PROJECT REPORT NO. 33

AGROCLIMATIC CAPABILITY OF SOUTHERN PORTIONS OF THE YUKON TERRITORY AND MACKENZIE DISTRICT, N.W.T.

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ATMOSPHERIC ENVIRONMENT SERVICE – METEOROLOGICAL APPLICATIONS BRANCH
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THIS REPORT HAS RECEIVED ONLY LIMITED CIRCULATION BECAUSE OF THE SPECIAL NATURE OF THE PROJECT. HOWEVER, REFERENCE IS PERMITTED IF THE WORDS "UNPUBLISHED MANUSCRIPT" ARE MADE PART OF THE BIBLIOGRAPHIC ENTRY, IN ACCORDANCE WITH ACCEPTED PRACTICE.

DEPARTMENT OF FISHERIES AND
THE ENVIRONMENT
ATMOSPHERIC ENVIRONMENT SERVICE

THE AGROCLIMATIC CAPABILITY OF SOUTHERN PORTIONS OF THE YUKON TERRITORY AND MACKENZIE DISTRICT, N.W.T.

prepared in the Meteorological
Applications and Consultation Division,
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SUMMARY

The climate of an area of nearly 50,000,000 hectares in the Yukon and Northwest Territories has been assessed in terms of the possibilities for agriculture. The assessment entailed an examination of the principal climatic factors affecting crop growth, namely: heat, frost frequency, soil moisture deficiency, and (indirectly), light during the growing season. The data were obtained from 43 long-term meteorological stations supplemented by 50 special climatological installations arranged in 20 transects across variable terrain. The latter were grouped to specifically measure the climatic implications of elevation, slope, adjacent water bodies and surface cover, in order that general rules for mapping areas distant from measured sites could be developed.

Forty-five, 1:250,000-scale map sheets showing seven levels of agroclimatic land quality, from broadly productive to useless, were prepared. The quality criteria were those developed by the British Columbia component of the Canada Land Inventory with modifications to suit conditions north of the 60th parallel. Classes 1 to 4 depict arable land. Specific adjustments were made to the soil moisture storage assumptions to account for low annual precipitation, immature soils and permafrost. As well, an interpretative guide was prepared to evaluate paradoxical crop successes in spite of low heat accumulation during the growing season. These successes seem to be attributable to photoperiod

factors. The guide presents a list of crops pertinent to the Territories, which are allocated to seven discrete quality classes. The classes correspond exactly to the British Columbia classes for the frost-free season category, but are one to two classes higher for seasonal heat accumulation, and, as mentioned above, soil moisture standards are different.

The mapping is estimated to have a precision of about one-half of a class interval. This is based on estimates of the error in growing season mean temperature and precipitation, and of the errors inherent in the procedures adopted to compute spatial values of growing degree-days, the frost-free season and the soil moisture deficit, which are, respectively: 65 GDD, 10-15 days and 20-40 mm.

It is clear from the maps that there are no extensive areas having a suitable climate for subsistence agriculture. Narrow bands of class 2 or 3 land exist along most major rivers of the Yukon and Northwest Territories. The only significant areas with class 2 ratings are in the Liard Valley near Fort Liard and near Watson Lake. Unrestricted class 2 land encompasses nearly 22,000 ha while there are nearly 17,000 ha which have a moisture deficiency.

Restricted class 3 land includes 184,500 ha in the Yukon Territory and 4,400,000 ha in the Northwest Territories. Aridity accounts for 62 per cent of this land in the Yukon and 26 per cent in the Mackenzie District. Low heat accumulation and a low heat-frost risk combination account for 37 and 1 per cent (Y.T.) and 22 and 52 per cent (N.W.T.), respectively, of the class 3 land mapped.

Class 4 climate is marginal for cultivation, but sustains grazing. From the climatic viewpoint it is not extensive in the North, representing 26,300 ha in the Yukon and 93,200 ha in the Northwest Territories. Climate class 5G, suitable only for forage crops in British Columbia, seems to support a number of crops belonging to class 4 and even 3 (potatoes) in the North. Cause relationships of this phenomenon need further elucidation, since 5G land covers nearly 11 per cent of the total area mapped and would represent nearly 94 per cent of the climatically suitable land for cultivation in the Yukon. The corresponding values for the Mackenzie District are 37 and 62 per cent, respectively.

The best climates for northern agriculture are found at low elevations on sunny slopes, and preferably near a large river or lake. Such sites have the warmest temperatures and a long frost-free season.

The agroclimatic capability maps represent average conditions over the 1941-70 normal climatological period. The inter-annual variation throughout the region is enough to change the classification to one class below the mapped average for 6 to 10 per cent of the years where the class value is low (for example, Whitehorse and Haines Junction), and 17 to 30 per cent of the years where a mid-range class has been designated (for example, Fort Simpson and Fort Smith). There is a similar proportion of years when the class becomes one or two levels above average. Thus the maps depict the average capability for a particular range of crops, but for one or several years at a time, the record of crop success may be considerably different.

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CHAPTER 1: INTRODUCTION

1.1 NATURE OF THE PROJECT

This report presents a climatic assessment of selected parts of the Yukon and Northwest Territories, specifically those regions where forms of sustained agriculture are believed to be possible. This work was done at the request of the Northern Natural Resources and Environment Branch of the Department of Indian and Northern Affairs, Ottawa. The study is complemented by a reconnaissance soil survey carried out by the Saskatchewan Institute of Pedology.

Land capable of agricultural production is not particularly plentiful in the Territories, but some land is quite good. Soil surveys in the Northwest Territories have suggested 2 million hectares of land may be suitable for some cultivation. An increasing pressure for the settlement of lands supposed to be suitable for sustained cultivation and grazing prompted the Minister of Indian and Northern Affairs to halt the issuing of Crown land for farming in January 1975 until a scientific resource survey could be carried out. In February 1975, the Atmospheric Environment Service, of the Department of Environment agreed to undertake a three-year climatological survey, including a two-year field programme. The survey took the form of establishing some 50 new measurement sites and a number of moving surveys and analysis of existing network information. Field crews were located at Whitehorse and Fort Simpson during the growing seasons of 1975 and 1976 to maintain the stations, abstract data, and carry out topoclimatological survey work. Principal parameters measured were air temperature, humidity and precipitation. Some measurements were made of wind and soil temperature.

The 50 stations were arranged in 20 regional transects in order to detect slope, elevation and vegetative influences on climate. These were located in areas having known agricultural potential, but also were given a geographical distribution designed to assess inter-district climatic characteristics. The stations were equipped with standard self-registering equipment, and the data obtained were compared to records from principal network stations over the study period, and to the 30-year normal period of record, 1941-1970. Regular network stations having a record exceeding 10 continuous years number 20 in the Yukon Territory and 23 in Mackenzie and Keewatin Districts, N.W.T. The current and historical meteorological network of the Yukon and Northwest Territories is documented in Appendix J.

The climatological data were analysed in such a way that they could be expressed in terms of quality scale of agroclimatic capability. These data were subsequently mapped at 1:250,000 and 1:50,000 scales. The capability classification chosen was one developed by the British Columbia land inventory (1972) and employed in a preliminary survey of Mackenzie District agroclimatic resources by Williams and Sneddon (1975-unpublished). It was found subsequently in the present study that the class values required some modification and need to be carefully interpreted. A classification guide, effectively a revision, has been developed to assist in this regard.

An agroclimatic capability classification requires an extensive set of crop production data. Although the classification employed for this report does not consider yield, but rather refers to a specific range of crops that it is possible to grow within a region, some difficulty was experienced in assembling adequate information. Data from the Dominion Experimental Farms at Haines Junction and Fort Simpson may be analysed against local meteorological records; however, annual yield data were not accessible in several cases and recourse was made to summary reports published from time to time. The Experimental Farms have now been closed for several years and conditions at outlying settlements have been documented only by reconnaissance surveys and by interviews. It is interesting to note that a classical paper on a garden survey of the Mackenzie Valley by Albright in 1933 remains pertinent. References to cropping experience have been published by a number of Department of Agriculture personnel, and these are listed in the bibliography of this report.

1.2 NEED FOR THE STUDY

Forms of subsistence agriculture have been practised in the Territories beginning in the last century. Scientific agricultural research dates from the early 1900's when Agriculture

Canada began to collect production data in co-operation with residents and missionaries. Experimental farms were established at Fort Simpson and near Haines Junction following World War II. Many vegetables, forages and grains introduced in northern localities have done well, and have encouraged a recent accelerated demand for Crown land for agricultural purposes. Decisions as to which lands are suitable for farming or for forestry, wildlife and other purposes require good site-specific information on land quality. Not having this information, and faced with unprecedented settlement demands, a suspension of agricultural land allocation was proclaimed by the Canadian Government on January 10, 1976, in order that appropriate data could be collected and comprehensive land-use policies could be determined in co-operation with Territorial governments and interest groups. Baseline data including climate were to be collected over a 3-year period.

The climatic capability of a region for agricultural production delimits the type of farming possible and the likely crops to be produced. Climatological analysis will also indicate the degree to which a level of production may be sustained from year to year, assuming soil and market factors to be favourable. Crop growth is dependent of conditions of heat, moisture and light. Air temperature regimes experienced during the growing season determine the nature of broad agricultural districts which in turn are locally zoned according to available soil moisture, a condition affected by precipitation, evapotranspiration and soil texture-structural factors. All crops require light but the quantity and timing is critical. Long summer daylight periods favour certain types of crops. Others react adversely to sustained light, thus limiting their production in northern areas for reasons other than temperature and moisture.

While a number of local climatological studies have been undertaken, (e.g. Harris and Carder 1975, Burns 1973), there is no agroclimatic assessment covering the extensive area of present concern.

Recent work by Williams and Sneddon (1975-unpublished) approaches the scale of the present study, being a provisional agroclimatic capability study of Mackenzie District with some extension into the Yukon Territory. Indeed the work of Williams and Sneddon set the stage for the present study. These authors attempted to map the agroclimatic capability of a vast region consisting of 23 map sheets at a scale of 1:250,000, using the British Columbia Land Inventory classification (1972). The BCLI classification was chosen over that of Chapman and Brown (1966) because greater detail could be presented.

Williams and Sneddon made use of a number of statistical techniques to estimate temperature and precipitation fields over a close-spaced grid. They drew on earlier normal temperature estimation work of Williams in 1971 for The Canadian Great Plains, and made use of 10 x 10 km grid square normal precipitation estimates prepared by Shawinigan Engineering for Agriculture Canada in 1970. Both techniques are based on multiple factor regression statistics.

The use of the BC classification requires parameterization of seasonal growing degree-days, the frost-free period, precipitation and the soil moisture deficit. Degree-days were estimated from mean monthly temperatures and their standard deviations following procedures developed by Thom (1954 a,b). The frost-free season was ascertained by examining when a value of 42°F (5.6°C) occurred in spring and fall on smoothed normal curves of mean daily minimum temperature. The soil moisture deficit was computed by algebraically subtracting potential evapotranspiration from growing season precipitation. Potential evapotranspiration was computed from temperature and global solar radiation by methods used for the versatile soil moisture budget (Baier et al 1972).

The classification component parameters were separately mapped using a computerized SYMAP procedure. The classification rating was determined by overlaying the component maps. Final capability class maps were sketched on 1:250,000 scale N.T.S. maps with minor boundary line interpolation according to topography.

The present study, a detailed description of which follows over the next few pages, represents a verification and extension of Williams and Sneddon's work. Their study is based on statistical and interpolative procedures developed for the most part in southern Canada. The present study was oriented toward the collection of hard climatological data within land tracts which could be actually developed for agriculture. The final correspondence with the maps of Williams and Sneddon was remarkably good. This is encouraging because the statistical-computer approach represents a considerable saving in time and money for studies of this type.

The work reported here must be considered to be of a reconnaissance nature. This is principally because two years of climatological measurements are of limited accuracy for statistically estimating conditions over a longer period. Short-period data are nevertheless useful to estimate topoclimatic effects of a number of recurring land types in order that long-term station data may be adjusted to local conditions. The results, however, give a first approximation of local climatic variability in agrocapability terms on scales which are compatible with other resource inventories employed in land-use planning.

1.3 ORGANIZATION OF THE STUDY

Previous studies were limited by their areal extent and their reliance on a limited number of widespread meteorological observing stations, many of which are not particularly representative of the area considered to be agriculturally suitable.

It was considered desirable to establish a station network to especially reflect meso-meteorological influences; that is, the effects terrain and small-scale meteorological systems have on the climate. Within such a vast area only a coarse sampling of conditions is possible, for reasons of economy. Sites were chosen for instrumentation so that data could be collected weekly or less often depending on access and instrument type. To ensure a good data set instruments operating over an eight-day period were chosen over those operating for a month, so that malfunctions would not entail critical data losses. Stations were laid out to sample local elevation range and slope aspects, as these produce important meso-climatic variations in sub-arctic areas (McKay et al 1970). The stations were sited by experienced technical staff and climatologists. The intended representativeness of each site was tested by traverses with portable equipment, and as a result some relocation took place. Where roads were present mobile temperature surveys by motor-vehicle were undertaken. The data were further supplemented by observations of phenological change of <u>Populus tremuloides</u>, a ubiquitous tree to the region, and a number of interviews with residents having gardening and other plant production experience.

The project was directed from the Meteorological Applications and Consultation Division of the Atmospheric Environment Service Headquarters Toronto, with the collaboration of the Western Regional Office, Edmonton. Two experienced meteorological technicians established operational bases in Whitehorse and Fort Simpson, and with locally-acquired assistants, they installed and maintained the network, performing special surveys, and preparing necessary data summaries. Field direction was given by a coordinating meteorologist, who in the course of his duties travelled extensively in the North, participated in field studies, assembled the data, analysed it, prepared maps and reported the results. He formed a close liaison with AES national and regional offices, ensuring that a full study programme was carried out within the required time allotment.

1.4 ACKNOWLEDGEMENTS

This report is based on reports prepared by the project field co-ordinator, F.J. Eley, meteorologist under contract with the Atmospheric Environment Service. Overall technical and logistical planning of the project was directed by the scientific advisor, B.F. Findlay, who received advice and assistance from G.A. McKay, R.A. Treidl and J. Woods at AES Headquarters, Toronto. The project was promoted by and received considerable guidance from Dr. J.I. Sneddon, Agricultural Land Advisor to the Northern Natural Resources and Environment Branch of the Department of Indian and Northern Affairs, Ottawa. Dr. Sneddon participated in the review of results throughout the project, including the final report. Considerable technical support was given by D.W. McNichol, who, (with F.A. Richardson), also participated in Yukon field operations in the early period.

The Director of the AES Western Regional Office, Mr. G.H. Legg , arranged for a smooth co-ordination of work between Toronto, Edmonton and territorial locations, and provided administrative and logistical support on a number of occasions. Messrs.

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The network installations and servicing were undertaken by D. Gilbert, (Y.T.) and T. Detlor (N.W.T.) under the general direction of F.J. Eley. They and their staff, P. Ford, L. Nelson and C. Erion, spent much effort to install and maintain the climatological network, from which the data recovery was excellent.

Special climatological observers for the project included: R. Tait (Haines Junction), B. Greenfield (Hay River), J. Kraus (Mackenzie Highway), H. Reynolds (Slave River Lowland) and W. Kruger (Wrigley).

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CHAPTER 2: CLIMATIC LIMITATIONS TO AGRICULTURE

2.1 INTRODUCTION

Climate plays a dominant influence on the range of plants growing within an area, and the degree to which they successfully adapt to environmental conditions. Adequate heat, light, and moisture during the growing season, along with the absence of frost, strong winds, hail and flooding enable discrete ranges of crops to be grown on satisfactory soils.

2.2 HEAT

With adequate light and moisture, temperature becomes the dominant control over plant growth. However, it is not only a question of sufficiently high temperatures to promote seed germination. Temperatures several degrees above freezing must persist for a period long enough for the plant to mature. Utaaker (1968) has noted that plant respiration which releases the chemical energy used in the growth process is temperature controlled. Generally, plant growth does not take place until there is a certain accumulation of heat above the freezing point. The needed accumulation varies among plants, but for many species growth is said to begin at or above 5-6°C (Brown et al 1967). The growth rate also varies according to the rate of heat accumulation, the intensity reached and the duration, assuming other factors not to be influential. Some researchers have attempted to take a variable heat factor into account for crop-climatic models (Coligado and Brown 1975).

One of the simplest ways of expressing heat accumulation in terms which may be compared to crop growth is the degree-day concept. Here, a degree-day represents a day having a mean temperature of one degree above a recognized threshold, or base, say 5°C. Therefore, a day having a mean temperature of 10°C accumulates 5 degree-days. Cumulative degree-days over a period may be related to crop development stages. However, it is found that degree-day values vary in quality with respect to crop growth depending on the synoptic conditions during days on which they were accumulated. A region having a series of relatively cool days, but with mean temperatures generally above the growth threshold, does not produce the same plant response as a region having comparative anomalies of higher and lower temperatures. Stated another way, the relationship of growing degree-days and crop growth is not linear. For example, quite a few warm days together are required to achieve certain plant stages, e.g. flowering, fruiting. Marine climates having a long growing season with a uniformly low temperature regime will not produce a wide range of crops in spite of large season degree-day accumulations. Boughner (1964) has provided a good review of the degree-day concept. Other limitations to the index which he has noted to be of significance are:

(a) each plant species has its own threshold temperature and responds differently to antecedent heat accumulation during growth stages. For example, in the case of corn, special, exponentially-computed heat units have been developed.

(b) *daytime and nighttime temperatures do not equally affect crop processes (mean daily temperatures) and latitudinal effects are not taken into account.*

(c) *temperature is a measurement of sensible heat transfer between the atmosphere and environment including plants, but is only an index of radiation exchanges, evaporation heat losses and condensation heat gains, though these are principal energy fluxes affecting plants.*

(d) *strictly employed there will be heat accumulation before seed germination is possible and after the vegetative period in fall. Boughner excluded such spurious data in developing his "effective growing season".*

In spite of these limitations and the fact that other weather processes are simultaneously affecting plants, the degree-day index provides a useful assessment of air temperature effects on a range of crops over a broad area. It is easy to apply and has previously been used in other regions so affording intercomparisons. It forms a key component of the B.C. climatic capability classification which has been employed later in this study. Recently, Coligado (1975) has developed an exponentially-controlled growing degree-day index for cool coastal regions of British Columbia. However, since virtually all of The Territorial study area experiences a continental climate with relatively warm days and cool nights during the growing season this modification was not adopted.

The term "growing season" has been employed to infer the period outside the frost season when crop growth is feasible.

This has been specifically defined by authorities in a number of ways. It may correspond to the frost-free period (no temperature below 0°C occurring), although it is common for many crops to sustain a mild frost and continue to grow; and as already noted above, most crops do not begin to grow until some heat accumulation occurs above the freezing point. An "effective growing season" may be defined as the period when there is a 4/5 chance of no killing frost (assumed to be 28°F (-2°C) (Trewartha 1954), or the period between occurrences of five or more consecutive days of mean daily temperatures below 42°F (5.6°C) (Boughner op cit).

In this report the frost-free season parameter has been stressed as it represents a component of the B.C. classification.

2.3 SOIL MOISTURE

Most water assimilated by vascular plants is moved by turgor pressure through the root system to the stems and leaves. Precipitation, evapotranspiration and soil properties are determinant factors of the quantity of soil moisture available. Excess moisture not retained by soil particles drains to the water table, but as shortages occur it becomes increasingly difficult for plant root hairs to abstract thin films of water tensionally bonded to the soil particles. Thus situations arise in nature where copious precipitation may be followed by periods of sunny, dry weather when the water is quickly evaporated to the atmosphere particularly when there is a wind associated. In areas where soils are coarse-textured, less water is originally retained near the surface.

Gross averaging of the amounts and timing of precipitation and evapotranspiration over a number of years may suggest an adequate situation for crop cultivation, but this is the fallacy of averages, and in the North the ideal condition of frequent precipitation events throughout the growing season does not occur very often. Plants must depend greatly on water stored in the soil during these years, or irrigation may be practised. However, there are problems particular to the North which make these solutions less attractive. The amount of water stored in the soil is considerably less than that in British Columbia, for example. Annual precipitation for much of the area is only about 300-500 mm, of which half is snowfall. Much of the water resulting from snowmelt fails to infiltrate the frozen soil surface and continues as overland flow to streams. Local areas may benefit from the release of autumn rainwater frozen in the soil, or from the degradation of permafrost. While the clearing of forested land will generally lead to a lowering of the permafrost table with a release of water, this process will be completed in a few years when the permafrost table has passed deep below the rooting zone, where it is no longer influential.

With respect to irrigation, Peake and Walker (1975) note that some Yukon irrigation water sources that remain cold all summer may adversely affect plant development. Low temperatures are characteristic of many streams, otherwise suitable, and the pooling and heating of irrigation water may be an additional expense to farming in the North.

The soil moisture content and storage capacity may be directly measured, but it is more practical for large areas to estimate general conditions by hydrological techniques. For the purposes of this study a determination of regional values on a monthly, and growing season basis is adequate. The moisture stored in the soil at a given time may be computed from climatological records where the evapotranspiration demand is subtracted from precipitation water available after run-off. For this study the well-known Thornthwaite climatic water balance procedure was used (Thornthwaite and Mather 1957). The Thornthwaite values and indices are computed from temperature and precipitation data, but it is necessary to ascertain the soil storage capacity.

Authorities have noted a number of limitations in the Thornthwaite technique for computing soil moisture storage and other water balance parameters (Baier, 1967, Kakela, 1973). These deficiencies are largely related to misapplications, in particular attempts to compute values for periods shorter than a month. This criticism is justified, since average monthly temperature values are an important input parameter. Baier and Robertson (1966) have developed a "versatile soil moisture budget" which as a result of refinements (Baier et al 1972) can be used with weekly and shorter period data. The versatile budget is also well related physically to soil moisture processes. Williams and Sneddon employed this procedure in a simplified form for the Mackenzie District and while problems were encountered, these were not particularly related to the method.

For the purpose of this study which is a seasonal assessment of moisture deficiency over a broad area, the Thornthwaite method is considered to be as adequate as would be the versatile budget (Sanderson and Phillips, 1967, Martin and Gray, 1969). A comparison of seasonal values at Fort Simpson where the versatile budget was used by Coligado et al (1968), suggests agreement within 45 mm. Moreover, the Thornthwaite procedure is operationally simple to use and has been employed in many other regional studies, thus facilitating intercomparisons, (for example the national work of Chapman and Brown, 1966 or for Quebec-Massin, 1971, Ontario - Phillips, 1976 the Prairies - Laycock, 1967).

Baier (1967) has prepared a review of the relationships of soil moisture and evapotranspiration to which those desiring a detailed appreciation of the problem are referred.

2.4 LIGHT

For many plants the short northern growing season is compensated by the extended daylength period of the early summer months. Most plants are sensitive to the quantity and intensity of light. However, not all plants respond favourably to prolonged light exposure, thus such crops are unsuitable for northern cultivation. Light is the essential element in plant photosynthesis, a process which controls protoplasm/tissue production and plant growth. Light then affects plant structural development, food production, and the time required for some species to produce seed (Hildreth et al 1941). Plants also require resting stages which usually occur at night. Some crops which have been grown in the North and which prefer a prolonged light period are:

Vegetables: dill cucumber, sugar beets, radish, spinach, some potatoes;

Grains and Forages : winter barley, bromegrass, canarygrass, cloudgrass, fescue, foxtail, oats, orchardgrass, ryegrass, timothy, winter wheat, wheatgrass, red clover, sweet clover.

Some crops which are tolerant to long days are:

garden beets, cabbage, lettuce, some peas, some potatoes, some strawberries, some tomatoes, spring barley, rye, alfalfa, clovers.

Some crops which are not affected by photoperiod are:

most lima beans, most string beans, carrots, celery, cucumbers, most peas, some peppers, a few potatoes, some strawberries, most tomatoes, most corn

This list was prepared by Spector, and was included in Chapter 7 of Chang (1968). Daylength is a function of latitude, but over the growing season the longest photoperiod occurs in the area south of the Arctic Circle corresponding to the Mackenzie Valley settlements of Fort Good Hope, Fort Norman, Wrigley and Fort Simpson, and in the Yukon: Dawson, Mayo and Whitehorse. Unfortunately for the North much of the photosynthetically useful insolation for the year comes while there is still snow cover (Hare and Ritchie 1972).

Daylength also influences air temperatures as the march of hourly maximum temperatures in summer continues through the afternoon, permitting comparably higher values, particularly on clear windless days, to those measured at stations far to the south. The shorter nighttime period means that low minimum temperatures will not occur often, allowing a larger-than-might-be expected accumulation of growing degree-days at higher latitudes. Thus the B.C. agroclimatic capability classification which does not include a daylength factor, will reflect latitude effect to some extent through the degree-day index. This matter will be returned to later in the report.

2.5 OTHER CLIMATIC FACTORS

On a very local scale a plant climatologist may wish to isolate cause and effect relationships between weather and plant performance. On a broad scale to which this report pertains, cognizance of strong wind zones, areas of flood hazard, plus an appreciation of contingent physiographic factors affecting climatic conditions; for example, areas of excessively drained soils, have important implications for mapping and regional interpretation.

2.6 AGROCLIMATIC LAND CAPABILITY CLASSIFICATION

The climatic capability of a region to sustain agriculture has been examined and classifications have been developed for several regions of the country. Recently most of this has been carried out under the auspices of the Canada Land Inventory and its provincial counterparts.

The procedures of bio-physical (ecological) land classification have been summarized by Lacate (1969). Bio-physical land classifications have been undertaken in all parts of Canada over the last few years, both comprehensive and thematic modes. In 1976, the Canada Committee for Ecological (Bio-Physical) Land Classification was formed and its first publication (Thie and Ironside (eds), presents a sampling of current studies.

In British Columbia (as elsewhere) an agroclimatic capability classification that would be complementary to a soil capability classification was developed (British Columbia 1972, Runka 1973). The climatic capability classification produced for Canada (Chapman and Brown 1966) was judged to be too general for application in the montane province, but some of its concepts were retained in the new classification. Both classifications are based on growing degree-days, the frost-free period, seasonal precipitation and soil moisture deficiency.

Inasmuch as terrain represents important controls over local climate, the British Columbia land inventory authority found it necessary to develop a new classification in place of the one produced for general Canadian use. The terrain of the Yukon Territory and the western parts of Mackenzie District has similarities to that of British Columbia, leading Williams and Sneddon (1975-unpublished) to attempt an agroclimatic capability classification of Mackenzie District using the B.C. system. At the inception of the present study it was decided to continue with and complement the work of Williams and Sneddon using the BC capability classification.

The BC system supposes a range of climatic quality for agriculture through seven classes, where class I represents a wide range of opportunities to cultivate a variety of fruits, vegetables, grains and forages belonging to temperate climates, and class 7 signifies a climate so severe, that even natural browse cannot regenerate. It is important to note that the classification delimits the ranges or diversity of selected crops possible within an area, but does not impute the yield or year to year success of individual crops.

The limits of each class expressed through levels ascribed to the component parameters (growing degree-days, etc.) are listed in Appendix A.

In addition to primary class parameters, secondary classes may be assigned in consideration of severe events such as drought, low winter temperatures, or extreme minima in summer causing plant mortality, wind, low summer heat accumulation, heavy snowfall, and intense summer rain. These were not applied in the present mapping as they depend on local knowledge not available to a reconnaissance survey. However, application of the classification does require considerable topoclimatological reasoning, and an ability to make use of vegetation and soil evidence to infer conditions some distance from measuring sites. The BC system grants to the analyst, the full decision as to class level even when measurements are available from nearby sites. For example, the system assumes the soil moisture to be at field capacity at the beginning of the growing season. Locally this may not be true and the analyst downgrades the land class to reflect this.

In the application of the BC system to the North, the soil moisture storage capacity was altered from 250 mm to 75 mm because most of the area is to the lee of high mountain barriers and receives comparatively less precipitation. Subsequently it was also found that the growth of certain crops did not correspond to the defined climatic limits. These matters are further dealt with in Chapter 4.

CHAPTER 3: GENERAL CLIMATE OF THE STUDY REGION

3.1 MACROCLIMATE PATTERNS

Large scale climatic patterns (i.e. those occurring over large parts of continents) are controlled by latitude, distance from oceans (continentality), dominant air-masses, and mountain barriers between the region in question and air-mass source regions. The study region is at high latitudes where the amount of solar radiation received at the ground is attenuated by its long path through the atmosphere. The amount received on each unit of flat surface is also reduced by the low sun angle, which spreads the energy over the horizontal plane. High latitude also brings about large differences in energy income between summer and winter. In winter the sun is low in the sky and days are short while in summer the high sun is associated with very long days. Arctic air-masses, formed over the Arctic Ocean or far northern land-masses, are characterized by very cold temperatures. Because of their low temperatures they have low moisture-holding capacity and they tend to produce very little precipitation. Air-masses originating over the mid-latitudes of the Pacific Ocean have mild temperatures and a high moisture content. Air-masses formed over southern parts of the North American continent are warm and dry. Arctic and Pacific air-masses dominate over the Yukon, and western Northwest Territories. (Kendrew and Kerr 1955, Kendrew and Currie 1955, Burns 1973). Continental air-masses affect the region on rare occasions in summer. The Yukon is separated from the Pacific Ocean by a high mountain barrier and the western Northwest Territories is separated from the Pacific by several ranges of mountains. Mountains also reduce incursions of Arctic air masses into the northern Yukon, but the western Northwest Territories is essentially open to the north. The effect of continentality, (or distance from the ocean) is that an air-mass may remain over the land for a long time and become very cold in winter or very warm and dry in summer. This effect is often felt in the southwestern Northwest Territories. There are frequent intrusions of warmer Pacific air into the Yukon during the winter.

The climate of a region is usually described with the aid of observations at climatological stations within the region. The network is documented in Appendix J. The long-term climatological stations in the North, for which the record is widely published, are nearly all located near lakes or large rivers. They are thus also situated at the lowest local elevations. Such siting is representative of the climate of the shores of rivers and lakes, but it is not representative of the climate of the surrounding land that is higher and not close to large bodies of water. The bias caused by stations at low elevation is to represent higher temperatures than the average for the area, because of the general decrease of temperature with elevation. Such stations also have a small difference between daily maximum and minimum temperatures because the air temperature tends to take on characteristics of the nearby water surface, i.e. a small daily range. Precipitation amounts may also be less than average at lakeshore sites, because cold water in summer will inhibit the natural convection of air currents by chilling from beneath. Under different synoptic conditions originally moist air may undergo sinking to lower elevations which dries and brings stability to the air. However, in fall, evaporation from lakes into passing dry Arctic air may bring about shoreline snowshowers and the formation of discrete belts of deep snow cover. Since the settlements are all located along rivers and lakes, and agriculture is likely to develop first in warm locations and near present settlements, the climate of the long-term climatological stations is in most cases representative of the suitable agricultural land in their vicinity.

Temperatures in the North during summer are only slightly cooler than at many localities in Western Canada. For example, the mean July temperature at Fort Simpson, N.W.T. is 16.8°C and at Dawson, Yukon it is 15.0°C. At Edmonton, the mean July temperature is 17.5°C. The winter mean temperatures in the North are much cooler. For example, the January mean daily temperature at Fort Simpson Airport is -27.6°C compared with -18.7°C at Saskatoon Airport. However, summers in the North are short with only a modest accumulation of heat during the growing season. A few comparative values are 1100 growing degree-days (GDD) Celsius (above 5°C) for Fort Simpson (the warmest place in the Territories); 970 GDD at Dawson; and 660 GDD at Haines Junction; compared to 1400 GDD at Edmonton. At some places with low elevation, the summers are coolest and the degree-day accumulations smallest. An example is Haines Junction, which is situated at 600 m a.s.l. below the icefields of the St. Elias Mountains. Summer temperatures are also cooler around Great Slave Lake than at places more than half-way downstream on the Mackenzie River. The warmest places are in the southwestern Northwest Territories away from the lake, particularly along the Mackenzie River downstream to Wrigley, and upstream from Fort Simpson along the Liard River. In the Yukon, most valley bottoms below about 750 m a.s.l. are warm enough for some form of agriculture.

The average frost-free period across the North varies so much that local effects are apparent on even a casual analysis. Yellowknife Airport, on the north side of Great Slave Lake has the longest average frost-free period (108 days) in the Territories, and is comparable to Edmonton, Saskatoon and Regina, all places with much warmer mean summer temperatures. Throughout the region of greatest interest to this study,long-term average frost-free periods vary, for most part, from 60 to 95 days. The longer periods are recorded around Great Slave Lake, and at other places where the climate stations are well-ventilated with high minimum temperatures due to heat from the water body. The shortest mean frost-free period in the region is 21 days at Haines Junction. This station experiences brief nocturnal frosts in all of the summer months which suggests that cold air circulated downslope from mountain glaciers may be impounded in the saucer-like terrain of the Shakwak-Dezadeash Valley confluence. In such a case solar energy is consumed in heating the air at the expense of the soil and adjacent plant environment.

The precipitation pattern over the study area reflects the influence of mountain barriers on moisture-bearing Pacific air-masses and some local effects. Summer precipitation is mostly shower activity which is dependent on the sun's heating of the land to induce vertical air currents which subsequently develop into showers. Where a large lake or cold winds from glaciers dampen convection, the summer precipitation is reduced. The high mountain barrier of the St. Elias Mountains climatically separates the southwestern Yukon from the Pacific Ocean. The lowest precipitation amounts in the Yukon occur immediately to the northeast of these mountains. The highest precipitation experienced at Yukon low-elevation climatological stations occurs at Watson Lake. This southeastern Yukon location receives moist air from both the southeast and the south. In the Northwest Territories there is a large change in annual total precipitation from the 300 to 340 mm south of Great Slave Lake to 250 to 280 mm on the north side of the lake. Fort Providence at the west end of the lake also has low precipitation attributed to the cold water body. The highest precipitation rates at low-elevation locations in the Northwest Territories are estimated to occur along the Liard River just north of the British Columbia border. This appears to be associated with the impact of moist air-masses from the southeast rising and cooling on windward mountain ranges.

The climatic moisture deficit described in Chapter 2 is an important index of water available to crops. Since this deficit increases with increasing temperature but decreases with increasing precipitation, it is highest on the average, in warm areas with low rainfall. The highest climatic moisture deficits in the study area occur at Whitehorse, Yukon and at Fort Providence, N.W.T., both places having high summer temperatures and low precipitation. The deficit at these stations is about 240 mm, while the deficit for most of the other long-term climatological stations averages 150 to 220 mm annually. The lowest climatic moisture deficit occurs at Haines Junction, with a value of 73 mm. This station has low precipitation, but it also has little energy available in the ambient atmosphere for evapotranspiration. These climatic moisture deficit estimates are based on an estimated soil moisture storage capacity of 75 mm. Extensive clearing and cultivation of land may deepen the rooting zone and increase the moisture storage capacity. This would also be accomplished by adding organic material to coarse-textured mineral soils. Thus the soil moisture deficit described in this report which has been fitted to natural surfaces may become less of a limitation on cultivated lands.

3.2 MESOCLIMATIC PATTERNS

Mesoclimatology describes climatic patterns over small areas from about a kilometre to a few tens of kilometres across. The climate within an area of this size is controlled by the topographic factors of elevation, slope aspect and shape, and proximity to local water bodies. The special network and surveys were designed to permit mapping at this scale (1:50,000 - 1:250,000). Even finer-scale details are significant in choosing individual areas for cultivation and selection on that scale should be left to microclimatologists.

The effects of topography are qualitatively discussed in general texts on micro- and mesoclimatology, such as 'The climate near the ground' by Geiger (1965), or 'Descriptive micrometeorology' by Munn (1966). Some applications of topoclimate to agriculture are reviewed in 'An Introduction to agrotopoclimatology' by MacHattie and Schnelle (1974). In all of the above texts there is an extensive review of the literature, but the findings are often inconclusive as a result of the complexity of effects at each field situation studied and the difficulty of operating controlled experiments on real topography.

However, in this study the effect of commonly recurring land forms on local climatic patterns has been estimated quantitatively, making possible the climatic mapping of areas tens of kilometres distant from any climatological observation sites.

The effect of increasing elevation is a general reduction in air temperature. This has been estimated in other mountainous regions at about 0.65°C/100 m (Geiger, loc. cit.). In this project, an average reduction of mean daily maximum temperatures in the summer of 0.80°C/100 m was found to occur for the several local transects. The reduction of mean daily temperature is at a lesser rate, because higher ground tends to have a smaller range between the daily minimum and maximum temperatures. Because the daily range is smaller and less variable with ascending elevation from a valley bottom, frost hazard decreases, even though the average temperature also decreases. Near the ground at night, however, a reverse gradient in the vertical temperature profile may be established due to radiated heat loss from the surface. In winter,and in confined valleys which are typical to much of the Yukon,these "inversions" are hundreds of metres thick.

In broad valleys or relatively flat land, where elevation gradually changes from place to place, the daily temperature range does not vary as it does in narrow valleys. The decrease of temperature with elevation in such areas is about 0.80°C/100 m. The minimum temperature also decreases with elevation, and there is a regular decrease of both the accumulated growing degree-days and frost-free season with elevation.

The effects of slopes on climate are related to their steepness, morphology and the direction they face (aspect). Temperature records are influenced by the downslope nocturnal drainage of cold air or by the degree of mixing of diurnally-warmed air on slopes with southerly aspects. Steeper slopes, and those with convex shapes have relatively better cold air drainage and so have higher minimum temperatures than shallow or concave slopes. Well-drained slopes are also subject to increased mixing of their surface air with the surrounding air-mass in the daytime. This effect reduces the daily maximum temperature on steep and particularly on convex slopes. Concave landforms, such as hollows or ravines, and particularly those with no slope, are most susceptible to "pooling" of cool air, to reach very low temperatures on quiet nights. Under such conditions the vertical temperature gradient is reversed in the lowest layers of the atmosphere forming an inversion. In the North where the sun angle is always low, slopes which face south collect more radiation than level ground and considerally more radiation than north-facing slopes. This effect causes an increase in the total radiation received by rough, broken land surfaces compared to smooth, flat land.

The agroclimatic significance of the above-discussed processes on temperature may be summarized. South-facing slopes are warmer because they receive more radiation. Well-drained slopes have a small daily temperature range; they have less risk of frost; and they have a longer frost-free season. Concave forms with no slope are the so-called "frost hollows", wherein even shallow slopes permit cold air to flow gravitationally like sheet run-off of rain water from the land. Concave forms (ravines) on north slopes are subject to many cold nights because of the combination of reduced solar heat and impeded cold air drainage.

Precipitation is also affected by topography. There is a general increase of precipitation with elevation associated with the lifting of air-masses over the land. Air-masses bringing moisture tend to come from a particular direction, a source area. Therefore, the side of a range of hills or mountains facing that source receives the highest precipitation (the windward side) while the downwind or leeward side is dry. In the study area, the agent of lifting causing most summer precipitation is convection currents resulting from daytime heating of the earth's surface. Such convection cells bring about an uneven precipitation distribution (scattered showers). Such patterns present great difficulty when preparing regional precipitation maps. This type of precipitation of course decreases where the effect of daily heating is reduced, such as near a large lake. There may also be a reduction in convective precipitation near high mountains, because of subsiding cold air from snow-and icefields during both day and night.

It follows that the pattern of increased precipitation with altitude accompanied by decreased temperatures means that evaporative stress on the soil and plants will be less at moderate elevations. On sunny slopes the moisture demand and soil deficit increases and such areas may be unsuitable for agriculture, particularly where open soils with low moisture-holding capacity also occur. In the mapping of agroclimatic capability, significant moisture limitations were noted in warm areas at the bottom of valleys and on the sunny slopes.

CHAPTER 4: COLLECTION, PROCESSING AND ANALYSIS OF DATA

4.1 PRINCIPLES OF THE FIELD SURVEY

The objective of the project as a whole was to map in as fine detail as possible, the main climatic limitations to agriculture. As described in Chapter 2, the limitations can be well approximated by: the heat accumulation during the growing season; the length of the frost-free season; and the moisture supply, assuming for the moment that photoperiod is not regionally significant. These in turn can be estimated from measured temperature and precipitation. Therefore, the two essential climatic parameters measured in the field study were temperature and precipitation.

It is recognized that other climatic factors, i.e. soil temperature, sunshine or solar radiation, evapotranspiration measurements have a bearing on the climatic capability for agriculture. These have been indirectly assessed in the mapping procedures, based on regular meteorological network information. Some effort was made to measure weekly soil temperatures at a number of sites. The results are reported in Appendix H.

As described in Chapter 3, there are considerable differences in general topographic form and other major climatic influences across the region of concern to this project. The Yukon is mountainous, with a particularly high barrier to moist Pacific air in the southwest corner of the Territory. Temperatures vary considerably from the warmth of the southeastern Yukon, to the cool of the northwest, which is more subject to Arctic air-masses. In view of the Yukon topography all lands with agroclimatic suitability lie in some sort of valley, and are therefore under the influence of those pertinent valley mesoclimatic patterns. In the Northwest Territories, where the land is flat or gently rolling, the local patterns are caused by elevation differences and drainage patterns of air and water. The influence of Great Slave Lake and smaller bodies of water were of particular concern, since established service centres and some of the better soils are found near them.

The field study was designed to sample the local climatic patterns within each major physiographic region. The local patterns to be measured were the effects on climate of elevation, slope aspect, and slope shape within an appropriate elevation range. This range needed to be large enough to show the effect of elevation, and to cover the probable range of potential agricultural land in the locality. It was desirable to make some of the observations in former agricultural areas in order to take advantage of past agricultural experience for the establishment of agroclimatic classification.

The field study programme had to produce data which could be analysed and mapped. This required standardization in the instruments used, in their siting and installation: and the data abstracted from them, had to conform within the temporary programme and with the regular climatological network.

Briefly stated, the principles of the field programme and the project itself were as follows:

a) *to measure and evaluate temperature and precipitation, from which the basic climatic limitations to agriculture can be derived;*

b) *to produce a good areal coverage of the chief climate parameters according to broad natural landscape division, and within known agricultural areas, so that past experience might be used to advantage;*

c) *to show climatic changes due to surface elevation, slope geometry and aspect within an appropriate elevation range;*

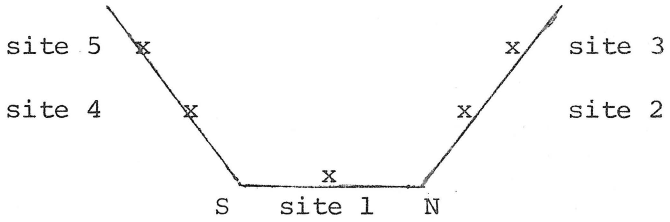
d) *to produce mappable data.*

While limited by normal constraints of time, money and personnel, this study represents a more detailed agroclimatic analysis of the Yukon and Northwest Territories than previous work. The results of such a vast reconnaissance-type survey conducted within a brief period of time must be considered tentative until more crop and climatic data become available. In time, information from presently inaccessible areas may warrant reassessment of the present data.

4.2 PROCEDURES

4.2.1 Transects

Most of the 50 temporary climatological stations were arranged in 14 transects of two to five sites placed within a few kilometres of each other, for each locality studied. A few stations were set up individually to help sample the climate of large land areas between the transects and between regular climatological stations. The transects were designed to determine the effects of elevation and slope aspect on climate. The basic form of valley transects was conceived as in the diagram below:



The standard elevation range was intended to be 150 m from the valley floor to sites #2 and #4, and a further 150 m to sites #3 and #5. The sampling of other factors of topography within the valley depended on the sites available. This form of transect was used at most of the Yukon localities, and was applied, in part, at Fort Liard, Nahanni Butte/South Nahanni, and Wrigley in the N.W.T. A complete listing of the transect locations, the number of sites in each, and the location of individual temporary-network, climate stations, is given in Appendix D.

Two other forms of transect were also applied. At Fort Simpson, N.W.T., where there are only small differences in elevation, five sets of instruments were placed at seven sites over the course of the two field seasons. The sites were chosen to represent different local landforms, such as marsh, sand dune, level ground, river bank, or island. At Hay River, N.W.T. the transect was derived from climatological stations situated at 1.5 km and 21.5 km from the south shore of Great Slave Lake. These sites were on nearly level ground with a few surrounding trees.

Limited roadways and trails along with rough terrain were the limitations which caused most of the valley transects to be incomplete. Within a reasonable ground range of Wrigley and Nahanni Butte, there were only valley floor features and south-facing slopes. North-facing slopes were separated by rivers and/or considerable distance from the rest of the valley configuration. At most of the Yukon transects, roads had been built on the north side of the valley. A long walk, and in some cases, a river, prevented access to the south side of these valleys on a regular basis. It would have been valuable to sample climate away from the rivers and large lakes in the general land area between Fort Simpson and Fort Liard, N.W.T. This was precluded by the expense of hiring helicopters.

The places chosen for transects in the temporary network of climate stations were representative of the latitude and longitude of the upper Mackenzie and lower Liard River valleys, and of the major valleys of the Yukon; this also provided for some sampling of the climate south of Great Slave Lake. The Yukon terrain may be considered in simplified form as a series of valleys separated by mountain-chains running northwest to southeast, each further from the Pacific Ocean. The Whitehorse and Champagne transects sample landscapes typical to the southwest of the territory. The Teslin and Carmacks transects are in an intermediate valley, and the Watson Lake, Stewart Crossing and Dawson transects all lie within the Tintina Trench. Most of the transects include a regular climatological station, usually one of long-term record.

The basic instrumentation of each site in the transects and temporary network was a Lambrecht 252C thermohygrograph, with a seven-day clock, or a 31-day clock; standard A.E.S. maximum and minimum Fahrenheit thermometers; and a rain gauge. The rain gauge consists of a cylinder having a diameter of 9 cm and is mounted with the receiver opening about 30 cm above the ground. The thermohygrographs and thermometers were sheltered from radiation in louvred Stevenson Screens, with the sensors 1.4 m above the ground. Six sites were equipped with mechanical weather stations (Meteorology Research Inc., model 1082M), which record air temperatures, relative humidity, wind direction and speed, and rainfall including rate of fall. The temperature and humidity sensors are on the north face of the instrument housing, sheltered from radiation from above, east, west, and south. These sensors were sited 3.3 m above the ground with the wind vane and cups at 3.5 m above the ground. The mechanical weather stations provided a non-standard observation in several ways. The height above ground and the radiation shielding differ from international standards for air temperature networks. Similarly, the anemometer height and exposure were non-standard. Nevertheless, the data were of considerable use in evaluating local climate. Occasional calibration spot checks of temperature and humidity were made with a portable psychrometer held near the mechanical weather station's head. At most of the mechanical weather station sites in the Yukon collocated regular temperature-humidity stations were operated for at least one month simultaneously. A full description of the equipment used in the field programme, both for the temporary network and mobile surveys, is given in Appendix E.

The data abstracted from the records of the temporary climate stations were: daily maximum and minimum temperatures; daily maximum and minimum relative humidities; and total precipitation for the period between station servicing, usually one week. For the mechanical weather stations, hourly wind speed and direction, and daily precipitation were also abstracted. For the thermohygrograph-thermometer sets, the process was completed by transcribing adjusted thermohygrograph daily maximum and minimum temperature values to data sheets and magnetic storage tape. The adjustment factor was determined from the differences between the self-registering thermometer values (standard) and the thermograph trace over the servicing period.

4.2.2 Mobile Surveys

Mobile surveys of temperature were made by motor-vehicle along access routes between the stations of each transect in the temporary network in the Yukon and Northwest Territories. Some surveys were also made along the highways in the Northwest Territories connecting Fort Simpson, Fort Providence, and Fort Smith to Hay River. The purpose of these surveys was to look for details of climatic variation which may have been missed by the stations in the transects, and to determine the interstation topoclimate. In order to represent the same sort of data generated by the permanent climate stations, the mobile surveys were run in the afternoons and late at night, in order to document the times of day when maximum and minimum temperatures normally occur. The emphasis in the surveys was placed on sampling nocturnal conditions of clear skies and little or no wind. This case is known to be one in which local topography most clearly affects the pattern of local temperatures, as the modifying effects on temperatures caused by air mixing and back-radiation of heat energy from clouds, are kept to a minimum. On clear, quiet nights in a cool, dry air-mass, the influence of local topographic forms on the settling and pooling of cold air, and therefore temperature, is intensified, with the result that frost may occur on concave-shaped landforms, though not elsewhere. Therefore, a deliberate sampling of these conditions by mobile surveys helps to reveal the areas and landforms of high-frost hazard, leading to the definition of an important climatic limitation to northern agriculture.

The mobile surveys for this project were done in light trucks and on foot. The trucks carried fast-response electrical thermometers, in some cases with recording equipment. The temperature sensors were radiation-shielded. In the Yukon Territory, the foot surveys were extensions of the truck surveys, running from the roadside to the sites set back from the road. In the Northwest Territories there are no roads joining the temporary climatological stations at Nahanni Butte/South Nahanni, Fort Liard or Wrigley. These transects were surveyed entirely on foot and by boat. For the Northwest Territories foot surveys, a portable electric thermometer was used. For the supplementary foot surveys in the Yukon, a hand-held psychrometer was employed. With vehicle-borne thermometers, significant temperature differences could be measured over distances as short as approximately 200 m. On the foot surveys this was reduced to about 50 m. (An example of the mapping of a mobile temperature survey is shown in Figure 6).

4.2.3 Other Observations

A few other forms of climatic observation were undertaken in the study area during the two field seasons. These included documenting patterns of phenological events in aspen (*Populus tremuloides*), soil temperature observations, discussions with northern residents, and general observations of the climate over the area during the summer season.

Phenological events represent observable stages in the annual growth cycle of plants, such as the leafing-out of deciduous trees in the spring. The purpose of recording such events was to detect response patterns of vegetation to weather sequences between, and at the temporary climatological station transects. The servicing crews travelled from bases at Whitehorse, in the Yukon, and Fort Simpson, in the Northwest Territories, to most of the temporary climate network stations on a weekly basis. An attempt was made to look at the patterns of selected phenological events over the routes travelled regularly. The events selected were the spring leafing-out and the autumn colouring of leaves of the aspen. This species is common to the whole area, and has readily observable changes, which can be viewed from a distance. These particular events were chosen because they are indicators of the onset of growth in the spring and the end of the growing season in the autumn.

An attempt was made to measure soil temperature without permanent probes. Two approaches were tried. In one attempt, holes were bored so as to be slightly less in depth than the standard measurement levels of 10, 20, 50 and 100 cm. They were kept open by means of a plastic pipe liner approximately 2.5 cm in diameter. The holes were kept covered between observations with fibreglass batting or spruce boughs. The temperatures were measured with a sharp-pointed, metal-sheathed thermistor probe which was pushed past the bottom of each hole, one or two centimetres to reach the standard level. The other approach also involved a probe being pushed into the bottom of a small hole approximately 2.5 cm in diameter. In this case, a fresh hole was bored for each observation, using a soil auger. The boring was stopped at approximately each standard level whereupon the thermistor probe was inserted and a reading taken. Since the observations were made weekly and not at a standard time of day, the data from near surface levels proved difficult to analyse. The 50 cm and 100 cm levels, however, showed a consistant difference through the season, from the network soil temperature station at Watson Lake Airport. Appendix H provides further details of this phase of the programme.

The field co-ordinator, attempted to discuss climate and agriculture with residents of places throughout the study area. It was necessary to carefully digest what was learned in this way, since little of it was based on systematic records of climate or agriculture. These interviews were useful in that they revealed the range of crops raised in at least some years, and something of the husbandry necessary to grow them. There were very few people actually engaged in crop production within the study area and it was not feasible to contact all of them. Discussion with these northern residents served mainly to provide a feel for the forms of cropping systems in the North, and their relations to northern climate and to other areas.

The field co-ordinator spend most of the summer of 1975 and the early summer of 1976 travelling in the North. He directly observed the weather conditions and crop responses through the growing season. Such local knowledge was useful in the mapping so that subjective adjustments to the necessarily coarse objective estimates of local climate patterns could be made.

4.3 ANALYSIS OF CLIMATIC PATTERNS

It was originally intended that the transect temperature and precipitation data could be grouped into regional patterns based on physiographic definition. For a number of reasons this plan did not materialize as conceived. Short-period relationships between the parameters measured on the transects and those observed at the permanent network reference stations were difficult to define. An attempt was made to relate the 1975 seasonal transect observations of accumulated growing degree-days, frost-free days and soil moisture supply to concurrent values at permanent long-term stations. In 1976, however, the patterns established the previous year did not hold so the approach was relaxed to utilize growing season means of temperature and annual precipitation totals. Monthly variability was estimated to be proportional to the permanent station estimator. For mapping of agroclimatic parameters, the basic patterns were determined from the areal temperature and precipitation fields.

