15	6	7	40	4	4	4	8	12
Mar.	1012	39	45	34	55	23	68	5	72	8·4	2·5	7	18	3	13	<1	<1	0	21	64	7·0	6·6	7·6	7·6	6·3	16	5	5	42	4	5	4	9	10
Apr.	1014	45	50	37	62	29	71	22	71	7·0	2·2	3	19	1	4	<1	<1	0	18	68	7·4	6·8	8·0	7·7	6·9	12	4	4	40	6	5	6	12	11
May	1016	49	56	42	70	34	84	30	71	5·1	2·6	<1	18	<1	<1	1	0	<1	20	64	7·2	7·4	7·5	7·1	6·6	11	2	4	35	8	7	7	12	14
Jun.	1017	53	60	46	73	40	88	36	75	4·2	2·3	0	14	0	0	2	0	0	13	75	8·0	8·4	8·3	7·6	7·5	11	2	2	26	8	10	10	12	19
Jul.	1018	56	62	50	74	44	87	40	77	4·8	2·6	0	16	0	0	4	0	0	12	76	8·1	8·3	8·4	7·9	7·8	10	2	2	27	10	8	10	11	20
Aug.	1017	57	64	51	76	44	86	40	76	5·4	2·6	0	16	0	0	4	<1	<1	19	67	7·4	7·6	8·1	6·9	6·8	9	2	3	30	12	7	7	10	20
Sep.	1015	54	60	47	73	39	81	30	79	7·9	2·9	0	17	0	0	3	<1	<1	22	67	7·2	7·2	7·9	7·1	6·5	13	3	3	31	10	4	4	12	20
Oct.	1012	48	53	43	63	32	71	22	81	12·5	4·4	<1	23	<1	1	2	<1	0	13	76	8·0	7·6	8·7	8·4	7·3	13	4	6	47	5	2	2	8	13
Nov.	1010	42	46	38	57	27	68	14	82	12·3	3·4	2	22	<1	7	1	<1	0	16	71	7·7	7·4	8·0	7·9	7·4	13	6	10	44	4	4	2	6	11
Dec.	1009	37	41	33	52	17	63	1	86	11·1	2·9	8	22	2	15	<1	<1	0	17	70	7·6	7·0	8·1	8·1	7·1	16	8	8	44	3	3	2	6	10
Mean	1014	46	52	40	63	30			78										18	69	7·5	7·3	8·0	7·6	7·8	13	4	5	37	7	5	5	10	14
Extreme or total							88	−6		95·6	4·9	37	215	11	69	18	<1	<1																
Number of year's observations	39	38	38	38	31	31	38	38	10	41	21	41	10	10	10	10	10	10	10	10	←		10		→	←				24				→

* Till 1941. Lat. 54° 18′N. Long. 130° 18′W. Alt. 170 ft.

Climatological Table for PRINCETON. Lat. 49° 29′N.* Long. 120° 30′W.* Altitude above MSL 2,283 ft.*

Month	Pressure: Mean at M.S.L.	Air Temperature at Station Level: Daily Mean	Mean of daily: Max.	Mean of daily: Min.	Mean of monthly: Max.	Mean of monthly: Min.	Absolute extremes: Highest recorded	Absolute extremes: Lowest recorded	Relative Humidity: 1630 L.S.T.	Precipitation: Mean Total, all forms	Precipitation: Max. fall in 24 hours	Precipitation: Mean Snowfall (in. of snow)	Number of days of: Rain, ≥ ·01 in.	Number of days of: Snow, depth ≥ ·1 in.	Number of days of: Frost (in screen)	Number of days of: Fog (vis. ≤ 1 km.)	Number of days of: Gale ≥ 39 m.p.h.	Number of days of: Thunder	Percentage of Time with: Clear sky (≤ 2/10 covered)	Percentage of Time with: Overcast sky (≥ 8/10 covered)	Cloud amount, tenths of sky covered: Mean for four synoptic hours	Cloud: 0430 L.S.T.	Cloud: 1030 L.S.T.	Cloud: 1630 L.S.T.	Cloud: 2230 L.S.T.	Wind Directions (Percentage frequencies means of 24 hourly observations daily): N	NE	E	SE	S	SW	W	NW	Calm
	mb.	°F	°F	°F	°F	°F	°F	°F	%	in.	in.	in.																						
Jan.	1023	16	26	7	40	−17	49	−49	86	1·5	1·0	12	2	11	<1	5	<1	0	18	71	7·6	7·6	8·1	7·7	6·9	12	7	6	2	3	3	3	8	5
Feb.	1018	23	35	11	47	−13	65	−43	75	1·0	2·6	8	2	10	1	6	0	0	20	68	7·4	7·5	8·0	7·6	6·3	16	5	6	1	1	2	6	8	55
Mar.	1016	34	47	21	61	6	74	−20	55	0·7	0·4	4	4	6	0	3	<1	0	26	58	6·5	5·7	7·2	7·3	5·8	17	7	7	5	3	7	9	13	32
Apr.	1016	44	59	29	76	17	89	7	43	0·6	0·5	<1	7	1	<1	1	0	<1	21	60	7·2	6·7	8·6	7·8	5·5	12	5	8	6	4	9	13	18	25
May	1015	52	68	36	85	25	95	20	42	1·0	1·0	<1	9	<1	1	1	<1	1	25	54	6·4	6·3	7·1	7·1	5·0	14	5	9	6	5	8	17	19	17
Jun.	1015	58	74	42	90	32	98	25	44	1·1	0·8	0	11	0	1	<1	0	2	21	58	6·8	7·0	7·0	7·4	5·6	12	6	8	7	5	8	16	20	18
Jul.	1016	63	81	45	96	35	107	31	38	1·0	0·8	0	7	0	1	<1	0	4	42	39	4·7	4·6	5·0	5·7	3·5	15	4	6	11	3	6	16	23	16
Aug.	1016	62	80	44	92	34	101	22	37	0·9	1·2	0	7	0	<1	<1	0	3	37	42	4·9	4·7	5·2	6·0	3·6	16	5	6	10	3	5	14	22	19
Sep.	1017	54	70	38	86	25	94	13	39	1·0	0·6	0	7	0	<1	1	0	<1	42	42	4·9	4·1	5·7	5·9	3·9	16	4	8	7	4	5	10	16	30
Oct.	1018	44	58	30	74	17	90	−1	58	0·9	1·7	1	9	1	<1	6	0	<1	27	58	6·5	6·3	7·3	7·0	5·4	11	4	7	4	3	5	8	15	43
Nov.	1019	31	39	23	54	7	78	−18	81	1·6	1·3	8	7	9	1	8	0	0	13	76	8·1	8·1	8·8	8·0	7·5	12	6	8	2	4	3	6	9	50
Dec.	1019	21	29	14	44	−12	57	−40	89	1·8	2·2	14	3	13	1	6	0	0	14	74	8·0	8·0	8·4	7·8	7·8	12	7	5	1	2	3	5	8	57
Mean	1017	42	55	28	70	13			57										26	58	6·6	6·4	7·2	7·1	5·6	14	6	7	5	3	5	10	15	35
Extreme or total							107	−49		13·1	2·6	47	75	51		37	<1	10																
Number of year's observations	10	45	45	45	20	20	58	58	10	45	11	45	10	10	10	10	10	10	10	10	←		10		→	←				8				→

* Till 1941. Lat. 49° 26′N. Long. 120° 30′W. Alt. 2,075 ft. (town).

Climatological Table for QUESNEL. Lat. 53° 2′N.* Long. 122° 31′W.* Altitude above MSL 1,787 ft.*

Month	Pressure	Air Temperature at Station Level							Relative Humidity	Precipitation			Number of days of						Percentage of Time with		Cloud amount, tenths of sky covered					Wind Directions — Percentage frequencies means of 24 hourly observations daily								
			Mean of daily		Mean of monthly		Absolute extremes																											
	Mean at M.S.L.	Daily Mean	Max.	Min.	Max.	Min.	Highest recorded	Lowest recorded	1630 L.S.T.	Mean Total, all forms	Max. fall in 24 hours	Mean Snowfall (in. of snow)	Rain, ≥ ·01 in.	Snow, depth ≥ ·1 in.	Frost (in screen)	Fog (vis. ≤ 1 km.)	Gale ≥ 39 m.p.h.	Thunder	Clear sky (≤ ²⁄₁₀ covered)	Overcast sky (≥ ⁸⁄₁₀ covered)	Mean for four synoptic hours	0430 L.S.T.	1030 L.S.T.	1630 L.S.T.	2230 L.S.T.	N	NE	E	SE	S	SW	W	NW	Calm
	mb.	°F	°F	°F	°F	°F	°F	°F	%	in.	in.	in.																						
Jan.	1023	15	24	5			59	−51	88	1·4	1·0	13	2	7		5		0	24	61	6·8	6·1	7·7	7·4	6·1	4	1	4	25	10	2	2	18	34
Feb.	1019	20	31	8			66	−50	75	1·0	0·8	9	1	6		3		0	20	65	7·3	6·8	7·7	8·0	6·5	7	1	3	22	8	6	1	19	33
Mar.	1015	32	44	18			74	−30	60	0·8	0·8	4	3	3		4		0	27	57	6·4	5·4	6·8	7·8	5·5	8	2	5	18	16	2	6	20	24
Apr.	1015	43	57	28			88	−7	50	0·6	0·7	<1	5	1		2		<1	14	67	7·6	7·4	8·4	8·7	5·9	13	2	6	18	16	6	5	18	16
May	1015	52	67	36			96	12	44	1·1	1·4	<1	8	0		3		2	25	55	6·5	6·2	6·6	7·5	5·5	10	3	4	16	10	6	6	27	17
Jun.	1014	58	73	44			98	18	49	2·0	1·3	0	11	0		6		3	10	64	7·6	7·6	7·4	8·3	6·9	11	4	7	18	11	5	4	24	17
Jul.	1016	62	78	46			105	30	52	1·9	1·3	0	10	0		6		4	15	64	7·5	7·6	7·8	7·8	6·7	11	3	6	16	10	4	6	25	20
Aug.	1016	61	76	45			101	29	53	1·7	1·5	0	12	0		15		4	22	58	6·7	7·6	6·5	7·1	5·6	11	3	7	16	10	6	6	24	18
Sep.	1017	53	67	38			94	12	50	1·5	1·3	0	9	0		15		1	33	51	5·9	6·6	6·1	6·4	4·4	11	3	5	16	13	7	7	19	20
Oct.	1015	43	54	31			83	−6	64	1·6	1·4	1	9	1		12		<1	18	66	7·4	7·6	8·1	7·7	6·1	4	2	5	30	15	6	4	16	18
Nov.	1018	29	40	21			76	−31	87	1·5	1·0	7	5	5		11		0	16	73	7·8	7·6	8·6	8·1	7·0	6	1	7	24	13	7	3	12	26
Dec.	1016	21	29	12			59	−52	92	1·4	1·0	11	2	8		7		0	14	76	8·1	7·7	8·8	8·4	7·3	5	1	6	28	12	3	3	13	29
Mean	1017	41	53	28					64												7·1	7·0	7·5	7·8	6·1	8	2	5	21	12	5	4	20	23
Extreme or total							105	−52		16·4	1·5	45	77	31		89		14																
Number of year's observations	4	55	44	44			58	58	5	56	21	44	10	10		4		4	4	4	←	—	4	—	→	←	—	—	—	6	—	—	—	→

* Till 1946. Lat. 52°59′N. Long. 122° 30′W. Alt., 750 ft. (town).

Climatological Table for SMITHERS (A). Lat. 54° 50′N.* Long. 127° 10′W.* Altitude above MSL 1,718 ft.*

Month	Pressure	Air Temperature at Station Level							Relative Humidity	Precipitation			Number of days of						Percentage of Time with		Cloud amount, tenths of sky covered					Wind Directions: Percentage frequencies means of 4 hourly observations daily								
	Mean at M.S.L.	Daily Mean	Mean of daily Max.	Mean of daily Min.	Mean of monthly Max.	Mean of monthly Min.	Absolute extremes Highest recorded	Absolute extremes Lowest recorded	1630 L.S.T.	Mean Total, all forms	Max. fall in 24 hours	Mean Snowfall (in. of snow)	Rain, ≥ ·01 in.	Snow, depth ≥ ·1 in.	Frost (in screen)	Fog (vis. ≤ 1 km.)	Gale ≥ 39 m.p.h.	Thunder	Clear sky (≤ 2/10 covered)	Overcast sky (≥ 8/10 covered)	Mean for four synoptic hours	0430 L.S.T.	1030 L.S.T.	1630 L.S.T.	2230 L.S.T.	N	NE	E	SE	S	SW	W	NW	Calm
	mb.	°F	°F	°F	°F	°F	°F	°F	%	in.	in.	in.																						
Jan.	1019	16	27	11			48	−48	76	1·8	2·4	14	2	8	31	2	0	0	20	68	7·3	6·8	7·8	7·9	6·8	2	1	13	32	4	3	2	5	38
Feb.	1017	20	31	11			52	−35	82	1·2	0·6	9	1	7	28	2	0	0	20	65	7·2	6·7	8·0	7·8	6·4									
Mar.	1015	30	41	20			61	−23	68	0·9	0·6	6	1	4	30	1	0	0	26	56	6·4	5·5	7·0	7·5	5·7									
Apr.	1014	40	52	29			74	−1	58	1·0	1·0	<1	5	1	23	<1	0	0	20	63	7·2	6·4	8·0	8·5	5·7	4	1	10	24	8	6	5	10	32
May	1016	49	62	35			86	20	52	1·6	2·1	0	10	0	9	1	0	<1	24	57	6·6	6·3	7·0	7·3	5·6									
Jun.	1016	54	67	40			98	26	51	1·6	1·0	0	11	0	2	2	0	1	16	59	7·1	6·8	7·3	7·6	6·6									
Jul.	1017	57	70	43			99	29	56	1·9	1·2	0	12	0	<1	2	0	1	12	66	7·6	7·4	7·8	8·2	6·9	7	3	8	9	4	3	13	16	37
Aug.	1016	56	72	41			91	24	55	1·2	0·8	0	8	0	2	3	0	1	25	51	6·2	5·6	6·6	7·0	5·7									
Sep.	1016	50	64	37			86	18	62	1·3	0·8	0	9	0	7	3	0	<1	29	50	6·0	5·5	6·8	6·7	4·9									
Oct.	1014	40	50	32			75	7	74	1·8	1·7	1	11	1	19	5	0	0	14	69	7·5	6·9	8·2	8·2	6·6	2	1	15	24	6	4	5	6	37
Nov.	1014	28	36	21			59	−19	87	1·9	2·0	9	7	9	27	3	0	0	11	73	8·0	7·6	8·6	8·4	7·3									
Dec.	1013	18	27	12			50	−30	92	2·0	1·1	16	2	12	31	3	0	0	15	70	7·3	6·7	7·3	8·1	7·0									
Mean	1017	38	50	28					68										19	62	7·0	6·5	7·5	7·8	6·2	4	1	12	22	6	4	6	9	36
Extreme or total							99	−48		18·1	2·4	55	79	42	209	27	0	3																
Number of years observations	8	13	10	10			50	50	8	13	14	10	10	10	9	9	9	9	9	9	←	—	9	—	→	←	—	—	—	9	—	—	—	→

* Till 1941. Lat. 54° 47′N. Long. 127° 12′W. Alt. 1,631 ft. (town).

Climatological Table for VANCOUVER (A). Lat. 49° 11′N. Long. 123° 10′W. Altitude above MSL 22 ft.

Month	Pressure: Mean at M.S.L.	Air Temperature at Station Level: Daily Mean	Mean of daily: Max.	Mean of daily: Min.	Mean of monthly: Max.	Mean of monthly: Min.	Absolute extremes: Highest recorded	Absolute extremes: Lowest recorded	Relative Humidity: 1630 L.S.T.	Precipitation: Mean Total, all forms	Precipitation: Max. fall in 24 hours	Precipitation: Mean Snowfall (in. of snow)	Number of days of: Rain, ≥ ·01 in.	Snow, depth ≥ ·1 in.	Frost (in screen)	Fog (vis. ≤ 1 km.)	Gale ≥ 39 m.p.h.	Thunder	Percentage of Time with: Clear sky (≤ 2/10 covered)	Overcast sky (≥ 8/10 covered)	Cloud amount, tenths of sky covered: Mean for four synoptic hours	0430 L.S.T.	1030 L.S.T.	1630 L.S.T.	2230 L.S.T.	Wind Directions (Percentage frequencies means of 24 hourly observations daily): N	NE	E	SE	S	SW	W	NW	Calm
	mb.	°F	°F	°F	°F	°F	°F	°F	%	in.	in.	in.																						
Jan.	1015	36	41	31	52	17	59	0	84	4·9	1·5	6	15	3		11		0	18	72	7·7	7·4	8·1	8·0	7·2	3	8	46	17	5	4	6	8	2
Feb.	1017	39	45	33	54	22	61	3	79	5·1	2·6	5	15	3		7		0	21	69	7·5	7·4	7·8	7·7	6·9	4	8	42	14	5	5	9	12	2
Mar.	1016	42	49	36	60	27	66	15	71	3·7	1·5	1	16	0		4		<1	25	62	6·8	6·5	7·4	7·2	6·2	4	7	32	15	7	6	11	15	2
Apr.	1017	49	56	41	68	33	76	26	67	2·5	1·8	<1	14	0		2		<1	21	64	7·2	7·2	7·8	7·3	6·3	3	6	26	16	8	9	13	17	1
May	1017	54	63	46	74	38	83	36	65	2·0	1·4	0	10	0		1		1	28	55	6·3	6·5	6·8	6·2	5·7	2	5	25	18	6	8	15	18	2
Jun.	1017	60	68	51	78	44	83	40	64	1·4	1·6	0	9	0		1		1	24	57	6·6	7·1	7·1	6·1	6·1	2	5	25	20	7	8	17	16	1
Jul.	1018	63	72	55	82	48	87	44	62	1·1	0·7	0	7	0		1		1	39	44	5·2	5·8	5·8	4·9	4·3	2	4	25	25	8	8	14	13	1
Aug.	1017	63	71	54	80	48	87	45	65	1·2	1·2	0	7	0		5		1	41	42	5·0	5·6	5·8	4·8	3·6	2	3	26	25	5	6	12	19	2
Sep.	1017	58	66	50	76	39	84	32	70	2·0	1·6	0	9	0		12		<1	39	49	5·4	5·3	6·4	5·3	4·6	2	5	27	18	4	5	15	21	2
Oct.	1016	50	57	44	66	32	71	27	79	4·9	1·8	0	15	0		13		<1	23	66	7·1	7·4	7·7	7·1	6·3	4	7	35	17	4	4	10	17	2
Nov.	1017	43	49	37	57	26	62	20	84	5·2	1·6	1	17	1		10		<1	16	76	8·0	7·8	8·3	8·3	7·6	3	8	40	18	6	5	8	10	2
Dec.	1016	39	44	34	54	20	57	8	89	6·5	2·3	3	18	2		13		0	17	74	7·9	7·6	8·2	8·2	7·6	3	8	43	18	5	5	6	9	2
Mean	1017	50	57	43	67	33			73										26	61	6·7	6·8	7·3	6·8	6·0	3	6	33	18	6	6	11	15	2
Extreme or total							87	0		40·3	2·6	18	152	9		80		4																
Number of years observations	14	14	14	14	14	14	14	14	10	14	14	14	13	13		10		10	10	10	←		10		→	←				13				→

Climatological Table for VANCOUVER (City). Lat. 49° 17′N. Long. 123° 05′W. Altitude above MSL 45 ft.

Month	Pressure	Air Temperature at Station Level							Relative Humidity	Precipitation			Number of days of						Percentage of Time with		Cloud amount, tenths of sky covered					Wind Directions: Percentage frequencies means of 24 hourly observations daily								
	Mean at M.S.L.	Daily Mean	Mean of daily Max.	Mean of daily Min.	Mean of monthly Max.	Mean of monthly Min.	Absolute extremes Highest recorded	Absolute extremes Lowest recorded	1630 L.S.T.	Mean Total, all forms	Max. fall in 24 hours	Mean Snowfall (in. of snow)	Rain, ≥ ·01 in.	Snow, depth ≥ ·1 in.	Frost (in screen)	Fog (vis. ≤ 1 km.)	Gale ≥ 39 m.p.h.	Thunder	Clear sky (≤ 2/10 covered)	Overcast sky (≥ 8/10 covered)	Mean for four synoptic hours	0430 L.S.T.	1030 L.S.T.	1630 L.S.T.	2230 L.S.T.	N	NE	E	SE	S	SW	W	NW	Calm
	mb.	°F	°F	°F	°F	°F	°F	°F	%	in.	in.	in.																						
Jan.	1016	37	41	32			59	2		8·2	3·6	11	17	4		4	0	0								1	18	39	19	4	5	6	6	2
Feb.	1017	39	45	34			61	8		6·1	2·8	6	15	3		3	0	0								2	16	37	18	3	6	7	8	3
Mar.	1016	43	50	37			68	15		5·3	4·0	3	17	1		1	0	<1								2	17	30	16	3	8	11	11	2
Apr.	1016	49	57	41			79	27		3·5	2·2	<1	14	3		<1	0	1								3	13	29	15	3	9	11	15	2
May	1016	55	64	46			83	33		2·8	1·6	0	12	0		<1	0	1								3	11	26	17	3	11	12	15	2
Jun.	1016	60	69	51			92	40		2·3	1·9	0	10	0		<1	0	1								2	10	25	22	3	11	10	15	2
Jul.	1017	64	74	54			91	43		1·3	1·7	0	7	0		0	0	1								2	8	23	22	3	11	12	16	3
Aug.	1016	63	73	54			92	39		1·6	2·4	0	7	0		<1	0	1								2	11	25	21	2	9	9	16	5
Sep.	1015	58	66	50			86	30		3·4	3·4	0	10	0		2	0	1								2	13	26	16	2	8	12	16	5
Oct.	1017	51	57	44			77	21		6·3	3·1	<1	15	<1		6	0	<1								2	15	30	14	2	7	11	13	6
Nov.	1018	44	48	39			63	10		8·1	5·1	2	18	1		6	0	<1								1	17	36	17	3	5	8	9	4
Dec.	1016	39	43	35			60	8		8·8	4·2	5	20	3		5	0	<1								2	18	40	18	4	6	5	4	3
Mean	1016	50	57	43																						2	14	31	18	3	8	9	12	3
Extreme or total							92	2		57·9	5·1	27	163	13		29	0	8																
Number of years observations	28	40	40	40			40	40		52	52	52	31	31		27	27	27								←				21				→

Climatological Table for VICTORIA (Gonzales). Lat. 48° 25′N. Long. 123° 19′W. Altitude above MSL 228 ft.

Month	Pressure	Air Temperature at Station Level							Relative Humidity	Precipitation			Number of days of						Percentage of Time with		Cloud amount, tenths of sky covered					Wind Directions — Percentage frequencies means of 24 hourly observations daily								
			Mean of daily		Mean of monthly		Absolute extremes																											
	Mean at M.S.L.	Daily Mean	Max.	Min.	Max.	Min.	Highest recorded	Lowest recorded	1630 L.S.T.	Mean Total, all forms	Max. fall in 24 hours	Mean Snowfall (in. of snow)	Rain, ≥ ·01 in.	Snow, depth ≥ ·1 in.	Frost (in screen)	Fog (vis. ≤ 1 km.)	Gale ≥ 39 m.p.h.	Thunder	Clear sky (≤ 2/10 covered)	Overcast sky (≥ 8/10 covered)	Mean for four synoptic hours	0430 L.S.T.	1030 L.S.T.	1630 L.S.T.	2230 L.S.T.	N	NE	E	SE	S	SW	W	NW	Calm
	mb.	°F	°F	°F	°F	°F	°F	°F	%	in.	in.	in.																						
Jan.	1017	39	43	36			56	6	83	4·0	3·0	4	16	2	4	4	1	<1	17	69	7·6		7·8	7·3		30	18	14	11	7	7	11	2	<1
Feb.	1016	41	46	37			60	9	78	3·2	3·2	3	13	2	3	2	1	<1	17	72	7·6		7·7	7·6		31	15	12	10	7	8	14	2	1
Mar.	1016	45	50	39			69	27	73	2·1	2·3	1	15	<1	1	2	1	0	20	65	7·2		7·3	7·0		19	10	10	8	9	16	24	3	1
Apr.	1017	49	56	43			75	32	71	1·2	1·4	<1	11	<1	<1	1	1	<1	20	61	6·9		6·9	6·9		14	9	8	6	10	22	28	2	1
May	1016	54	61	47			85	35	67	1·0	1·5	0	7	0	0	2	<1	1	29	50	5·9		6·2	5·7		10	6	6	4	13	29	30	1	1
Jun.	1017	57	65	50			95	41	69	0·9	1·3	0	6	0	0	2	<1	<1	32	42	5·5		5·7	5·3		6	4	4	2	15	34	33	1	1
Jul.	1018	60	68	52			95	46	68	0·5	0·8	0	4	0	0	2	<1	<1	44	36	4·5		4·6	4·4		4	4	4	2	16	40	29	<1	1
Aug.	1017	60	68	52			91	46	72	0·6	0·9	0	4	0	0	3	0	<1	45	35	4·5		4·9	4·1		5	5	5	2	17	37	26	1	2
Sep.	1017	57	65	50			89	40	73	1·3	1·7	0	7	0	0	6	<1	<1	36	46	5·4		5·6	5·3		14	10	8	4	15	21	24	1	3
Oct.	1017	51	57	46			77	27	80	2·9	1·7	0	13	<1	0	6	2	<1	22	61	6·9		6·8	7·0		24	12	11	8	12	12	17	2	2
Nov.	1016	45	49	41			66	24	92	3·7	1·6	1	17	<1	1	3	1	<1	10	74	8·1		8·1	8·0		31	15	14	10	8	7	12	2	1
Dec.	1016	41	45	38			59	12	86	4·8	1·9	2	20	1	5	3	1	0	14	73	7·8		8·0	7·7		28	14	14	14	9	7	12	1	1
Mean	1017	50	56	44					76										26	57	6·5		6·6	6·4		18	10	9	7	12	20	22	1	1
Extreme or total							95	6		26·2	3·2	10	133	5	14	36	8	3																
Number of years' observations	10	30	30	30			30	30	10	30	30	30	10	10	10	10	10	10	10	10	10		10	10		←				23				→

PART II

The Climate of Northern British Columbia and the Yukon Territory

CHAPTER 8

Topography and Climatic Divisions

8.1 Introduction and General Climate

This Region includes Canada west of the Rockies and the Mackenzie Mountains, from about lat. 55°N to the Arctic. It is a land of plateau and mountain-range, some wide open vales but many deep and narrow valleys, the whole clothed with monotonous forests of conifers and poplars up to an altitude of (in the central part) about 5,000 feet. Roads are few and most of them lonely, but they include two important through routes: the Alaska Highway (Dawson Creek to Alaska) and the Hart Highway (Prince George to Dawson Creek and Fort St. John). The only railway is the little narrow-gauge White Pass line from Whitehorse to Skagway. Population is scanty indeed and nearly all is collected in the few towns and round mines; many names of towns famous in the gold-rush of the nineties remain on the map, but the towns are but shadows of their former size and wealth—Dawson City, Fort Selkirk, Atlin. Widely scattered are telegraph repeater-stations, radio-ranges, airports; roadhouses, fairly numerous, but far apart, cater for the traffic, not inconsiderable in summer, on the Alaska Highway.

The Region is a continuation to the northwest of southern British Columbia and thus is in higher latitudes, between 55° and 70°N. Topographically it differs in being of a plateau type (the greater part is so named on the official maps, but the plateaux are much modified from the flatness which the word connotes), while the south of British Columbia consists of a series of almost parallel mountain-ranges. An equally important, or more important, climatic factor is the absence of seaboard, for this northern Region is out off from the Pacific, physically as well as politically, by the narrow panhandle of Alaska which includes the innumerable islands off the coast as well as the seaward slopes of the Coast and the St. Elias Mountains. Though from some of their highest points the Pacific is within sight our Region is essentially continental, for the ranges are so high and continuous (despite the deep river-valleys which cut through them, but are too narrow and tortuous to form atmospheric corridors) that they form a strong climatic divide. The Rocky Mountains on the east are a less secure defence against the winter rigours of the Mackenzie Basin.

Summary descriptions of the seasons and of the major topography (as bearing upon climatic conditions) follow. The bounding mountain-systems on west and east are considered first, after them the 'Interior Plateau', and lastly the little-known far north of the Yukon Territory. The border between British Columbia and Yukon Territory is the parallel of 60°N., which has no relation to natural features; the grain of the land is SE–NW (except in the far north), and is very obvious in the mountains, rivers, and lakes.

In winter the whole region is under snow and ice. Snow is not deep on the lower ground, and transport is not much impeded except by occasional drifts (indeed by frequent drifts at bad places), but it lies deep on the uplands with

10-foot drifts burying the few roads and trails, and stopping wheel-traffic. The days are short in the south; north of the Ogilvie Mountains the sun does not rise above the horizon in midwinter. Rivers are frozen to a depth of some feet; the sky is fairly bright, the air usually almost calm, clear and dry, making the cold easy to bear, healthy and not unpleasant. But fog tends to lie in the hollows, and the glint of ice-crystals is often seen.

March brings signs that winter is ending; the days are lengthening rapidly; mean temperature rises though extreme cold is still possible. On the lowlands snow is disappearing, and the ice on the rivers begins to break up and melt. But true spring is only a short and much interrupted transition between winter and summer. June may perhaps deserve the latter name; by then most of the snow has gone except on the hills, many lakes have open water though some are still covered with white ice glistening in the bright sunshine; rivers are rising fast with melt-water from their mountain-sources; channels on the hill-sides, dry or snow-filled most of the year, hold rushing torrents which undermine and wash away roads that are not well engineered, for the culverts are blocked with solid ice and snow. The twigs of the dark spruce begin to put forth their yellow-green new leaves, and great stands of poplar show up from afar, vivid green patches among the solemn conifers. The white trunks and delicate leafage of paper-birches dot the hill-sides. The midday sunshine of calm days is warm and welcome, but temperature falls fast in the evening; bleak cold winds, often carrying an irritating dust, make brittle weather which is only too frequent.

Summer is pleasant but short. Snow and ice have disappeared except on the highest uplands; rivers and lakes are open water, now at its highest level. Bright flowers bloom, in surprising profusion for these high latitudes, to live their short lives on the sunny slopes. The delicately-tinted skies above the glow of the midnight sun adorn the calm peace of night; white cumulus clouds, sometimes swelling to thunderstorm size and shape, reflect the midday sun as they sail through the deep-blue sky; a beautiful azure haze veils the distant hills. The land often dries out, and forest-fires may sweep through vast tracts, leaving ugly bare scars with blackened, naked, tree-trunks; drought is as serious a threat as cold to such little agriculture as is carried on. The valleys may hold strips of white fog at night after rain.

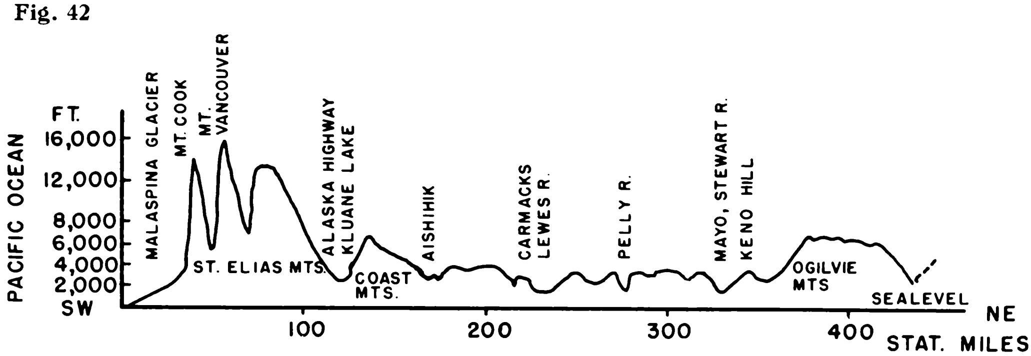
September is definitely autumn. The sun is still warm by day, but the nights foretell the rapid approach of winter. Snow begins to whiten the lower slopes of the uplands and makes a bright background for the gay autumn tints of the poplars among the black spruce. After mid-October rain is rare even on the lowlands, and little falls till April over most of the Territory. By mid-October the roads and trails on the highlands, including the Haines Cut-off, are closed by snow-drifts and remain closed till the following May or June, 10-foot drifts not seldom remaining in mid-May. All the lakes are freezing up, and most bear a sheet of thick ice from the end of October till June.

