<u>This pocket contains:</u>

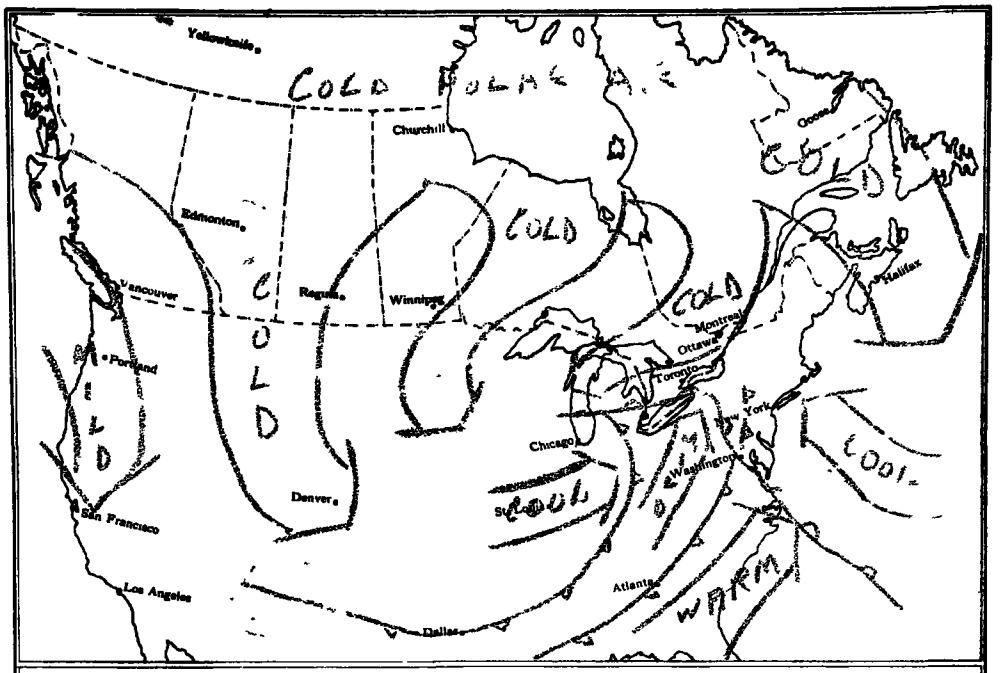
1. Chart of general weather forecast.
2. Booklet on Yellowknife, N. W. T.
3. Booklet on the Alaska Highway.
4. Leaflet on Fort Smith, N. W. T.
5. Polar-centered azimuthal equidistant projection of Northern North America.
6. Feature on Yellowknife, N. W. T., Globe & Mail, Toronto, Sept. 15th, 1948.
7. <u>Lifeline of the North</u>, Time, July 19th, 1948.

Form 9073-7-46

GENERAL WEATHER FORECAST

METEOROLOGICAL DIVISION DEPARTMENT OF TRANSPORT.

FOR THE OTTAWA REGION...ISSUED AT 11:30 AM DATE FEB 28/48



Summary of Weather Map at 0730E SAT. FEB 28.

AN INTENSE STORM RESULTING FROM THE STRUGGLE BETWEEN TROPICAL AND POLAR AIR HAS BROUGHT NEAR BLIZZARD CONDITIONS INTO THE OTTAWA VALLEY TODAY WARM AIR ALOFT WILL CAUSE OCCASIONAL FREEZING RAIN WITH THE SNOW DURING THIS AFTERNOON. THE STORM WILL HAVE SPENT ITSELF BY SUNDAY MORNING AND COLDER WEATHER WILL FOLLOW IN ITS WAKE

Forecast For TODAY FEB 28th

CONTINOUS SNOW.
OCCASIONAL FREEZING RAIN OR ICE PELLETS MIXED WITH THE SNOW THIS AFTERNOON.
TEMPERATURES UNCHANGED
WINDS EASTERLY 25 DECREASING TO 15 THIS EVENING

TEMPERATURES	
Reported High yesterday	[illegible]
Reported Low last night	[illegible]
Forecast High today	28
Forecast Low tonight	20
Forecast High tomorrow	36

Outlook For SUNDAY FEB 29th.