4.3.1 Analysis of Temperature

The observations of temperature were summarized to mean values for the four-month summer field seasons (June 1 to Sept. 30, 1975 & 1976); these being the: daily mean, mean daily maximum and mean daily minimum. The means for the same period for all other stations in the study area were calculated for comparison. These temperatures were plotted for each locality or region against elevation to produce local or regional temperature profiles (Table 1). The transects were analysed individually for the local effects on temperature of elevation, slope aspect, drainage and slope shape. The resultant findings were synthesized into regional estimates of the effects of these topographic factors, since each transect was physically unique, and since there was limited sampling of some factors in some transects (e.g. north aspects).

Since the climate of each station in the local transects was due to a complex of topographic factors, it was necessary to combine the results of several transects to isolate each factor. The effect of elevation was observed in transects of two or more sites in 12 localities.[1] Aspect was compared between northerly and southerly slopes at six localities[2], and between level ground and southerly slopes at all 12 transects with elevation change[1].

Note 1: Whitehorse, Champagne, Haines Junction, Carmacks, Stewart Crossing, Dawson, Carcross, Teslin, Watson Lake, Fort Liard, Nahanni Butte, and Wrigley.

Note 2: Whitehorse, Watson Lake, Champagne, Carmacks, Stewart Crossing, and Fort Liard.

Table 1

Mean Seasonal Vertical Temperature Gradients at Individual Transects

(°C/100 m)

Transect	Maxima (daytime)	Mean	Remarks
Yukon			
Composite Yukon Valley Sites 1976	1.0	0.8	14 stations
Composite Yukon Hilltop Sites 1976	0.8	0.7	12 stations
Yukon-southerly drained 1976	1.0	0.9	8 stations
Yukon-southerly drained 1975	1.0	0.7	10 stations
Whitehorse 1976	0.7	0.5	above 1000 m 1° (max) 0.7° (mean)
1975	0.8	0.4	
Champagne 1976	1.0	0.6	below 850 m, inversion -0.8° (mean)
1975	0.9	-0.3	inversion throughout for mean
Haines Junction 1976	0.6	0.3	
1975	0.7	0.5	
Carmacks 1976	0.9	0.5	isothermal to 800 m for mean
1975	1.0	0.4	
Stewart Crossing 1976	0.9	0.5	inversion sites 1-2 (mean)
1975	1.0	isothermal (0.0)	inversion sites 1-2 (mean)
Dawson 1976	0.7	0.4	low min temps influence mean
1975	0.7	0.3	
Carcross 1976	1.1	0.7	
1975	0.8	0.6	
Tagish 1976	0.7	0.3	
Teslin 1976	0.5	isothermal (0.0)	
1975	0.7	0.2	
Watson Lake 1976	0.7	0.5	
1975	0.8	0.2	

Table 1 (cont'd)

Gradient °C/ 100m

Transect	Maxima	Mean	Remarks
Northwest Territories			
Southwest N.W.T.			
Composite 1976	0.8	0.5	
1975	0.8	0.5	
Fort Simpson 1976 (elevation range 150m)	isothermal (0.0)	-0.4	
1975	isothermal (0.0)	isothermal (0.0)	
Nahanni Butte 1976	0.8	0.7	Steep inversion (mean) up to 275 m (-2.5)
1975	0.9	0.7	inversion up to 320 m (-1.3)
Fort Liard 1976	0.4	0.3	
1975	0.7	0.3	mean is isothermal to 400 m
Wrigley 1976 (elevation range 115m)	1.1	0.4	steep inversion from site 1 to Airport (mean)
1975	1.1	-0.7	

There was no case where a simple north-facing slope was available to compare with a simple south-facing slope. The effect of the shape of the landform was specifically observed at Fort Simpson and Teslin. The effect of the shape of sites was estimated in interpreting temperature profiles for the various transects. The analysis also relied on known and accepted effects of topography on climate (e.g., Geiger, 1965; Munn, 1966; MacHattie and Schnelle, 1974; Curry and Mann, 1965; Dickison, 1970; Walker, 1961). Graphical examples of local temperature transects are illustrated by Figure 1.

The analysis showed a consistent decrease of mean daily maximum temperature with elevation. After explainable local deviations had been adjusted for, the rate of decrease with elevation (lapse rate) of the mean daily maximum temperature was observed to be generally between 0.75 to 0.85°C per 100 m. A value of 0.80°C per 100 m was used for the temperature estimates used in the mapping. It will be noted in Table 1 that there exists a wide disparity in transect lapse rates indicating the myriad of microclimates occurring and the difficulty in selecting sites representative of extensive areas. However, it may be profitable to re-interpret data sets stratified according to synoptic conditions.

The difference between daily maximum and daily minimum temperature is the range. The mean daily temperature range was found to vary considerably with topographic form, and proximity to bodies of water. There were some consistent patterns of this parameter, and these were noted and used with the determined maximum temperatures to estimate the mean and minimum for each place. Some typical values of mean daily range (°C) for the four-month summer season are:

Level land (Mackenzie)	13°
Valley-floor (Yukon)	14°
Bog	15° to 16°
Concave base of a slope	16° to 18°
Well-drained slope	12°
Hilltop (convex slope)	8° to 10°
Great Slave Lake shores	10° (12° in bogs)

In the Yukon, the standard (most of the long-term record stations) was a valley-floor location. It was estimated that maximum temperatures on south-facing slopes were about 0.5°C warmer than the valley-floor sites, and the maximum temperatures on the north-facing slopes were 0.5°C cooler than valley-floor locations.

The long-term stations are, of course, located at varying elevations. In order to standardize them to a common level, an equivalent mean daily maximum temperature at 500 m a.s.l. was generated by drawing a line having a slope of 0.8°C/100 m through the value for each station. These standard-elevation, mean daily maximum temperatures for the season were plotted on a regional map. The isotherms of this stratified temperature field show regional effects without the complication of altitude (Map 3).

As a general principle in the study area, features of topography large enough to see on the scale of mapping used (1:250, 000, 1:50,000) were taken into account as much as possible in the estimation of temperature-rated agroclimatic limitations. In addition to the common and frequently-found features mentioned above, cognizance was also taken of the warming effect of large rivers and lakes, the lowering of maximum temperature at hilltops due to mixing with surrounding air, the excessive daytime heating of concave south-facing slopes, among other factors.

4.3.2 Analysis of Precipitation

The observations of precipitation in the temporary network did not appear to show any consistent increase or decrease with elevation, and stations in the same locality with similar topography had large differences in seasonal precipitation accumulation (of the order of 1:2, Appendix F). This is further exemplified by Table 2. These observations engendered some caution in using precipitation observed in two seasons to draw estimated mean precipitation patterns over the area. As a further test of the reliability of such estimates, the ratio of the 1975 summer season precipitation at the long-term record stations, to their respective 1941-70 normals for the same period was calculated and mapped. The map (Map 4) showed general regional patterns, but there were some large unexplained differences between adjacent stations. Since the pattern was not completely consistent, no map of the estimated ratio of observed season precipitation to the 30-year period mean could be drawn with confidence. The obser-

Table 2

Transect Precipitation Analysis

Transect	Station	Elevation (m)	Gauge Aspect	June -Sep Precip. (mm)		Precip.Gradient (mm/100 m)		
				1975	1976	Aspect	1975	1976
A YUKON								
TESLIN	Teslin #2	872	W	162	113	W	12.4	43.1
	Teslin #3	1009	W	179	172			
	Teslin,"A"	701	S	164	161			
	Johnson's Crossing	738	S	168	--	S	10.8	--
WATSON LAKE	Watson L.#2	799	W	231	300			
	Watson L.#3	914	ON TOP OF HILL	221	273			
	Watson L.#4	814	S	225	260			
	Watson L.#5	902	S	237	324	S	9.9	23.0
	Watson L."A"	685	S	217	274			
	Rancheria	969	W	227	190			
	Swift River	891	S	219	--			
CARMACKS	Carmacks #1	524	S	160	--			
	Carmacks #2	658	W	156	87	W	12.7	16.4
	Carmacks #3	692	N	181	115	N	7.5	--
	Carmacks #4	792	W	173	109			
	Carmacks #5	692	E	151	135			
	Carmacks, Forestry	533	N	169	--			
STEWART CROSSING	Stewart Cr.#1	494	W	151	132			
	Stewart Cr.#2	640	W	160	141			
	Stewart Cr.#3	780	W	157	156	W	6.2	8.5
	Stewart Cr.#5	555	E	225	95			
	Ft.Selkirk	454	S	142	118			

Table 2 (cont'd)

Transect	Station	Elevation (m)	Gauge Aspect	June -Sep Precip. (mm)		Precip Gradient (mm/100 m)		
				1975	1976	Aspect	1975	1976
MAYO	Mayo,"A"	503	S	269	188			
	Elsa	814	N	177	210	S	5.1	2.1
	Keno	1472	S	318	208			
WHITEHORSE	Whitehorse#1	853	W	170	116			
	Whitehorse#2	1015	W	251	129	W	26.1	11.6
	Whitehorse#3	1018	E	191	95	E	1.9	1.0
	Whitehorse,Riv.	643	W	154	86			
	Whitehorse,"A"	703	E	185	92			
CHAMPAGNE	Champagne#1	701	S	155	100			
	Champagne#2	677	S	187	90	S	11.8	7.3
	Champagne#3	841	S(Hilltop)	186	79			
	Champagne#4	905	S	214	-			
	Champagne#4B	936	S	-	109			
	Champagne#5	826	N	189	82			
HAINES JUNCTION	Haines Jctn.#2	643	S	152	-			
	Haines Jctn. Ml.1019	599	S	163	125			
DAWSON	Dawson#1	366	N(Broad Valley)	140	73			
	Dawson#2	512	S	138	106			
	Dawson#3	384	N	156	127			
	Dawson City	324	W	146	99			
CARCROSS	Carcross	661	W	115	112			
TAGISH	Tagish#1	661	E	93	113			

Table 2 (cont'd)

Transect	Station	Elevation (m)	Gauge Aspect	June -Sep Precip. (mm)		Precip. Gradient (mm/100 m)		
				1975	1976	Aspect	1975	1976
B N.W.T.								
FORT SIMPSON	Ft.Simp.#1	123	W	156	185			
	Ft.Simp.#2	177	E	164	-	N	--	21.6
	Ft.Simp.#3	177	E	162	214			
	Ft.Simp.#6	177	N	-	190(E)			
	Ft.Simp."A"	176	E	171	207			
	Poplar River #1	265	N	192(E)	219			
WRIGLEY	Wrigley #1	131	W	170(E)	107			
	Wrigley #2	171	W	150(E)	-			
	Wrigley #3	216	W	127(E)	70	W	-50.6	-43.5
	Wrigley #4	247	W	-	70(E)			
	Wrigley "A"	156	W	257	87			
NAHANNI	Nahanni #1	317	S	271	257			
	Nahanni #2	189	Broad Valley No Slope	277	221	S	-4.7	28.6
FORT LIARD	Ft. Liard #1	390	S	266	443			
	Ft. Liard #2	384	E	264	348	N	78.9	-436.8
	Ft. Liard #3	232	N	275	307			
	Ft. Liard #4	305	N on Top of Ridge	196	184			
	Ft. Liard "A"	213	N	260	390			
HAY RIVER	Hay River #1	165	No Real slope aspect valley too broad	137	218			
	Hay River #2	201		186	250			
	Hay River Paridise Gardens	213		153	234			
	Hay River "A"	161		132	193			

Table 2 (cont'd)

Transect	Station	Elevation (m)	Gauge Aspect	June -Sep Precip. (mm)		Precip. Gradient (mm/100 m)		
				1975	1976	Aspect	1975	1976
FORT NELSON	Ft. Nelson A.	375	S	322	475			
TROUT LAKE	Trout Lake	497	N	196(E)	138(E)	from Popular River N	1.7	-61.4
MACK.HIGHWAY	Mile 166.5	250	N	141(E)	134			
FORT PROVIDENCE	Fort Providence	159	Broad Valley No Slope	163	145			
JOE KRAUS	Joe Kraus	290	E	-	305			
FORT SMITH	Fort Smith "A"	203	N	256	169			
YELLOWKNIFE	Yellowknife "A"	208	S	122	147			

servations of 1976 had similarly large variations between stations from the 1975 values, and from the normal. Accordingly, it was decided to interpolate precipitation between long-term stations taking account of likely variations due to synoptic (large-scale) weather patterns, elevation, mountain barriers, large lakes and other features.

To find a reasonable regional estimate of the increase of precipitation with elevation, the records of annual total precipitation were reviewed for all possible high and low elevation station pairs in the study region. These consisted mostly of the last two to four years of record from storage gauges at hilltop locations in the Yukon, compared to valley stations nearby. There are also a few places where stations other than hilltops can be compared with places much lower in elevation. Table 3 indicates the results of this comparison, mostly in the Yukon. The Swan Hills, Alberta transect was included because it is on land similar to some of the plateaux of the Mackenzie District, and it is a transect of four stations with five years of record.

Table 3

Valley-Hilltop Pairs Increase of Annual Precipitation with Elevation (mm/100m)

Dawson	3.6 mm/100 m
Stewart Crossing	5.7
Haines Junction	-11.2
Watson Lake-Transport Tower *	4.0
Whitehorse-Tagish Tower *	12.8

* Sacramento-type storage gauges.

Table 4

Valley-High Ground Increase of Annual Precipitation (Not Hilltop Pairs) With Elevation (mm/100m)

Mayo-Elsa	21
Mayo-Keno	16
Dawson-Boundary	30
Ross River-Mile 216 Canol Road	30
Sheldon Lake-Mile 216	15
Fort Simpson-Tungsten	14
Teslin-Swift River-Cassiar	50
Swan Hills	38

A complete annual precipitation gradient was determined for the Nahanni National Park (the study has not yet been completed). Here, the data were synthesized from a variety of precipitation, snow course, and hydrometric sources, and adjusted to common periods of record. The results are shown in Figure 2, which suggests the elevation/annual total relationship is 33 mm/ 100 m between 150 and 1600 m on a windward slope. Regional precipitation gradients are obviously very difficult to determine. There is a high variability from storm to storm, and aspect toward the wind direction at the time of precipitation is important. Scattered thunderstorms further complicate the picture on the short-term as they may miss being gauged, or by passing directly over the gauge they give a false impression of the amount of regional precipitation.

For mapping purposes the analyst could not bring himself to regionalize "average" gradients, and so selected an arbitrary value of 20 mm/100, knowing that this was a typical value experienced throughout the region. To rationalize precipitation data in rugged terrain is a fascinating experience which has attracted research in most mountainous countries of the world. A number of interesting papers were given at the World Meteorological Organization - International-Hydrological Decade Symposium at Geilo, Norway, in 1972. Interested persons should consult the Proceedings (WMO No. 326) or papers by Dickison (1970); Curry and Mann (1965); Eley et al (1961); Hamilton (1954).

As with temperature, a standard elevation value of mean annual precipitation was established from the records of long-term climatological stations. The mean annual total precipitation for each station with 1941-70 normals was adjusted to sea-level by subtracting 20 mm per 100 m of elevation for each station. These standard elevation values were then plotted on a map and analysed for possible coherent patterns (Map 5). It may be noted that while precipitation was adjusted to sea-level, temperatures were stratified at 500 m. This represents simply an idiosyncrasy resulting from the work being done at different times.

In the Yukon Territory a very dry area appears directly northeast of the St. Elias Mountains, including stations from Whitehorse to Haines Junction. Precipitation is a little greater to the north of this band, and it gradually is increased to the east reaching a high value at Watson Lake. In the Northwest Territories portion of the study area, the highest precipitation value found is in the southwest corner, on the basis of the Fort Nelson record. The stations along the shores of Great Slave Lake and Fort Providence, have low mean annual precipitation values for reasons explained in Chapter 3.

Precipitation in the North is distributed unevenly through the year, with a high peak in the summer months. This distribution, which is to the advantage of agriculture, varies considerably in its amplitude from place to place. It was assumed for the area surrounding each long-term climatological station, that the distribution of precipitation over the year is the same as that recorded at the station. The only exception to this general rule, was the precipitation distribution over the summer and fall along the south shore of Great Slave Lake. In that area, there is a fall maximum due to snow showers in cold air-flow off the lake. Based on studies of the patterns of lake-effect snowfall it seems the heavy precipitation zone does not extend further than a few kilometres inland from the lake. Where terrain is accentuated near the water body especially heavy falls occur (Wiggin 1950, Webb and Phillips 1973, Henry 1965).

4.4 ESTIMATION OF AGROCLIMATE PARAMETERS

4.4.1 Growing Degree-Days

Attempts to estimate average growing degree-day accumulations directly from transect temperature data were frustrated by the difficulty in regionalizing elevation-temperature gradients. The problem was compounded by the need to estimate accumulations at some stations prior to and after the field measurement seasons (June 1 - Sept. 30). An alternate method was adopted wherein a relationship was established for long-term regular meteorological stations, the field season mean temperature and the cumulative growing season degree-days.

In order to use long-term records to represent normal conditions and to smooth small variations, the most recent standard 30-year normal temperatures were used (1941-70 Normals; Temperature AES 1973). The fullest list of average growing season growing degree-days covers the period 1950-59 (Boughner, 1964). Comparison with recent longer-term data lists indicated good agreement. In order to use records from the latitudes of interest, the four-month mean temperature was plotted against growing season total of growing degree-days for all Canadian stations between latitudes 58° and 65°, (Table 5). The resulting graphical relation is shown in Figure 3. The maximum deviation of points from the line is 50 GDD (C) units or about one-quarter of the range of a class in the scheme used for land capability classification. Within the range of temperatures in the Yukon and N.W.T. this relation provides satisfactory estimates of all the appropriate growing degree-day classification groupings.

Table 5

List of Yukon, Northwest Territories and far northern provincial weather stations used to compare annual growing degree-day accumulation to June 1 - September 30 normal mean temperature (all stations in Canada between latitudes 58 and 65°N').

Aishihik
Dawson
Mayo
Snag
Teslin
Watson Lake
Whitehorse
Coral Harbour
Ennadai Lake
Fort Resolution
Fort Simpson
Fort Good Hope
Fort Providence
Fort Reliance
Frobisher Bay
Hay River
Norman Wells
Nottingham Island
Resolution Island
Yellowknife
Fort Smith
Aklavik
Dease Lake
Fort Nelson
Smith River
Embarras
Fort Vermilion CDA
Brochet
Churchill
Fort Chimo
Port Harrison
(Inoucdjouac)
(Fort McMurray)*

*south of 58°N

This relation was tested further by plotting a selected set of British Columbia and Alberta stations (Table 6). The set was selected to show a wide range of mean temperatures and geographic regions, including the British Columbia coast and interior, and places on the plains of Alberta. This set extends into a higher temperature range than the northern stations. There was a significantly greater spread of growing degree-day (GDD) means from the line of best fit to the points, than was found with the northern stations alone. The only consistent deviation was at the Pacific coastal points, where a large number of days with mean temperature a few degrees above 5.6° (42°F) gave higher GDD totals for each June to September mean temperature.

Table 6

List of British Columbia and Alberta stations used to test growing degree-day graphical relation derived from northern weather station records:

British Columbia	Alberta
Agassiz	Banff
Cranbrook	Beaverlodge
Fort Nelson	Coronation
Kamloops	Edmonton
Nanaimo	Embarras
Old Glory Mountain	Fort Vermilion
Port Hardy	Jasper
Prince George	Lethbridge
Prince Rupert	McMurray
Revelstoke	Medicine Hat
Smithers	Red Deer
	Wagner

4.4.2 Frost-free Season

A review of the record of the observation networks of 1975 and 1976 shows that the length of the frost-free season varied widely between stations situated close together, but on different topographic forms. If the first-fall frost occurred on a quiet night in a newly-arrived cold air-mass, the air drainage of each site determined the minimum temperature at the site. On such nights it was found that the minimum at the valley floor was 8 to 10°C cooler than on a knoll top 150 m above the valley floor. It was also found from the record of these two seasons that the day of last-spring frost or first-fall frost was the same for several stations in an area, which on the average have different minimum temperatures and thus can be expected to have different average last-spring or first-fall frost dates. This is the effect of a significant cold air-mass moving into an area quickly, causing a one-day shift to considerably cooler temperatures. Because this is the normal pattern of each year's occurrence of last-spring and first-fall frost dates, a review of the patterns of the two seasons in order to project long-term conditions over a region or locality is a complex procedure and the conclusions may be misleading.

Frost dates are highly variable within short distances due to the topographical effects on climate (Chapter 3). However, in order to assess local effects in the mapping, an analysing method by which stable long-term data and the transect measurements could be integrated was adopted. The method was to determine the normal mean daily minimum temperature which corresponded to the average frost date for each station. The derived "indicator" temperatures could be mapped and the frost-free period deduced for any area within scale limitations of the mapping. The two-year record from the transect stations was adjusted to long-term and used for guidance. This is essentially the method employed by Chapman and Brown (1966) for southern Canada.

To apply this method to the present project, a smoothed curve of mean minimum temperature was drawn from the averaged monthly values of mean daily minimum temperature in the 1941-70 normals, for all stations with such normals in the Yukon, western Northwest Territories, and a few northern stations in Alberta and British Columbia. Figure 4 illustrates an example of the procedure.

The mean minimum temperatures on the dates of last-spring and first-fall frost were taken from the curve for each station and plotted on a map (Map 6) of the region. (Dates of last-spring and first-fall frost from Hemmerick and Kendall, 1972).

The temperatures plotted on this map are regional values of the mean daily minimum temperature on the dates of last-spring frost and first-fall frost. Most of the differences between the plotted points within the map area can be explained in terms of local topographic effects and the influence of air-masses. The highest values of the plotted frost date indicator temperatures occur in the upper Mackenzie River Valley and northern Alberta. This is a region where, during spring and fall, there are periods of cold temperatures in a season of generally mild weather. These low temperature spells occur when Arctic air-masses push south up the broad Mackenzie River Valley. Frost often occurs during such outbreaks of Arctic air. The stations surrounding Great Slave Lake have lower frost indicator temperatures because the lake reduces their daily temperature range. This effect is more pronounced in the fall when the lake surface temperature is several degrees above 0°C and it provides heat to prevent frost along its shores. In the Yukon, Arctic air-masses do not invade as frequently in the spring and fall because of the mountains to the north and east, and the proximity of the southern Yukon to the Pacific Ocean. The long-term minimum temperatures corresponding to the mean dates of last-spring frost and first-fall frost for each long-term climatological station were thus taken to be representative of the surrounding area, except that the values at Great Slave Lake shoreline stations were used for a distance only a few kilometres from the lake.

4.4.3 Moisture Deficit

It was noted in Section 2.3 that the Thornthwaite climatic water balance technique was employed to determine the seasonal soil moisture deficit. In Section 2.6 mention was made that the soil moisture storage capacity was adjusted downward from the 250 mm values of the B.C. system.

A value of 75 mm (~3") storage was ultimately selected. Studies in southern Canada, and in particular the Prairie region, have used a storage of 100 mm (~4") over a one-metre depth (Chapman and Brown 1966) (Martin and Gray 1969). The rationalization of this 75 mm value is that for mountainous areas of the North the soils will have a generally coarser texture than those derived from similar rocks and glacial materials in the prairies, on account of their lithologic composition and younger age. In lowland areas, particularly river valleys and lacustrine plains, there is a broad variety of glacial and fluvial materials, but extensive regions are characterized by a permafrost active layer being less than one metre in thickness. It is reasoned that most northern soils hold less moisture than Prairie counter-parts for reasons of texture or reduced storage areas within the rooting zone. The contention is supported by the results of a water balance investigation of the Willowlake River watershed situated on typical Mackenzie Valley soils (Tarnocai, 1973), 45 km south of Wrigley. The river originates in the Horn Plateau and drains 21,600 km^2. An eleven-year (1964-74) stream-gauge record was examined along with temperature and precipitation data from Wrigley for the same period, adjusted to the basin elevation. Thornthwaite evapotranspiration calculations were performed, assuming soil storages of 100, 75 and 50 mm. The 75 mm-value corresponded to the best fit in water balance computations. The bookkeeping operation necessary for application of the Thornthwaite system has been described by Thornthwaite and Mather 1957 and the "balance sheet" from a typical computation is illustrated in Appendix I (Table 5).

The dominant parameters in the Thornthwaite formula are temperature and daylength. Temperature is a broad integrator of the balance of radiation exchanges, air movement, and humidity and other meteorological factors affecting evaporation.

$$ET = 1.6\ (10T/I)^a$$

where: ET is the potential transpiration for a 30-day month

T is the mean air temperature (°C)

I is a heat index which is the sum of 12 monthly indices i, given by

$$i = (T/5)^{1.514}$$

a is a cubic function of I

The factor I is dependent on latitude, and I values were computed for the appropriate latitude belt of the study area.

4.5 AGRICULTURAL CAPABILITY CLASSIFICATION

4.5.1 BCLI Classification

The system of classification of climate capability for agriculture used in this project was the system established for the British Columbia Land Inventory (BCLI) with a few adjustments (Section 2.6). The BCLI classification is in use by the Secretariat of the Environment and Land-Use Committee of the Government of British Columbia. This classification has similarities to those used in other parts of Canada, but it was developed in a province with a wide range of climates, from wet to dry, and from hot to cold. Agriculture is practised or attempted in a wide range of climates in British Columbia. The classification was refined over a period of years by field-testing and discussion among Provincial Agriculturists and Horticulturists in the agricultural districts of the province.

In order to apply this classification to the North, a review was made of available hard data correlating cropping potential (crop success, or sufficient yield) and climate measured in the year of the reported crop at certain locations. Such records were found in the reports of some years at the Dominion Experimental Farms at Fort Simpson, N.W.T. and Haines Junction (Mile 1019), Y.T. There is also a report on a series of standard cereals tests in the North (Guitard _et al._, 1965).

These reports showed that agriculture practised at Fort Simpson fitted Class 2, as outlined in the BCLI scheme. The climate at Fort Simpson is in frost-free season Class 2 (89 days), heat Class 2 (1156 GDD (C)), and aridity Class 3 (180 mm). At Haines Junction, the crop record suggests Class 4 agriculture in that cool season vegetables were grown with care; potatoes did poorly, and cereals were produced with some problems. The cereals at Haines Junction were subject to frost at all stages of their development, but they matured and the seed had more than 70% germination the next year. The climate at Haines Junction corresponds to BCLI frost-free season Class 6 (21 days), heat Class 6 (estimated 700 GDD (C)), and aridity Class 3 (211 mm deficit). The very short frost-free season at Haines Junction, where crops are not severely damaged by frost, appears to be related to the cold winds off the nearby mountain glaciers and persistant cold air in the valley. It does not appear to represent the probable level of damage at most places with such a very short frost-free season. Moreover, an examination of daily minimum temperatures indicates that many frost events are of a mild variety, a degree or so below the freezing point. For example, in 1976 there were only 10 frost free days, but there were 89 days between killing frosts (-2.2°C).

There are a number of reports of agricultural or horticultural success in the North, not correlated with climate records. Peake and Walker (1975) reported their findings on the past and present extent of agriculture in the Yukon. Albright

(1933) described gardening along the Athabasca and Mackenzie Rivers from Fort McMurray to Herschel Island in the summer of 1930, with some comments on the 1931 and 1932 seasons. Records indicate that the climate of those years was close to normal. Harris (1967) reported the extent of practised and experimental horticulture in the North in 1966. Brown (1970) mentioned a few additional historical facts about northern agriculture. The field co-ordinator made personal contact with a number of persons involved in agriculture in the North. These people were the staff at the CDA Research Station Beaverlodge, and northern residents with field crop and market gardening experience. The results of a review of these sources are summarized in Appendix C.

Matching the general reports of agriculture in the North with some average climatic data for several places (Appendix C) shows that potatoes for example have been grown consistently where the 'normal' heat is as low as 950 GDD (C). Potatoes were not successful at Haines Junction (estimated 700 GDD (C)). From Appendix C-2 it may be seen that a lack of agreement between the GDD and crop ratings appears to be general throughout the North, although Haines Junction represents one of the worst cases. In some instances this may be attributed to lake effect, where nearshore cold water dampens a buildup of sensible heat. In others daylength may be the cause, since most of the crops grown react favourably to light (including potatoes). However, at Dawson which has one of the longest daylength factors over the growing season, the classification appears to fit.

The frost-free season specifications were considered well-matched to the crop requirements. Some crops do mature faster at warm locations at the high latitudes of the study area, such as Fort Simpson, where cereal crops matured faster than at any other Alaskan or Northern Canada experimental farm. This may be due to the fact that Fort Simpson has the warmest climate of the high-latitude experimental farms studied. The standard cereal tests (Guitard et al 1965) indicate that this early maturity of cereals matches the frost-free season standards of the BCLI classification.

The very short frost-free season at Haines Junction seems to have the effect of slowing plant processes rather than inducing mortality. The frequent presence of cold air in the valley may induce a crop hardiness and other sites having a proximity to ice fields may react similarly.

The frost-free season and growing degree-day specifications were left unchanged from the BCLI classification for the purposes of mapping because of limited hard data on which to base new specifications. Unchanged specifications also allows direct comparison with agroclimatic capability maps in northern British Columbia. However, modifications to aid in the interpretation of these maps are outlined in Chapter 5.

The BCLI classification assumes a soil moisture storage capacity of 250 mm. As mentioned previously the moisture deficit estimates in the study area were computed with a soil moisture storage of 75 mm. In order to devise a comparable set of climatic moisture deficit ranges, a broad selection of typical combinations of temperature and precipitation in the North were used to calculate the deficit using both 250 mm and 75 mm assumed soil moisture storage capacity. The resulting values were plotted and 75 mm storage equivalents of the BCLI moisture deficits were extracted. The resulting values were slightly adjusted on the basis of the Prairies classification of climate capability for agriculture (Bowser, 1967; Chapman and Brown, 1966). The moisture deficit values used in the classification of the North are given in Appendix B.

4.6 AGRICULTURAL CAPABILITY MAPPING

As described above, the mapping was based on estimates of temperature and precipitation patterns derived from the observations of two summer seasons, and adjusted to the 1941-70 period. The basic regional estimate of temperature was the June to September mean daily maximum at 500 metres above sea level. These regional temperatures were derived by mapping this season mean temperature for each long-term climatological station, adjusted to 500 m a.s.l. by a lapse rate of 0.8°C/100 m. For localities where only a temporary climatological station was available, the value of the standard elevation temperature was different from that of nearby permanent stations by the mean difference observed during the 1975 and 1976 seasons. The basic regional estimate of precipitation was a mapping of the mean annual total precipitation of the latest 30-year normal period (1941-70) adjusted to sea-level by an assumed increase with elevation of 20 mm of precipitation per 100 m of elevation. The rationale for the adoption of a vertical temperature gradient of 0.8°C/100 m and a precipitation gradient of 20 mm/100 m was outlined in sections 4.3.1 and 4.3.2.

In the application of the BC climatic capability classification each area is rated from 1-7 in terms of heat, frost-free period and moisture supply according to criteria set out in Appendix B. Where the three values do not coincide, the class value of the most limiting factor is chosen and the cause of the limitation is identified by the letters G (for heat), F (for frost), and A (for aridity). For example, an area assigned class 4 for heat, 3 for frost and 3 for aridity would be classed 4G. In the case of an aridity limitation the class that would result if irrigation were available is indicated in parentheses. For example, an area assigned 2 for heat 1 for frost and 3 for aridity would be classed 3A(2G).

The agroclimatic capability of the study area (according to the BC classification) was mapped at 1:250,000 scale covering 45 map sheets representing a land area of nearly 50,000,000 ha. Supplementary mapping at a scale of 1:50,000 was undertaken in areas of special interest where finer detail is desired. Altotogether 120 large scale sheets were produced.

CHAPTER 5: INTERPRETATION

5.1 LAND CAPABILITY MAPS - SOURCES OF ERROR

The precision of mapping of climatic capability for agriculture is affected by the precision of climatological estimates and by the assumptions of the classification used. The climatic estimates were made in three stages; analysis of the field observations and long-term climatic records; estimation of regional patterns of temperature and precipitation from analysed patterns in localities; and derivation of patterns of frost-free season, growing degree-day accumulation and climatic moisture deficit. All these stages are subject to some degree of error.

The field observations were limited by the number and type of instruments used, and problems of access to sites, which prevented the completion of several topoclimatic transects. The temporary observation network and other aspects of the field programme were also hindered by the rapid execution of the project after its initial planning. Since the operation was started almost immediately after the field co-ordinator went into the North, a detailed knowledge of the country and its access was not immediately available for use in finalizing transect designs, and putting the climatologial network into operation.

There are severe statistical limitations in treating only two years of observations to determine long-term average conditions. For each whole season or annual total, such as growing degree-day accumulation, frost-free season, or precipitation, two years is a very small sample. The variability from year to year is large, as described in the end of this chapter, and two years may both be considerably different from 'normal' in the same direction. It was found in the analysis of temperature profiles (Sec. 4.3.1) that the differences between nearby stations due to topography of the individual sites, could vary by an average value of 1.0°C over the season. Since these local differences were used in estimating normal climatic patterns, there is an opportunity for error if the adjustments have not been properly rationalized.

The error of the 30-year normals is very small for the period represented. Temperature patterns estimated between long-term stations probably have an error of the June to September mean temperature of the order of 1.0°C, depending on the complexity of estimating temperature at the particular location. Precipitation was estimated with some very simple assumptions, which may lead to adjustments in some areas when better data are available. In valley-floor areas at elevations similar to the nearest long-term record stations, precipitation estimates have a probable standard error of the order of 25 mm of annual total precipitation. At elevations several hundred metres higher or lower, the estimates may be in error by 100 mm or more annually. Since the arid areas are almost all in the lower elevations of valleys, the error of aridity estimates is in most cases of the order of 25 mm. Moreover, these areas are often fairly close to regular network stations, reducing the magnitude of any adjustments.

The errors in deriving agroclimate parameters from temperature and precipitation estimates are due to the variability in the data used to make the conversion estimates. For frost-free seasons, the indicated minimum temperature for frost dates varies by 0.5 to 1.2°C between neighbouring climatological stations with 30-year normals. This leads to an error in the length of the frost-free season thus estimated, of 4 to 10 days (Map 6; Figure 4). The average spread of growing degree-day accumulation from the line relating it to season mean temperature is 15 degree-days (Figure 3). Calculation of the climatic moisture deficit depends on all the input data, including soil moisture storage capacity. Changes of assumed soil moisture storage capacity between 50 and 150 mm produce differences of the estimated soil moisture deficit of 20 to 40 mm, which are much greater than the error of calculations. The soil moisture storage capacity on potentially arable land in the North may well vary in the range from 50 to 150 mm. The overall error of estimating the agroclimate is somewhat less than the sum of errors in climatological analysis and in conversion to agroclimate parameters. The mean error in frost-free season is probably 10 to 15 days. The mean error in growing degree-days estimates is probably of the order of the equivalent of 1.0°C in summer season temperatures, or 65 growing degree-days. The mean error of estimated climatic moisture deficit is in the range of 20 to 40 mm.

These estimated errors in components forming the agroclimatic classes represent a range of about half a class of frost-free season, one third of a class of growing degree-day accumulation, and two-thirds of a class of moisture deficit. The precision of mapping is thus estimated here to be at best within about one-half of the class interval of climatic specifications.

As noted in section 4.5.1 and Appendix C-2 there is a poor cooresponpondence between the class assigned to actual growing degree-day values and the type of crops which may be grown with heat being limiting at the site. The class departure may be explained by lake or local terrain effects in a few cases, but there appears to be a number of discrepancies large enough to represent one or two and occasionally three class levels. Since the cropping capability in these cases is always greater than the climatic class would suggest, photoperiod may be the residual causative factor. Photoperiod is a function of latitude and is not considered in the BC classification except indirectly where long days in a continental climate may accumulate comparatively more heat units.

Nevertheless, there is some reticence in making an arbitrary adjustment to the GDD criteria of the classification or adding a photoperiod factor at this time because:

(a) there exists very little "hard" information on cropping practices and experiences throughout most of this vast region, and only a very few persons with direct experience in gardening or farming may be consulted. The detailed records of the two experimental farms have become dispersed since their closure, and are for the most part, inaccessible. For this report, recourse had to be made to summary progress reports and uncertainty exists as to the nature and operations of many valuable parts of the programme.

(b) the nature of photoperiod effects on northern crops is imperfectly known except that there is a variable response among species. In an attempt to elucidate growing season/light effects at various locations, the apparent departure of the BC climate class rating from the actual crop rating was plotted against seasonal daylight hours, but the relationship is difficult to discern (Figure 5).

(c) the crop class levels assigned at various locations were based on rather limited data, both from the period of cultivation experience and the range of crops cultivated. Indicator crops belonging to specific BC class levels were utilized to judge class levels, but uncertainty remains as to whether the full range of crops for the class level could be grown and whether the indicator types were truly representative of the range. The behaviour of potatoes in particular appears anomalous. Boswell and Jones (1941) note that while it lacks hardiness, the plant "shows a remarkable response to length of daylight". Albright describes potato culture throughout the Mackenzie Valley as "ubiquitous", thus ensuring a class 3 capability north to the Delta!

Nevertheless, there is plausibility to the argument that northern crops will mature with greater quantities of light compensating for a lesser heat accumulation. Accordingly, the heat ranges of the BC classification might be relaxed to admit places with documented crop successes to be assigned a higher class in the hierarchy. For example in Appendix B-2 the growing-degree day ranges have been adjusted to permit general agreement in the climatic capability class level and the corresponding crop class level (Appendix C-2). Those locations for which accord could not be achieved include stations influenced by cold water bodies, (Hay River) frequent frosts (Haines Junction , Fort Smith) ,and far northern locations (Aklavik , Inuvik) .

Therefore, it seems reasonable for most localities having a "G" class limitation indicated on the maps accompanying this report to be re-considered at a level 1-2 classes higher according to criteria in Appendix B-2. A table indicating the range of crops to which the revised classification would pertain forms Appendix C-3.

The analysis of climate on the mesoscale shows patterns with variations on the order of hundreds of metres in horizontal dimension. On this scale, farms having only a few hectares under cultivation are not individually classified. To assess the climate capability for agriculture of potential small holdings, further study of local microclimates is required.

5.2 AREAL DISTRIBUTION OF THE CAPABILITY CLASSES

Upon completion of the 1:250,000 maps, the areas for each of the classes represented were planimetered. Land mapped in the Yukon Territory exclusive of water bodies and swamps totalled 28,831,476 ha, and 20,368,121 ha were mapped in the Mackenzie District.

A breakdown of class levels according to map sheet and to climatic limitation is given by Tables 7,8 for the Yukon and Northwest Territories, respectively. The regions to which the individual map sheets pertain may be determined from Map 2.

It may be seen that the Yukon is more severely limited by low heat than the Mackenzie District. The warm summers of the latter area, however, appear to be associated with greater evapotranspiration and soil moisture stress. It bears repeating that areas having a G class limitation may produce crops equivalent to that of a higher class. Of course, such does not apply to areas having a double limitation, i.e. GF.

5.3 INTERANNUAL VARIATION

In view of contemporary concerns with food production and the implications for agriculture on the frontier, some statistical analyses of climatic fluctuations have been carried out. These are graphically displayed by moving means of growing degree-day accumulations, frost-free period, seasonal precipitation and absolute standard deviation of these parameters (Figures 7 - 25).

Table 7

Agroclimatic class areas in hectares for the southern portion of the Yukon Territory

MAP		CLASS								
N.T.S. No.	Name	3A	3G	3GF	4A	5G	5GF	6G	6GF	7G
105A	Watson Lake	1,210	49,193			475,402	15,726	438,306		189,516
105B	Wolf Lake					3,306		360,120		844,273
105C	Teslin					190,322	4,032	529,434		467,741
105D	Whitehorse	7,661				212,621	7,661	318,104		610,402
105E	Lac Laberge	323			5,605	320,645	1,169	564,999		271,411
105F	Quiet Lake					32,177		212,500		920,401
105G	Finlayson Lake					14,113		343,548		804,434
105H	Frances Lake					12,097		326,814		817,256
105J	Sheldon Lake					11,694		299,999		802,418
105K	Tay River					69,113		336,290		710,966
105L	Glenlyon	10,766			3,589	343,265		378,346		383,144
105M	Mayo	6,452				195,564	7,258	328,628		538,709
106D	Nash Creek					6,089		112,258		946,046
115A	Dezadeash					96,008	2,419	306,653		760,926
115 C&B	Mount St. Elias							13,145		1,818,021
115 G&F	Kluane Lake					403		210,403		1,489,191
115H	Aishihik Lake					55,322	2,419	349,757	7,258	742,619
115I	Carmacks	48,064		403	17,137	335,120	2,823	390,846		339,153
115 K&J	Snag	8,468				86,693		818,547	20,161	677,418
115 N&O	Stewart River	14,516				228,387		664,595	2,016	720,966
115P	McQuesten	18,952				259,274	11,694	443,951	2,823	358,064
116A	Larsen Creek							93,387		972,256
116 C&B	Dawson		18,548			93,508		323,185		1,142,861
TOTAL		116,412	67,741	403	26,331	3,041,123	55,201	8,163,815	32,258	17,328,192

Table 8

<u>Agroclimatic class areas in hectares for the southern portion of the Mackenzie District, N.W.T.</u>

MAP		CLASS												
N.T.S. No.	Name	2	2A	3A	3G	3GF	4F	5G	5GF	6G	6F	6GF	7G	7GF
75 D	Fort Smith					185,080		835,079	2,823					
75 E	Taltson Lake					403		571,370	288,709					
85 A	Little Buffalo River			8,468	31,048	653,628		372,177	152,016					
85 B	Buffalo Lake			191,129		524,313	28,992	192,338	79,724					
85 C	Tathlina Lake			85,484	23,790	268,951	34,677	273,387	235,887	89,516		71,774		
85 D	Kakisa River		2,016	2,984	89,072	2,581	2,581	552,983	342,983	65,403	23,226	162,298	847	
85 E	Mills Lake			249,556	195,040	215,242		172,419	256,451			11,694		10,484
85 F	Falaise Lake			563,709				163,306	290,725					
85 G	Sulphur Bay			12,903		33,105		196,774	1,613					
85 H	Ft. Resolution				87,379	65,564		403,386						
85 J	Yellowknife					16,048		644,676	48,589					
85 K	Rae			19,355	12,500	32,258	806	415,322	529,434			3,226		
85 L	Willow Lake				19,597			7,500	566,410			162,459		267,419
95 A	Trout Lake					403		207,661	8,065	125,000	21,371	748,789	14,516	
95 B	Fort Liard	21,855			145,580	111,290	12,500	508,467	27,016	120,161	51,210	142,338	45,161	
95 C	La Biche River				47,581	16,935		150,806	8,065	424,193			517,338	
95 D	Coal River			4,435				248,427		604,031			337,419	
95 G	Sibbeston Lake		6,048		55,726	85,605	13,710	416,773	163,548	121,129		205,564	62,581	16,169
95 H	Fort Simpson		8,871		120,161	65,726		229,435	570,563	2,823		141,935	403	
95 I	Bulmer Lake				11,290	10,081		75,524	760,563	1,613		179,354		65,847
95 J	Camsell Bend				101,572			397,822	151,129			337,782		88,266
95 O	Wrigley				43,145			479,435	44,758	298,387		173,387	403	68,145
	TOTAL	21,855	16,935	1,138,023	983,481	2,287,212	93,266	7,515,067	4,528,621	1,852,256	95,807	2,340,600	978,668	516,330

The six stations for which the statistical analyses were made are Whitehorse, Watson Lake, Haines Junction and Fort Simpson, Fort Smith and Hay River. Figures 7 to 24 show the five-year moving means of frost-free period, growing degree-day accumulation and annual precipitation at these stations. The deviation from the mean is scaled in units of the standard deviation for the station. Figure 25 shows the five-year moving mean of growing degree-day accumulation for Dawson in Fahrenheit units, with the deviation expressed in absolute units. The standard deviation of each climate element is of the order of one class interval of agroclimate classification, except that precipitation varies by 100 mm or more between years, or the equivalent of two agroclimate class intervals. The interannual variability is similar at all the places for which statistics were done, except Fort Smith, which is significantly more variable in frost-free season and seasonal total precipitation.

At most places the five-year moving means of frost-free season and growing degree-day accumulation exhibit long waves with amplitudes of the order of 0.7 to 1.0 standard deviations and periods of several years. Since the apparent period is not regular, there are probably waves with several periods superimposed. One of the periods is very likely to be the 22 years of the sun spot cycle. Precipitation is highly variable from year to year, with relatively small amplitude waves of the five-year moving mean. Deficiency or excess of precipitation can be more restrictive for a year or two at a time. The worst effects of either case on northern agriculture will likely be when it combines with a long spell of low temperatures. Whatever the cause of these fluctuations, the implication for agriculture is that there occur in the North, at not entirely predictable intervals, periods of several years when the climate is considerably more restrictive to agriculture than the long term average climate indicates.

The Dawson graph of moving means of growing degree-day accumulation shows a longer period variation with an apparent period of the order of 40 years. On this apparent cycle, the present is a time of warming, with mean heat accumulation near or above the long-term average. The five-year moving mean of frost-free period at Hay River, Fort Smith and Fort Simpson is plotted for 60 years or more. These places show large waves of 10- to 22-year periods, but no trend of the 40-year period exhibited by Dawson's heat accumulation. Where precipitation records have been plotted for 50 years or more, there are also variations with periods of 10 to 22 years, but no obvious 40-year cycle. This longer cycle thus appears to be peculiar to Dawson and possibly to the higher latitudes of the study area.

Figures 26 to 30 show the frequency distribution of years in which five of the six stations first listed above was in each Class of the BCLI classification (modified for soil moisture). All stations show significant variability. There is a greater variability among the illustrated index stations having Class 4 rating, than for those with a mean Class 5 or 6 rating. The middle classes of the classification have narrow ranges of climate specifications because it is in these ranges that the range of possible cultivation rapidly changes with climate. Where frontier locations have Class 3 or 4 agroclimate on the average, and a considerable climate variability, there will be great differences in agricultural success from year to year. It is seen in the graphical presentation here (Figures 26 to 30) that Fort Smith and Fort Simpson, representative of warmer land in the Northwest Territories, have considerable interannual variation in their climatic capability for agriculture. Fort Smith has a very wide variation, because of the combined effects of a Class 3 mean classification and wide variations in its climate.

As discussed above, the interannual variation of climate in the North is very significant for agriculture. The standard deviation of annual values of all important agroclimatic parameters are of the order of magnitude of a class interval, so that everywhere the annual climatic capability for agriculture varies significantly from year to year. This has two main effects on the mapping in this project. A good portion of the crop history data available to this study occurred during better climatic years, leading to overly optimistic interpretations of climatic normal records. Secondly, the maps must be used with the understanding that interannual and inter-decadal variability is highly significant. The zoning on the map does not predict what the crop range will be next year, but rather what it ought to be on the average if the latest 30-year normal period continues to exemplify the mean condition.