8.2 Topography and its Influence on the Climate

The Coast Mountains, as in the south of British Columbia, are of more climatic importance than their height might suggest. With ranges of about 6,000 feet in the south, increasing to 8,000 feet in the north, and a few peaks as high as 10,000 feet (Mt. Ratz, 57.4°N., 10,290 feet), their continuity and breadth constitute an effective divide between the Pacific Ocean and the interior; several rivers cut their way through them to the sea in remarkably wild, deep valleys or gorges, with almost precipitous sides, and bottoms 1,000 feet or less above sea-level, but there are no passage-ways wide enough to facilitate the movement of air-masses. Many snow- and small ice-fields cap the highest tracts.

The Coast Mountains continue northwest into Yukon Territory between Aishihik and Kluane Lakes with uplands above 7,000 feet, to die out near the Alaska frontier, but they belie their name by leaving the coast. A much more imposing system, the St. Elias Mts., replaces them as the coastal rampart; the Alaska Highway west of Whitehorse marks the line of separation (Fig. 42). The St. Elias Mts. start on the west of Chatham Inlet and increase in breadth and height to the frontier and beyond where, with a breadth of 100 miles over a similar length, they are among the outstanding mountain-systems of the globe,

Fig. 42

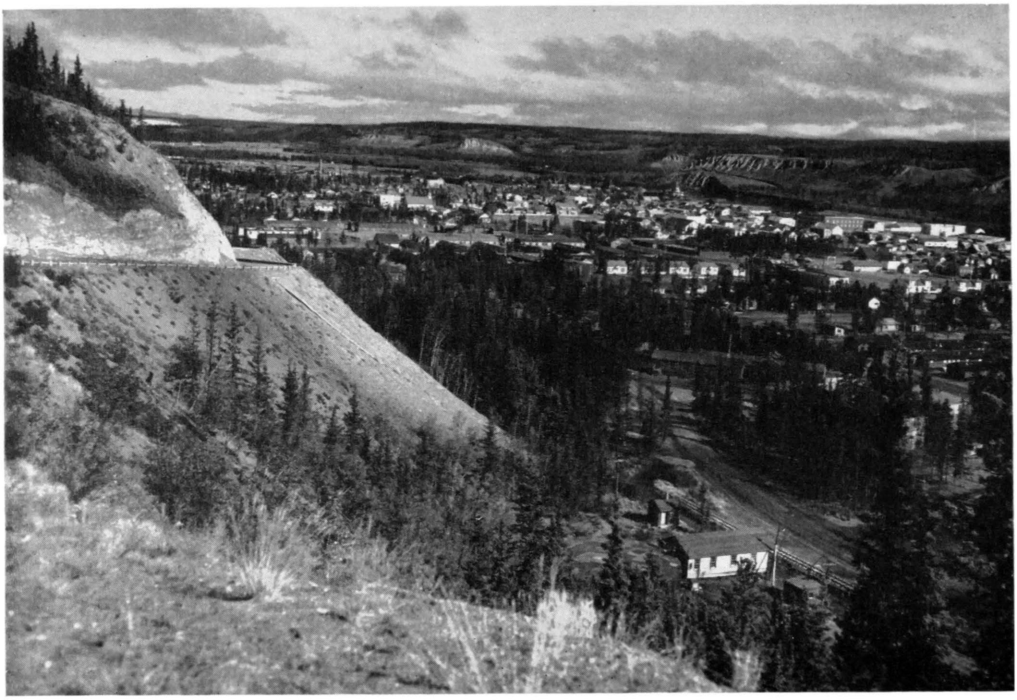


Profile from the Pacific Ocean northeastward through the Yukon.

containing many summits over 15,000 feet, the highest, Mt. Logan, being nearly 20,000 feet. Their snows maintain great ice-fields above 10,000 feet which feed innumerable long valley-glaciers on all sides, and such masses of slowly-moving ice as the Malaspina Glacier in Alaska which spreads to a width of 25 miles near the Pacific. The glacier-system of these mountains is said to be the largest on the globe except the polar ice-caps. Behind this double rampart, one of them of such magnitude, the severely continental climate of the interior is able to approach remarkably close to the ocean.

The Rocky Mountains and the ranges which succeed them towards the northwest form the boundary, and climatic defence, of the Region in the east. The Rockies are much less lofty here than in the south of British Columbia, but they exceed 9,000 feet and small areas about 57°N have snow and ice. South of this they are interrupted by a wide depression with the narrow, and in its lower levels very rugged, valley of the Peace River (2,000 feet) making its turbulent way through from the Rocky Mountain Trench to Alberta and finally the Arctic. Northward the altitude increases (in much of the uplands to over 7,000 feet, with peaks above 9,000 feet) to the next passage-way, the valley of the Liard River flowing to the Mackenzie River, here at a level of about 2,000 feet; the Alaska Highway takes advantage of the depression. Here the Rocky Mountains end, leaving a broad corridor on their north. But the Mackenzie Mountains, a much wider system, including the Selwyn Ranges, take up their trend about 100 miles to the east, and continue it along the Yukon-Northwest Territory border, to about 65°N., where they turn west as the narrower and less lofty Ogilvie Mountains as far as the Alaska frontier. Much of the Mackenzie Mountains between 62° and 65°N. is but little known; most of the uplands probably exceeds 5,000 feet, parts 8,000 feet (Keele Peak 8,500 feet). The Ogilvie Range rising to 7,000 feet forms the divide between the more or less known and developed central Yukon and little visited, or explored, north.

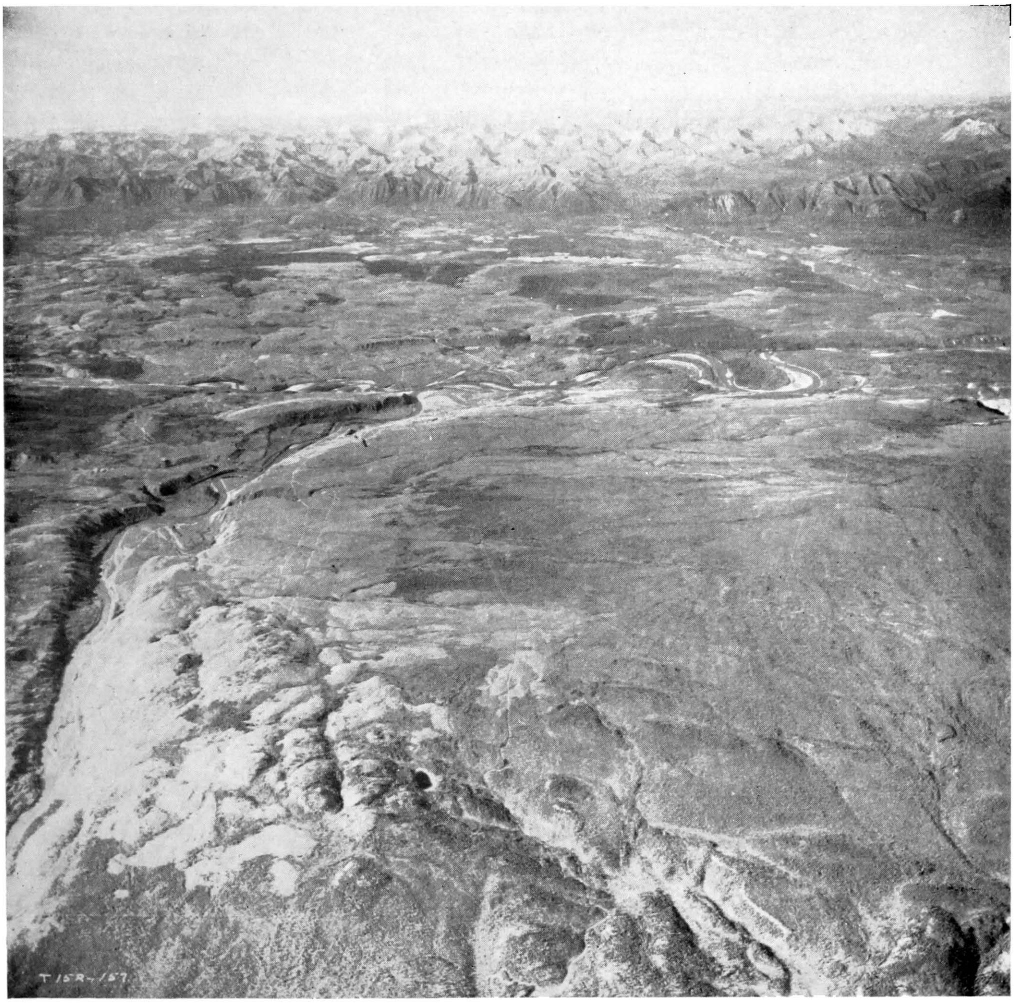
The 'Interior Plateau' is an elevated area with average height about 4,000 feet, but it is far from being the flattish tableland implied by its name. Most of it is rough, irregularly rolling upland, similar in general type but differing considerably in elevation; large areas exceed 5,000 feet and isolated mountains even 6,000 feet, but they are still rough upland with few peaks standing out conspicuously in height or shape. 'Rough highland' is a more suitable description than 'plateau'. More conspicuous than the elevations are the uplands 'vales',



A view of Whitehorse where the Yukon River has cut down through some two hundred feet of silt.

wide depressions of rather desolate country with flattish bottoms and gently-sloping sides among the higher uplands, and much more spectacular, the numerous river-valleys, deep and narrow with steep and in places precipitous sides. Many are ravines incised two or three thousand feet in the highland blocks by the recent Pleistocene glaciers and the present-day rivers rushing impetuously to the Pacific; some contain long narrow ribbon-lakes. Thus topography determines three main climatic types: the high upland, the elevated vale, the deep river-valley; unfortunately meteorological stations are few, and all are in the valley-bottoms.

This interior plateau comprises the whole wide expanse between the Coast Mountains and the Rockies, from the south boundary of the Region, 55°N., to the Mackenzie and Ogilvie Mountains and beyond. The general level slopes very gently from the neighbourhood of lat. 57°N. to the basin of the Yukon River.



View of the broad Yukon Plateau looking southward across Ross River Post and the junction of the Ross and Pelly Rivers.

Subdivisions may be recognised. A median elevation forms a backbone, the Stikine Mountains, through British Columbia with the usual grain, here SSE–NNW, and altitude running from an average 7,000 feet to over 8,000 feet in its highest tracts. The feature continues into Yukon Territory between Teslin River and Lake and the Liard River and is known there as the Cassiar Mountains, rising above 6,000 feet only in small areas. It ends in the Pelly Mountains which overlook the Pelly River.

Between the Stikine Mountains and the Coast Ranges is a belt of ill-defined broken upland of the general type of the Stikine Mountains, the 'Skeena Mountains' (about lat. 57°N.), which forms a broad divide between the Skeena and

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Naas Rivers on the south and the Stikine River on the north. Farther north it contains Atlin and Tagish Lakes where it meets the basin of the Lewes River; Atlin provides a long and useful series of meteorological observations, discontinued since 1946, and Telegraph Creek on the Stikine River a short series, also discontinued.

On the east the Stikine Mountains are more sharply bounded by the Rocky Mountain Trench, the well-known and remarkable geological and orographical feature (see Sect. 1.1) which separates it from the Rocky Mountains. It extends through British Columbia (with the usual SSE–NNW trend) as a narrow, straight, depression or valley 10-20 miles wide, its floor at a height of 2,500 feet; in the south it is drained by the Parsnip and the Finlay to the Peace River, and in the north by the Kechika to the Liard. At the provincial frontier it widens into the extensive basin occupied by the head waters of the Liard River and its tributaries (including Frances River and Lake) and continues WNW as a relative lowland containing the Lewes River, the Pelly River, the Stewart, and their many tributaries, themselves wide and deep rivers, which unite to form the great Yukon. This last area is the 'Yukon plateau' of the maps; but it is the lowest part of our region in respect of both its upper levels (about 3,000-4,000 feet) and its valleys (all the major valley-bottoms are below 2,000 feet). Here, as in the interior uplands of British Columbia, the actual river-valleys are deep and steep sided, incised in recent time in the open and much older upper vales. The Lewes River, the most southern tributary of the Yukon, comes down from the White Pass, the most important passage between the Pacific Ocean and Yukon Territory, and the Yukon River leaves the Territory in a valley below 1,000 feet northwest of Dawson City, the lowest level in the Territory except in the far north.

Largely as a result of the increasing height and breadth of the mountain-systems on the southwest and northeast, the Yukon Plateau has the most continental climate of the Region, with the least precipitation and the largest range of temperature.

The Territory north of the Mackenzie—Ogilvie Mountains is also called plateau. The east, the Peel Plateau, is drained by the Peel River to the Mackenzie delta, the northwest (a valuable district for furs) by the Porcupine River to the Yukon; the general level is estimated at about 4,000 feet. In the extreme north it is cut off sharply and overlooks the low coastal plain, 100 miles long in Yukon Territory and 15 miles wide, and the ice-bound Beaufort Sea. The coastal plain and north of the plateau are treeless Barrens; the tree-line rises southward to about 5,000 feet in the south of Yukon Territory and higher in British Columbia, but, as everywhere, it varies with local conditions, climatic and edaphic; in the wild windy uplands through which the Haines Cut-off runs it is down to 2,700 feet.

To emphasize the outstanding topographical controls of this large and not very well known land with somewhat complicated relief we tabulate the major features:—

(a) The region is in high latitudes, and continental despite the proximity of the oceans.

(b) As a whole it is upland and mountain, bounded by mountain-systems; its climate is of a modified plateau type.

(c) The Coast Mountains and the St. Elias Mountains are so continuous and lofty that they form a remarkably effective barrier against Pacific influences. Most of such Pacific influences as do penetrate come through the depression which includes the White (alt. 2,915 ft.), the Taku, and other passes south and southeast of Whitehorse, the Haines Cut-off passage, and possibly the lower valley of the Alsek River.

(d) The Rockies are a rampart on the east against the winter thrusts of extremely cold polar air from the Northwest Territories. But the defence is not impassable, the barrier being lower and less continuous than the Coast Mountains, and the interior is liable to intensely cold spells.

8.3 Meteorological Stations

The stations with the longest records which are used in this Chapter are listed in Table 60 and mapped in Fig. 43. Observations at other places, many of them landing-strips, for a year or so, are too short for determining the climate of a land with great variability from year to year.

Table 60

Meteorological stations in Yukon Territory and northern British Columbia

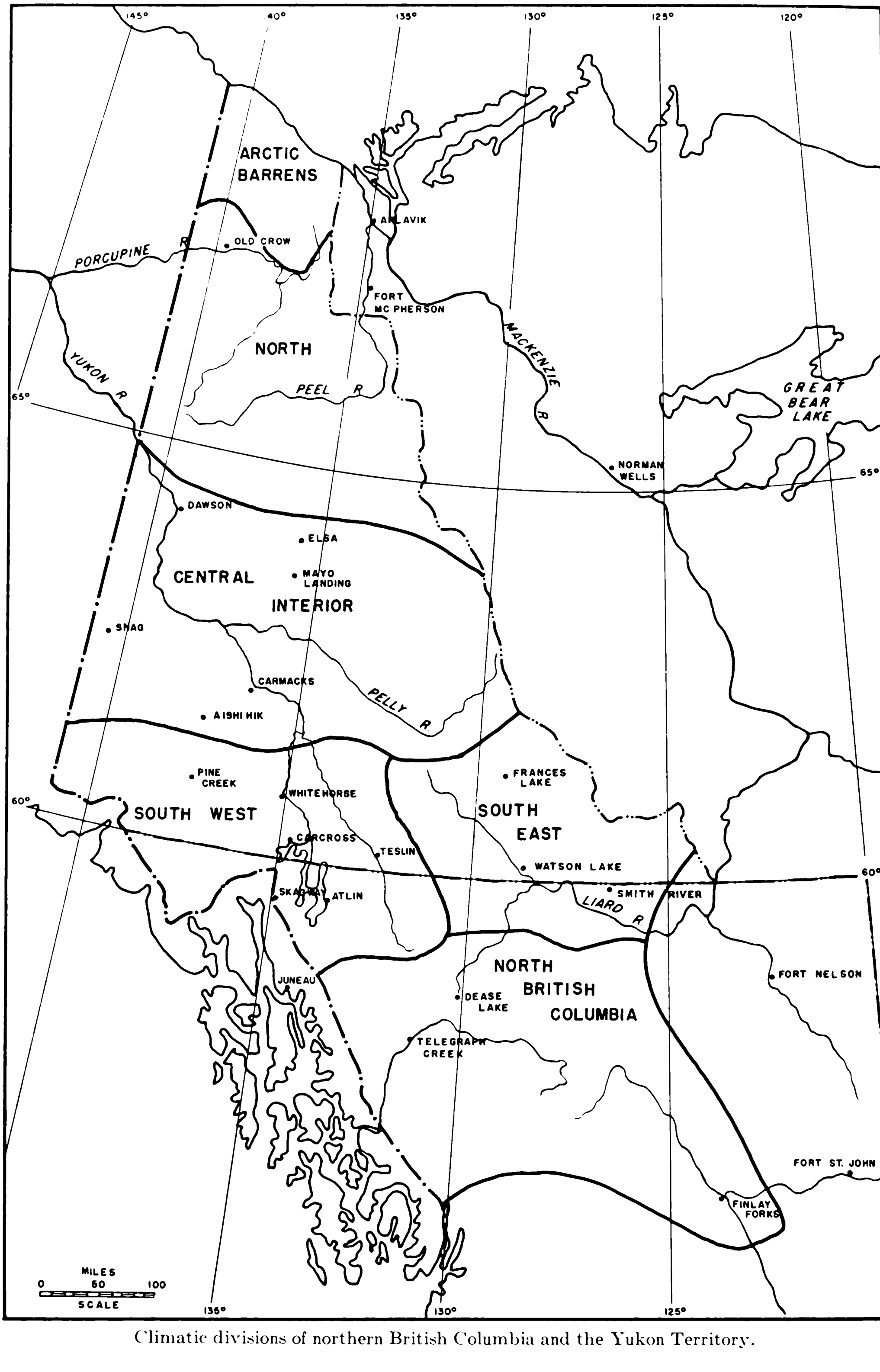
Station	Latitude N. °	'	Longitude W. °	'	Altitude feet
Aishihik (A)	61	37	137	31	3,170
Atlin	59	35	133	38	2,240
Carcross	60	11	134	34	2,171
Dawson City	64	4	139	29	1,062
Dease Lake (A)	58	25	130	0	2,678
Elsa	64	0	135	40	3,000*
Finlay Forks (A)	56	0	123	49	1,900
Frances Lake	61	17	129	24	2,425
Mayo Landing (A)	63	35	135	51	1,625
Smith River (A)	59	52	126	30	2,208
Snag (A)	62	22	140	24	1,925
Teslin (A)	60	10	132	44	2,300
Watson Lake (A)	60	7	128	48	2,248
Whitehorse (A)	60	43	135	5	2,289

*(Approx.)

In north British Columbia only two stations (except Atlin and Smith River which belong climatically rather to Yukon Territory), Finlay Forks and Dease Lake, have records for even 6 years. The deeply incised valleys in which they are situated seem to exert even more than the usual strong control of such topography (and in all British Columbia the bold relief is a very large factor). The Coast Range, here politically in Alaska, is as effective a screen from the ocean as in the south.

In the Yukon most stations are in the south, on or near the Alaska Highway. On the British Columbia border Atlin has a good and long series of records (1905-46), but it no longer functions; Smith River is a new station on the airfield with records since 1944. The only stations used for Central Yukon are Dawson City and Mayo, which have the longest records in the Territory. Unfortunately all the stations are in the valleys, and all except Whitehorse (which is on the airfield, a wide table overlooking the town and Lewes River from 200 feet above) on the valley-floors. The high valleys, the uplands, and the summits are meteorologically unknown except in so far as their clouds and snow-cover can be seen

Fig. 43



Climatic divisions of northern British Columbia and the Yukon Territory.

from the air above. It may be assumed that their tops and windward slopes have much more low cloud and precipitation, especially snow, than the adjacent lowlands; that their mean minimum air temperatures, both daily and seasonal, up to about 1,500 feet are higher, particularly round frost-hollows; and their maxima considerably lower than on the lowlands. Above 1,500 feet the minima probably begin to fall below the lowland values, and the maxima continue to decrease, but no estimate of the differences can be suggested. Approximate mean monthly temperatures on the uplands may be estimated by deducting from available means at stations in neighbouring valleys 1°F. for each 330 feet of elevation above them, but they will probably be too high for the summer months, and considerably too low for the winter when the valleys often contain unduly cold air under an inversion of temperature.

8.4 Climatic Divisions

The regional divisions shown in Fig. 43 can be only approximate, adopted rather to facilitate discussion of the available records than to delimit climatic regions.

The Southwest of the Yukon has the least continental, the Central Interior the most continental, climate. The Southeast is almost as continental as the Central Interior; it is the upper basin of the Liard River which flows east to the Mackenzie, enclosed by the Cassiar and Pelly Mountains on the west and on the east rising into the south end of the Mackenzie Mountains (here known as the Selwyn Range). Its forests are the best in the Territory with stands of trees up to 120 feet high and 2 feet in diameter at 5 feet from the ground; they seem to be specially favoured in freedom from fires, no extensive fire having occurred since 1873.

Northern British Columbia resembles the south of Yukon Territory in many respects, but it enjoys longer days and more sunshine in winter (though air temperatures are hardly higher than in the Yukon) and a longer and warmer summer thanks to its lower latitude.

The Ogilvie Mountains serve as the northern boundary of the Central division, all of which is in the Yukon River basin. North of the Ogilvie Range is the North division which has no observations except from Old Crow for about one year, and indeed some of the area is hardly yet explored. Other meteorological stations are Aklavik and Fort McPherson across the border in Northwest Territory, with moderately long records, but they are in the delta of the Mackenzie River, topographically very different from the Yukon plateau. Aklavik however, is probably fairly representative of the Arctic littoral, and its records are included in some of the Tables of Part II. This North division is forested in the south, but northward the forests thin out, trees are smaller and shorter, the tree-line on the hills lower, and the northern tract of the plateau as well as the littoral are treeless Barrens where summer is too cool and short for plant growth save stunted shrubs and annuals.

8.5 Length of Day and Night

The whole Region is north of lat. 55°N., all Yukon Territory beyond 60°N. and part beyond the Arctic circle. In winter even in the south the days are short and get no effective sunshine, the north gets none at all (Tables 61, 62). Summer makes a new world. The snow has disappeared except on the mountains under the rapidly lengthening sunshine of May, vegetation advances apace, and 24 hours daylight—24 hours of possible sunshine in the north—foster a better plant growth than the air temperature would suggest. At the Experimental Farm at Pine Creek (near Haines Junction) the grain—wheat and barley—is sown in late April in an average year and growth is so rapid through the long warm summer days that it is clearly visible from day to day. Shortage of water, even actual drought, is at least as great a hazard as cold.

Table 61

Sunrise and sunset; the times given are when the sun's upper limb appears on the unobstructed horizon with normal atmospheric refraction; north of lat. 65° the times vary appreciably with changing refraction

Lat.	Date	Time of sunrise	Time of sunset	Duration of sun above horizon h.	m.
56°	21 Dec.	0829	1526	06	57
	21 June	0313	2050	17	37
60°	21 Dec.	0902	1454	05	52
	21 June	0235	2128	18	53
62°	21 Dec.	0923	1432	05	09
	21 June	0209	2154	19	45
65°	21 Dec.	1011	1345	03	34
	21 June	0100	2303	22	03
67°	21 Dec.			00	00
	21 June			24	00

Table 62

Dates of disappearance and reappearance of sun in winter

Lat.	Disappearance	Reappearance
68°	9 Dec.	3 Jan.
70°	26 Nov.	17 Jan.
72°	17 Nov.	26 Jan.

The long days, the usually bright sky delicately coloured in pinks and yellow during the midnight hours, extraordinarily clear air, sharp sky-line of dark bristling forest and bare upland, form a memorable scene. But the change with the approach of autumn is rapid. In September and October the days shorten 6 minutes a day (in lat. 62°N.) and within a few weeks winter grips the land. In December north of the Arctic circle the sun fails to rise. But the snow reflects the midday glow and other sky light, and the full moon almost turns night to day; the aurora is frequent and brilliant, and tints the white landscape. Data of intensity of illumination from sun, moon, and aurora are given in The Climate of Central Canada.

CHAPTER 9

Pressure Systems, Winds, Air Masses, and Frontal Zones

9.1 Air Masses, Pressure Systems, and Frontal Zones

(Sections 2.3 and 2.4 describe the air masses and pressure systems of the North Pacific which the Yukon shares. Most of the present Section is based on observations at Meteorological stations along the Alaska highway, largely summarized in *A Few Notes on Weather in the Whitehorse Region* by H. Cameron and C. E. Thompson; local forecast study, Meteorological Division, Canada, 1953. Hardly any detail is available from the rest of the Territory).

In all seasons, particularly in the winter half-year, the weather is controlled more often by the outer fringes than the central sectors of depressions passing W—E on the adjacent oceans. The pressure-type with which most of the bad weather is associated is the 'trowal' ('trough of warm air aloft'), the usual up-lifted warm sector of an occluded depression. The warm air in the trowal is commonly maritime Polar, but sometimes maritime Tropical. These upper troughs are now often marked on the synoptic charts, many extending far north beyond the surface trough of a depression on the Gulf of Alaska (but some that are traced in the Yukon seem to have no connection with a surface-wave). With the approach of the trowal pressure falls, low cloud covers the sky, especially on the uplands, and much middle cloud above it at 8—12,000 feet adds to the difficulties of aircraft. Rain falls steadily (or in thunderstorms in summer), snow in winter. The change behind the trowal to clear skies and fair weather is rapid, the middle cloud breaks up and the low cloud is dispersed, except when the northerly wind (which may come in suddenly in strength) meets uplands which cause persistent up-slope condensation, often with heavier precipitation than in in front of the trowal. Turbulence may be severe above the rough uplands.

In winter, trowals sometimes come in series with intervals of about a day and many are of considerable weather intensity. They advance more rapidly in a high-index circulation, when their speed is about that of the wind at the 700 mb. level, than in a low-index circulation, a natural result of the much longer N—S fetch of the air currents in front and rear of a long trough in which the opposed air masses may be Tropical and Arctic.

In summer trowals are still a strong weather influence though they are weaker and travel more slowly. The Territory is invaded also by other low-pressure types, most of which form presumably on the Polar or maritime Arctic front over the Gulf of Alaska or south of the Aleutian Islands (Fig. 12), and find entry easier in summer when the land is warmer than the sea. Occasional closed depressions enter the Territory from Alaska. Many active surface-troughs projecting north from depressions over the Pacific sweep over. All these systems take an easterly course through Alaska and the Yukon. Anticyclones appear in all seasons. Their formation is extrordinarily frequent and vigorous in winter.

F. J. Bodurtha carried out 'An investigation of anticyclogenesis in Alaska' (Journal of Meteorology, 1952 April) tabulating the frequency of anticyclogenesis (defined as an increase of the central pressure ≥ 7 mb. in 24 hours) on the globe north of lat. 40°N., the frequencies being grouped by rectangles of 5° of latitude, 10° of longitude. The rectangle 65° – 70°N., 130° – 140°W., (covering the north half of the Yukon) proved to have most, 41 cases in the months December—February of the 4 years 1947-50; next in order were east Ontario with 31, Lake Baykal and district (Siberia) 31, and south Saskatchewan 23.

In winter maritime Arctic or maritime Polar air masses are predominant, and continental Arctic is not uncommon. Continental Arctic air can form in the Yukon itself, and it also comes in from the Northwest Territories when a steep barometric gradient overcomes the defensive line of the Rocky and Mackenzie Mountains. Its cold surface layers are dense and tend to stagnate. This may lead to an interesting situation when warmer maritime Polar air comes north in front of a disturbance; it overrides the continental Arctic air which moves away at intermediate and high levels as the polar air advances. Lakes of the coldest air are left behind in sheltered depressions, and at times on flat country as a shallow veneer.

Arctic air is an appreciable element, usually coming in from NW through Alaska. Tropical air very rarely appears on the surface, and then much modified, but it may be found aloft in long S—N trowals.

In summer maritime Polar air is still commonest, but both maritime Arctic and maritime Tropical are sometimes present on the surface and in considerable depth.

That pressure-gradients can change, and air masses move, rapidly and for great distances in the upper atmosphere seems to be proved by what may be described metaphorically as sympathetic relations between distant frontal zones. A trowal moving east on the Polar front and extending far enough north to override a (not very distant) Arctic front often appears to be the cause of the development of an open wave on it—an effect which may not be specially remarkable; indeed a major wave seldom develops on the Arctic front without this assistance. But it is remarkable that waves on the Polar and Arctic fronts are almost always approximately in phase even when the fronts are a thousand miles apart; in a strong high-index circulation, however, the two fronts may have independent developments. Under low-index conditions the two find it easy to coalesce, and often do so, forming a single divide between Tropical and Arctic air.

9.2 Pressure and Winds

Pressure. The mean annual pressure reduced to sea-level is very similar at all the stations (see Climatological Tables). Of the monthly means the highest is February, the lowest October, with a secondary maximum in summer, July or August at most stations, and a secondary minimum in March or April (the month, or second month, after the higher maximum). The graph for Whitehorse (Fig. 11) is representative. The major controlling pressure system for the whole Region in winter is the cold anticyclone of northwest Canada (in January it is centered on the east border of Yukon), and in summer the N. Pacific anticyclone (Figs. 3-8), and pressure is highest in February and July (or August) under their dominance. In the transition seasons, March—April and October—November, neither of them is strongly developed or centred near the Yukon and mean pressure is lowest. The abrupt fall after the February maximum, and the check to the winter rise in December, are interesting minor features.

Surface Winds. Reliable records of air movement are even less adequate in Yukon Territory than in British Columbia. Hourly instrumental readings, unfortunately not for long periods, are available from Dease Lake, Smith River, and Atlin in the north of British Columbia, the airports on or near the Alaska Highway, and Frances Lake in Southeast Yukon. For the Central Interior Dawson City and Mayo Landing have long-period records for the 4 synoptic hours daily.

The data given in this Section are (so far as available):

Climatological Tables, mean percentage frequencies of directions for each month,
Table 63, mean monthly speed,
Table 64, mean percentage frequencies of directions and speeds in the early morning and in the afternoon in January and July (at Dawson City and Mayo for 4 hours),
Table 65, mean speed by directions in January, April, July, October,
Table 66, extreme wind speeds for January, April, July, and October and highest records (speed and direction) for 1 hour.

Table 63

Mean monthly speed of wind (m.p.h.)

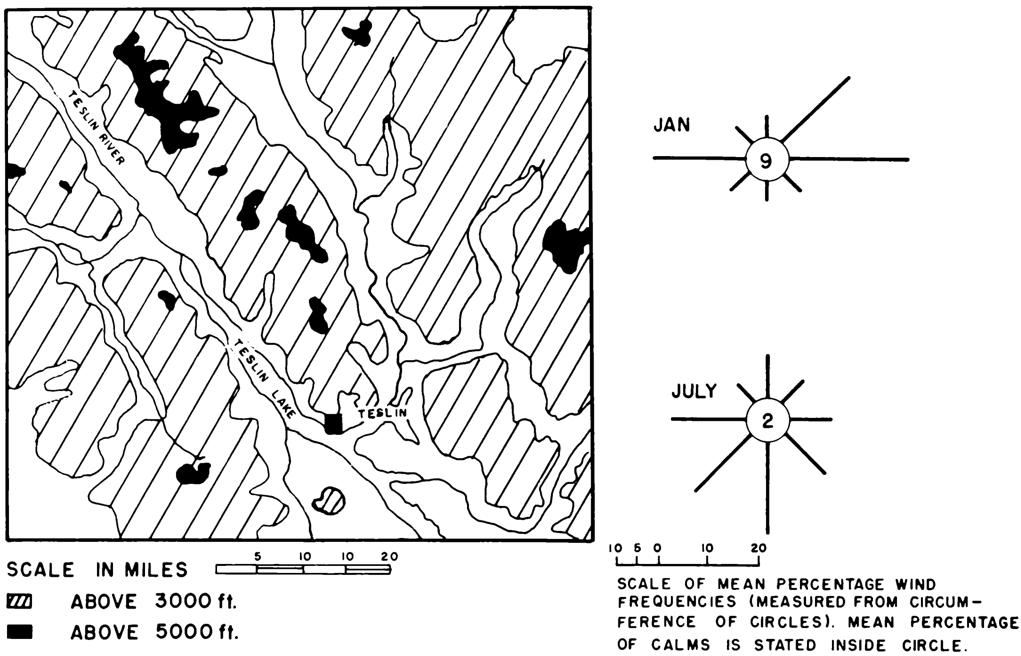
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Dease Lake (1947-52)....	5	6	5	5	5	4	4	4	4	5	4	4	5
Smith River (1946-52)...	3	4	5	7	6	7	6	6	5	5	4	3	5
Atlin (1922-41)..........	6	6	7	8	8	8	8	9	9	10	10	8	8
Watson Lake (1939-52)...	2	3	5	6	7	6	6	5	6	6	4	2	5
Teslin (1945-52)..........	4	4	4	5	5	5	4	5	4	5	6	4	5
Whitehorse (1943-52)....	8	8	9	9	9	8	7	8	9	10	8	8	8
Aishihik (1945-52).......	5	5	6	7	9	8	7	7	9	8	6	4	7
Snag (1945-52)...........	2	2	3	5	5	4	4	4	4	3	3	2	3
Dawson City............	See Table 64 for the available data												
Mayo Landing...........	See Table 64 for the available data												
Frances Lake (1942-7)...	2	3	4	5	5	5	5	5	5	6	3	2	4

Two points stand out, the low speed of the winds and the high proportion of calms at nearly all stations, and the remarkable diversity of directions which shows itself not only between neighbouring stations but also at any one station, for at most the winds are shared between two, in many cases almost opposite, directions. There seems to be no general pattern of surface air-movement, topography being a stronger control than pressure-gradient, as can be seen by study of a large-scale topographical map. Whitehorse, Teslin and Watson Lake are given as examples in Figs. 44-46, in which the contour lines, rivers, and lakes show the topography and the wind-roses the mean percentage frequencies of wind directions in January and July.