OVERCAST WITH SNOW-FLURRIES SUNDAY MORNING
CLOUDY SUNDAY AFTERNOON AND EVENING
TURNING COLDER SUNDAY NIGHT. WINDS NORTHEAST 20

Special Weather Notes

THE LATEST WEATHER INFORMATION SHOWS THAT THE SNOW HAS CHANGED TO RAIN IN THE TRENTON/TORONTO/MUSKOKA REGION WITH SOME RAIN ~~REPORTED AS CLOSE AS SMITH FALLS. THE PRECIPITATION IS EXPECTED~~ TO REMAIN MOSTLY SNOW AT OTTAWA

Issued at 11:30 HAM Feb 28 1948

Duty Forecaster

FOR FURTHER WEATHER INFORMATION PLEASE CALL 4-9468.

SUPPLEMENT TO THE FOLDER

YELLOWKNIFE - GENERAL INFORMATION

POPULATION

The population of Yellowknife on April 1, 1947, was approximately 3,500, but this figure is expected to increase during the year.

HOW TO REACH YELLOWKNIFE

By Air - Yellowknife is situated about 700 miles north of Edmonton, Alberta, and is most conveniently reached by airplane. Canadian Pacific Air Lines provide regular service daily except Sunday from Edmonton to Yellowknife and return. The trip, one-way, occupies about five hours. The regular fare via Fort Smith, one-way, is $80 plus $12 Transportation Tax; return fare $144 plus $21.60 tax. An alternative route is available from Edmonton to Yellowknife via Peace River, Alberta. The fare is the same as that via Fort Smith.

In addition to scheduled services operated by Canadian Pacific Air Lines, a non-scheduled service is operated from Edmonton to Peace River, and from Peace River to Yellowknife, via Hay River Settlement, by Peace River Northern Airways. Fares from Edmonton to Yellowknife and return are identical with those of Canadian Pacific Air Lines. The fare, one-way, from Peace River to Yellowknife is $60 plus $9 tax; the return fare $108 plus $16.20 tax. The fare, one-way, from Hay River to Yellowknife is $20 plus $3 tax; the return fare $36 plus $5.40 tax.

Wheel-equipped aircraft land at an aerodrome located at Long Lake, about five miles by road from Yellowknife. A bus service operates between the aerodrome and the settlement. Seaplane bases have been established at Long Lake and at Yellowknife Bay.

AIR EXPRESS AND FREIGHT RATES

The following rates are charged by Canadian Pacific Air Lines for the transportation of freight and express from Edmonton to Yellowknife: Express, via Fort Smith, 29 cents per pound. Freight rates via Fort Smith are: over 100 pounds, 20 cents per pound; over 500 pounds, 18 cents per pound; over 1,000 pounds, 16 cents per pound.

The express and freight rates from Peace River to Yellowknife are 18 cents per pound; over 100 pounds, 16 cents per pound; over 500 pounds, 14 cents per pound; over 1,000 pounds, 12 cents per pound.

Rates covering the transportation of freight and express from Peace River to Yellowknife by Peace River Northern Airways are identical with those of Canadian Pacific Air Lines.

WATER TRANSPORTATION RATES

The rate for transportation of freight over the water route from railhead at Waterways, Alberta, to Yellowknife is about two cents per pound. Freight rates on the railway from Edmonton to Waterways have recently been reduced by order of the Board of Transport Commissioners. Rates may be obtained on application to the Northern Alberta Railways at Edmonton.

COMMUNICATION

Postal Service - Mail service is maintained to and from Yellowknife by air four times each week. Letters are carried at regular postage rates.