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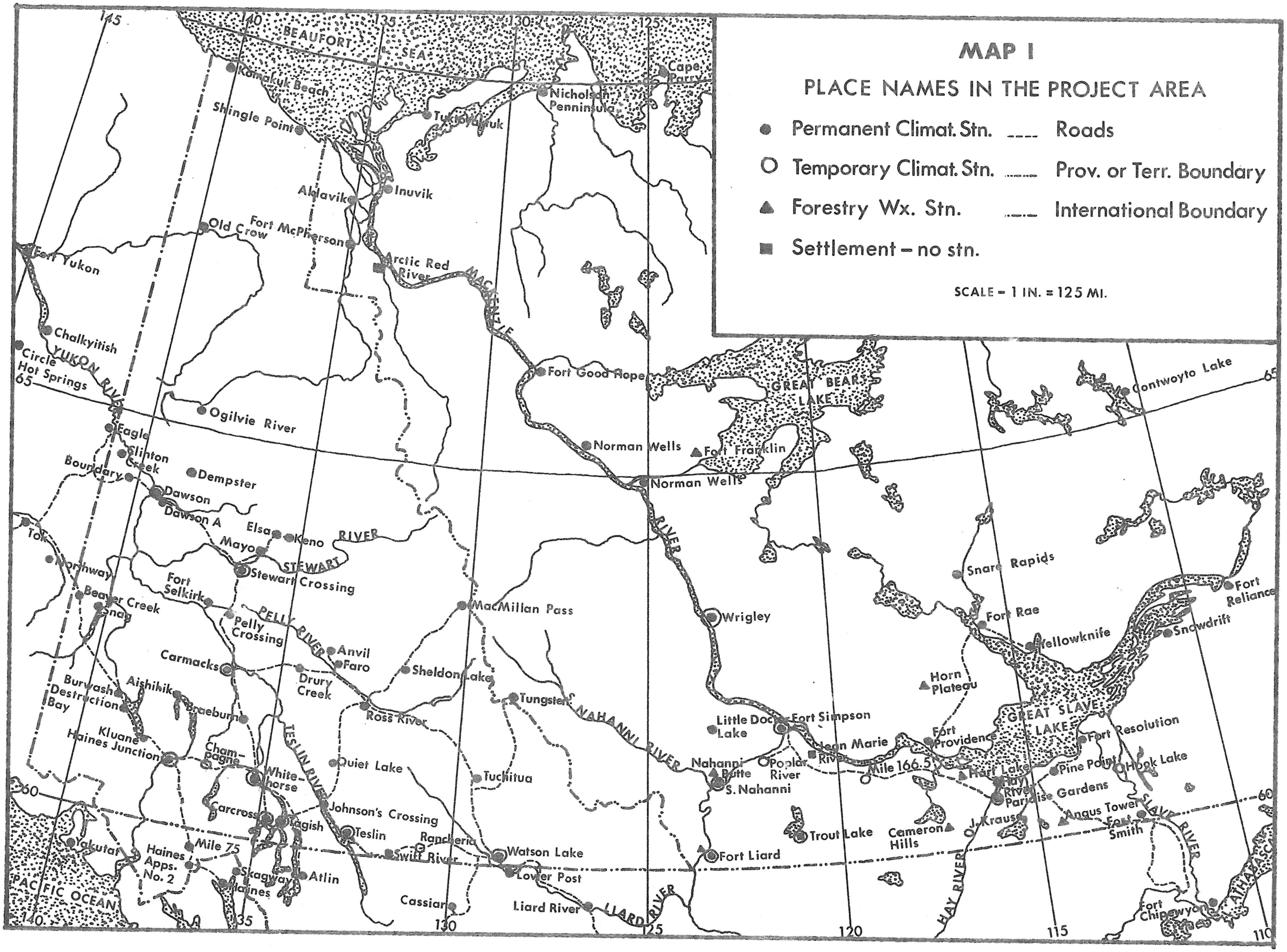
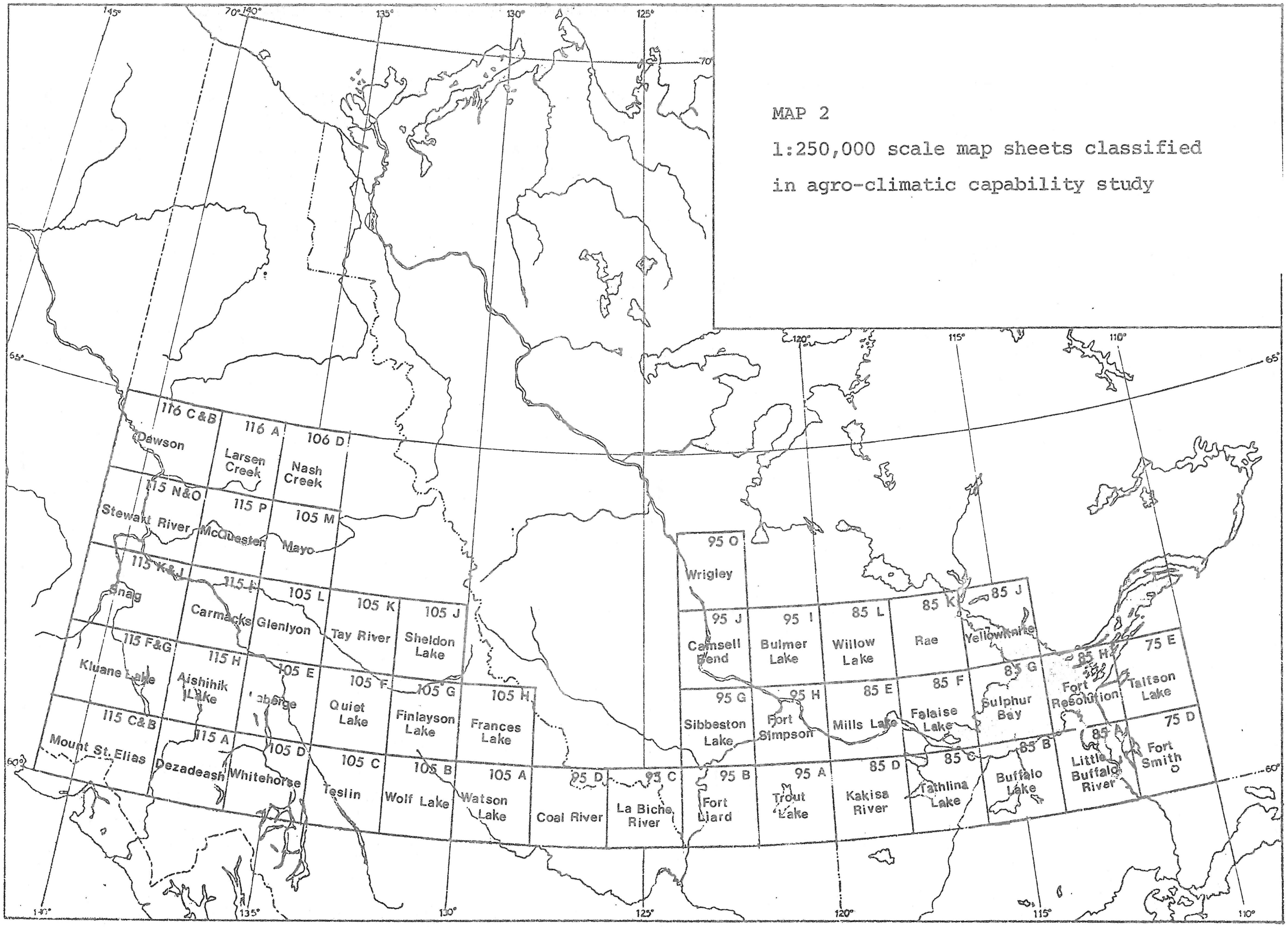


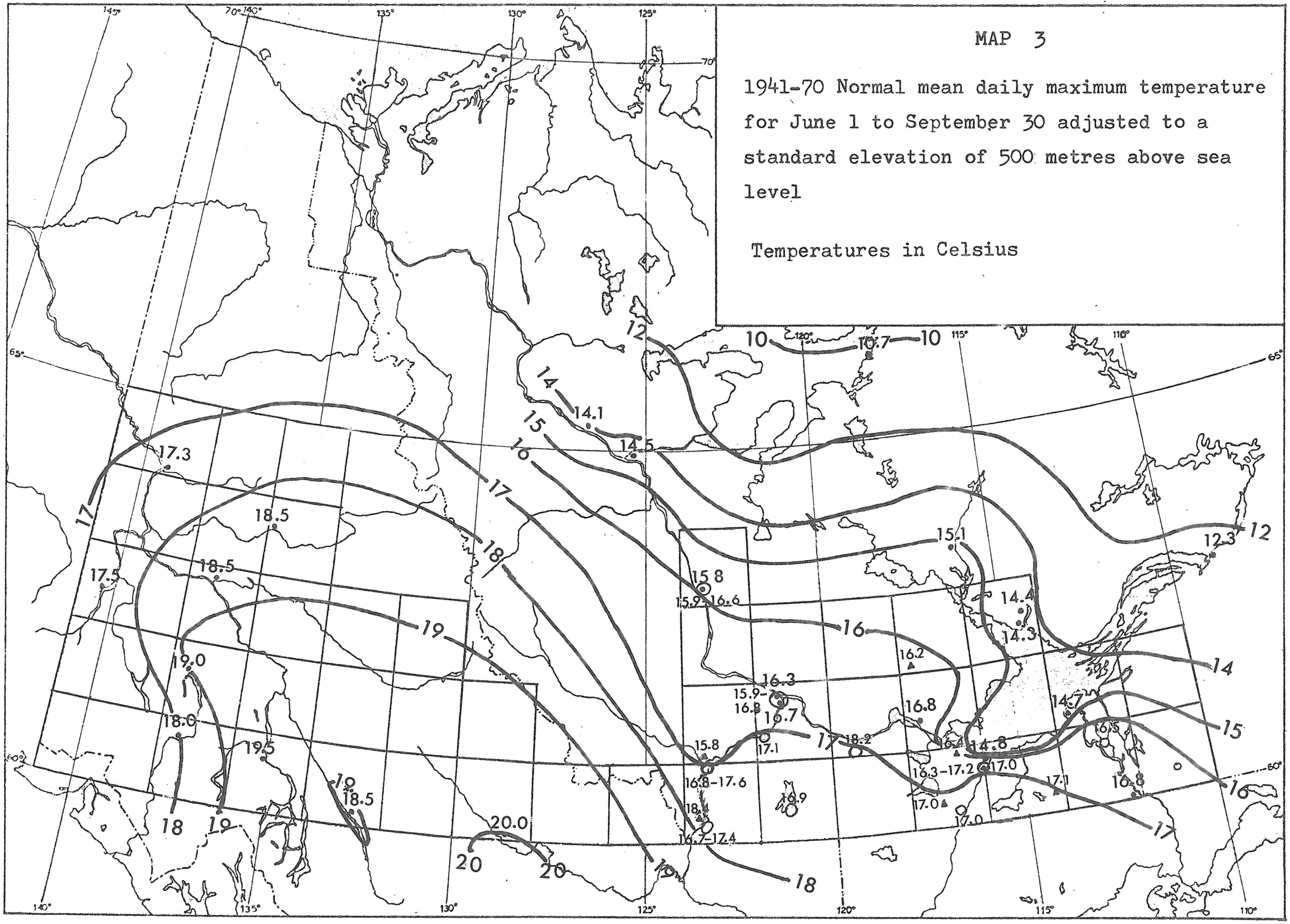
MAP I

PLACE NAMES IN THE PROJECT AREA



MAP 2

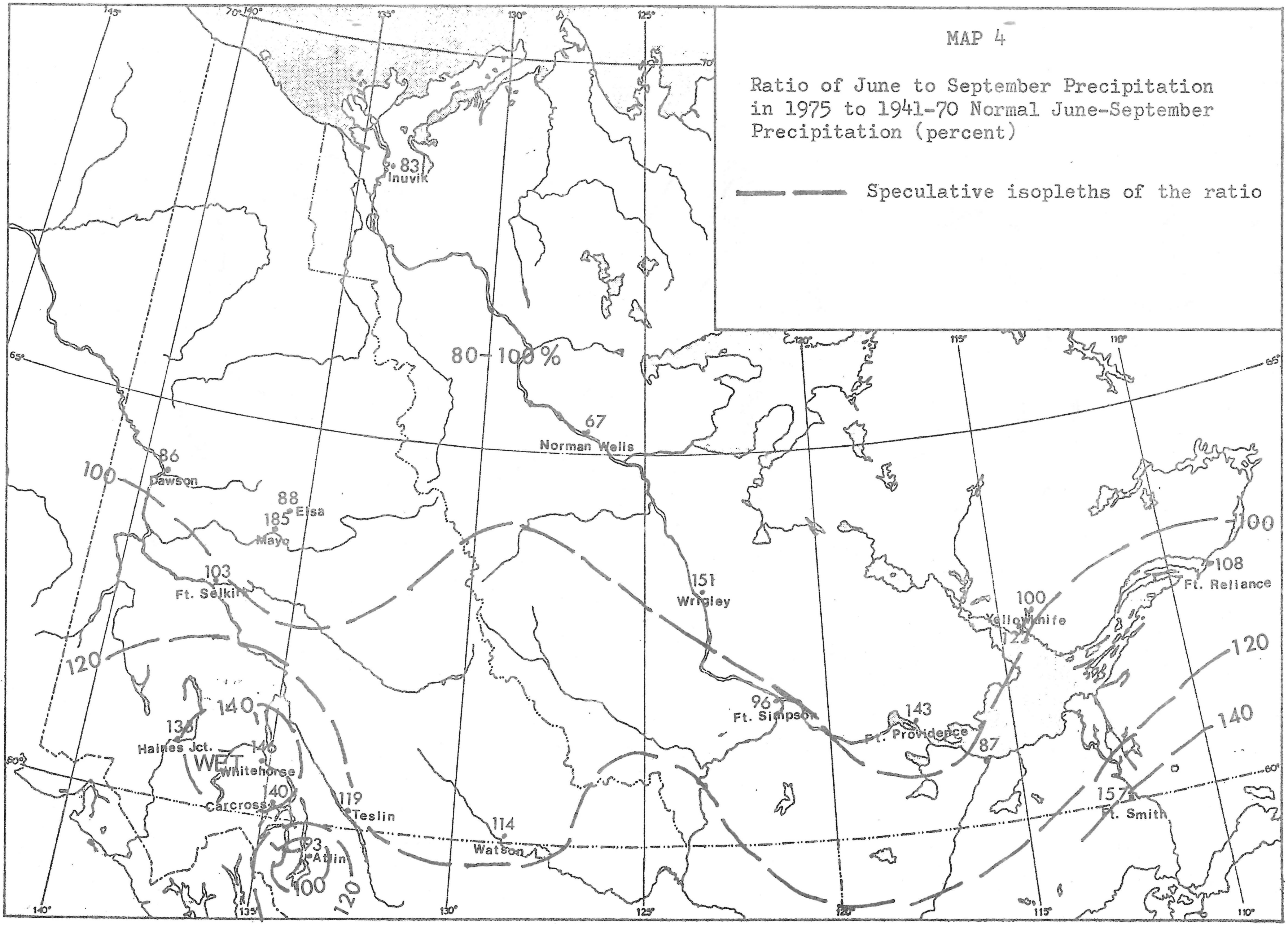
1:250,000 scale map sheets classified in agro-climatic capability study



MAP 3

1941-70 Normal mean daily maximum temperature for June 1 to September 30 adjusted to a standard elevation of 500 metres above sea level

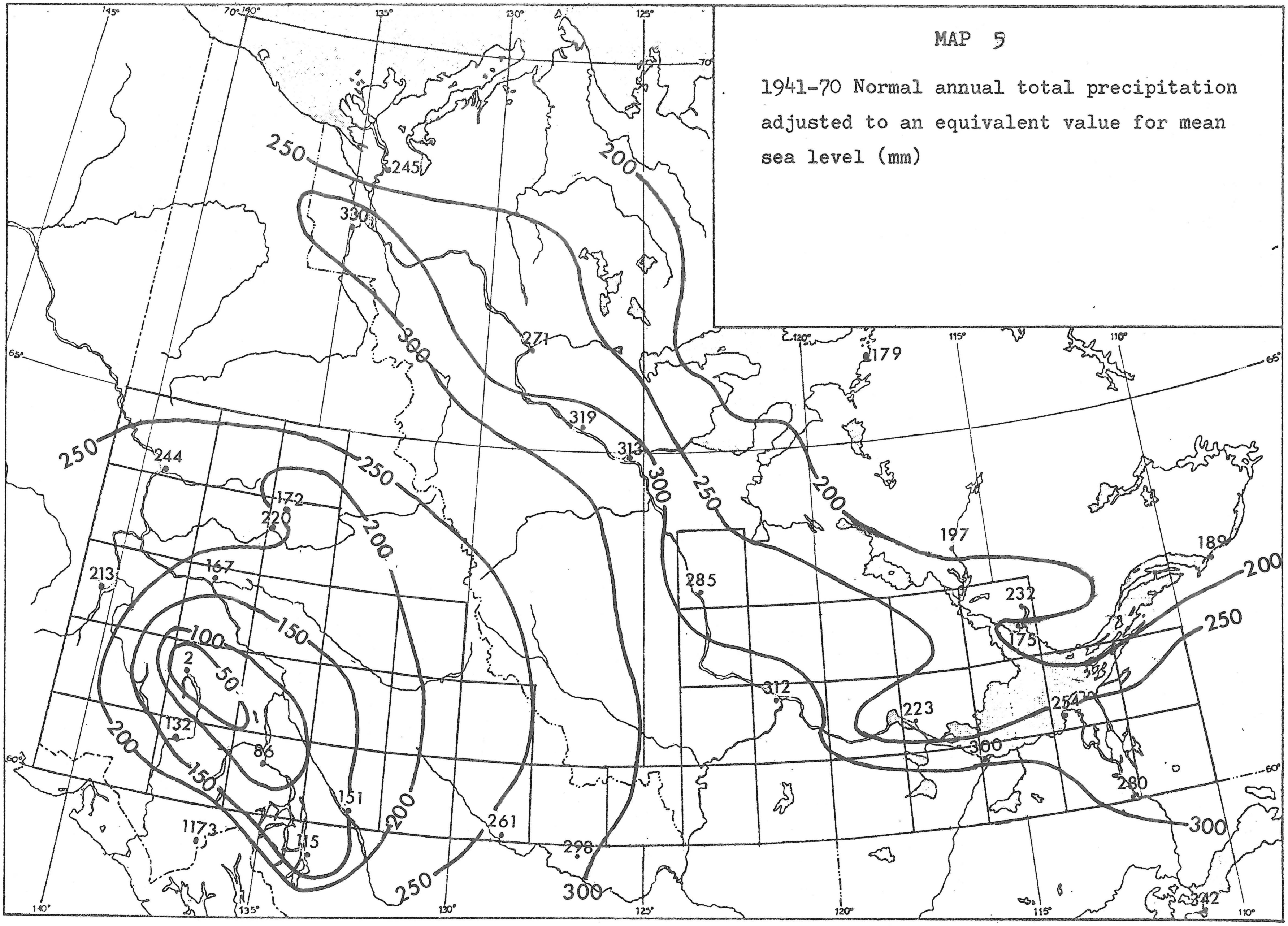
Temperatures in Celsius



MAP 4

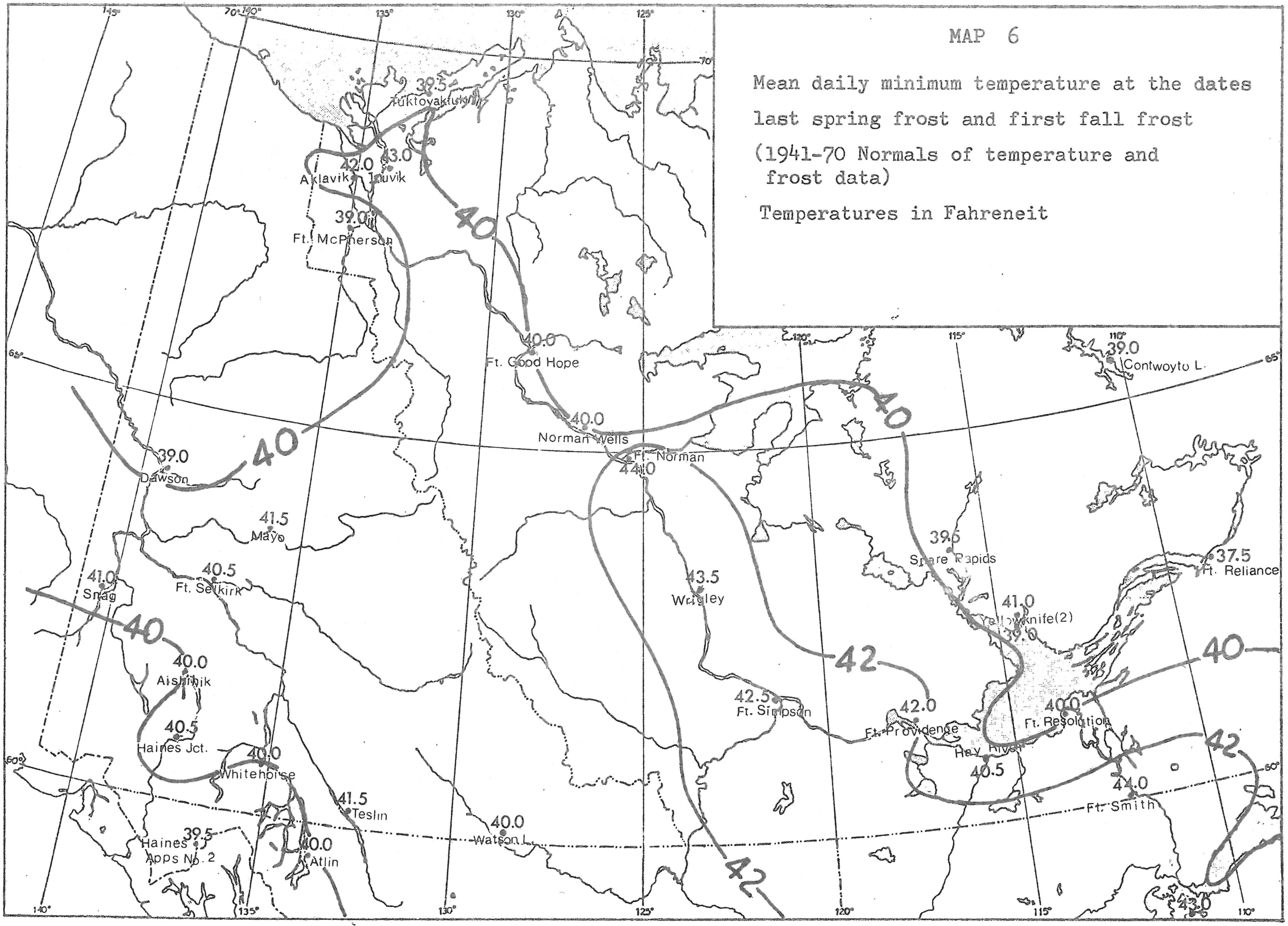
Ratio of June to September Precipitation in 1975 to 1941-70 Normal June-September Precipitation (percent)

— — Speculative isopleths of the ratio



MAP 5

1941-70 Normal annual total precipitation adjusted to an equivalent value for mean sea level (mm)



MAP 6

Mean daily minimum temperature at the dates last spring frost and first fall frost

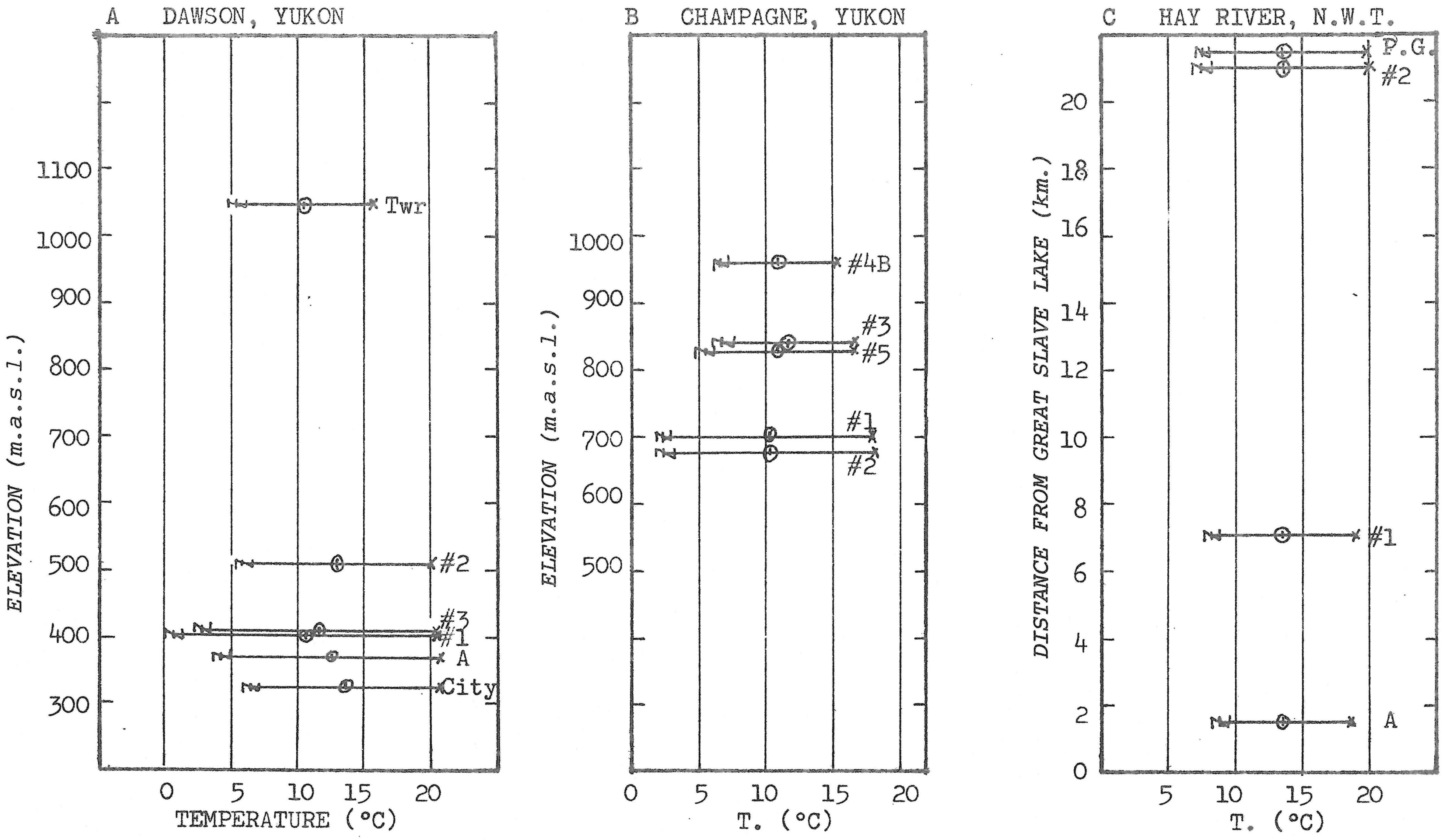
(1941-70 Normals of temperature and frost data)

Temperatures in Fahreneit

Figure 1 EXAMPLES OF LOCAL TRANSECT TEMPERATURE PLOTS

A and B: Vertical temperature profiles

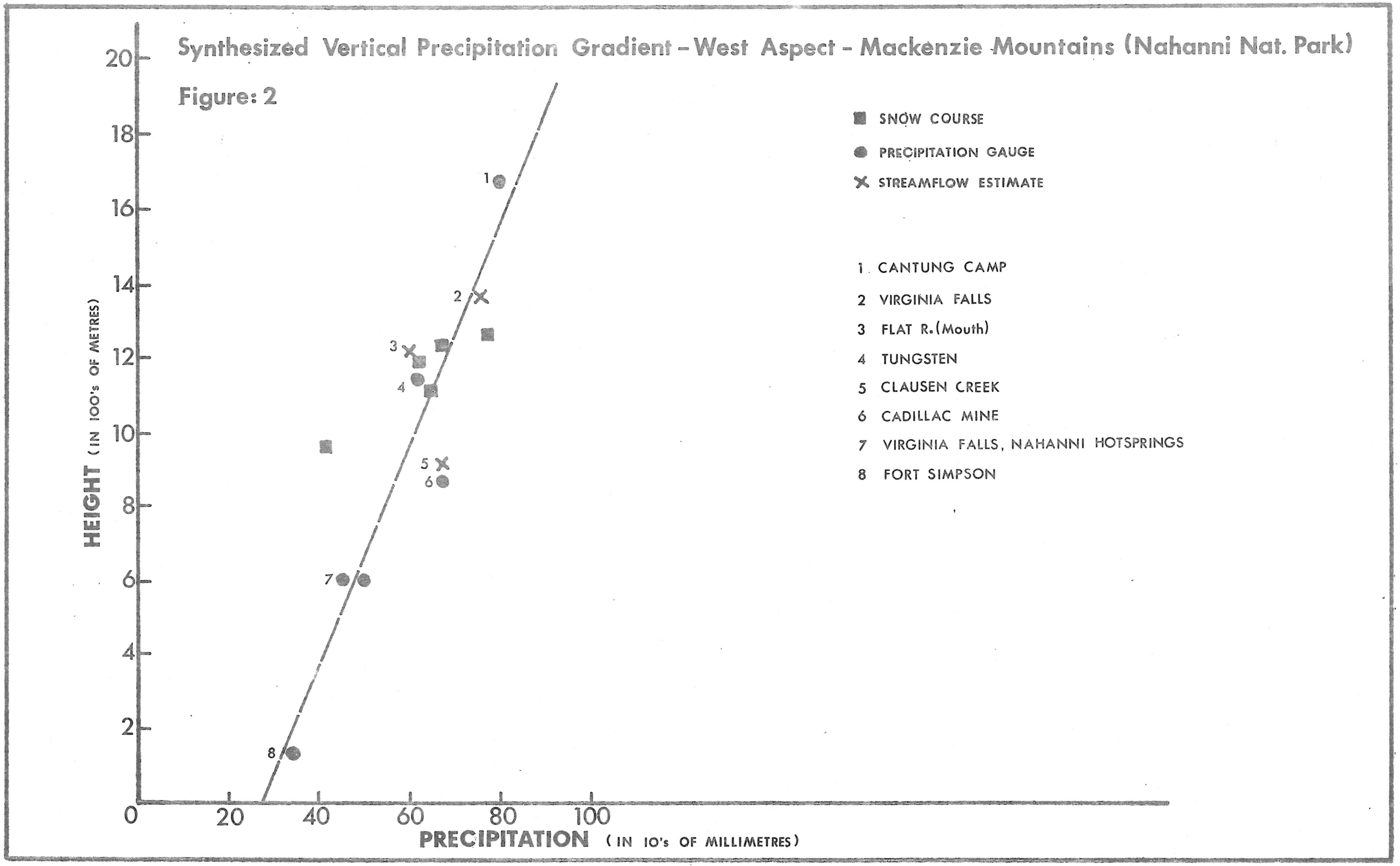
C: Horizontal temperature profile of lake effect



City: Level, urban, by large river
Tower: Wooded mountain top
#1: Level grassed valley floor
#2: Steep south slope
#3: Shallow north slope

#1: Level, grass-pine
#2: Level, grass-spruce
#3: Short grass hill top
#4B: Steep south slope
#5: North side of hill top

A: Airport site on delta
#1: Level, riverside, forest
#2: Level, sandy, recent pine burn
P.G.: Level, cultivated, river valley



Synthesized Vertical Precipitation Gradient – West Aspect – Mackenzie Mountains (Nahanni Nat. Park)

Figure: 2

Figure 3 GROWING DEGREE-DAYS VERSUS JUNE-SEPTEMBER MEAN TEMPERATURE

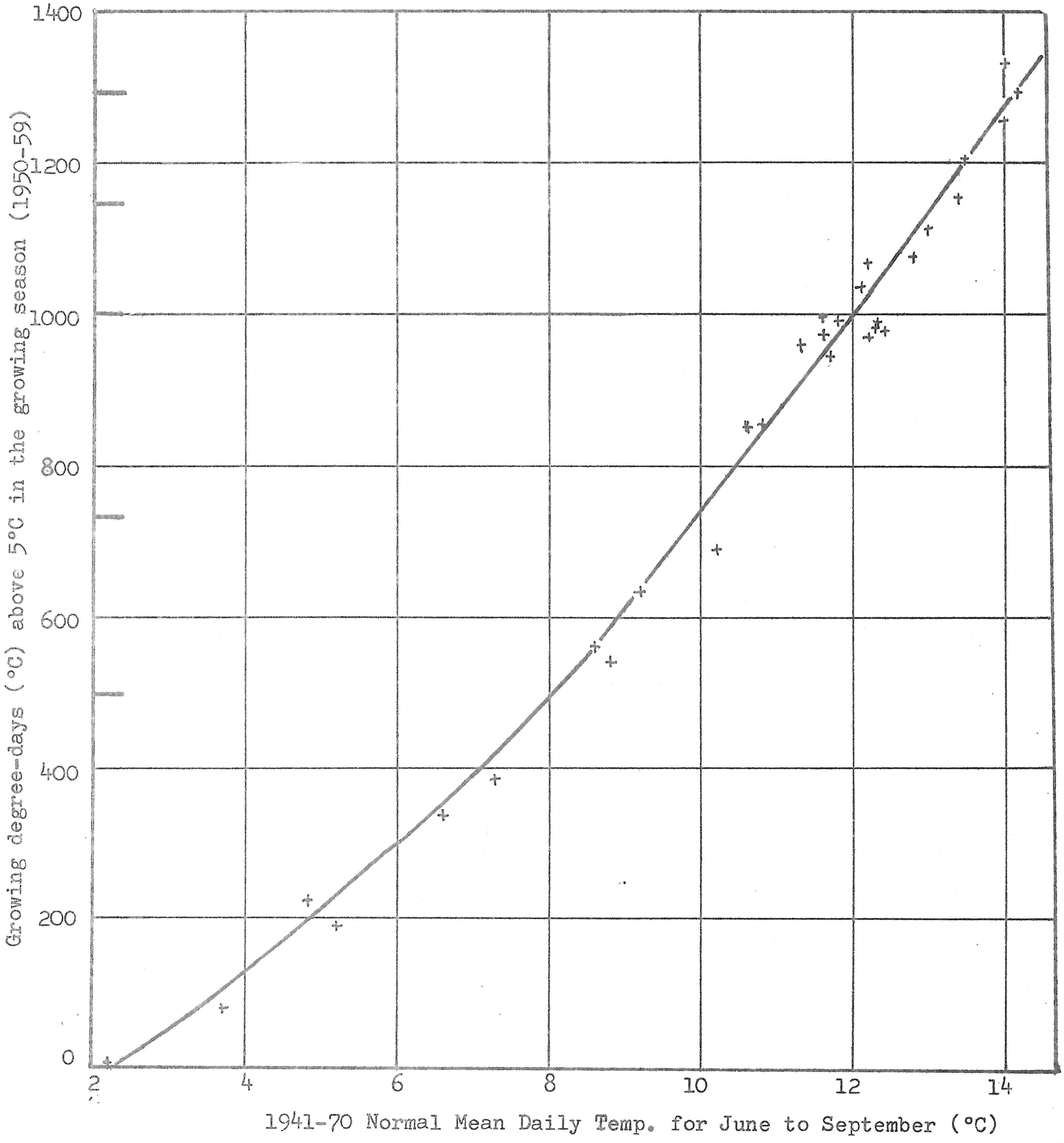


Figure 4 EXAMPLE OF SMOOTHED CURVE OF MEAN DAILY MINIMUM TEMPERATURE

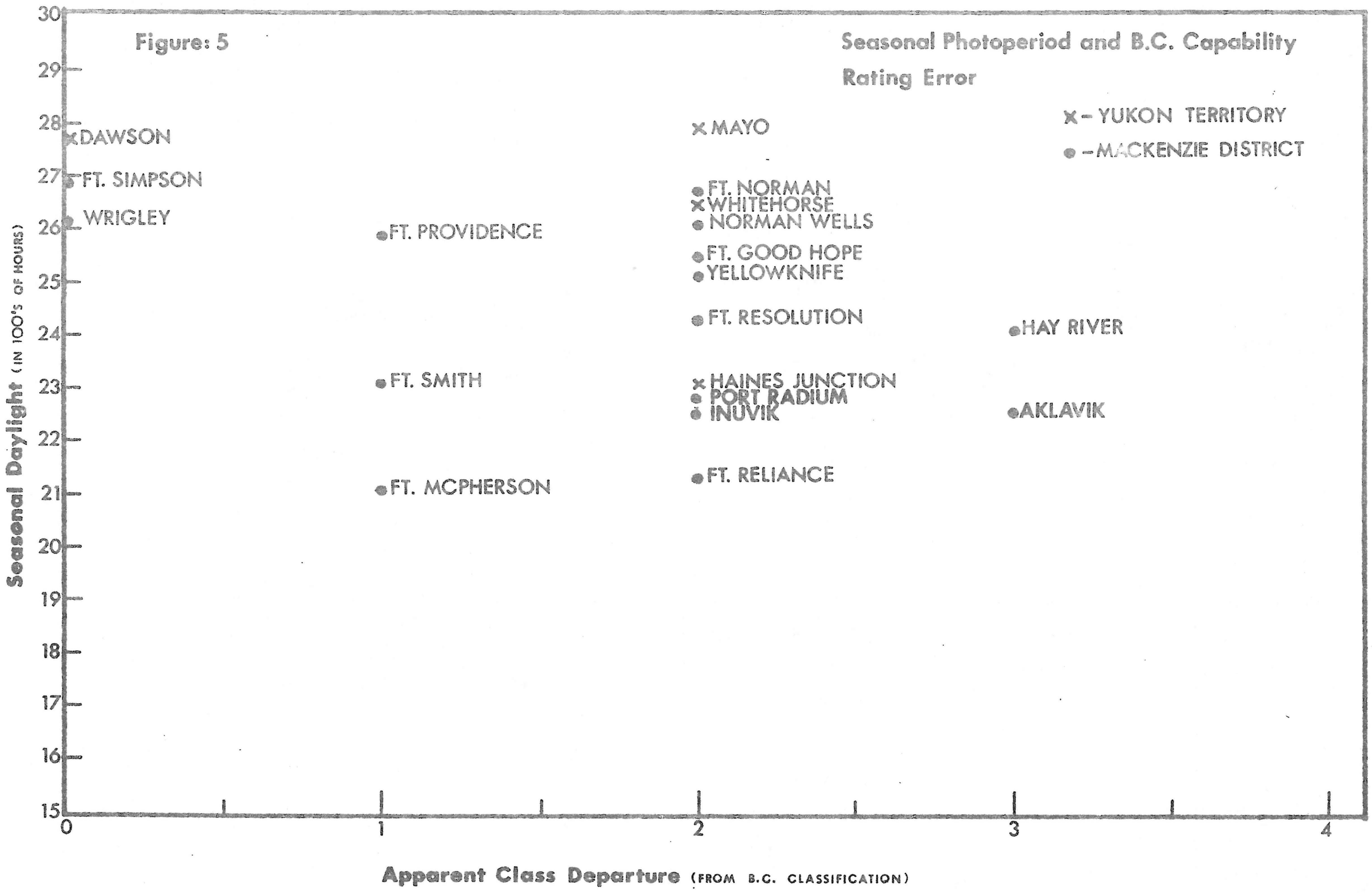
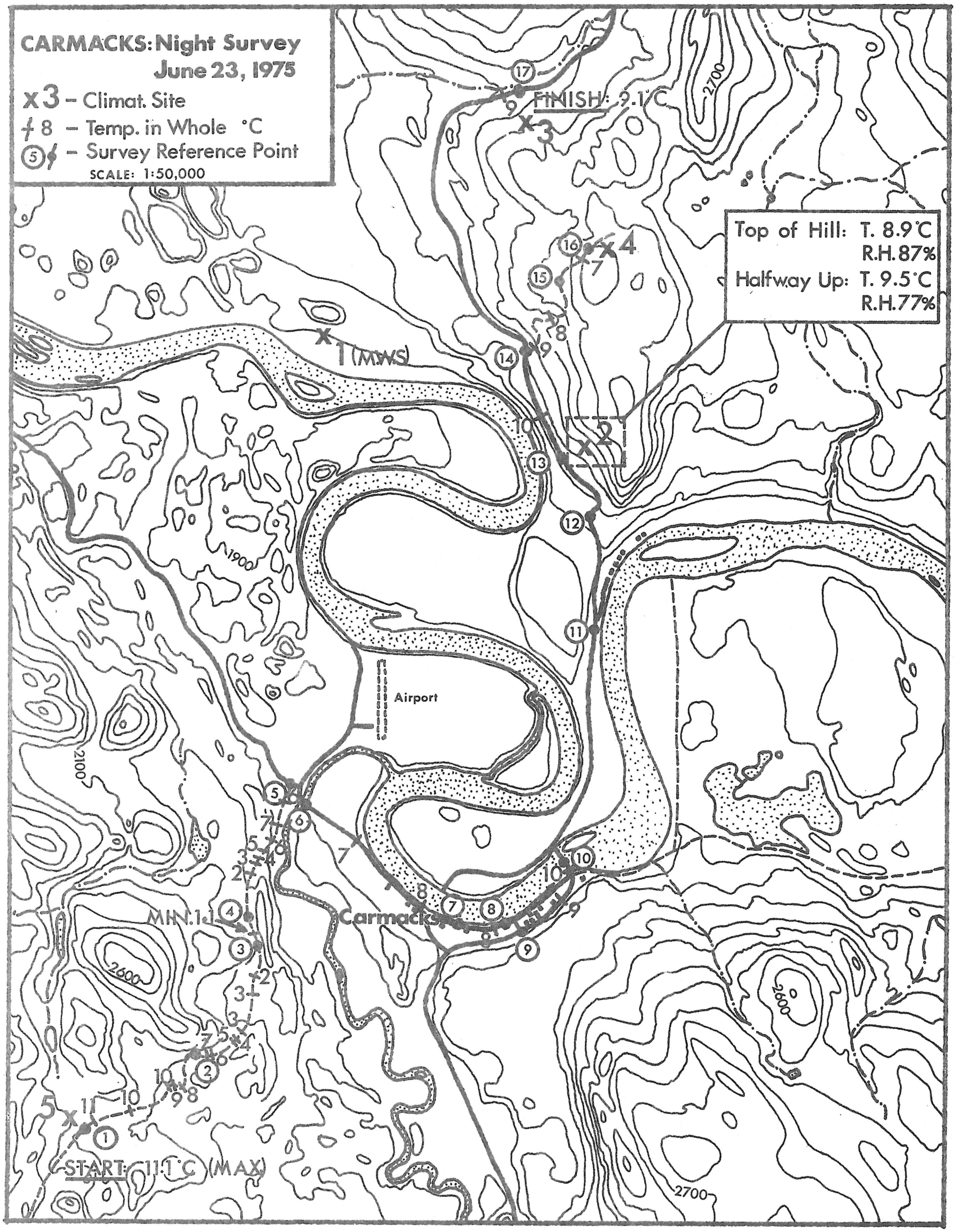


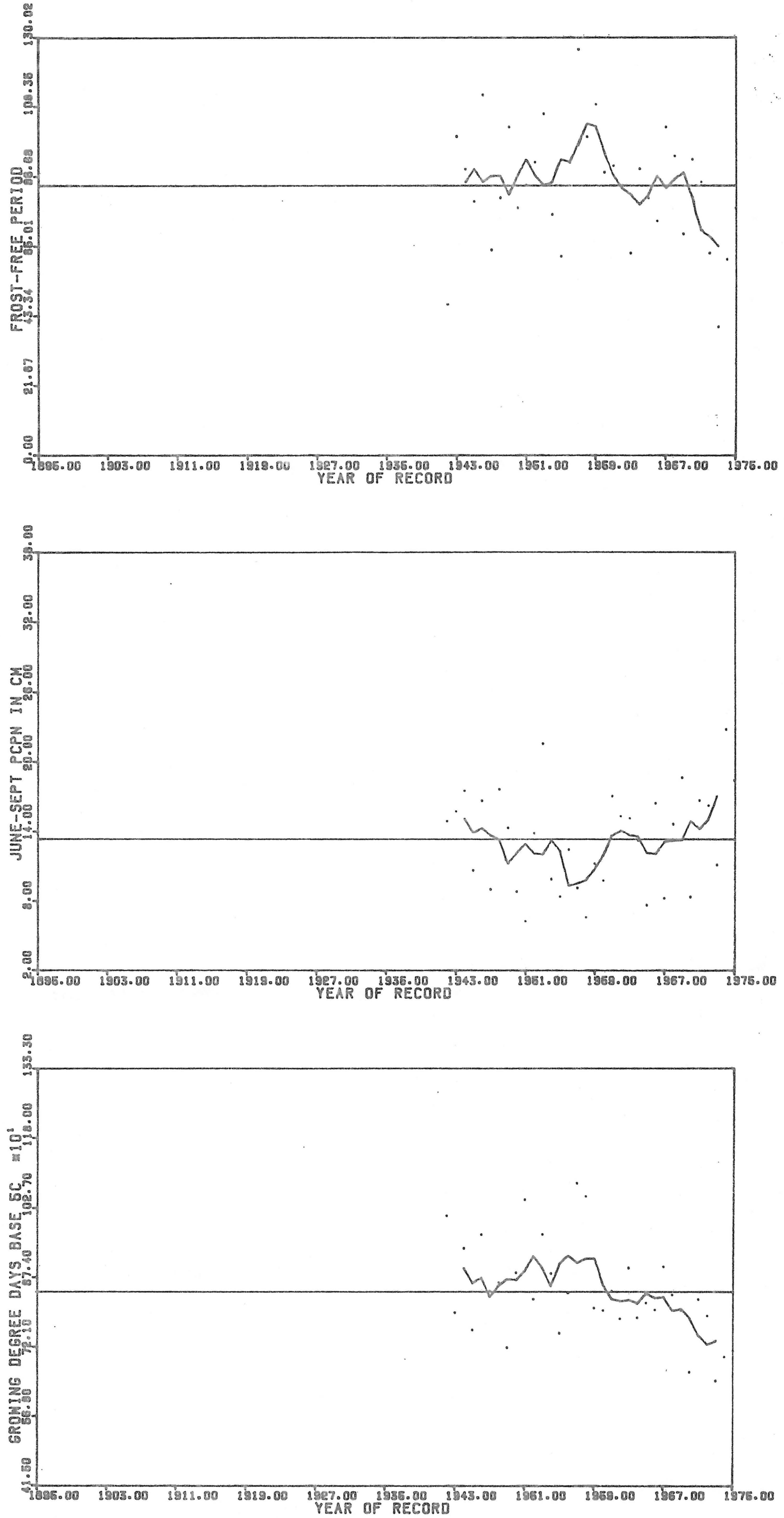
Figure: 5

Seasonal Photoperiod and B.C. Capability Rating Error

Figure 6 Example of a mobile temperature survey

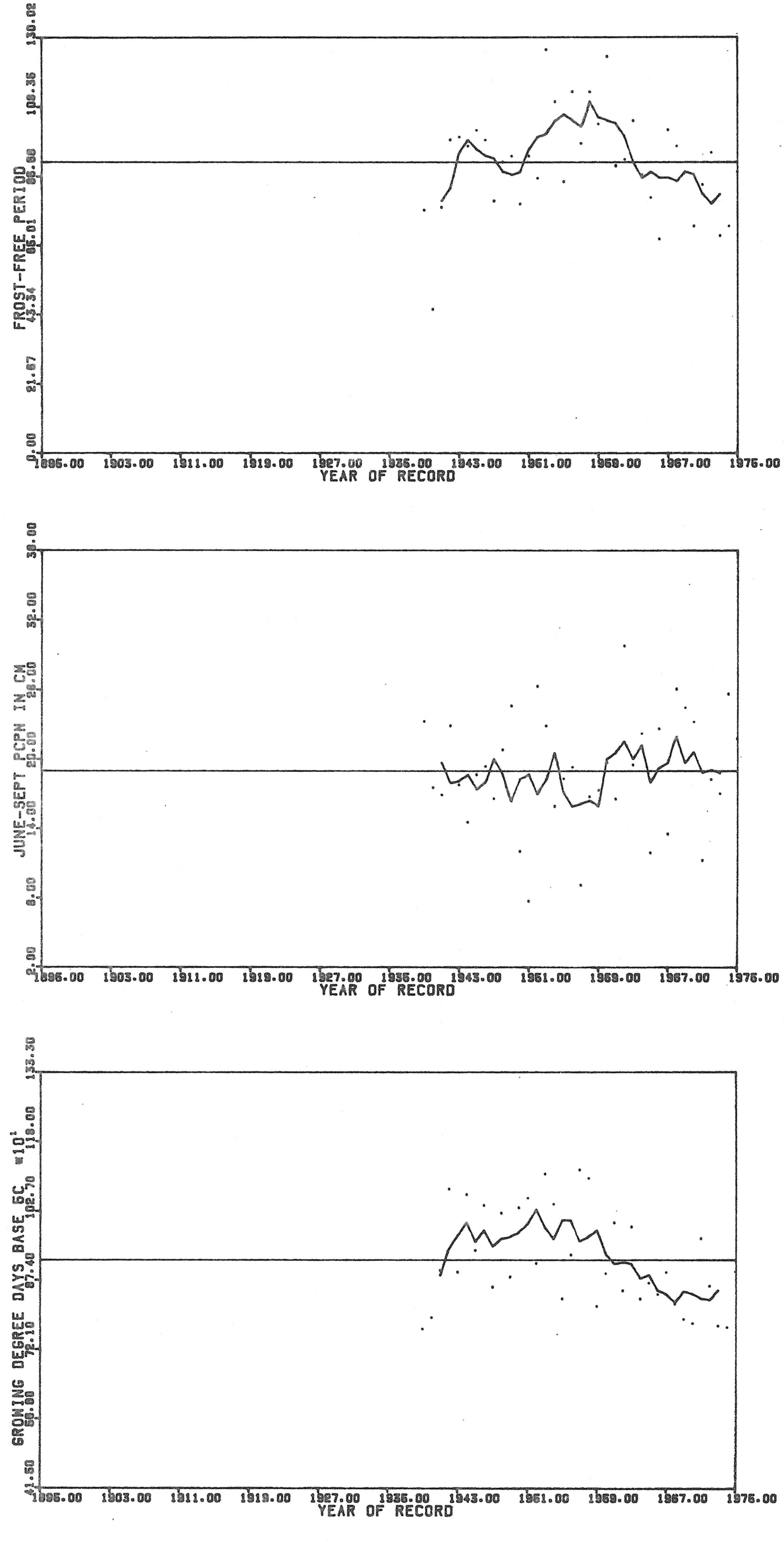


WHITEHURSE

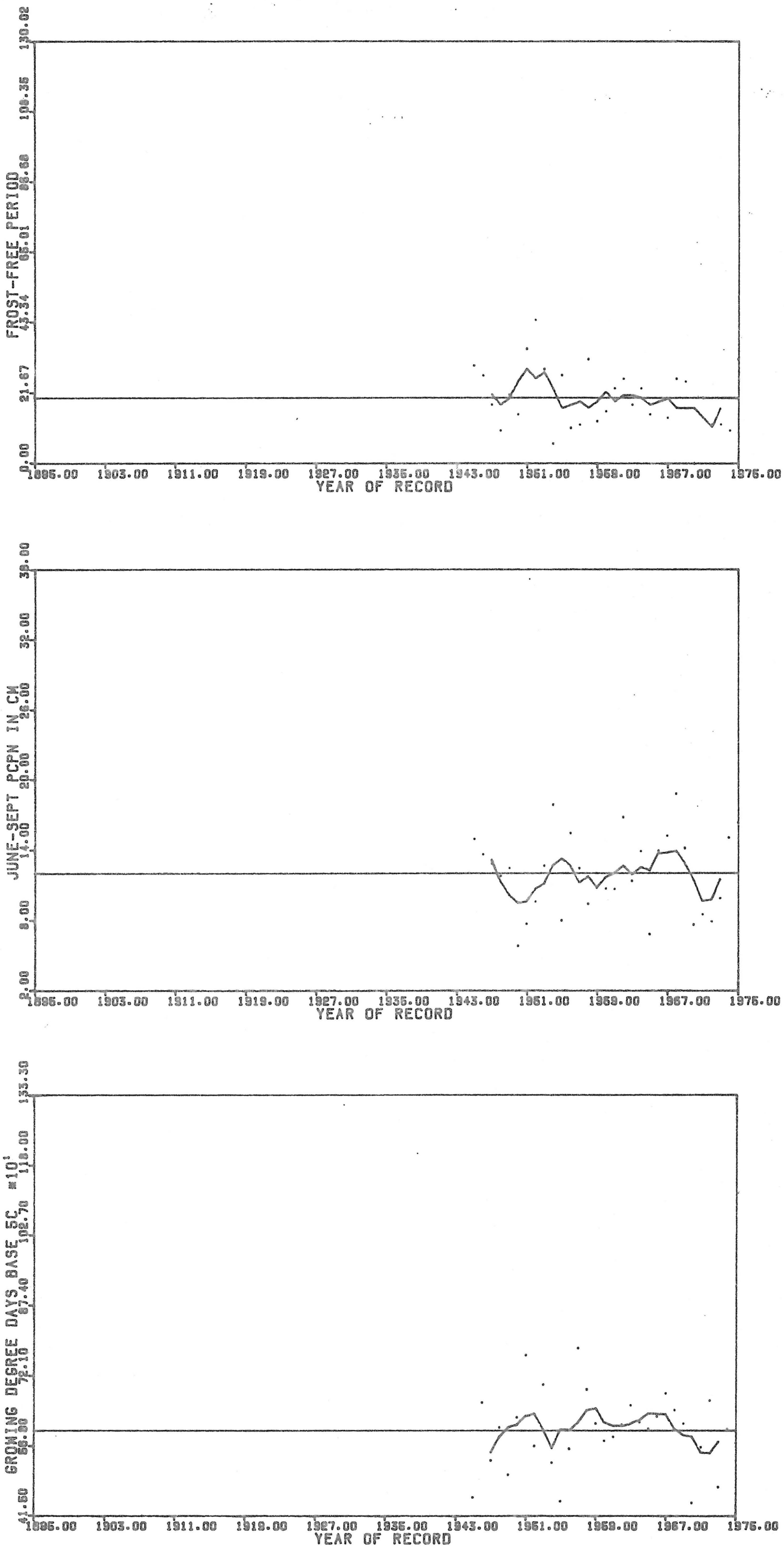


Figures 7-9 Interannual Variation (five-year moving-means) of the frost-free period, growing season precipitation and growing degree-days at

WATSON LAKE

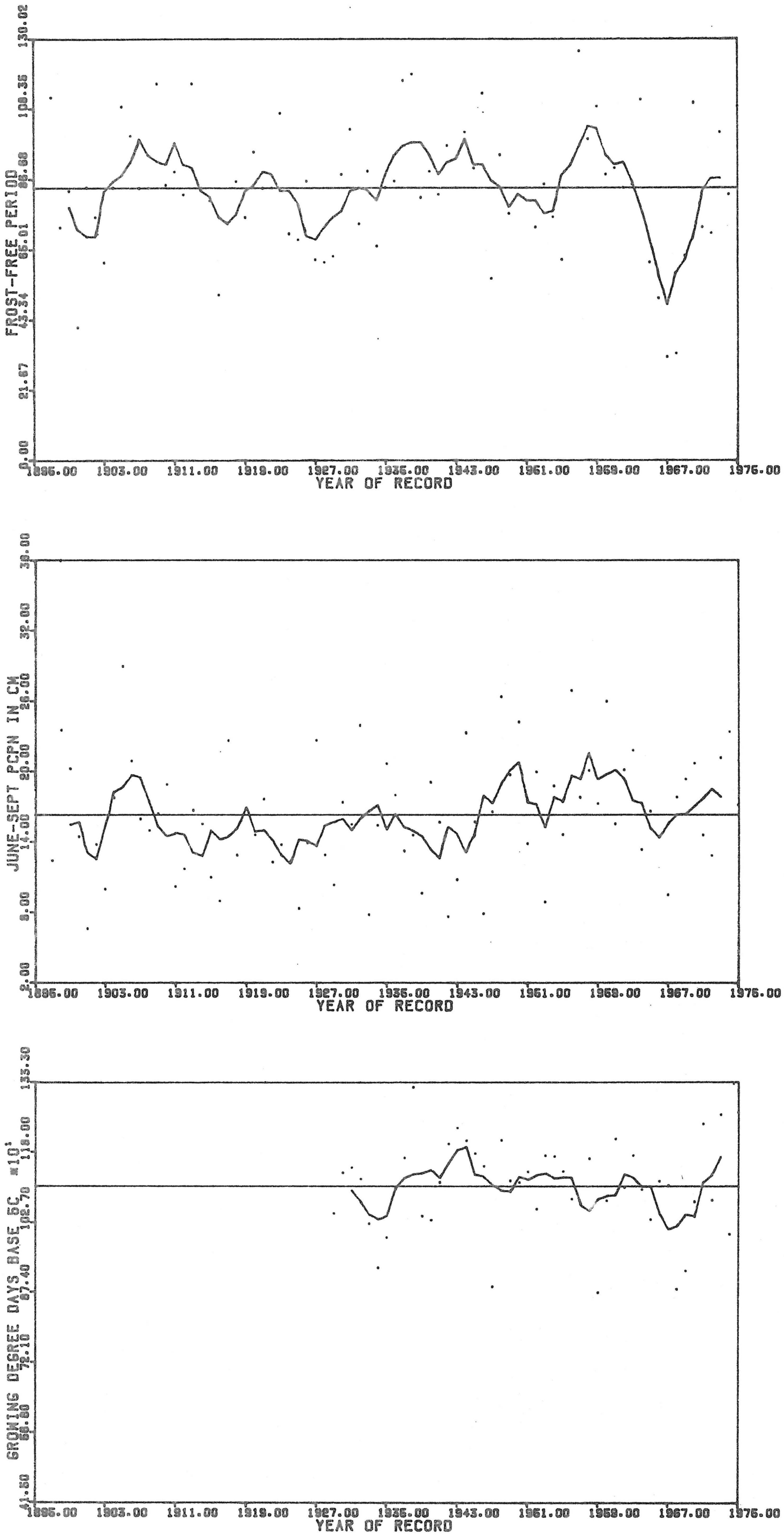


Figures 10-12 Interannual Variation (five-year moving-means) of the frost-free
period, growing season