Only at Atlin and Whitehorse (Table 63) does the mean annual speed attain 8 m.p.h., itself a low figure. Snag, Watson Lake and Frances Lake have winter means as low as 2 m.p.h., a cushion of intensely cold, dense, air stagnating in the valley-bottoms and resisting movement.

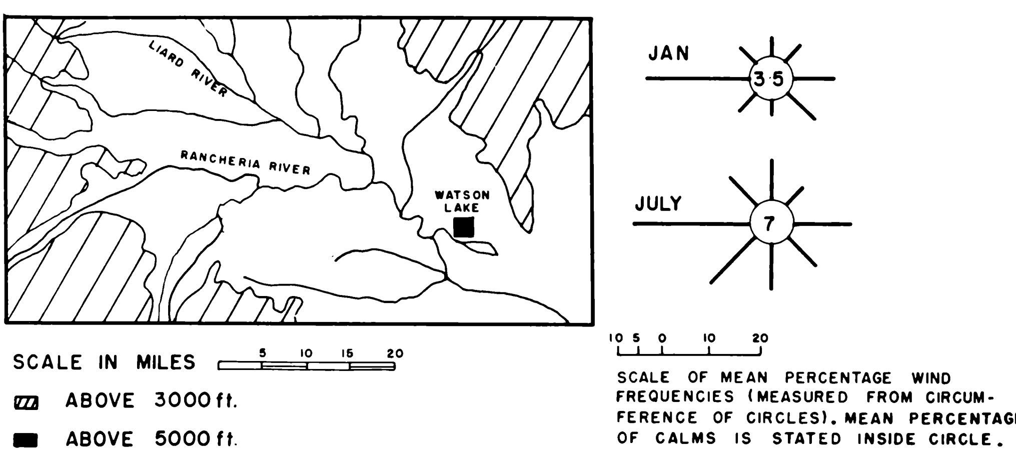
The frequent strips of white fog lying motionless in many valleys in winter (signs of very low temperatures as well as high relative humidity), and in summer the clouds of dust raised by passing vehicles, dust which hangs long in the still air between the forest-walls of the clearings through which the long road runs, are visible indications of the sluggish air-movement.

Fig. 44



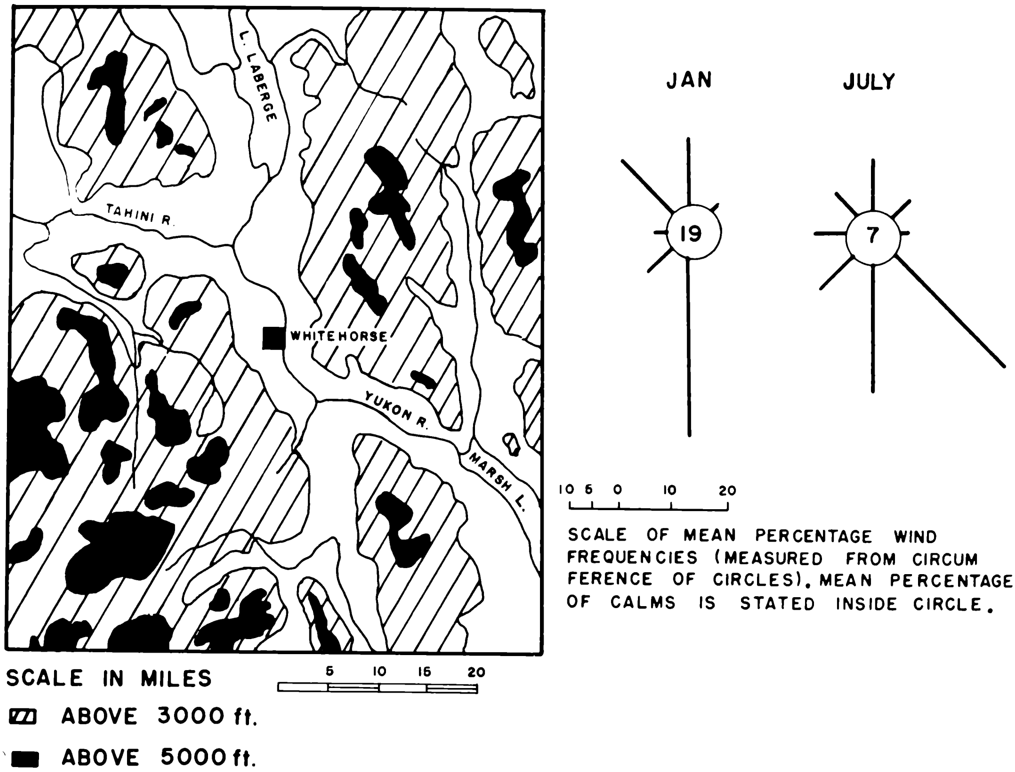
Wind Roses and topography, Teslin.

Fig. 45



Wind Roses and topography, Watson Lake.

Fig. 46



Wind Roses and topography, Whitehorse.

Table 64

Wind—Directions and speeds (percentage frequencies) according to time of day

	Hour LST	Directions, percentage frequencies								Speed, m.p.h. percentage frequencies			
		N	NE	E	SE	S	SW	W	NW	calm	1-12	13-38	>38
Dease Lake													
(1945,47-51).Jan.....	0430	25	45	3	8	9	3	1	1	5	94	1	0
	1630	33	25	1	7	21	5	1	3	5	90	4	0
July....	0430	8	9	3	30	26	3	<1	3	17	83	0	0
	1630	4	4	2	19	27	25	5	10	4	93	4	0
Smith River (1944-51)													
Jan.....	0430	17	<1	1	1	17	5	6	11	41	55	4	0
	1630	20	2	2	2	22	6	1	5	40	55	5	0
July....	0430	8	<1	1	2	27	15	18	8	21	77	2	0
	1630	8	4	6	9	16	30	18	5	5	79	16	0
Atlin (1941-6)													
Jan.....	2230	9	2	4	8	34	0	0	0	43	48	9	0
	1630	6	3	4	8	31	0	0	2	45	44	11	0
July....	2230	1	1	0	10	50	1	1	2	35	59	6	0
	1630	1	0	2	10	60	<1	<1	<1	26	64	10	0
Finlay Forks (1945-51)													
Jan.....	1030	3	16	9	9	6	9	13	19	15	74	10	1
	1630	6	19	12	9	1	9	12	12	20	67	12	<1
July....	1030	6	23	13	22	1	10	3	6	15	78	7	0
	1630	3	26	7	16	7	13	3	6	19	66	13	<1
Watson Lake (1939-52)													
Jan.....	0330	3	2	6	5	2	5	16	5	56	42	2	0
	1530	3	2	8	7	2	7	20	5	46	52	2	0
July....	0330	12	6	9	6	3	6	12	10	36	63	1	0
	1530	2	4	8	15	13	19	24	9	5	76	19	0

Table 64—Concluded

Wind—Directions and speeds (percentage frequencies) according to time of day

	Hour LST	Directions, percentage frequencies								Speed, m.p.h. percentage frequencies			
		N	NE	E	SE	S	SW	W	NW	calm	1-12	13-38	>38
Teslin (1946-52)													
Jan.....	0330	3	26	19	3	3	5	9	3	29	67	4	0
	1530	3	18	22	6	3	9	14	4	21	73	6	0
July....	0330	10	10	1	3	12	13	8	5	38	62	0	0
	1530	2	2	6	18	28	25	11	3	5	82	13	0
Whitehorse (1943-52)													
Jan.....	0330	10	1	1	14	34	2	1	13	25	45	30	0
	1530	13	1	0	13	37	3	1	13	19	45	36	0
July....	0330	3	0	0	26	29	7	5	3	27	63	10	0
	1530	12	4	4	35	16	8	5	4	12	63	25	0
Aishihik (1945-52)													
Jan.....	0330	22	3	2	8	22	6	2	3	32	56	12	0
	1530	28	4	0	10	24	5	1	4	24	60	16	0
July....	0330	10	3	2	11	24	18	3	4	25	72	3	0
	1530	16	3	4	33	24	5	7	6	2	70	28	0
Snag (1945-52)													
Jan.....	0330	4	5	7	3	5	8	6	7	55	44	1	0
	1530	4	8	5	4	3	6	12	9	49	50	1	0
July....	0330	2	1	2	1	7	23	26	5	33	66	1	0
	1530	12	8	13	9	9	4	19	22	4	91	5	0
Dawson City (1941-51)													
Jan.....	0330	13	4	1	4	40	4	<1	3	30	59	11	0
	0930	16	6	1	4	37	8	0	2	26	62	12	0
July....	1530	18	5	1	5	38	12	0	1	20	70	10	0
	2130	16	4	1	5	36	4	1	2	32	58	10	0
	0330	8	4	3	4	10	4	1	1	66	34	<1	0
	0930	13	6	1	4	28	5	2	1	39	58	3	0
	1530	26	5	4	4	24	8	3	5	21	69	10	0
	2130	15	3	3	3	11	5	3	5	52	46	3	0
Mayo Landing (1942-51)													
Jan.....	0330	4	13	1	1	<1	6	1	<1	73	24	3	0
	0930	9	13	2	1	3	4	4	<1	65	32	3	0
	1530	6	13	2	1	3	6	3	0	67	30	3	0
	2130	6	15	1	0	<1	6	3	<1	68	29	3	0
July....	0330	3	4	1	1	2	5	1	1	83	17	1	0
	1930	2	5	5	3	4	12	2	1	65	33	2	0
	1530	5	9	3	5	7	24	8	5	34	61	6	0
	2130	6	5	1	2	3	12	2	1	68	30	2	0
Frances Lake (1942-7)													
Jan.....	0930	16	3	3	23	9	3	8	13	22	72	6	0
	1530	10	1	2	26	14	3	7	15	22	73	3	1
July....	0930	13	1	2	32	27	7	8	8	2	96	1	0
	1530	18	4	0	28	17	11	8	14	0	91	9	0

Table 64 shows the influence of time of day, the hours chosen representing very early morning (night conditions) and late afternoon (the hot hours). Considering first the air movement, the number of calms in winter, both night and day (which do not differ much,) is unusually large, over 40 per cent at Smith River, Atlin, Mayo Landing, Watson Lake, and Snag; calms are very frequent at night in summer also, but air movement soon increases with the heat of the day and calms are few (at most stations) in the afternoon. At the other extreme, speeds over 38 m.p.h. are extremely rare; by far the most frequent are less than 13 m.p.h. (but noticeably higher in the afternoon at Whitehorse and (in July) Aishihik). The highest records for 1 hour (Table 66) are notably low, none exceeding 38 m.p.h. (i.e. moderate gale), and 38 m.p.h. is very unusual. Most of the strong winds in all seasons blow from the direction which gives the highest mean speed.

Table 65

Mean speed of wind (m.p.h.) by directions

		N	NE	E	SE	S	SW	W	NW
Dease Lake (1947-51)........	Jan......	8	4	2	5	4	5	1	5
	Apr.....	7	5	3	6	6	5	6	8
	Jul......	6	4	2	5	5	5	1	6
	Oct.....	7	4	3	6	5	5	3	5
Smith River (1946-52).......	Jan......	5	8	8	4	6	6	4	2
	Apr.....	7	7	9	8	7	9	8	5
	Jul......	6	6	7	8	7	7	8	4
	Oct.....	5	6	8	6	7	8	5	3
Atlin (1922-41)..............	Jan......	4	4	5	10	12	13	3	7
	Apr.....	5	5	5	9	10	9	5	8
	Jul......	5	6	5	10	8	7	5	7
	Oct.....	6	6	6	13	13	15	6	8
Watson Lake (1939-52).......	Jan......	2	3	4	6	3	5	3	3
	Apr.....	3	6	6	6	6	10	7	7
	Jul......	4	4	6	5	6	8	7	7
	Oct.....	4	7	9	8	6	8	6	5
Teslin (1946-52)..............	Jan......	4	4	4	6	7	5	1	3
	Apr.....	4	4	5	7	6	8	7	2
	Jul......	3	4	4	5	6	8	7	5
	Oct.....	3	5	6	9	8	10	8	6
Whitehorse (1943-52)........	Jan......	5	4	2	10	14	14	6	7
	Apr.....	8	6	4	11	10	10	6	8
	Jul......	6	5	4	10	9	8	5	6
	Oct.....	7	5	5	14	12	10	4	8
Aishihik (1945-52)...........	Jan......	5	6	4	10	10	5	2	10
	Apr.....	6	4	4	10	8	7	5	10
	Jul......	7	5	3	9	8	5	4	8
	Oct.....	5	3	6	15	11	5	3	6
Snag (1945-52)...............	Jan......	1	2	3	2	2	2	4	6
	Apr.....	3	4	5	4	4	4	6	8
	Jul......	4	4	4	5	4	4	4	7
	Oct.....	2	3	4	4	3	3	4	6
Frances lake (1942-9)........	Jan......	2	2	2	4	3	3	1	3
	Apr.....	3	4	4	6	5	5	4	5
	Jul......	4	3	3	6	5	5	5	6
	Oct.....	4	3	4	7	7	7	7	7
Aklavik (NWT) (1941-6)....	Jan......	5	5	3	7	5	4	4	12
	Apr.....	8	4	5	7	8	5	5	10
	Jul......	8	5	5	6	6	5	4	10
	Oct.....	6	5	3	6	6	3	4	8

Table 66

Extreme wind speeds (m.p.h.)

		Jan.	Apr.	July	Oct.
Dease Lake (1946-52)	Highest mean for month	8	7	5	6
	Lowest mean for month	4	5	4	4
	Highest record for 1 hour	23N	30S	17N	27SE
Smith River (1946-52)	Highest mean for month	5	7	7	6
	Lowest mean for month	2	5	5	4
	Highest record for 1 hour	30SW	29SW	28SE	29SW
Atlin (1922-41)	Highest mean for month	8	8	8	10
	Lowest mean for month	2	5	6	8
	Highest record for 1 hour	38SW	26S	22S	34SW
Watson Lake (1939-52)	Highest mean for month	4	8	7	8
	Lowest mean for month	1	5	5	3
	Highest record for 1 hour	30S	30S	27W	38W
Teslin (1946-52)	Highest mean for month	5	7	6	8
	Lowest mean for month	3	5	3	4
	Highest record for 1 hour	30S	30SW	22SW	29SW
Whitehorse (1943-52)	Highest mean for month	12	10	8	13
	Lowest mean for month	6	7	5	6
	Highest record for 1 hour	42S	32SE	25SE	36SE
Aishihik (1945-52)	Highest mean for month	7	10	8	12
	Lowest mean for month	3	6	6	5
	Highest record for 1 hour	41S	37S	31S	40S
Snag (1945-52)	Highest mean for month	3	7	5	4
	Lowest mean for month	<1	4	4	2
	Highest record for 1 hour	26NW	24NW	22NW 22SW	22W 22SW
Frances Lake (1942-47)	Highest mean for month	4	6	5	7
	Lowest mean for month	<1	4	4	5
	Highest record for 1 hour	31SW	21NW	23NW	24S
Aklavik (NWT) (1941-46)	Highest mean for month	7	9	8	6
	Lowest mean for month	3	6	7	3
	Highest record for 1 hour	29NW	39NW	30NW	25S

The surface winds—evidently in most places mere local drifts—are of little depth. For the general air movements in the lower atmosphere we should consider 850 mb. contours approximately 4,500 feet above m.s.l. in January, 4,800 feet in July. The wind blows very nearly along the contour lines, so that in January the 'true' lower wind over the whole region is WNW, with a mean vector speed 12 m.p.h. or less (again a low figure). In July the true direction is less uniform, SW in the north of British Columbia, veering to W north of the Yukon River; and the vector speed is much less, under 6 m.p.h.; thus the true winds in the lower atmosphere in summer, as well as the surface winds, are very light.

9.3 Winds: Local Features

Whitehorse. Southerly winds predominate strongly in all months, with a large addition of southeasterlies in summer; E and NE are notably few. Calms are frequent (20 per cent of the observations) in winter and not infrequent (7 per cent) in summer.

The speed is among the highest recorded in the region, with annual mean 8 m.p.h.; it is rather higher in spring and autumn but the seasonal difference is small. SE, S and SW winds are strongest, E and NE weakest (as well as fewest)

In winter the winds differ little from day to night. In summer direction is fairly constant, but, as at most stations, the wind is usually stronger in the afternoon, and calms are few.

The sketch map in Fig. 46 shows the strong topographical control. Skagway at the head of Lynn Canal is about 100 miles to the south, and several passes through the Coast Range, including the White Pass (alt. 2,915 ft.), offer passage through the formidable barrier for air from the Pacific, which reaches Whitehorse as a S or SE wind; below Whitehorse the valley of the Lewes River and Lake Laberge opens widely towards N and NW. In the east and northeast an upland barrier over 6,000 feet, and in the west mountains rising to over 7,000 feet, are screens against winds from those directions.

Aishihik. Unlike Whitehorse, Aishihik reverses its predominant directions from N in winter to S and SE the rest of the year.

The winds are among the strongest recorded at the Yukon stations, but calms are frequent, about 30 per cent on winter nights; the mean speed is about 8 m.p.h. in spring and autumn, only 5 m.p.h. in winter. The strongest are NW and SE, SE being notably strong with mean speed 15 m.p.h. in October. Highest records for 1 hour have exceeded 30 m.p.h. in April and July, and attained 40 m.p.h. in January and October, all from south.

The winds differ little from night to day in winter. In summer, however, many nights are calm, but very few afternoons; the speed exceeds 13 m.p.h. in 28 per cent of the summer afternoon observations.

Topography seems to give clear clues to these air movements. The long Aishihik and Sekulmun Lakes lead in southerly winds all the year, and towards the north a fairly open passage from the valley of the Nishing River directs the most frequent winds of winter. The mountain-wall on the west bars the way against winds from that direction, but the almost complete absence of east winds is less clearly related to topography since no strong barrier forbids their passage.

SE and S winds are by far the strongest all the year and also among the most frequent; N winds which are the most frequent in winter have only half the speed of the southerlies; strong breezes from the large lakes are common on summer afternoons, but gale force is rare and speeds of 38 m.p.h. or over are practically unknown, the highest record for 1 hour being 41 m.p.h. from south in January.

Snag. Winds are remarkably light in winter and summer, in night and day; winter has about 50 per cent calms, summer 33 per cent in the night but only 4 per cent in the afternoon.

The mean speed in winter is about 2 m.p.h., for the whole year only 3 m.p.h. Speeds over 12 m.p.h. are very rare even on summer afternoons, and hardly known in winter. NW winds are strongest in all seasons, their relative advantage being largest in winter; they are largely katabatic from the uplands on the northwest.

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Direction is variable. In the months March to October W and NW are most frequent, N and NE least, but E is fairly frequent, blowing up the valley on that side. Time of day has little influence in winter in this high latitude. In summer the wind is almost always W or SW at night (being possibly in part katabatic from the snow-mountains), in the afternoon NW and W. At night 33 per cent of the observations are calms, in the afternoon only 4 per cent.

The highest records for 1 hour have not exceeded 22 m.p.h. in July and October, 26 m.p.h. in January; most of the strongest winds are from NW and W.

Watson Lake. The surrounding topography is much less bold than at the other stations, but the lake on the west and south has considerable influence (Fig. 45). The dominant winds are from W and SW in all months. Summer has frequent E and SE winds also, but all other directions occur though much less frequently. The speed is low, annual mean only 5 m.p.h., falling to 2 m.p.h. in winter; it is highest in spring and autumn, but the highest monthly mean is only 7 m.p.h. (in May). The strongest winds are SW and W, blowing across the lake (but easterlies are as strong in autumn). Calms are remarkably frequent in winter (50 per cent in July). 12 m.p.h. is rarely exceeded except on summer afternoons when the lake breeze blows strongly; full gale force for 1 hour has been recorded only once, from W in October.

CHAPTER 10

Temperature and Humidity

10.1 Temperature: General

The oceanic conditions and the bold relief of the land have been described already in Section 1·1 as being major factors in determining the climates of southern British Columbia. They continue north and probably their influence is largest along the Panhandle of Alaska, where the ocean surface is indeed cooler but is in much stronger contrast to the interior with its continental winter, an extension of the even colder winter of the Northwest Territories. Moreover the Coast Mountains are higher and more continuous, with large areas of perennial snow and ice, culminating in the St. Elias Mountains. The transition in winter from warm ocean to extremely cold interior is extraordinarily abrupt, the isotherms for the winter months being packed more closely than in any other region of the size on the globe (Fig. 15). It must be remembered that the isotherms referred to show temperatures corrected to sea level; the actual temperatures in the interior are at least 5°, in most areas 10°, lower, so that the decrease from the coast is much larger. But the Yukon does not reach the Pacific Coast and most of the transition of temperature is effected in the Panhandle. Even the southwest of the Territory adjacent to the Panhandle has a strongly continental climate, though showing clearly its greater proximity to the ocean in that the winter temperatures are less extreme than in the interior.

The absolute minima (Fig. 20) are extremely low and include the lowest surface temperature in North America, -81° at Snag, but the mean daily minima though low, are considerably higher than in Northwest Territories. At most of the stations temperatures well above 40° have occurred in all the winter months, over 50° at some; at Snag alone in its 9 years of records temperature has never risen to freezing point in December, 31° being the highest reading. Evidently the whole region is occasionally invaded by warm Pacific air.

In summer (Figs. 5, 22) the gradient is reversed and very much reduced, the ocean being a little cooler than the interior, but the interior has about the same actual temperature as the littoral. This summer distribution continues through the months May to September, before and after which the changes from and to the winter distribution are effected rapidly.

Adequate observations north of the Yukon River are lacking on land and at sea, but the isotherms of Figs.15-18 probably give a good approximation to the facts. In January temperature changes little from central Yukon to the Arctic shores, the whole region being intensely cold for the thickly frozen Arctic, in very strong contrast to the always open Pacific, provides little or no warmth. But in July the Arctic is an effective chilling agent and temperature rises towards the interior from its shores much faster than from the Pacific. The gradient from the still frozen Arctic to the warming land is steepest in spring as is usual on polar coasts.

Table 67

Temperature data for representative groups of stations

	Alt. (ft.)	January mean temp.	January mean daily range	July mean temp.	July mean daily range	Mean annual range
Yukon Territory, Southwest						
Atlin (B.C.)	2,240	2	13	54	20	54
Teslin	2,300	3	17	55	23	52
Whitehorse	2,289	5	16	56	22	51
Mean		3	15	55	22	52
Yukon Territory, Interior						
Aishihik	3,170	-1	23	53	24	54
Snag	1,925	-14	20	57	25	71
Dawson City	1,062	-19	14	60	26	79
Mayo Landing	1,625	-11	19	58	27	69
Frances Lake	2,627	-3	18	57	26	60
Mean		-10	19	57	26	67
Yukon Territory, Southeast						
Watson Lake	2,248	-7	19	59	23	66
Smith River (B.C.)	2,208	-8	21	57	25	65
Mean		-8	20	58	24	66
British Columbia						
Finlay Forks	1,900	2	23	57	29	55
Dease Lake	2,678	1	18	54	24	53
Mean		2	20	56	26	54
Aklavik (NWT)	25	−18	16	56	19	74

Table 67 and the Climatological Tables for the individual stations supplement the charts of isotherms. Stations are few and very unevenly distributed vertically and horizontally, and most of the records are short. Atlin and Smith River are so near the border that they go with Southwest and Southeast Yukon in Table 67. Aishihik is included with the Interior, but the station itself is unduly favoured by its topography (a large influence at all stations in this Region). The grouping by locality in this Table brings out major differences of climate. The first group, the Southwest, near the provincial and international borders, has the least extreme climate, the next, the Interior, the most extreme but the Southeast differs little from it. In summer the group means are similar; the large difference is in winter, the January mean being 13° lower in the Interior than in the Southwest. The difference stands out most clearly in the annual ranges, 67° in the Interior and 52° in the Southwest. The daily range also is rather larger in the Interior; it is considerably larger in summer. Northern British Columbia is represented by Finlay Forks and Dease Lake; their means differ remarkably little from those of Southwest Yukon despite the difference of latitude. The high daily range at Finlay Forks is noticeable.

The fall in winter temperature from the south of British Columbia to the Yukon is a measure of the increasing frequency of Arctic and polar air-masses.

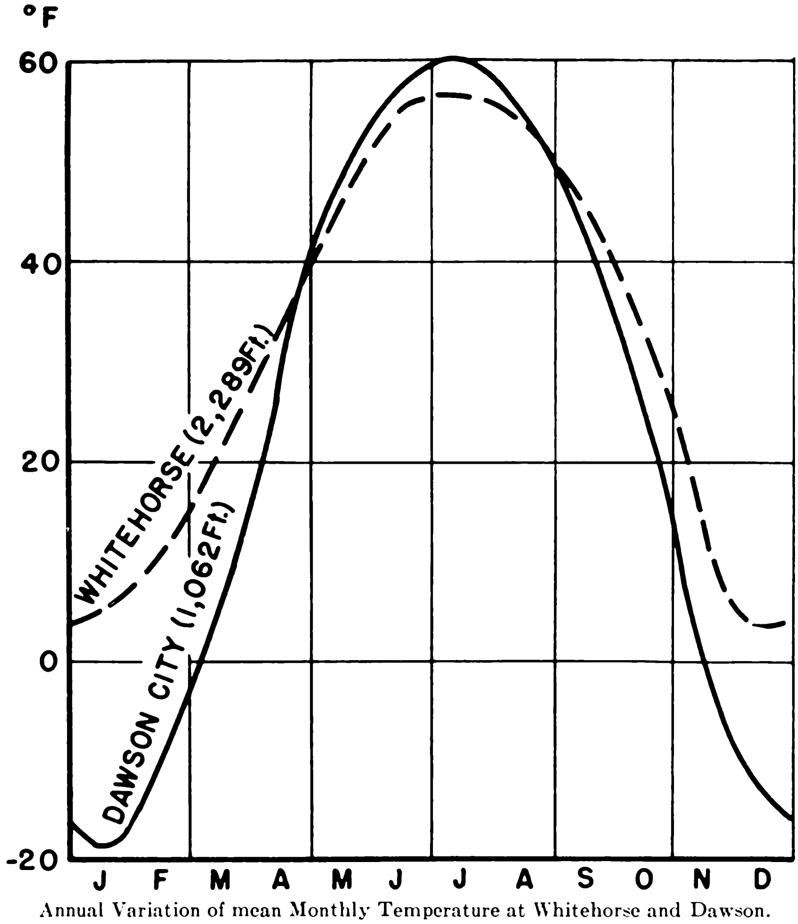
The outstanding feature, the basis of the limitations and possibilities of plant, animal, and to a large extent human, life (apart from mining activities) in the Region, is the enormous range of temperature (Fig. 19). The Yukon adjoins the Northwest Territories in which the mean annual range rises to about 90°F. in the lower Mackenzie valley, and in most of the north interior of the Yukon it exceeds 80°, for the narrowing of the continent, which tends to reduce the range, is counter-balanced by the plateau elevation, by the mountain-barrier which largely wards off Pacific warmth, and by the ice-cover of the polar sea on the north. The large range is a result mainly of the long and intensely cold winter, for summer, though short, is normal for the latitude, and the visitor who chances on a summer rather warmer than the mean is surprised at the genial weather. The tempering of the winter cold by the Pacific is the chief cause of the reduction of the annual range to about 50° in the southwest of Yukon Territory.

At all stations in Yukon Territory and North British Columbia the transition from winter (monthly mean below 32°) to summer (monthly mean above 50°) is effected in the one month May, and from summer to winter in the 2 months September—October, (August—September at Atlin, September only at Mayo, Smith River, and Snag). The rapidly changing altitude of sun and length of day are reflected in the rapid change of daily temperature.

The graphs of mean temperature at Whitehorse and Dawson City (Fig. 47) illustrate some of the points that have been mentioned above. They also show the general tendency to more uniform temperature in the three summer than in the three winter months.

Some details of the conditions in the separate regions follow.

Fig. 47



Annual Variation of mean Monthly Temperature at Whitehorse and Dawson.

Temperature: Winter

Southwest Yukon. The oceanic influences which, as just mentioned, penetrate to this Region are modified by the mountain-barrier and by distance, but they make the winters much milder than in the rest of the Yukon (Fig. 47). The monthly means are below 32° in 5 months, November to March, but in no month below zero. The mean daily maximum is below 32° in the same months, and Whitehorse has never recorded a temperature above 32° in December, but other months usually have at least one day (January has had 5) with maximum above 32°. On the other hand very low minima must be expected, extreme records (all in January) being −62° at Whitehorse, −63° at Teslin, −54° at Atlin. Most spells of intense cold do not last long.

Central Yukon. In the interior the monthly mean falls below 32° in October and does not rise above it again till May, after 8 months. The mean of the coldest month, January, is far below zero, −19° at Dawson, −11° at Mayo, −14° at Snag, and the mean daily maximum fails to rise to freezing-point in no less then 5 months, November to March (it is below zero in December, January, and February at Dawson). The mean daily minimum remains below zero in the same 5 months and is below 32° in the 7 months October to April. Extreme minima below −60° have been recorded in December, January, and February (in the 5 months November to March at Snag).

Snag has won fame as being the coldest station in Canada in winter. Its absolute minimum, −81° on 3 Feb. 1947, is the lowest record, not in Canada only, but in the New World (other stations in the Yukon have records well below −70°). The lowest world record is −94° at Verkhoyansk in northeast Siberia. Snag has a rival, however, in Dawson City which has even lower figures for some aspects of winter cold (Table 68):

Table 68

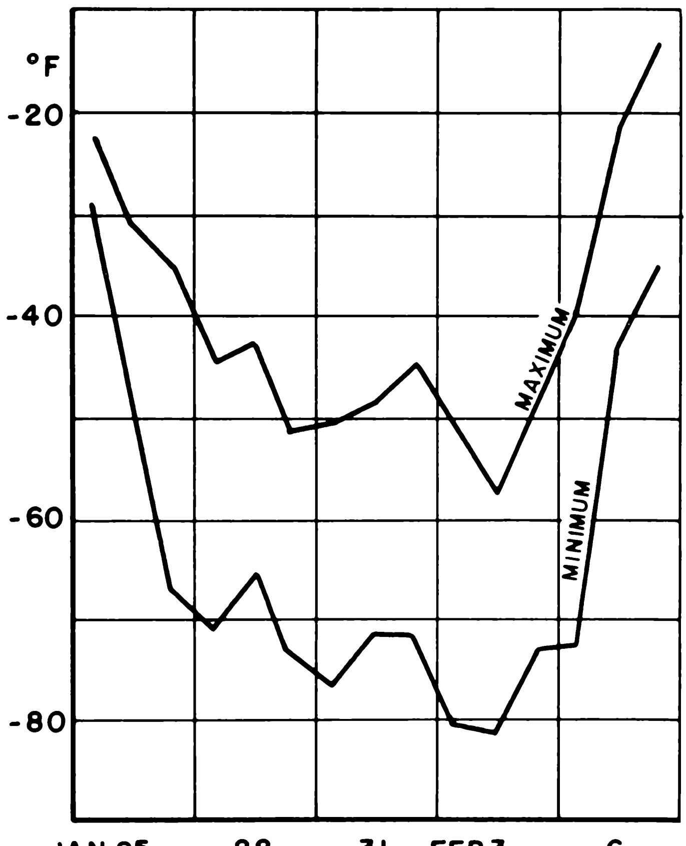
Winter temperature at Snag and Dawson City

	December			January			February		
	mean	mean daily min.	abs. min.	mean	mean daily min.	abs. min.	mean	mean daily min.	abs. min.
Snag	−15	−24	−69	−14	−24	−76	−10	−23	−81
Dawson City	−13	−19	−63	−19	−26	−68	−11	−19	−73

Extreme cold is here, as elsewhere, largely an 'inversion' effect strongly developed in favourable topography. Snag is 1,925 feet above the sea in lat. 62°N., in the middle of a depression, a bowl, of about 5 miles diameter. The mountains round the bowl rise abruptly and steeply to over 3,000 feet above sea-level and extend for hundreds of miles. The St. Elias Mountains form a specially wide and lofty barrier towards the Pacific, peaks rising to nearly 20,000 feet due south of Snag but 100 miles distant; this barrier compensates for Snag's position well south of the continental core of Yukon Territory. The White River valley enters the bowl from the south and its continuation northeast and north is the only outlet—a relatively narrow one. On the west is the long, more or less flat and open, NW—SE valley containing the Tanana River which joins the Yukon

River in central Alaska (but the 30 miles of the valley nearest Snag is drained east into the bowl). This corridor gives passage from the far northwest to Snag for continental Arctic air, very cold by its origin in winter. Local conditions intensify the cold. The whole region, valleys and mountains, is covered throughout winter with crisp snow, a very efficient insulator from the warmer ground below and a very active radiator of its own heat when the sky is clear, as is often the case in winter. The loss by radiation is not balanced by insolation for the sun is below the mountain sky-line all the 24 hours in mid-winter. The coldest of the very cold surface air gravitates down the slopes during the frequent calms and collects in the hollows; probably the valleys of the White River and its tributaries convey volumes of extremely cold air derived from the snowfields and glaciers of the St. Elias Mountains. Fig. 48 shows the lowering of temperature in such circumstances for 10 days before the record minimum was attained, and the rapid rise when the 'lake' of cold air was dissipated.