LOCAL TRANSPORTATION

Six taxi operators, two buses, and several truck and motor-boat taxi operators furnish transportation service from Yellowknife Settlement and vicinity. Several air services have aircraft available for charter trips to outlying points.

THE MINING INDUSTRY

Progress was made in the mining industry in Yellowknife District during 1946. Gold production was resumed at the Con-Rycon properties in August, and gold obtained from these mines and from the Negus mine during 1946 totalled 46,260 ounces. Resumption of gold production at the Thompson-Lundmark property during 1947 has been forecast.

In addition, a number of promising properties are under development. Included is that of Giant Yellowknife Gold Mines Limited, which is carrying on lateral development from two shafts, ore being stock-piled. Gold production is expected to be under way at this property by the end of 1948. Shaft sinking or lateral development operations are also under way at the properties of Discovery Yellowknife, Beaulieu Yellowknife, Sunset Yellowknife, Viking Yellowknife and North Inca Gold Mines, and at that of Diversified Mining Interests (Canada) Limited. Operations at the property of Crestaurum Mines Limited were suspended early in 1947. Reports also indicate milling on a small scale will be commenced in 1947 at properties of Peg Tantalum Mines Limited near Ross Lake, and DeSteffany Tantalum-Beryllium Mines Limited in the Beaulieu River region. Many other companies are carrying on diamond drilling programs and arranging for development.

Good progress is being made in the hydro-electric power project on Snare River, about 90 miles north of Yellowknife Settlement. It is expected that power from this source will be available to mining properties late in 1948.

ACCOMMODATION

Accommodation in Yellowknife Settlement for the travelling public was improved in 1946 when a modern 40-room hotel was opened. A second hotel and two rooming houses are also available.

July 15, 1947.

YELLOWKNIFE

Northwest Territories

Canada

GENERAL INFORMATION

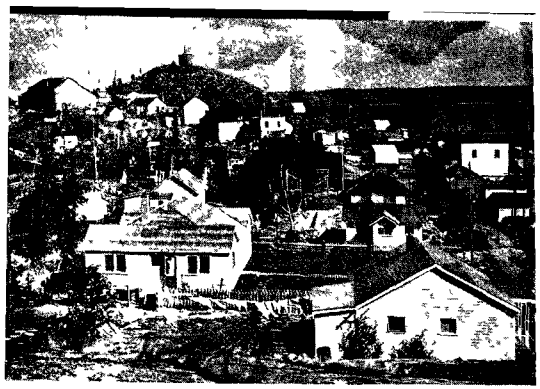
Miners leaving Negus shaft

DEPARTMENT OF MINES AND RESOURCES

Bureau of Northwest Territories and Yukon Affairs

LANDS, PARKS AND FORESTS BRANCH

Ottawa, Canada



Part of Yellowknife Settlement

YELLOWKNIFE

Northwest Territories

The Settlement of Yellowknife is situated on Yellowknife Bay, on the north shore of Great Slave Lake, Northwest Territories, at approximately latitude 62°N., longitude 114°W. It is the centre of activity in Yellowknife Mining District, where the principal industry is gold mining. The population, including that of the surrounding area, was approximately 3,000 on June 1, 1946, but this figure is likely to increase.

Yellowknife was founded in 1935, following gold discoveries made in the vicinity of Yellowknife River and Bay. The settlement expanded as promising properties were developed into producing mines. Conditions brought about by the war necessitated temporary suspension of gold production at various properties between 1942 and 1944, but milling has been resumed. Reports of remarkable discoveries made on the Giant Yellowknife property in 1944, following an extensive diamond-drilling program, aroused a new interest in the mining field. During 1944 and 1945, thousands of new claims were staked and an intensive program of exploration and development was inaugurated.