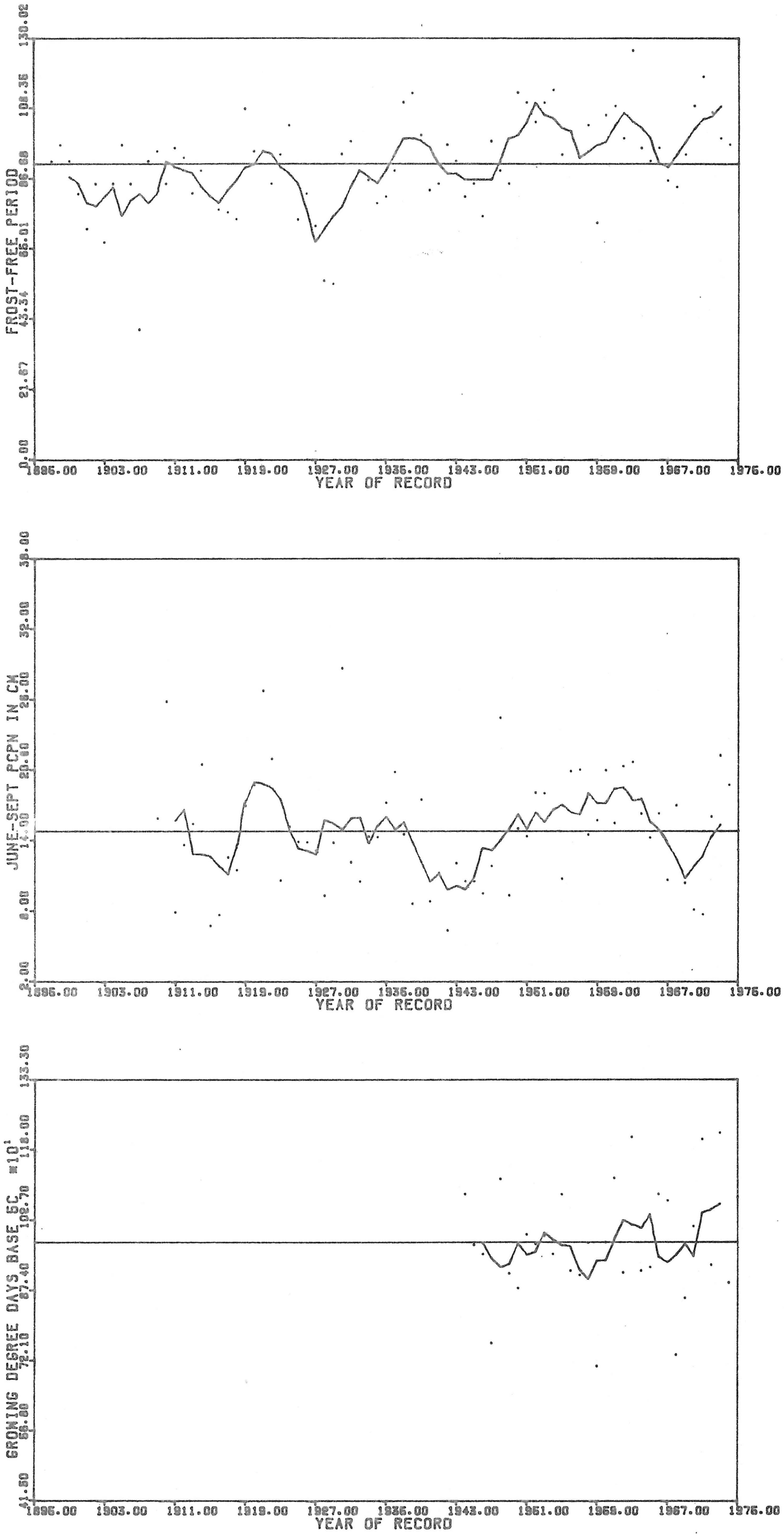
Figures 13-15 Interannual Variation (five-year moving-means) of the frost-free period, growing season precipitation and growing degree-days at

FORT SIMPSON



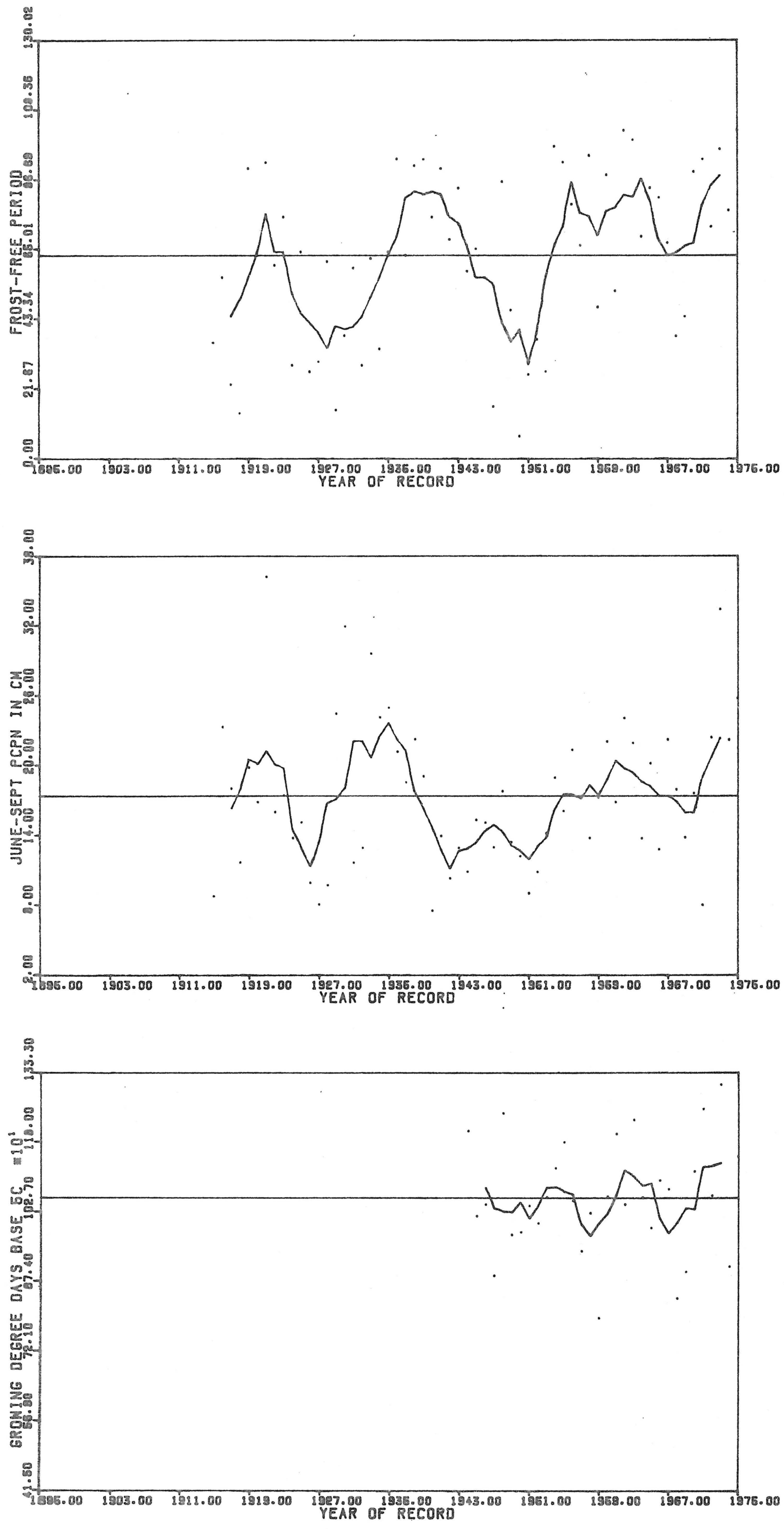
Figures 16-18 Interannual Variation (five-year moving-means) of the frost-free period, growing season precipitation and growing degree-days at

HAY RIVER



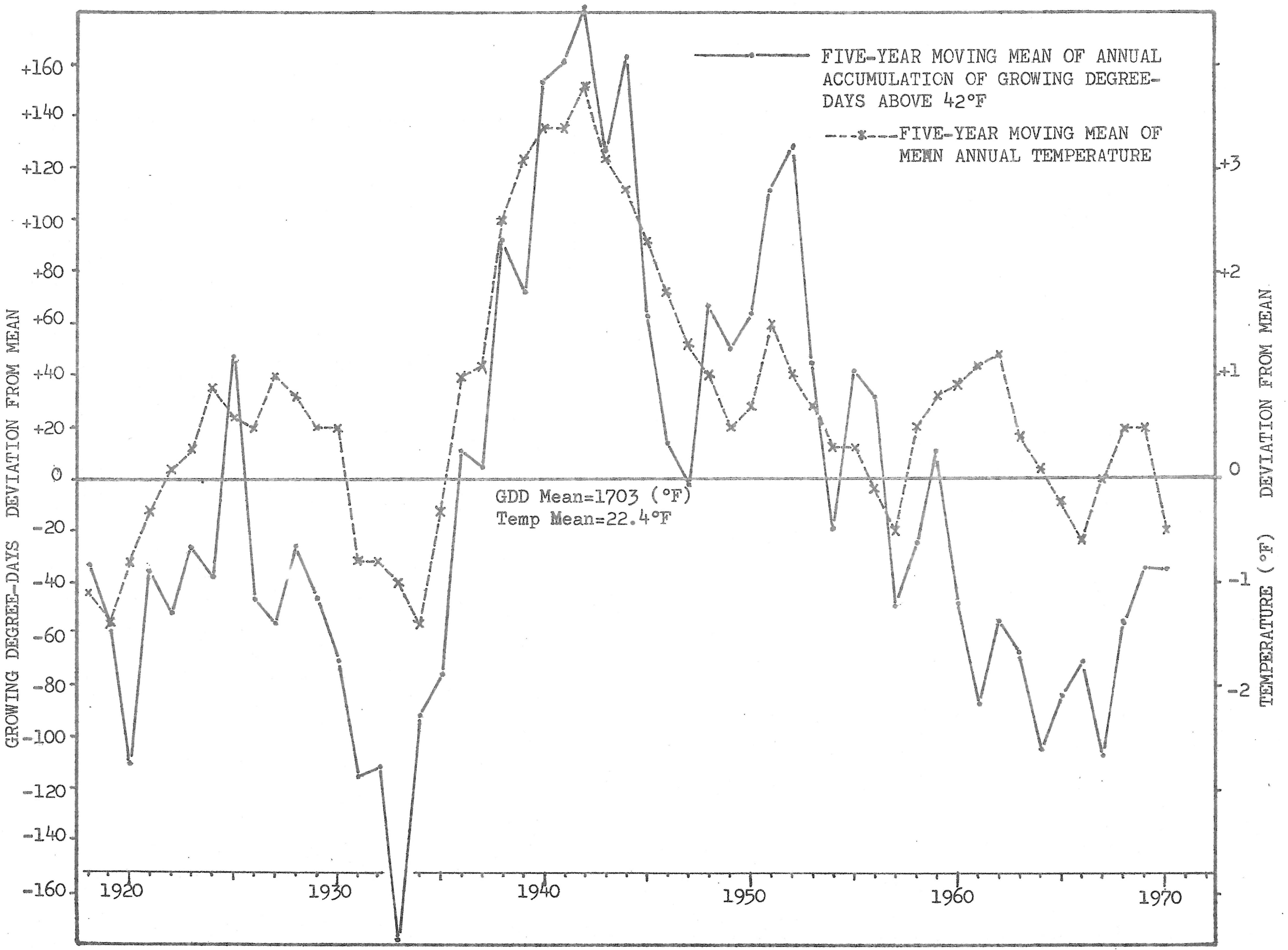
Figures 19-21 Interannual Variation (five-year moving-means) of the frost-free period, growing season

FORT SMITH



Figures 22-24 Interannual Variation (five-year moving-means) of the frost-free period, growing season precipitation and growing degree-days at

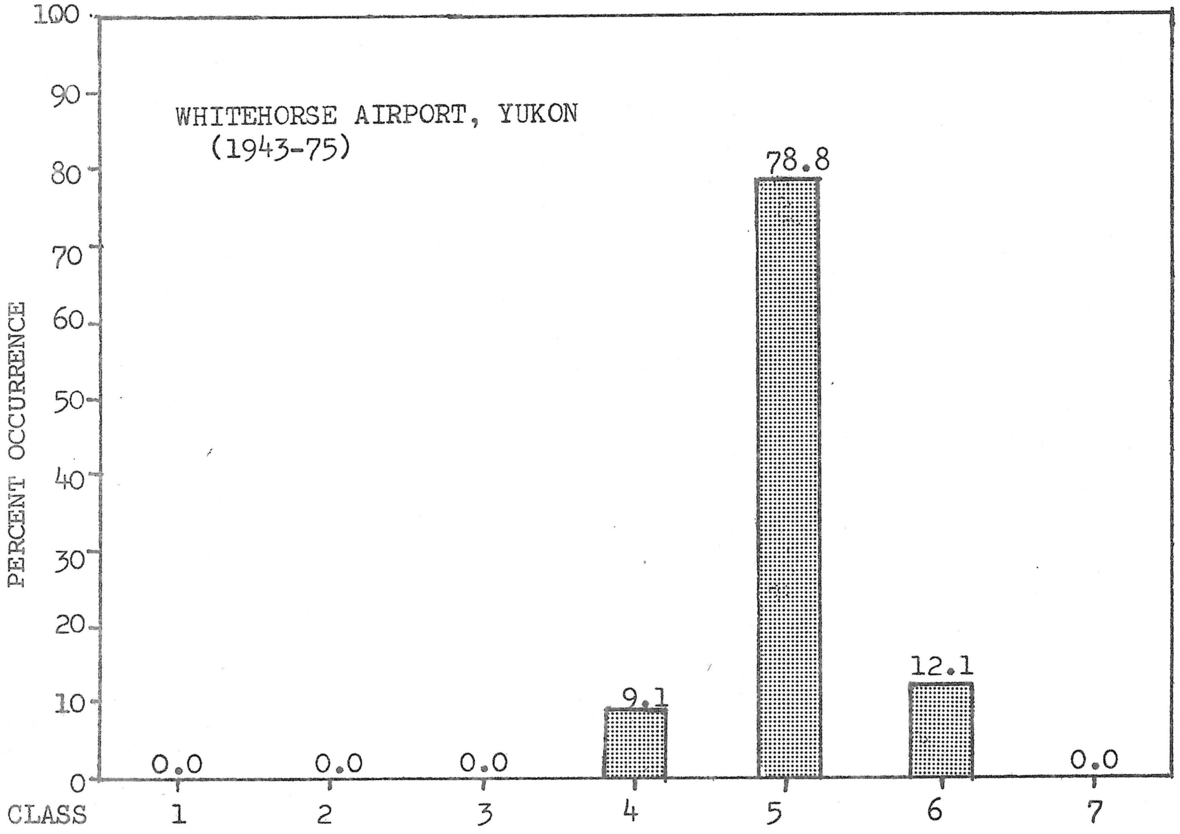
Figure 25. INTERANNUAL VARIATION OF GROWING DEGREE-DAY ACCUMULATION AT DAWSON CITY, YUKON



Figures 26 to 30: INTERANNUAL VARIATION OF CLIMATE CAPABILITY FOR AGRICULTURE AS CLASSIFIED BY THE B.C.L.I. CLASSIFICATION MODIFIED FOR SOIL MOISTURE

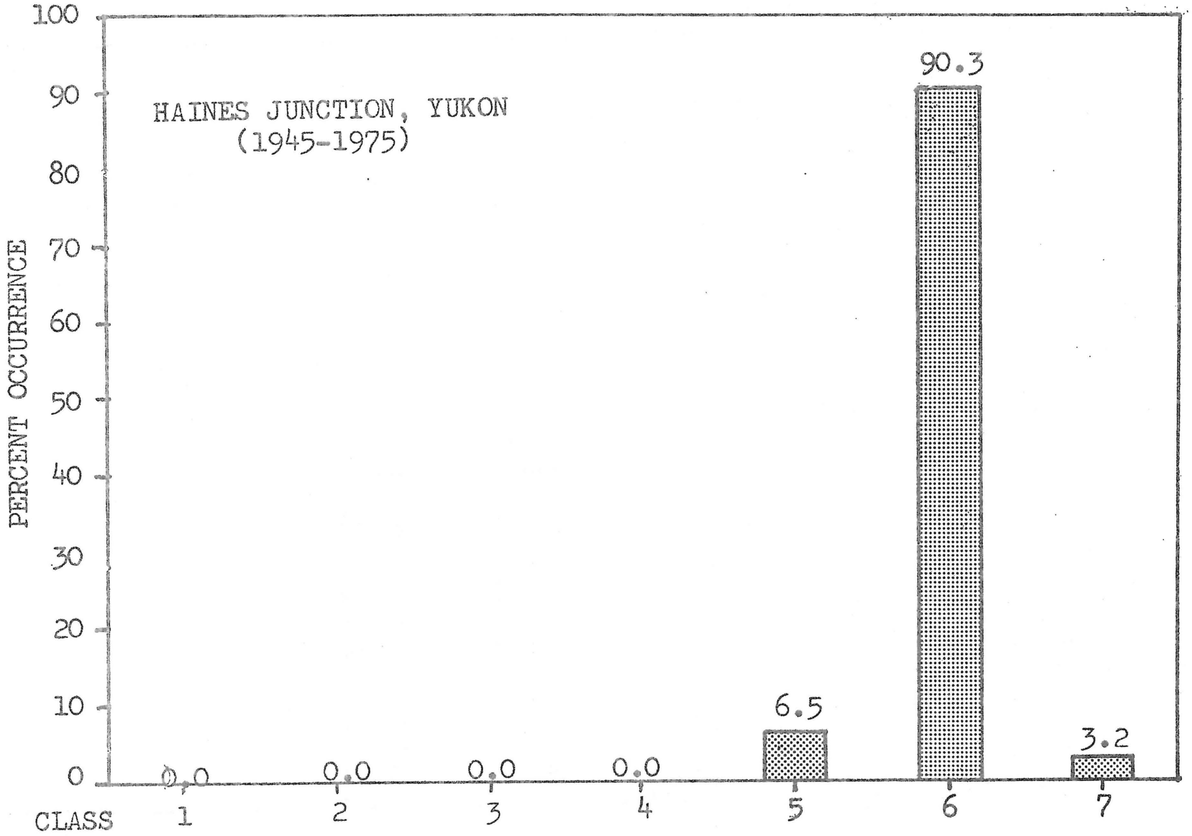
Figure	Location
26	Whitehorse, Yukon
27	Haines Junction, Yukon
28	Fort Simpson, N.W.T.
29	Hay River, N.W.T.
30	Fort Smith, N.W.T.

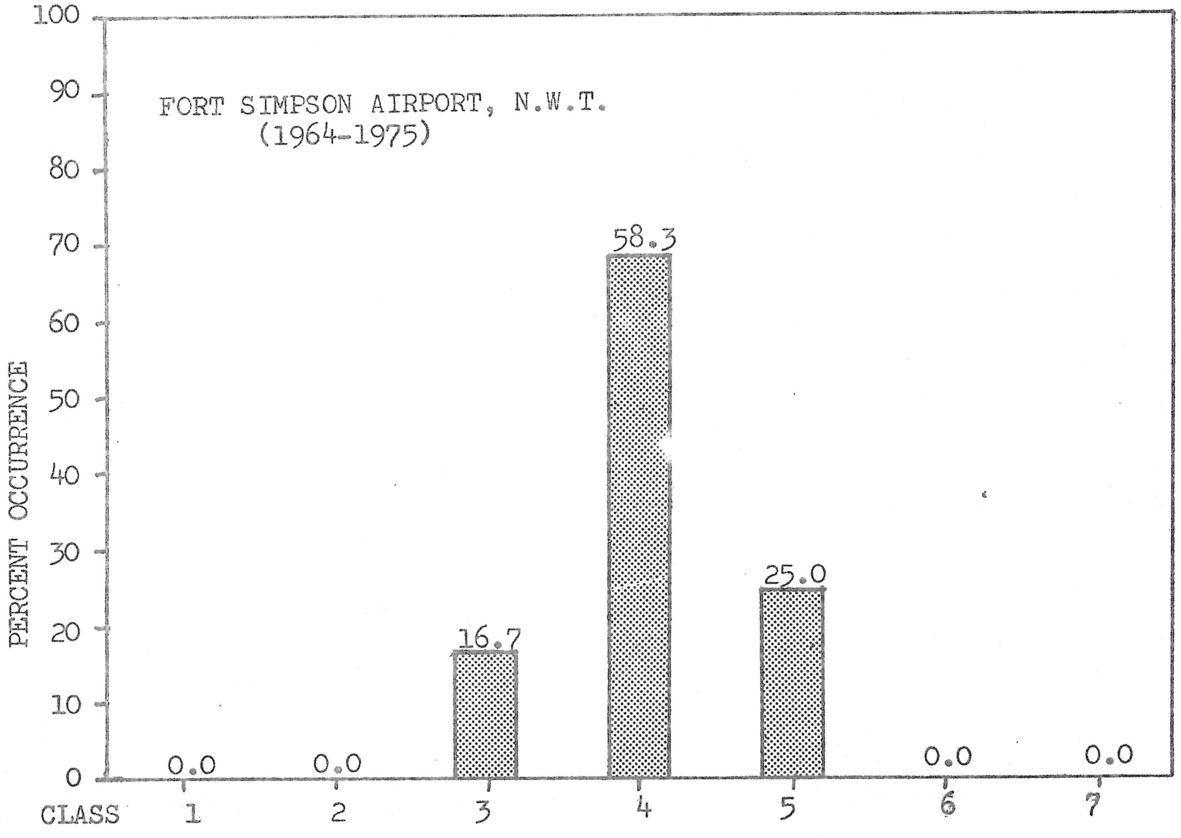
Figure 26



INTERANNUAL VARIATION OF CLIMATE CAPABILITY FOR AGRICULTURE CLASSES

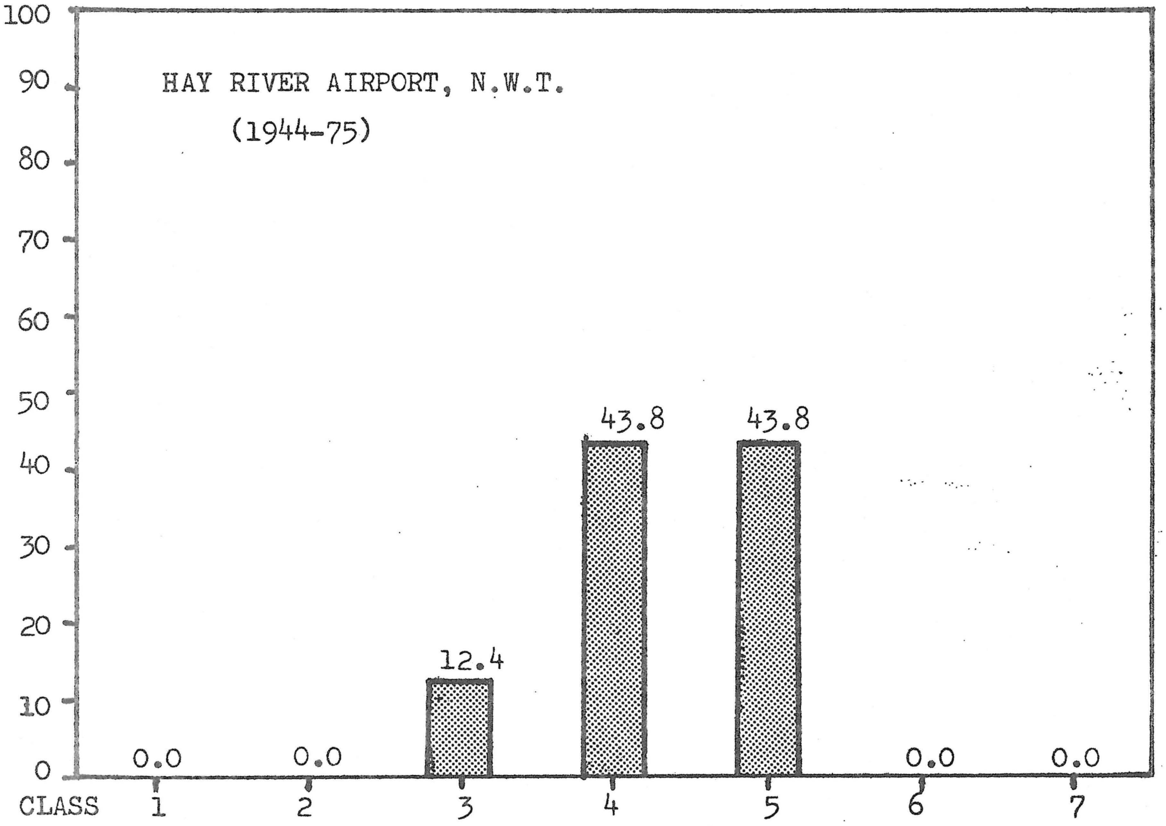
Figures 27, Haines Junction, and 28 , Fort Simpson

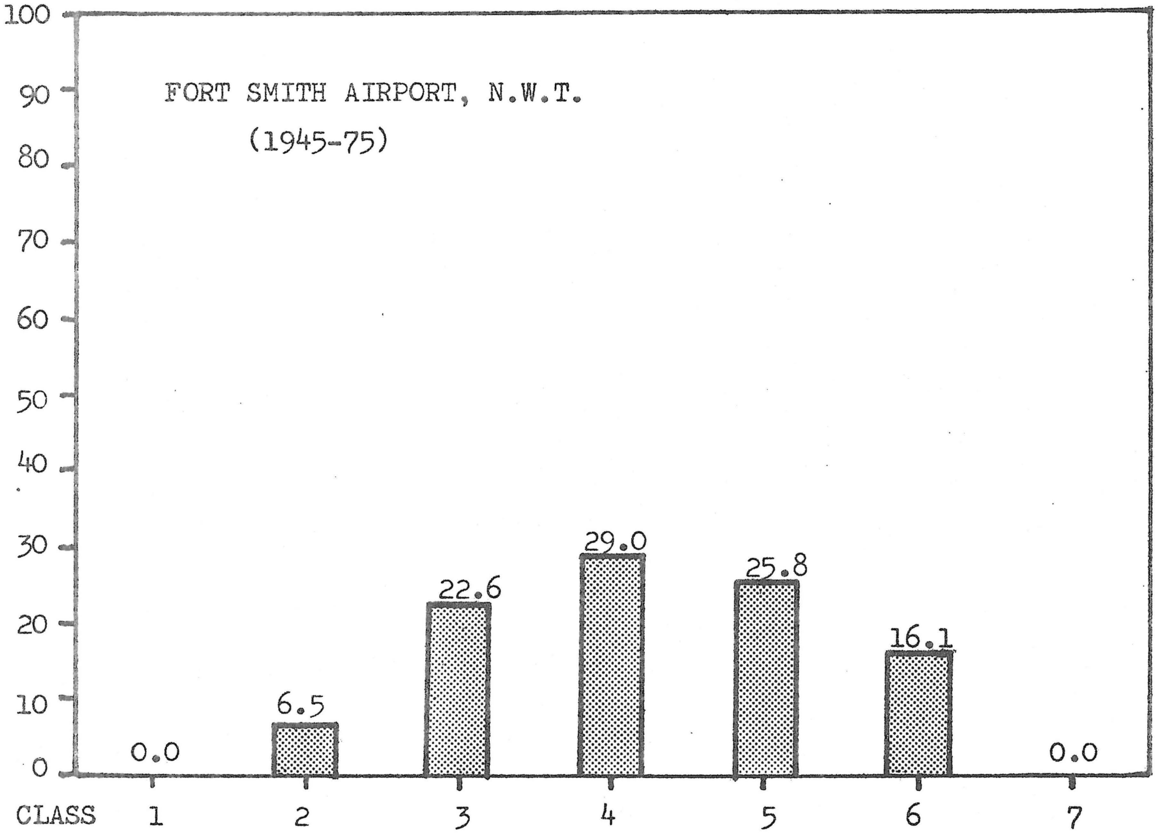




INTERANNUAL VARIATION OF CLIMATE CAPABILITY FOR AGRICULTURE CLASSES

Figures: 29, Hay River and 30, Fort Smith





APPENDIX A

BCLI CLASSIFICATION OF CLIMATIC CAPABILITY FOR AGRICULTURE

Class	*Frost-Free Period (days)*	*GDD Greater than 5°C*	*Precipitation (mm)*		*Soil Moisture Deficit (mm) (250 mm Storage)*
			Annual	*May-Sept*	
1	*90 - 120*	*1290 to 1620*	*380+*	*230+*	*0 to 40*
2	*75 - 90*	*1145 to 1290*	*380-*	*200 to 250*	*40 to 120*
3	*60 - 75*	*1000 to 1145*	*330-*	*215-*	*120 to 190*
4	*50 - 60*	*1000 to 1145*			*190 to 265*
5	*30 - 50*	*735 to 1000*			*265 to 345*
6	*<30*	*500 to 735*			*345 to 405*
7	*<30*	*<500*			

Class	*Agricultural Capability*
1	*The key crop is corn. A wide range of vegetables and fruits can be grown. A wide range of forage crops and cereal grains can be grown.*
2	*Vegetables and fruits are somewhat restricted, and only cool-season crops do well, such as: beets, broccoli, cabbage, strawberries. Raspberries and potatoes are considered marginal. A wide range of forage crops and cereals can be grown commercially, but there may be weather problems in harvesting cereals.*
3	*Only cool-loving vegetables and small fruits in favoured local sites, cabbage, cauliflower and potatoes. Forage crops are still possible in variety, but there are some which do better, such as brome grass, timothy, clover. Only commercial cereal crops are oats and barley.*
4	*No potatoes, hardy varieties of cool-loving vegetables. Forage crops are possible. Barley and oats are capable of being grown periodically.*
5	*Only forage crops.*
6	*Only native browse for grazing can be utilized.*
7	*No capability for agriculture.*

APPENDIX B-1

CLASSIFICATION OF CLIMATIC CAPABILITY FOR AGRICULTURE AS APPLIED IN THE YUKON AND NORTHWEST TERRITORIES IN FEBRUARY, 1977 FOR MAPPING PURPOSES.

Class	Frost-Free Period (Days)	Growing Degree-Days Greater than 5°C	Climatic Moisture Deficit (mm) (75 mm Storage)
1	>90	>1290	0 to 100
2	75 to 90	1145 to 1290	100 to 180
3	60 to 75	1000 to 1145	180 to 250
4	50 to 60	1000 to 1145	250 to 300
5	30 to 50	735 to 1000	300 to 350
6	<30	500 to 735	350 or more
7	<30	<500	350 or more

APPENDIX B-2

INTERPRETIVE GROWING DEGREE-DAY CLASSES FOR ASSESSING AGRO-CAPABILITY LEVELS SHOWN ON MAPS OF THE YUKON AND NORTHWEST TERRITORIES PREPARED IN FEBRUARY 1977

Revised Class	*Range of GDD >5°C*	*B.C. Standard Range for Indicated class (>5°C)*	*Corres. B.C. Class level (crop)*
1	*>1145*	*>1290*	*1, 2G*
2	*1000 - 1145*	*1145 - 1290*	*3, 4G*
3	*870 - 1000*	*1000 - 1145*	*upper 5G*
4	*735 - 870*	*1000 - 1145*	*lower 5G*
5	*615 - 735*	*735 - 1000*	*upper 6G*
6	*500 - 615*	*500 - 735*	*lower 6G*
7	*<500 **	*<500*	*7*

**The cut-off level of 500 seasonal GDD is arbitrary. Some areas having less than this value may support grazing.*

CROP TYPES GROWN AT SOME TIME IN THE NORTH

Location	Cereals	Potatoes	Cool-Season Vegetables	Warm-Season Vegetables	Source
N.W.T.					
Aklavik		X	X		Albright
Arctic Red River	Ocnl	X			Albright
Artillery Lake (nr. Fort Reliance)	failed		lettuce/ radish		Albright
Fort Good Hope	X	X	X		Albright
Fort Liard		X	X		Albright
Fort McPherson	Ocnl	some failures	X		Albright
Fort Norman		X			Albright
Fort Providence		X	X	Ocnl tomatoes, corn	Albright
Fort Resolution		X	X	Apple tree	Albright
Fort Simpson	X	X	X	Tomatoes	Gilbey
Fort Smith	X	X	X	Corn	Albright
Hay River	X	X	X	Tomatoes	Albright
Inuvik			X		Harris
Port Radium			lettuce/radish		Albright
Norman Wells		X	X		Brown
Rae		X	X		Albright
Thunder River (nr. Arctic Red River)	Not Mature	Ocnl	X		Albright
Wrigley		X	X		Albright
Yukon: Dawson	X	X	X		Peake
Haines Junction	X	X	X		Abbott
Keno Hill		X			Brown
Mayo		X	X		Peake
Pelly Ranch	X	X	X		Bradley
Whitehorse		X	X		Eley

APPENDIX C-2

AGROCLIMATE PARAMETERS RATINGS AT SELECTED NORTHERN STATIONS

Station & (latitude)		Daylight hours during growing season	1941-70 Frost-free period (days)	B.C. class #	1950-59 Growing degree-days	B.C. class #	1941-70 Climatic moisture deficit (mm) (75 mm storage)	B.C. class #	Overall BC climate rating	Climate Rating from crop indicators
N.W.T.:										
Aklavik	(68.2)	*2244*	77	2	663	6			6G	3
Fort Good Hope	(66.2)	2548	76	2	941	5			5G	3
Fort McPherson	(67.5)	2104	81	2	835E	5			5G	4
Fort Norman	(64.9)	2674	58	4	990E	5			5G	3
Fort Providence	(61.3)	2593	77	2	1108	3	242	3	3G	2
Fort Reliance	(62.7)	2132	90	2	688	6*			6G*	4
Fort Resolution	(61.2)	2424	95	1	987	5*	213	3	5G*	3
Fort Simpson	(61.9)	2674	89	2	1156	2	180	2	2	2
Fort Smith A	(60.0)	2310	64	3	1074	3	185	3	3	2
Hay River A	(60.9)	2408	97	1	978	5*	192	3	5G*	2
Inuvik A	(68.3)	*2247*	45	5	600E	6			6G	4
Norman Wells	(65.2)	2610	90	2	969	5	153	2	5G	3
Port Radium	(66.1)	*2270*	74	3	590	6*			6G*	4
Wrigley	(63.2)	2621	73	3	1060E	3			3	3
Yellowknife	(62.5)	2516	108	1	981	5			5G	3
Yukon:										
Dawson	(64.1)	2770	92	1	1035	3	180	2	3G	3
Haines Junction	(60.7)	2318	21	6	700E	6	211	3	6GF	4
Mayo A	(63.6)	2792	66	3	978	5	197	2	5G	3
Pelly Ranch (Ft. Selkirk)	(62.8)		59	4	940E	5	205	3	5G	3
Watson Lake A	(60.1)		95	1	1067	3	158	2	3G	-
Whitehorse A	(60.7)	2646	87	2	972	5	219	3	5G	3

* lake effect reduces GDD

APPENDIX C-3

"North of 60" Agroclimatic Capability Classification Guide

This is a guide to assist in evaluating the B.C. agroclimatic capability classification applied in the Yukon and Northwest Territories.

It is essentially a crop listing corresponding to seven levels of climatic quality for agriculture.

Class 1 The highest class is based on a broad range of hardy, cool season vegetables, and a limited range of frost-susceptible cool season and hardy adaptable season crops. The adaptable season crops are marginal to these regions, as are a number of other crops, but can be successfully cultivated on sites having favourable micro-climates. Good soil management practices are assumed. Marginally acceptable crops are denoted by an asterisk*. Crops which are climatically suited, but are frost-susceptible are denoted by F.

Other suitable crops include a few small domestic fruits; good yields of hardy grains; wheat and rye are marginal.

The climatic conditions necessary correspond to B.C. class levels 1 and 2G (modified for soil moisture). The crops are slightly below class 1, mainly lying within Class 2.

The sources of information for compiling those lists are: Boswell and Jones (1941), British Columbia (1972), Dominion Experimental Farms, Summaries of research, Guitard et al (1965), Harris et al (1972), Williams (1974), Harris (1970), Nowosad (1970), Albright (1933).

Adaptable Season Vegetables (prefer temperatures 12 - 25°C)	Cool Season Vegetables (no prolonged temperature above 20°)	Fruits	Forage Crops	Grains
Beans*	Beets	Apples*	Alfalfa	Barley
Celery*	Broad Beans F	Currents	Alsike clover	Oats
Corn*	Broccoli	Raspberries*	Bromegrass	Polish rapeseed*
Cucumbers*	Brussels sprouts	Saskatoon berries	Orchardgrass	Winter rye*
Green peppers*	Cabbages	Strawberries F	Reed canary grass	Winter wheat*
Muskmelons*	Carrots		Red clover	
Seed onions*	Cauliflower		Ryegrass	
Squash*	Horseradish		Sweet clover	
Tomatoes*	Kohlrabi		Timothy	

Adaptable Season Vegetables (prefer temperatures 12 - 25°C)	*Cool Season Vegetables (no prolonged temperature above 20°)*	*Fruits*	*Forage Crops*	*Grains*
	Leaf lettuce F *Parsnips* *Peas** *Potatoes F* *Radishes* *Rhubarb* *Rutabagas (and turnips)* *Set onions F* *Spinach* *Swiss Chard*			

<u>Class 2</u> The list corresponds to that of Class I with the exception of marginal crops. The climate corresponds to B.C. levels 3, 4G.*

<u>Class 3</u> This class has a good range of hardy, cool-loving vegetables with some frost-susceptible species growing in microclimatically favourable areas (marked by asterisk - marginal). There are no cultivated fruits. The climate corresponds to B.C. levels 4, 5G.*

Cool Season Vegetables	*Forage Crops*	*Grains*
*Beets**	*Alfalfa*	*Barley*
*Broad beans**	*Alsike clover*	*Oats*
Brussels Sprouts	*Bromegrass*	
Cabbages	*Red clover*	
*Carrots**	*Ryegrass*	
*Cauliflower**	*Sweet clover*	
Kohlrabi		
Parsnips		
*Potatoes**		
Radishes		
Rutabagas		
Sprouting broccoli		

<u>Class 4</u> This corresponds to class 3 except for the marginal crops. The climatic rating is B.C. level 5G.

Class 5 This is based on a limited range of cool season vegetables, forage crops and hardy grains. Some sites within these areas are microclimatically unfavourable for marginally indicated crops. B.C. climate class 6G (upper).

Vegetables	Forages	Grains
Brussels sprouts	Alfalfa*	Barley*
Cabbages	Bromegrass	Oats*
Kohlrabi	Clovers*	
Parsnips*	Ryegrass	
Radishes	Timothy	
Spinach		
Sprouting broccoli		
Swiss chard		

Class 6 Corresponds to class 5, excluding marginal crops. All crops, however, become limited to sheltered sites and south-facing slopes. B.C. climate class 6G (lower).

Class 7 Under very favourable conditions cultivated forages may produce in some years, but generally confined to native browse (marginal) or unsuitable for any agricultural use. B.C. climate class 7G.

APPENDIX D

LIST OF TRANSECTS AND OTHER TEMPORARY CLIMATOLOGICAL STATION LOCALITIES

Locality	Transect	Number of permanent stations	Number of temporary stations
N.W.T.:			
Fort Liard	x	2	4
Fort Simpson	x	1	7
Hay River	x	2	2
Hook Lake (North of Fort Smith)		0	1
Joe Kraus (South of Hay River)		0	1
Mile 166, Mackenzie Hwy		0	1
Nahanni Butte	x	2	3
Trout Lake		0	1
Wrigley	x	1	4
Yukon:			
Carcross-Tagish	x	1	3
Carmacks	x	1	5
Champagne	x	0	6
Dawson	x	2	3
Haines Junction	x	1	1
Rancheria		0	1
Stewart Crossing	x	1	4
Teslin-Johnsons Crossing	x	2	3
Watson Lake	x	1	4
Whitehorse	x	2	3

In the course of the two observations seasons, temporary climatological observations were made at 57 sites.

APPENDIX E

LIST OF INSTRUMENTATION USED IN THE FIELD STUDY

A. Temporary climatological stations:

- 50 Stevenson Screens
- 44 Lambrecht Model 252C Thermohygrographs (Celsius)
  (44 seven-day clocks and 3 thirty-one day clocks)
- 8 thermographs of various makes
- 55 each maximum and minimum thermometers of A.E.S. standards except without calibration
- 44 A.E.S. standard copper rain gauges

B. Six Meteorology Research Incorporated (MRI) mechanical weather stations Model 1082M, with associated tipping-bucket rainfall recorder (metric units).

C. Yukon mobile temperature surveys. One set of temperature and wet-bulb temperature recording equipment, with ventilated sensor boom, for mobile operation.

D. N.W.T. mobile temperature surveys. One Blackadar-type thermistor thermometer.

E. For spot checks. Four hand psychrometers with Zeal calibrated mercury in glass thermometers. Two hand-held electric-fan ventilated psychrometers (as model of Environmental Tectronics Corporation).

F. For soil temperature measurements. Two Yellow Springs Instrument Company (YSI) Telethermometers Model 45C, with pointed metal sheathed probes. This instrument also used with air temperature probe for some mobile temperature surveys.

APPENDIX F. SUMMARY OF THE CLIMATE RECORDS OF THE 1975 AND 1976 FIELD SEASONS

Station	1975					1976				
	June 1-Sept. 30 Mean daily temp. (°C)			Frost free season (days)	June-Sept. Precip. (mm)	June 1-Sept. 30 Mean daily temp. (°C)			Frost free season (days)	June-Sept. Precip. (mm)
	Max.	Min.	Mean			Max.	Min.	Mean		
YUKON										
Whitehorse Airport	16.3	5.2	10.8	78	185	18.0	4.7	11.3	70	92
Whitehorse Riverdale	17.6	5.4	11.6	70	154	19.2	5.0	12.1	72	86
Whitehorse #1	16.6E	4.9E	10.8E	78	170	17.9	5.0	11.4	81	116
Whitehorse #2	14.6	5.2	9.9	112+	251	16.1	6.8	11.4	120	129
Whitehorse #3	14.3	3.2	8.8	45	191	15.5	3.4	9.4	45	95
Haeckel Hill Tower						10.9E	4.7E	7.8E		
Champagne #1	14.3	1.1	7.7	26	155	18.0	2.2	10.2	39	100
Champagne #2	16.9	3.4	10.1	38	187	18.1	2.2	10.2	39	90
Champagne #3	15.1	6.6	10.8	128+	186	16.8	6.8	11.8	120	79
Champagne #4	15.0	6.6	10.8	128+	214					
Champagne #4B						15.3	6.6	11.0	122	109
Champagne #5	15.3	5.5	10.4	95	189	16.7	5.4	11.0	50	82
Haines Junction	17.0	2.6	9.8	35	163	17.5	2.4	10.1	11	125
Haines Junction #2	16.3	3.2	9.8	31	152					
Paint Mountain Tower	10.8E	0.7E	5.7E			12.5E	2.2E	7.4E		

Station	1975 June 1-Sept. 30 Mean daily temp. (°C)			Frost free season (days)	June-Sept. Precip. (mm)	1976 June 1-Sept. 30 Mean daily temp. (°C)			Frost free season (days)	June-Sept. Precip. (mm)
	Max.	Min.	Mean			Max.	Min.	Mean		
YUKON										
Carmacks	19.2	5.4	12.2	86	169	19.6	5.4	12.6	79+	
Carmacks #1	20.0E	4.0E	11.8E	64	160	20.0	4.4	12.2	65	
Carmacks #2	18.6	6.4	12.6	124+	156	20.2	6.8	13.5	95	87
Carmacks #3	16.8	3.6	10.2	77	181	19.2	3.8	11.5	70	115
Carmacks #4	17.3	5.0	11.2	77	173	17.8	5.4	11.5	92	109
Carmacks #5	17.6	4.2	11.0	77	151	18.9	4.6	11.8	78	135
Carmacks Tower						12.8E	5.4E	9.1E		
Fort Selkirk	19.3	4.4	11.9	84	142	20.5	4.4	12.4	78+	118
Stewart Crossing #1	20.0	3.0	11.9	45	151	20.7	3.0	11.8	30	132
Stewart Crossing #2	18.4	7.2	12.9	91+	160	20.3	7.5	13.9	110+	141
Stewart Crossing #3	16.6	7.1	11.9	107+	157	18.0	7.5	12.7	114	156
Stewart Crossing #5	17.4	5.2	11.3	59+	225	19.0	5.1	12.0	85	95
Stewart Crossing Tower						12.6E	4.4E	8.5E		
Mayo Airport	18.6	5.8	12.2	66	269	20.3	6.0	13.2	95	188
Elsa	16.3	5.7	11.0	90+	177	17.6	6.7	12.1		210
Keno Hill	11.1	3.9	7.5	22	318	12.5	4.1	8.3	74+	208

Station	1975					1976				
	June 1-Sept. 30 Mean daily temp. (°C)			Frost free season (days)	June-Sept. Precip. (mm)	June 1-Sept. 30 Mean daily temp. (°C)			Frost free season (days)	June-Sept. Precip. (mm)
	Max.	Min.	Mean			Max.	Min.	Mean		
YUKON										
Dawson City	19.2	6.4	12.8	108	146	20.7	6.4	13.6	94	99
Dawson Airport						20.8E	4.2E	12.5E	67	
Dawson #1	19.2	2.5	10.8	43	140	20.5	0.8	10.6	39	73
Dawson #2	18.5	5.7	12.0	66+	138	20.1	5.9	13.0	96	106
Dawson #3	19.0	3.2	11.1	45	156	20.6	2.8	11.7	67	127
Dawson Tower	14.1E	6.6E	10.4E			15.8E	5.4E	10.6E		
Carcross	15.8E	4.0	9.9E	30	115	16.9	3.8	10.4	26	112
Nares	12.0E	2.6E	7.3E			14.8	2.2	8.5	25	
Montana	10.0E	2.0E	6.0E			12.2	1.9	7.0	1	
Tagish #1	16.3	1.9	9.1	39	93	16.2E	2.6E	9.4E	1	113
Tagish Tower						12.2E	4.1E	8.2E		
Johnson's Crossing	16.4	3.7	10.0	32	168	17.8E	3.8E	10.6E	26	
Teslin Airport	17.2	4.5	10.8	97	164	17.0	4.3	10.6	33	161
Teslin #1						15.2	6.0	10.6	115	
Teslin #2	15.9	3.9	9.9	69	162	16.2	3.4	9.8	27	113
Teslin #3	14.6	5.6	10.1	102+	179	15.4	5.5	10.4	104	172

Station	1975 June 1-Sept. 30 Mean daily temp. (°C)			Frost free season (days)	June-Sept. Precip. (mm)	1976 June 1-Sept. 30 Mean daily temp. (°C)			Frost free season (days)	June-Sept. Precip. (mm)
	Max.	Min.	Mean			Max.	Min.	Mean		
YUKON										
Swift River	15.4	2.2	8.8	19	219					
Rancheria #2	15.9	2.6	9.3	28	227	14.8	2.3	8.6	5	190
Watson Lake Airport	18.2	5.9	12.0	90	217	17.2	5.6	11.5	81+	274
Watson Lake #2	17.6	6.3	11.9	99+	231	16.2	5.8	11.0	81	300
Watson Lake #3	16.3	7.1	11.7	121+	221	14.8	6.5	10.6	110	273
Watson Lake #4	17.2	3.4	10.2	46	225	15.8	3.1	9.4	32	260
Watson Lake #5	16.8	4.2	10.5	71	237	15.4	4.0	9.8	32	324
Tom Creek Tower						15.5E	6.3E	10.9E		
Transport Tower						11.0E	3.8E	7.4E		
NORTHWEST TERRITORIES										
Wrigley Airport	19.7	7.7	13.7	78	257	20.4	7.2	13.8	70	87
Wrigley #1	20.9E	4.0E	12.6E	63	170E	21.0	4.0	12.5	51	107
Wrigley #2	20.4E	5.3E	12.8E	63	150E					
Wrigley #3	19.6E	6.8E	13.0E	77	127E	20.3	7.1	13.7	70	70
Wrigley #4						19.8E	6.5E	13.2E	73+	70E

Station	1975					1976				
	June 1-Sept. 30 Mean daily temp. (°C)			Frost free season (days)	June-Sept. Precip. (mm)	June 1-Sept. 30 Mean daily temp. (°C)			Frost free season (days)	June-Sept. Precip. (mm)
	Max.	Min.	Mean			Max.	Min.	Mean		
NORTHWEST TERRITORIES										
Fort Simpson Airport	20.5	8.0	14.2	96	171	20.5	8.0	14.2	86	207
Fort Simpson #1	20.0	7.8	13.7	95+	156	20.1	6.6	13.4	82	185
Fort Simpson #2	20.6E	5.7E	13.1E	63+	164					
Fort Simpson #3	20.6E	5.8#	13.2E	90+	162	20.1	5.8	13.0	80	214
Fort Simpson #4	20.3E	7.3E	13.8E	61+						
Fort Simpson #6						20.2E	8.0E	14.1E	85	190E
Fort Simpson #7						19.5E	6.5E	13.0E	81+	
Fort Simpson #8						19.9E	7.2E	13.6E	84+	
Poplar River #1	20.0E	6.8E	13.5E	101+	192E	20.2	6.5	13.4	82	219
Nahanni Valley	20.2	6.1	13.2			20.2E	5.0E	12.6E		
Nahanni #1	20.4E	9.0E	14.7E	117+	271	20.0	9.7	14.8	136+	257
Nahanni #2	21.1E	4.7E	12.9E	53	277	21.0	4.4	12.7	40	221
Nahanni #3						20.5E	4.8E	12.6E	64	
Nahanni Butte						10.2E	4.1E	7.2E		

Station	1975 June 1-Sept. 30 Mean daily temp. (°C)			Frost free season (days)	June-Sept. Precip. (mm)	1976 June 1-Sept. 30 Mean daily temp. (°C)			Frost free season (days)	June-Sept. Precip. (mm)
	Max.	Min.	Mean			Max.	Min.	Mean		
NORTHWEST TERRITORIES										
Fort Liard Airport	20.4	8.0	14.2	123	260	19.8	8.0	13.9	124+	390
Fort Liard #1	19.3E	9.2E	14.2E	99+	266	17.8	9.1	13.4	136+	443
Fort Liard #2	18.4	9.1	13.8	119+	264	18.0	9.3	13.7	135+	348
Fort Liard #3	19.3	8.1	13.7	117+	275	19.0	8.5	13.8	123	307
Fort Liard #4	19.6E	8.5E	14.0E	87+	196	17.9	7.9	12.9	108+	184
Fort Liard Tower	20.4E	8.0E	14.2E			16.8E	6.9E	11.8E		
Fort Nelson	20.6	7.9	14.2	123	322	19.7	7.7	13.7	104	475
Trout Lake	17.7E	4.2E	11.0E	30	196E	17.6E	4.2E	10.9E	66	138E
Mile 166.5 Mackenzie Highway	21.1E	6.0E	13.6E	72+	141E	20.7	6.2	13.4	16	134
Fort Providence	20.4	6.8	13.6	66	163	20.0	6.8	13.4	81	145
Horn Plateau Tower	15.9E	6.4E	11.2E							
Hart Lake Tower	19.0E	9.0E	14.0E							
Hay River Airport	18.6	8.2	13.4	101	132	18.6	8.9	13.7	119+	193
Paradise Gardens	20.2	7.5	13.9	107	153	19.9	7.7	13.8	99	234
Hay River #1	19.6E	8.0E	13.8E	100	137	19.0	8.2	13.6	118+	218
Hay River #2	20.2	6.5	13.4	72+	186	20.0	7.6	13.8	99	250

Station	1975 June 1-Sept. 30 Mean daily temp. (°C)			Frost free season (days)	June-Sept. Precip. (mm)	1976 June 1-Sept. 30 Mean daily temp. (°C)			Frost free season (days)	June-Sept. Precip. (mm)
	Max.	Min.	Mean			Max.	Min.	Mean		
NORTHWEST TERRITORIES										
Joe Kraus				71+		19.8E	7.3E	13.5E	127+	305
Cameron Hills	15.0E	7.0E	11.1E							
Fort Smith	19.7	7.5	13.6	80	256	20.3	7.2	13.8	71	169
Hook Lake										
Yellowknife Airport	18.1	10.0	14.1	123	122	17.8	9.4	13.6	135	147

APPENDIX G. SUMMARY OF FROST-FREE PERIOD AT THE TEMPORARY STATIONS

	1975				1976			
Station	Last spring frost	First fall frost	Frost-free season 0°C	-2°C	Last spring frost	First fall frost	Frost-free season 0°C	-2°C
YUKON								
Whitehorse #1	6/21	9/8	78	88	6/9	8/30	81	113
Whitehorse #2	6/12	a10/3	112+	124+	5/31	9/29	120	129
Whitehorse #3	6/14	7/30	45	87	6/1	7/17	45	95
Champagne #1	6/26	7/23	26	26	6/14	7/24	39	66
Champagne #2	6/17	7/26	38	43	7/6	7/17	39	31
Champagne #3	b5/29	a10/3	128+	128+	5/25	9/23	120	139+
Champagne #4	b5/29	a10/3	128+	128+	5/30	9/30	122	133+
Champagne #5	6/6	9/10	95	130+	5/27	7/17	50	127
Champagne #6					b7/20	9/1	43+	43+
Haines Jct. #2	6/21	7/23	31	43				
Carmacks #1	6/25	8/29	64	77	6/14	8/19	65	95
Carmacks #2	b5/28	9/28	124+	127+	5/28	9/1	95	134+
Carmacks #3	6/12	8/29	77	83	6/14	8/24	70	92
Carmacks #4	6/12	8/29	77	122+	5/28	8/29	92	117
Carmacks #5	6/12	8/29	77	79	6/1	8/19	78	101
Stewart Crossing #1	6/11	7/27	45	51	6/27	7/28	30	69
Stewart Crossing 2	b5/30	8/29	91+	91+	b5/19	9/6	110+	134+
Stewart Crossing 3	b5/29	9/13	107+	121+	5/14	9/6	114	142+
Stewart Crossing 5	b5/31	7/29	59+	90+	6/4	8/29	85	93
Dawson #1	6/15	7/29	43	45	7/11	8/16	39	67
Dawson #2	b5/31	8/5	66+	90+	5/25	8/30	96	111
Dawson #3	6/13	7/29	45	59+	6/14	8/21	67	107

Dates in month/day form.
b before this date
a after this date
\+ more than this number of days

APPENDIX G. continued

	1975				1976			
	Last spring frost	First fall frost	Frost-free season		Last spring frost	First fall frost	Frost-free season	
Station			0°C	-2°C			0°C	-2°C
YUKON								
Teslin #1					5/30	9/23	115	130+
Teslin #2	6/12	8/21	69	111+	6/19	7/17	27	103
Teslin #3	6/21	a10/1	102+	123+	5/29	9/11	104	124
Nares					6/20	7/16	25	71
Montana					7/15	7/17	1	78
Tagish	6/24	7/23	39	31	7/15	7/17	1	31
Rancheria #2	6/26	7/25	28	71	7/11	7/17	5	31
Watson Lake #2	b6/3	9/10	99+	121+	6/12	9/2	81	136+
Watson Lake #3	b6/3	a10/1	121+	121+	6/12	10/1	110	138+
Watson Lake #4	6/23	8/9	46	89	6/15	7/17	32	34
Watson Lake #5	6/15	8/26	71	89	6/15	7/17	32	91
N.W.T.								
Wrigley #1	5/27	7/30	63	75	6/22	8/13	51	52
Wrigley #2	5/27	7/30	63	94				
Wrigley #3	5/26	8/12	77	105	6/13	8/23	70	112+
Wrigley #4					b6/11	8/23	73+	97+
Fort Simpson #1	b5/28	8/31	95+	122+	6/13	9/4	82	116+
Fort Simpson #2	b5/28	7/30	63+	95+				
Fort Simpson #3	b6/1	8/25	85+	91+	6/15	9/4	80	85
Fort Simpson #4	b7/1	8/31	61+	87+				
Fort Simpson #6					6/13	9/7	85	100+
Fort Simpson #7					b6/15	9/4	81+	84+
Fort Simpson #8					b6/15	9/7	84+	84+
Poplar River	b6/1	9/11	101+	102+	6/13	9/4	82	115+

APPENDIX G. continued

	1975				1976			
	Last spring frost	First fall frost	Frost-free season		Last spring frost	First fall frost	Frost-free season	
Station			0°C	-2°C			0°C	-2°C
N.W.T.								
Nahanni #1	b6/1	9/26	117+	117+	b5/19	10/2	136+	137+
Nahanni #2	6/7	7/31	53	90	7/14	8/24	40	69
Nahanni #3					6/20	8/24	64	69
Fort Liard #1	b6/19	9/26	99+	99+	b5/19	10/2	136+	137+
Fort Liard #2	b5/30	9/26	119+	119+	b5/19	10/1	135+	136+
Fort Liard #3	b6/1	9/26	117+	118+	5/30	10/1	123	129+
Fort Liard #4	b7/1	9/26	87+	88+	b5/27	9/12	108+	127+
Trout Lake	6/29	7/30	30	45+	6/20	8/26	66	66
Mile 166 (Mac Hwy)	b6/1	8/12	72+	72+	7/14	7/31	16	75
Hay River #1	6/2	9/11	100	131+	6/4	a9/30	118+	131+
Hay River #2	b6/1	8/15	72+	72+	6/4	9/12	99	131+
Joe Kraus	b6/2	8/13	71+	105+	b5/23	9/28	127+	130+

APPENDIX H

SOIL TEMPERATURE: SHORT-TERM OBSERVATIONS

A supplementary programme of soil temperature observations was undertaken to look at soil temperature-climate relations on a mesoscale. This programme was intended to produce some results which could assist in the classification of soils. The soil temperature in mid-July at a depth of 50 cm was considered to be the key parameter of interest for soil classification.