Fig. 48



Temperatures during a record breaking cold spell at Snag.

The Snag 'frost-hole' is evidently specially successful in trapping the coldest air from an extensive district. But inspection suggests that only the lack of observations from other similar hollows with possibly more favourable topography in the farther interior prevents the eclipse of Snag's remarkable record.

Interesting effects of the cold were noted on that intensely cold night at Snag. The breath froze immediately with a hiss and hung motionless for several minutes, audibility was uncannily super-normal, so that sounds from an Indian village 3 miles away were plainly heard.

Southeast Yukon. The monthly mean is below 32° in the 6 months November to April and well below zero in the 3 months December, January, and February. The mean daily maximum remains below 32° in the 5 months November to March (and at Watson Lake is only 1° above zero in December), and the mean daily minimum at or below zero in the 4 months November to February. Temperatures above 37° have not been recorded at Watson Lake in December and they seem to be very rare in January and February; minima below −60° have been registered in December, January, and February.

Frances Lake has had the lowest reading after Snag of the whole Territory, −76° in January, but its means in the winter months, mean for the month, mean daily maximum, and mean minimum, are much higher than at other stations in the interior. This is interesting in view of the altitude, several hundred feet above the others, but possibly the greater altitude favours higher means by facilitating the removal by gravity of the dense chilled surface air.

North British Columbia. Winters (judged by the two short records at Finlay Forks and Dease Lake) are similar to those of Southwest Yukon, with monthly means far below 32° in the 5 months November to March (or April) but not quite down to zero in any month. The mean daily maximum is below 32° in the 4 months November to February. Extreme minima are −60° at Dease Lake, −68° at Finlay Forks.

10.3 Temperature: Summer

The warm season (or summer) is taken as including months with mean temperatures 50° or over.

Southwest Yukon. Summer comprises the 3 months, June, July, and August, the monthly mean reaching 56° in July at Whitehorse. The mean daily maximum exceeds 60° in each of the same 3 months, reaching 67° in July at Whitehorse and Teslin. The highest records are 87° at Atlin, 89° at Teslin, and 91° at Whitehorse; but frost has been recorded in every month at all three stations.

The rather cooler summers than in the Interior and Southeast are an effect of proximity to the Pacific.

Interior. The mean exceeds 50° in the 3 months June, July, and August (reaching 60° in July at Dawson City, 57° at the other stations). The mean daily maximum exceeds 60° in the same 3 months and approaches 70° in July. The highest records, 95° at Dawson, 88° at Snag, are high figures but not exceptional for the position on the globe. More striking is the occurrence of very low readings, for frost (2° or 3° below freezing point) has occurred in all months, even in July.

Southeast Yukon. The summers differ little from those in the Central Interior. The monthly mean exceeds 50° in June, July, and August, reaching 59° at Watson Lake in July, 57° at Smith River. The mean daily maximum exceeds 60° in the same 3 months, to reach 70° in July at Watson Lake. The absolute maxima are 90° at Watson Lake, 92° at Smith River. Frost has been registered in every month of the year at Smith River and in all except July at Watson Lake and Frances Lake.

North British Columbia. Here also the mean exceeds 50° in each of the 3 summer months, and the mean daily maximum exceeds 60° (70° at Finlay Forks). The highest maxima are 93° at Dease Lake, 90° at Finlay Forks; but frost has been recorded in every month of the year, and temperature has fallen to 27° at Finlay Forks in July.

10.4 Temperature: Periods and Frequencies of Significant Temperatures

Table 69

Mean dates and lengths of periods with the specified mean daily temperatures

	Below 0°	Above 32°	Above 42°	Above 60°
Atlin	None	15 Apr.—28 Oct. (195 days)	13 May—1 Oct. (139 days)	None
Dawson	17 Nov.— 9 Mar. (112 days)	18 Apr.— 9 Oct. (173 days)	7 May—19 Sept. (133 days)	3 July—16 July (12 days)
Watson Lake	27 Nov.—17 Feb. (81 days)	29 Apr.—19 Oct. (172 days)	19 May—27 Sept. (129 days)	None

Table 70

Mean dates and lengths of periods with mean daily maximum temperature 43° or above

Atlin	2 May to 3 Oct.	(154 days)
Carcross	25 Apr. to 6 Oct.	(164 days)
Whitehorse	22 Apr. to 3 Oct.	(164 days)
Dawson City	18 Apr. to 27 Sept.	(162 days)
Mayo	22 Apr. to 2 Oct.	(163 days)
Watson Lake	15 Apr. to 2 Oct.	(170 days)

Table 71

Mean dates and lengths of periods with mean daily minimum temperature 32° or over

Carcross	26 May to 24 Sept.	(121 days)
Whitehorse	17 May to 21 Sept.	(127 days)
Dawson City	12 May to 16 Sept.	(127 days)
Watson Lake	11 May to 25 Sept.	(137 days)

Tables 69, 70 and 71 contain the mean dates and lengths of the periods with daily means below 0°, above 32°, above 42°, above 60°, with mean daily maximum above 43°, and with mean daily minimum 32° or over, dates chosen as being of considerable practical interest. Sporadic days with the given temperatures may of course occur far outside the mean periods. The dates of mean daily maximum 43° and minimum 32° seem to be significant in the life-cycle of many plants of the region; vagrant frosts which may be severe enough to do much harm in the growing season are indicated in Table 73. Of the three stations Atlin, nearest the

Pacific, has the least severe winters and the coolest summers, judged by the present criteria as well as others. Dawson is at the other extreme, being in winter's icy grip some weeks before the Southwest, but it is also the earliest to enjoy the approach of summer with temperature above 42°.

The long cold winters with mean temperature below zero are an outstanding feature of this northern land. And it must be recalled that all the data are from the valleys, the bleak uplands send none.

Table 72

Mean number of arctic (min. ≤ −40°) sub-arctic (max. ≤ 0°) days; in brackets the largest and smallest records in period

		Nov.	Dec.	Jan.	Feb.	Mar.
Whitehorse (1946-51)	Artic	<1(1,0)	2(5,0)	2(5,0)	2(5,0)	0(0,0)
	Sub-arctic	5(11,0)	10(17,0)	10(18,1)	7(16,0)	1(4,0)
Snag (1945-51)	Arctic	3(9,0)	7(13,0)	7(15,0)	8(15,0)	2(9,0)
	Sub-arctic	9(16,0)	21(25,18)	19(25,14)	14(19,10)	1(5,0)
Mayo Landing (1946-51)	Arctic	4(13,0)	7(13,0)	9(14,0)	7(16,0)	1(8,0)
	Sub-arctic	9(21,7)	16(24,11)	17(27,8)	15(23,7)	4(23,8)
Watson Lake (1946-51)	Arctic	1(3,0)	4(8,0)	5(17,0)	5(9,0)	<1(2,0)
	Sub-arctic	8(16,1)	16(22,4)	17(28,8)	12(15,8)	<1(6,0)

Table 73

Dates and duration of frost-free period

Station (no. of years' records in brackets)	Date of last frost in spring			Date of first frost in autumn			Mean duration of frost-free period (days)
	mean	earliest	latest	mean	earliest	latest	
Finlay Forks (6)	7 July	28 June	15 July	29 July	20 July	5 Aug.	22
Dease Lake (5)	2 July	18 June	15 July	13 Aug.	27 July	24 Aug.	42
Atlin (40)	11 June	15 May	11 July	4 Sept.	17 July	21 Sept.	85
Whitehorse (10)	10 June	29 May	4 July	27 Aug.	30 July	20 Sept.	78
Pine Creek (6)	7 July	20 June	14 July	28 July	16 July	9 Aug.	21
Snag (7)	17 June	30 May	13 July	7 Aug.	27 July	19 Aug.	51
Dawson City (52)	4 June	13 May	14 July	21 Aug.	19 July	15 Sept.	78
Mayo Landing (26)	5 June	17 May	13 July	8 Aug.	20 July	9 Sept.	64
Watson Lake (12)	1 June	18 May	25 June	25 Aug.	10 Aug.	10 Sept.	85
Smith River (7)	2 July	14 June	13 July	11 Aug.	23 July	21 Aug.	40

Table 74

Mean number of 'thaw-days' (i.e. winter days with maximum temperature ≥33°); in brackets the largest and smallest records in period

		Nov.	Dec.	Jan.	Feb.	Mar.
Whitehorse	(1946–51)	10(15,5)	2(4,0)	3(8,0)	3(7,0)	11(22,0)
Snag	(1946–51)	<1(2,0)	0(0,0)	0(0,0)	<1(1,0)	10(19,2)
Mayo Landing	(1946–51)	4(7,0)	0(0,0)	0(0,0)	<1(1,0)	12(23,1)
Watson Lake	(1946–51)	7(12,1)	0(0,0)	1(5,0)	1(4,0)	14(21,1)

Data of sub-arctic days (maximum temperatures ≤ 0°) and arctic days (minimum temperature ≤ −40°) at 4 stations are given in Table 72; again the milder winters in the Southwest (represented by Whitehorse) than in the Interior (Snag, Mayo) and the Southeast (Watson Lake) stand out. But the Whitehorse station is at the airport on the plateau, 200 feet above the valley-bottom on which the town is built; temperatures in the town on winter nights may be 10° or more lower than at the airport.

Table 73 shows the dates and durations of the period of frost and Table 74 aims at a measure of a related feature of considerable practical importance, the frequency of thaws in the winter months, days when the temperature rises above 32° and turns the usually dry crips snow to slush, which after some hours will freeze again into hard, rough, sharp, unyielding ice. Except at Whitehorse thaws have not occurred in December at the stations tabulated and are very rare in January and February.

Table 75

Mean number of tropical (max. ≥ 86°), summer (max. ≥ 77°), and temperate (max. ≥ 60°) days; in brackets the largest and smallest records in period

		May	June	July	Aug.	Sept.
Whitehorse (1946–51)........	Tropical.....	<1(1,0)	<1(2,0)	<1(2,0)	0(0,0)	0(0,0)
	Summer.....	1(5,0)	4(9,0)	6(11,1)	3(6,0)	0(0,0)
	Temperate..	9(18,2)	24(32,14)	28(31,24)	21(27,16)	9(19,2)
Snag (1946–51)..............	Tropical.....	<1(2,0)	<1(2,0)	<1(3,0)	0(0,0)	0(0,0)
	Summer.....	1(5,0)	5(12,0)	8(14,3)	4(10,0)	0(0,0)
	Temperate..	14(21,8)	24(30,13)	29(31,26)	20(28,4)	10(17,4)
Watson Lake (1946–51).......	Tropical.....	0(0,0)	1(4,0)	<1(3,0)	0(0,0)	0(0,0)
	Summer.....	1(5,0)	6(15,0)	8(14,3)	4(7,0)	1(6,0)
	Temperate..	13(21,9)	26(29,18)	28(30,25)	25(30,21)	11(14,2)

Table 75 contains details of the summer temperature. The number of 'tropical' days is a reminder that warmth, though of short duration, is by no means unknown in this sub-polar region, for such days have occurred in June and in July at all the stations tabulated, but not in August. 'Summer' days are of course much more frequent, normally occurring in May, June, July, and August, most in June and July. The long summer sunshine gives warmth throughout most of the 24 hours and is a major factor in the surprising abundance of the natural flora. Careful greenhouse cultivation can produce almost semi-tropical growth; a greenhouse, more than commonly successful it is true (but without artificial heat), at Elsa, 64°N., alt. 3,000 ft. contained in June a riot of lush green leafage and ripening fruit, tomatoes, cucumbers, watermelons, gourds, and among flowers geraniums, antirrhinums, roses.

A point of interest is the higher temperature in June than August in this high-latitude continental climate, in contrast to the marked advantage of August in most of Canada. It is the more striking since much snow remains to be melted in June. The long days and high solstitial sun explain June's advantage.

10.5 Temperature: Variability

Some idea of the variability that has occurred in the past and may be expected in the future in greater degree (for most of the past data cover only short periods) may be obtained from the following Tables:

The Climatological Tables give the absolute highest and lowest temperatures recorded in each month, and this information is amplified for 4 stations in Table 75,

Table 77 gives the variability of the mean daily maximum and the mean daily minimum (as opposed to the absolute extremes of Table 76) for January and July,

Table 78, the percentage frequencies of monthly temperatures above and below the mean, the limits chosen being 5°—10° and >10°,

Table 79, the liability of successive Januarys and successive Julys to differ in their mean temperature,

Tables 72-75, the highest and lowest as well as mean records.

Notes on the salient features are appended to the Tables. The very large variability indicated by all is a reminder that long periods of observations, much longer and more numerous than are now available, are required to establish the climate. And caution must be used in accepting opinions based on visits or even short residence in the country. Some winter months have been remarkably mild; a warm spell in 1938 gave maxima between 40° and over 50° every day from 20 February to 2 March, and March had a mean temperature about 7° above the mean. On the other hand in the same year between 10 January and 20 February many days had minima between −30° and −50°. In January 1909 cold air invaded the Yukon from north Siberia and temperature fell several times to −50° and −60° during and almost uninterrupted spell of intense cold. The larger variability in the Yukon is a main difference between it and the Mackenzie Valley.

Table 76

Variability of minimum temperature in January, maximum in July; the highest and lowest records are given, with years of occurrence; period of records in brackets after name of station

	January minimum			July maximum		
	Highest	Lowest	Range	Highest	Lowest	Range
Atlin (1915–46)	4(1944)	−54(1925)	58	86(1927)	69(1917) (1937)	17
Watson Lake (1939–52)	9(1952)	−74(1947)	83	92(1951)	59(1951)	33
Whitehorse (1941–52)	31(1951)	−62(1947)	93	91(1951)	61(1951)	30
Dawson City (1951–52)	−1(1951)	−66(1934) (1952)	67	93(1925)	66(1951)	27

The lowest minima in January and the highest maxima in July are the absolute extremes shown in the Climatological Tables.

The range of variability of the winter minima (mean for the 4 stations 75°) is enormously larger than of the July maxima (mean 27°).

Table 77

Variability of mean daily maximum and minimum temperatures in January and July. The highest and lowest records are given, with dates of occurrence; periods of records in brackets after name of station

	January daily means				July daily means			
	Maximum		Minimum		Maximum		Minimum	
	Highest	Lowest	Highest	Lowest	Highest	Lowest	Highest	Lowest
Atlin.......... (1915–46)	29(1931) (1942)	−1(1920)	23(1926	−14(1925)	72(1915)	58(1937)	47(1915) (1940)	36(1937)
Watson Lake.. (1939–52)	17(1942)	−19(1950)	0(1942)	−39(1950)	75(1951)	66(1945)	49(1944) (1951)	45(1939)
Whitehorse.... (1941–52)	26(1942)	−8(1952)	15(1942)	−23(1952)	75(1951)	63(1945)	49(1951)	44(1943)
Dawson City.. (1915–52)	5(1937)	−32(1925)	2(1926)	−43(1925)	80(1927)	66(1922)	50(1927)	42(1925)

The very large variability again stands out; it is much larger in winter than in summer.

In winter the minimum is more variable than the maximum, but in summer the maximum is much the more variable.

Table 78

Percentage frequencies of departure of monthly temperatures from long-period means (periods in brackets)

	January				July			
	Excess		Deficit		Excess		Deficit	
	5°–10°	>10°	5°–10°	>10°	5°–10°	>10°	5°–10°	>10°
Atlin (1906–1938)..................	9	21	21	12	6	0	3	0
Watson Lake (1939–1950)..........	17	8	33	8	0	0	0	0
Dawson City (1901–1950).........	14	20	22	16	2	0	2	0
	—	—	—	—	—	—	—	—
Totals.....................	40	49	76	36	8	0	5	0

Winter (illustrated by January) is very much more variable than summer (July) the sum of the percentages at the 3 stations in the Table in January being 201, in July only 13. The variability of the winters (Fig. 25) is extremely large even for the position on the globe.

In winter large excesses (> 10°) are more frequent than small, but small deficits are more frequent than large; in summer all the departures are less than 10°.

Table 79

Number of cases with specified differences of mean temperature between pairs of successive Januarys and between pairs of successive Julys; period of records in brackets (some series have short breaks)

	January differences (°F.)									July differences (°F.)						
	<1	1	2	3	4	5–10	11–15	16–20	>20	<1	1	2	3	4	5–10	>10
Atlin (1915–34)...........	1	1	0	0	0	6	2	3	6	3	3	2	1	4	6	0
Watson Lake (1939–50)....	0	3	0	0	0	4	1	1	2	2	4	2	2	1	0	0
Dawson City (1915–34)...	1	0	2	1	1	1	3	4	6	1	4	4	2	4	4	0

The variability causes many difficulties in a land where ice affords passage over the wide and deep rivers but open water necessitates ferries. The rivers are fed in spring by the melting snow on the mountains; rapid melting by unusual warmth swells their volume and increases the current so that ferrying may be impossible. On the other hand in prolonged cold the supply of melt-water fails and the levels fall unduly low; this may delay the opening of navigation on the Yukon River for several weeks. The relation between fuel consumption and temperature is obvious.

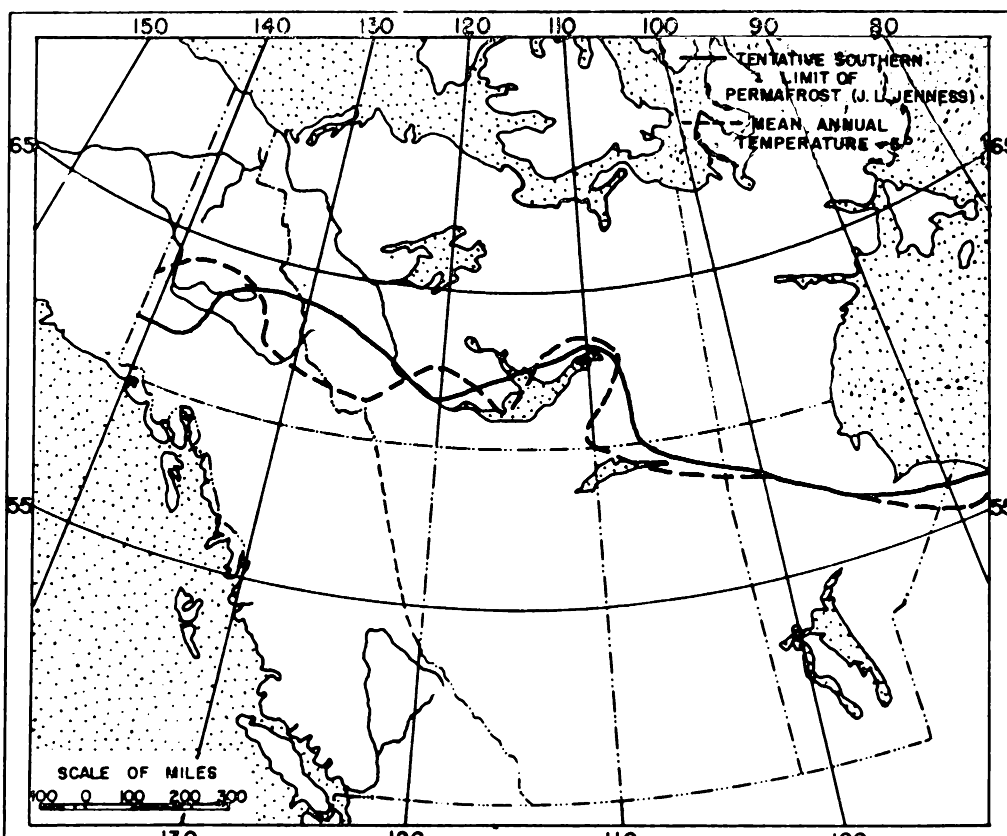
10.6 Climatic Change

The Yukon seems to share the increase of temperature in recent decades usual in high latitudes. The records at Dawson City, one of the few stations with a fairly long series of observations, have been analysed by 10-year running means of annual and seasonal temperatures. The largest rise has been in winter and spring, the smallest, hardly appreciable, in summer. The rise has been rapid only since about 1927. The annual mean was about 3° higher in 1941-50 than in 1901-10 and the winter mean about 9° higher in 1939-48 than in any other 10-year period since 1901.

10.7 Permafrost

The extent of permafrost is of great practical importance and also of much climatic interest though it is not necessarily an expression of the present-day temperature. Fig. 49 shows its approximate southern limit and the mean annual isotherm of $-5°C$. which it follows fairly closely.

Figure 49



Southern limit of Permafrost.

10.8 Humidity

Mean values of dew-point, relative humidity, and mixing ratio at representative stations are given in Table 80. Afternoon means of relative humidity are given in the Climatological Tables.

Table 80

Humidity; mean dew-point (and dry-bulb temp.), relative humidity (%), and mixing ratio (g/kg); periods of records in brackets; hours are L.S.T. Instrumental difficulties make winter values uncertain and at some stations they are omitted

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Atlin (1941–6)												
2230 temp. dry bulb	16	15	24	34	46	54	54	54	47	37	21	18
Dew-point	14	13	21	28	36	43	45	45	40	31	18	16
Rel. Humidity	91	90	88	77	69	68	71	74	76	80	87	93
Mixing ratio	1·6	1·5	2·2	3·1	4·4	5·7	6·4	6·4	5·1	3·7	1·9	1·8
1630 temp. dry bulb	18	20	28	40	53	60	60	60	52	40	23	20
Dew-point	16	16	24	31	40	47	49	48	42	33	20	17
Rel. humidity	92	84	84	70	62	62	67	66	67	74	87	90
Mixing ratio	1·8	1·8	2·7	3·5	5·2	6·8	7·4	7·2	5·5	3·9	2·1	1·9
Whitehorse (1943–50)												
0330 temp. dry bulb	6	2	16	24	37	45	48	46	40	32	14	6
Dew-point	3	0	12	19	30	38	42	41	36	27	11	3
Rel. humidity	88	88	85	81	76	76	80	82	84	81	88	90
Mixing ratio	0·9	0·8	1·4	2·1	3·4	4·8	5·6	5·3	4·4	3·0	1·4	0·9
1530 temp. dry bulb	8	11	28	38	55	64	64	62	53	39	17	7
Dew-point	5	6	18	22	32	41	45	44	38	29	13	5
Rel. humidity	86	80	66	52	41	44	49	51	57	66	85	89
Mixing ratio	1·0	1·1	2·0	2·4	3·7	5·4	6·2	6·0	4·9	3·2	1·5	1·0
Snag (1944–46, 48–50)												
0330 temp. dry bulb	−12	−14	1	15	34	43	47	42	34	20	0	−11
Dew-point	−14	−16	−2	12	29	39	44	39	31	18	−3	−13
Rel. humidity	92	90	89	86	81	84	89	89	91	92	88	92
Mixing ratio	0·3	0·3	0·7	1·4	3·3	4·9	6·1	5·1	3·7	1·9	0·7	0·4
1530 temp. dry bulb	−7	1	24	36	56	64	66	63	52	32	5	−8
Dew-point	−9	−2	18	23	36	44	49	45	38	26	2	−9
Rel. humidity	88	84	79	58	47	47	54	53	60	76	89	93
Mixing ratio	0·5	0·5	2·0	2·5	4·4	6·0	7·4	6·4	4·9	2·8	0·9	0·5
Dawson (1942–50)												
0330 temp. dry bulb					37	47	50	46	38			
Dew-point					34	44	48	44	37			
Rel. humidity					88	90	92	94	94			
Mixing ratio					4·1	6·0	7·1	6·1	4·6			
1530 temp. dry bulb					58	67	69	63	52			
Dew-point					40	51	55	51	42			
Rel. humidity					52	57	60	66	71			
Mixing ratio					5·2	7·4	9·2	7·9	5·7			
Frances Lake (1942–7, broken)												
2130 temp. dry bulb			14	26	44	53	55	53	43	34	10	3
Dew-point			10	20	32	45	49	45	38	30	7	0·0
Rel. humidity			81	80	65	74	79	76	82	85	89	86
Mixing ratio			1·3	2·1	3·8	6·2	7·3	6·4	4·8	3·4	1·1	0·8
1530 temp. dry bulb	−2	obs. inadequate	25	36	55	63	65	62	52	36	12	4
Dew-point	−6		19	26	36	46	50	46	41	30	8	1
Rel. humidity	80		76	67	49	55	58	57	67	77	84	86
Mixing ratio	0·6		2·0	2·8	4·5	6·6	7·6	6·6	5·4	3·4	1·2	0·8

Table 80—Concluded

Humidity; mean dew-point (and dry-bulb temp.), relative humidity (%), and mixing ratio (g/kg); periods of records in brackets; hours are L.S.T. Instrumental difficulties make winter values uncertain and at some stations they are omitted

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Watson Lake (1943-49)												
0330 temp. dry bulb	—8	—4	7	23	36	46	49	45	40	31	7	—8
Dew-point	—10	—6	5	20	31	41	45	42	36	27	5	—10
Rel. humidity	92	91	88	86	82	82	84	86	88	86	91	91
Mixing ratio	0·5	0·6	1·0	2·1	3·6	5·4	6·2	5·5	4·5	3·0	1·0	0·5
1530 temp. dry bulb	−3	5	27	40	56	65	67	64	54	39	11	−5
Dew-point	−6	1	18	26	33	44	48	46	40	30	8	−7
Rel. humidity	90	83	69	58	41	46	50	53	60	69	88	90
Mixing ratio	0·6	0·8	1·9	2·8	3·9	6·0	7·0	6·6	5·3	3·4	1·2	0·5
Smith River (1944-50)												
0430 temp. dry bulb	−6	−8	9	21	35	44	46	43	38	28	6	−6
Dew-point	−7	−10	7	18	31	40	44	40	36	26	5	−7
Rel. humidity	95	91	91	88	85	86	93	89	92	92	96	95
Mixing ratio	0·5	0·6	1·1	2·0	3·6	5·2	6·1	5·2	4·3	2·8	1·0	0·5
1630 temp. dry bulb	0	4	29	38	58	65	67	63	54	38	11	−4
Dew-point	−1	1	19	25	31	45	49	47	41	29	9	−5
Rel. humidity	96	87	63	59	36	48	52	55	61	70	91	96
Mixing ratio	0·7	0·8	2·1	2·7	3·6	6·2	7·3	6·6	7·6	3·3	1·2	0·6
Dease Lake (1945, 1947-50)												
0430 temp. dry bulb	1	3	13	22	33	40	44	42	38	30	17	2
Dew-point	0	0	11	19	30	37	42	40	36	28	16	1
Rel. humidity	96	86	92	89	87	94	94	39	94	92	97	98
Mixing ratio	0·8	0·8	1·4	2·1	3·4	4·7	5·6	5·2	4·5	3·1	1·8	0·8
1630 temp. dry bulb	5	10	31	38	55	62	62	60	53	40	21	4
Dew-point	5	8	29	25	33	42	48	36	40	32	19	4
Rel. humidity	97	90	92	60	44	48	61	42	61	74	91	99
Mixing ratio	1·0	1·2	3·3	2·7	4·0	5·7	7·2	6·3	5·2	3·8	2·0	1·0
Aklavik (1942-50)												
1030 dew-point						43	94	53	33			
Rel. humidity						78	78	86	87			
Mixing ratio						5·8	7·3	6·3	3·9			
1630 dew-point						44	51	48	35			
Rel. humidity						67	68	76	80			
Mixing ratio						6·1	7·9	7·1	4·3			

CHAPTER 11

Clouds and Sunshine

11.1 Clouds: At Meteorological Stations

All the observing stations from which alone regular data can be obtained and compiled are in the valleys. But this is essentially a region of uninhabited uplands and lofty mountains, on which cloud is thicker and more persistent than below as pilots of aircraft are well aware, and only reports from aircraft and distant observation from valley-stations provide information.

In this Chapter Tables of data from the stations, with some notes, are given first, and a more descriptive account of the uplands follows.

The mean amount of cloud (all forms) is about 7/10 at all the recording stations. The monthly means are given in the Climatological Tables. Summer and autumn are the cloudiest seasons. Of the months February and March are the clearest at most stations, but the differences are small.

Table 81

Mean number of days with small (0–2 tenths), medium (3 – 7), and large (8 – 10) amount of cloud, all levels, at morning and afternoon hours of observation

Station (period of records in brackets)	Hours of obs. L.S.T. AM & PM	Cloud amount (tenths)	Jan. AM	Jan. PM	Apr. AM	Apr. PM	July AM	July PM	Oct. AM	Oct. PM
Finlay Forks (1945–51)...	1030 & 1630	0–2	4	6	4	5	3	2	3	3
		3–7	6	7	5	7	8	8	5	7
		8–10	21	18	21	18	20	21	23	21
Dease Lake (1945–51)....	0430 & 1630	0–2	13	7	7	2	5	2	8	2
		3–7	3	3	4	4	6	4	5	4
		8–10	15	21	19	24	20	25	18	25
Atlin (1941–46)..........	1030 & 1630	0–2	5	6	6	4	4	4	3	4
		3–7	5	5	8	10	10	10	7	7
		8–10	21	20	16	16	17	17	21	20
Whitehorse (1941–51)....	0330 & 1530	0–2	9	5	8	3	6	2	8	4
		3–7	5	5	6	5	7	6	7	5
		8–10	17	21	16	22	18	23	16	22
Aishihik (1943–51).......	0330 & 1530	0–2	11	6	9	4	7	2	13	8
		3–7	4	5	5	5	6	6	6	5
		8–10	16	20	16	21	18	23	12	18
Snag (1944–51)...........	0330 & 1530	0–2	10	5	10	5	6	3	8	6
		3–7	4	5	5	5	5	8	5	4
		8–10	17	21	15	20	20	20	18	21
Mayo Landing (1941–51).	0330 & 1530	0–2	10	7	10	5	6	2	9	5
		3–7	3	5	5	6	9	9	5	4
		8–10	18	19	5	19	16	20	18	21
Watson Lake (1941–51)...	0330 & 1530	0–2	9	8	6	3	6	2	7	3
		3–7	3	4	7	4	7	8	5	4
		8–10	19	19	17	23	18	21	19	24
Smith River (1944–51)...	0430 & 1630	0–2	11	7	7	2	6	2	8	4
		3–7	4	5	6	4	8	8	5	4
		8–10	16	19	17	24	17	21	18	23
Aklavik (1941–51).......	0430 & 1630	0–2	14	10	12	11	6	8	6	4
		3–7	4	5	3	5	7	7	3	5
		8–10	13	16	15	14	17	17	22	21

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The Climatological Tables, which classify cloud-amount by time of day, show that the sky is least cloudy at night, with about 6·5 tenths, most cloudy in the afternoon, 7·7 tenths, with little seasonal difference.

Table 81 indicates that at all stations large cloud-amount (8-10) predominates strongly over small (0-2) in both morning and afternoon. Thus in the morning the sky is nearly or quite overcast on about 1 day in 2, in the afternoon on rather more than 2 days in 3, again with small seasonal difference. Clear skies are not common; they are much more frequent in the morning than in the afternoon. A notable feature is the rarity of medium amount of cloud, which is very much less frequent than overcast sky, and at many stations rather less frequent than clear skies.