HOW TO REACH YELLOW 3

By Air—Yellowknife is located about les north of Edmonton, Alberta, and is most conver reached by aeroplane. Canadian Pacific Air Lines pro gular service daily except Sunday from Edmonton to Yell e and return. The trip, one way, occupies about five l The regular fare, one way, is $126.50, and return, $227.7 cial summer fare (May 1 - October 31, 1946) is $97.75 on and $195.50 return. Wheel-equipped aircraft land at a rome located at Long Lake, about five miles by road fr llowknife. A taxi service operates between the aerodrc d the settlement. Seaplane bases have been establis Long Lake and at Yellowknife Bay.

By Water—During the summer months wknife may also be reached by boat from Waterw lberta—the terminus of the Northern Alberta Railways dmonton—by way of Athabaska and Slave Rivers cross Great Slave Lake. The combined train and boa ney requires from one week to 10 days, depending on nav... conditions. Limited passenger services will be available in 1946 on boats operated by Mackenzie River Transport (Hudson's Bay Company). Further information concerning time-tables and fares may be obtained by writing to the company at Edmonton.

TRANSPORTATION OF FREIGHT

The most economical means of transporting freight to Yellowknife is by water from railhead at Waterways, Alberta. Freight services are maintained during the "open" season (approximately June 15 to October 15) by three water transportation companies: Mackenzie River Transport (Hudson's Bay Company), Northern Transportation Company Limited, and Yellowknife Transportation Company Limited. Most mining companies, merchants, and individuals import the coming year's requirements in summer, and carry large stocks. This is an important factor to be considered by anyone planning to start a business enterprise. The rate for freight over this water route from Waterways to Yellowknife is about two cents per pound.

Transportation of freight by air express is more expensive, the rate being 35 cents per pound from Edmonton. Additional information may be obtained from any office of Canadian Pacific Air Lines.

During the winter months, from January to April, some freight is transported by tractor trains and trucks from railhead at Grimshaw, Alberta over a winter road to Hay River Settlement on the south shore of Great Slave Lake, and thence across the ice to Yellowknife via Fort Resolution. The freight rate for this service is eight cents per pound and 10 cents for perishable goods. Construction of an all-weather highway over this route from Grimshaw to Hay River is now under way.

COMMUNICATIONS

Postal Service—Mail service is maintained to and from Yellowknife by air, several times weekly. Letters are carried at regular postage rates.

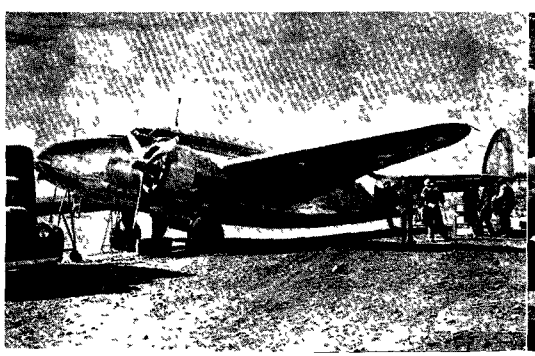
Radio-telegraph—Radio-telegraph service to and from Yellowknife is available at commercial rates through the radio facilities of the Royal Canadian Corps of Signals. Messages are accepted by commercial telegraph companies for transmission to Yellowknife.

YELLOWKNIFE SETTLEMENT

The original Settlement of Yellowknife is situated on a rocky peninsula projecting into Yellowknife Bay, and on two adjacent islands. The townsite has recently been extended following the survey of an area located about a mile from the original site. Lots on the new townsite are available for business and residential purposes, and may be leased from the Agent of Dominion Lands at Yellowknife.

The settlement contains various Government offices, including that of the Mining Recorder, Royal Canadian Mounted Police detachment, Royal Canadian Corps of Signals office, a hotel, two rooming houses, nine restaurants, motion picture theatre, and many other places of business. Among the latter are four general merchant stores, hardware and builders supplies establishment, electrical contractor, garage, drug store, two bakeries, delicatessen, three banks, meat market, meat storage plant, two barber shops, hairdressing parlour, jeweller, two laundries, two assay offices, green grocer, dry cleaner, and a printing office which issues a weekly newspaper. The settlement is served by a doctor, dentist, and two lawyers. Water, air and highway transportation companies or establishments have offices in the settlement. A post office and a liquor store are maintained by the Government.