Soil temperatures were observed at one to three sites on each of the transects except Wrigley. The sites were chosen to represent first the soils of higher agricultural potential in the valley bottoms and secondly sites of contrasting soil and air climate on the transect, differing significantly in topography. The observations were made every two weeks at 5,10,20,50 and 100 cm levels where possible. In some colder soils frost prevented measurements at deeper levels with the technique used.

The observations technique used for this project was devised to make soil temperature observations immediately, rather than to dig in sensors and allow soil to settle around them as in permanent installations. The immediate technique was to drill or punch a narrow hole (2.5 cm diameter) to just above the level to be observed, then push a pointed, metal-sheathed thermistor temperature probe into the bottom of the hole. Two types of holes were used. In one case, a set of holes were dug to 0.5 to 1.0 cm above the standard levels and lined with heavy-duty plastic pipe. In the second case, a fresh hole was punched for each observation, and the temperature was observed at each standard level as that level was reached. The first method was used for the Yukon soil temperature observations and the second method was used for the Northwest Territories observations. Where the two methods were compared, the first (pipe-lined set of holes) produced readings furthest from the ambient air temperature and thus likely to be closer to the true soil temperature.

In order to analyse these observations, the soil temperatures were plotted: against depth of a few places at certain dates and against time through the season for all sites. The mid-July soil temperature at 50 cm was plotted against the June mean air temperature, the July mean air temperature and the mean air temperature of June 1 to September 30. For Watson Lake Airport, where there is a permanent soil temperature installation, the march of the permanent and temporary observations were plotted together for comparison.

In the comparisons with the Watson Lake permanent observations, it was found that the temporary method observed temperatures at 50 cm some 3.0 to 4.0°C warmer at the beginning of the season. The difference diminished to 1.0 to 1.5°C after 8 weeks, and it was more consistent after mid-summer (Figure H.1). This pattern resembles the trend of temperatures at various levels in the top 100 cm of soil through the summer season. At most places there is a wide range of temperatures through the upper levels in the warming period, but about the fall equinox the top 100 cm may be nearly isothermal.

A review of the march of soil temperature at Yukon sites from about June 12 to October 1, 1975 indicates that for most of them, the 50 cm soil temperature observed in mid-July would be within 1.0°C of the mid-summer 'plateau' of 50 cm soil temperature. The 50 cm level 'plateau' in 1975 extended from about July 1 to August 20 or later at stations in the Yukon Territory. The 50 cm soil temperature of mid-July was at most places warmer than it was during the remainder of the summer. In the Northwest Territories soil temperature observations began June 24 or later. The march of soil temperatures there was sharply downward after mid-July 1975. June 1975 had record temperatures in the southwestern Northwest Territories, which was followed by more normal temperatures for the remainder of the summer. No comparable soil temperature observations were made in the Northwest Territories in 1976, when a more normal march of the mean air temperature occurred.

There is no close relation between summer mean temperature of July mean temperature of the air and the mid-July soil temperature at 50 cm. However, this may result from the 50 cm region being a zone of heat divergence which receives heat from the surface until mid-July, then cools as the heat migrates to greater depths. The relations reviewed (Figures H.4 and H.5) showed that 50 cm soil temperature in mid-July was highest in well drained sites on purely mineral soil. The highest temperature occurred at airports where the soil and its vegetation and leaf litter had been removed at some time. The coldest soils were those with a thick layer of organic matter, and imperfectly or poorly drained.

In summary, the temporary soil temperature observation programme showed that:

(a) temporary summer observations have an error of +1.0 to +4.0°C, mostly due to the influence of ambient air temperature conducted to the observations points;

(b) 50 cm soil temperature at mid-July of a normal year is representative of 50 cm temperatures from about July 1 to the end of summer (Aug. 15 to Sept. 30);

(c) 50 cm soil temperature varies by 5 to 10°C locally between disturbed mineral soil sites (warm) and undisturbed, poorly drained sites with a thick (15 cm or more) cover of organic soil (cold soils). The summer air temperature varies locally between such sites by as little as 1.0 or 2.0°C.

Figure H.1 1976 MARCH OF 50 cm SOIL TEMPERATURE AT WATSON LAKE AIRPORT

Comparison of permanent sensor and temporary hole techniques

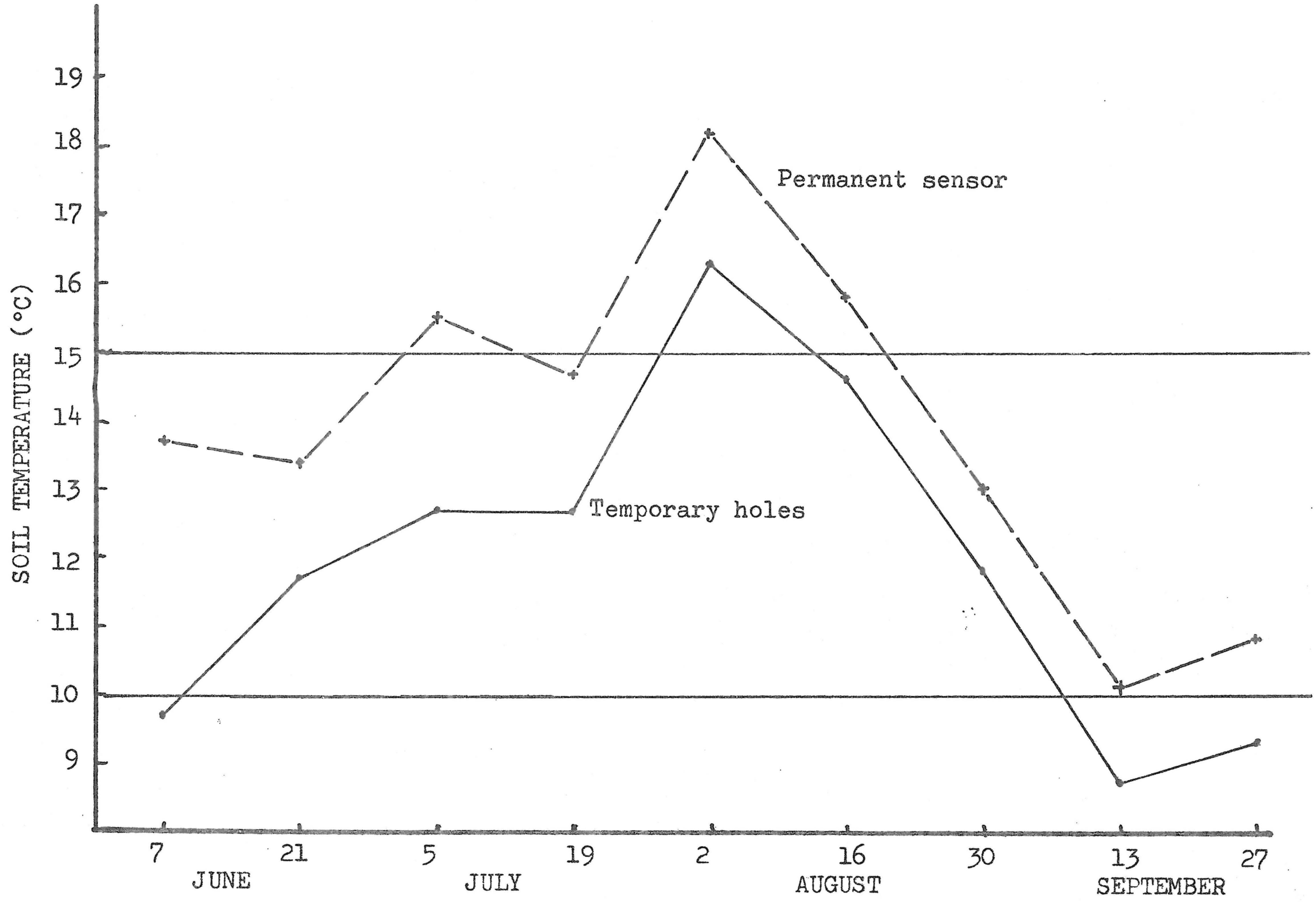


Figure H.2 1975 SEASON MARCH OF SOIL TEMPERATURES AT WHITEHORSE AIRPORT

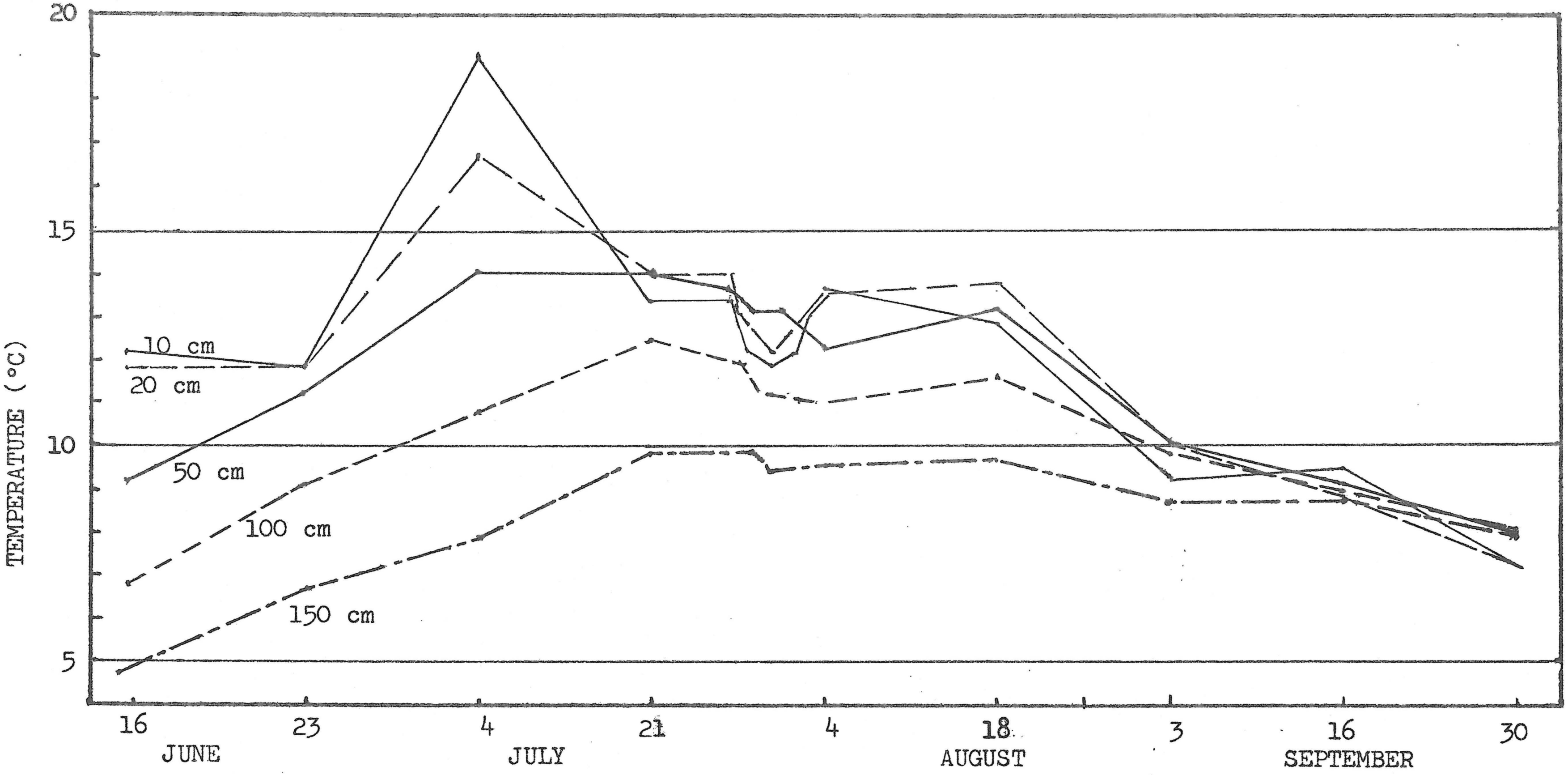
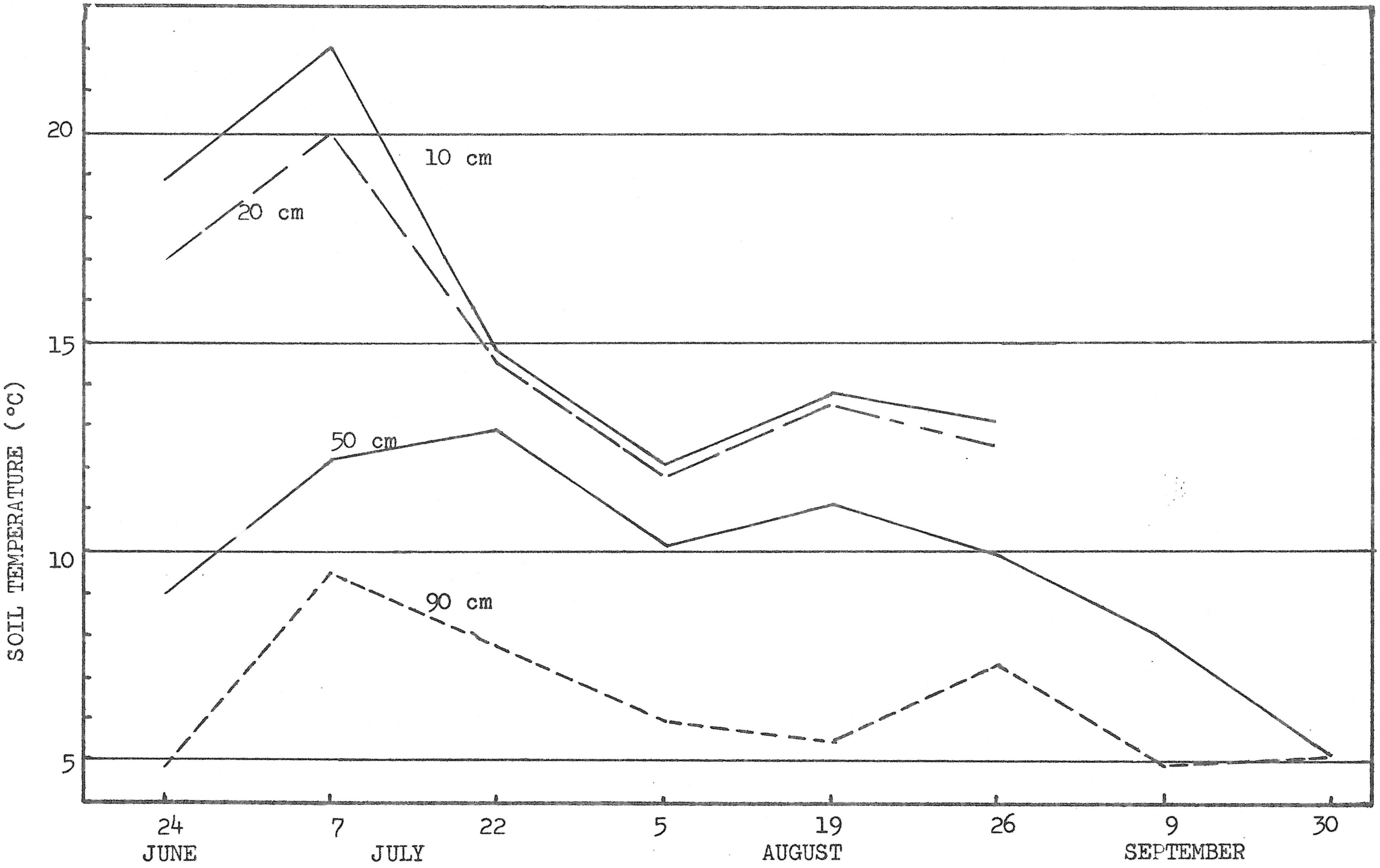


Figure H.3 1975 SEASON MARCH OF SOIL TEMPERATURES AT FORT SIMPSON SITE #1



STATIONS ON FIGURES H.4 AND H.5

1. Whitehorse A
2. Whitehorse Site 1
3. Champagne Site 1
4. Champagne Site 2
5. Champagne Site 4
6. Carmacks Site 1
7. Carmacks Site 4
8. Stewart Crossing Site 1
9. Stewart Crossing Site 2
10. Stewart Crossing Site 5
11. Dawson Site 1
12. Dawson Site 2
13. Dawson Site 3
14. Tagish
15. Teslin A
16. Teslin Site 2
17. Rancheria Site 2
18. Watson Lake A
19. Watson Lake Site 2
20. Fort Simpson Site 1
21. Fort Simpson Site 2
22. Fort Simpson Site 3
23. Poplar River
24. Nahanni (Parks base)
25. Fort Liard A
26. Hay River Site 2
27. Hay River Paradise Gardens

Figure H.5 MID-JULY SOIL TEMPERATURE AT 50 CM VERSUS JULY MEAN AND SUMMER SEASON MEAN AIR TEMPERATURE 1975 N.W.T. SITES

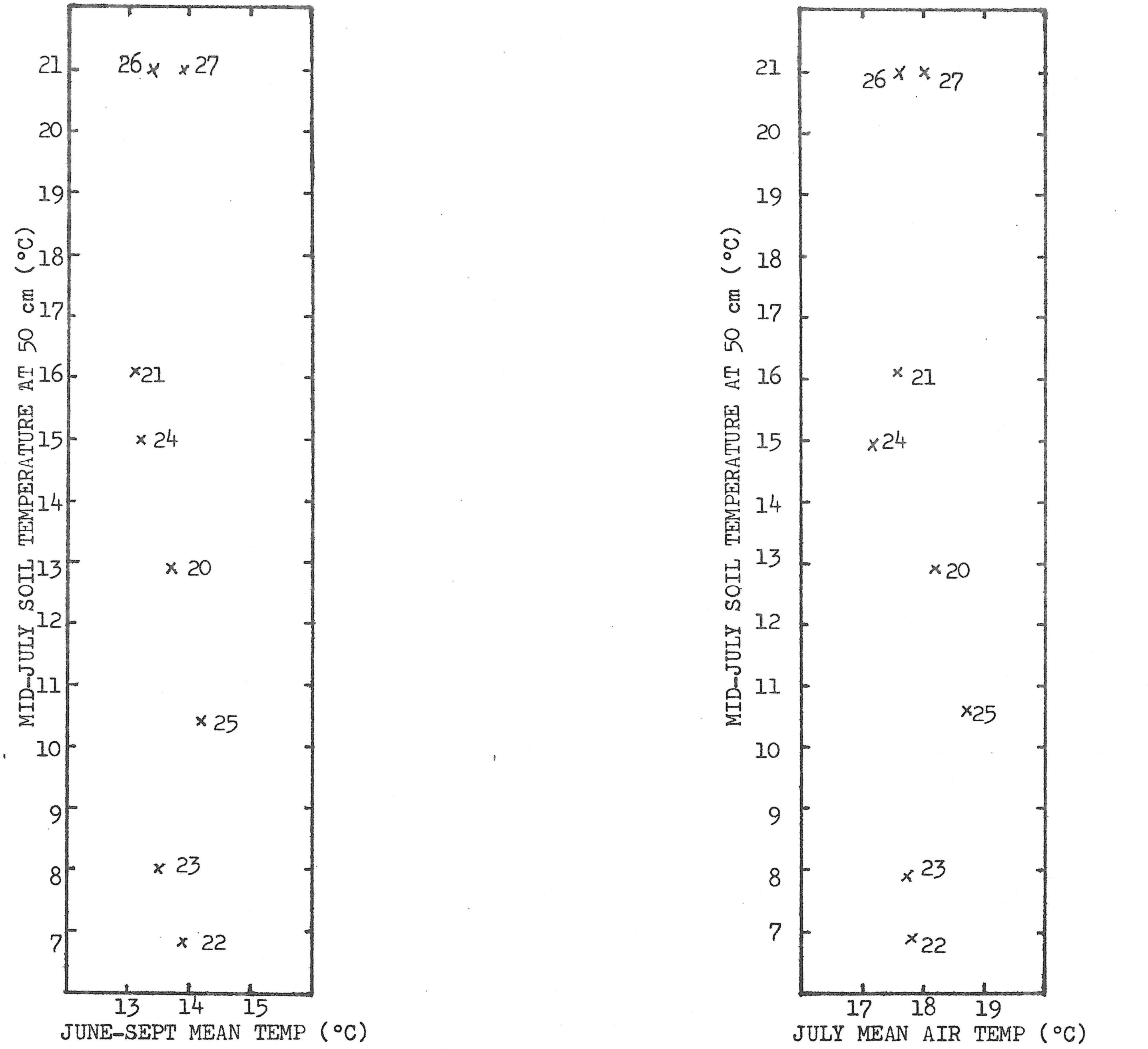
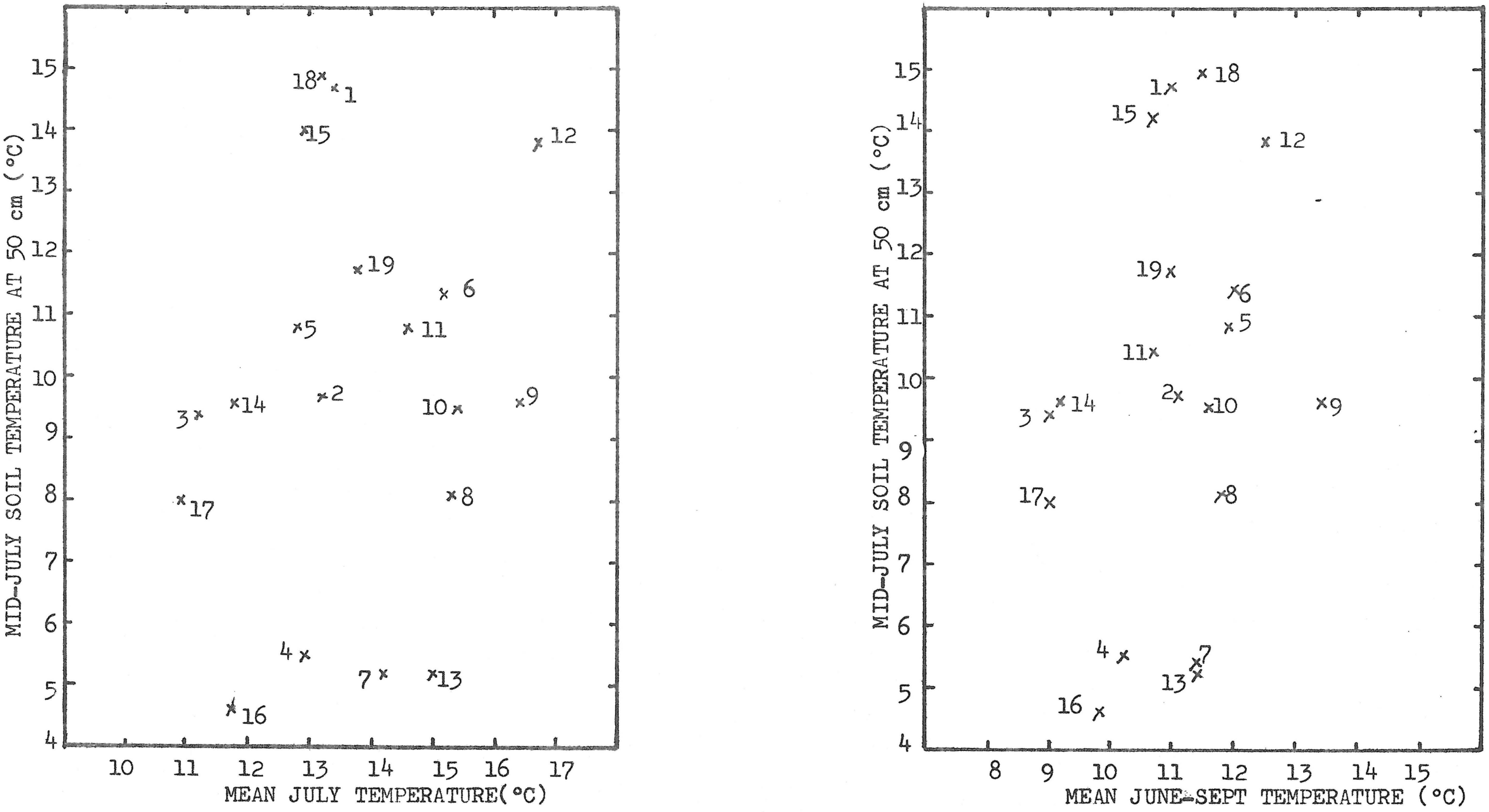


Figure H.4 MID-JULY SOIL TEMPERATURE AT 50 CM VERSUS JULY MEAN AND SUMMER SEASON MEAN AIR TEMPERATURE 1975 and 1976 AVERAGE FOR YUKON SITES



APPENDIX I

Moisture Deficit in the Fort Simpson Region

(B.F. Findlay and T. Detlor)

In the application of the BC agroclimatic capability classification to the Yukon and Northwest Territories it is necessary to determine regional values of soil moisture storage capacity in order to compute the moisture deficit. This may be accomplished through a study of the hydrological budget, or water balance, i.e.

$$S = I - O - E$$

where:

S = storage of water in soil

I = inflow to basin (precipitation)

O = outflow from basin or run-off

E = evapotranspiration

To apply this concept it is necessary to select a watershed which has been streamgauged, and for which representative precipitation information is available. Two watersheds north of Fort Simpson but south of Wrigley were found to be suitable. These are the Willowlake River and the Martin River basins.

Soil Moisture Storage Capacity

The Willowlake basin is situated 80 miles north of Simpson and 30 miles south of Wrigley. It originates in the Horn Plateau and so enters the Mackenzie River from the east. The drainage area is 8330 sq. miles in the 500 - 2500' elevation range. The soils and landforms seem to be quite typical of the upper and middle Mackenzie River (Tarnocai, 1973).

Streamgauge records from 1964-74 (11 years) were employed (Table 1) along with precipitation data from Wrigley for the same period. The latter were adjusted for the basin elevation (Table 2). Evapotranspiration was computed using the Thornthwaite technique (Thornthwaite and Mather, 1957). Monthly totals and averages were used.

The average annual run-off for the 11 year period at Willowlake River was 88.8 mm. Adjusted mean annual precipitation was found to be 409.7 mm, leaving 320.9 mm for evapotranspiration and storage. To perform the necessary bookkeeping functions of the Thornthwaite procedure a soil moisture storage capacity is assumed. Values of 100, 75 and 50 mm were successively substituted with the following results:

<u>Case A</u> (100 mm soil storage)

S = I - 0 - E

= 409.7 - 88.8 - 345.0

= -24.1 mm

<u>Case B</u> (75 mm soil storage)

S = 409.7 - 88.8 - 328.0

= -7.1 mm

<u>Case C</u> (50 mm soil storage)

S = 409.7 - 88.8 - 308.0

= +12.7

Discussion

A value $S \simeq 0$ means that the soil moisture capacity values assumed in the computation of actual evapotranspiration is closest to the true value. It may be seen that the soil moisture storage within the rooting zone of the Willowlake watershed is > 50 mm but < 75 mm.

Moisture Deficit

A further study of Thornthwaite evapotranspiration - precipitation - run-off relationships was undertaken for Fort Simpson where a computer tabulation used 1964-72 climatological data expressed in an evapotranspiration format developed by P.Y.T. Louie (Table 5).

The Willowlake River gauge data were considered to be too distant so information from the Martin River, 15 miles north of Fort Simpson which has been gauged since 1973 was used. However, the period 1964-74 was synthesized by the flow duration technique employing Willowlake River data. The Martin River drains 784 sq. miles with an elevation range of 1900 '. The flow duration procedure has been described by Findlay (1966) for use in northern Quebec-Labrador to estimate long-term streamflow. The method is based on a comparison of flow levels in terms of probability of occurrence (Table 6, Table 7) (Figures 1,2,3,4). Synthesized Martin River data are shown in Table 7 and compared to actual measurements in Fig. 5 for the years 1973, 1974. Synthesized discharge for 1964-72 period is compared with discharge computed by the Thornthwaite water balance in Table 8. The agreement in the latter case is not particularly good. The years 1964 and 1970, are especially bad. For 1964, the error may be explainable by the fact that was the first year in the calculation,

Table 1

Willowlake River Monthly Discharge

c.f.s.

Year	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
1964	473	310	241	194	-	-	3090	1540	1850	1650	914	482
1965	372	274	177	-	-	8570	2450	1140	670	811	274	165
1966	108	114	80.4	82.7	6640	6960	2240	1240	684	831	474	344
1967	254	219	247	295	19500	10200	2320	1160	662	580	342	249
1968	184	184	180	166	4690	5900	3130	698	3800	1730	-	-
1969	293	200	173	-	-	4120	2060	1970	1520	912	428	291
1970	241	206	184	242	6450	5950	-	5800	4880	3420	1080	682
1971	526	425	327	-	-	5070	1290	1720	1940	1060	336	180
1972	160	150	136	129	7210	6930	3410	1560	944	505	396	262
1973	179	132	137	549	14600	3470	1910	2710	1720	606	155	171
1974	167	131	119	132	10500	6860	2500	1590	1470	923	539	305

Table 2

Computation of Willowlake River Basin Precipitation

Elevation Range (ft. a.s.l.)	Wrigley mean precip. (mm) 1964-74	+	Elevation factor (mm) (precipitation gradient = 30 mm/ 100 m)			Area of basin at specified elevation range (sq. mi.)			Total Precip. over Basin
500	344.8	+	0	=	344.8	x	80	=	27584
500 - 1000	344.8	+	30.5	=	375.3	x	4967	=	1864115.1
1000 - 1500	344.8	+	81.3	=	426.1	x	1105	=	470840.5
1500 - 2000	344.8	+	121.9	=	466.7	x	1069	=	498902.3
2000	344.8	+	152.4	=	497.2	x	1109	=	551394.8
								TOTAL	3412836.7

(÷ 8330)

Average precipitation per unit area = 409.7

Table 3

Willowlake River - Monthly Precipitation (mm)

January	17.5	July	72.5
February	17.2	August	54.1
March	11.5	September	34.7
April	21.4	October	39.6
May	36.8	November	26.2
June	60.4	December	17.8

Total 409.7

and the antecedent snow cover may not have been well estimated from winter snowfall. In 1970 the error may be related to thundershower activity at Wrigley where precipitation in June, July and August totalled 242.8 mm, 175% of normal (the highest since the opening of the station in 1943). At Fort Simpson precipitation for the same period was 101% normal. The Fort Simpson moisture deficit computed by the climatic water balance is shown by Table 9.

Discussion

Although poor agreement is evident between the synthesized "measured" discharge values, and those computed by the Thornthwaite method, this probably indicates a worse than actual situation, since both data sets are estimated not measured. It seems likely that the Thornthwaite seasonal, long term values which are used in the agroclimatic classification are sufficiently accurate. Some caution is warranted with individual year values, as Kakela (1973) discovered at Yellowknife.

Table 4

Evapotranspiration in the Willowlake River Basin

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Soil Moisture Storage Capacity 100 mm													
T °C	-31.3	-24.6	-16.0	- 6.5	7.4	14.2	15.9	13.3	5.8	- 3.0	-16.1	-25.7	
I	0	0	0	0	1.81	4.86	5.76	4.4	1.25	0	0	0	18.1
unadjusted PE	0	0	0	0	1.7	2.8	3.0	2.6	1.4	0	0	0	
PE mm	0	0	0	0	68	114	123	98	45	0	0	0	448
P mm	18	17	12	21	37	60	73	54	35	40	26	18	
P-PE	18	17	12	21	-31	-54	-50	-44	-10	40	26	18	
Acc Pot WL					31	85	135	179	189				
ST	116	133	145	166	73	42	25	16	14	54	80	98	
Δ ST	0	0	0	0	-27	-31	-17	- 9	- 2	0	0	0	
AE	0	0	0	0	64	91	90	63	37	0	0	0	345
Soil Moisture Storage Capacity 75 mm													
P					37	60	73	54	35				
Acc Pot WL					31	85	135	179	189				
ST					49	23	12	6	6				
Δ ST					26	26	11	6	0				
AE					63	86	84	60	35				328
Soil Moisture Storage Capacity 50 mm													
P					37	60	73	54	35				
Acc Pot WL					31	85	135	179	189				
ST					26	8	3	1	1				
Δ ST					24	18	5	2	0				
AE					61	78	78	56	35				308

TABLE 5

Moisture Deficit Computation Using Thornthwaite, 1964-72

FORT SIMPSON A

LAT... 62 WHC... 75.00 LAG...0.50 W... 60.00 WS... 67.00 S... 0.0 SS... 0.0 EL... 5760.0C

	T	P	PE	P-PE	AE	W	WS	S	SS	RO	PR	D
1 64	-27.83	16.76	0.0	16.76	0.0	60.00	83.76	0.0	0.0	0.0	0.0	
2 64	-17.06	21.34	0.0	21.34	0.0	60.00	105.10	0.0	0.0	0.0	0.0	
3 64	-23.11	17.02	0.0	17.02	0.0	60.00	122.12	0.0	0.0	0.0	0.0	
4 64	-5.97	37.08	0.0	37.08	0.0	60.00	159.20	0.[illegible]	0.0	0.0	0.0	
5 64	6.86	28.96	57.20	-28.25	52.73	51.23	0.0	72.10	0.0	72.10	0.0	4.47
6 64	15.17	33.27	127.44	-94.17	72.79	11.71	0.0	36.05	0.0	36.05	0.0	55.35
7 64	17.58	11.68	147.91	-136.23	22.83	0.56	0.0	18.03	0.0	18.03	0.0	125.08
8 64	14.86	53.09	116.96	-63.87	53.42	0.23	0.0	9.01	0.0	9.01	0.0	63.76
9 64	5.92	35.31	45.53	-10.23	35.33	0.20	0.0	4.51	0.0	4.51	0.0	10.20
10 64	0.92	26.92	7.71	19.22	7.71	19.41	0.0	2.25	0.0	2.25	0.0	
11 64	-16.58	38.10	0.0	38.10	0.0	19.41	38.10	1.13	0.0	1.13	0.0	
12 64	-27.00	18.03	0.0	18.03	0.0	19.41	56.13	0.56	0.0	0.56	0.0	
		337.57	502.76		244.81					143.64	0.0	258.86

HI= 20.2619 A=0.82945

T = Temperature
P = Precipitation
PE = Potential Evapotranspiration
AE = Actual Evapotranspiration
W = Water held in soil
WS = storage in snow
S = surplus
RO = runoff
D = deficit
WHC = soil water holding capacity
EL = elevation

	T	P	PE	P-PE	AE	W	WS	S	SS	RO	PR	D
1 65	-26.56	18.03	0.0	18.03	0.0	19.41	74.17	0.28	0.0	0.28	0.0	
2 65	-30.17	24.64	0.0	24.64	0.0	19.41	98.81	0.14	0.0	0.14	0.0	
3 65	-10.44	6.60	0.0	6.60	0.0	19.41	105.41	0.07	0.0	0.07	0.0	
4 65	1.25	0.0	12.11	-12.11	11.20	63.80	0.0	24.95	0.0	24.95	0.0	.91
5 65	8.86	1.02	72.17	-71.15	42.07	22.75	0.0	12.47	0.0	12.47	0.0	30.11
6 65	12.56	62.23	110.50	-48.27	73.31	11.67	0.0	6.24	0.0	6.24	0.0	37.19
7 65	17.50	63.75	148.56	-84.80	72.18	3.24	0.0	3.12	0.0	3.12	0.0	76.38
8 65	15.03	10.67	119.34	-108.67	13.39	0.52	0.0	1.56	0.0	1.56	0.0	105.45
9 65	3.81	29.21	32.70	-3.49	29.23	0.49	0.0	0.78	0.0	0.78	0.0	3.47
10 65	-1.53	39.62	0.0	39.62	0.0	0.49	39.62	0.39	0.0	0.39	0.0	
11 65	-16.08	21.34	0.0	21.34	0.0	0.49	60.96	0.19	0.0	0.19	0.0	
12 65	-24.39	16.26	0.0	16.26	0.0	0.49	77.22	0.10	0.0	0.10	0.0	253.99
		293.37	495.37		241.38					50.29	0.0	

HI = heat index
A = exponent
LAG = runoff lag

HI= 19.1484 A=0.81200

		P	PE	P-PE	AE	W	WS	S	SS	RO	PR	D
1 66	-3[illegible].28	8.89	0.0	8.89	0.0	0.49	86.11	0.05	0.0	0.05	0.0	
2 66	-2[illegible].64	5.08	0.0	5.08	0.0	0.49	91.19	0.02	0.0	0.02	0.0	
3 66	-1[illegible].44	32.26	0.0	32.26	0.0	0.49	123.44	0.01	0.0	0.01	0.0	
4 66	-[illegible].75	16.76	0.0	16.76	0.0	0.49	140.21	0.01	0.0	0.01	0.0	
5 66	[illegible].4	73.15	67.39	5.76	67.39	75.00	0.0	35.73	0.0	35.73	0.0	
6 66	1[illegible].92	14.73	125.16	-110.43	78.33	11.40	0.0	17.87	0.0	17.87	0.0	46.83
7 66	16.50	77.22	139.81	-62.59	83.93	4.69	0.0	8.93	0.0	8.93	0.0	55.88
8 66	13.69	30.99	108.75	-77.76	34.19	1.49	0.0	4.47	0.0	4.47	0.0	74.56
9 66	9.33	21.59	65.95	-44.36	22.27	0.81	0.0	2.23	0.0	2.23	0.0	43.68
10 66	-4.28	30.48	0.0	30.48	0.0	0.81	30.48	1.12	0.0	1.12	0.0	
11 66	-22.72	38.61	0.0	38.61	0.0	0.81	69.09	0.56	0.0	0.56	0.0	
12 66	-23.14	26.16	0.0	26.16	0.0	0.81	95.25	0.28	0.0	0.28	0.0	
		375.92	507.06		286.11					71.28	0.0	220.95

HI= 20.7090 A=0.83642

TABLE 5 (CONTINUED)

FORT SIMPSON A

LAT... 61   WHC... 75.00   LAG...0.50   W... 0.81   WS... 35.25   S... 0.28   SS... 0.0   EL... 5760.00

	T	P	PE	P-PE	AE	W	WS	S	SS	RO	MR	D		
1 67	-27.81	14.22	0.0	14.22	0.0	0.81	109.47	0.14	0.0	0.14	0.0			
2 67	-26.11	24.38	0.0	24.38	0.0	0.81	133.86	0.07	0.0	0.07	0.0			
3 67	-18.36	16.26	0.0	16.26	0.0	0.81	150.11	0.03	0.0	0.03	0.0			
4 67	-3.67	12.70	0.0	12.70	0.0	0.81	162.81	0.02	0.0	0.02	0.0			
5 67	6.94	23.11	58.09	-34.97	51.47	46.64	0.0	44.32	0.0	44.32	0.0	6.62		
6 67	13.83	29.97	118.39	-88.42	64.57	12.05	0.0	22.16	0.0	22.16	0.0	53.82		
7 67	15.69	28.19	134.90	-106.71	38.21	2.03	0.0	11.08	0.0	11.08	0.0	96.69		
8 67	15.64	11.18	122.28	-111.10	12.90	0.30	0.0	5.54	0.0	5.54	0.0	109.38		
9 67	9.00	25.40	64.76	-39.36	25.53	0.19	0.0	2.77	0.0	2.77	0.0	39.23		
10 67	-2.06	29.97	0.0	29.97	0.0	0.18	29.97	1.38	0.0	1.38	0.0			
11 67	-13.31	10.16	0.0	10.16	0.0	0.18	40.13	0.69	0.0	0.69	0.0			
12 67	-21.78	22.35	0.0	22.35	0.0	0.18	62.48	0.35	0.0	0.35	0.0			
		247.90	498.42		192.68					88.55	0.0	305.74	HI= 20.0187	A=0.8256

	T	P	PE	P-PE	AE	W	WS	S	SS	RO	MR	D		
1 68	-30.19	28.19	0.0	28.19	0.0	0.18	90.68	0.17	0.0	0.17	0.0			
2 68	-20.64	9.65	0.0	9.65	0.0	0.18	100.33	0.09	0.0	0.09	0.0			
3 68	-9.33	9.65	0.0	9.65	0.0	0.18	109.98	0.04	0.0	0.04	0.0			
4 68	-1.78	20.32	0.0	20.32	0.0	0.18	130.30	0.02	0.0	0.02	0.0			
5 68	7.39	18.80	65.32	-46.52	54.30	39.49	0.0	27.75	0.0	27.75	0.0	11.02		
6 68	13.78	49.53	122.33	-72.80	75.34	13.68	0.0	13.88	0.0	13.88	0.0	46.99		
7 68	14.53	43.18	130.87	-87.69	53.28	3.59	0.0	6.94	0.0	6.94	0.0	77.59		
8 68	12.56	30.73	106.22	-75.48	33.14	1.19	0.0	3.47	0.0	3.47	0.0	73.08		
9 68	6.39	54.61	52.50	2.11	52.50	3.29	0.0	1.73	0.0	1.73	0.0			
10 68	-1.00	27.43	0.0	27.43	0.0	3.29	27.43	0.87	0.0	0.87	0.0			
11 68	-14.97	22.10	0.0	22.10	0.0	3.29	49.53	0.43	0.0	0.43	0.0			
12 68	-27.36	12.45	0.0	12.45	0.0	3.29	61.98	0.22	0.0	0.22	0.0			
		326.64	477.23		268.56					55.61	0.0	208.68	HI= 16.9532	A=0.77732

	T	P	PE	P-PE	AE	W	WS	S	SS	RO	MR	D		
1 69	-34.47	12.95	0.0	12.95	0.0	3.29	74.93	0.11	0.0	0.11	0.0			
2 69	-21.17	14.99	0.0	14.99	0.0	3.29	89.92	0.05	0.0	0.05	0.0			
3 69	-13.17	21.08	0.0	21.08	0.0	3.29	111.00	0.03	0.0	0.03	0.0			
4 69	0.50	35.05	6.67	28.38	6.67	75.00	0.0	33.05	0.0	33.05	0.0			
5 69	7.69	21.34	67.57	-46.23	56.67	39.66	0.0	16.92	0.0	16.92	0.0	.09		
6 69	13.39	22.35	119.80	-97.45	53.59	8.42	0.0	8.46	0.0	8.46	0.0	66.21		
7 69	15.47	55.37	137.60	-82.22	61.34	2.46	0.0	4.23	0.0	4.23	0.0	76.26		
8 69	11.69	81.03	100.68	-19.65	81.60	1.89	0.0	2.12	0.0	2.12	0.0	19.08		
9 69	5.81	34.80	48.88	-14.08	35.12	1.56	0.0	1.06	0.0	1.06	0.0	13.76		
10 69	0.67	1.78	7.25	-5.47	1.89	1.45	0.0	0.53	0.0	0.53	0.0	5.36		
11 69	-14.25	39.37	0.0	39.37	0.0	1.45	39.37	0.26	0.0	0.26	0.0			
12 69	-17.44	7.62	0.0	7.62	0.0	1.45	46.99	0.13	0.0	0.13	0.0			
		347.73	488.44		296.88					67.75	0.0	191.57	HI= 16.8450	A=0.77560

TABLE 5 (CONTINUED)

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FORT SIMPSON A

LAT... 61   WHC... 75.00   LAG...0.50   W... 1.45   WS... 46.99   S... 0.13   SS... 0.0   EL... 5760.00

            T        P       PE      P-PE      AE        W       WS        S       SS        RO       MR     D

 1 70   -26.31   14.99    0.0     14.99     0.0      1.45    61.98     0.07     0.0       0.07     0.0
 2 70   -20.58   10.92    0.0     10.92     0.0      1.45    72.90     0.03     0.0       0.03     0.0
 3 70   -12.86    7.87    0.0      7.87     0.0      1.45    80.77     0.02     0.0       0.02     0.0
 4 70    -1.19   10.41    0.0     10.41     0.0      1.45    91.19     0.01     0.0       0.01     0.0
 5 70     8.17   70.87   67.08     3.79    67.08    75.00     0.0     10.72     0.0      10.72     0.0
 6 70    15.28   55.88  129.15   -73.27   105.11    25.77     0.0      5.36     0.0       5.36     0.0   24.04
 7 70    16.17   55.12  138.87   -83.75    73.59     7.30     0.0      2.68     0.0       2.68     0.0   65.28
 8 70    14.36   42.93  114.60   -71.67    47.65     2.58     0.0      1.34     0.0       1.34     0.0   66.95
 9 70     5.39   53.09   42.98    10.11    42.98    12.69     0.0      0.67     0.0       0.67     0.0
10 70    -3.36   24.13    0.0     24.13     0.0     12.69    24.13     0.33     0.0       0.33     0.0
11 70   -14.83    8.89    0.0      8.89     0.0     12.69    33.02     0.17     0.0       0.17     0.0
12 70   -25.75   17.78    0.0     17.78     0.0     12.69    50.80     0.08     0.0       0.08     0.0

                372.87  492.67             336.40                                        21.48     0.0 156.[illegible]7  HI= 19.4977      A=0.8174

            T        P       PE      P-PE      AE        W       WS        S       SS        RO       MR     D

 1 71   -31.94   11.43    0.0     11.43     0.0     12.69    62.23     0.04     0.0       0.04     0.0
 2 71   -21.56   13.72    0.0     13.72     0.0     12.69    75.95     0.02     0.0       0.02     0.0
 3 71   -16.08   13.97    0.0     13.97     0.0     12.69    89.92     0.01     0.0       0.01     0.0
 4 71    -2.00   17.02    0.0     17.02     0.0     12.69   106.93     0.01     0.0       0.01     0.0
 5 71    10.33   30.23   77.82   -47.59    66.36    38.87     0.0     22.31     0.0      22.31     0.0   11.46
 6 71    15.97   24.13  130.71  -106.58    56.42     6.58     0.0     11.16     0.0      11.16     0.0   74.29
 7 71    16.75   45.97  139.81   -93.83    51.04     1.52     0.0      5.58     0.0       5.58     0.0   88.77
 8 71    15.31   35.56  117.59   -82.03    36.63     0.44     0.0      2.79     0.0       2.79     0.0   80.96
 9 71     7.61   40.39   53.81   -13.42    40.46     0.37     0.0      1.39     0.0       1.39     0.0   13.35
10 71    -2.11   32.77    0.0     32.77     0.0      0.37    32.77     0.70     0.0       0.70     0.0
11 71   -17.28   22.61    0.0     22.61     0.0      0.37    55.37     0.35     0.0       0.35     0.0
12 71   -29.33   14.48    0.0     14.48     0.0      0.37    69.85     0.17     0.0       0.17     0.0

                302.26  519.73             250.90                                        44.53     0.0 268.[illegible]  HI= 22.3700      A=0.86223

            T        P       PE      P-PE      AE        W       WS        S       SS        RO       MR     D

 1 72   -29.33   25.40    0.0     25.40     0.0      0.37    95.25     0.09     0.0       0.09     0.0
 2 72   -27.78   13.21    0.0     13.21     0.0      0.37   108.46     0.04     0.0       0.04     0.0
 3 72   -15.31   29.21    0.0     29.21     0.0      0.37   137.67     0.02     0.0       0.02     0.0
 4 72    -6.78   25.91    0.0     25.91     0.0      0.37   163.58     0.01     0.0       0.01     0.0
 5 72     7.83   35.31   64.75   -29.44    59.92    50.39     0.0     44.48     0.0      44.48     0.0    4.83
 6 72    15.89   18.54  133.29  -114.74    62.22     6.71     0.0     22.24     0.0      22.24     0.0   71.07
 7 72    15.56   56.39  134.49   -78.10    60.98     2.12     0.0     11.12     0.0      11.12     0.0   73.51
 8 72    15.83   39.88  124.04   -84.17    41.40     0.59     0.0      5.56     0.0       5.56     0.0   82.64
 9 72     3.28   13.46   28.56   -15.10    13.57     0.49     0.0      2.78     0.0       2.78     0.0   14.99
10 72    -3.14   21.08    0.0     21.08     0.0      0.49    21.08     1.39     0.0       1.39     0.0
11 72   -15.81   12.95    0.0     12.95     0.0      0.49    34.04     0.69     0.0       0.69     0.0
12 72   -24.56   26.67    0.0     26.67     0.0      0.49    60.71     0.35     0.0       0.35     0.0