Table 82

Mean monthly percentages of hours with Low Cloud, in tenths of sky covered and of Sky Obscured (by fog, precipitation, smoke)

	Tenths	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Dease Lake													
(1947–51)........	0–2	75	76	75	63	58	55	38	46	54	58	62	68
	3–7	4	4	8	14	18	21	24	19	15	14	8	6
	8–10	16	15	15	23	23	24	36	33	30	25	26	20
Sky obscured............		5	5	2	1	1	<1	2	2	1	3	4	6
Teslin													
(1944–51)........	0–2	69	65	68	56	62	54	50	56	56	54	52	66
	3–7	10	10	13	20	19	24	26	21	18	18	13	9
	8–10	15	20	17	21	19	22	24	22	25	25	28	19
Sky obscured............		6	5	2	2	<1	0	<1	<1	1	3	7	6
Whitehorse													
(1944–51)........	0–2	63	68	69	57	61	52	48	54	55	58	47	63
	3–7	12	10	16	24	25	28	33	24	21	18	15	12
	8–10	18	16	12	16	14	19	19	22	23	22	31	19
Sky obscured............		7	6	3	3	<1	<1	<1	<1	1	2	7	6
Aishihik													
(1944–51)........	0–2	75	74	75	64	61	52	48	58	63	72	68	72
	3–7	8	8	11	18	20	26	28	20	16	11	9	9
	8–10	12	14	11	16	18	21	23	22	19	15	17	15
Sky obscured............		5	4	3	2	1	<1	<1	<1	2	2	6	4
Watson Lake													
(1944–51)........	0–2	60	59	61	52	58	46	48	55	53	50	46	58
	3–7	11	9	14	21	22	29	28	21	17	14	13	10
	8–10	21	24	21	24	20	24	23	23	28	31	32	24
Sky obscured............		8	8	4	3	<1	1	<1	1	2	5	19	8
Smith River													
(1944–51)........	0–2	74	67	71	55	56	48	48	60	60	66	64	69
	3–7	6	7	11	22	24	29	32	23	16	12	9	7
	8–10	14	18	13	19	19	23	19	16	22	18	20	17
Sky obscured............		6	8	5	4	1	<1	1	1	2	4	7	7

Table 82 gives data of low cloud (not total cloud like the previous Table). Small amounts are much more frequent than large at all stations, about 3 times more at most; skies are overcast or almost overcast with low cloud in only about 1 hour in 5. But the seasons differ much, small amounts being much more common in winter than in summer and large amounts rather more in summer than in winter. Medium amounts are remarkably rare in winter; in summer they are about as frequent as large. In most of the year the tendency is to either nearly cloudless or nearly overcast sky.

Clouds: Along Air Routes

The uplands are prone to the types usual in such country. They intensify in depth and extent any cloud that may exist round about, especially in low pressure systems, circular depressions or the linear occlusions ('trowals') which are more common. When humid air ascends the slopes, whether in widespread frontal currents or as a local 'valley-breeze' in the hotter hours of the day, the tops are soon cloud-capped though the surrounding lowlands are still enjoying clear skies and sunshine. On the windward slopes and summits the cloud may be thousands of feet thick, and give heavy rain or snow, while the lee slopes with descending and warming air are clear. The turbulence in strong winds crossing mountains sometimes builds the cloud up to more than twice the height of the summits above the lowland.

Trough, moist air, up-slope winds—these have been found by meteorologists at the airports to be the warning words, and they are more ominous in the hill districts. The observations made at the airports and reports from aircraft are the source of the following information[1].

The airports, like the other settlements, are in the valleys, separated by wide uplands 3-4,000 higher, so that the direct air routes are largely over high ground. In some weathers when the mountains are covered the cloud base is high enough to leave a clear passage for contact flight over the low ground round them. It is fortunate that the Territory has many corridors through the uplands and also large expanses of flats. The long corridor in which the Alaska Highway runs is useful, but many passages are too narrow for safe navigation except in good weather.

The following pages give some account of the conditions on the much-flown route *Snag—Whitehorse—Watson Lake.*

Snag gets a good deal of cloud from the W'ly winds in and behind fronts moving from W or WNW. These winds are up-slope on the highlands east of Snag, and stratocumulus and stratus may cover not only the highlands but the Snag depression, with ceiling down to 1,250 feet. On the highlands the cloud may build up to 14,000 feet in turbulent air.

An aircraft leaving Snag under clear skies may run into mountain-cloud after passing Wellesley Lake, and remain in it as far as the descent to Aishihik.

In bad weather the cloud may be unbroken up to 18,000 feet above the windward slopes, and turbulence and icing add to the difficulties of navigation. The clearing on the east slope into the Aishihik hollow is a usual result of descent and adiabatic warming and the sky may be almost clear over the hollow. The valley of the Nisling River north of the highlands is a corridor, narrow but yet wide enough for good navigation, which often remains clear of low cloud so as to offer a practicable by-pass north of the highlands. And contact conditions may be found south of them also above the Alaska Highway. But this route is sometimes closed in. For when moist air from the Pacific comes up through the depression followed by the Haines Cut-off and spreads behind the St. Elias Mountains, the Highway corridor fills with low cloud all the way from Canyon Creek to Kluane Lake, and the Koidern Pass south of Snag may also be covered.

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(1) Cameron H. and Thompson, C. E. *A few notes on weather in the Whitehorse region.* (Meteorological Division — Dept. of Transport — Canada. Tec. Cir.)

Aishihik gets little low cloud except with N and NE winds which are up-slope round the airport and may give persistent cloud and turbulence. The most frequent winds, from S and W, are down-slope and give little low-cloud. But middle cloud, altostratus and altocumulus, is common in tropical upper air in a 'trowal' approaching from the west.

The direct route from *Aishihik to Whitehorse* is over irregular uplands up to 7,000 feet. They are often completely closed in by cloud with NW winds, which may prevent contact flight for a day or longer. Moist cyclonic winds from south also bring cloud, but it is less persistent, and contact flight may be possible along the Alaska Highway; these winds are turbulent over the broken country 20 miles west of Lake Laberge. Whitehorse has an average duration of low cloud for the Highway, more than Snag and Aishihik, less than Teslin and Watson Lake; very low ceilings are rare. Three conditions give most low cloud: (1) N winds, behind a front moving from west to east, are up-slope and stratocumulus is down to 1-3,000 feet, sometimes with light precipitation. All N winds tend to give some low cloud, (2) in summer SE winds aloft, associated with a stagnating depression over the Juneau district, bring low stratus, together with general cloud up to 10,000 feet, but the low cloud soon disappears if the S wind is strong enough to descend to the surface, (3) in moist S'ly winds associated with a cold low-pressure system to the southwest cloud may build up, solid or broken, to over 10,000 feet in the Lewes River valley, and tend to persist, but seldom with ceiling below 1,000 feet even at night. This occurs several times every summer.

Thin layers of altocumulus at 10-14,000 feet are common in summer, mostly in the forenoon and early afternoon.

Whitehorse-Teslin-Watson Lake. Orographic cloud may persist on the uplands between the Lewes River valley and Teslin Lake and on the much higher Cassiar Mountains between Teslin and the Liard River valley. The cloud thickens in front of troughs coming from the west, their altostratus joining up with the orographic cloud to form a solid mass up to 15,000 feet. Turbulence may be fairly severe. Contact flight along the Highway is sometimes possible, but with ceilings below 2,500 feet Devil's Pass, through which the Highway runs betwen Marsh Lake and Teslin, may be closed in (and there is much turbulence in strong winds).

In summer moist air sometimes comes in through the White and adjacent passes and spreads persistent low stratus over the Teslin district.

The cloud on the uplands clears on the east slopes of the Cassiar Mountains in descending W'ly winds. But N and NE winds are here up-slope and give thick cloud.

Watson Lake also gets most of its low clouds with N and NE winds, which spread orographic cloud with base sometimes below 2,000 feet. In summer cold depressions stagnating over the district may give persistent low cloud. Low cloud generally clears with the setting in of W'ly winds.

Whitehorse-Juneau. The normal flight route is over the passes in the mountain-divide between plateau and ocean, and along the narrow Skagway Fiord which is steeply enclosed by highland. The whole area is liable to have much low cloud when cyclonic winds meet the coast. Contact flight over the White Pass (2,915 feet) with its little railway is not possible when warm damp S'ly winds are condensing their vapour as they ascend the slopes; unless Skagway reports a ceiling of at least 2,500 feet the passes will be closed in.

With SSW wind the passes may be clear, but Skagway Fiord is under low cloud. In this case a route is sometimes found, south of Haines, well over on the west of the fiord where the cloud is broken in lee of the highland.

With S winds an inland route may be possible when the direct route is closed in. This leads southeast from Whitehorse, past Atlin Lake, and then down the E-W valley of the Taku River which has little cloud with the winds blowing across and not up to it. In winter strong and very turbulent squamish winds (Sect.3.1) often blow down this valley from intense high pressures in the interior.

Forms of Cloud

Table 83

Mean number of hours with specified cloud-forms (St = stratus, Cu = cumulus, Cu + = heavy cumulus, Cb = cumulonimbus, Sc = stratocumulus, Ns = nimbostratus, Fs =fractostratus, Fc =fractocumulus, Ac =altocumulus, As =altostratus, Acc = altocumulus castellatus

		St	Cu	Cu+	Cb	Sc	Ns	Fs	Fc	Ac	As	Acc
Dease Lake (1947–51)......	Jan......	36	0	0	0	21	<1	3	1	60	79	0
	Apr.....	34	20	11	2	50	1	3	2	62	62	0
	July.....	18	37	29	11	105	2	9	8	80	39	0
	Oct.....	40	2	0	0	90	2	11	2	80	72	0
Teslin (1944–51)...........	Jan......	121	0	0	0	113	<1	8	5	198	211	
	Apr.....	89	85	31	10	237	3	15	12	221	165	
	July.....	38	159	91	48	279	2	31	26	348	91	
	Oct.....	92	24	6	1	282	8	54	21	246	162	
Whitehorse (1944–51)......	Jan......	130	1	<1	0	139	1	18	2	220	162	
	Apr.....	47	99	42	5	279	<1	18	7	232	149	
	July.....	14	180	128	65	306	4	26	16	360	84	
	Oct.....	56	20	7	1	309	8	48	17	269	118	
Aishihik (1944–51).........	Jan......	116	<1	0	0	88	1	10	1	154	264	
	Apr.....	48	80	24	4	230	1	12	4	161	182	
	July.....	12	120	139	58	317	5	32	18	297	103	
	Oct.....	44	5	1	0	204	4	31	13	176	202	
Snag (1944–51).............	Jan......	150	0	0	0	53	1	0	<1	183	194	
	Apr.....	58	67	12	6	158	1	3	5	221	141	
	July.....	30	132	91	67	292	8	25	50	285	71	
	Oct.....	96	3	<1	<1	157	6	14	14	226	141	
Watson Lake (1944–51).....	Jan......	144	0	<1	<1	119	<1	5	1	207	195	
	Apr.....	106	86	83	14	254	1	14	9	228	172	
	July.....	27	145	113	53	296	4	26	22	323	83	
	Oct.....	119	7	2	1	232	4	37	5	238	162	
Smith River (1944–51).....	Jan......	72	0	0	0	99	<1	2	<1	235	221	0
	Apr.....	58	98	24	8	282	<1	17	8	263	171	0
	July.....	18	177	86	52	311	1	38	19	352	101	1
	Oct.....	70	10	3	<1	191	1	32	5	313	167	0

In autumn and winter altostratus and altocumulus predominate, together with a good deal of stratocumulus and stratus; other forms are rare (Table 83). The great change in summer is the frequent appearance of cumuliform cloud in all its varieties, types which were already becoming prominent in spring. This change is almost universal in the lands of lower latitudes over the globe, and it is interesting to find it, a continental characteristic due to atmospheric instability over warm land, so prominent in the far north. Altocumulus and stratocumulus also have their greatest frequency in summer, when these higher forms are much more frequent than ordinary cumulus. Stratus and altrostratus decrease to a pronounced minimum in summer.

11.3 Sunshine

Pine Creek (Experimental Farm) alone has continuous records, for only 3 years1949-51. The mean durations (hours) are:

Jan.	22	Apr.	179	July	241	Oct.	96
Feb.	85	May	263	Aug.	241	Nov.	28
Mar.	190	June	238	Sept.	155	Dec.	0

Year 1738.

CHAPTER 12

Precipitation

12.1 Precipitation: Mean Annual

Mean annual precipitation, including both rain and snow (snow is expressed in rain-equivalent, 10 inches of snow to 1 inch rain), as shown on the chart (Fig. 50), is remarkably uniform over most of the Yukon Territory except where the excessive precipitation of the mountains of the Littoral encroaches on the south and west, raising the totals to 40 and probably 60 inches in very small tracts of the mountains. The southeast of the Territory also is favoured, having about 50 per cent more than the rest of the interior (Frances Lake 16 inches, Watson Lake 17 inches). In northern British Columbia the precipitation, judged by the few records, seems to be more than in central Yukon, about 15 inches in the valleys. But records are few everywhere and lacking in the Coast Mountains and also on the uplands of the interior, where the isohyets are based entirely on the few valley records.

Much of the precipitation of the vales as well as of the mountains is probably orographic, an effect of the ascent of the air as it approaches the surrounding hills.

Over most of the lower ground in an average year the precipitation is snow in the months November to March, rain in June to August; the spring months, April and May, and the autumn, September and October, usually get rain in their warmer, snow in their colder weeks, an alternation which makes them the most unpleasant weeks of the year for traffic of all kinds.

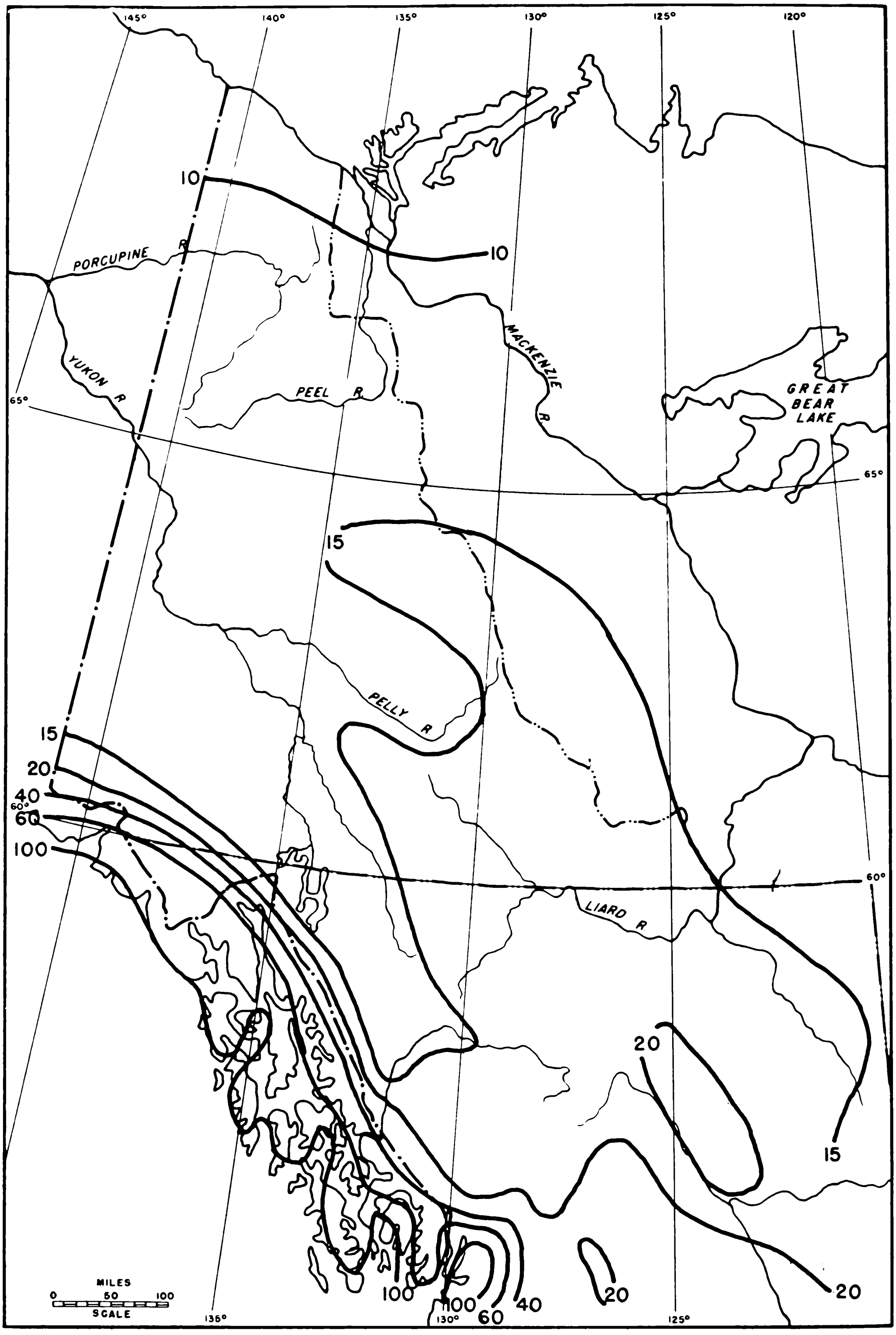
The lack of data from the uplands throughout the Region is the more unfortunate since the water from the melting snow is the major control of the depth of the large rivers on which navigation, ferries, and water-power depend. Late melting, associated with abnormally cool spring and early summer, entails late opening of navigation and deficiency of water-power.

Snowfall (Fig. 51) appears to be fairly uniform, least, 40 inches or a little less, on the Arctic Coast, and rising to 60 inches in the south-west and much more on the Coast and St. Elias Mountains. Northern British Columbia has appreciably more, over 60 inches on the Coast Mountains and also east of a line from Teslin Lake to Babine Lake. Again it must be noted that the recording stations are very sparse and all in the valley-bottoms; the mountains certainly get more snow, their west slopes very much more, than the valleys.

Regime (Table 84, Figs. 52, 53). There is no pronounced wet or dry season, but spring has least precipitation (except at Aishihik), summer most (except at Atlin and Finlay Forks) its proportion being highest (48 per cent) at Aishihik and Snag. July and August are the rainiest months at most stations, and much of the rain falls in thunderstorms, which are rather frequent for such a high latitude, many stations having 6 or more in those two months (see Table 95). Autumn gets about twice as much precipitation as spring at most stations.

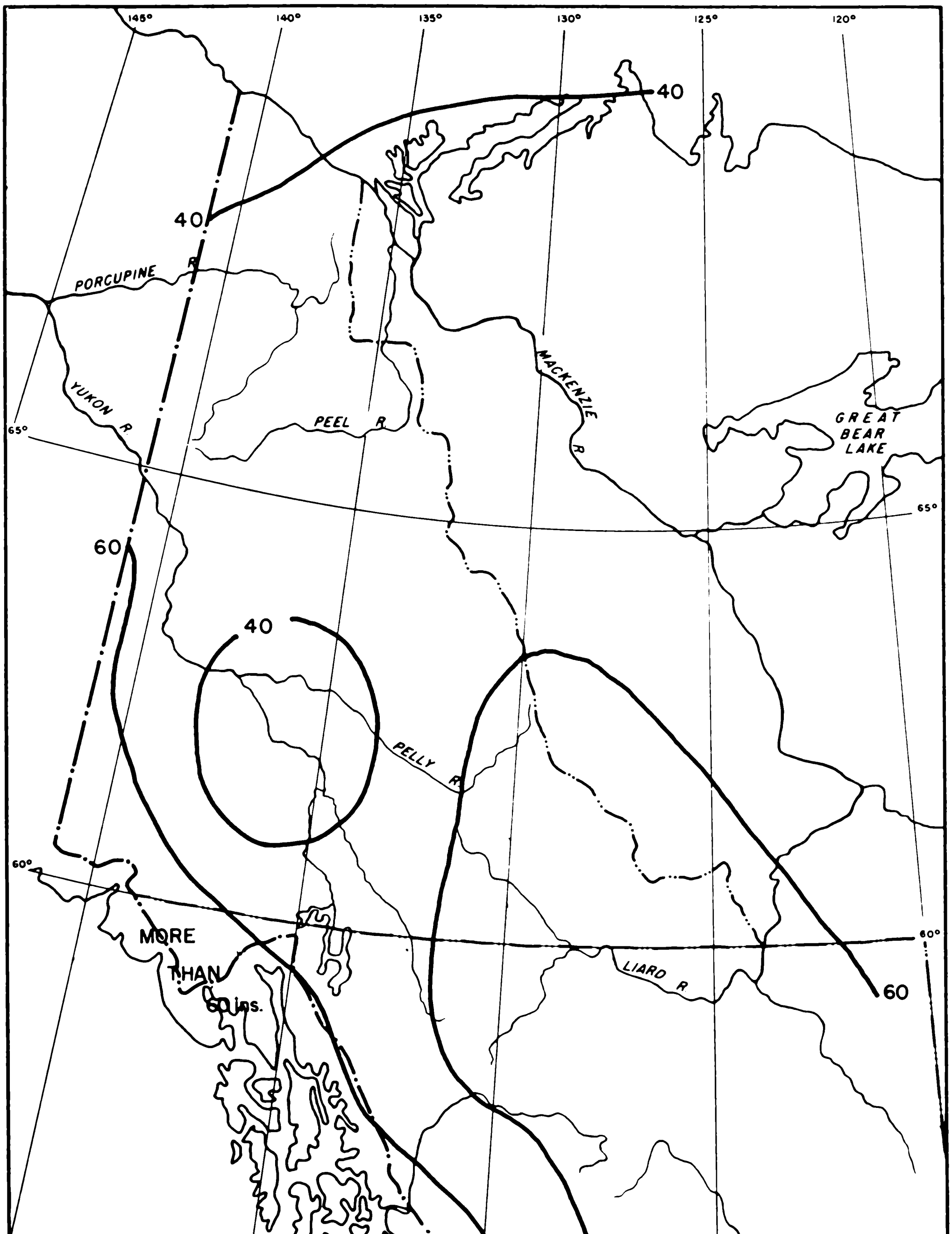
The interior of Yukon Territory has the smallest proportion of its precipitation in winter, and consequently the snowfall is small.

Fig. 50



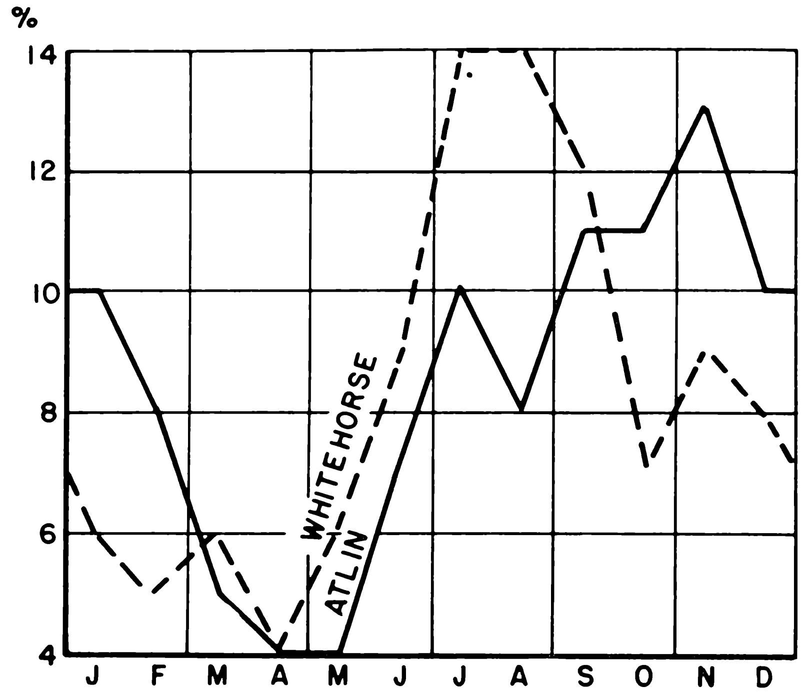
Mean annual precipitation (inches) in northern British Columbia and the Yukon Territory.

Fig. 51



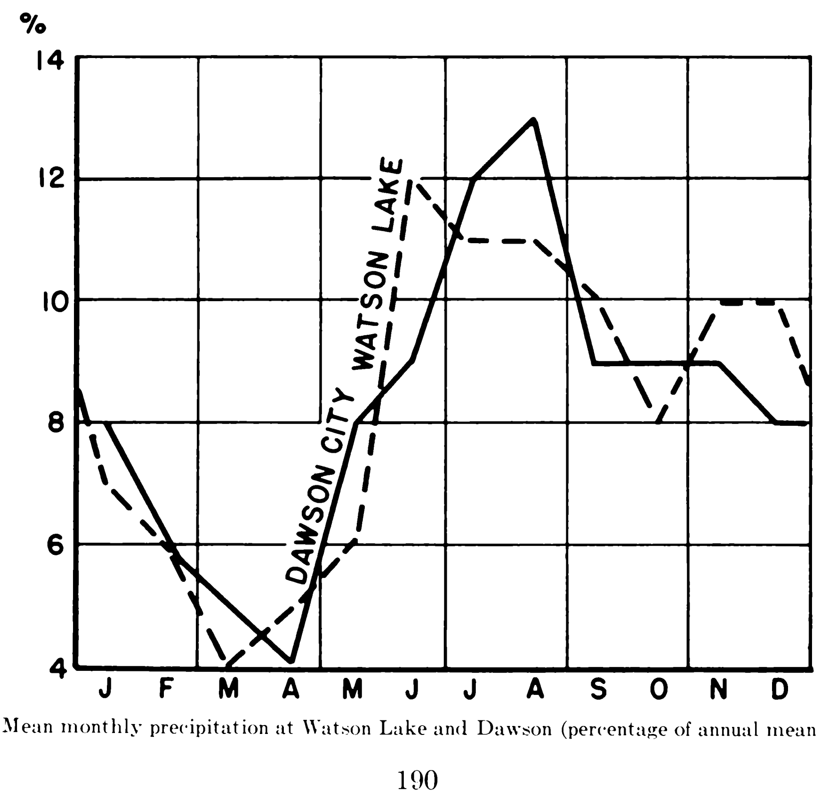
Mean annual snowfall (inches) for northern British Columbia and the Yukon Territory.

Fig. 52



Mean monthly precipitation at Whitehorse and Atlin (percentage of annual mean).

Fig. 53



Mean monthly precipitation at Watson Lake and Dawson (percentage of annual mean).

Table 84

Mean precipitation, distribution over the year

Station (period of records in brackets)	Mean ann. precip.	Mean percentage of annual precipitation: summer half yr.	winter half yr.	spg.	sum.	aut.	wint.	Month with most	Month with least
Yukon Territory, SW									
Atlin (B.C.) (1931–46)	11·1	58	42	12	27	34	27	Nov.	Apr.
Teslin (1943–50)	12·8	44	56	13	36	31	20	July	Feb.
Whitehorse (1941–50)	10·6	39	61	15	39	28	18	July	Apr.
Mean		47	53	13	34	31	22		
Yukon Territory, interior									
Aishihik (1943–50)	10·1	29	71	19	48	20	13	July	Dec.
Snag (1943–50)	14·1	34	66	15	48	18	19	July	Mar.
Dawson City (1901–50)	11·8	46	54	18	38	31	22	Aug.	Apr.
Mayo Landing (1925–50)	11·2	37	63	13	43	26	18	Aug.	Apr.
Frances Lake (1941–49)	16·0	49	51	12	33	28	26	July	Apr.
Mean		39	61	15	42	24	19		
Yukon Territory, SE									
Watson Lake (1938–50)	16·7	45	55	15	35	27	23	June	Mar.
Smith River (B.C.) (1944–50)	18·0	41	59	14	39	26	21	July	Mar.
Mean		43	57	14	37	27	22		
North British Columbia									
Finlay Forks (1945–50)	16·7	46	54	16	28	27	30	July	Mar.
Dease Lake (1944–50)	15·0	43	57	9	39	29	23	Aug.	Apr.
Mean		44	56	12	34	28	26		
Aklavik (N.W.T.) (1926–50)	9·2	40	60	15	40	27	18	Aug.	Mar.

Snow becomes frequent in the beginning of October and from then till April rain is very rare, and indeed unknown except in the early and late weeks of the period. As a rule the land, even in the valleys, is almost continuously white from mid-October till early April, the lower uplands till mid-May, and the heights over 7,000 feet almost throughout the year. The giants of the St. Elias Mountains, with summits up to nearly 20,000 feet, bear great fields of perennial snow which feed hundreds of glaciers; few large glaciers however descend far into Yukon Territory, but those that do are a main source of water for nearly all the rivers in the southwest.

The following timetable gives some idea of the winter conditions:

September, snow begins to fall on the uplands above 6,000 feet. October, the snowline descends, and most of the low ground is usually covered by the middle of the month. The depth increases only slowly, for the snow-fall is not heavy and much is lost by ablation and evaporation.

November, most of the valleys in Yukon Territory have about 6 inches of snow on the ground, those in northern British Columbia more.

December and January, the depth increases slowly, to perhaps 12 inches in the valleys of Yukon Territory, and twice as much in the east of northern British Columbia by mid-February. The uplands have far more, but depth is very variable and no details are available.

After the end of February the snow is melting, the rate naturally depending on the weather; by the end of March patches of ground are bare, and most of the valleys are clear by the end of April. But the uplands retain more or less snow till much later.

Tables 85, 86 give the mean, the largest, and the smallest depths of snow lying, as noted in the few available sources, but they are based on very short and irregular records and they have no claim to accuracy.

Table 85

Snow, average depth (inches) on ground

	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
Atlin.........		8	7	10		
Teslin...	8	12	17	18	13	
Aishihik......	4	7	8	9	8	3
Snag..........	7	9	15	14	11	5
Dawson City..........	5	7	14	6	6	3
Mayo Landing..........	6	10	17	20	12	
Frances Lake..........	8	20		16	13	
Watson Lake..........	6	16	25	30	14	4
Smith River............	8	18	25	26	23	10
Finlay Forks..........	4	16	15	19	13	
Dease Lake..........	8	15	17	15	13	10

Omissions denote lack of records

Table 86

Snow on ground, greatest and least depths (inches) that have been noted, excluding drifts

		Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
Dawson City	Greatest............	23	32	32	34	31	6
	Least...............						0
Watson Lake	Greatest............	12	26	28	36	36	11
	Least...............	0	6				0

Omissions denote lack of records

12.2 Precipitation: Frequency of Occurrence and Intensity

Most stations have between 100 and 120 days with precipitation, but in the Southeast Region of Yukon Territory and in north British Columbia the number rises to about 150; rain-days and snow-days are about equal (see Climatological Tables). The uplands must have more rain-days, and very many more snow-days, than the valleys.

Table 87 gives a classification by intensity. The most prominent feature is the high proportion of light rain and drizzle, almost all the rain being in that category, but light rain and drizzle are probably much over-estimated at the expense of moderate and heavy both in the actual observations and in computation. Light and moderate snow falls in more than twice the number of hours of light and moderate rain, but the high figures for snowfall result largely from the basis of classification.

Table 87

Mean number of hours with the specified intensities of rain and snow. For rain, light indicates a rate of fall not exceeding 0·1 inches an hour, moderate between 0·1 and 0·3 inches, heavy exceeding 0·3 inches; for snow, the categories are based on the effect of the falling snow on visibility; light indicates visibility 5/8 mile or more, moderate between 5/8 and 5/16 mile, heavy less than 5/16 mile

		Rain			Snow		
		Light (incl. drizzle)	Moderate	Heavy	Light	Moderate	Heavy
Whitehorse (1944–51)	Jan.	0	0	0	201	2	1
	July	55	0	0	0	0	0
Teslin (1944–51)	Jan.	0	<1	0	154	2	<1
	July	61	1	0	0	0	0
Aishihik (1944–51)	Jan.	0	0	0	143	<1	<1
	July	60	1	0	0	0	0
Snag (1944–51)	Jan.	0	0	0	138	4	<1
	July	79	1	0	0	0	0
Watson Lake (1944–51)	Jan.	<1	0	0	186	6	1
	July	61	1	0	0	0	0
Smith River (1944–51)	Jan.	2	0	0	196	61	14
	July	61	1	0	0	0	0
Dease Lake (1947–51)	Jan.	14	2	0	32	1	0
	July	26	0	0	0	0	0

12.3 Precipitation: Snow-pellets, Sleet and Freezing Rain

According to the available data (Table 88) snow-pellets fall not infrequently in autumn and spring, but they have been noted in every month except July though very rarely in summer. Sleet is sometimes recorded in autumn. Freezing rain also is recorded mostly in autumn, but it is not unknown in winter.