Yellowknife has regular Air Service



Landing supplies at Yellowknife from Barges

SUPPLIES AND COMMODITIES

Most foodstuffs are imported by dealers and others during the summer months in order to take advantage of lower freight rates. Unexpected growth in population affects supplies, which, in the event of a shortage, must be replenished by tractor train or aircraft at increased cost. The cost of living in Yellowknife is considerably higher than in the provinces. As an example, bread retails at 25 cents per loaf.

Fresh vegetables may be purchased from two local market gardeners. Scattered areas of arable land within reach of the settlement are available for gardening. A number of the common vegetables, including potatoes, turnips, carrots, cabbage, cauliflower, beets, peas, lettuce, celery and onions are raised locally. All dairy products are imported, and condensed or evaporated milk is used almost exclusively. Some eggs are produced and sold at Yellowknife.

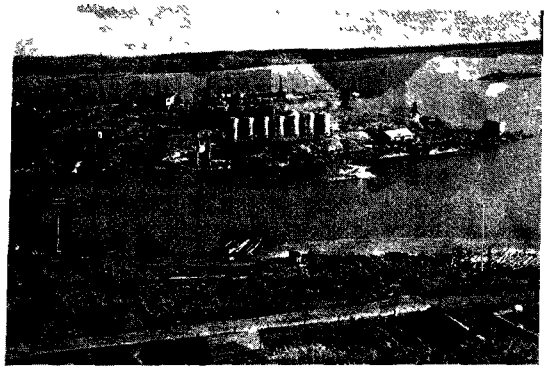
Both wood and oil are used as fuel. Wood supplies are scarce, and cordwood costs $16 per cord in pole lengths. Fuel oil for heating purposes retails at 30 cents per gallon. Other oil products, including gasoline, may also be purchased.

PUBLIC SERVICES

Yellowknife Settlement is served with hydro-electric power, has street lighting, and in summer is served by a water-pipe system. Water and sewage services are also planned for the recent addition to the townsite. Regular garbage collections are made in the settlement.

There are two churches (Church of England in Canada and Roman Catholic) in the settlement, a public school employing four teachers and offering instruction from Grades 1 to 11, and a community hall. Hospital accommodation is available at present in the hospital operated at the "Con" Mine, but plans are being completed for the erection of a large hospital in the townsite.

Opportunities for recreation include bowling, pool and billiards, badminton, baseball and softball, boating, fishing, skating, hockey, and curling in season. An area suitable for development as a golf course has been located within a short distance of the settlement.



Yellowknife Bay, showing oil storage, Jolliffe Island

LOCAL TRANSPORTATION

A system of roads provides access from the settlement to the mines in the vicinity, and to the airport. These roads are surfaced with waste rock from the mines and with gravel. Additions to the system are under construction. Mining areas situated some distance from the settlement are serviced in winter by aircraft and tractor train, and in summer by aircraft and with the aid of motor boat transportation.