                318.01  485.13             238.09                                        88.77     0.0 247.04  HI= 19.5603      A=0.81846
```

Table 6

Flow Duration Data - Martin River and Willowlake River

Discharge equal to or greater than CSM*	Martin River No. of times	% of total time	Willowlake R. No. of times	% of total time
.01	730	100	730	100
.02	395	54.1	577	70.8
.06	300	41.0	363	49.7
.10	245	33.5	322	44.1
.60	90	12.3	92	12.6
1.0	53	7.2	42	5.7
2.0	18	2.4	17	2.3
3.0	7	.9	9	1.2

* cubic feet per second per square mile of drainage.

Table 8

Estimated Discharge, Martin River

Year	Martin River estimated discharge mm	Thorthwaite calculated discharge mm	Martin R. Actual observed
1964	52.32	143.64	
1965	56.26	50.29	
1966	54.12	71.28	
1967	99.97	88.55	
1968	56.66	55.61	
1969	41.35	67.75	
1970	98.93	21.48	
1971	56.69	44.53	
1972	60.80	88.77	
1973	68.60		67.10
1974	70.07		88.44

Table 7

Discharge Willowlake River Long-Term (1964-74) (CSM)

1964	.056	.037	.028	.028	.55*	.75*	.370	.184	.222	.198	.109	.057
1965	.044	.032	.021	.02*	.65*	1.028	.294	.136	.080	.097	.032	.019
1966	.012	.013	.009	.009	.797	.835	.268	.148	.082	.099	.056	.041
1967	.030	.026	.029	.035	2.340	1.224	.278	.139	.079	.069	.041	.029
1968	.022	.022	.021	.019	.563	.708	.375	.083	.456	.207	.15*	.085*
1969	.035	.024	.020	.02*	.65*	.494	.247	.236	.182	.109	.051	.034
1970	.028	.024	.022	.029	.774	.714	.75*	.696	.585	.410	.129	.081
1971	.063	.051	.039	.02*	.95*	.608	.154	.206	.232	.127	.040	.021
1972	.019	.018	.016	.015	.865	.831	.409	.187	.113	.060	.047	.031
1973	.021	.015	.016	.065	1.752	.416	.229	.325	.206	.072	.018	.020
1974	.020	.015	.014	.015	1.260	.823	.300	.190	.176	.110	.064	.036

* estimated

Estimated Martin R. Discharge (CSM)

1964	.032	.019	.018	.018	.465	.740	.280	.120	.142	.129	.065	.032	2.060
1965	.022	.019	.017	.017	.600	1.11	.205	.086	.050	.060	.018	.011	2.215
1966	.011	.011	.009	.009	.79	.860	.185	.094	.050	.060	.032	.020	2.131
1967	.018	.018	.019	.019	2.15	1.31	.190	.086	.048	.040	.019	.019	3.936
1968	.017	.017	.017	.017	.488	.700	.280	.051	.370	.135	.095	.052	2.231
1969	.019	.017	.017	.017	.600	.405	.165	.155	.119	.067	.028	.019	1.628
1970	.018	.017	.017	.018	.770	.699	.740	.651	.525	.310	.080	.050	3.895
1971	.037	.028	.019	.017	1.08	.550	.100	.135	.152	.078	.019	.017	2.232
1972	.017	.016	.014	.013	.900	.851	.315	.120	.070	.035	.025	.018	2.394
1973	.017	.013	.014	.038	1.710	.311	.150	.235	.136	.043	.016	.017	2.701
1974	.017	.013	.013	.013	1.30	.830	.212	.124	.113	.068	.037	.019	2.759

Actual Martin R. Discharge (CSM)

1973	.008	.007	.007	.016	1.08	.812	.419	.173	.082	.023	.010	.005	2.642
1974	.007	.004	.003	.005	1.658	.860	.244	.390	.186	.074	.034	.017	3.482

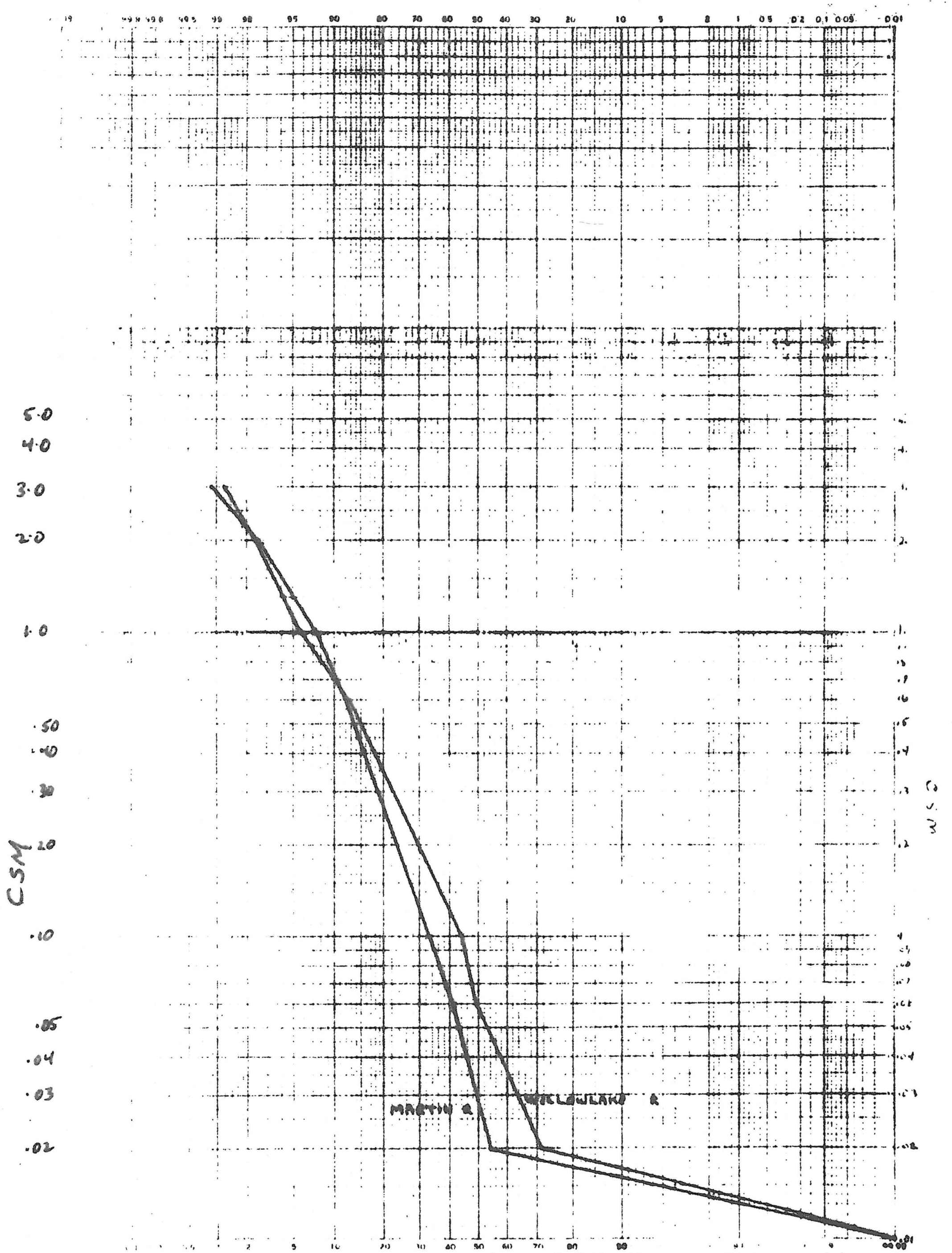
Table 9

Fort Simpson Moisture Deficit

Year	Moisture Deficit mm	Moisture Deficit in
1964	258.86	10.19
1965	253.99	10.00
1966	220.95	8.70
1967	305.74	12.04
1968	208.68	8.22
1969	191.57	7.54
1970	156.27	6.15
1971	268.83	10.58
1972	237.04	9.72
Mean	247.04	9.24
1975*	233	9.17

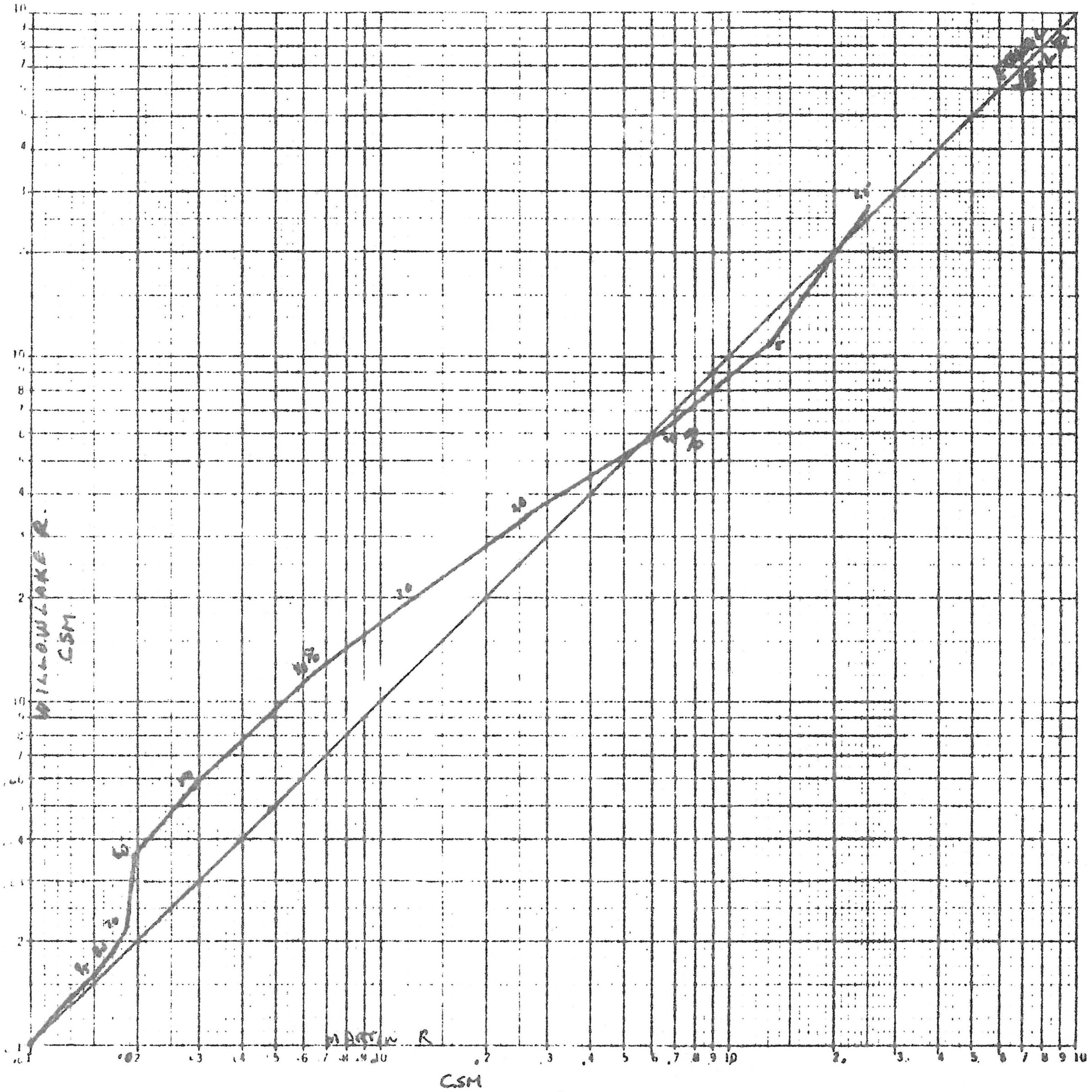
* computed by hand.

Figure 1



Short-term flow Duration Curves 1973-74

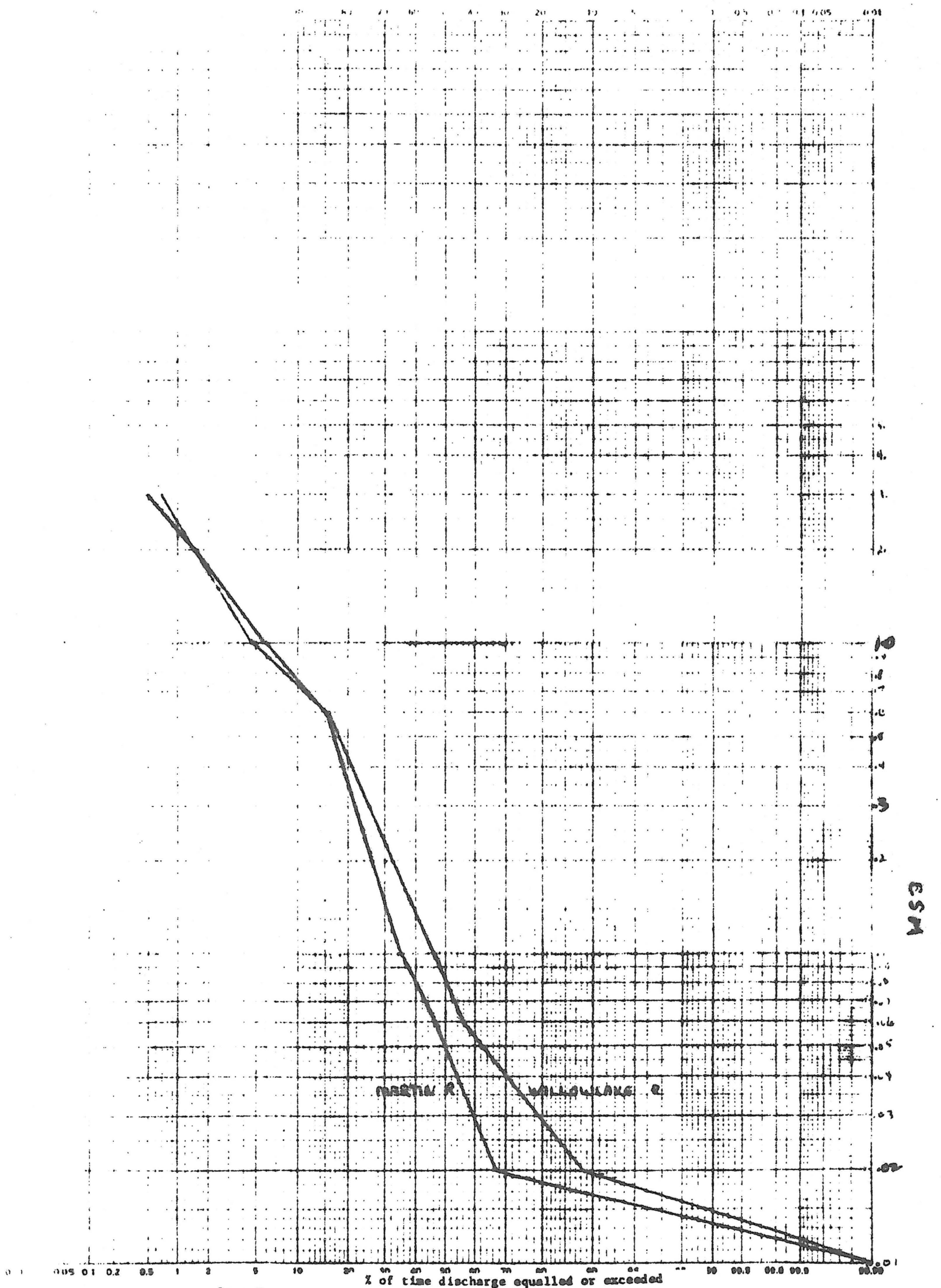
Figure 2



Correlation between Willowlake River and Martin River 1973-74

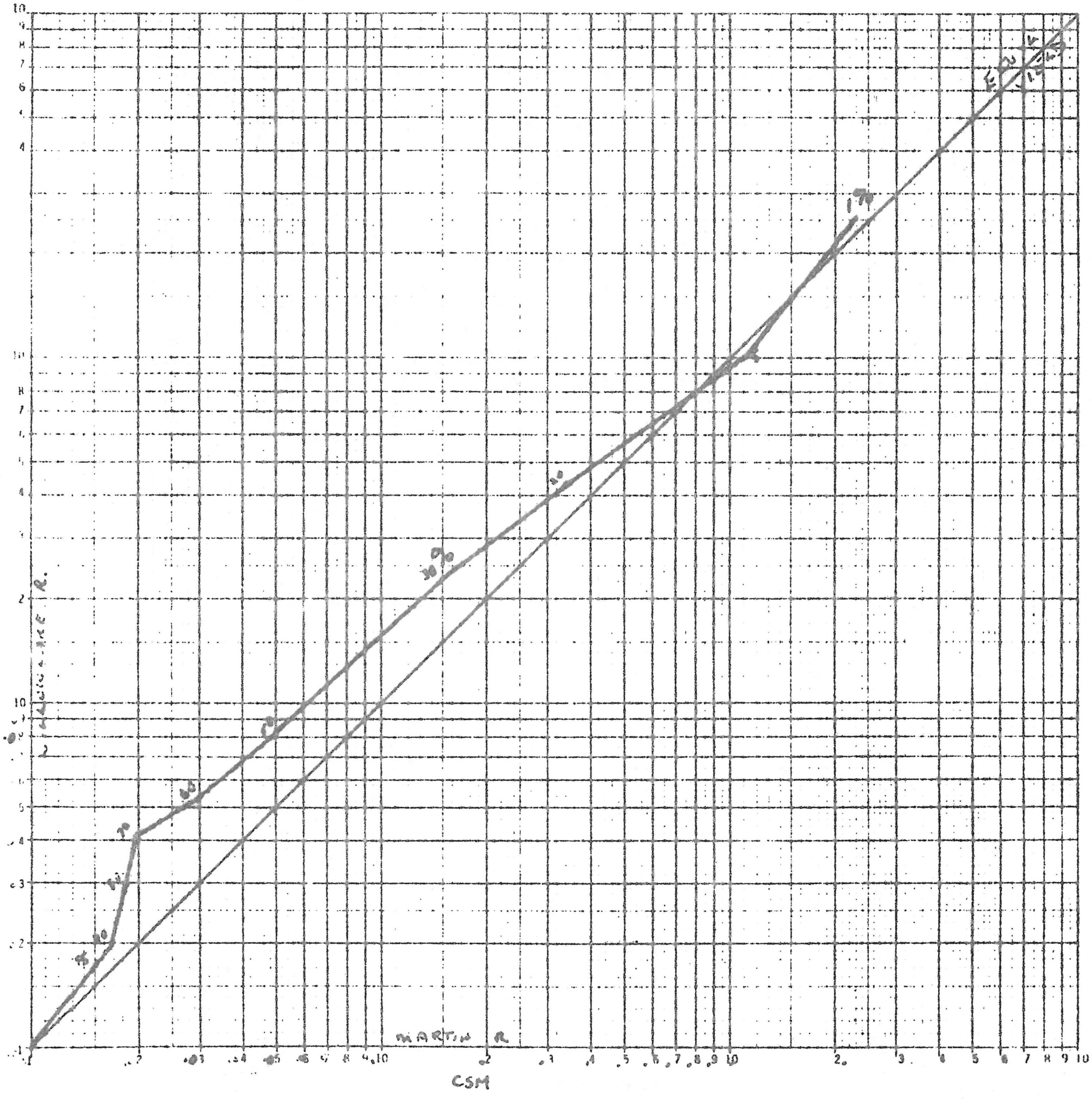
based upon discharge of equal per cent duration 1973 and 1974

Figure 3



Long-Term Flow Duration Curves 1964-74

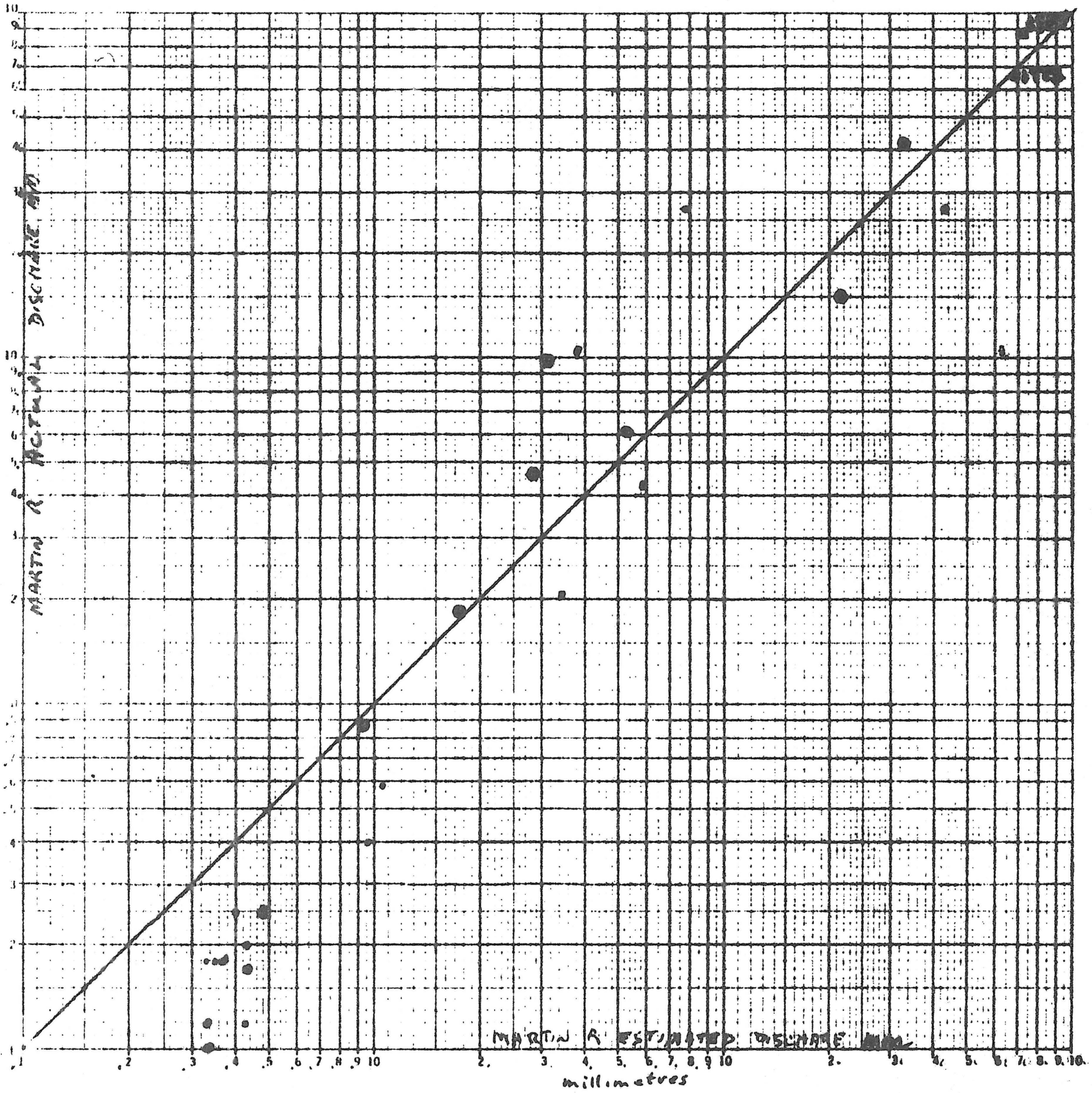
Figure 4



Correlation between Willowlake River and
Martin River

based upon discharge of equal per cent
duration 1964-74

Figure 5



- • 1973 monthly means
- ● 1974 monthly means
- ▪ annual total

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APPENDIX J

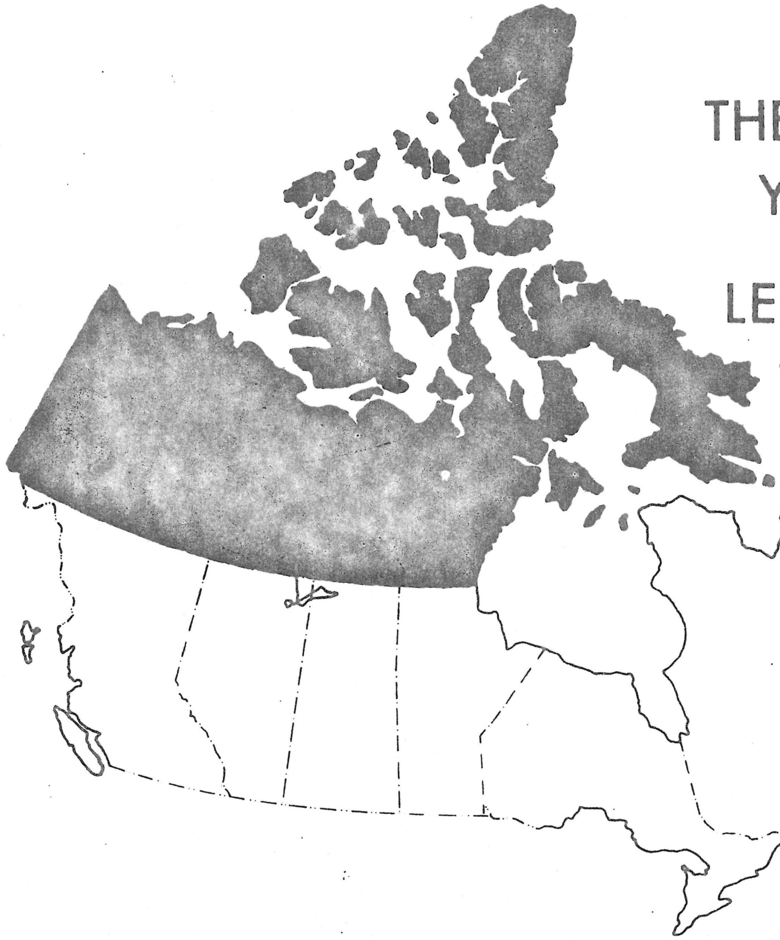
Environment Canada Environnement Canada

Atmospheric Environment Environnement atmosphérique

CLIMATOLOGICAL STATION DATA

catalogue

DE DONNÉES DES STATIONS CLIMATOLOGIQUES



THE NORTH
Y.T. N.W.T.

LE NORD
T.Y. et T.N.O.

UDC: 551.5:06(712.1/2)

DOWNSVIEW, ONT.
1976

TABLE HEADINGS

RUBRIQUES DES TABLEAUX

ENGLISH	FRANÇAIS
CLIMATOLOGICAL STATION DATA CATALOGUE	CATALOGUE DE DONNÉES DES STATIONS CLIMATOLOGIQUES
STATION NUMBER	NUMÉRO DE LA STATION
STATION NAME (+ Indicates part of record under another name.)	NOM DE LA STATION (+ Indique qu’une partie du relevé figure sous un autre nom.)
PROVINCE	PROVINCE
LATITUDE	LATITUDE
LONGTITUDE	LONGTITUDE
ELEVATION (feet)	ALTITUDE (pieds)
PERIODS WITH NO CHANGE IN PROGRAM, LOCATION OR NAME	PÉRIODES SANS CHANGEMENTS DE PROGRAMME, D’EMPLACEMENT OU DE NOM
(*indicates summer only)	(*été seulement)
Began—year—mo	Début—année—mois
Ended—year—mo	Fin—année—mois
OBSERVING PROGRAMME	PROGRAMME D’OBSERVATION
— synoptic report	— observation synoptique
— hourly weather	— observation horaire
— temperature	— température
— precipitation	— précipitation
— rate of rainfall	— intensité de la pluie
— wind mileage	— parcours du vent
— soil temperature	— température du sol
— evaporation	— évaporation
— sunshine	— insolation
— radiation	— rayonnement
— ozone	— ozone
— upper air	— altitudes
— snow survey	— relevé nivométriques
— tower	— tour
— air quality	— qualité de l’air
REGION	RÉGION

CLIMATOLOGICAL STATION DATA CATALOGUE

THE NORTH

This publication is part of a series designed to make available a reference to all climatological stations and data to the end of 1975. The series contains six volumes, one for each of the geographical areas listed below:

British Columbia.

The North - Y.T. and N.W.T.

The Prairie Provinces (Alberta, Saskatchewan and Manitoba).

Ontario.

Quebec.

Atlantic Provinces (New Brunswick, Nova Scotia,
Prince Edward Island and Newfoundland).

Information regarding the stations listed in this volume can be obtained from the appropriate Regional Director.

For stations listed in the Western Region:

Regional Director
Atmospheric Environment Service
Western Region
2nd Floor, Oliver Building
10225, 100th Avenue
Edmonton, Alberta
T5J 0A1

For stations listed in the Central Region:

Regional Director
Atmospheric Environment Service
Central Region
185 Carlton Street, 6th Floor
Winnipeg, Manitoba
R3C 3J1

For stations listed in the Quebec Region:

Regional Director
Atmospheric Environment Service
Quebec Region
100 Alexis Nihon Blvd.
Ville St. Laurent, P.Q.
H4M 2N6

CATALOGUE DE DONNÉES DES STATIONS CLIMATOLOGIQUES

LE NORD

Cette publication fait partie d'une série destinée à servir de référence à toutes les stations et données climatologiques jusqu'à la fin de 1975. La série se compose de six volumes correspondant respectivement aux régions géographiques suivantes:

Colombie-Britannique.

Le Nord - T.Y. et T.N.O.

Provinces des Prairies (Alberta, Saskatchewan et Manitoba).

Ontario.

Québec.

Provinces de l'Atlantique (Nouveau-Brunswick, Nouvelle-Ecosse, Ile-du-Prince-Edouard et Terre-Neuve).

On peut se procurer des renseignements relatifs aux stations énumérées dans le présent volume en s'adressant au Directeur régional compétent.

Stations énumérées dans la Région de l'Ouest:

Directeur régional
Service de l'Environnement atmosphérique
Région de l'Ouest
Edifice Oliver, 2ème étage
10225, 100ème avenue
Edmonton, Alberta
T5J 0A1

Stations énumérées dans la Région du Centre:

Directeur régional
Service de l'Environnement atmosphérique
Région du Centre
185, rue Carlton, 6ème étage
Winnipeg, Manitoba
R3C 3J1

Stations énumérées dans la Région du Québec:

Directeur régional
Service de l'Environnement atmosphérique
Région du Québec
100, Boul. Alexis Nihon
Ville St-Laurent, P.Q.
H4M 2N6

Additional copies of this volume or copies of other volumes may be obtained from:

Atmospheric Environment Service
Department of the Environment
4905 Dufferin Street, Room 4N400
Downsview, Ontario
M3H 5T4

Attention: Climatological Services Division

On peut se procurer des exemplaires supplémentaires de ce volume ou des exemplaires d'autres volumes à l'adresse suivante:

Service de l'Environnement atmosphérique
Ministère de l'Environnement
4905, rue Dufferin, salle 4N400
Downsview, Ontario
M3H 5T4

Attention: Division des Services climatologiques

EXPLANATION OF TABULATED DATA

STATION NUMBER - The 7 digit number is the permanent identifier of a site at which official weather observations have been taken, and is also used to identify data from the site when transferred to punched cards or other media for processing. The first digit assigned identifies the province, the second and third digits identify the climatological district within the province, and the final four digits are assigned so that when they are arranged in ascending order the station names are in alphabetical order. Occasionally different names have been used for the same site and in these cases the data may be listed under different numbers with a cross reference, and are indicated by "+" in front of the name. When observations are discontinued at a site, the number is not used for subsequent stations (which may, or may not, differ in name) unless it is judged that the records from the earlier and subsequent stations may be combined for most climatological purposes. This does not mean that data from sites with different station names and numbers may not be combined for specific purposes, but such combination should be done at the discretion of the user.

LATITUDE, LONGITUDE AND ELEVATION - The latitude and longitude of each site is given to the nearest minute. These data are relatively more accurate for more recent years due to the improvement in inspection services and better reference maps. For stations which were in operation only during the early years of the Meteorological Service, the same information was not always available and some of the coordinates may be in error. The elevation indicated for principal stations is generally the established elevation. In general it is the elevation determined for the barometer cistern when the instrument was first installed, and it usually remains unchanged throughout the history of the station. For climatological stations the elevation is the height of the ground on which the instruments are exposed as accurately as it can be read from contour maps, or estimated by use of an aneroid barometer.

OBSERVING PROGRAM - Entries in these columns give information on observing programs at individual stations and the applicable date for each program. A new line is listed for an observing station whenever:

-there is a change in program

-observations are resumed after no reports have been received from a particular program for a period greater than 3 months. Note - exception is made to this rule in the case of those stations where observations are taken only during the summer or the winter months (indicated by * or $ respectively)

-there has been a change in station name. If the change in name involves also a change in station number, this new number will appear immediately after the last entry

EXPLICATION DES DONNÉES SOUS FORME DE TABLEAUX

NUMERO DE LA STATION - Le numéro à 7 chiffres est le numéro d'ordre climatologique permanent d'un emplacement où des observations météorologiques officielles on été effectuées; il permet aussi d'identifier les données en provenance du site quand elles sont reportées sur des cartes perforées ou d'autres moyens pour y être traitées. Le premier chiffre attribué indique la province, le deuxième et le troisième le district climatologique au sein de la province et les quatre derniers chiffres sont attribués de façon que, classés en ordre croissant, ils indiquent le nom des stations en ordre alphabétique. Parfois, des noms différents désignent le même site; dans ce cas, les données peuvent être énumérées sous différents numéros suivis d'un renvoi; le nom est alors précédé d'une croix ("+"). Quand ces observations cessent dans un emplacement, le numéro ne sert pas aux stations suivantes (lesquelles peuvent avoir le même nom ou un nom différent) à moins que l'on estime possible de combiner les relevés de la première station et des stations suivantes pour la plupart des usages climatologiques. Ce qui ne veut pas dire que l'on ne puisse, à des fins particulières, combiner les données de sites dont le nom et le numéro de la station diffèrent; mais une telle combinaison doit rester à la discrétion de l'usager.

LATITUDE, LONGITUDE ET ALTITUDE - On exprime la latitude et la longitude de chaque site à la minute près. Les données des dernières années sont relativement plus exactes grâce à l'amélioration des services d'inspection et aux meilleures cartes de référence. Pour certaines stations qui n'ont fonctionné qu'au cours des premières années du service météorologique, les mêmes renseignements n'étaient pas toujours disponibles et certaines coordonnées peuvent être erronées. L'altitude indiquée pour les stations principales est d'ordinaire l'altitude établie. En général, il s'agit de l'altitude déterminée par la cuvette barométrique lors de la première installation de l'instrument; elle demeure d'habitude inchangée pendant toute l'activité de la station. Pour les stations climatologiques, l'altitude est l'altitude du sol sur lequel sont exposés les instruments, fournie aussi précisément que possible par la lecture des cartes d'isohypses, ou calculée à l'aide d'un baromètre anéroide.

PROGRAMME D'OBSERVATION - Les inscriptions portées dans ces colonnes fournissent des renseignements sur les programmes d'observation des stations particulières et la date d'application de chaque programme. On porte une nouvelle inscription pour une station d'observation chaque fois que:

-Il y a un changement de programme

-Les observations reprennent si on n'a pas reçu de comptes rendus d'un programme particulier pendant au moins 3 mois. Remarque: font exception à cette règle les stations où ne sont effectuées des observations qu'au cours des mois d'été (indiquées par *) ou au cours des mois d'hiver (indiquées par $).

-there has been a minor change in location. In many such cases there will be minor changes in one or all of the latitude, longitude and elevation values, but this is not always the case. Thus when 2 lines are listed, and there have been no change in any of the entries, the user is alerted to a possible discontinuity in the record due to minor changes in the site.

PERIODS - the year and month (January - 01, February - 02, etc.) that the program began and ended. Special symbols indicate:

* - program taken only during summer months

$ - program taken only during winter months

----- - data not processed

999 88 - data (from Air pollution station) not published. May be available from AES HQ on special project cards.

HOURLY WEATHER -

X - 24 hours per day
B - 8 observations per day, every 3 hours
C - 4 observations per day, every 6 hours
D - irregular observations, daily
E - 8 observations per day, every 3 hours plus extra hours
F - 4 observations per day, every 6 hours plus extra hours
G - MARS (Meteorological Automatic Reporting Station) irregular
H - MARS 24 hours per day
P - less than 24 hourly observations were taken each day

RATE OF RAINFALL -

X - Tipping bucket rain gauge
S - Fischer and Porter precipitation gauge
B - both X and S
W - Weighing type precipitation gauge
V - Volumetric

WIND MILEAGE -

B - Data processed from 45B autographic record
U - Data processed from U2A autographic record
H - Data processed from hourly observations by U2A
J - Data processed from hourly observations by 45B

-Il y a un changement de nom de la station. Si le changement de nom entraîne aussi un changement de numéro, ce nouveau numéro doit apparaître immédiatement après la dernière inscription.

-Il y a un changement mineur d'emplacement. Dans bien des cas semblables, il y a aussi des changements mineurs dans l'une ou l'autre ou bien l'ensemble des valeurs suivantes: latitude, longitude et altitude; mais ce n'est pas toujours le cas. Ainsi, quand 2 lignes apparaissent et qu'il n'y a eu aucun changement dans aucune des inscriptions, l'usager est prévenu qu'une interruption des relevés a pu avoir lieu par suite de changements secondaires au site.

PERIODES - L'année et le mois (Janvier - 01, Février - 02, etc) indiquent le début et la fin du programme. On utilise les symboles spéciaux suivants:

*	- programme effectué seulement au cours des mois d'été
$	- programme effectué seulement au cours des mois d'hiver
-----	- données non traitées
999 88	- données (de station d'étude de la pollution atmosphérique) non publiées. Peuvent être obtenues auprès de l'Administration centrale du SEA sur des fiches de projets spéciaux.

RELEVES METEOROLOGIQUES HORAIRES -

X - 24 heures sur 24
B - 8 observations par jour, soit toutes les 3 heures
C - 4 observations par jour, soit toutes les 6 heures
D - observations quotidiennes irrégulières
E - 8 observations par jour, soit toutes les 3 heures, plus des observations supplémentaires
F - 4 observations par jour, soit toutes les 6 heures, plus des observations supplémentaires
G - MARS (Station météorologique automatique) irrégulières
H - MARS, 24 heures sur 24
P - moins de 24 observations horaires effectuées chaque jour

INTENSITE DES PRECIPITATIONS -

X - pluviomètre à augets basculeurs
S - pluvionivomètre de Fischer et Porter
B - X et S réunis
W - Pluvionivomètre balance
V - Jauge Volumétrique

UPPER AIR -

X - rawinsonde (temperature, pressure, humidity and wind)
W - rawin (wind only)
T - radiosonde (temperature, pressure and humidity)

SOIL TEMPERATURE -

D - Daily readings
G - Graphical readings

EVAPORATION -

A - Type A pan
R - Type A pan using radioactive tracer (for Atomic Energy of Canada)

OZONE -

T - Total ozone and umkehr observations using Dobson spectrophotometer
S - Ozonesonde on a weekly basis (usually Wednesday)
O - T and S

SNOW SURVEY -

V - 5 points
X - 10 points

RADIATION -

A - Global solar radiation RF1
B - Sky radiation RF2
C - Reflected solar radiation RF3
D - Net radiation RF4
E - Daylight illumination RF7
F - A + B
G - A + C
H - A + D
J - A + B + C
K - A + B + C + D
L - A + C + D
M - A + B + C + D + E

AIR QUALITY -

T - turbidity
C - precipitation chemistry
B - T + C
P - particulate sampling
G - gaseous sampling

DISTANCE PARCOURUE PAR LE VENT -

B - Données traitées, à partir de relevés fournis par l'appareil enregistreur 45B
U - Données traitées à partir de relevés fournis par l'appareil enregistreur U2A
H - Données traitées à partir d'observations horaires effectuées par l'appareil U2A
J - Données traitées à partir d'observations horaires effectuées par l'appareil 45B

AEROLOGIE -

X - radiosonde - radiovent (température, pression, humidité et vent)
W - radiovent (vent seulement)
T - radiosonde (température, pression et humidité)

TEMPERATURE DU SOL -

D - lectures quotidiennes
G - lectures graphiques

EVAPORATION -

A - bac de type A
R - bac de type A utilisant un indicateur radioactif (pour l'Energie atomique du Canada)

OZONE -

T - observations d'ozone totales et observations Umkehr utilisant le spectrophotomètre Dobson
S - observations par sonde d'ozone une fois par semaine (d'ordinaire le mercredi)
O - T et S

RELEVES NIVOMETRIQUES -

V - 5 points
X - 10 points

RAYONNEMENT -

A - Rayonnement solaire global RF1
B - Rayonnement du ciel RF2
C - Rayonnement solaire réfléchi RF3
D - Rayonnement net RF4
E - Eclairement naturel RF7
F - A + B
G - A + C

ALL OTHER COLUMNS -

In the other columns an "X" indicates observations taken.

REGION -

W - Western
C - Central
Q - Quebec

H - A + D
J - A + B + C
K - A + B + C + D
L - A + C + D
M - A + B + C + D + E

QUALITE DE L'AIR -

T - turbidité
C - chimie des précipitations
B - T + C
P - échantillon de particules
G - échantillon gazeux

AUTRES COLONNES -

Dans les autres colonnes, le signe "X" indique que des observations ont eu lieu.

REGION -

W - Ouest
C - Centre
Q - Québec

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	YUKON TERRITORY																										
2100100	AISHIHIK A	YT	61 39	137 29	3170	1943 06	1943 11	X	P	X	X																W
2100100	AISHIHIK A	YT	61 39	137 29	3170	1943 12	1944 08	X	X	X	X																W
2100100	AISHIHIK A	YT	61 39	137 29	3170	1944 09	1966 09	X	X	X	X		B														W
2100120	ANVIL	YT	62 22	133 23	3850	1967 11	1969 11			X	X																W
2100120	ANVIL	YT	62 22	133 23	3800	1969 11	1970 08			X	X																W
2100120	ANVIL	YT	62 22	133 23	3800	1970 08	1971 05			X	X		B														W
2100120	ANVIL	YT	62 22	133 23	3800	1971 05	1971 10			X	X																W
2100120	ANVIL	YT	62 22	133 23	3800	1971 10	1972 04			X	X		B														W
2100120	ANVIL	YT	62 22	133 23	3800	1972 05	1973 07			X	X																W
2100120	ANVIL	YT	62 22	133 23	3800	1973 08				X	X		B														W
2100150+	BAGNALL BEACH	YT	69 35	140 10	30	1958 06	1960 12			X	X																W
2100150+	ALSO 2100685		69 35	140 10																							
2100160	BEAVER CREEK	YT	62 23	140 53	2175	1968 11	1968 11			X	X																W
2100160	BEAVER CREEK	YT	62 23	140 53	2175	1968 12	1969 02		D	X	X																W
2100160	BEAVER CREEK	YT	62 23	140 53	2175	1969 02	1972 05		D	X	X		B														W
2100160	BEAVER CREEK	YT	62 23	140 53	2175	1972 05	1975 05		B	X	X		B														W
2100160	BEAVER CREEK	YT	62 23	140 53	2175	1975 05			B	X	X	X	B														W
2100164	BONANZA CREEK	YT	63 58	139 21	1300	1975 05 *				X	X																W
2100167	BRAEBURN	YT	61 30	135 45	2100	1974 05				X	X																W
2100170	BROOKS BROOK	YT	60 30	133 23	2365	1944 02	1945 04	X	P	X	X																W
2100182	BURWASH A	YT	61 22	139 03	2628	1966 09	1974 07	X	X	X	X																W
2100182	BURWASH A	YT	61 22	139 03	2628	1974 07		X	X	X	X	X															W
2100190	CANYON CREEK	YT	60 52	137 08	2130	1944 01	1946 03	X	P	X	X																W
2100200	CARCROSS	YT	60 10	134 42		1907 01	1907 12			X	X																W
2100200	CARCROSS	YT	60 10	134 42		1909 01	1914 02			X	X																W
2100200	CARCROSS	YT	60 11	134 41	2160	1914 03	1928 03			X	X																W
2100200	CARCROSS	YT	60 11	134 41	2160	1934 08	1948 03			X	X																W
2100200	CARCROSS	YT	60 11	134 41	2160	1949 05	1950 12			X	X																W
2100200	CARCROSS	YT	60 10	134 42	2165	1953 12	1955 02			X	X																W
2100200	CARCROSS	YT	60 10	134 42	2165	1955 07	1955 09			X	X																W
2100200	CARCROSS	YT	60 10	134 42	2175	1959 05	1960 07			X	X																W
2100200	CARCROSS	YT	60 10	134 42	2180	1962 05	1962 09			X	X																W
2100200	CARCROSS	YT	60 11	134 41	2170	1963 09	1963 12			X	X																W
2100200	CARCROSS	YT	60 11	134 41	2170	1971 07	1971 07			X	X																W
2100200	CARCROSS	YT	60 11	134 41	2170	1973 01				X	X																W
2100300	CARMACKS	YT	62 06	136 18	1710	1950 09	1953 03			X	X																W

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								Synoptic Report	Hourly Weather	Temperature	Precipitation	Rate of Rainfall	Wind Mileage	Soil Temperature	Evaporation	Sunshine	Radiation	Ozone	Upper Air	Snow Survey	Tower	Air Quality	1	2	3	4	Region
2100300	CARMACKS	YT	62 06	136 18	1710	1963 08				X	X	X															W
2100310	CASINO CREEK	YT	62 41	138 50	3500	1969 08	1970 03			X	X																W
2100310	CASINO CREEK	YT	62 41	138 50	3500	1971 06	1973 04			X	X																W
2100350	CHAPMAN LAKE	YT	64 51	138 22		1960 04	1960 08		P																		W
2100365	CLINTON CREEK	YT	64 25	140 40	1100	1964 06 *	1964 08			X	X																W
2100365	CLINTON CREEK	YT	64 25	140 40	1100	1965 03	1966 08			X	X																W
2100366	CLINTON CREEK	YT	64 28	140 44	1950	1966 09	1967 05			X	X																W
2100366	CLINTON CREEK	YT	64 28	140 44	1895	1967 10				X	X																W
2100398	DAWSON	YT	64 04	139 20		1898 11	1901 03			X																	W
2100399	DAWSON	YT				1905 08	1905 10				X																W
2100400	DAWSON	YT	64 04	139 26	1062	1897 07	1897 12			X	X																W
2100400	DAWSON	YT	64 04	139 26	1062	1898 11	1899 02			X	X																W
2100400	DAWSON	YT	64 04	139 26	1062	1900 10	1901 07			X	X																W
2100400	DAWSON	YT	64 04	139 26	1062	1901 08	1937 03	X	D	X	X																W
2100400	DAWSON	YT	64 04	139 26	1062	1937 04	1937 12	X	D	X	X		B														W
2100400	DAWSON	YT	64 04	139 26	1062	1938 01	1953 08	X	D	X	X																W
2100400	DAWSON	YT	64 04	139 26	1062	1953 09	1954 06	X	F	X	X																W
2100400	DAWSON	YT	64 04	139 26	1062	1954 07	1960 02	X	F	X	X		B														W
2100400	DAWSON	YT	64 04	139 26	1062	1960 03	1966 12	X	X	X	X		B														W
2100400	DAWSON	YT	64 04	139 26	1062	1967 01		X	X	X	X																W
2100410	DEMPSTER	YT	64 27	138 13	3250	1966 06	1966 10			X	X																W
2100410	DEMPSTER	YT	64 27	138 13	3250	1967 04				X	X																W
2100412	DEMPSTER 177	YT	65 53	137 33	2370	1973 07	1974 08			X	X																W
2100415	DEMPSTER 203	YT	66 07	137 15	2020	1974 08				X	X																W
2100418	DESTRUCTION BAY	YT	61 15	138 48	2575	1975 03				X	X																W
2100420	DEVILS PASS	YT	60 31	134 10	2220	1944 02	1944 06	X	P	X	X																W
2100430	DEZADEASH	YT	60 22	137 02	2375	1974 07				X	X																W
2100460	DRURY CREEK	YT	62 12	134 23	1998	1970 01				X	X																W
2100470	EAGLE RIVER	YT	66 27	136 43	1065	1971 05 *	1972 06			X	X																W
2100500	ELSA	YT	63 55	135 29	2770	1948 10	1950 05				X																W
2100500	ELSA	YT	63 55	135 29	2770	1950 10	1951 06				X																W
2100500	ELSA	YT	63 55	135 29	2770	1951 11	1952 07				X																W
2100500	ELSA	YT	63 55	135 29	2770	1952 07	1955 01			X	X																W

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			° ′	° ′	(feet)	Began year mo.	Ended year mo.	Synoptic Report	Hourly Weather	Temperature	Precipitation	Rate of Rainfall	Wind Mileage	Soil Temperature	Evaporation	Sunshine	Radiation	Ozone	Upper Air	Snow Survey	Tower	Air Quality	1	2	3	4	
2100500	ELSA	YT	63 55	135 29	2770	1955 07	1959 12			X	X																W
2100500	ELSA	YT	63 55	135 29	2770	1960 10	1964 09			X	X																W
2100500	ELSA	YT	63 55	135 29	2770	1965 03	1965 04			X	X																W
2100500	ELSA	YT	63 55	135 29	2670	1974 04				X	X																W
2100515	FARO	YT	62 21	133 24	3525	1966 04	1968 02			X	X																W
2100516	FARO	YT	62 14	133 22	2278	1971 10	1972 01			X	X																W
2100516	FARO	YT	62 14	133 22	2278	1972 02	1972 02			X	X		B														W
2100516	FARO	YT	62 14	133 22	2278	1972 02	1972 09		D	X	X		B														W
2100516	FARO	YT	62 14	133 22	2278	1972 09	1974 12		D	X	X	X	B														W
2100516	FARO	YT	62 14	133 22	2278	1974 12		X	D	X	X	X	B														W
2100530	FISH LAKE	YT	60 10	132 03	2845	1944 02	1945 08	X	P	X	X																W
2100550	FLIGHT STRIP NUMBER 6	YT	60 40	133 28	2770	1945 04	1945 08	X	P	X	X																W
2100552	FLIGHT STRIP NUMBER 8	YT	61 25	139 07	2575	1944 04	1945 09	X	P	X	X																W
2100570	FORT CONSTANTINE	YT	64 26	140 34		1895 11	1897 08			X	X																W
2100600	FORT SELKIRK	YT				1898 11	1899 11			X	X																W
2100600	FORT SELKIRK	YT	62 47	137 17	1555	1951 12	1952 07			X	X																W
2100600	FORT SELKIRK	YT	62 49	137 22	1490	1954 06	1964 05			X	X																W
2100600	FORT SELKIRK	YT	62 49	137 22	1490	1964 06	1965 06			X	X				A												W
2100600	FORT SELKIRK	YT	62 49	137 22	1490	1965 07	1966 05			X	X	X			A												W
2100600	FORT SELKIRK	YT	62 49	137 22	1490	1966 06				X	X	X			A	S											W
2100604	FORTY MILE	YT	64 30	140 30	1000	1926 10	1927 06			X	X																W
2100610	FRANCES LAKE	YT	61 17	129 24	2425	1941 10	1947 09	X	P	X	X		B														W
2100610	FRANCES LAKE	YT	61 17	129 24	2425	1947 10	1948 05	X	P	X	X																W
2100610	FRANCES LAKE	YT	61 17	129 24	2425	1948 09	1949 05			X	X																W
2100612	FRANCES RIVER	YT	60 29	129 08	2274	1973 10						S															W
2100627	HAINES APPS #4	YT	60 49	137 44	2775	1969 12	1970 06			X																	W
2100627	HAINES APPS #4	YT	60 49	137 44	2775	1970 07	1971 09			X	X																W
2100630+	HAINES JUNCTION	YT	60 46	137 35	1965	1958 10	1958 10		D	X	X																W
2100630+	HAINES JUNCTION	YT	60 46	137 35	1965	1958 11	1959 04		D	X	X					S											W
2100630+	HAINES JUNCTION	YT	60 46	137 35	1965	1959 05	1961 09		D	X	X		B			S											W
2100630+	HAINES JUNCTION	YT	60 46	137 35	1965	1961 10	1962 02		D				B			S											W
2100630+	HAINES JUNCTION	YT	60 46	137 35	1965	1962 03	1962 08		D	X	X		B			S											W
2100630+	HAINES JUNCTION	YT	60 46	137 35	1965	1962 09	1963 04		D	X	X		B	D		S											W
2100630+	HAINES JUNCTION	YT	60 46	137 35	1965	1963 05	1964 06		D	X	X		B	D	A	S											W
2100630+	HAINES JUNCTION	YT	60 46	137 35	1965	1964 06	1969 12		D	X	X	X	B	D	A	S											W
2100630+	HAINES JUNCTION	YT	60 46	137 35	1965	1970 01	1971 10			X	X	X	B	D	A	S											W
2100630+	HAINES JUNCTION	YT	60 46	137 35	1965	1971 10	1972 09			X	X	X			A	S											W

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			° '	° '	(feet)	Began year mo.	Ended year mo.	Synoptic Report	Hourly Weather	Temperature	Precipitation	Rate of Rainfall	Wind Mileage	Soil Temperature	Evaporation	Sunshine	Radiation	Ozone	Upper Air	Snow Survey	Tower	Air Quality	1	2	3	4	
2100630	+HAINES JUNCTION	YT	60 46	137 35	1965	1972 10	1973 09			X	X					S											W
2100630	+HAINES JUNCTION	YT	60 46	137 35	1965	1973 10	1973 12			X	X		B	D		S											W
2100630	+HAINES JUNCTION	YT	60 46	137 35	1965	1974 01	1974 05		D	X	X		B	D		S											W
2100630	+HAINES JUNCTION	YT	60 46	137 35	1965	1974 05			D	X	X	X	B	D	A	S											W
2100630	+ ALSO 2100900		60 46	137 35																							
2100632	HART RIVER	YT	64 39	136 47	3000	1969 03	1969 04			X	X																W
2100635	HERSCHEL ISLAND	YT	69 30	139 15	15	1896 12	1899 08			X																	W
2100635	HERSCHEL ISLAND	YT	69 30	139 15	15	1899 09	1903 12			X	X																W
2100635	HERSCHEL ISLAND	YT	69 30	139 15	15	1904 01	1904 06	X	P	X	X																W
2100635	HERSCHEL ISLAND	YT	69 30	139 15	15	1904 07	1906 03			X	X																W
2100635	HERSCHEL ISLAND	YT	69 30	139 15	15	1915 12	1918 03	X	P	X	X																W
2100636	HERSCHEL ISLAND	YT	69 34	138 57	10	1974 07 *	1974 08			X	X		B														W
2100636	HERSCHEL ISLAND	YT	69 34	138 57	10	1974 09 *	1974 09		D	X	X		B														W
2100640	HYLAND RIVER STRIP	YT	61 30	128 16	2800	1973 10						S															W
2100650	IRON CREEK	YT	60 01	127 51	2850	1958 05	1960 04			X	X																W
2100670	JOHNSONS CROSSING	YT	60 29	133 20	2265	1963 08	1966 08			X	X	X															W
2100670	JOHNSONS CROSSING	YT	60 29	133 20	2265	1966 09				X	X																W
2100675	+KAY POINT	YT	69 20	138 43	37	1956 09	1956 10		P																		W
2100675	+KAY POINT	YT	69 20	138 43	37	1959 01	1960 12			X	X																W
2100675	+ ALSO 2101050		20 13																								
2100677	KENO HILL	YT	63 56	135 12	4830	1974 04				X	X																W
2100680	KLUANE LAKE	YT	61 00	138 30	2500	1946 05	1947 02			X	X																W
2100680	KLUANE LAKE	YT	61 01	138 24	2580	1970 05	1970 08			X																	W
2100680	KLUANE LAKE	YT	61 02	138 24	2580	1970 09	1971 05			X	X																W
2100680	KLUANE LAKE	YT	61 01	138 24	2580	1971 05	1971 08			X	X					S											W
2100680	KLUANE LAKE	YT	61 01	138 24	2580	1973 06	1974 05			X	X																W
2100680	KLUANE LAKE	YT	61 01	138 24	2580	1974 06	1975 02			X	X		B														W
2100680	KLUANE LAKE	YT	61 01	138 24	2580	1975 02				X	X		B							X							W
2100685	+KOMAKUK BEACH	YT	69 35	140 11	30	1961 01	1973 07			X	X																W
2100685	+KOMAKUK BEACH	YT	69 35	140 11	30	1973 07	1973 07	X	C	X	X																W
2100685	+KOMAKUK BEACH	YT	69 35	140 11	30	1973 08		X	C	X	X		B														W
2100685	+ ALSO 2100150		69 35	140 11																							
2100690	LITTLE GOLD CREEK	YT	64 05	141 00	4125	1974 05 *				X	X																W
2100695	MACMILLAN PASS	YT	63 10	130 12	4622	1970 08	1971 10			X	X																W
2100696	MACTUNG	YT	63 17	130 11	6200	1972 07 *	1973 09			X	X																W

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2100700	+MAYO LANDING	YT	63 36	135 53	1625	1924 10	1937 03	X	D	X	X																W
2100700	+MAYO LANDING	YT	63 36	135 53	1625	1937 04	1937 10	X	D	X	X		B														W
2100700	+MAYO LANDING	YT	63 36	135 53	1625	1937 11	1953 09	X	D	X	X																W
2100700	+MAYO LANDING	YT	63 36	135 53	1625	1953 10	1967 C9	X	F	X	X		B														W
2100700	+MAYO	YT	63 36	135 53	1625	1967 10	1967 11	X	D	X	X		B														W
2100700	+MAYO	YT	63 36	135 53	1625	1967 12	1968 03	X	D	X	X		B							V							W
2100700	+MAYO	YT	63 36	135 53	1625	1968 03	1968 08	X	E	X	X		B							V							W
2100700	+MAYO	YT	63 36	135 53	1625	1968 08	1968 10	X	D	X	X		B							V							W
2100700	+MAYO	YT	63 36	135 53	1625	1968 11	1969 02	X	E	X	X		B							V							W
2100700	+MAYO A	YT	63 37	135 52	1625	1969 02	1971 04	X	E	X	X		B							V							W
2100700	+MAYO A	YT	63 37	135 52	1625	1971 05	1971 09	X	X	X	X									V							W
2100700	+MAYO A	YT	63 37	135 52	1625	1971 10	1972 04	X	D	X	X		B							V							W
2100700	+MAYO A	YT	63 37	135 52	1625	1972 05	1972 09	X	X	X	X		B							V							W
2100700	+MAYO A	YT	63 37	135 52	1625	1972 10	1973 C4	X	D	X	X		B							V							W
2100700	+MAYO A	YT	63 37	135 52	1625	1973 05	1973 09	X	X	X	X		B							V							W
2100700	+MAYO A	YT	63 37	135 52	1625	1973 10	1974 04	X	D	X	X		B							V							W
2100700	+MAYO A	YT	63 37	135 52	1625	1974 04	1975 05	X	X	X	X									V							W
2100700	+MAYO A	YT	63 37	135 52	1625	1975 06		X	X	X	X	X								V							W
2100720	MCQUESTEN	YT	63 33	137 24	1400	1968 03 *	1968 08			X	X																W
2100740	MILE 34 BOUNDARY ROAD	YT	64 14	140 21	3400	1967 01 $	1971 07			X	X																W
2100740	MILE 34 BOUNDARY ROAD	YT	64 14	140 21	3400	1971 10				X	X																W
2100744	MINTO	YT	62 38	137 15	3000	1974 05 *				X	X																W
2100746	MOOSE CREEK	YT	63 31	137 01	1510	1972 08	1972 08			X	X																W
2100746	MOOSE CREEK	YT	63 31	137 01	1510	1973 09	1975 04			X	X																W
2100755	MOUNTAIN VIEW LODGE	YT	61 38	139 40	2275	1974 07 *				X	X																W
2100765	NEW IMPERIAL	YT	60 38	135 05	2625	1968 04	1969 04			X	X																W
2100794	OGILVIE RIVER	YT	65 22	138 19	1947	1971 05	1971 09			X	X																W
2100794	OGILVIE RIVER	YT	65 22	138 18	1900	1972 08				X	X																W
2100800	OLD CROW	YT	67 34	139 50	820	1951 09	1956 07			X	X																W
2100800	OLD CROW	YT	67 34	139 50	820	1968 11	1973 12			X	X																W
2100800	OLD CROW	YT	67 34	139 50	820	1974 04	1974 11			X	X																W
2100800	OLD CROW	YT	67 34	139 50	820	1974 12	1975 02			X	X		B														W
2100800	OLD CROW	YT	67 34	139 50	820	1975 03	1975 06						B														W
2100800	OLD CROW	YT	67 34	139 50	820	1975 07	1975 07					X	B														W
2100800	OLD CROW	YT	67 34	139 50	820	1975 08			D			X	B		A												W
2100830	ORCHIE LAKE	YT	62 10	131 45		1944 08	1945 03	X	P	X	X																W
2100860	PARKIN	YT	66 14	137 17	1750	1971 07	1971 11			X	X																W
2100860	PARKIN	YT	66 14	137 17	1750	1971 11	1973 09			X	X		B														W

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	(+ Indicates part of record under another name.)		° '	° '	(feet)	Began year mo.	Ended year mo.	Synoptic Report	Hourly Weather	Temperature	Precipitation	Rate of Rainfall	Wind Mileage	Soil Temperature	Evaporation	Sunshine	Radiation	Ozone	Upper Air	Snow Survey	Tower	Air Quality	1	2	3	4	
2100900+	PINE CREEK	YT	60 46	137 35	1960	1944 10	1945 10			X	X																W
2100900+	PINE CREEK	YT	60 46	137 35	1960	1945 11	1958 10			X	X					S											W
2100900+	ALSO 2100630		60 46	137 35																							