Table 88

Number of hours with records (mean, highest, and lowest) of fall of snow-pellets, sleet, and freezing rain or drizzle

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Teslin (1944–51)												
Snow-pellets												
Mean	0	0	1	3	1	<1	0	0	<1	<1	<1	0
Highest, and lowest	0,0	0,0	5,0	7,0	9,0	1,0	0,0	0,0	1,0	2,0	2,0	0,0
Sleet												
Mean	0	0	0	0	0	0	0	0	0	<1	0	0
Highest, and lowest	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	2,0	0,0	0,0
Freezing rain or drizzle												
Mean	1	0	0	<1	0	0	0	0	0	<1	0	0
Highest, and lowest	9·0	0,0	0,0	1,0	0,0	0,0	0,0	0,0	0,0	3,0	0,0	0,0
Whitehorse (1944–51)												
Snow-pellets												
Mean	<1	0	1	2	1	0	0	<1	1	0	0	<1
Highest, and lowest	3,0	0,0	4,0	6,1	6,0	0,0	0,0	1,0	5,0	0,0	0,0	1,0
Sleet												
Mean	0	0	0	0	<1	0	0	0	0	0	0	0
Highest, and lowest	0,0	0,0	0,0	0,0	1,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Freezing rain or drizzle												
Mean	0	<1	0	0	0	0	0	0	0	0	<1	0
Highest, and lowest	0,0	2,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	3,0	0,0

Table 88—Concluded

Number of hours with records (mean, highest, and lowest) of fall of snow-pellets, sleet, and freezing rain or drizzle.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Aishihik (1944-51)												
Snow-pellets												
Mean	0	1	<1	1	2	<1	0	0	1	0	0	<
Highest, and lowest	0,0	7,0	1,0	3,0	4,0	1,0	0,0	0,0	2,0	0,0	0,0	1,0
Sleet												
Mean	0	0	0	<1	0	0	0	<1	0	<1	0	0
Highest, and lowest	0,0	0,0	0,0	1,0	0,0	0,0	0,0	1,0	0,0	1,0	0,0	0,0
Freezing rain or drizzle												
Mean	0	<1	0	0	0	0	0	0	0	0	0	<1
Highest, and lowest	0,0	1,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	2,0
Snag (1944-51)												
Snow-pellets												
Mean	<1	0	<1	<1	1	0	0	0	0	1	1	0
Highest, and lowest	1,0	0,0	1,0	1,0	2,0	0,0	0,0	0,0	0,0	3,0	3,0	0,0
Sleet												
Mean	0	0	0	0	0	0	0	0	1	0	0	0
Highest, and lowest	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	9,0	0,0	0,0	0,0
Freezing rain or drizzle												
Mean	3	0	0	0	0	0	0	0	0	3	2	0
Highest and, lowest	2,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	20,0	10,0	0,0
Watson Lake (1944-51)												
Snow-pellets												
Mean	1	<1	2	6	2	0	0	0	<1	1	<1	<1
Highest, and lowest	3,0	1,0	9,0	14,0	9,0	0,0	0,0	0,0	3,0	2,0	2,0	1,0
Sleet												
Mean	0	0	0	0	0	0	0	0	<1	1	<1	0
Highest, and lowest	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	2,0	5,0	1,0	0,0
Freezing rain or drizzle												
Mean	0	0	0	0	0	0	0	0	0	1	2	<1
Highest, and lowest	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	11,1	9,0	1,0
Smith River (1944-51)												
Snow-pellets												
Mean	1	<1	2	4	1	0	0	0	<1	<1	1	0
Highest, and lowest	3,0	2,0	7,0	6,0	10,0	0,0	0,0	0,0	2,0	3,0	2,0	0,0
Sleet												
Mean	0	0	0	<1	0	0	0	0	<1	1	0	0
Highest, and lowest	0,0	0,0	0,0	1,0	0,0	0,0	0,0	0,0	2,0	5,0	0,0	0,0
Freezing rain or drizzle												
Mean	<1	0	0	<1	0	0	0	0	<1	2	2	1
Highest, and lowest	2,0	0,0	0,0	1,0	0,0	0,0	0,0	0,0	1,0	10,0	9,0	3,0
Dease Lake (1947-51)												
Snow-pellets												
Mean	0	0	<1	0	0	0	0	0	0	0	0	0
Highest, and lowest	0,0	0,0	2,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Sleet												
Mean	0	0	0	0	0	0	0	0	0	0	0	0
Highest, and lowest	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Freezing rain or drizzle												
Mean	0	0	0	0	0	0	0	0	0	0	0	0
Highest, and lowest	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0

12.4 Precipitation: Variability

Only four stations have long enough records for useful consideration. In Table 89 it will be seen that all have had many months with no appreciable precipitation, most in late winter and spring, few in autumn. The highest monthly records are low, none reaching 4 inches.

Table 89

Highest and lowest records of precipitation (inches); period of records in brackets

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Atlin (1905–46)													
Highest	3·8	2·2	2·1	1·2	1·1	2·6	2·3	2·9	3·5	3·4	3·7	3·1	19·0
Lowest	0·2	0	0	<0·1	0	0·1	0	0	0·1	0·5	0·2	0	6·7
Carcross (1907–50)													
Highest (broken)	2·4	1·7	1·4	0·9	1·4	1·8	2·2	1·8	3·0	2·5	2·8	1·4	14·5
Lowest	0	0	0	0	0	0	0	0	0·2	0·1	0·2	0·1	4·1
Dawson (1915–50)													
Highest	2·9	1·7	1·8	1·7	2·8	2·5	3·9	5·2	2·6	2·9	3·8	2·2	17·9
Lowest	0·2	0·1	T	0	0·1	0·1	0·1	0·2	0·3	0·1	0·1	0·1	9·0
Mayo Landing (1927–50)													
Highest	3·9	1·4	1·6	1·0	1·6	3·0	3·0	3·9	2·3	2·6	2·0	2·6	16·9
Lowest	T	0	T	T	0·2	0·8	0·6	0·2	0·2	0·2	T	0·1	8·5

Table 90 shows that the range of the variability of annual precipitation varies much in relation to the mean, considerably exceeding 100 per cent at Atlin and Carcross, and being little over 70 per cent at the stations in the interior.

Table 90

Mean annual precipitation and extreme records (period of records in brackets); Md is the difference between the extremes expressed as a percentage of the mean

	Mean annual precip. (in.)	Highest record	Lowest record	M_d
Atlin (31 yrs.)	11·1	19·0	6·7	111
Carcross (1907–50) (broken)	9·0	14·5	4·1	116
Dawson (1915–50)	12·6	17·9	9·0	71
Mayo Landing (1927–50)	11·3	16·9	8·5	74

Table 91 gives the variability of the annual precipitation according to the specified limits. An interesting feature is that, except at Carcross, the most frequent totals are not within the limits which include the mean value.

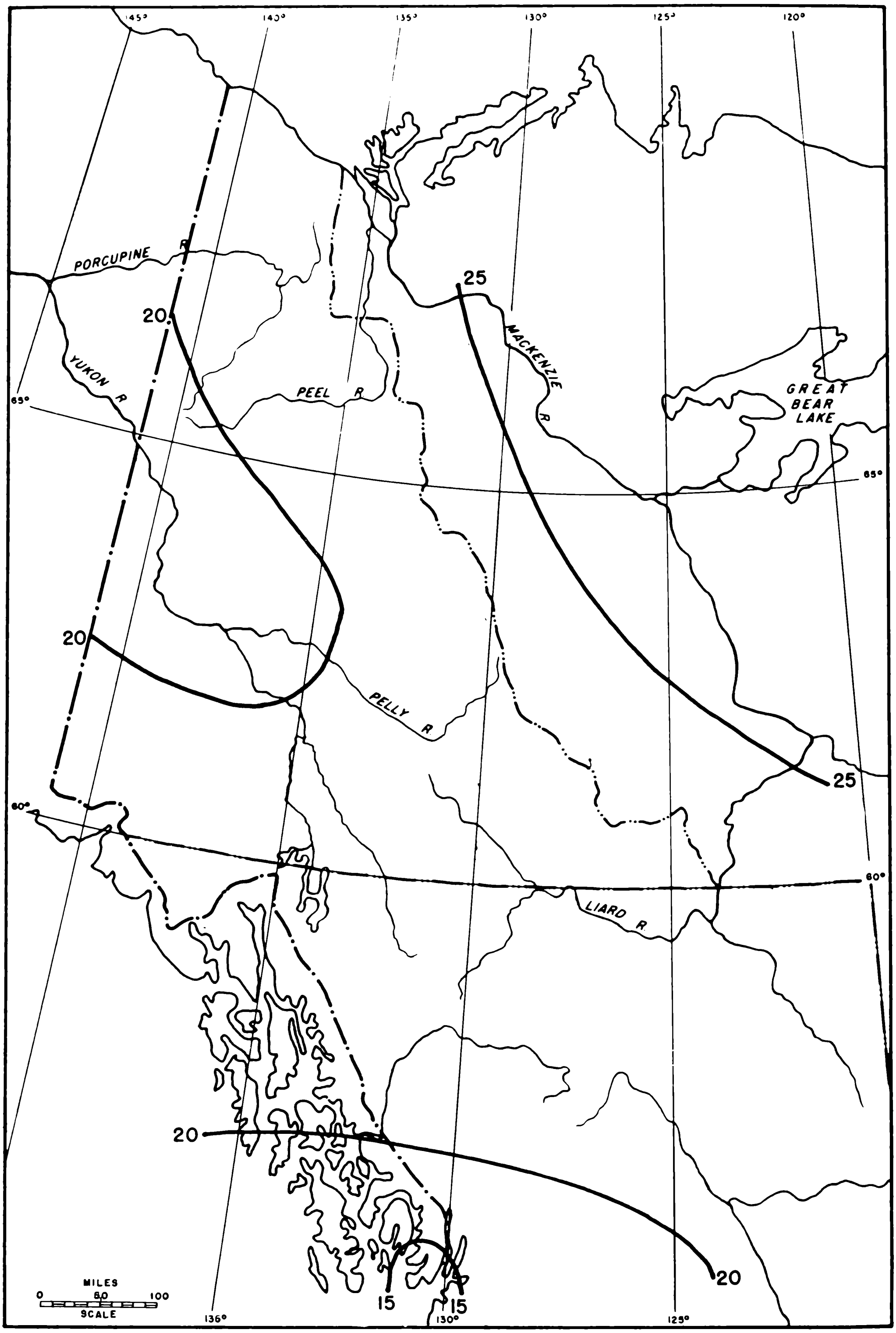
In Fig. 54 the coefficient of variation of the annual precipitation is shown cartographically.

Table 91

Variability of annual precipitation, percentage of years with amount within the specified ranges

Station (number of years' observations in brackets)	Mean annual precip.	Range (inches) <8	8–10	10·1–12·0	12·1–14·0	14·1–16·0	16·1–18·0	>18
Atlin (31)	11·1	7	35	26	16	13	0	3
Carcross (21)	9·0	33	38	19	5	5	0	0
Dawson (47)	11·8	0	9	28	34	23	6	0
Mayo Landing (23)	11·2	4	35	17	35	0	9	0
Mean per cent		11	29	23	22	10	4	1

Fig. 54



Coefficient of variation of the annual precipitation in northern British Columbia and the Yukon Territory. The coefficient of variation is the standard deviation divided by the mean.

Variability, Snowfall. This is indicated in three Tables. Table 92 gives the monthly and annual extremes at three stations. At none of them has snow been recorded in July, and at most it is very rare in June. The highest monthly records are only moderate in January, 39 inches at Mayo, 29 inches at Dawson and Atlin. The annual totals rise to 98 inches at Atlin.

Table 92

Highest and lowest snowfall recorded; period in brackets

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Atlin (1915–46)													
Highest.............	29·0	21·4	19·0	7·0	4·5	0	0	2·5	6·7	26·0	34·0	21·9	97·7
Lowest..............	2·1	0	0	0	0	0	0	0	0	0	0	0	10·0
Dawson (1915–50)													
Highest.............	29,4	16·6	17·6	7·5	4·2	0·2	0	1·0	9·4	17·6	23·1	22·2	74·3
Lowest..............	1·7	0·7	T	0	0	0	0	0	0	0·3	0·8	1·3	24·9
Mayo Landing (1927–50)													
Highest.............	39·2	12·9	15·5	7·2	T	0	0	0	6·6	19·0	19·7	26·3	65·2
Lowest..............	T	0	T	0	0	0	0	0	0	0	T	0·8	12·0
Aklavik (NWT) (1935–50)													
Highest.............	14·3	9·7	7·0	15·0	9·6	3·8	0	6·9	12·8	29·3	22·4	17·6	
Lowest..............	T	T	T	T	T	0	0	0	0	0·5	0·3	0·3	

Table 93 gives the percentage frequencies of monthly snowfalls within the specified ranges and Table 94 those of annual snowfalls. The most frequent annual totals are between 40-60 inches, limits which includes the annual mean.

The lack of records from the uplands leaves a wide gap in our information on the variability of the snowfall over the greatest part of the Region.

Table 93

Percentage frequencies of monthly snowfalls within the specified ranges; period of records in brackets

Station	Range (in.)	J	F	M	A	M	J	J	A	S	O	N	D
Atlin (1915–46).......	0 or T	0	3	6	22	75	100	100	97	81	23	3	6
	0·1– 4·0	6	37	53	66	22	0	0	3	19	19	23	13
	4·1– 6·0	22	9	13	9	3	0	0	0	0	16	13	23
	6·1–10·0	34	31	25	3	0	0	0	0	0	26	19	19
	>10·0	38	19	3	0	0	0	0	0	0	16	42	39
Dawson (1915–50)....	0 or T	0	0	3	11	61	97	100	97	47	0	0	0
	0·1– 4·0	19	33	42	71	36	3	0	3	47	31	19	8
	4·1– 6·0	25	19	19	11	3	0	0	0	0	19	3	25
	6·1–10·0	22	28	19	6	0	0	0	0	6	28	31	31
	>10·0	33	19	17	0	0	0	0	0	0	22	47	36
Mayo Landing (1927-50)..........	0 or T	4	8	17	17	92	100	100	100	75	8	4	0
	0·1– 4·0	21	54	38	75	8	0	0	0	21	33	12	33
	4·1– 6·0	25	17	21	4	0	0	0	0	4	12	21	21
	6·1–10·0	33	12	12	4	0	0	0	0	0	29	37	17
	>10·0	17	8	12	0	0	0	0	0	0	17	25	29
Aklavik (NWT).....	0 or T	0	0	0	0	22	60	95	66	17	0	0	0
	0·1– 4·0	39	52	64	35	61	25	5	29	63	38	29	58
	4·1– 6·0	26	13	9	22	4	5	0	0	8	21	17	21
	6·1–10·0	26	26	18	26	13	5	0	0	8	12	29	0
	>10·0	9	9	9	17	0	5	0	5	4	29	25	21

Table 94

Percentage frequencies of yearly snowfall within specified ranges; period of records in brackets

	Range (in.) <20·1	20·1–30·0	30·1–40·0	40·1–60·0	>60·0
Atlin (1915–46)	3	3	23	52	19
Dawson (1915–50)	0	6	8	61	25
Mayo Landing (1927–50)	13	30	4	30	22
Aklavik (1926–50)	—	15*	20	35	30

* Percentage frequency below 30·1 in.

12.5 Thunderstorms, Hail

Thunderstorms are more frequent than might be expected in high latitudes and they contribute a considerable proportion of the rain. The mean numbers of days with thunder are given in the Climatological Tables and in Figs. 37-41; such records are liable to be inaccurate, but thunder seems to be least frequent in the Southwest Region (Whitehorse 4 days) most frequent in the Interior and Southeast (Aishihik 15 days, Smith River 12) and in northern British Columbia. Table 95, the mean number of hours in which it is heard, corroborates the occurrence by days. Thunder is unknown in the months October to April, and is most frequent in June and July. Hail (Table 96), usually associated with thunderstorms, has a similar régime but is less frequent. It is liable to occur from April to September, but is not dangerous.

The data of thunderstorms, as of other elements from the airports, fail to express the much greater frequency on the uplands. There the storms are liable to occur in active cold fronts in the summer half-year, but they are not very frequent and few are severe. On the ordinary air-route they seem to be most frequent round Snag, over the Cassiar Mountains, and between Watson Lake and Smith River, least frequent in the Lewes River valley near Whitehorse.

Table 95

Thunderstorms, hours of occurrence, mean, highest, and lowest records (periods in brackets)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Whitehorse (1944–51)												
Mean	0	0	0	0	<1	3	4	1	0	0	0	0
Highest, and lowest	0,0	0,0	0,0	0,0	2,0	13,0	19,0	4,0	0,0	0,0	0,0	0,0
Teslin (1944–51)												
Mean	0	0	0	0	<1	5	9	2	0	0	0	0
Highest, and lowest	0,0	0,0	0,0	0,0	2,0	18,0	36,0	6,0	0,0	0,0	0,0	0,0
Aishihik (1944–51)												
Mean	0	0	0	0	<1	5	8	1	0	0	0	0
Highest, and lowest	0,0	0,0	0,0	0,0	1,0	21,0	20,0	3,0	0,0	0,0	0,0	0,0
Snag (1944–51)												
Mean	0	0	0	0	1	7	10	4	1	0	0	0
Highest, and lowest	0,0	0,0	0,0	0,0	2,0	22,0	25,0	18,0	2,0	0,0	0,0	0,0
Watson Lake (1944–51)												
Mean	0	0	0	0	1	5	7	3	1	0	0	0
Highest, and lowest	0,0	0,0	0,0	0,0	4,0	14,0	19,0	7,0	2,0	0,0	0,0	0,0

Table 96

Hail, number of hours, mean, highest, and lowest records (periods in brackets)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Teslin (1944–51)												
Mean	0	0	0	0	0	<1	<1	<1	<1	0	0	0
Highest, and lowest	0,0	0,0	0,0	0,0	0,0	1,0	2,0	1,0	1,0	0,0	0,0	0,0
Whitehorse (1944–51)												
Mean	0	0	0	0	0	1	1	<1	<1	0	0	0
Highest, and lowest	0,0	0,0	0,0	0,0	0,0	4,0	2,0	1,0	1,0	0,0	0,0	0,0
Aishihik (1944–51)												
Mean	0	0	0	0	1	1	1	<1	0	0	0	0
Highest, and lowest	0,0	0,0	0,0	0,0	2,0	2,0	2,0	2,0	0,0	0,0	0,0	0,0
Snag (1944–51)												
Mean	0	0	0	<1	1	1	<1	<1	0	0	0	0
Highest, and lowest	0,0	0,0	0,0	1,0	3,0	2,0	1,0	1,0	0,0	0,0	0,0	0,0
Watson Lake (1944–51)												
Mean	0	0	0	<1	1	1	<1	1	1	0	0	0
Highest, and lowest	0,0	0,0	0,0	3,0	2,0	2,0	2,0	2,0	1,0	0,0	0,0	0,0
Aklavik (NWT) (1941–50)												
Mean	0	0	0	0	0	0	0	0	0	0	0	0
Highest, and lowest	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0

12.6 Water Supply and River Navigation

In the early days nearly all transport was by lake and river; depth of water, speed of current, and duration of open water were the controlling factors. This is no longer the case in the south and southwest of Yukon Territory where the Alaska Highway is in full use, but river navigation is likely to remain for many years the chief means of transport of heavy freight in the interior. Most of the land is mountain or plateau, geologically young and till recently under the Pleistocene ice-sheet. Large sheets of ice still remain on the heights in the south and southwest, and the rivers are interrupted by innumerable shoals and rapids, and in their upper courses by waterfalls. The navigation season is short and precarious and at the mercy of several hazards. Precipitation all the year is only moderate to small, under 12 inches over most of the Territory except on the mountains (where the amount is unknown, but probably small for such country). At any rate the summer maximum is not large, distribution over the year being fairly even; there is no semblance of a summer monsoon, no rainy season which might provide even a few months of high river for reliable and safe navigation. But small as it is, direct rainfall is valuable in some rivers. The other sources of supply are two: melting snow on all the mountains in early summer, and melting ice in the glaciers and ice-fields of the St. Elias Mountains and the Coast Mountains south and southeast of Whitehorse in late summer. Of the glaciers and ice-fields those of the St. Elias Mountains are by far the larger, and they are indeed of great extent. In July and August they send down enormous floods in rushing torrents which fill the channels of the Donjek and White Rivers to overflowing and sweep away bridges. Unfortunately those rivers are of little use in themselves, and the floods they carry join the Yukon River only at Stewart River, so that they do not help navigation in the reaches where water is most needed. The other glacier-system, on the Coast Mountains, which feeds the Lewes River is small, but its melt-water suffices to raise the levels in the Lewes River and Lake Laberge, and in less degree in the Yukon River, enough to provide for navigation in July and August.

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The other source of melt-water, snow on the highlands, begins to be useful in May, increases to a maximum in June, but falls off in early July, after which the summer rains help to maintain levels for a few weeks. The rivers depending on snow are those that head in the Cassiar, Mackenzie, and Ogilvie Mountains, the largest being the Teslin, Pelly and Macmillan, Stewart, and Klondike. Normally these rise fast in May and early June and the rise helps to break up their winter ice-cover. But the water-supply depends on the amount of snow that the previous winter has provided and also on the temperature, for a cold spring delays the melting, making the flow irregular in date and continuity. At any rate by late July and August melting snow ceases to be of significance, and the only hope then is from local rains. The Stewart and its tributaries seem to be favoured by heavier and longer rains in their mountain sources in late August and early September.

Unfortunately the rivers flowing northwest from Whitehorse, and the Stewart which taps important mining country, are dependent for most of their water on these precarious sources, and they are the rivers which have been most used in the past, and might be used more now but for this failing. The opening of navigation on the Lewes River has been advanced since 1925 by the building of a dam below Marsh Lake on the river's upper course about 20 miles SE of Whitehorse. The dam is closed when navigation ends in early September, and water is stored in the winter half-year. In early May it is opened and the level of Lake Laberge (the shoals of which are an obstacle to navigation) rises about 5 feet, breaking the shore ice, so that navigation from Whitehorse begins in a normal season about 20 May (formerly it was about 8 June); but even now a cold spring can delay the use of the largest river-steamers till mid-June. Until about 1950 navigation on the Stewart River was the means of evacuation of the valuable, and very heavy, silver-lead concentrates from the Mayo mining district, but the water was deep enough for the larger steamers and barges only about 3 weeks in June, after which navigation by smaller craft might be continued till mid-September.

Northern British Columbia provides little river or lake navigation. The lower Stikine has regular services up to Telegraph Creek, the river being navigable on the average from the end of April to the beginning of November; it is usually frozen solid by the beginning of December. Dease Lake is open from early June to early December.

CHAPTER 13

Visibility

13.1 Visibility: General

Data are given in:

Climatological Tables (number of days with fog),

Table 97 (frequency of visibility, AM and PM, within specified ranges),

Table 98 (frequency of types of fog by number of hours of occurrence),

Table 99 (driving snow and blowing dust),

Table 100 (smoke),

Table 101 (visibility and simultaneous ceilings).

Visibility is very good in the valleys in spring and autumn, less good (but not bad) in autumn and winter, as will be gathered from the descriptions that follow of conditions at the several stations. Steam-fog in autumn from the many great lakes and wide rivers, and ice-fog during intense winter cold, are features of this northern land.

13.2 Visibility: Fog

True fog is probably rare on the uplands (where thick weather is due to cloud down to the surface), but no records are available. It is fairly frequent in the valleys, and the records at the airports are representative of the valleys in the south of the Yukon; there are no adequate records from the rest of the Territory. Fog is rare except in the winter half-year, and its occurrence depends chiefly on the local topography.

The types of fog are:

inversion-fog, much the commonest in all seasons;

frontal, may be widespread in the warm air of passing shallow troughs of low pressure, but not frequent;

steam-fog, forms when cold air drifts over warmer lakes and wide rivers, and spreads over the adjoining land; most frequent in autumn before the freeze-up;

ice-crystal fog, fairly frequent in calm air under clear skies in winter when the temperature goes below zero.

Table 97

Mean number of days with specified ranges of horizontal visibility at morning and afternoon observations (note, means are expressed to the nearest whole number)

	Hour L.S.T.	Range of visibility	Jan.	Apr.	July	Oct.
Watson Lake (1941–51)	0330	<1 km.	1	<1	<1	1
		1–10 km.	6	2	1	2
		>10 km.	24	28	30	28
	1530	<1 km.	<1	<1	0	<1
		1–10 km.	4	1	1	1
		>10 km.	27	28	30	29
Smith River (1944–51)	0430	< 1 km.	<1	<1	1	1
		1–10 km.	4	3	1	2
		>10 km.	27	27	29	28
	1630	< 1 km.	<1	<1	0	0
		1–10 km.	3	1	<1	2
		>10 km.	28	29	31	29
Finlay Forks (1946–51) broken	0430	< 1 km.	0	0	0	0
		1–10 km.	3	1	0	1
		>10 km.	28	29	31	30
	1630	< 1 km.	1	0	0	<1
		1–10 km.	4	1	<1	2
		>10 km.	26	29	30	29
Dease Lake (1944–51)	0430	< 1 km.	0	<1	<1	1
		1–10 km.	2	1	2	2
		>10 km.	29	28	28	28
	1630	< 1 km.	<1	<1	<1	<1
		1–10 km.	3	1	1	1
		>10 km.	28	29	30	29
Atlin (1941–46)	1030	< 1 km.	<1	0	0	<1
		1–10 km.	4	1	<1	3
		>10 km.	26	29	31	28
	1630	< 1 km.	<1	0	0	<1
		1–10 km.	4	1	1	2
		>10 km.	26	29	30	29
Whitehorse (1941–51)	0330	< 1 km.	1	<1	<1	<1
		1–10 km.	5	1	<1	<1
		>10 km.	25	28	31	30
	1530	< 1 km.	<1	0	0	<1
		1–10 km.	3	<1	<1	1
		>10 km.	28	30	31	30
Aishihik (1943–51)	0330	< 1 km.	1	<1	<1	<1
		1–10 km.	4	2	1	2
		>10 km.	26	28	30	29
	1530	< 1 km.	1	0	0	<1
		1–10 km.	2	1	<1	1
		>10 km.	28	29	31	29
Snag (1944–51)	0330	< 1 km.	1	<1	<1	3
		1–10 km.	4	2	1	3
		>10 km.	26	27	30	25
	1530	< 1 km.	<1	<1	<1	<1
		1–10 km.	3	1	<1	2
		>10 km.	28	29	31	28
Mayo Landing (1941–51)	0330	< 1 km.	4	<1	<1	1
		1–10 km.	3	1	2	4
		>10 km.	24	28	28	26
	1530	< 1 km.	2	0	0	1
		1–10 km.	3	1	1	3
		>10 km.	26	29	30	27
Aklavik (NWT) (1942–51)	0430	< 1 km.	1	<1	<1	2
		1–10 km.	4	4	2	6
		>10 km.	26	26	29	22
	1630	< 1 km.	1	<1	<1	1
		1–10 km.	6	4	2	6
		>10 km.	24	27	29	25

Table 98

Number of hours with obstruction to vision, mean, highest, and lowest records.

Definitions:

Fog, dense, objects not visible at 660 yards

Fog, moderate, objects visible at 660 yards, but not at 1,100 yards

Fog, light, objects visible at 1,100 yards, but not at 7 miles

Shallow fog, fog lying on ground, of depth not exceeding 6 feet; very light shallow fogs are ignored

Ice-fog, an obscurity in the surface layers due to minute crystals of ice which cause haloes, pillars of light above strong lights, and glinting (most at an angle of 22° from the source of light)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Teslin (1944–51)													
Fog, dense													
Mean	2	1	1	1	<1	0	1	1	3	1	1	4	16
Highest, and lowest	5,0	8,0	5,0	6,0	1,0	0,0	5,0	3,0	11,0	8,0	6,0	17,0	
Fog, moderate													
Mean	2	<1	<1	<1	0	0	<1	<1	1	<1	1	5	9
Highest, and lowest	5,0	2,0	1,0	1,0	0,0	0,0	1,0	1,0	6,0	1,0	4,0	18,0	
Fog, light													
Mean	11	6	3	3	4	2	3	4	4	5	14	21	80
Highest, and lowest	43,0	30,0	15,0	7,0	16,0	12,0	23,0	10,0	17,0	13,0	52,0	73,0	
Shallow fog,													
Mean	2	2	1	<1	0	<1	1	0	1	0	0	1	8
Highest, and lowest	13,0	3,0	2,0	1,0	0,0	1,0	2,0	0,0	3,0	0,0	0,0	4,0	
Ice-fog,													
Mean	4	1	1	0	0	0	0	0	0	0	0	1	7
Highest, and lowest	22,0	4,0	6,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	5,0	
Haze													
Mean	0	0	0	0	4	<1	1	<1	0	0	0	0	5
Highest, and lowest	0,0	0,0	0,0	0,0	35,0	3,0	4,0	2,0	0,0	0,0	0,0	0,0	
Whitehorse (1944–51)													
Fog, dense													
Mean	3	<1	1	1	0	0	0	3	4	1	7	4	24
Highest, and lowest	15,0	2,0	4,0	2,0	0,0	0,0	0,0	7,0	9,0	5,0	27,0	16,0	
Fog, moderate													
Mean	1	1	<1	1	<1	0	0	1	1	1	4	3	13
Highest, and lowest	4,0	4,0	1,0	3,0	1,0	0,0	0,0	4,0	4,0	2,0	9,0	12,0	
Fog, light													
Mean	8	5	4	4	1	1	3	4	7	5	17	19	78
Highest, and lowest	35,0	28,0	15,0	10,0	6,0	4,0	11,0	18,0	24,0	10,0	45,0	41,0	
Shallow fog,													
Mean	1	<1	0	0	1	0	0	3	4	1	1	3	14
Highest, and lowest	3,0	1,0	0,0	0,0	1,0	0,0	0,0	9,0	16,0	3,0	2,0	20,0	
Ice-fog,													
Mean	29	15	0	0	0	0	0	0	0	<1	6	22	72
Highest, and lowest	71,0	50,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	1,0	31,0	51,0	
Haze													
Mean	0	0	0	1	0	0	0	0	<1	0	1	0	2
Highest, and lowest	0,0	0,0	0,0	9,0	0,0	0,0	0,0	0,0	1,0	0,0	4,0	0,0	
Aishihik (1944–51)													
Fog, dense													
Mean	5	3	<1	1	1	<1	1	2	3	4	10	10	40
Highest, and lowest	31,0	14,0	2,0	3,0	4,0	1,0	4,0	10,0	8,0	20,0	28,0	25,0	
Fog, moderate													
Mean	7	3	<1	0	1	<1	1	<1	2	2	13	12	41
Highest, and lowest	24,0	15,0	2,0	0,0	3,0	1,0	5,0	1,0	6,0	4,0	26,2	41,0	
Fog, light													
Mean	16	12	2	1	2	2	2	3	8	8	34	31	121
Highest, and lowest	39,0	32,0	16,0	5,0	4,0	9,0	9,0	10,0	37,0	21,0	96,0	66,0	
Shallow fog,													
Mean	3	<1	2	<1	<1	<1	<1	2	3	1	2	2	15
Highest, and lowest	14,0	1,0	8,0	2,0	1,0	1,0	2,0	3,0	17,0	4,0	7,0	12,0	

Table 98—Continued

Number of hours with obstruction to vision, mean, highest, and lowest records.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Aishihik (1944-51)—Con.													
Ice-fog,													
Mean	7	2	1	0	0	0	0	0	0	0	<1	3	13
Highest, and lowest	44,0	17,0	4,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	2,0	14,0	
Haze													
Mean	0	0	0	0	0	<1	0	0	0	0	0	0	<1
Highest, and lowest	0,0	0,0	0,0	0,0	0,0	1,0	0,0	0,0	0,0	0,0	0,0	0,0	
Snag (1944-51)													
Fog, dense													
Mean	8	7	4	1	2	1	1	2	8	30	15	10	89
Highest, and lowest	36,0	26,0	10,0	3,0	8,0	4,0	4,0	10,0	19,0	59,0	59,0	29,0	
Fog, moderate													
Mean	4	3	2	1	0	0	1	2	6	12	9	2	42
Highest, and lowest	13,0	10,0	8,0	7,0	0,0	0,0	3,0	6,0	14,0	28,3	22,0	7,0	
Fog, light													
Mean	21	12	9	1	2	3	5	8	20	42	42	21	186
Highest, and lowest	56,0	34,0	25,0	3,0	4,0	12,0	14,0	35,0	69,3	105,11	90,3	49,0	
Shallow fog,													
Mean	3	<1	2	<1	1	<1	2	2	4	2	1	1	18
Highest, and lowest	20,0	4,0	6,0	2,0	2,0	2,0	6,0	7,0	19,0	11,0	5,0	9,0	
Ice-fog,													
Mean	8	9	1	<1	0	0	0	0	0	1	2	9	30
Highest, and lowest	29,0	57,0	3,0	1,0	0,0	0,0	0,0	0,0	0,0	10,0	8,0	39,0	
Haze													
Mean	0	0	0	0	0	0	<1	0	0	0	0	0	<1
Highest, and lowest	0,0	0,0	0,0	0,0	0,0	0,0	1,0	0,0	0,0	0,0	0,0	0,0	
Watson Lake (1944-51)													
Fog, dense													
Mean	5	2	3	3	1	1	4	5	6	6	12	5	53
Highest, and lowest	15,0	9,0	8,0	7,0	5,0	5,0	15,0	11,0	18,3	14,0	27,0	24,0	
Fog, moderate													
Mean	3	2	1	1	2	1	2	2	5	5	5	4	33
Highest, and lowest	7,0	6,0	6,0	2,0	5,0	3,0	9,0	4,0	9,0	9,0	12,0	14,0	
Fog, light													
Mean	21	9	5	7	3	4	5	9	13	21	24	16	137
Highest, and lowest	92,0	49,0	13,0	26,0	8,0	13,0	21,0	18,0	19,0	35,7	44,0	46,0	
Shallow fog,													
Mean	0	3	1	1	<1	0	<1	<1	1	0	1	2	9
Highest, and lowest	0,0	14,0	2,0	3,0	2,0	0,0	2,0	2,0	6,0	0,0	3,0	3,0	
Ice-fog,													
Mean	42	10	2	0	0	0	0	0	0	1	5	24	84
Highest, and lowest	122,1	34,0	10,0	0,0	0,0	0,0	0,0	0,0	0,0	5,0	23,0	77,0	
Haze													
Mean	0	0	0	0	0	0	0	0	0	0	<1	0	<1
Highest, and lowest	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	1,0	0,0	
Smith River (1944-51)													
Fog, dense													
Mean	2	2	1	2	<1	3	6	8	11	8	5	2	50
Highest, and lowest	4,0	8,0	7,0	13,0	2,0	12,0	12,0	29,0	25,0	28,0	9,0	10,0	
Fog, moderate													
Mean	1	0	<1	2	<1	<1	1	1	2	4	2	1	14
Highest, and lowest	8,0	0,0	2,0	7,0	1,0	1,0	4,0	3,0	4,0	9,0	5,0	3,0	
Fog, light													
Mean	8	5	2	8	6	7	9	01	17	18	10	8	108
Highest, and lowest	46,0	18,0	8,0	35,0	17,0	19,0	22,0	24,0	29,0	58,5	21,0	33,0	
Shallow fog,													
Mean	0	<1	8	1	0	1	3	2	2	1	1	1	20
Highest, and lowest	0,0	1,0	62,0	4,0	0,0	3,0	15,0	6,0	7,0	9,0	8,0	3,0	
Ice-fog,													
Mean	0	0	1	2	0	0	0	0	0	<1	<1	1	4
Highest, and lowest	0,0	0,0	3,0	19,0	0,0	0,0	0,0	0,0	0,0	1,0	2,0	5,0	
Haze													
Mean	0	0	0	0	1	<1	<1	0	0	0	0	0	1
Highest, and lowest	0,0	0,0	0,0	0,0	4,0	2,0	2,0	0,0	0,0	0,0	0,0	0,0	

Table 98—Concluded

Number of hours with obstruction to vision, mean, highest, and lowest records.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Dease Lake (1947–51)													
Fog, dense													
Mean	1	2	<1	<1	1	0	<1	2	3	1	3	1	14
Highest, and lowest	6,0	9,0	1,0	2,0	6,0	0,0	2,0	3,0	5,0	2,0	6,0	5,0	
Fog, moderate													
Mean	0	2	<1	0	<1	<1	0	1	<1	1	2	2	8
Highest, and lowest	0,0	7,0	1,0	0,0	2,0	1,0	0,0	2,0	1,0	3,0	5,0	10,0	
Fog, light													
Mean	2	2	<1	0	<1	0	<1	3	2	2	3	5	19
Highest, and lowest	6,0	8,0	1,0	0,0	2,0	0,0	1,0	5,0	4,0	5,0	8,0	11,0	
Shallow fog,													
Mean	0	0	0	0	0	0	0	0	0	0	0	0	0
Highest, and lowest	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	
Ice-fog,													
Mean	1	0	0	0	0	0	0	0	0	0	0	0	1
Highest, and lowest	7,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	
Haze													
Mean	0	0	0	0	0	0	0	0	0	0	0	0	0
Highest, and lowest	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	
Aklavik (NWT) (1941–50)													
Fog, dense													
Mean	1	0	<1	<1	1	<1	<1	<1	1	2	1	<1	7
Highest	2	0	1	1	3	1	1	2	5	6	3	1	13

Most of the following descriptions for the airports are taken from *A few notes on weather in the Whitehorse region*(1) by H. Cameron and C. E. Thompson

Watson Lake. Steam-fog often forms over the lake, but the air movement is usually katabatic from the uplands on the north and northeast and carries it away from the airport (but it sometimes drifts back aloft in the form of thin, very low, stratus with ceiling down to 50 feet). Frontal and ice-fog are more frequent than at the other airports. In general fog (except steam-fog) occurs with light winds from N and NE; W'ly winds are subsiding after their passage of the Cassiar Mountains and the air is usually clear.