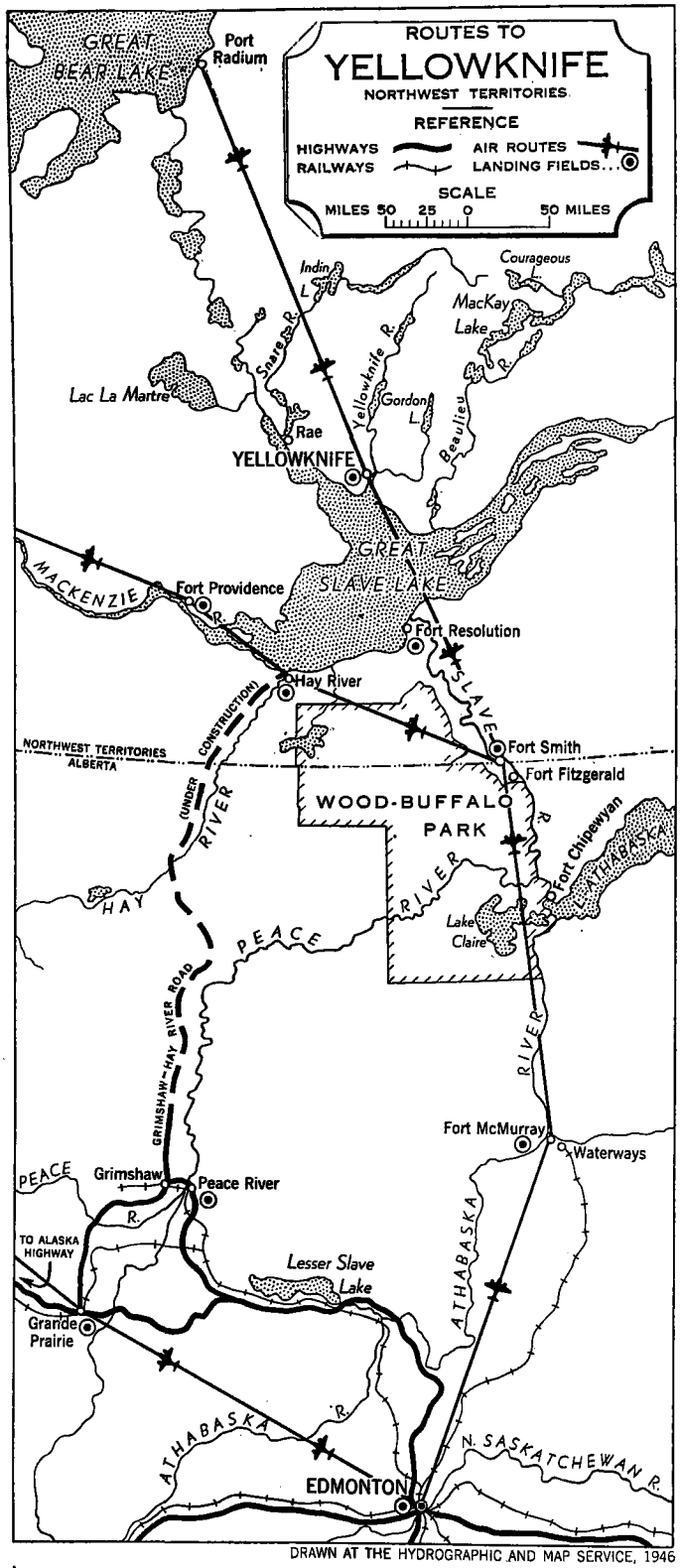
Four taxi operators, two buses, and several truck and motor-boat taxi operators furnish transportation service in the settlement and vicinity. Several air services have aircraft available for charter trips to outlying points.

THE MINING INDUSTRY

Gold production in the Yellowknife District commenced in August, 1938, and by 1942 the following properties were milling gold: Con and Rycon Mines operated by Consolidated Mining and Smelting Company of Canada, Limited; Negus Mines, Limited; Ptarmigan Mines, Limited; Thompson-Lundmark Gold Mines, Limited, and International Tungsten Mines, Limited on Outpost Island in Great Slave Lake. The Ruth Mine of Consolidated also was brought to a state of production by 1942. A shortage of labour and other conditions brought about by the war forced temporary suspension of gold production on these properties, but the Negus Mine is again in operation. Resumption of milling at the Con and Rycon Mines, and at Thompson-Lundmark Mine is expected about September, 1946.