2100910	QUIET LAKE	YT	61 09	133 04	2665	1966 11	1968 10			X	X																W
2100910	QUIET LAKE	YT	61 09	133 04	2665	1969 03 *				X	X																W
2100920	RAMPART HOUSE	YT				1918 09	1918 10			X	X																W
2100920	RAMPART HOUSE	YT				1919 03	1919 08			X	X																W
2100930	RANCHERIA	YT	60 05	130 10	2770	1944 01	1944 05	X	P	X	X																W
2100930	RANCHERIA	YT	60 05	130 10	2770	1945 03	1945 08	X	P	X	X																W
2100935	ROCK RIVER	YT	66 47	136 20	2000	1974 09						S															W
2100938	ROSS RIVER	YT	62 02	132 25	2316	1944 02	1944 08	X	P	X	X																W
2100940	ROSS RIVER	YT	61 59	132 26	2300	1961 12	1962 05			X																	W
2100940	ROSS RIVER	YT	61 59	132 26	2300	1962 05	1962 05			X	X																W
2100940	ROSS RIVER	YT	61 58	132 26	2260	1963 08	1964 05			X	X	X															W
2100940	ROSS RIVER	YT	61 58	132 26	2260	1966 12	1966 12			X	X																W
2100940	ROSS RIVER	YT	61 59	132 27	2290	1967 04				X	X																W
2100945	SAM LAKE	YT	68 25	138 37	1500	1974 05	1974 09			X	X																W
2100948	SHELDON LAKE	YT	62 37	131 17	2900	1970 07 *				X	X																W
2100950	SHINGLE POINT	YT	68 57	137 13	174	1956 05	1957 06		P																		W
2100950	SHINGLE POINT	YT	68 57	137 13	174	1957 06	1973 07			X	X																W
2100950	SHINGLE POINT	YT	68 57	137 13	182	1973 07		X	C	X	X		B														W
2101000	SNAG A	YT	62 22	140 24	1925	1943 08	1944 08	X	X	X	X																W
2101000	SNAG A	YT	62 22	140 24	1925	1944 09	1966 09	X	X	X	X		B														W
2101030	STEWART CROSSING	YT	63 22	136 40	1800	1963 09	1964 04			X	X	X															W
2101030	STEWART CROSSING	YT	63 23	136 40	1575	1974 08				X	X																W
2101050+	STOKES POINT	YT	69 20	138 46	100	1961 01	1963 07			X	X																W
2101050+	ALSO 2100675		69 20	138 46																							
2101070	SWEDE CREEK	YT	64 06	139 45	1050	1918 07	1929 01			X	X					S											W
2101080	SWIFT RIVER	YT	60 00	131 05	3415	1944 02	1946 02	X	P	X	X																W
2101081	SWIFT RIVER	YT	60 00	131 11	2924	1966 11				X	X																W
2101090	TAGISH	YT	60 17	134 15		1898 07	1900 08			X	X																W
2101091	TAGISH CREEK	YT	60 18	134 16	2500	1968 07	1969 06					S															W

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2101100	TESLIN A	YT	60 10	132 45	2300	1943 09	1943 09		X																		W
2101100	TESLIN A	YT	60 10	132 45	2300	1943 10	1945 07	X	X	X	X																W
2101100	TESLIN A	YT	60 10	132 45	2300	1945 08	1949 01	X	X	X	X		B														W
2101100	TESLIN A	YT	60 10	132 45	2300	1949 02	1949 10	X	X	X	X																W
2101100	TESLIN A	YT	60 10	132 45	2300	1949 11	1966 12	X	X	X	X		B														W
2101100	TESLIN A	YT	60 10	132 45	2300	1967 01	1967 05	X	X	X	X																W
2101100	TESLIN A	YT	60 10	132 45	2300	1967 06	1975 06	X	X	X	X	X															W
2101100	TESLIN A	YT	60 10	132 45	2300	1975 06		X	D	X	X	X															W
2101135+	TUCHITUA	YT	60 55	129 15	2490	1971 01				X	X																W
2101135+	ALSO 2101180		60 55	129 15																							
2101150	VICTORIA GULCH	YT				1905 08	1905 09				X																W
2101180+	WATROSS	YT	60 55	129 15	2490	1967 01	1970 12			X	X																W
2101180+	ALSO 2101135		60 55	129 15																							
2101200	WATSON LAKE A	YT	60 07	128 49	2248	1938 10	1938 10	X	P	X	X																W
2101200	WATSON LAKE A	YT	60 07	128 49	2248	1938 11	1942 02	X	P	X	X		B														W
2101200	WATSON LAKE A	YT	60 07	128 49	2248	1942 04	1964 11	X	X	X	X		B														W
2101200	WATSON LAKE A	YT	60 07	128 49	2248	1964 12	1966 12	X	X	X	X		B							V							W
2101200	WATSON LAKE A	YT	60 07	128 49	2248	1967 01	1969 05	X	X	X	X									V							W
2101200	WATSON LAKE A	YT	60 07	128 49	2248	1969 06	1969 09	X	X	X	X					S				V							W
2101200	WATSON LAKE A	YT	60 07	128 49	2248	1969 10		X	X	X	X	X		D		S				V							W
2101290	WHITEHORSE	YT				1900 07	1900 08			X																	W
2101290	WHITEHORSE	YT	60 45	135 00	2075	1904 11	1907 12			X	X																W
2101290	WHITEHORSE	YT	60 45	135 00	2075	1909 01	1911 01			X	X																W
2101290	WHITEHORSE	YT	60 43	135 03	2087	1940 09	1942 03	X	P	X	X																W
2101290	WHITEHORSE	YT	60 43	135 03	2087	1959 02	1960 07			X																	W
2101300	WHITEHORSE A	YT	60 43	135 04	2289	1942 04	1942 06	X	P	X	X		B														W
2101300	WHITEHORSE A	YT	60 43	135 04	2289	1942 07	1946 04	X	X	X	X		B														W
2101300	WHITEHORSE A	YT	60 43	135 04	2289	1946 05	1957 02	X	X	X	X		B						X								W
2101300	WHITEHORSE A	YT	60 43	135 04	2289	1957 03	1959 07	X	X	X	X		B			S			X								W
2101300	WHITEHORSE A	YT	60 43	135 04	2289	1959 08	1965 02	X	X	X	X	X	B			S			X								W
2101300	WHITEHORSE A	YT	60 43	135 04	2289	1965 03	1966 12	X	X	X	X	X	B			S			X	X							W
2101300	WHITEHORSE A	YT	60 43	135 04	2289	1967 01	1970 07	X	X	X	X	X				S			X	X							W
2101300	WHITEHORSE A	YT	60 43	135 04	2289	1970 07	1974 07	X	X	X	X	X				S	H		X	X							W
2101300	WHITEHORSE A	YT	60 43	135 04	2289	1974 07		X	X	X	X	X			A	S	H		X	X							W
2101400	WHITEHORSE RIVERDALE	YT	60 42	135 02	2103	1959 02	1970 08			X																	W
2101400	WHITEHORSE RIVERDALE	YT	60 43	135 02	2100	1970 08	1973 08			X																	W
2101400	WHITEHORSE RIVERDALE	YT	60 43	135 02	2100	1973 09				X	X																W
2101600	WOLF CREEK	YT	60 35	134 57	2450	1969 03	1972 06			X	X																W
2101600	WOLF CREEK	YT	60 35	134 57	2450	1972 12	1974 06			X	X																W

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	NORTHWEST TERRITORIES																										
2200100	AKLAVIK	NWT	68 14	135 00	30	1926 07	1927 02	X	P	X	X																W
2200100	AKLAVIK	NWT	68 14	135 00	30	1927 08	1939 02	X	P	X	X																W
2200100	AKLAVIK	NWT	68 14	135 00	30	1940 01	1942 08	X	P	X	X																W
2200100	AKLAVIK	NWT	68 14	135 00	30	1942 09	1944 11	X	P	X	X								X								W
2200100	AKLAVIK	NWT	68 14	135 00	30	1944 12	1948 07	X	P	X	X		B						X								W
2200100	AKLAVIK	NWT	68 14	135 00	30	1948 08	1954 12	X	C	X	X		B				A		X								W
2200100	AKLAVIK	NWT	68 14	135 00	30	1955 01	1956 02	X	B	X	X		B				A		X								W
2200100	AKLAVIK	NWT	68 14	135 00	30	1956 02	1960 09	X	B	X	X		B			S	A		X								W
2200100	AKLAVIK	NWT	68 14	135 00	30	1960 10	1960 11	X	B	X	X																W
2200100	AKLAVIK	NWT	68 14	135 00	30	1961 05	1962 03			X	X																W
2200150	+AKLAVIK EAST 3	NWT	68 18	133 29	198	1955 04	1956 06						B														W
2200150	+AKLAVIK EAST 3	NWT	68 18	133 29	198	1957 01	1957 01			X	X																W
2200150	+AKLAVIK EAST 3	NWT	68 18	133 29	198	1957 02	1957 12			X	X		B														W
2200150	+ ALSO 2202570		68 18	133 29																							
2200200	AKLAVIK RADIOSONDE	NWT	68 14	135 00	30	1953 03	1960 09			X	X																W
2400300	ALERT	NWT	82 30	62 20	205	1950 06	1950 08	X	P	X	X																C
2400300	ALERT	NWT	82 30	62 20	205	1950 09	1950 09	X	P	X	X								X								C
2400300	ALERT	NWT	82 30	62 20	205	1950 10	1964 06	X	B	X	X		B						X								C
2400300	ALERT	NWT	82 30	62 20	205	1964 07	1966 10	X	B	X	X		3				H		X								C
2400300	ALERT	NWT	82 30	62 20	205	1966 11	1967 07	X	B	X	X		B				H		X	X							C
2400300	ALERT	NWT	82 30	62 20	205	1967 08	1967 08	X	B	X	X		B			S	H		X	X							C
2400300	ALERT	NWT	82 30	62 20	205	1967 09	1968 06	X	B	X	X		B				H		X	X							C
2400300	ALERT	NWT	82 30	62 20	205	1968 07	1974 11	X	B	X	X		B			S	H		X	X							C
2400300	ALERT	NWT	82 30	62 20	205	1974 12	1975 07	X	B	X	X		B			S	H		X	X							C
2400300	ALERT	NWT	82 30	62 20	205	1975 07		X	B	X	X		U			S	H		X	X							C
2200310	ANGUS TOWER	NWT	60 26	114 28	780	1968 06 *	1971 09			X	X																W
2200310	ANGUS TOWER	NWT	60 26	114 28	780	1973 05 *				X	X																W
2400400	ARCTIC BAY	NWT	73 00	85 18	36	1937 09	1943 03	X	P	X	X																C
2400400	ARCTIC BAY	NWT	73 00	85 18	36	1943 04	1943 10	X	P	X	X								X								C
2400400	ARCTIC BAY	NWT	73 00	85 18	36	1943 11	1957 07	X	P	X	X		B						X								C
2400400	ARCTIC BAY	NWT	73 00	85 18	36	1957 08	1960 07	X	P	X	X		B														C
2400400	ARCTIC BAY	NWT	73 00	85 18	36	1960 08	1964 11	X	P	X	X																C
2400400	ARCTIC BAY	NWT	73 00	85 18	36	1964 12	1966 05			X	X																C
2400400	ARCTIC BAY	NWT	73 00	85 18	36	1971 01	1973 09	X	C	X	X		B														C
2400400	ARCTIC BAY	NWT	73 02	85 09	36	1973 09	1974 05	X	C	X	X		B														C
2400400	ARCTIC BAY	NWT	73 02	85 09	36	1974 09		X	D	X	X		B														C
2200412	ARCTIC RED RIVER	NWT	69 28	133 44	100	1974 06 *				X	X																W
2200430	ATKINSON POINT	NWT	69 56	131 24	10	1959 01	1963 08			X	X																H

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2500480	BACHE PENINSULA	NWT	79 10	76 45	10	1930 09	1933 03	X	P	X	X																C
2200495	BAKER CREEK	NWT	62 31	114 22	650	1969 08						S															W
2300500	BAKER LAKE	NWT	64 10	96 00	30	1934 05	1935 08			X	X																C
2300500	BAKER LAKE	NWT	64 18	96 00	41	1946 02	1949 01	X	D	X	X																C
2300500	BAKER LAKE	NWT	64 18	96 00	41	1949 02	1951 10	X	D	X	X								X								C
2300500	BAKER LAKE	NWT	64 18	96 00	41	1951 11	1955 05	X	D	X	X		B						X								C
2300500	BAKER LAKE	NWT	64 18	96 00	41	1955 06	1962 10	X	B	X	X		B						X								C
2300500	BAKER LAKE	NWT	64 18	96 00	41	1962 11	1964 09	X	X	X	X		B						X								C
2300500	BAKER LAKE	NWT	64 18	96 00	41	1964 10	1964 11	X	X	X	X		B	D					X								C
2300500	BAKER LAKE	NWT	64 18	96 00	41	1964 12	1966 12	X	X	X	X		B	D					X	X							C
2300500	BAKER LAKE	NWT	64 18	96 00	41	1967 01	1969 09	X	X	X	X			D					X	X							C
2300500	BAKER LAKE	NWT	64 18	96 00	41	1969 10	1970 07	X	X	X	X			D			D		X	X							C
2300500	BAKER LAKE	NWT	64 18	96 00	41	1970 07		X	X	X	X			D		S	H		X	X							C
2300502	BAKER LAKE SHELL ISLAND	NWT	64 00	94 23		1946 08	1946 08	X	P	X	X																C
2200550	BATHURST INLET	NWT	66 50	108 01	44	1956 09	1958 01		P																		W
2200550	BATHURST INLET	NWT	66 50	108 01	44	1958 02	1958 12		P	X	X																W
2200550	BATHURST INLET	NWT	66 50	108 01	44	1959 01	1962 08	X	X	X	X																W
2400552	BATHURST ISLAND	NWT	75 43	98 25	10	1971 05 *	1973 03			X	X																C
~~2400552~~	~~BATHURST ISLAND~~	~~NWT~~	~~75 43~~	~~98 25~~	~~10~~	~~1973 04 *~~	~~1973 04~~			~~X~~	~~X~~		~~B~~														C
2400552	BATHURST ISLAND	NWT	75 43	98 25	10	1973 05 *				X	X		B			S											C
2200555	BERNARD HARBOUR	NWT	68 47	114 50	140	1914 10	1915 10	X	P	X	X																H
2200555	BERNARD HARBOUR	NWT	68 47	114 50	140	1916 05	1916 06	X	P	X	X																H
2200555	BERNARD HARBOUR	NWT	68 47	114 50	140	1959 01	1963 07			X	X																H
2400557	BLACKLEAD ISLAND	NWT		66 12	50	1903 11	1905 07			X	X																Q
2400560	BRAY ISLAND	NWT	69 14	77 13	69	1955 11	1957 04		P																		H
2400560	BRAY ISLAND	NWT	69 14	77 13	69	1959 01	1963 07			X	X																H
2400565	BREVOORT ISLAND	NWT	63 21	64 10	1216	1957 03	1957 06		D																		H
2400565	BREVOORT ISLAND	NWT	63 21	64 10	1216	1959 11	1960 03			X	X																H
2400565	BREVOORT ISLAND	NWT	63 21	64 10	1216	1960 04	1974 03	X	C	X	X																H
2400565	BREVOORT ISLAND	NWT	63 21	64 10	1216	1974 04	1975 06	X	C	X	X																W
2400570	BROUGHTON ISLAND	NWT	67 33	63 47	1905	1956 06	1957 08		D																		H
2400570	BROUGHTON ISLAND	NWT	67 33	63 47	1905	1957 09	1960 03			X	X																H
2400570	BROUGHTON ISLAND	NWT	67 33	63 47	1905	1960 03	1974 03	X	C	X	X																H
2400570	BROUGHTON ISLAND	NWT	67 33	63 47	1905	1974 04		X	C	X	X																W
2400574	BROUGHTON VILLAGE	NWT	67 33	64 02	30	1971 06				X	X																W
~~2500595+BYRON BAY~~		~~NWT~~	~~68 45~~	~~109 04~~	~~367~~	~~1961 01~~	~~1974 03~~	~~X~~	~~C~~	~~X~~	~~X~~																H
2500595+BYRON BAY		NWT	68 45	109 04	367	1974 04		X	C	X	X																W

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								Synoptic Report	Hourly Weather	Temperature	Precipitation	Rate of Rainfall	Wind Mileage	Soil Temperature	Evaporation	Sunshine	Radiation	Ozone	Upper Air	Snow Survey	Tower	Air Quality	1	2	3	4	Region
2500595+ ALSO 2503940			68 45	109 04																							
2200597	CADILLAC MINE	NWT	61 32	124 45	2850	1970 01	1970 11			X	X																W
2500600+	CAMBRIDGE BAY	NWT	69 07	105 01	47	1927 09	1927 12	X	P																		W
2500600+	CAMBRIDGE BAY	NWT	69 07	105 01	47	1929 01	1929 07	X	P	X	X																W
2500600+	CAMBRIDGE BAY	NWT	69 07	105 01	47	1930 06	1932 07	X	P	X	X																W
2500600+	CAMBRIDGE BAY	NWT	69 07	105 01	47	1934 10	1935 09	X	P	X	X																W
2500600+	CAMBRIDGE BAY	NWT	69 07	105 01	47	1935 10	1937 06			X																	W
2500600+	CAMBRIDGE BAY	NWT	69 07	105 01	47	1937 07	1938 07	X	P	X	X																W
2500600+	CAMBRIDGE BAY	NWT	69 07	105 01	47	1939 01	1939 06			X	X																W
2500600+	CAMBRIDGE BAY	NWT	69 07	105 01	47	1939 11	1947 05	X	P	X	X																W
2500600+	CAMBRIDGE BAY	NWT	69 07	105 01	47	1948 01	1948 05	X	P	X	X																W
2500600+	CAMBRIDGE BAY	NWT	69 07	105 01	47	1948 06	1955 04	X	P	X	X		B														W
2500600+	CAMBRIDGE BAY	NWT	69 07	105 01	47	1955 05	1959 12	X	P	X	X		B														W
2500600+	CAMBRIDGE BAY	NWT	69 07	105 01	47	1960 01	1960 10	X	X	X	X																W
2500600+	CAMBRIDGE BAY A	NWT	69 06	105 07	74	1960 11	1965 11	X	X	X	X		B														W
2500600+	CAMBRIDGE BAY A	NWT	69 06	105 07	74	1965 12	1966 12	X	X	X	X		b							V							W
2500600+	CAMBRIDGE BAY A	NWT	69 06	105 07	74	1967 01	1968 04	X	X	X	X									V							W
2500600+	CAMBRIDGE BAY A	NWT	69 06	105 07	74	1968 05	1968 07	X	X	X	X					S				V							W
2500600+	CAMBRIDGE BAY A	NWT	69 06	105 07	74	1968 08	1970 02	X	X	X	X	X				S				V							W
2500600+	CAMBRIDGE BAY A	NWT	69 06	105 07	74	1970 02	1971 10	X	X	X	X	X				S			X	V							W
2500600+	CAMBRIDGE BAY A	NWT	69 06	105 07	74	1971 10		X	X	X	X	X				S	A		X	V							W
2200606	CAMERON HILLS	NWT	60 18	117 03	2760	1974 05 *	1974 05			X	X																W
2200615	CAMSELL RIVER	NWT	63 30	112 00		1933 12	1934 03			X	X																W
2200620	CAN TUNG	NWT	62 01	128 21	6000	1973 10						S															W
2400635	CAPE DORSET	NWT	64 14	77 15	20	1915 03	1915 03	X	P	X	X																Q
2400635	CAPE DORSET	NWT	64 14	77 15	20	1916 09	1917 09	X	P	X	X																Q
2400635	CAPE DORSET	NWT	64 14	77 15	20	1963 02	1964 03			X	X																Q
2400635	CAPE DORSET	NWT	64 13	76 33	30	1970 09	1971 01	X	E	X	X	X	B			S											Q
2400635	CAPE DORSET	NWT	64 13	76 33	30	1971 02		X	E	X	X	X	B			S				X							Q
2400650	CAPE DYER	NWT	66 39	61 23	2371	1955 12	1957 09		X																		Q
2400650	CAPE DYER	NWT	66 39	61 23	2371	1958 01	1959 07	X	8	X	X																Q
2400654	CAPE DYER A	NWT	66 35	61 37	1232	1959 08	1966 10	X	X	X	X																Q
2400654	CAPE DYER A	NWT	66 35	61 37	1232	1966 11		X	X	X	X									V							Q
2400658	CAPE HERSCHEL	NWT	78 37	74 42	197	1973 06	1973 08	X	C	X	X					S											W
2400658	CAPE HERSCHEL	NWT	78 37	74 42	197	1973 09	1974 09	X	C	X	X		B			S											W
2400660	CAPE HOOPER	NWT	68 26	66 47	1316	1956 03	1956 12		X																		H
2400660	CAPE HOOPER	NWT	68 26	66 47	1316	1957 01	1957 04		X	X	X																H
2400660	CAPE HOOPER	NWT	68 26	66 47	1316	1957 05	1957 06		X																		H
2400660	CAPE HOOPER	NWT	68 26	66 47	1316	1957 08	1974 03	X	C	X	X																H

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						Began year mo.	Ended year mo.	Synoptic Report	Hourly Weather	Temperature	Precipitation	Rate of Rainfall	Wind Mileage	Soil Temperature	Evaporation	Sunshine	Radiation	Ozone	Upper Air	Snow Survey	Tower	Air Quality	1	2	3	4	
2400660	CAPE HOOPER	NWT	68 26	66 47	1316	1974 04		X	C	X	X																W
2500667	CAPE NOREM	NWT	77 28	110 28	45	1970 04	1970 08			X	X																W
2200670+	CAPE PARRY	NWT	70 10	124 41	50	1955 08	1956 06	X	X	X	X																W
2200670+	CAPE PARRY	NWT	70 10	124 41	50	1956 07	1957 04		X																		W
2200670+	CAPE PARRY	NWT	70 10	124 41	50	1957 05	1959 09	X	B	X	X																W
2200670+	ALSO 2200675		70 10	124 41																							
2200675+	CAPE PARRY A	NWT	70 10	124 41	53	1959 09	1964 12	X	X	X	X																W
2200675+	CAPE PARRY A	NWT	70 10	124 41	53	1965 01		X	X	X	X									V							W
2200675+	ALSO 2200670		70 10	124 41																							
2200680	CAPE PEEL	NWT	69 03	107 19	192	1959 01	1963 07			X	X																H
2200690+	CAPE YOUNG	NWT	68 56	116 55	55	1961 01	1973 05			X	X																H
2200690+	CAPE YOUNG	NWT	68 56	116 55	59	1973 05	1974 03	X	C	X	X																H
2200690+	CAPE YOUNG	NWT	68 56	116 55	59	1974 04	1974 06	X	C	X	X																W
2200690+	CAPE YOUNG	NWT	68 56	116 55	59	1974 06		X	C	X	X		B														W
2200690+	ALSO 2204300		68 56	116 55																							
2300700	CHESTERFIELD	NWT	63 20	90 43	21	1930 09	1931 08	X	P	X	X		B														C
2300700	CHESTERFIELD	NWT	63 20	90 43	21	1931 09	1934 07	X	P	X	X																C
2300700	CHESTERFIELD	NWT	63 20	90 43	21	1934 08	1935 02	X	P	X	X		B														C
2300700	CHESTERFIELD	NWT	63 20	90 43	21	1935 03	1935 06	X	P	X	X																C
2300700	CHESTERFIELD	NWT	63 20	90 43	21	1935 07	1935 11	X	P	X	X		B														C
2300700	CHESTERFIELD	NWT	63 20	90 43	21	1935 12	1937 09	X	P	X	X																C
2300700	CHESTERFIELD	NWT	63 20	90 43	21	1937 10	1955 12	X	B	X	X		B														C
2300700	CHESTERFIELD	NWT	63 20	90 43	21	1956 01	1956 08	X	B	X	X																C
2300700	CHESTERFIELD	NWT	63 20	90 43	21	1956 09	1962 10	X	B	X	X		B														C
2300700	CHESTERFIELD	NWT	63 20	90 43	21	1962 10	1966 12	X	X	X	X		B														C
2300700	CHESTERFIELD	NWT	63 20	90 43	21	1967 01	1968 06	X	X	X	X																C
2300700	CHESTERFIELD	NWT	63 20	90 43	21	1968 06	1973 03	X	E	X	X		B														C
2300700	CHESTERFIELD	NWT	63 20	90 43	21	1973 04		X	F	X	X		B														C
2300705	CHESTERFIELD INLET	NWT	63 45	91 50	48	1921 11	1931 12	X	P	X	X																C
2200730	CLIFTON POINT	NWT	69 12	118 38	107	1957 06	1957 06		P																		H
2200730	CLIFTON POINT	NWT	69 12	118 38	107	1959 01	1963 07			X	X																H
2200750	CLINTON POINT	NWT	69 35	120 45	330	1955 08	1957 05		C																		H
2200750	CLINTON POINT	NWT	69 35	120 45	330	1957 06	1973 11	X	C	X	X																H
2200750	CLINTON POINT	NWT	69 35	120 45	330	1973 11	1974 03	X	C	X	X		U														H
2200750	CLINTON POINT	NWT	69 35	120 45	330	1974 04		X	C	X	X		U														W
2400800	CLYDE	NWT	70 27	68 33	10	1933 09	1933 12			X	X																Q
2400800	CLYDE	NWT	70 27	68 33	10	1942 11	1943 09	X	P	X	X																Q
2400800	CLYDE	NWT	70 27	68 33	10	1946 02	1948 08	X	P	X	X																Q
2400800	CLYDE	NWT	70 27	68 33	10	1948 09	1954 09	X	P	X	X							X									Q

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2400800	CLYDE	NWT	70 27	68 33	10	1954 10	1959 09	X	P	X	X		B						X								Q
2400800	CLYDE	NWT	70 27	68 33	10	1959 10	1960 08	X	P	X	X								X								Q
2400800	CLYDE	NWT	70 27	68 33	10	1960 09	1963 01	X	P	X	X		B						X								Q
2400800	CLYDE	NWT	70 27	68 33	10	1963 02	1963 10	X	P	X	X								X								Q
2400800	CLYDE	NWT	70 27	68 33	10	1963 11	1965 01	X	P	X	X		B						X								Q
2400800	CLYDE	NWT	70 27	68 33	10	1965 02	1968 09	X	P	X	X		B						X	X							Q
2400800	CLYDE	NWT	70 27	68 33	10	1968 10	1970 07	X	P	X	X		B			S			X	X							Q
2400800	CLYDE	NWT	70 27	68 33	10	1970 08	1971 03	X	B	X	X		B							X							Q
2400800	CLYDE	NWT	70 27	68 33	10	1971 04	1975 08	X	B	X	X		B			S				X							Q
2400800	CLYDE	NWT	70 27	68 33	10	1975 08	1975 11	X	C	X	X		B			S				X							Q
2400800	CLYDE	NWT	70 27	68 33	10	1975 11		X	B	X	X		B			S				X							Q
2400815	COBURG ISLAND	NWT	75 54	79 02	10	1972 07	1972 08									S											W
2400815	COBURG ISLAND	NWT	75 54	79 02	10	1972 09	1973 09	X	C	X	X					S											W
2400815	COBURG ISLAND	NWT	75 55	79 00	10	1973 09	1974 09	X	C	X	X		B			S											W
2200850	CONTWOYTO LAKE	NWT	65 29	110 22	1481	1956 07	1958 12		D																		W
2200850	CONTWOYTO LAKE	NWT	65 29	110 22	1481	1959 01	1962 08	X	X	X	X																W
2200850	CONTWOYTO LAKE	NWT	65 29	110 22	1481	1962 09		X	D	X	X																W
2200900	COPPERMINE	NWT	67 50	115 07	28	1930 10	1931 07	X	P	X	X																W
2200900	COPPERMINE	NWT	67 50	115 07	28	1932 08	1936 12	X	P	X	X																W
2200900	COPPERMINE	NWT	67 50	115 07	28	1937 01	1937 01	X	P	X	X		B														W
2200900	COPPERMINE	NWT	67 50	115 07	28	1937 02	1937 05	X	P	X	X																W
2200900	COPPERMINE	NWT	67 50	115 07	28	1937 06	1947 10	X	P	X	X		B														W
2200900	COPPERMINE	NWT	67 50	115 07	28	1947 11	1948 12	X	P	X	X		B						X								W
2200900	COPPERMINE	NWT	67 50	115 07	28	1949 01	1965 11	X	P	X	X		B			S			X								W
2200900	COPPERMINE	NWT	67 50	115 07	28	1965 12	1969 07	X	P	X	X		B			S			X	X							W
2200900	COPPERMINE	NWT	67 50	115 07	28	1969 07	1970 02	X	X	X	X					S			X	X							W
2200900	COPPERMINE	NWT	67 50	115 07	28	1970 02		X	X	X	X					S											W
2301000	CORAL HARBOUR A	NWT	64 12	83 22	193	1933 10	1935 07	X	B	X	X																C
2301000	CORAL HARBOUR A	NWT	64 12	83 22	193	1945 03	1945 08	X	B	X	X																C
2301000	CORAL HARBOUR A	NWT	64 12	83 22	193	1945 09	1945 09	X	B	X	X								X								C
2301000	CORAL HARBOUR A	NWT	64 12	83 22	193	1945 10	1950 03	X	B	X	X		B						X								C
2301000	CORAL HARBOUR A	NWT	64 12	83 22	193	1950 05	1951 03	X	B	X	X								X								C
2301000	CORAL HARBOUR A	NWT	64 12	83 22	193	1951 04	1955 04	X	B	X	X		B						X								C
2301000	CORAL HARBOUR A	NWT	64 12	83 22	193	1955 05	1964 12	X	X	X	X		B						X								C
2301000	CORAL HARBOUR A	NWT	64 12	83 22	193	1965 01	1966 12	X	X	X	X		B						X	X							C
2301000	CORAL HARBOUR A	NWT	64 12	83 22	193	1967 01	1968 09	X	X	X	X								X	X							C
2301000	CORAL HARBOUR A	NWT	64 12	83 22	193	1968 09	1968 10	X	X	X	X								X	X							C
2301000	CORAL HARBOUR A	NWT	64 12	83 22	193	1968 11	1970 06	X	X	X	X					S			X	X							C
2301000	CORAL HARBOUR A	NWT	64 12	83 22	193	1970 06		X	X	X	X					S	A		X	X							C
2501015	CRAIG HARBOUR	NWT	76 20	80 50	10	1922 09	1923 06			X	X																C
2501017	CRAIG HARBOUR	NWT	76 12	79 35	12	1933 09	1940 07	X	P	X	X																C
2401025	DEVON ISLAND	NWT	74 40	84 40		1961 09	1962 07		P	X	X																C

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2401030+	DEWAR LAKES	NWT	68 39	71 14	1700	1961 01	1974 03	X	C	X	X																H
2401030+	DEWAR LAKES	NWT	68 39	71 14	1700	1974 04		X	C	X	X																W
2401030+	ALSO 2402690		68 39	71 14																							
2401050	DUNDAS HARBOUR	NWT	74 30	82 30	18	1930 09	1933 08	X	P	X	X																C
2401050	DUNDAS HARBOUR	NWT	74 30	82 30	18	1945 10	1948 12	X	P	X	X																C
2401050	DUNDAS HARBOUR	NWT	74 30	82 30	18	1949 05	1949 10	X	P	X	X																C
2401050	DUNDAS HARBOUR	NWT	74 30	82 30	18	1950 05	1950 08	X	P	X	X																C
2401060+	DURBAN	NWT	67 06	62 09	2180	1959 01	1959 12		P																		H
2401060+	DURBAN ISLAND	NWT	67 06	62 09	2180	1960 01	1963 07			X	X																H
2401060+	ALSO 2403010		67 06	62 09																							
2501070	EAST DRAKE	NWT	76 25	107 49	0	1974 11	1975 04		D																		W
2401080+	EAST SIMPSON	NWT	68 24	88 13	265	1955 09	1957 05		P																		H
2401080+	EAST SIMPSON	NWT	68 24	88 13	265	1959 01	1960 12			X	X																H
2401080+	ALSO 2402665		68 24	88 13																							
2401090+	EKALUGAD	NWT	68 43	68 33	2375	1956 08	1957 04		P																		H
2401090+	EKALUGAD	NWT	68 43	68 33	2375	1959 01	1960 12			X	X																H
2401090+	EKALUGAD FIORD	NWT	68 43	68 33	2375	1961 01	1963 08			X	X																H
2301100	ENNADAI LAKE	NWT	61 08	100 55	1065	1949 01	1949 08		P																		C
2301100	ENNADAI LAKE	NWT	61 08	100 55	1065	1949 10	1952 12	X	P	X	X																C
2301100	ENNADAI LAKE	NWT	61 08	100 55	1065	1953 01	1956 04	X	P	X	X		B														C
2301100	ENNADAI LAKE	NWT	61 08	100 55	1065	1956 05	1966 12	X	X	X	X		B														C
2301100	ENNADAI LAKE	NWT	61 08	100 55	1065	1967 01	1967 06	X	X	X	X																C
2301100	ENNADAI LAKE	NWT	61 08	100 55	1065	1967 07	1967 12	X	P	X	X		B														C
2301100	ENNADAI LAKE	NWT	61 08	100 55	1065	1967 12	1975 09	X	F	X	X		B							X							C
2301100	ENNADAI LAKE	NWT	61 08	100 54	1065	1975 09		X	F	X	X		B							X							C
2301150	ESKIMO POINT	NWT	61 07	94 03	25	1943 03	1945 07	X	P	X	X																C
2301150	ESKIMO POINT	NWT	61 06	94 03	30	1968 11	1973 03						B														C
2301150	ESKIMO POINT	NWT	61 06	94 03	30	1973 03	1973 09			X	X		B														C
2301150	ESKIMO POINT	NWT	61 06	94 03	30	1973 10	1974 02			X	X																C
2301150	ESKIMO POINT	NWT	61 06	94 03	30	1974 02	1974 03			X	X		B														C
2301150	ESKIMO POINT	NWT	61 06	94 03	30	1974 04	1974 08			X	X																C
2301150	ESKIMO POINT	NWT	61 06	94 03	30	1974 09	1974 10			X	X		B														C
2301150	ESKIMO POINT	NWT	61 06	94 03	30	1974 11	1975 04			X	X																C
2301150	ESKIMO POINT	NWT	61 06	94 03	30	1975 06	1975 07			X	X		B														C
2401200	EUREKA	NWT	80 00	85 56	8	1947 05	1947 05	X	P	X	X																C
2401200	EUREKA	NWT	80 00	85 56	8	1947 06	1950 03	X	P	X	X								X								C
2401200	EUREKA	NWT	80 00	85 56	8	1950 04	1952 05	X	P	X	X		B						X								C
2401200	EUREKA	NWT	80 00	85 56	8	1952 06	1953 05	X	P	X	X								X								C
2401200	EUREKA	NWT	80 00	85 56	8	1953 06	1960 07	X	P	X	X		B						X								C
2401200	EUREKA	NWT	80 00	85 56	8	1960 07	1963 08	X	P	X	X		B				A		X								C

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2401200	EUREKA	NWT	80 00	85 56	34	1963 08	1964 08	X	P	X	X		B				A		X								C
2401200	EUREKA	NWT	80 00	85 56	34	1964 09	1965 12	X	P	X	X		B						X								C
2401200	EUREKA	NWT	80 00	85 56	34	1965 12	1968 07	X	P	X	X		B						X	X							C
2401200	EUREKA	NWT	80 00	85 56	34	1968 07	1970 07	X	P	X	X		B			S			X	X							C
2401200	EUREKA	NWT	80 00	85 56	34	1970 07	1973 05	X	B	X	X		B			S	A		X	X							C
2401200	EUREKA	NWT	80 00	85 56	34	1973 05	1973 08	X	X	X	X		B			S	H		X	X							C
2401200	EUREKA	NWT	80 00	85 56	34	1973 08	1973 09	X	E	X	X		B			S	H		X	X							C
2401200	EUREKA	NWT	80 00	85 56	34	1973 10	1975 04	X	B	X	X		B			S	H		X	X							C
2401200	EUREKA	NWT	80 00	85 56	34	1975 04	1975 07	X	E	X	X		B			S	H		X	X							C
2401200	EUREKA	NWT	80 00	85 56	34	1975 07	1975 08	X	E	X	X		U			S	H		X	X							C
2401200	EUREKA	NWT	80 00	85 56	34	1975 09		X	B	X	X		U			S	H		X	X							C
2301300	FERGUSON LAKE	NWT	62 52	96 49	400	1953 03	1953 03			X	X																C
2301300	FERGUSON LAKE	NWT	62 52	96 49	400	1953 04	1953 09		P	X	X																C
2301300	FERGUSON LAKE	NWT	62 52	96 49	400	1954 05	1954 07		P																		C
2201345	FLAT RIVER	NWT	61 58	128 12	3660	1960 08 *	1960 09			X	X																W
2401350+	FOLEY	NWT	68 57	75 18	532	1955 12	1956 12		X																		H
2401350+	FOLEY	NWT	68 57	75 18	532	1957 01	1957 07		P																		H
2401350+	FOLEY	NWT	68 57	75 18	532	1957 08	1960 12	X	P	X	X																H
2401350+	ALSO 2402684		68 57	75 18																							
2201380	FORT FRANKLIN	NWT	65 11	123 26	523	1974 06 *				X	X																W
2201400	FORT GOOD HOPE	NWT	66 16	128 38	174	1944 08	1945 07	X	D	X	X																W
2201400	FORT GOOD HOPE	NWT	66 16	128 38	174	1945 08	1949 02	X	D	X	X		B														W
2201400	FORT GOOD HOPE	NWT	66 16	128 38	174	1949 03	1949 08	X	D	X	X																W
2201400	FORT GOOD HOPE	NWT	66 16	128 38	174	1949 09	1950 11	X	D	X	X		B														W
2201400	FORT GOOD HOPE	NWT	66 16	128 38	174	1950 12	1950 12			X	X		B														W
2201400	FORT GOOD HOPE	NWT	66 16	128 38	174	1951 01	1953 12			X	X																W
2201400	FORT GOOD HOPE	NWT	66 16	128 38	174	1954 01	1960 04			X	X		B														W
2201400	FORT GOOD HOPE	NWT	66 16	128 38	174	1960 06	1960 10						B														W
2201400	FORT GOOD HOPE	NWT	66 16	128 38	174	1960 11	1965 06			X	X		B														W
2201400	FORT GOOD HOPE	NWT	66 16	128 38	174	1965 06			D	X	X		B														W
2201500	FORT GOOD HOPE 2	NWT	66 15	128 38	137	1897 05	1903 07				X																W
2201500	FORT GOOD HOPE 2	NWT	66 15	128 38	137	1907 08	1908 08				X																W
2201500	FORT GOOD HOPE 2	NWT	66 15	128 38	137	1908 09	1909 01	X	P	X	X																W
2201500	FORT GOOD HOPE 2	NWT	66 15	128 38	137	1909 02	1909 07			X	X																W
2201500	FORT GOOD HOPE 2	NWT	66 15	128 38	137	1909 07	1955 12	X	P	X	X																W
2201500	FORT GOOD HOPE 2	NWT	66 15	128 38	137	1956 01	1966 12			X	X																W
2201575	FORT LIARD	NWT	60 15	123 28		1892 09	1893 05			X	X																W
2201575	FORT LIARD	NWT	60 14	123 28	700	1973 07			D	X	X		B														W
2201600	FORT MCPHERSON	NWT	67 26	134 53	100	1892 10	1895 07			X	X																W
2201600	FORT MCPHERSON	NWT	67 26	134 53	100	1895 09	1900 06			X																	W
2201600	FORT MCPHERSON	NWT	67 26	134 53	100	1907 10	1908 06			X	X																W

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			°	'	°	'	(feet)	Began year	mo.	Ended year	mo.	Synoptic Report	Hourly Weather	Temperature	Precipitation	Rate of Rainfall	Wind Mileage	Soil Temperature	Evaporation	Sunshine	Radiation	Ozone	Upper Air	Snow Survey	Tower	Air Quality	1	2	3	4	
2201600	FORT MCPHERSON	NWT	67	26	134	53	100	1909	09	1913	06	X	P	X	X																W
2201600	FORT MCPHERSON	NWT	67	26	134	53	100	1914	08	1927	01	X	P	X	X																W
2201600	FORT MCPHERSON	NWT	67	26	134	53	100	1927	08	1928	09	X	P	X	X																W
2201600	FORT MCPHERSON	NWT	67	26	134	53	100	1929	07	1937	06	X	P	X	X																W
2201600	FORT MCPHERSON	NWT	67	26	134	53	100	1937	07	1948	03			X	X																W
2201600	FORT MCPHERSON	NWT	67	26	134	53	100	1949	01	1950	08			X	X																W
2201600	FORT MCPHERSON	NWT	67	26	134	53	100	1951	09	1975	06			X	X																W
2201600	FORT MCPHERSON	NWT	67	26	134	53	100	1975	10					X	X																W
2201602	FORT MCPHERSON NWLFS	NWT	69	27	134	50	100	1974	06 *	1974	08			X	X																W
2201700	FORT NORMAN	NWT	64	54	125	34	310	1903	08	1907	07				X																W
2201700	FORT NORMAN	NWT	64	54	125	34	310	1908	07	1922	12	X	P	X	X																W
2201700	FORT NORMAN	NWT	64	54	125	34	310	1923	08	1928	06	X	P	X	X																W
2201700	FORT NORMAN	NWT	64	54	125	34	300	1930	08	1939	01	X	P	X	X																W
2201700	FORT NORMAN	NWT	64	54	125	34	300	1940	02	1940	02	X	P	X	X																W
2201700	FORT NORMAN	NWT	64	54	125	34	300	1940	11	1951	01	X	P	X	X																W
2201700	FORT NORMAN	NWT	64	54	125	34	300	1951	02	1961	06			X	X																W
2201700	FORT NORMAN	NWT	64	53	125	34	242	1974	06 *					X	X																W
2201800	FORT PROVIDENCE	NWT	61	20	117	40	523	1943	03	1944	01	X	C	X	X																W
2201800	FORT PROVIDENCE	NWT	61	20	117	40	523	1944	12	1953	07	X	C	X	X																W
2201800	FORT PROVIDENCE	NWT	61	20	117	40	523	1953	08	1953	10	X	C	X	X		B														W
2201800	FORT PROVIDENCE	NWT	61	20	117	40	523	1953	11	1954	07	X	C	X	X																W
2201800	FORT PROVIDENCE	NWT	61	20	117	40	523	1954	08	1955	06	X	C	X	X		B														W
2201800	FORT PROVIDENCE	NWT	61	20	117	40	523	1955	07	1957	07	X	D	X	X		B														W
2201800	FORT PROVIDENCE	NWT	61	20	117	40	523	1957	08	1959	08	X	D	X	X																W
2201800	FORT PROVIDENCE	NWT	61	20	117	40	523	1959	09	1960	02	X	D	X	X		B														W
2201800	FORT PROVIDENCE	NWT	61	20	117	40	523	1960	03	1960	06	X	D	X	X																W
2201800	FORT PROVIDENCE	NWT	61	20	117	40	523	1960	07	1961	06	X	D	X	X		B														W
2201800	FORT PROVIDENCE	NWT	61	20	117	40	523	1961	07	1962	07	X	D	X	X																W
2201800	FORT PROVIDENCE	NWT	61	20	117	40	523	1972	10	1973	01			X	X		B														W
2201800	FORT PROVIDENCE	NWT	61	20	117	40	523	1973	02				D	X	X		B														W
2201850	FORT RAE	NWT	62	40	115	45		1934	03	1936	01			X	X					S											W
2201900	FORT RELIANCE	NWT	62	43	109	06	539	1948	10	1950	09	X	E	X	X																W
2201900	FORT RELIANCE	NWT	62	43	109	06	539	1950	10	1951	01			X	X																W
2201900	FORT RELIANCE	NWT	62	43	109	06	539	1951	02	1952	08	X	E	X	X																W
2201900	FORT RELIANCE	NWT	62	43	109	06	539	1952	09	1954	08	X	E	X	X		B														W
2201900	FORT RELIANCE	NWT	62	43	109	06	539	1954	09	1955	03	X	E	X	X																W
2201900	FORT RELIANCE	NWT	62	43	109	06	539	1955	04	1961	03	X	E	X	X		B														W
2201900	FORT RELIANCE	NWT	62	43	109	06	539	1961	04	1961	09	X	E	X	X		B														W
2201900	FORT RELIANCE	NWT	62	43	109	06	539	1961	10	1965	12	X	E	X	X		B														W
2201900	FORT RELIANCE	NWT	62	43	109	10	539	1969	08	1972	06	X	E	X	X		B							V							W
2201900	FORT RELIANCE	NWT	62	43	109	06	539	1966	01	1969	08	X	E	X	X		B							V							W
2201900	FORT RELIANCE	NWT	62	43	109	10	539	1972	07			X	E	X	X	X	B							V							W
2201998	FORT RESOLUTION	NWT	61	10	113	40	520	1875	07	1875	11		P																		W

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			°	'	°	'	(feet)	Began year	mo.	Ended year	mo.	Synoptic Report	Hourly Weather	Temperature	Precipitation	Rate of Rainfall	Wind Mileage	Soil Temperature	Evaporation	Sunshine	Radiation	Ozone	Upper Air	Snow Survey	Tower	Air Quality	1	2	3	4	
2201998	FORT RESOLUTION	NWT	61	10	113	40	520	1910	01	1910	12		P																		W
2201998	FORT RESOLUTION	NWT	61	10	113	40	520	1911	08	1936	08			X	X																W
2202000+	FORT RESOLUTION	NWT	61	10	113	41	549	1930	09	1938	02	X	P	X	X																W
2202000+	FORT RESOLUTION	NWT	61	10	113	41	549	1943	03	1944	02	X	P	X	X																W
2202000+	FORT RESOLUTION	NWT	61	10	113	41	549	1945	08	1960	03	X	P	X	X																W
2202000+	FORT RESOLUTION	NWT	61	10	113	41	549	1960	04	1968	01	X	X	X	X																W
2202000+	FORT RESOLUTION A	NWT	61	11	113	41	549	1968	01	1969	07	X	X	X	X																W
2202000+	FORT RESOLUTION A	NWT	61	11	113	41	549	1969	07	1970	02	X	X	X	X	X															W
2202000+	FORT RESOLUTION A	NWT	61	11	113	41	549	1970	02	1970	03	X	D	X	X	X															W
2202000+	FORT RESOLUTION A	NWT	61	11	113	41	549	1970	03	1975	06	X	D	X	X	X	B														W
2202000+	FORT RESOLUTION A	NWT	61	11	113	41	549	1975	10				D																		W
2402050	FORT ROSS	NWT	71	55	94	15	50	1937	10	1938	02			X	X																C
2402050	FORT ROSS	NWT	71	55	94	15	50	1938	09	1942	09	X	P	X	X																C
2402050	FORT ROSS	NWT	71	55	94	15	50	1943	04	1943	10	X	P	X	X																C
2402050	FORT ROSS	NWT	71	55	94	15	50	1944	09	1946	08	X	P	X	X																C
2402050	FORT ROSS	NWT	71	55	94	15	50	1946	09	1948	02	X	P	X	X		B														C
2402050	FORT ROSS	NWT	71	55	94	15	50	1948	03	1948	03	X	P	X	X																C
2202098	FORT SIMPSON	NWT	61	52	121	13	572	1943	03	1943	07	X	P	X	X																W
2202098	FORT SIMPSON	NWT	61	52	121	13	572	1944	02	1946	07	X	P	X	X																W
2202099	FORT SIMPSON	NWT	61	52	121	35		1875	05	1875	11			X																	W
2202099	FORT SIMPSON	NWT	61	52	121	35		1876	11	1877	03			X																	W
2202099	FORT SIMPSON	NWT	61	52	121	35		1877	12	1878	03			X																	W
2202099	FORT SIMPSON	NWT	61	52	121	35		1878	10	1879	05			X																	W
2202099	FORT SIMPSON	NWT	61	52	121	35		1895	11	1895	12			X	X																W
2202099	FORT SIMPSON	NWT	61	52	121	35		1897	03	1902	12			X	X																W
2202099	FORT SIMPSON	NWT	61	52	121	35		1903	05	1904	06			X	X																W
2202099	FORT SIMPSON	NWT	61	52	121	35		1905	01	1908	06			X	X																W
2202099	FORT SIMPSON	NWT	61	52	121	35		1908	07	1921	06	X	P	X	X																W
2202099	FORT SIMPSON	NWT	61	52	121	35		1922	08	1927	10	X	P	X	X																W
2202100	FORT SIMPSON	NWT	61	52	121	21	422	1927	06	1952	01	X	B	X	X																W
2202100	FORT SIMPSON	NWT	61	52	121	21	422	1952	02	1952	08	X	B	X	X					S											W
2202100	FORT SIMPSON	NWT	61	52	121	21	422	1952	09	1952	12	X	B	X	X		B			S											W
2202100	FORT SIMPSON	NWT	61	52	121	21	422	1953	01	1954	02	X	B	X	X		B														W