Smith River. Dense fog is about as frequent as at Watson Lake, but moderate and light fog less frequent. Ice-fog is much less frequent.

Dease Lake. According to its records has least fog of all the stations, only 22 hours a year with dense or moderate fog and 1 hour with ice-fog.

Teslin. Despite the proximity of the large lake fog (except light) is remarkably rare, probably largely owing to good air-drainage. But frontal fog (and low stratus) can be persistent in summer.

Whitehorse. The airport on its plateau is above most fogs, which lie in the Lewes River valley below. But dense fog is not unknown in autumn. Most of the valley-fogs are combinations of the common inversion (and katabatic) types, with steam-fogs from the small local lakes of the Lewes River and the more distant Marsh Lake and Lake Laberge from SE and N winds respectively may drift it. But only occasionally do these shallow types rise to the landing-field.

(1) (Local forecast study - Meteorological Division, Canada, 1953).

Frontal fog may form in summer (but the condensation usually takes the form of cloud up to 10,000 feet and higher), associated with a stagnating low pressure system over the Juneau district; when S'ly winds come in strong enough to reach the surface in the Lewes valley any fog disappears.

Ice-crystal fog is common in calm and very cold weather in winter.

Aishihik. With its two large lakes to give steam-fog, and surrounding steep slopes to send down cold surface air and form inversion conditions, this station has much more fog than Whitehorse airport. But the air-drainage to the north is fairly good, and most fog is not persistent. November, December, and January are the foggiest months. Ice-fog is not frequent.

Snag. The bowl-like topography collects cold humid air gravitating down the steep surrounding slopes and valleys, and finding only narrow egress towards northeast. Hence inversion-fogs from the rivers are frequent and on many days persist till noon, except in summer. Steam-fog from the rivers is common in autumn. The damp air of stagnating depressions favours frontal fog in summer. Snag records more fog (except ice-fog) than any of the other stations. Ice-fog is common in calm and intensely cold air under clear skies, conditions which sometimes persist for several days in winter anticyclones.

13.3 Visibility: Other Obstructions

Table 99

Number of hours (mean, highest and lowest records) in which blowing or drifting snow and blowing dust were observed

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Dease Lake (1947–51)													
Blowing or drifting snow,													
Mean................	3	11	3	1	0	0	0	0	0	0	1	5	24
Highest, and lowest.	9,0	42,0	10,0	7,0	0,0	0,0	0,0	0,0	0,0	0,0	2,0	25,0	
Blowing dust,													
Mean................	0	0	0	0	0	0	0	0	0	0	0	0	0
Highest, and lowest.	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	
Watson Lake (1944–51)													
Blowing or drifting snow,													
Mean................	2	26	14	2	0	0	0	0	0	2	8	5	59
Highest, and lowest.	8,0	80,0	59,0	12,0	0,0	0,0	0,0	0,0	0,0	16,0	34,0	28,0	
Blowing dust,													
Mean................	0	0	0	0	<1	0	0	<1	0	0	0	0	<1
Highest, and lowest.	0,0	0,0	0,0	0,0	1,0	0,0	0,0	2,0	0,0	0,0	0,0	0,0	
Smith River (1944–51)													
Blowing or drifting snow,													
Mean................	13	29	16	<1	0	0	0	0	0	1	5	9	73
Highest, and lowest.	65,0	71,0	62,0	1,0	0,0	0,0	0,0	0,0	0,0	5,0	38,0	27,0	
Blowing dust,													
Mean................	0	0	0	0	0	0	0	0	0	0	0	0	0
Highest, and lowest.	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	
Teslin (1944–51)													
Blowing or drifting snow,													
Mean................	6	7	7	1	0	0	0	0	0	1	11	4	37
Highest, and lowest.	17,0	31,0	43,0	5,0	0,0	0,0	0,0	0,0	0,0	6,0	26,0	6,0	
Blowing dust,													
Mean................	0	0	0	0	0	0	0	0	0	0	0	0	0
Highest, and lowest.	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	

Table 99—Concluded

Number hours (mean, highest and lowest records) in which blowing or drifting snow and blowing dust were observed.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Whitehorse (1944–51)													
Blowing or drifting snow,													
Mean................	25	23	7	1	0	0	0	0	0	2	19	17	104
Highest, and lowest.	58,0	67,0	32,0	5,0	0,0	0,0	0,0	0,0	0,0	7,0	77,0	80,0	
Blowing dust,													
Mean................	0	0	0	0	0	0	0	<1	0	0	0	0	<1
Highest, and lowest.	0,0	0,0	0,0	0,0	0,0	0,0	0,0	1,0	0,0	0,0	0,0	0,0	
Aishihik (1944–51)													
Blowing or drifting snow,													
Mean................	9	7	4	1	0	0	0	0	0	0	2	8	31
Highest, and lowest.	52,0	13,0	11,0	4,0	0,0	0,0	0,0	0,0	0,0	0,0	12,0	27,0	
Blowing dust,													
Mean................	0	0	0	0	0	1	0	0	0	0	0	0	1
Highest, and lowest.	0,0	0,0	0,0	0,0	0,0	10,0	0,0	0,0	0,0	0,0	0,0	0,0	
Snag (1944–51)													
Blowing or drifting snow,													
Mean................	7	8	8	3	0	0	0	0	0	1	8	5	40
Highest, and lowest.	54,0	35,0	32,0	16,0	0,0	0,0	0,0	0,0	0,0	6,0	26,0	19,0	
Blowing dust,													
Mean................	0	0	0	0	0	0	0	<1	0	0	0	0	<1
Highest, and lowest.	0,0	0,0	0,0	0,0	0,0	0,0	0,0	1,0	0,0	0,0	0,0	0,0	

Table 100

Smoke; mean number of hours, and highest and lowest records, in which atmospheric obscurity due to smoke was observed; period of records in brackets

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Watson Lake (1944–51)													
Mean................	1	<1	<1	0	5	3	3	3	4	1	<1	1	21
Highest, and lowest.	9,0	3,0	1,0	0,0	30,0	12,0	16,0	20,0	23,0	6,0	3,0	5,0	
Teslin (1944–51)													
Mean................	0	0	0	0	0	1	3	2	1	1	0	<1	8
Highest, and lowest.	0,0	0,0	0,0	0,0	0,0	8,0	19,0	14,0	5,0	4,0	0,0	3,0	
Whitehorse (1944–51)													
Mean................	1	2	0	4	2	3	5	0	1	0	<1	2	20
Highest, and lowest.	7,0	7,0	0,0	1,0	14,0	14,0	30,0	0,0	2,0	0,0	3,0	12,0	
Aishihik (1944–51)													
Mean................	0	0	0	0	0	2	3	0	0	0	0	0	5
Highest, and lowest.	0,0	0,0	0,0	0,0	0,0	12,0	20,0	0,0	0,0	0,0	0,0	0,0	
Snag (1944–51)													
Mean................	0	0	0	0	0	0	8	<1	<1	0	0	0	8
Highest, and lowest.	0,0	0,0	0,0	0,0	0,0	0,0	32,0	1,0	2,0	0,0	0,0	0,0	

Tables 99 and 100 give the frequency of solid forms of obstruction to visibility, blowing snow, blowing dust, and smoke. The first is much the most frequent and also of most practical importance, but of course occurs only in the winter months, October to April. Blowing dust is rare since most of the land in the neighbourhood of the stations is tree- or grass- covered. Smoke also is rare; originating in forest-fires it is most frequent in the dry summer months, but Whitehorse and Watson Lake get some in winter also.

Visibilities and simultaneous ceilings.

Mean data are given in Table 101.

Table 101

Mean monthly number of hours with specified ceilings and associated visibilities

Visibility	Ceiling (feet)	Jan.	Apr.	July	Oct.	Jan.	Apr.	July	Oct.
		Dease Lake				Smith River			
	0–200	0	*	*	2	1	2	2	8
0 to	300–500	6	1	*	1	1	2	1	2
¾ mile	600–1,000	4	*	0	2	11	5	1	5
	0–200	0	0	0	*	0	*	0	*
1 to	300–500	1	*	0	*	0	1	0	2
2½ miles	600–1,000	8	1	1	4	5	3	1	6
0 to	1,100–2,000	5	1	0	1	37	16	2	13
2½ miles	over 10,000	0	0	0	*	1	1	2	3
		Watson Lake				Whitehorse			
	0–200	13	2	3	8	4	2	0	1
0 to	300–500	2	2	1	2	1	1	0	1
¾ mile	600–1,000	11	2	0	5	1	2	0	3
	0–200	1	0	0	5	1	0	0	1
1 to	300–500	*	0	1	3	0	0	0	1
2½ miles	600–1,000	5	1	*	5	3	2	0	3
0 to	1,100–2,000	40	16	*	7	20	16	*	3
2½ miles	over 10,000	32	1	1	4	15	*	*	1

* Indicates a mean occurrence equal to or less than ½, but greater than 0.

APPENDIX II

Climatological Tables for Meteorological Stations in Northern British Columbia and the Yukon

Climatological Table for AISHIHIK. Lat. 61° 37′N. Long. 137° 31′W. Altitude above MSL 3,170ft.

Month	Pressure: Mean at M.S.L.	Air Temperature at Station Level: Daily Mean	Mean of daily: Max.	Mean of daily: Min.	Mean of monthly: Max.	Mean of monthly: Min.	Absolute extremes: Highest recorded	Absolute extremes: Lowest recorded	Relative Humidity: 1530 L.S.T.	Precipitation: Mean Total, all forms	Precipitation: Max. fall in 24 hours	Precipitation: Mean Snowfall (in. of snow)	Number of days of: Rain, ≥ ·01 in.	Snow, depth ≥ ·1 in.	Frost (in screen)	Fog (vis. ≤ 1 km.)	Gale ≥ 39 m.p.h.	Thunder	Percentage of Time with: Clear sky (≤ 2/10 covered)	Overcast sky (≥ 8/10 covered)	Cloud amount, tenths of sky covered: Mean for four synoptic hours	0330 L.S.T.	0930 L.S.T.	1530 L.S.T.	2130 L.S.T.	Wind Directions, Percentage frequencies means of 24 hourly observations daily: N	NE	E	SE	S	SW	W	NW	Calm
	mb.	°F	°F	°F	°F	°F	°F	°F	%	in.	in.	in.																						
Jan.	1011	−1	11	−12			46	−58	87	0·5	0·2	5	0	9	31	2	<1	0	29	57	6·4	5·8	6·6	7·2	5·9	29	8	2	5	22	15	3	5	11
Feb.	1016	−1	12	−13			45	−70	82	0·4	0·2	4	0	8	28	2	<1	0	33	55	6·1	5·6	7·0	6·6	5·2	29	7	2	5	22	14	3	9	9
Mar.	1009	14	28	0			46	−51	72	0·5	0·6	5	0	7	31	<1	<1	0	35	47	5·6	4·6	6·2	6·4	5·3	23	5	3	13	27	16	3	6	4
Apr.	1014	23	35	12			50	−36	61	0·5	0·6	4	0	5	30	<1	<1	0	22	60	6·8	6·0	6·6	7·8	6·7	17	5	2	15	33	14	3	9	2
May	1015	41	53	29			83	6	52	0·9	0·5	3	6	2	22	<1	0	0	19	60	7·1	6·5	7·0	7·9	6·8	9	4	2	21	42	11	3	6	2
Jun.	1015	50	63	38			87	22	52	1·7	1·0	<1	11	<1	4	3	<1	12	16	62	7·1	6·6	6·9	7·8	7·1	12	4	2	23	33	12	3	7	4
Jul.	1014	53	65	41			86	26	57	1·8	1·8	0	13	0	1	<1	0	3	14	66	7·5	7·0	7·2	8·2	7·8	12	6	3	25	27	15	3	7	2
Aug.	1015	49	61	37			79	16	56	1·4	0·9	<1	9	0	6	1	0	<1	20	63	7·0	6·3	7·2	7·8	6·7	15	5	2	19	29	14	3	11	2
Sep.	1012	41	52	30			73	−4	59	0·9	0·8	3	4	4	17	2	0	0	21	61	7·0	6·1	7·8	7·7	6·4	18	5	2	18	30	14	3	7	3
Oct.	1005	28	37	18			59	−10	71	0·6	0·8	5	0	6	29	2	<1	0	28	53	6·3	5·2	7·6	7·1	5·5	26	4	2	17	26	14	4	6	1
Nov.	1010	6	16	−3			49	−53	90	0·5	0·2	5	0	9	30	3	<1	0	25	62	6·8	5·7	7·7	7·5	6·2	44	6	2	7	13	10	3	5	10
Dec.	1012	−4	6	−13			42	−59	92	0·4	0·2	4	0	9	31	4	<1	0	29	52	6·1	5·5	6·8	6·8	5·4	29	7	3	6	21	12	3	4	15
Mean	1012	25	37	14					69										24	58	6·5	5·9	7·0	7·4	6·2	22	6	2	15	26	14	3	7	5
Extreme or total							87	−70		10·1	1·8	39	43	59	260	19	1	15																
Number of years' observations	6	8	8	8			8	8	7	8	8	8	9	9	9	7	7	7	7	7	←		7		→	←				9				→

Climatological Table for ATLIN. Lat. 59° 35′N. Long. 133° 38′W. Altitude above MSL 2,240ft.

Month	Pressure: Mean at M.S.L.	Air Temperature at Station Level: Daily Mean	Mean of daily: Max.	Mean of daily: Min.	Mean of monthly: Max.	Mean of monthly: Min.	Absolute extremes: Highest recorded	Absolute extremes: Lowest recorded	Relative Humidity: 1630 L.S.T.	Precipitation: Mean Total, all forms	Precipitation: Max. fall in 24 hours	Precipitation: Mean Snowfall (in. of snow)	Number of days of: Rain, ≥ ·01 in.	Snow, depth ≥ ·1 in.	Frost (in screen)	Fog (vis. ≤ 1 km.)	Gale ≥ 39 m.p.h.	Thunder	Percentage of Time with: Clear sky (≤ 2/10 covered)	Overcast sky (≥ 8/10 covered)	Cloud amount, tenths of sky covered: Mean for four synoptic hours	1030 L.S.T.	1630 L.S.T.	2230 L.S.T.	Wind Directions, Percentage frequencies means of 24 hourly observations daily: N	NE	E	SE	S	SW	W	NW	Calm
	mb.	°F	°F	°F	°F	°F	°F	°F	%	in.	in.	in.																					
Jan.......	1017	2	9	−4			45	−54	92	1·1	1·0	10	1	6	31	0		0	23	63	6·9	7·4	7·3	6·1	8	19	6	16	9	1	1	20	20
Feb.......	1017	8	16	1			46	−53	84	0·9	1·0	8	1	4	28	0		0	27	51	6·0	6·9	6·2	4·9	5	14	8	18	13	2	2	18	20
Mar.......	1015	19	27	10			50	−39	84	0·6	0·7	5	<1	3	31	0		0	22	50	6·3	6·0	6·9	5·9	3	13	8	26	18	3	2	18	9
Apr.......	1013	32	41	24			62	−24	70	0·4	0·6	2	1	2	24	0		0	21	52	6·3	6·4	6·6	5·8	3	11	8	28	26	4	3	13	4
May......	1014	43	53	33			80	18	64	0·4	0·6	1	3	<1	8	0		0	28	45	5·6	5·4	6·1	5·4	1	9	8	31	33	6	3	6	3
Jun.......	1015	51	62	39			87	25	62	0·8	0·6	<1	6	0	1	0		0	22	44	5·8	5·6	6·2	5·7	2	11	6	30	30	6	3	9	3
Jul........	1017	54	64	43			86	30	68	1·2	1·1	0	7	0	0	0		0	14	56	6·7	6·7	7·1	6·4	1	12	6	32	31	5	3	7	3
Aug.......	1016	53	62	43			82	28	65	0·9	0·9	<1	6	0	2	0		0	23	53	6·2	6·5	6·3	5·9	3	15	6	30	29	5	2	9	1
Sep.......	1013	46	54	38			80	15	67	1·2	0·7	1	8	<1	4	0		0	18	60	6·9	6·8	7·1	6·7	4	17	6	33	20	4	2	12	2
Oct.......	1011	36	41	30			66	−16	74	1·3	1·7	6	7	2	15	0		0	15	62	7·3	7·8	7·9	6·3	5	14	8	32	22	3	1	12	3
Nov......	1012	24	28	19			56	−18	87	1·4	0·6	10	2	7	28	0		0	16	68	7·4	7·9	7·7	6·7	9	23	7	28	14	2	<1	15	2
Dec.......	1012	12	16	6			49	−30	90	1·1	1·0	10	1	4	29	<1		0	18	66	7·4	8·1	7·6	6·4	12	33	5	18	9	2	<1	16	5
Mean.....	1014	32	40	24					76										21	56	6·6	6·8	6·9	6·0	5	16	7	27	20	4	2	13	6
Extreme or total...							87	−54		11·3	1·7	53	43	28	201	<1		0															
Number of years' observations	20	44	44	44			52	52	6	16	16	16	10	10	6	10		10	10	10	10	10	10	10	←				20				→

Climatological Table for DAWSON CITY. Lat. 64° 4′N. Long. 139° 29′W. Altitude above MSL 1,062ft.

Month	Pressure: Mean at M.S.L.	Air Temperature at Station Level: Daily Mean	Mean of daily: Max.	Mean of daily: Min.	Mean of monthly: Max.	Mean of monthly: Min.	Absolute extremes: Highest recorded	Absolute extremes: Lowest recorded	Relative Humidity: 1530 L.S.T.	Precipitation: Mean Total, all forms	Precipitation: Max. fall in 24 hours	Precipitation: Mean Snowfall (in. of snow)	Number of days of: Rain, ≥ ·01 in.	Snow, depth ≥ ·1 in.	Frost (in screen)	Fog (vis. ≤ 1 km.)	Gale ≥ 39 m.p.h.	Thunder	Percentage of Time with: Clear sky (≤ 2/10 covered)	Overcast sky (≥ 8/10 covered)	Cloud amount, tenths of sky covered: Mean for four synoptic hours	0330 L.S.T.	0930 L.S.T.	1530 L.S.T.	2630 L.S.T.	Wind Directions (Percentage frequencies means of 4 hourly observations daily): N	NE	E	SE	S	SW	W	NW	Calm
	mb.	°F	°F	°F	°F	°F	°F	°F	%	in.	in.	in.																						
Jan.	1017	−19	−12	−26			36	−68		0·9	0·8	9	0	10	31	2		0	24	61	6·8	6·3	7·2	7·3	6·3	16	5	1	4	38	7	<1	2	27
Feb.	1020	−11	−4	−19			48	−73		0·7	0·6	7	0	7	28	3		0	31	54	6·0	5·7	6·9	6·2	5·1									
Mar.	1012	5	17	−6			52	−50		0·6	0·6	6	0	6	31	1		0	34	49	5·7	4·7	6·8	6·3	4·8									
Apr.	1012	29	42	16			69	−41		0·5	0·6	3	2	3	28	<1		0	28	45	5·7	4·8	6·1	6·6	5·3									
May	1013	46	59	34			85	9	52	1·0	2·0	1	8	1	11	<1		1	19	51	6·4	6·0	6·2	7·4	6·2									
Jun.	1011	57	70	43			95	25	57	1·2	0·7	<1	11	<1	<1	<1		2	15	52	6·6	6·2	6·1	7·4	6·7									
Jul.	1012	60	73	47			95	29	60	1·6	2·1	0	12	0	<1	<1		4	12	58	7·0	6·8	6·6	7·6	7·1	16	4	3	4	18	6	2	3	44
Aug.	1012	55	68	42			88	17	66	1·7	1·9	<1	13	0	1	1		1	16	58	6·9	6·4	7·2	7·3	6·6									
Sep.	1012	43	53	33			79	8	71	1·4	0·7	2	9	2	10	4		<1	17	62	7·0	6·2	8·1	7·4	6·3									
Oct.	1006	26	33	20			68	−23		1·1	0·6	8	3	7	28	4		0	18	66	7·3	6·9	8·5	7·6	6·0									
Nov.	1015	1	7	−4			49	−50		1·1	1·1	11	0	11	30	3		0	24	65	7·0	6·4	7·6	7·6	6·4									
Dec.	1016	−13	−7	−19			55	−63		1·0	0·8	10	0	11	31	5		0	28	61	6·7	6·1	7·1	7·3	6·1									
Mean	1013	23	33	13															22	57	6·6	6·0	7·0	7·2	6·1	16	5	2	4	28	6	1	2	36
Extreme or total							95	−73		11·8	2·1	57	58	58	229	23		8																
Number of years' observations	10	53	53	53			53	53	9	50	20	50	20	20	10	10		10	10	10	←—	——	10	——	—→									

62898—15

Climatological Table for DEASE LAKE. Lat. 58° 25′N. Long. 130° 0′W. Altitude above MSL 2,678ft.

Month	Pressure	Air Temperature at Station Level							Relative Humidity	Precipitation			Number of days of						Percentage of Time with		Cloud amount, tenths of sky covered					Wind Directions: Percentage frequencies means of 24 hourly observations daily								
	Mean at M.S.L.	Daily Mean	Mean of daily Max.	Mean of daily Min.	Mean of monthly Max.	Mean of monthly Min.	Absolute extremes: Highest recorded	Absolute extremes: Lowest recorded	1630 L.S.T.	Mean Total, all forms	Max. fall in 24 hours	Mean Snowfall (in. of snow)	Rain, $\geq$ ·01 in.	Snow, depth $\geq$ ·1 in.	Frost (in screen)	Fog (vis. $\leq$ 1 km.)	Gale $\geq$ 39 m.p.h.	Thunder	Clear sky ($\leq$ 2/10 covered)	Overcast sky ($\geq$ 8/10 covered)	Mean for four synoptic hours	0430 L.S.T.	1030 L.S.T.	1630 L.S.T.	2230 L.S.T.	N	NE	E	SE	S	SW	W	NW	Calm
	mb.	°F	°F	°F	°F	°F	°F	°F	%	in.	in.	in.																						
Jan.	1018	1	10	−8			40	−60	97	1·3	0·4	13	<1	15	31	3	0	0	29	62	6·6	5·6	7·5	7·2	5·9	17	48	4	10	12	6	<1	1	1
Feb.	1021	3	13	−8			45	−46	90	1·0	0·8	10	<1	12	28	2	0	0	29	61	6·6	6·0	7·4	7·0	5·9	27	43	4	7	13	3	<1	2	1
Mar.	1016	21	33	9			52	−33	92	0·4	0·5	4	1	7	31	1	0	0	28	57	6·4	5·6	7·0	7·5	5·5	22	29	4	15	22	5	1	2	<1
Apr.	1014	30	41	19			59	−25	60	0·4	0·3	4	1	7	29	<1	0	0	16	70	7·6	7·1	7·9	8·6	6·9	15	17	4	23	30	6	1	3	<1
May	1015	45	59	31			89	14	44	0·6	0·4	1	5	1	19	1	0	1	23	60	6·7	6·3	6·6	7·9	6·2	9	17	4	24	25	13	1	7	1
Jun.	1015	52	67	38			93	26	48	1·0	0·5	1	11	1	5	1	0	2	18	62	7·1	6·2	7·4	8·0	6·8	5	10	1	29	21	27	1	6	<1
Jul.	1016	54	66	42			89	32	61	2·7	1·0	0	16	0	<1	<1	0	3	9	74	8·2	7·7	8·1	8·9	8·0	6	9	2	32	26	18	2	4	<1
Aug.	1016	52	65	39			84	21	42	2·2	1·6	<1	14	<1	5	1	0	1	23	61	6·6	6·5	6·2	7·1	6·5	8	12	2	26	32	14	1	4	1
Sep.	1015	46	58	35			81	5	61	1·7	0·8	<1	15	<1	9	4	0	<1	19	68	7·4	6·6	7·9	8·3	6·8	10	14	2	25	32	12	1	3	1
Oct.	1008	35	43	26			69	−9	74	1·3	0·5	8	6	8	26	4	0	0	16	68	7·6	5·4	8·1	8·7	6·8	15	15	3	22	28	12	1	3	1
Nov.	1013	18	25	11			58	−33	91	1·3	0·9	12	2	12	29	4	0	0	14	73	7·8	6·1	8·7	8·0	7·3	16	26	5	18	20	10	1	2	2
Dec.	1014	4	12	−4			45	−51	99	1·1	0·5	11	0	13	31	4	0	0	23	64	7·0	4·9	7·8	7·8	6·3	14	46	6	11	12	5	<1	2	3
Mean	1015	30	41	19					71										21	65	7·1	6·2	7·6	7·9	6·6	14	24	3	20	23	11	1	3	1
Extreme or total							93	−60		15·0	1·6	63	69	79	243	25	0	7																
Number of years' observations	3	7	7	7			8	8	5	7	7	7	7	7	6	6	6	6	6	6	←		6		→	←				6				→

Climatological Table for FINLAY FORKS. Lat. 56° 0′N. Long. 123° 49′W. Altitude above MSL 1,900ft.

Month	Pressure	Air Temperature at Station Level							Relative Humidity	Precipitation			Number of days of						Percentage of Time with		Cloud amount, tenths of sky covered					Wind Directions — Percentage frequencies means of 2 hourly observations daily								
	Mean at M.S.L.	Daily Mean	Mean of daily Max.	Mean of daily Min.	Mean of monthly Max.	Mean of monthly Min.	Absolute extremes Highest recorded	Absolute extremes Lowest recorded	1630 L.S.T.	Mean Total, all forms	Max. fall in 24 hours	Mean Snowfall (in. of snow)	Rain, ≥ ·01 in.	Snow, depth ≥ ·1 in.	Frost (in screen)	Fog (vis. ≤ 1 km.)	Gale ≥ 39 m.p.h.	Thunder	Clear sky (≤ 2/10 covered)	Overcast sky (≥ 8/10 covered)	Mean for four synoptic hours	0430 L.S.T.	1030 L.S.T.	1630 L.S.T.	2230 L.S.T.	N	NE	E	SE	S	SW	W	NW	Calm
	mb.	°F	°F	°F	°F	°F	°F	°F	%	in.	in.	in.																						
Jan.		2	13	−10			44	−68		1·6	0·7	16	<1	13	31	2		0	19	61	6·9	4·7	7·3	6·8	4·5	6	17	12	9	3	9	12	15	17
Feb.		6	18	−6			47	−55		1·4	0·8	13	1	11	28	1		0	14	73	7·7	9·5	8·0	7·7	6·3	3	28	14	10	3	7	7	14	14
Mar.		25	39	11			59	−30		0·5	0·2	4	2	5	30	<1		0	22	59	6·5	6·8	6·8	6·5	5·6	6	27	13	12	3	12	6	9	12
Apr.		36	47	24			67	−15		0·8	0·5	2	7	2	24	0		<1	16	67	7·4	7·1	7·6	7·4	6·7	7	20	7	23	3	13	7	13	7
May		49	65	32			86	15		1·3	0·7	0	11	0	16	<1		1	20	51	6·4	6·8	6·5	6·6	5·4	4	24	14	18	4	7	7	14	7
Jun.		56	71	40			90	25		1·1	0·6	0	11	0	6	1		3	16	52	6·2	5·6	6·0	6·4	6·5	2	28	11	17	2	13	2	13	12
Jul.		57	71	42			88	27		2·3	0·9	0	16	0	2	<1		6	9	63	7·3	7·0	7·5	7·4	6·9	4	27	10	20	3	10	2	7	17
Aug.		55	72	38			89	20		1·2	0·6	0	11	0	7	3		3	23	51	6·4	7·5	6·2	6·5	5·9	5	21	9	13	5	14	4	10	19
Sep.		48	62	34			83	17		1·4	1·0	<1	11	0	16	5		1	21	57	6·6	6·1	6·8	6·8	6·6	5	23	11	23	3	10	3	9	13
Oct.		36	46	25			69	0		1·3	0·5	2	11	4	26	3		0	10	74	8·0	8·6	8·3	8·0	6·3	3	18	15	18	5	15	6	9	11
Nov.		18	26	11			61	−43		1·8	1·0	14	3	12	30	<1		0	10	77	8·2	8·9	8·6	7·9	7·4	3	30	7	12	3	12	7	9	17
Dec.		7	15	−1			41	−51		2·0	0·5	20	0	18	31	2		0	9	81	8·4	8·2	8·7	8·5	7·6	4	23	8	7	3	10	11	15	19
Mean		33	45	20															16	64	7·2	7·2	7·4	7·2	6·3	5	24	11	15	2	11	6	13	13
Extreme or total							90	−68		16·7	1·0	70	84	65	247	17		14																
Number of years' observations		6	6	6			6	6		6	6	6	6	6	6	6		6	6	6	6	2	6	6	6	←				6				→

Climatological Table for FRANCES LAKE. Lat. 61° 17′N. Long. 129° 24′W. Altitude above MSL 2,627ft.