Active developm is also proceeding at other promising properties iant Yellowknife Gold Mines, Limited property in knife River area, two shafts have been sunk, anc ted that gold production will start in 1948. Cres ld Mines, Limited, have the sinking of a shaft u nd it is hoped to commence milling in 1948. R eate that milling on a small scale will be commen at properties of Peg Tantalum Mines, Limited, nea , and De Staffany Tantalum Beryllium Mines, l the Beaulieu River region. Many other compa rrying on diamond drilling programs and arrang elopment.

Electric power fo equirements of the operating mines and for the S f Yellowknife is provided by a hydro-electric pla by the Consolidated Mining and Smelting Comp ada, Limited, on Yellowknife River north of Prosp As new mining developments in the district will r power than is available from this plant, a new pov n Snare River, about 80 miles from Yellowknife S is being undertaken by the Canadian Governme... ...expected that power from this source will be available in 1948.



DRAWN AT THE HYDROGRAPHIC AND MAP SERVICE, 1946

Printed by EDMOND CLOUTIER, King's Printer
Ottawa, Canada, 1946
Reqn. (M. & R.) 10408

General Information Concerning
THE ALASKA HIGHWAY - CANADIAN SECTION
(Northwest Highway System)

The Alaska Highway (Canadian section) commences at Dawson Creek, British Columbia, (Mile 0.0) and enters Alaska at Mile 1221.4. Dawson Creek is the western terminus of a branch of the Northern Alberta Railways, and is also served by the provincial highway systems of Alberta and British Columbia. It is approximately 495 miles by railway, and 475 miles by highway (shortest route) from Edmonton. Approximate mileages from ports of entry into Canada to Dawson Creek are as follows: Kingsgate, British Columbia, to Dawson Creek (via Cranbrook, Macleod and Calgary), 994 miles; Coutts, Alberta, to Dawson Creek, 870 miles.

Construction of the Alaska Highway through Canada was commenced in March, 1942, and the pioneer road was completed by November of the same year. The work was undertaken by United States Army Engineers. The road was developed into a military highway in 1943 with the aid of civilian contractors. Its total length from Dawson Creek, B.C., to Fairbanks, Alaska, is 1,523 miles, of which 1,221 miles are in Canada and 302 miles in Alaska. The highway follows generally the air route through the region, and access roads connect it with airports along the Northwest Staging Route. Under the terms of the agreement governing its construction, the highway was maintained by the United States authorities as a military road until April 1, 1946, when it was turned over to Canada.

The Alaska Highway has a gravelled, all-weather surface from Dawson Creek, B.C., through British Columbia and Yukon Territory to the Yukon-Alaska boundary, and is kept open to traffic throughout the year. Maintenance on the highway is now being carried on by the Northwest Highway System (Canadian Army) and information on the current condition of the highway may be obtained at any time from The Commander, Northwest Highway System (Canadian Army), Whitehorse, Yukon Territory.

The Haines Cut-off Road, which connects the port of Haines, Alaska, with the Alaska Highway at a point approximately 95 miles west of Whitehorse, Yukon Territory, is kept open to traffic during the summer months only.

Provincial Approach Roads

Although the Alaska Highway is kept open to traffic throughout the year, ferries are used to cross some of the larger rivers on approach roads between Edmonton, Alberta, and Dawson Creek, B.C., and it is not advisable to travel during the spring when the ice is breaking up or during the autumn when ice is forming on the rivers. Information concerning the condition of approach roads in Alberta, and capacities of bridges and ferries thereon, may be obtained upon application to the Director, Provincial Publicity and Travel Bureau, Edmonton, Alberta. In this connection it should be noted that the maximum load permitted by the Smoky River Ferry is 12 tons.

Travel Regulations

Permits to travel on the Alaska Highway are no longer required, but arrangements for accommodation should be made in advance.

Loading and Clearance Regulations

(a) Unrestricted gross weight, 15 tons.
(b) Special multiple axle or trailer type maximum gross, 30 tons.
(c) Maximum axle load, 12 tons.
(d) Axle spacing, 14 feet.
(e) Maximum vertical clearance, 14 feet.