2202100	FORT SIMPSON	NWT	61	52	121	21	422	1954	03	1955	03	X	B	X	X		B				A										W
2202100	FORT SIMPSON	NWT	61	52	121	21	422	1955	04	1963	10	X	X	X	X		B			S	A										W
2202100	FORT SIMPSON	NWT	61	52	121	21	432	1963	11	1964	05									S	A										W
2202100	FORT SIMPSON	NWT	61	52	121	21	432	1964	06											S											W
2202101	FORT SIMPSON A	NWT	61	45	121	14	576	1963	11	1966	10	X	X	X	X		B														W
2202101	FORT SIMPSON A	NWT	61	45	121	14	576	1966	10	1966	12	X	X	X	X		B							V							W
2202101	FORT SIMPSON A	NWT	61	45	121	14	576	1967	01	1969	05	X	X	X	X									V							W
2202101	FORT SIMPSON A	NWT	61	45	121	14	576	1969	05			X	X	X	X	X								V		B					W
2202110+	FORT SIMPSON EXP FARM	NWT	61	52	121	21	430	1958	07	1961	03							D													W

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								Synoptic Report	Hourly Weather	Temperature	Precipitation	Rate of Rainfall	Wind Mileage	Soil Temperature	Evaporation	Sunshine	Radiation	Ozone	Upper Air	Snow Survey	Tower	Air Quality	1	2	3	4	
2202110+	FORT SIMPSON EXP FARM	NWT	61 52	121 21	430	1961 04	1961 10			X	X			D													W
2202110+	FORT SIMPSON EXP FARM	NWT	61 52	121 21	430	1961 11	1961 12			X	X			D		S											W
2202110+	FORT SIMPSON CDA	NWT	61 52	121 21	430	1962 01	1969 12			X	X			D		S											W
2202196	FORT SMITH	NWT	60 00	111 56	600	1913 06	1914 02	X	P	X	X																W
2202196	FORT SMITH	NWT	60 00	111 56	600	1914 08	1929 02	X	P	X	X																W
2202198	FORT SMITH	NWT	60 00	111 52	680	1928 03	1938 03	X	P	X	X																W
2202198	FORT SMITH	NWT	60 00	111 52	680	1938 04	1944 07	X	P	X	X		B														W
2202198	FORT SMITH	NWT	60 00	111 52	680	1944 08	1945 07	X	P	X	X																W
2202198	FORT SMITH	NWT	60 00	111 52	680	1946 02	1946 05	X	P	X	X																W
2202200	FORT SMITH A	NWT	60 01	111 58	665	1943 09	1944 11	X	P	X	X																W
2202200	FORT SMITH A	NWT	60 01	111 58	665	1944 12	1948 05	X	P	X	X								X								W
2202200	FORT SMITH A	NWT	60 01	111 58	665	1948 06	1949 08	X	X	X	X																W
2202200	FORT SMITH A	NWT	60 01	111 58	665	1949 09	1953 06	X	X	X	X		B						X								W
2202200	FORT SMITH A	NWT	60 01	111 58	665	1953 07	1964 11	X	X	X	X		B			S			X								W
2202200	FORT SMITH A	NWT	60 01	111 58	665	1964 12	1966 06	X	X	X	X		B			S			X	X							W
2202200	FORT SMITH A	NWT	60 01	111 58	665	1966 06	1966 12	X	X	X	X		B		A	S			X	X							W
2202200	FORT SMITH A	NWT	60 01	111 58	665	1967 01	1970 09	X	X	X	X				A	S			X	X							W
2202200	FORT SMITH A	NWT	60 01	111 58	665	1970 09	1971 05	X	X	X	X			D	A	S			X	X							W
2202200	FORT SMITH A	NWT	60 01	111 58	665	1971 05	1974 06	X	X	X	X			D	A	S	A		X	X							W
2202200	FORT SMITH A	NWT	60 01	111 58	665	1974 06		X	X	X	X			D	R	S	A		X	X							W
2202250	FRANK CHANNEL	NWT	62 47	115 57	525	1974 05 *				X	X																W
2402300	FROBISHER BAY A	NWT	63 45	68 33	68	1942 05	1945 12		P																		Q
2402300	FROBISHER BAY A	NWT	63 45	68 33	68	1946 01	1950 08	X	P	X	X																Q
2402300	FROBISHER BAY A	NWT	63 45	68 33	68	1950 09	1951 05	X	P	X	X								X								Q
2402300	FROBISHER BAY A	NWT	63 45	68 33	68	1951 05	1956 02	X	X	X	X								X								Q
2402300	FROBISHER BAY A	NWT	63 45	68 33	68	1956 03	1964 10	X	X	X	X					S			X								Q
2402300	FROBISHER BAY A	NWT	63 45	68 33	68	1964 11	1972 11	X	X	X	X					S			X	X							Q
2402300	FROBISHER BAY A	NWT	63 45	68 33	68	1972 12		X	X	X	X					S	H		X	X							Q
2302320	FULLERTON	NWT	64 00	89 02		1904 11	1905 07	X	P	X	X																C
2402340+	GLADMAN POINT	NWT	68 40	97 48	83	1961 01	1974 03	X	C	X	X																H
2402340+	GLADMAN POINT	NWT	68 40	97 48	83	1974 04		X	C	X	X																W
2402340+	ALSO 2402670		68 40	97 48																							
2402345	GRISE FIORD	NWT	76 28	82 52	5	1973 10				X	X		B														C
2402350+	HALL LAKE A	NWT	68 47	81 15	24	1955 08	1956 12		X																		Q
2402350+	HALL LAKE A	NWT	68 47	81 15	24	1957 01	1957 07		X	X	X																Q
2402350+	HALL LAKE A	NWT	68 47	81 15	24	1957 08	1958 07	X	B	X	X								X								Q
2402350+	HALL LAKE A	NWT	68 47	81 15	24	1958 08	1958 08	X	E	X	X								X								Q
2402350+	HALL LAKE A	NWT	68 47	81 15	24	1958 08	1960 12	X	X	X	X								X								Q
2402350+	HALL BEACH A	NWT	68 47	81 15	24	1961 01	1964 12	X	X	X	X								X								Q
2402350+	HALL BEACH A	NWT	68 47	81 15	24	1965 01	1970 08	X	X	X	X								X	X							Q

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2402350	+HALL BEACH A	NWT	68 47	81 15	24	1970 08		X	X	X	X						A		X	X							Q
2202360	HART LAKE	NWT	60 51	116 38	828	1974 05 *				X	X																W
2302370	HAT ISLAND	NWT	68 19	100 05	118	1959 01	1963 07			X	X																H
2202398	HAY RIVER	NWT	60 51	115 57	529	1893 09	1894 06			X	X																W
2202398	HAY RIVER	NWT	60 51	115 57	529	1894 10	1896 11			X	X																W
2202398	HAY RIVER	NWT	60 51	115 57	529	1897 09	1908 06			X	X																W
2202398	HAY RIVER	NWT	60 51	115 57	529	1908 08	1943 06	X	P	X	X																W
2202400	+HAY RIVER	NWT	60 52	115 44	529	1943 04	1943 05	X	P	X	X																W
2202400	+HAY RIVER	NWT	60 52	115 44	529	1943 11	1949 05	X	P	X	X																W
2202400	+HAY RIVER	NWT	60 52	115 44	529	1949 06	1952 09	X	X	X	X																W
2202400	+HAY RIVER	NWT	60 52	115 44	529	1952 10	1964 10	X	X	X	X		B														W
2202400	+HAY RIVER A	NWT	60 51	115 46	529	1964 10	1966 12	X	X	X	X		B														W
2202400	+HAY RIVER A	NWT	60 51	115 46	529	1967 01	1971 05	X	X	X	X																W
2202400	+HAY RIVER A	NWT	60 51	115 46	529	1971 05		X	X	X	X	X															W
2202405	HAY RIVER PARADISE GDNS	NWT	60 39	116 00	700	1962 05	1962 08			X	X																W
2202405	HAY RIVER PARADISE GDNS	NWT	60 39	116 00	700	1965 09				X	X																W
2502500	+HOLMAN ISLAND	NWT	70 30	117 38	30	1939 11	1940 07						B														W
2502500	+HOLMAN ISLAND	NWT	70 30	117 38	30	1941 01	1941 07	X	P	X	X																W
2502500	+HOLMAN ISLAND	NWT	70 30	117 38	30	1941 08	1942 07	X	P	X	X		B														W
2502500	+HOLMAN ISLAND	NWT	70 30	117 38	30	1943 01	1946 06	X	P	X	X		B														W
2502500	+HOLMAN ISLAND	NWT	70 30	117 38	30	1947 06	1957 05	X	P	X	X		B														W
2502500	+HOLMAN ISLAND	NWT	70 30	117 38	30	1958 08	1962 12	X	P	X	X		B														W
2502500	+HOLMAN	NWT	70 30	117 38	30	1963 01	1963 02	X	P	X	X		B														W
2502500	+HOLMAN	NWT	70 30	117 38	30	1963 03	1969 08	X	P	X	X																W
2502500	+HOLMAN	NWT	70 44	117 47	30	1969 08	1969 12	X	P	X	X																W
2202516	HORN PLATEAU	NWT	62 08	118 07	2450	1974 05 *				X	X																W
2202518	HORN RIVER	NWT	61 30	118 02	500	1973 07				X	X																W
2202520	HORTON RIVER	NWT	70 01	126 56	530	1959 01	1963 05			X	X																H
2302530	HUDSON BAY SITE 1	NWT	58 30	87 10	69	1974 09 *	1974 09		X																		C
2302531	HUDSON BAY SITE 2	NWT	58 30	86 47	69	1974 09 *	1974 10		X																		C
2302532	HUDSON BAY SITE 3	NWT	58 01	84 18	69	1974 08 *	1974 09		X																		C
2402540	IGLOOLIK	NWT	69 24	81 49	75	1972 09	1974 03						B														Q
2202550	INDIN LAKE	NWT	64 16	115 13	900	1948 03	1949 03	X	P	X	X																W
2202550	INDIN LAKE	NWT	64 16	115 13	900	1950 05	1950 07	X	P	X	X																W

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2202570+	INUVIK A	NWT	68 18	133 29	200	1958 01	1958 10			X	X		B														W
2202570+	INUVIK A	NWT	68 18	133 29	200	1958 11	1960 09		D	X	X		B														W
2202570+	INUVIK A	NWT	68 18	133 29	200	1960 09	1960 10		D	X	X		B				X		X								W
2202570+	INUVIK A	NWT	68 18	133 29	200	1960 11	1960 11	X	D	X	X		B				A		X								W
2202570+	INUVIK A	NWT	68 18	133 29	200	1960 12	1960 12	X	X	X	X		B				A		X								W
2202570+	INUVIK A	NWT	68 18	133 29	200	1961 01	1964 11	X	X	X	X		B			S	A		X								W
2202570+	INUVIK A	NWT	68 18	133 29	200	1964 12	1966 12	X	X	X	X		B			S	A		X	X							W
2202570+	INUVIK A	NWT	68 18	133 29	200	1967 01	1972 07	X	X	X	X					S	A		X	X							W
2202570+	INUVIK A	NWT	68 18	133 29	200	1972 07	1972 11	X	X	X	X	X				S	A		X	X							W
2202570+	INUVIK A	NWT	68 18	133 29	200	1972 11	1973 03	X	X	X	X	X				S	A		X	X							W
2202570+	INUVIK A	NWT	68 18	133 29	200	1973 03		X	X	X	X	X															W
2202570+	ALSO 2200150		68 18	133 29																							
2202580	INUVIK CDA	NWT	68 18	133 29	220	1961 05 *	1961 08			X	X																W
2202582	INUVIK UA	NWT	68 19	133 32	339	1973 03	1973 05									S			X	X							W
2202582	INUVIK UA	NWT	68 19	133 32	339	1973 05										S	A		X	X							W
2502600	ISACHSEN	NWT	78 47	103 32	83	1948 05	1948 05	X	P	X	X																C
2502600	ISACHSEN	NWT	78 47	103 32	83	1948 06	1948 07	X	P	X	X		B														C
2502600	ISACHSEN	NWT	78 47	103 32	83	1948 08	1955 10	X	P	X	X		B						X								C
2502600	ISACHSEN	NWT	78 47	103 32	83	1955 11	1957 10	X	P	X	X								X								C
2502600	ISACHSEN	NWT	78 47	103 32	83	1957 11	1966 12	X	P	X	X		B						X								C
2502600	ISACHSEN	NWT	78 47	103 32	83	1967 01	1968 03	X	P	X	X		B						X	X							C
2502600	ISACHSEN	NWT	78 47	103 32	83	1968 04	1970 07	X	P	X	X		B			S			X	X							C
2502600	ISACHSEN	NWT	78 47	103 32	83	1970 07	1975 07	X	B	X	X		B			S	H		X	X							C
2502600	ISACHSEN	NWT	78 47	103 32	83	1975 07		X	B	X	X		U			S	H		X	X							C
2302650+	JENNY LIND	NWT	68 39	101 44	60	1955 10	1957 03		P																		H
2302650+	JENNY LIND	NWT	68 39	101 44	60	1957 04	1957 06		P	X	X																H
2302650+	JENNY LIND	NWT	68 39	101 44	60	1957 09	1960 12			X	X																H
2302650+	JENNY LIND ISLAND	NWT	68 39	101 44	60	1961 01	1973 10			X	X																H
2302650+	JENNY LIND ISLAND	NWT	68 39	101 44	120	1973 10	1974 03	X	C	X	X		B														H
2302650+	JENNY LIND ISLAND	NWT	68 39	101 44	120	1974 04		X	C	X	X		B														W
2202655	JOHNAHCE RIVER	NWT				1941 11	1942 03			X	X																W
2502657	JOHNSON POINT	NWT	72 46	118 30	30	1972 04		X	X	X	X																W
2302660	KAZAN R BASE	NWT	61 34	100 40	800	1945 07	1945 08	X	P	X	X																C
2402665+	KEITH BAY	NWT	68 24	88 13	265	1961 01	1963 07			X	X																H
2402665+	ALSO 2401080		68 24	88 13																							
2402670+	KING WILLIAM	NWT	68 40	97 48	83	1955 08	1957 05		X																		H
2402670+	KING WILLIAM	NWT	68 40	97 48	83	1957 06	1960 12	X	C	X	X																H
2402670+	ALSO 2402340		68 40	97 48																							
2302671	KINGYOUK CREEK	NWT	64 15	96 19		1971 10						S															C

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			° '	° '	(feet)	Began year mo.	Ended year mo.	Synoptic Report	Hourly Weather	Temperature	Precipitation	Rate of Rainfall	Wind Mileage	Soil Temperature	Evaporation	Sunshine	Radiation	Ozone	Upper Air	Snow Survey	Tower	Air Quality	1	2	3	4	
2202673	KITTIGAZUIT	NWT	69 17	133 56	92	1948 09	1950 03	X	P	X	X																W
2402675	KIVITOC	NWT	67 58	64 55	1450	1957 03	1957 04		P																		H
2402675	KIVITOC	NWT	67 58	64 55	1450	1959 08	1963 03			X	X																H
2202678	LAC LA MARTRE	NWT	63 09	117 16	880	1974 05 *				X	X																W
2202680+	LADY FRANKLIN	NWT	68 30	113 13	50	1955 10	1957 05		P																		H
2202680+	LADY FRANKLIN	NWT	68 30	113 13	50	1957 06	1957 06		P	X	X																H
2202680+	LADY FRANKLIN	NWT	68 30	113 13	50	1957 07	1960 12			X	X																H
2202680+	LADY FRANKLIN POINT	NWT	68 30	113 13	50	1961 01	1973 05			X	X																H
2202680+	LADY FRANKLIN POINT	NWT	68 30	113 13	68	1973 05	1974 03	X	C	X	X																H
2202680+	LADY FRANKLIN POINT	NWT	68 30	113 13	68	1974 04	1974 06	X	C	X	X																W
2202680+	LADY FRANKLIN POINT	NWT	68 30	113 13	68	1974 06		X	C	X	X		B														W
2402681	LAKE HARBOUR	NWT	62 50	69 55	54	1909 10	1910 08	X	P	X	X																Q
2402681	LAKE HARBOUR	NWT	62 50	69 55	54	1913 09	1916 07	X	P	X	X																Q
2402681	LAKE HARBOUR	NWT	62 50	69 55	54	1919 12	1920 06	X	P	X	X																Q
2402681	LAKE HARBOUR	NWT	62 50	69 55	54	1921 08	1927 08	X	P	X	X																Q
2402681	LAKE HARBOUR	NWT	62 50	69 55	54	1930 10	1932 08	X	P	X	X																Q
2402681	LAKE HARBOUR	NWT	62 50	69 55	54	1932 08	1933 07		P																		Q
2402681	LAKE HARBOUR	NWT	62 50	69 55	54	1933 08	1946 06	X	P	X	X																Q
2402682	LAKE HAZEN	NWT	81 49	71 18	522	1957 08	1958 08	X	P	X	X																C
2402682	LAKE HAZEN	NWT	81 49	71 18	522	1963 05	1963 08	X	P	X	X																C
2202683	LIARD TOWER	NWT	60 18	123 31	2715	1974 05 *				X	X																W
220BFH3	LITTLE DOCTOR LAKE	NWT	61 54	123 15	708	1974 10				X	X																W
2402684+	LONGSTAFF BLUFF	NWT	68 57	75 18	532	1961 01	1974 03	X	C	X	X																H
2402684+	LONGSTAFF BLUFF	NWT	68 57	75 18	532	1974 04		X	C	X	X																W
2402684+	ALSO 2401350		68 57	75 18																							
2402686+	MACKAR INLET	NWT	68 18	85 41	1310	1961 01	1971 09	X	C	X	X																H
2402686+	MACKAR INLET	NWT	68 18	85 41	1310	1971 09	1972 02	X	C	X	X		B														H
2402686+	MACKAR INLET	NWT	68 18	85 41	1310	1972 02	1972 08	X	C	X	X																H
2402686+	MACKAR INLET	NWT	68 18	85 41	1310	1972 08	1972 09	X	C	X	X		B														H
2402686+	MACKAR INLET	NWT	68 18	85 41	1310	1972 09	1974 03	X	C	X	X																H
2402686+	MACKAR INLET	NWT	68 18	85 41	1310	1974 04		X	C	X	X																W
2402686+	ALSO 2403955		68 18	85 41																							
220K68F	MARIAN LAKE TOWER	NWT	63 04	116 53	967	1974 06 *				X	X																W
2402687	MARY RIVER	NWT	71 19	79 20	800	1963 05 *	1965 10			X	X																Q
2402688	MATHESON POINT	NWT	68 50	95 19	230	1959 01	1959 12		P																		H
2402688	MATHESON POINT	NWT	68 50	95 19	230	1960 01	1963 07			X	X																H

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2402689	MEIGHEN ISLAND ICE CAP	NWT	79 58	99 09	790	1960 06 *	1961 08		D	X																	H
2402689	MEIGHEN ISLAND ICE CAP	NWT	79 58	99 09	790	1961 08 *	1962 08		D	X	X																H
2402689	MEIGHEN ISLAND ICE CAP	NWT	79 58	99 09	790	1968 05 *	1971 08		D	X	X																H
240BFH9	MEIGHEN ISLAND NORTH	NWT	80 04	99 18	257	1968 06 *	1971 08		D	X	X																H
240BFHR	MEIGHEN ISLAND NORTH ICE	NWT	80 02	99 14	495	1970 06 *	1970 08		F	X	X																H
240BFQ9	MEIGHEN ISLAND WEST	NWT	79 58	99 30	330	1969 06 *	1969 08		P	X	X																H
2402690+	MID BAFFIN	NWT	68 39	71 14	1727	1956 06	1958 01		P																		H
2402690+	MID BAFFIN	NWT	68 39	71 14	1727	1958 02	1960 12	X	P	X	X																H
2402690+	ALSO 2401030		68 39	71 14																							
2402697+	MID MELVILLE	NWT	68 32	83 16		1956 06	1957 07		P																		H
2402697+	MID MELVILLE	NWT	68 33	83 19	890	1959 01	1960 12			X	X																H
2402697+	ALSO 2403680		68 32	83 18																							
2202698	MILLS LAKE	NWT	61 16	118 45	484	1944 02	1944 08	X	P	X	X																W
2502700	MOULD BAY	NWT	76 14	119 20	50	1948 05	1948 07	X	C	X	X		B														C
2502700	MOULD BAY	NWT	76 14	119 20	50	1948 08	1949 03	X	C	X	X		B						X								C
2502700	MOULD BAY	NWT	76 14	119 20	50	1949 04	1949 07	X	C	X	X								X								C
2502700	MOULD BAY	NWT	76 14	119 20	50	1949 08	1950 06	X	B	X	X								X								C
2502700	MOULD BAY	NWT	76 14	119 20	50	1950 07	1965 02	X	B	X	X		B						X								C
2502700	MOULD BAY	NWT	76 14	119 20	50	1965 03	1966 07	X	B	X	X		B				A		X								C
2502700	MOULD BAY	NWT	76 14	119 20	50	1966 08	1967 02	X	B	X	X						A		X								C
2502700	MOULD BAY	NWT	76 14	119 20	50	1967 02	1967 05	X	B	X	X						A		X	X							C
2502700	MOULD BAY	NWT	76 14	119 20	50	1967 05	1967 07	X	B	X	X		B				A		X	X							C
2502700	MOULD BAY	NWT	76 14	119 20	50	1967 08	1968 07	X	B	X	X		B			S	A		X	X							C
2502700	MOULD BAY	NWT	76 14	119 20	50	1968 07	1972 10	X	B	X	X		B			S	H		X	X							C
2502700	MOULD BAY	NWT	76 14	119 20	50	1972 10		X	B	X	X		B	D		S	H		X	X							C
2202723	NAHANNI BUTTE	NWT	61 05	123 23	4500	1974 06 *				X	X																W
2202725	NAHANNI HOT SPRINGS	NWT	61 15	124 02	2000	1973 08						S															W
2202727	NAHANNI VALLEY	NWT	61 03	123 22	700	1974 05				X	X																W
2202750+	NICHOLSON	NWT	69 57	128 55	10	1955 08	1957 06		P																		H
2202750+	NICHOLSON	NWT	69 57	128 55	10	1957 07	1957 07		P	X	X																H
2202750+	NICHOLSON	NWT	69 57	128 55	10	1957 08	1960 12			X	X																H
2202750+	NICHOLSON PENINSULA	NWT	69 54	128 58	320	1961 01	1973 08			X	X																H
2202750+	NICHOLSON PENINSULA	NWT	69 54	128 58	320	1973 08	1974 03	X	C	X	X																H
2202750+	NICHOLSON PENINSULA	NWT	69 54	128 58	320	1974 04	1974 09	X	C	X	X																W
2202750+	NICHOLSON PENINSULA	NWT	69 54	128 58	320	1974 09		X	C	X	X		B														W
2202800+	NORMAN WELLS A	NWT	65 17	126 48	209	1943 04	1944 12	X	B	X	X																W

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			° '	° '	(feet)	Began year mo.	Ended year mo.	Synoptic Report	Hourly Weather	Temperature	Precipitation	Rate of Rainfall	Wind Mileage	Soil Temperature	Evaporation	Sunshine	Radiation	Ozone	Upper Air	Snow Survey	Tower	Air Quality	1	2	3	4	
2202800+	NORMAN WELLS A	NWT	65 17	126 48	209	1945 01	1946 09	X	B	X	X								X								W
2202800+	NORMAN WELLS	NWT	65 18	126 51	209	1946 10	1949 04	X	B	X	X								X								W
2202800+	NORMAN WELLS A	NWT	65 17	126 48	209	1949 04	1949 09	X	B	X	X								X								W
2202800+	NORMAN WELLS A	NWT	65 17	126 48	209	1949 10	1949 11	X	B	X	X		B						X								W
2202800+	NORMAN WELLS A	NWT	65 17	126 48	209	1949 12	1950 03	X	B	X	X								X								W
2202800+	NORMAN WELLS A	NWT	65 17	126 48	209	1950 04	1950 09	X	B	X	X		B						X								W
2202800+	NORMAN WELLS	NWT	65 18	126 51	209	1950 10	1950 10	X	B	X	X		B						X								W
2202800+	NORMAN WELLS	NWT	65 18	126 51	209	1950 11	1951 05	X	B	X	X								X								W
2202800+	NORMAN WELLS	NWT	65 18	126 51	209	1951 06	1955 04	X	B	X	X		B						X								W
2202800+	NORMAN WELLS	NWT	65 18	126 51	209	1955 05	1958 11	X	X	X	X		B						X								W
2202800+	NORMAN WELLS A	NWT	65 17	126 48	209	1958 11	1958 12	X	X	X	X		B						X								W
2202800+	NORMAN WELLS A	NWT	65 17	126 48	209	1959 01	1964 05	X	X	X	X		B			S			X								W
2202800+	NORMAN WELLS A	NWT	65 17	126 48	209	1964 06	1964 10	X	X	X	X		B		A	S			X								W
2202800+	NORMAN WELLS A	NWT	65 17	126 48	209	1964 11	1966 12	X	X	X	X		B		A	S			X	X							W
2202800+	NORMAN WELLS A	NWT	65 17	126 48	209	1967 01	1967 10	X	X	X	X				A	S			X	X							W
2202800+	NORMAN WELLS A	NWT	65 17	126 48	209	1967 10	1972 11	X	X	X	X				A	S	A		X	X							W
2202800+	NORMAN WELLS A	NWT	65 17	126 48	209	1972 11	1974 05	X	X	X	X				A	S	H		X	X							W
2202800+	NORMAN WELLS A	NWT	65 17	126 48	209	1974 06		X	X	X	X	V			A	S	H		X	X							W
2202805	NORMAN WELLS SITE 1	NWT	65 17	126 50	190	1960 06	1960 09				X																W
2202806	NORMAN WELLS SITE 2	NWT	65 17	126 50	208	1960 06	1960 09				X																W
2202807	NORMAN WELLS SITE 3	NWT	65 16	126 42	200	1960 06	1960 09				X																W
2202808	NORMAN WELLS SITE 4	NWT	65 16	126 42	200	1960 06	1960 09				X																W
2402900	NOTTINGHAM ISLAND	NWT	63 07	77 56	54	1927 09	1928 07	X	C	X	X		B														Q
2402900	NOTTINGHAM ISLAND	NWT	63 07	77 56	54	1929 08	1944 08	X	C	X	X		B														Q
2402900	NOTTINGHAM ISLAND	NWT	63 07	77 56	54	1945 09	1954 12	X	C	X	X		B														Q
2402900	NOTTINGHAM ISLAND	NWT	63 07	77 56	54	1955 01	1963 06	X	B	X	X		B														Q
2402900	NOTTINGHAM ISLAND	NWT	63 07	77 56	54	1963 07	1964 06	X	B	X	X																Q
2402900	NOTTINGHAM ISLAND	NWT	63 07	77 56	54	1964 07	1970 07	X	B	X	X		B														Q
2302930	NUELTIN LAKE	NWT	60 30	99 00		1939 09	1941 08	X	P	X	X																C
2403000	PADLOPING ISLAND	NWT	67 02	62 44	130	1941 12	1946 01			X	X																Q
2403000	PADLOPING ISLAND	NWT	67 02	62 44	130	1947 10	1949 12			X	X																Q
2403000	PADLOPING ISLAND	NWT	67 02	62 44	130	1950 01	1950 07	X	P	X	X																Q
2403000	PADLOPING ISLAND	NWT	67 02	62 44	130	1951 01	1955 03	X	P	X	X																Q
2403000	PADLOPING ISLAND	NWT	67 02	62 44	130	1955 04	1956 08	X	X	X	X																Q
2403010+	PADLOPING ISLAND SITE 40	NWT	67 06	62 09	2180	1955 12	1958 02		P																		H
2403010+	ALSO 2401060		67 06	62 09																							
2403050	PANGNIRTUNG	NWT	66 08	65 44	43	1925 10	1926 07	X	P	X	X																Q
2403050	PANGNIRTUNG	NWT	66 08	65 44	43	1930 09	1931 08	X	P	X	X																Q
2403050	PANGNIRTUNG	NWT	66 08	65 44	43	1932 09	1942 12	X	P	X	X																Q
2403050	PANGNIRTUNG	NWT	66 08	65 44	43	1943 01	1950 07	X	P																		Q

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2203080	PEARCE POINT	NWT	69 49	122 42	160	1959 01	1963 07			X	X																W
2303090+	PELLY BAY	NWT	68 26	89 43	1069	1961 01	1974 03	X	C	X	X																H
2303090+	PELLY BAY	NWT	68 26	89 43	1069	1974 04		X	C	X	X																W
2303090+	ALSO 2303970		68 26	89 39																							
2203100	PINE POINT	NWT	60 50	114 28	780	1953 07	1954 09			X	X																W
2203100	PINE POINT	NWT	60 50	114 28	780	1954 10	1954 12			X	X		B														W
2203100	PINE POINT	NWT	60 50	114 28	780	1955 06	1955 08			X	X																W
2203100	PINE POINT	NWT	60 50	114 28	780	1965 03	1965 11			X	X																W
2403200	POND INLET	NWT	72 41	77 59	13	1921 10	1929 12	X	P	X	X																C
2403200	POND INLET	NWT	72 41	77 59	13	1930 09	1934 07	X	P	X	X																C
2403200	POND INLET	NWT	72 41	77 59	13	1935 09	1943 08	X	P	X	X																C
2403200	POND INLET	NWT	72 41	77 59	13	1944 09	1953 12	X	P	X	X																C
2403200	POND INLET	NWT	72 41	77 59	13	1954 05	1955 05	X	P	X	X																C
2403200	POND INLET	NWT	72 41	77 59	13	1955 06	1960 11			X	X																C
2403200	POND INLET	NWT	72 41	77 59	13	1965 05	1965 07			X	X																C
2403201	POND INLET A	NWT	72 40	78 00	193	1974 12	1975 02	X	X	X	X									V							Q
2403201	POND INLET A	NWT	72 40	78 00	193	1975 02	1975 06	X	X	X	X					S				V							Q
2403201	POND INLET A	NWT	72 40	78 00	193	1975 06		X	X	X	X	X				S				V							Q
2403275	PORT BURWELL	NWT	60 27	64 50		1928 08	1929 09	X	P	X	X																Q
2403275	PORT BURWELL	NWT	60 27	64 50		1932 08	1933 08		P																		Q
2403275	PORT BURWELL	NWT	60 27	64 50		1933 09	1934 07	X	P	X	X																Q
2403276	PORT BURWELL	NWT	60 25	64 51	125	1975 09		X	B	X	X																Q
2403280	PORT DE BOUCHERVILLE	NWT				1884 09	1886 09	X	P	X	X																Q
2203283	PORTER LAKE	NWT	61 42	108 00	1197	1974 06 *	1974 08									S											W
2203300	PORT RADIUM	NWT	66 05	118 02	628	1937 12	1940 06			X	X																W
2203300	PORT RADIUM	NWT	66 05	118 02	628	1942 09	1954 12	X	C	X	X																W
2203300	PORT RADIUM	NWT	66 05	118 02	628	1955 01	1957 07	X	C	X	X		B														W
2203300	PORT RADIUM	NWT	66 05	118 02	628	1957 08	1958 01	X	C	X	X																W
2203300	PORT RADIUM	NWT	66 05	118 02	628	1958 02	1958 04	X	C	X	X		B														W
2203300	PORT RADIUM	NWT	66 05	118 02	628	1958 05	1959 02	X	C	X	X																W
2203300	PORT RADIUM	NWT	66 05	118 02	628	1959 03	1959 03	X	C	X	X		B														W
2203300	PORT RADIUM	NWT	66 05	118 02	628	1959 04	1961 01	X	C	X	X																W
2203300	PORT RADIUM	NWT	66 05	118 02	628	1967 10	1967 11			X	X		B														W
2203300	PORT RADIUM	NWT	66 05	118 02	628	1967 12	1968 07		D	X	X																W
2203300	PORT RADIUM	NWT	66 05	118 02	628	1968 07	1974 09		D	X	X		B														W
2203305	PORT RADIUM (AUT)	NWT	66 05	117 56	1437	1975 11			H																		W
2203360	RAE LAKES	NWT	64 07	117 21	700	1974 05				X	X																W

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2303400	RANKIN INLET	NWT	62 48	92 04	100	1954 06	1954 06			X	X																C
2303400	RANKIN INLET	NWT	62 48	92 04	100	1954 07	1954 08			X	X		B														C
2303400	RANKIN INLET	NWT	62 48	92 04	100	1954 11	1955 01			X	X																C
2303400	RANKIN INLET	NWT	62 48	92 04	100	1958 09	1958 09			X	X																C
2303400	RANKIN INLET	NWT	62 48	92 04	100	1961 10	1962 06			X																	C
2503450	REA POINT A	NWT	75 21	105 43	45	1969 05	1970 07		P	X	X		B														W
2503450	REA POINT A	NWT	75 21	105 43	45	1970 08	1971 09		E	X	X																W
2503450	REA POINT A	NWT	75 21	105 43	45	1971 09			X	X	X																W
2403490	REPULSE BAY	NWT	66 32	86 15	73	1973 08				X	X		B														C
2403500+	RESOLUTE	NWT	74 41	94 55	56	1947 10	1947 12	X	C	X	X		B						X								C
2403500+	RESOLUTE	NWT	74 41	94 55	56	1948 01	1949 04	X	C	X	X		B			S			X								C
2403500+	RESOLUTE	NWT	74 41	94 55	56	1949 05	1949 06	X	C	X	X		B			S	A		X								C
2403500+	RESOLUTE	NWT	74 41	94 55	56	1949 07	1953 10	X	B	X	X		B			S	A		X								C
2403500+	RESOLUTE A	NWT	74 43	94 59	209	1953 10	1954 04	X	B	X	X		B			S	A		X								C
2403500+	RESOLUTE A	NWT	74 43	94 59	209	1954 05	1957 04	X	B	X	X		B			S			X								C
2403500+	RESOLUTE A	NWT	74 43	94 59	209	1957 05	1957 06	X	X	X	X		B			S			X								C
2403500+	RESOLUTE A	NWT	74 43	94 59	209	1957 07	1958 12	X	X	X	X		B			S	J	O	X								C
2403500+	RESOLUTE A	NWT	74 43	94 59	209	1959 01	1962 05	X	B	X	X		B			S	J	O	X								C
2403500+	RESOLUTE A	NWT	74 43	94 59	209	1962 06	1962 09	X	B	X	X		B		A	S	J	O	X								C
2403500+	RESOLUTE A	NWT	74 43	94 59	209	1962 10	1963 09	X	X	X	X		B		A	S	J	O	X								C
2403500+	RESOLUTE A	NWT	74 43	94 59	209	1963 10	1964 09	X	X	X	X		B		A	S	K	O	X								C
2403500+	RESOLUTE A	NWT	74 43	94 59	209	1964 10	1965 11	X	X	X	X		B	D	A	S	K	O	X								C
2403500+	RESOLUTE A	NWT	74 43	94 59	209	1965 12	1966 12	X	X	X	X		B	D	A	S	K	O	X	X							C
2403500+	RESOLUTE A	NWT	74 43	94 59	209	1967 01	1974 06	X	X	X	X			D	A	S	K	O	X	X							C
2403500+	RESOLUTE A	NWT	74 43	94 59	209	1974 06		X	X	X	X			D	R	S	K	O	X	X							C
240350E	RESOLUTE AP STN A	NWT	74 43	94 59	209	1957 08	999 88																				C
2403600	RESOLUTION ISLAND	NWT	61 18	64 53	127	1929 10	1933 10	X	P	X	X		B														Q
2403600	RESOLUTION ISLAND	NWT	61 18	64 53	127	1934 08	1948 06	X	P	X	X		B														Q
2403600	RESOLUTION ISLAND	NWT	61 18	64 53	127	1949 01	1949 08	X	P	X	X																Q
2403600	RESOLUTION ISLAND	NWT	61 18	64 53	127	1949 09	1951 09	X	P	X	X		B														Q
2403600	RESOLUTION ISLAND	NWT	61 18	64 53	127	1951 10	1961 10	X	P	X	X																Q
2403602+	RESOLUTION IS C WARWICK	NWT	61 35	64 39	1208	1962 03	1974 03	X	B	X	X		B														Q
2403602+	RESOLUTION ISLAND	NWT	61 35	64 39	1208	1974 03	1975 08	X	B	X	X		B														Q
2203616	ROSS POINT	NWT	68 35	111 06	488	1959 01	1963 07			X	X																H
2403625	ROWLEY ISLAND	NWT	69 05	79 02	196	1957 04	1957 05		P																		H
2403625	ROWLEY ISLAND	NWT	69 05	79 02	196	1957 11	1959 12			X	X																H
2403625	ROWLEY ISLAND	NWT	69 05	79 02	196	1960 01	1970 10	X	P	X	X																H
2503650	SACHS HARBOUR	NWT	71 59	125 17	277	1955 11	1956 10	X	P	X	X		B						X								W
2503650	SACHS HARBOUR	NWT	71 59	125 17	277	1956 11	1965 02	X	P	X	X		B			S			X								W

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2503650	SACHS HARBOUR	NWT	71 59	125 17	277	1965 03	1970 06	X	P	X	X		B			S			X	X							W
2503650	SACHS HARBOUR	NWT	71 59	125 17	277	1970 06	1970 10	X	E	X	X		B			S	A		X	X							W
2503650	SACHS HARBOUR	NWT	71 59	125 17	277	1970 10	1975 06	X	X	X	X					S	A		X	X							W
2503650	SACHS HARBOUR	NWT	71 59	125 17	277	1975 06		X	X	X	X	X				S	A		X	X							W
2203675	SANS SAULT RAPIDS	NWT	65 40	128 49	208	1971 01	1971 07			X																	W
2203675	SANS SAULT RAPIDS	NWT	65 40	128 49	208	1971 07	1973 01			X	X																W
2403680+	SARCPA LAKE	NWT	68 33	83 19	890	1961 01	1963 07			X	X																H
2403680+	ALSO 2402697		68 33	83 20																							
2203682	SAWMILL BAY	NWT	65 44	118 55	562	1948 02	1949 09	X	X	X	X																W
2203682	SAWMILL BAY	NWT	65 44	118 55	562	1956 08	1957 01		X																		W
2303685	SHEPHERD BAY	NWT	68 49	93 26	168	1955 10	1957 03		P																		H
2303685	SHEPHERD BAY	NWT	68 49	93 26	168	1957 04	1957 07		P	X	X																H
2303685	SHEPHERD BAY	NWT	68 49	93 26	168	1957 08	1973 04			X	X																H
2303685	SHEPHERD BAY	NWT	68 49	93 26	168	1973 04	1973 10	X	C	X	X																H
2303685	SHEPHERD BAY	NWT	68 49	93 26	168	1973 10	1974 03	X	C	X	X		B														H
2303685	SHEPHERD BAY	NWT	68 49	93 26	168	1974 04		X	C	X	X		B														H
2403688	SHERWOOD HEAD	NWT	78 12	89 43	200	1961 08	1963 08	X	P																		C
2403688	SHERWOOD HEAD	NWT	78 12	89 43	200	1964 09	1965 04	X	P																		C
2303694	SIMPSON LAKE	NWT	68 36	92 01	1218	1956 11	1957 04		P																		H
2303694	SIMPSON LAKE	NWT	68 36	92 01	1218	1959 01	1963 07			X	X																H
2203700+	SNARE RIVER	NWT	63 31	116 00	710	1947 06	1955 09			X	X																W
2203700+	SNARE RIVER	NWT	63 31	116 00	710	1955 10	1955 10		P	X	X																W
2203700+	SNARE RIVER	NWT	63 31	116 00	710	1955 11	1955 12		P	X	X		B														W
2203700+	SNARE RIVER	NWT	63 31	116 00	710	1956 01	1958 10		X	X	X		B														W
2203700+	SNARE RIVER	NWT	63 31	116 00	710	1958 11	1959 02		X				B														W
2203700+	SNARE RIVER	NWT	63 31	116 00	710	1959 03	1959 12		X	X	X		B														W
2203700+	SNARE RAPIDS	NWT	63 31	116 00	710	1960 01	1964 06		X	X	X		B														W
2203700+	SNARE RAPIDS	NWT	63 31	116 00	710	1964 07	1965 02		X	X	X																W
2203700+	SNARE RAPIDS	NWT	63 31	116 00	710	1965 03	1966 06			X	X																W
2203700+	SNARE RAPIDS	NWT	63 31	116 00	710	1968 01	1968 06			X	X																W
2203700+	SNARE RAPIDS	NWT	63 31	116 00	710	1968 11	1970 05			X	X																W
2203700+	SNARE RAPIDS	NWT	63 31	116 00	710	1974 05 *				X	X																W
2203750	SNOWDRIFT	NWT	62 24	110 44	580	1972 09	1973 02			X	X		B														W
2203750	SNOWDRIFT	NWT	62 24	110 44	580	1973 03	1974 08		D	X	X		B														W
2403800	SPENCE BAY	NWT	69 32	93 31	44	1951 10	1952 05	X	P	X	X																C
2403800	SPENCE BAY	NWT	69 32	93 31	44	1952 11	1954 03	X	P	X	X																C
2403800	SPENCE BAY	NWT	69 32	93 31	44	1954 04	1955 11	X	P	X	X		B														C
2403800	SPENCE BAY	NWT	69 32	93 31	44	1955 12	1957 10	X	P	X	X																C
2403800	SPENCE BAY	NWT	69 32	93 31	44	1957 11	1960 07	X	P	X	X		B														C
2403800	SPENCE BAY	NWT	69 32	93 31	44	1960 08	1963 07	X	P	X	X																C

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2403800	SPENCE BAY	NWT	69 32	93 31	44	1963 08	1963 08	X	P	X	X		B														C
2403800	SPENCE BAY	NWT	69 32	93 31	44	1963 09	1969 05	X	P	X	X																C
2403800	SPENCE BAY	NWT	69 32	93 31	44	1969 11	1969 12	X	P	X	X																C
2403800	SPENCE BAY	NWT	69 32	93 31	44	1971 06	1972 02	X	D	X	X																C
2403800	SPENCE BAY	NWT	69 32	93 31	40	1974 06				X	X																C
2403820	STRATHCONA SOUND	NWT	73 02	84 33	1174	1975 01		X	D	X	X		B														C
2303830	STURT POINT	NWT	68 47	103 21	64	1959 01	1963 07			X	X																H
2203890	TROUT LAKE	NWT	60 45	121 30	1650	1944 04	1945 10	X	P	X	X																W
2203891	TSICHU RIVER	NWT	63 18	129 49	4150	1974 10				X	X																W
2203892	TSU LAKE	NWT	60 41	111 52	700	1974 05 *				X	X																W
2203900	TUKTOYAKTUK	NWT	69 28	132 59		1948 10	1955 07			X	X																W
2203900	TUKTOYAKTUK	NWT	69 28	132 59		1955 12	1956 02			X	X																W
2203910+	TUKTUK	NWT	69 27	133 00	60	1955 08	1957 05		C																		H
2203910+	TUKTUK	NWT	69 27	133 00	60	1957 06	1960 12	X	C	X	X																H
2203910+	TUKTOYAKTUK	NWT	69 27	133 00	60	1961 01	1974 03	X	C	X	X																H
2203910+	TUKTOYAKTUK	NWT	69 27	133 00	60	1974 04		X	C	X	X																W
2203912	TUKTOYAKTUK A	NWT	69 26	133 02	45	1970 04 *	1973 07		D	X	X		B														W
2203912	TUKTOYAKTUK A	NWT	69 26	133 02	18	1973 10			D	X	X		B														W
2203920	TUNDRA MINE	NWT	64 02	111 10	1545	1963 09	1967 12			X	X																W
2203922	TUNGSTEN	NWT	61 57	128 15	3750	1966 10	1975 06			X	X																W
2203922	TUNGSTEN	NWT	61 57	128 15	3750	1975 06				X	X	X	B														W
2203925	TUNUNUK	NWT	69 01	134 41	160	1959 01	1963 07			X	X																W
2203933	TWIN GORGES	NWT	60 15	111 48	780	1967 08 *	1968 08			X	X																W
2203933	TWIN GORGES	NWT	60 15	111 48	780	1969 02	1969 02			X	X																W
2203933	TWIN GORGES	NWT	60 15	111 48	780	1969 09	1970 05			X	X																W
2503940+	UNNAMED POINT	NWT	68 45	109 04	367	1955 08	1957 05		P																		H
2503940+	UNNAMED POINT	NWT	68 45	109 04	367	1957 06	1957 07		P	X	X																H
2503940+	UNNAMED POINT	NWT	68 45	109 04	367	1957 08	1960 12	X	P	X	X																H
2503940+	ALSO 2500595		68 45	109 04																							
2203943	VIRGINIA FALLS	NWT	61 38	125 48	2000	1973 08						S															W
2503945	WALKER BAY	NWT	71 30	117 50	27	1938 09	1939 01	X	P	X	X																W
2403948+	WEST BAFFIN	NWT	68 37	73 12	510	1956 07	1956 08		P																		H
2403948+	WEST BAFFIN	NWT	68 37	73 12	510	1957 02	1957 04		P																		H

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2403948+	WEST BAFFIN	NWT	68 37	73 12	510	1959 01	1960 12			X	X																H
2403948+	WEST BAFFIN ISLAND	NWT	68 37	73 12	510	1961 01	1963 07			X	X																H
2403955+	WEST MELVILLE	NWT	68 18	85 41	1310	1955 10	1957 08		P																		H
2403955+	WEST MELVILLE	NWT	68 18	85 41	1310	1957 11	1960 12	X	P	X	X																H
2403955+	ALSO 2402686		68 18	85 41																							
2303970+	WEST SIMPSON	NWT	68 27	89 38	345	1955 07	1957 07		P																		H
2303970+	WEST SIMPSON	NWT	68 26	89 43	1069	1957 08	1960 12	X	P	X	X																H
2303970+	ALSO 2303090		68 26	89 39																							
2303985	WHALE COVE	NWT	62 11	92 36	20	1974 02				X	X		B														C
2204000	WRIGLEY A	NWT	63 12	123 25	511	1943 08	1946 09	X	P	X	X																W
2204000	WRIGLEY A	NWT	63 12	123 25	511	1946 10	1946 10		P																		W
2204000	WRIGLEY A	NWT	63 12	123 25	511	1947 06	1947 10	X	P	X	X																W
2204000	WRIGLEY A	NWT	63 12	123 25	511	1948 07	1950 09	X	P	X	X																W
2204000	WRIGLEY A	NWT	63 12	123 25	511	1950 10	1952 10			X	X																W
2204000	WRIGLEY A	NWT	63 12	123 25	511	1953 03	1955 09			X	X																W
2204000	WRIGLEY A	NWT	63 12	123 25	511	1955 10	1956 12		D	X	X																W
2204000	WRIGLEY A	NWT	63 12	123 25	511	1957 01	1957 06		D	X	X		B														W
2204000	WRIGLEY A	NWT	63 12	123 25	511	1957 07	1958 04		D	X	X																W
2204000	WRIGLEY A	NWT	63 12	123 25	511	1958 05			D	X	X		B														W
2204007	YADEK LAKE	NWT				1954 06	1954 08		P																		W
2204100	YELLOWKNIFE A	NWT	62 28	114 27	682	1942 07	1947 02	X	P	X	X																W
2204100	YELLOWKNIFE A	NWT	62 28	114 27	682	1947 03	1951 10	X	X	X	X																W
2204100	YELLOWKNIFE A	NWT	62 28	114 27	682	1951 11	1962 08	X	X	X	X		B														W
2204100	YELLOWKNIFE A	NWT	62 28	114 27	682	1962 08	1964 07	X	X	X	X	X	B														W
2204100	YELLOWKNIFE A	NWT	62 28	114 27	682	1964 08	1965 01	X	X	X	X	X															W
2204100	YELLOWKNIFE A	NWT	62 28	114 27	682	1965 02	1966 06	X	X	X	X	X								V							W
2204100	YELLOWKNIFE A	NWT	62 28	114 27	682	1966 06	1969 10	X	X	X	X	X			A					V							W
2204100	YELLOWKNIFE A	NWT	62 28	114 27	682	1969 11	1974 06	X	X	X	X	X			A	S				V							W
2204100	YELLOWKNIFE A	NWT	62 28	114 27	682	1974 06		X	X	X	X	X			R	S				V							W
2204150	YELLOWKNIFE CON MINE	NWT	62 28	114 20	515	1941 03	1942 10			X	X																W
2204200	YELLOWKNIFE HYDRO	NWT	62 40	114 15	523	1943 01	1970 12			X	X																W
2204200	YELLOWKNIFE HYDRO	NWT	62 40	114 15	523	1972 02				X	X																W
2204300+	YOUNG POINT	NWT	68 56	116 55	55	1955 08	1957 05		P																		H
2204300+	YOUNG POINT	NWT	68 56	116 55	55	1957 06	1957 07		P	X	X																H
2204300+	YOUNG POINT	NWT	68 56	116 55	55	1957 08	1960 12			X	X																H
2204300+	ALSO 2200690		68 56	116 55																							