Month	Pressure: Mean at M.S.L.	Air Temperature at Station Level: Daily Mean	Mean of daily: Max.	Mean of daily: Min.	Mean of monthly: Max.	Mean of monthly: Min.	Absolute extremes: Highest recorded	Absolute extremes: Lowest recorded	Relative Humidity: 1530 L.S.T.	Precipitation: Mean Total, all forms	Precipitation: Max. fall in 24 hours	Precipitation: Mean Snowfall (in. of snow)	Number of days of: Rain, ≥ ·01 in.	Snow, depth ≥ ·1 in.	Frost (in screen)	Fog (vis. ≤ 1 km.)	Gale ≥ 39 m.p.h.	Thunder	Percentage of Time with: Clear sky (≤ 2/10 covered)	Overcast sky (≥ 8/10 covered)	Cloud amount, tenths of sky covered: Mean for four synoptic hours	0330 L.S.T.	0930 L.S.T.	1530 L.S.T.	2130 L.S.T.	Wind Directions, Percentage frequencies means of 24 hourly observations daily: N	NE	E	SE	S	SW	W	NW	Calm
	mb.	°F	°F	°F	°F	°F	°F	°F	%	in.	in.	in.																						
Jan.	1017	−3	6	−12			41	−76	80	1·5	0·7	15	0	14	31	5	0	0	22	62	6·9	6·8	7·5	7·2	6·2	14	2	5	25	7	2	7	11	24
Feb.	1022	0	9	−9			41	−74		1·1	0·7	11	0	11	28	2	0	0	23	65	7·2	7·0	7·9	7·4	6·1	13	4	3	28	12	4	9	19	8
Mar.	1013	15	29	1			57	−37	76	0·7	0·7	7	0	10	31	1	0	0	23	62	6·9	6·6	7·6	7·5	5·7	9	4	4	34	15	6	8	15	4
Apr.	1014	28	41	15			57	−29	67	0·6	0·4	4	2	5	29	1	0	0	23	58	6·7	5·6	7·0	7·5	6·2	11	6	8	24	15	6	10	16	4
May	1016	45	59	31			86	12	49	0·7	0·6	<1	6	<1	19	1	0	1	25	52	6·3	5·3	6·6	7·1	5·7	14	8	6	28	14	8	9	12	2
Jun.	1014	54	67	41			84	28	55	1·9	1·0	<1	9	0	1	1	0	1	14	60	7·1	6·6	6·8	8·0	6·9	15	7	5	31	16	7	7	10	2
Jul.	1014	57	70	44			86	33	58	2·0	0·8	0	9	0	0	0	0	1	8	66	7·4	7·2	7·2	8·1	7·0	14	9	6	32	14	7	5	11	2
Aug.	1014	53	65	41			82	24	57	1·4	0·8	0	8	0	3	1	0	<1	14	63	7·2	6·8	7·4	7·9	6·5	12	7	8	34	13	6	4	14	1
Sep.	1013	44	55	33			76	7	67	1·6	0·7	<1	7	4	12	2	0	<1	18	63	7·2	6·0	7·8	8·0	6·2	11	8	8	39	11	4	5	13	1
Oct.	1010	33	41	25			59	−2	77	1·4	0·7	5	6	3	26	2	0	0	12	72	7·9	7·6	8·1	8·3	7·4	5	8	17	42	12	2	4	10	1
Nov.	1016	11	17	4			44	−38	84	1·5	0·5	15	0	13	30	4	0	0	13	74	7·9	8·0	8·0	7·9	7·8	7	7	17	37	6	1	5	15	5
Dec.	1017	−4	3	−12			39	−57	86	1·6	0·6	16	0	12	31	6	0	0	18	70	7·5	7·1	8·2	7·7	7·0	18	3	8	27	7	2	7	14	14
Mean	1015	28	38	17															18	64	7·2	6·7	8·5	7·7	6·6	12	6	8	32	12	5	7	13	6
Extreme or total							86	−76		16·0	1·0	74	47	72	241	26		3																
Number of years' observations	7	9	9	9			7	7	5	9	9	9	9	9	6	6	6	6	6	6	←		6		→	←				6				→

Climatological Table for MAYO LANDING. Lat. 63° 35′N. Long. 135° 51′W. Altitude above MSL 1,625ft.

Month	Pressure: Mean at M.S.L.	Air Temperature at Station Level: Daily Mean	Mean of daily: Max.	Mean of daily: Min.	Mean of monthly: Max.	Mean of monthly: Min.	Absolute extremes: Highest recorded	Absolute extremes: Lowest recorded	Relative Humidity: 1530 L.S.T.	Precipitation: Mean Total, all forms	Precipitation: Max. fall in 24 hours	Precipitation: Mean Snowfall (in. of snow)	Number of days of: Rain, ≥ ·01 in.	Snow, depth ≥ ·1 in.	Frost (in screen)	Fog (vis. ≤ 1 km.)	Gale ≥ 39 m.p.h.	Thunder	Percentage of Time with: Clear sky (≤ ²⁄₁₀ covered)	Overcast sky (≥ ⁸⁄₁₀ covered)	Cloud amount, tenths of sky covered: Mean for four synoptic hours	0330 L.S.T.	0930 L.S.T.	1530 L.S.T.	2130 L.S.T.	Wind Directions, Percentage frequencies means of 4 hourly observations daily: N	NE	E	SE	S	SW	W	NW	Calm
	mb.	°F	°F	°F	°F	°F	°F	°F	%	in.	in.	in.																						
Jan.	1017	−11	−1	−20			50	−73		0·8	1·4	7	0	8	31	5		0	27	60	6·6	5·8	7·5	6·9	5·7	6	13	1	1	2	6	3	0	68
Feb.	1020	−5	6	−16			53	−67		0·4	0·6	4	0	5	28	4		0	33	53	5·9	5·5	6·5	6·0	5·1									
Mar.	1014	13	26	−1			54	−56		0·4	0·6	4	0	4	31	1		0	32	52	6·0	5·3	6·4	6·4	5·3									
Apr.	1012	30	42	18			66	−42		0·3	0·2	2	2	3	27	<1		<1	26	52	6·2	5·4	6·1	7·0	5·9									
May	1014	46	58	34			89	9	53	0·8	1·0	<1	7	1	13	<1		<1	17	53	6·6	6·5	6·3	7·2	6·4									
Jun.	1013	56	69	42			95	28	56	1·4	1·0		9	0	2	<1		1	12	54	6·8	6·5	6·4	7·7	6·7									
Jul.	1013	58	72	45			96	27	60	1·6	0·8		12	0	<1	1		1	13	58	7·0	6·4	6·8	7·9	6·7	4	6	2	3	4	13	4	2	62
Aug.	1013	53	66	40			86	16	62	1·8	1·2		13	0	6	1		<1	20	56	6·6	6·2	6·5	7·3	6·5									
Sep.	1013	43	54	32			80	4	73	1·2	0·8	1	10	<1	14	1		<1	17	62	7·0	6·5	7·7	7·6	6·1									
Oct.	1007	29	37	22			65	−34		0·9	0·7	6	3	5	26	2		0	19	64	7·2	5·9	7·5	7·7	6·7									
Nov.	1016	4	12	−4			50	−59		0·8	0·6	8	1	7	30	4		0	27	58	6·5	5·7	6·7	7·1	6·3									
Dec.	1016	−10	0	−19			52	−72		0·8	0·6	8	0	8	31	6		0	28	59	6·5	5·8	7·0	7·0	6·0									
Mean	1014	26	37	14															24	57	6·6	6·0	6·8	7·2	6·1	5	9	2	2	3	9	4	1	65
Extreme or total							96	−73		11·2	1·2	41	57	41	239	25		2																
Number of years' observations	10	26	26	26			26	26	9	26	20	26	17	17	11	9		9	9	9	←	—	9	—	→									

Climatological Table for SMITH RIVER. Lat. 29° 52′N. Long. 126° 30′W. Altitude above MSL 2,208ft.

Month	Pressure: Mean at M.S.L.	Air Temperature at Station Level: Daily Mean	Mean of daily: Max.	Mean of daily: Min.	Mean of monthly: Max.	Mean of monthly: Min.	Absolute extremes: Highest recorded	Absolute extremes: Lowest recorded	Relative Humidity: 1630 L.S.T.	Precipitation: Mean Total, all forms	Precipitation: Max. fall in 24 hours	Precipitation: Mean Snowfall (in. of snow)	Number of days of: Rain, ≥ ·01 in.	Number of days of: Snow, depth ≥ ·1 in.	Number of days of: Frost (in screen)	Number of days of: Fog (vis. ≤ 1 km.)	Number of days of: Gale ≥ 39 m.p.h.	Number of days of: Thunder	Percentage of Time with: Clear sky (≤ 2/10 covered)	Percentage of Time with: Overcast sky (≥ 8/10 covered)	Cloud amount, tenths of sky covered: Mean for four synoptic hours	Cloud: 0430 L.S.T.	Cloud: 1030 L.S.T.	Cloud: 1630 L.S.T.	Cloud: 2230 L.S.T.	Wind Directions (Percentage frequencies means of 24 hourly observations daily): N	NE	E	SE	S	SW	W	NW	Calm
	mb.	°F	°F	°F	°F	°F	°F	°F	%	in.	in.	in.																						
Jan.	1017	−8	3	−18			49	−74	96	1·3	0·6	13	<1	16	31	1	0	0	26	60	6·6	6·0	7·2	7·0	6·0	21	2	1	1	18	6	6	6	39
Feb.	1020	−4	7	−16			48	−66	87	1·1	0·5	11	0	13	28	1	0	0	22	64	7·1	6·4	7·6	7·8	6·4	25	5	2	2	19	5	5	4	33
Mar.	1012	17	31	3			57	−50	63	0·6	0·5	5	1	10	31	1	0	0	28	57	6·4	5·8	6·8	7·2	5·7	18	5	3	5	18	16	8	5	22
Apr.	1014	28	40	17			56	−29	59	1·0	0·7	6	4	7	29	2	0	0	17	64	7·3	6·7	7·6	8·4	6·5	15	4	5	5	21	21	11	3	15
May	1015	46	59	33			89	16	36	0·9	0·6	2	8	2	16	0	0	1	21	58	6·9	6·2	7·0	7·8	6·5	14	4	6	8	16	16	17	6	13
Jun.	1013	55	68	42			92	26	48	1·9	1·1		13	<1	3	1	<1	3	15	61	7·3	6·6	7·5	8·0	6·9	11	3	3	6	23	20	17	5	12
Jul.	1014	57	69	44			89	30	52	2·8	1·7		14	0	1	3	0	6	14	62	7·4	6·9	7·3	8·2	7·1	11	4	3	5	25	19	15	4	14
Aug.	1014	53	66	40			88	23	55	2·3	2·7	<1	11	<1	6	3	0	1	23	57	6·6	5·9	7·0	7·7	5·8	9	2	2	3	27	20	16	4	17
Sep.	1014	45	56	34			79	−2	61	1·7	0·7	1	11	1	13	4	0	1	23	61	6·9	6·2	7·8	7·7	5·5	13	3	1	3	23	20	11	5	21
Oct.	1009	32	40	23			64	−24	70	1·5	0·5	9	5	8	25	3	0	0	20	67	7·4	6·6	8·0	8·2	6·8	17	3	1	2	24	17	10	7	19
Nov.	1015	8	16	−0			56	−50	91	1·5	0·5	14	1	15	30	2	0	0	20	67	7·3	7·0	7·9	7·5	6·8	24	2	1	1	22	9	6	6	29
Dec.	1017	−7	2	−16			47	−63	96	1·4	0·4	14	0	17	31	1	0	0	24	61	6·8	6·2	7·3	7·2	6·3	21	1	1	1	18	5	4	8	41
Mean	1014	27	38	16					68										21	62	7·0	6·4	7·5	7·7	6·4	17	3	2	4	21	14	10	5	23
Extreme or total							92	−74		18·0	2·7	75	68	89	244	22	<1	12																
Number of years' observations	5	7	7	7			8	8	7	7	8	7	8	8	8	5	5	5	7	7	←		7		→	←				7				→

Climatological Table for SNAG. Lat. 62° 22′N. Long. 140° 24′W. Altitude above MSL 1,925ft.

Month	Pressure: Mean at M.S.L.	Air Temperature at Station Level: Daily Mean	Mean of daily: Max.	Mean of daily: Min.	Mean of monthly: Max.	Mean of monthly: Min.	Absolute extremes: Highest recorded	Absolute extremes: Lowest recorded	Relative Humidity: 1530 L.S.T.	Precipitation: Mean Total, all forms	Precipitation: Max. fall in 24 hours	Precipitation: Mean Snowfall (in. of snow)	Number of days of: Rain, ≥ ·01 in.	Snow, depth ≥ ·1 in.	Frost (in screen)	Fog (vis. ≤ 1 km.)	Gale ≥ 39 m.p.h.	Thunder	Percentage of Time with: Clear sky (≤ 2/10 covered)	Overcast sky (≥ 8/10 covered)	Cloud amount, tenths of sky covered: Mean for four synoptic hours	0330 L.S.T.	0930 L.S.T.	1530 L.S.T.	2130 L.S.T.	Wind Directions (Percentage frequencies means of 24 hourly observations daily): N	NE	E	SE	S	SW	W	NW	Calm
	mb.	°F	°F	°F	°F	°F	°F	°F	%	in.	in.	in.																						
Jan.	1013	−14	−4	−24			33	−76	88	0·9	0·7	12	0	10	31	3	0	0	25	60	6·6	6·2	7·0	7·4	5·9	5	7	9	4	9	9	13	7	37
Feb.	1020	−10	3	−23			45	−81	84	0·7	0·4	7	0	9	28	3	0	0	33	55	6·1	5·3	7·0	6·8	5·3	7	11	14	5	7	13	15	8	20
Mar.	1010	11	26	−5			51	−60	79	0·5	0·4	5	0	7	31	3	0	0	31	51	6·0	5·3	7·1	6·5	5·1	5	5	15	5	10	17	20	12	11
Apr.	1012	25	39	10			58	−51	58	0·6	0·4	5	6	0	30	1	0	0	26	56	6·5	5·7	6·9	7·1	6·2	5	9	12	5	10	13	25	15	6
May	1012	45	58	31			86	6	47	1·0	1·1	1	6	1	17	1	0	0	18	64	7·3	6·8	7·1	8·0	7·2	7	7	12	7	11	14	26	14	2
Jun.	1012	54	67	40			88	23	47	2·4	2·1	1	11	<1	4	<1	0	2	12	68	7·7	7·5	7·3	8·2	7·9	10	8	8	5	8	15	25	19	2
Jul.	1013	57	69	44			88	29	54	3·0	1·4	0	14	0	1	1	0	4	14	68	7·4	7·2	7·0	7·6	7·8	7	6	11	7	9	13	23	19	5
Aug.	1014	52	65	38			84	13	53	1·8	1·0	<1	12	<1	8	3	0	2	18	66	7·3	6·9	7·5	7·7	7·1	7	7	14	6	7	11	24	17	7
Sep.	1011	41	53	29			76	−2	60	1·0	0·6	1	7	1	19	5	0	<1	16	68	7·6	6·5	8·6	8·6	6·6	5	7	17	6	6	12	22	15	10
Oct.	1005	24	34	15			58	−24	76	0·8	1·0	7	0	6	30	9	0	0	17	69	7·6	6·9	8·7	7·8	6·8	5	5	20	7	9	12	20	10	12
Nov.	1012	−3	6	−12			43	−63	89	1·0	0·4	9	0	10	30	4	0	0	24	63	6·9	6·2	7·8	7·5	5·8	5	8	10	5	9	11	18	7	27
Dec.	1013	−15	−6	−24			31	−69	93	0·6	0·9	8	0	10	31	3	0	0	27	54	6·6	6·1	7·1	7·3	5·8	5	6	12	4	6	8	9	5	45
Mean	1012	22	34	10					69										22	62	7·0	6·4	7·4	7·5	6·5	6	7	13	6	9	12	20	12	15
Extreme or total							88	−81		14·2	2·1	56	56	54	260	36	0	8																
Number of years' observations	6	8	8	8			9	9	6	8	7	6	9	9	8	8	8	8	7	7	←		7		→	←				8				→

Climatological Table for TESLIN. Lat. 60° 10′N. Long. 132° 44′W. Altitude above MSL 2,300ft.

Month	Pressure	Air Temperature at Station Level							Relative Humidity	Precipitation			Number of days of						Percentage of Time with		Cloud amount, tenths of sky covered					Wind Directions: Percentage frequencies means of 24 hourly observations daily								
	Mean at M.S.L.	Daily Mean	Mean of daily Max.	Mean of daily Min.	Mean of monthly Max.	Mean of monthly Min.	Absolute extremes Highest recorded	Absolute extremes Lowest recorded	1530 L.S.T.	Mean Total, all forms	Max. fall in 24 hours	Mean Snowfall (in. of snow)	Rain, ≥ ·01 in.	Snow, depth ≥ ·1 in.	Frost (in screen)	Fog (vis. ≤ 1 km.)	Gale ≥ 39 m.p.h.	Thunder	Clear sky (≤ 2/10 covered)	Overcast sky (≥ 8/10 covered)	Mean for four synoptic hours	0330 L.S.T.	0930 L.S.T.	1530 L.S.T.	2130 L.S.T.	N	NE	E	SE	S	SW	W	NW	Calm
	mb.	°F	°F	°F	°F	°F	°F	°F	%	in.	in.	in.																						
Jan.	1015	3	11	−6			44	−63	92	1·0	0·4	10	0	12	31	2	0	0	26	63	6·9	6·4	7·3	7·5	6·4	5	21	26	5	4	5	20	5	9
Feb.	1019	5	14	−4			41	−52	84	0·6	0·2	6	0	10	28	1	0	0	25	65	7·0	6·0	8·1	7·5	6·1	5	21	24	6	5	9	16	6	8
Mar.	1011	20	31	10			47	−34	70	·05	0·6	4	0	7	30	1	0	0	28	61	6·6	5·7	7·3	7·8	5·6	5	19	19	13	13	12	12	4	4
Apr.	1014	29	39	20			54	−16	59	0·6	0·4	5	2	6	29	<1	0	0	21	67	7·3	6·4	8·0	8·3	6·6	5	11	12	17	15	15	18	4	3
May	1016	44	57	31			83	11	44	0·6	0·8	<1	6	<1	20	<1	0	<1	24	58	6·7	5·7	6·9	7·8	6·4	6	7	11	13	20	20	17	3	3
Jun.	1015	53	66	40			89	26	42	1·1	0·7		9	0	3	1	0	2	21	61	6·9	6·9	6·9	7·9	6·9	6	5	6	10	20	25	19	8	1
Jul.	1016	55	67	44			88	30	54	1·8	1·5		12	0	<1	1	0	3	14	67	7·6	7·2	7·8	8·2	7·3	9	8	8	13	21	18	17	4	2
Aug.	1017	52	64	40			88	25	56	1·6	0·7	<1	12	<1	3	<1	0	1	23	60	6·9	6·2	7·3	7·5	6·6	11	8	8	12	18	16	16	6	5
Sep.	1015	45	55	35			77	14	64	1·5	0·5	1	11	1	12	1	0	0	22	62	7·0	5·9	8·2	7·8	5·9	9	14	16	14	13	11	14	5	4
Oct.	1009	34	41	27			60	−7	72	1·2	0·6	6	5	5	23	1	0	0	17	70	7·5	6·1	8·3	8·4	7·1	8	25	21	14	13	6	7	4	2
Nov.	1013	16	22	9			50	−35	88	1·3	0·8	12	2	13	29	1	0	0	18	73	7·8	6·9	8·5	8·2	7·1	7	37	25	5	5	4	8	8	1
Dec.	1015	4	11	−3			45	−52	93	1·0	0·6	10	0	14	31	<1	0	0	23	66	7·2	6·7	7·8	7·7	6·6	7	35	28	3	2	3	11	7	4
Mean	1015	30	40	20					68										22	64	7·1	6·3	7·7	7·8	6·6	7	18	17	10	12	12	15	5	4
Extreme or total							89	−63		12·8	1·5	55	59	68	239	9	0	6																
Number of years' observations	6	8	8	8			9	9	7	8	7	8	9	9	8	8	6	6	6	6	←		6		→	←				8				→

Climatological Table for WATSON LAKE. Lat. 60° 7′N. Long. 128° 48′W. Altitude above MSL 2,248ft.

Month	Pressure	Air Temperature at Station Level							Relative Humidity	Precipitation			Number of days of					
			Mean of daily		Mean of monthly		Absolute extremes											
	Mean at M.S.L.	Daily Mean	Max.	Min.	Max.	Min.	Highest recorded	Lowest recorded	1530 L.S.T.	Mean Total, all forms	Max. fall in 24 hours	Mean Snowfall (in. of snow)	Rain, ≥ ·01 in.	Snow, depth ≥ ·1 in.	Frost (in Screen)	Fog (vis. ≤ 1 km.)	Gale ≥ 39 m.p.h.	Thunder
	mb.	°F	°F	°F	°F	°F	°F	°F	%	in.	in.	in.						
Jan.	1018	−7	2	−17			48	−74	90	1·3	0·6	13	0	13	31	7	0	0
Feb.	1020	−1	10	−13			43	−67	83	1·0	0·6	10	0	11	28	2	0	0
Mar.	1013	15	29	1			51	−45	69	0·7	0·6	7	0	8	31	1	0	0
Apr.	1013	31	43	20			64	−27	58	0·8	0·7	6	1	7	28	1	0	1
May	1015	46	58	34			87	19	41	1·0	1·0	<1	8	<1	13	1	0	1
Jun.	1014	56	68	44			93	26	46	2·0	1·8		12	0	1	2	0	2
Jul.	1014	59	70	47			92	35	50	1·9	1·2		13	0	0	1	0	2
Aug.	1014	55	66	43			87	20	53	1·9	0·9	<1	13	<1	1	4	0	2
Sep.	1014	46	56	36			82	12	60	1·6	0·6	1	12	1	10	4	0	1
Oct.	1010	34	41	26			71	−22	69	1·3	0·5	8	5	7	24	4	0	0
Nov.	1015	8	16	1			51	−47	88	1·6	0·7	15	2	15	30	5	0	0
Dec.	1016	−7	1	−15			37	−62	90	1·6	1·0	16	0	17	31	4	0	0
Mean	1015	28	38	17					66									
Extreme or total							93	−74		16·7	1·8	76	66	79	228	36	0	9
Number of years' observations	10	13	13	13			13	13	7	13	13	13	13	13	11	11	11	10

Month	Percentage of Time with		Cloud amount, tenths of sky covered					Wind Directions: Percentage frequencies means of 24 hourly observations daily								
	Clear sky (≤ 2/10 covered)	Overcast sky (≥ 8/10 covered)	Mean for four synoptic hours	0330 L.S.T.	0930 L.S.T.	1530 L.S.T.	2130 L.S.T.	N	NE	E	SE	S	SW	W	NW	Calm
Jan.	24	61	6·8	6·4	7·3	6·9	6·7	5	4	8	9	4	5	23	8	35
Feb.	22	66	7·1	6·4	7·8	7·7	6·3	4	4	11	9	6	5	23	9	29
Mar.	26	61	6·7	5·9	7·3	7·5	5·9	4	6	18	17	9	8	19	4	15
Apr.	18	65	7·3	6·6	7·9	8·2	6·3	4	6	22	17	8	12	18	6	7
May	22	57	6·8	6·2	6·9	7·8	6·2	6	7	20	13	7	13	21	8	5
Jun.	16	63	7·3	6·9	7·3	8·0	7·0	7	6	15	15	8	13	22	9	5
Jul.	13	65	7·6	7·3	7·4	8·2	7·5	9	5	11	10	10	14	25	9	7
Aug.	21	58	6·9	6·2	7·3	7·6	6·3	9	6	12	9	8	11	22	13	10
Sep.	21	64	7·2	6·4	7·9	8·0	6·1	10	7	17	15	8	7	16	11	9
Oct.	16	69	7·6	7·0	8·1	8·4	7·0	6	6	15	18	7	9	16	14	9
Nov.	18	70	7·7	7·2	8·4	7·7	7·3	8	4	11	11	6	4	21	11	24
Dec.	19	69	7·5	6·8	8·1	7·8	7·2	4	3	7	7	4	3	24	8	40
Mean	20	64	7·2	6·6	7·6	7·8	6·6	6	5	14	13	7	9	21	9	16
Extreme or total																
Number of years' observations	10	10	←		10		→	←				14				→

Climatological Table for WHITEHORSE. Lat. 60° 43′N. Long. 135° 5′W. Altitude above MSL 2,289ft.

Month	Pressure: Mean at M.S.L.	Air Temperature at Station Level: Daily Mean	Mean of daily: Max.	Mean of daily: Min.	Mean of monthly: Max.	Mean of monthly: Min.	Absolute extremes: Highest recorded	Absolute extremes: Lowest recorded	Relative Humidity: 1530 L.S.T.	Precipitation: Mean Total, all forms	Precipitation: Max. fall in 24 hours	Precipitation: Mean Snowfall (in. of snow)	Number of days of: Rain, ≥ ·01 in.	Number of days of: Snow, depth ≥ ·1 in.	Number of days of: Frost (in screen)	Number of days of: Fog (vis. ≤ 1 km.)	Number of days of: Gale ≥ 39 m.p.h.	Number of days of: Thunder	Percentage of Time with: Clear sky (≤ 2/10 covered)	Percentage of Time with: Overcast sky (≥ 8/10 covered)	Cloud amount, tenths of sky covered: Mean for four synoptic hours	Cloud amount: 0330 L.S.T.	Cloud amount: 0930 L.S.T.	Cloud amount: 1530 L.S.T.	Cloud amount: 2130 L.S.T.	Wind Directions (Percentage frequencies means of 24 hourly observations daily): N	NE	E	SE	S	SW	W	NW	Ca
	mb.	°F	°F	°F	°F	°F	°F	°F	%	in.	in.	in.																						
Jan.	1013	5	13	−3			47	−62	86	0·6	0·4	6	0	11	31	4	0	0	22	61	6·9	6·1	6·1	7·5	6·5	14	1	0	11	33	5	2	15	19
Feb.	1018	7	16	−2			50	−59	80	0·5	0·4	5	0	9	28	2	0	0	26	59	6·6	5·9	7·6	6·8	6·1	17	1	1	12	32	4	1	14	18
Mar.	1011	21	31	12			49	−36	66	0·6	0·8	6	0	6	30	<1	0	0	24	58	6·7	6·3	7·3	7·2	5·9	16	2	1	21	32	5	5	9	9
Apr.	1012	32	41	22			59	−14	52	0·4	0·4	4	1	5	27	1	0	0	18	63	7·3	6·6	7·7	7·8	6·8	13	2	1	22	31	9	6	7	8
May	1015	46	57	34			86	19	41	0·6	0·5	1	4	1	13	<1	0	0	19	60	6·9	6·2	6·9	7·7	6·8	8	3	2	26	33	11	8	4	6
Jun.	1014	55	66	43			89	28	44	1·0	0·8	0	8	0	1	1	0	1	16	62	7·1	6·8	7·0	7·6	7·0	11	6	1	25	27	11	7	6	6
Jul.	1015	56	67	45			91	29	49	1·6	0·8	0	13	0	<1	<1	0	2	11	68	7·7	7·1	7·8	8·4	7·7	9	5	1	31	25	9	7	6	7
Aug.	1015	54	64	43			84	17	51	1·5	1·2	<1	10	<1	2	2	0	1	18	63	7·1	6·5	7·5	7·6	6·9	11	5	1	27	28	7	6	6	9
Sep.	1013	46	55	37			80	15	57	1·3	0·8	1	9	1	7	<1	0	0	18	66	7·2	6·5	7·9	7·8	6·6	8	2	0	28	34	8	5	6	9
Oct.	1007	34	41	28			59	−4	66	0·7	0·5	4	4	5	20	2	0	0	18	64	7·2	6·3	7·8	8·0	6·6	6	1	0	24	43	5	4	6	11
Nov.	1011	15	21	8			51	−43	85	1·0	0·4	9	0	12	28	3	0	0	14	73	7·9	7·3	8·7	8·0	7·8	15	1	0	14	32	5	3	14	16
Dec.	1013	3	10	−4			47	−50	89	0·8	0·4	8	1	11	30	3	<1	0	19	66	7·4	6·9	7·7	8·0	6·8	16	1	0	11	30	6	1	12	23
Mean	1013	31	40	22					64										19	64	7·2	6·5	7·5	7·7	6·8	12	2	1	21	32	7	5	9	12
Extreme or total							91	−62		10·6	1·2	45	50	61	217	18	0	4																
Number of years' observations	7	10	10	10			11	11	8	10	10	10	12	12	11	11	10	10	10	10	10	10	8	10	10	←				10				→

Climatological Table for AKLAVIK (N.W.T.). Lat. 68° 14′N. Long. 134° 50′W. Altitude above MSL 25ft.

Month	Pressure	Air Temperature at Station Level							Relative Humidity	Precipitation			Number of days of						Percentage of Time with		Cloud amount, tenths of sky covered					Wind Directions — Percentage frequencies means of 24 hourly observations daily								
			Mean of daily		Mean of monthly		Absolute extremes																											
	Mean at M.S.L.	Daily Mean	Max.	Min.	Max.	Min.	Highest recorded	Lowest recorded	1630 L.S.T.	Mean Total, all forms	Max. fall in 24 hours	Mean Snowfall (in. of snow)	Rain, ≥ ·01 in.	Snow, depth ≥ ·1 in.	Frost (in screen)	Fog (vis. ≤ 1 km.)	Gale ≥ 39 m.p.h.	Thunder	Clear sky (≤ 2/10 covered)	Overcast sky (≥ 8/10 covered)	Mean for four synoptic hours	0430 L.S.T.	1030 L.S.T.	1630 L.S.T.	2230 L.S.T.	N	NE	E	SE	S	SW	W	NW	Calm
	mb.	°F	°F	°F	°F	°F	°F	°F	%	in.	in.	in.																						
Jan.	1019	−18	−10	−26	19	−46	44	−56	96	0·5	0·60	6	0	4	31	1	0	0	39	46	5	4·8	6·1	5·7	5·1	16	1	4	11	22	3	4	23	16
Feb.	1021	−17	−9	−24	22	−46	49	−62	97	0·4	0·39	5	0	5	28	0	1	0	42	46	5	4·9	5·8	5·4	4·5	18	1	5	15	19	3	4	21	14
Mar.	1019	9	0	−18	28	−33	45	−50	92	0·3	0·33	4	0	4	31	0	1	0	44	44	5	4·8	5·5	5·2	4·5	23	1	5	18	17	1	4	25	6
Apr.	1018	9	19	−2	43	−23	56	−44	84	0·5	0·54	5	0	4	30	<1	2	0	38	48	6	5·6	5·9	5·4	5·3	30	2	4	11	15	2	5	27	4
May	1016	31	39	22	63	4	77	−14	77	0·5	0·42	3	2	2	28	1	0	0	30	56	6	6·4	6·5	6·0	5·9	29	10	6	8	10	1	3	30	3
Jun.	1013	49	58	39	78	28	85	20	68	0·8	1·17	2	5	1	35	0	0	0	28	53	6	6·5	5·9	5·7	5·7	28	12	6	11	8	2	1	28	4
Jul.	1012	56	66	47	82	37	93	30	68	1·4	1·61	0	9	—	1	<1	0	<1	24	54	6	6·6	6·8	5·9	6·2	26	11	8	9	10	3	3	24	6
Aug.	1011	50	59	42	76	33	88	25	78	1·4	0·79	1	10	<1	8	<1	0	0	19	63	7	7·0	7·3	6·9	7·1	17	7	4	13	21	3	3	26	6
Sep.	1013	38	44	32	63	21	72	12	88	0·9	0·47	3	7	4	12	1	0	0	14	73	8	7·7	8·2	7·7	7·2	24	6	6	14	14	2	2	25	7
Oct.	1010	20	25	16	41	−5	55	−22	95	0·8	0·59	8	1	7	30	2	0	0	17	71	8	7·5	8·1	7·7	7·3	11	4	5	19	21	2	4	22	12
Nov.	1017	−3	3	−9	24	−28	44	−50	97	0·7	0·50	8	0	8	30	1	0	0	25	63	7	6·3	7·5	7·6	6·0	11	1	5	15	20	2	2	22	22
Dec.	1017	−17	−10	−24	17	−41	46	−54	94	0·4	0·50	5	0	5	31	<1	0	0	38	47	6	5·2	5·5	6·4	5·1	8	1	2	15	17	3	1	18	35
Mean	1016	16	24	8					86										30	55	6	6·1	7·1	6·3	5·8	20	5	5	13	16	2	3	24	11
Extreme or total							93	−62		9·2	1·61	50	34	44	295	8	4	0																
Number of years' observations	20	25	25	25	10	10	25	25	10	25	10	25	10	10	10	10	10	10	10	10	←	—	10	—	→	←	—	—	—	10	—	—	—	→

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