Restrictions on travel may be made on short notice at any time by the highway maintenance authorities because of flood conditions or damage to bridges.

The use of trailers and cabin trailers is permissible on the highway. However, the use of heavy trailers in conjunction with passenger cars is not recommended, owing to difficulties which might be encountered on some of the longer grades.

Roadside Accommodations

A list of accommodations and roadside facilities along the highway will be found on page 8 of this circular. Travellers cannot expect assistance in matters of food and shelter or of automotive repairs from Northwest Highway System maintenance camps.

The Canadian Government has prepared public camp-grounds for use by travellers without charge, at several locations along the Alaska Highway in Yukon Territory. These camp-grounds are intended for the convenience of travellers equipped for camping, who carry their own food and supplies. In addition to an area for the erection of tents, etc., the camp-grounds provide cooking and dining shelters containing stoves and tables. The location of these camp-grounds is indicated in the list on page 8 of this circular.

Telephone and Telegraph Services

The Northwest Communication System, operated by Canadian National Telegraphs under the administration of the Dominion Department of Transport, provides facilities for public long distance telephone and commercial telegraph services at the following repeater stations along the Alaska Highway: Dawson Creek (Mile 0.0), Blueberry (Mile 101), Trutch (Mile 201), Fort Nelson (Mile 300), Summit Lake (Mile 392), Muncho Lake (Mile 456), Coal River (Mile 533), Watson Lake (Mile 634), Swift River (Mile 733), Brook's Brook (Mile 829), Whitehorse (Mile 918), Canyon Creek (Mile 996), Destruction Bay (Mile 1083), and Koidern (Mile 1156). In addition, the Northwest Communication System ties in with other Department of Transport facilities at aerodromes located at Fort St. John ton River, Fort Nelson, Smith River, Watson Lake, Teslin, Whitehorse, Aishihik, and

Bus Services

To faci maintenance operations on the highway, and for the benefit of travellers wi automobiles, buses are operated on the Alaska Highway between Dawson Creek and Whi e by the British Yukon Navigation Company, and between Whitehorse and Fairbanks by h Yukon Navigation Company and O'Harra Bus Lines. Persons travelling by bus over t te are accommodated overnight at lodges operated by the bus companies. Information c ing bus schedules and fares may be obtained from the British Yukon Navigation Co and from O'Harra Bus Lines, at Whitehorse, Y.T.

ADMINISTRATION OF NATURAL RESOURCES

As the Alaska Highway traverses portions of British Columbia, Yukon Territory, and the Territory of Alaska, the administration of the natural resources along the highway falls within the jurisdiction of the various governments concerned. In the following paragraphs will be found general information concerning the administration of lands, fish, game, and minerals, and the disposal of surplus buildings and equipment on the Canadian section of the highway.

Disposal of Public Lands

Normally, public or crown lands in Yukon Territory are disposed of by sale or by lease. At the present time, however, on account of lack of surveys, only "Permission to Occupy" is being given in the case of lands situated along the Alaska Highway on which buildings are to be erected immediately or the land otherwise used for the provision of tourist facilities. Applications for land privileges should be made to the Controller of Yukon Territory at Dawson or to the Agent of Dominion Lands at Whitehorse, Y.T., from whom application forms and additional information may be obtained.

Disposal of public lands along the Alaska Highway in the Province of British Columbia is under provincial jurisdiction. Further information may be obtained from Mr. J.T. Stubley, British Columbia Government representative at Pouce Coupe, B.C., or from the Department of Lands and Forests, Victoria, B.C.

Disposal of Surplus Buildings, etc.

Persons desiring to obtain buildings or materials used in the construction of the Alaska Highway and now surplus to requirements, should apply to the following officers of War Assets Corporation:

1. The Regional Manager, War Assets Corporation, 1109 West Georgia Street, Vancouver, B.C.

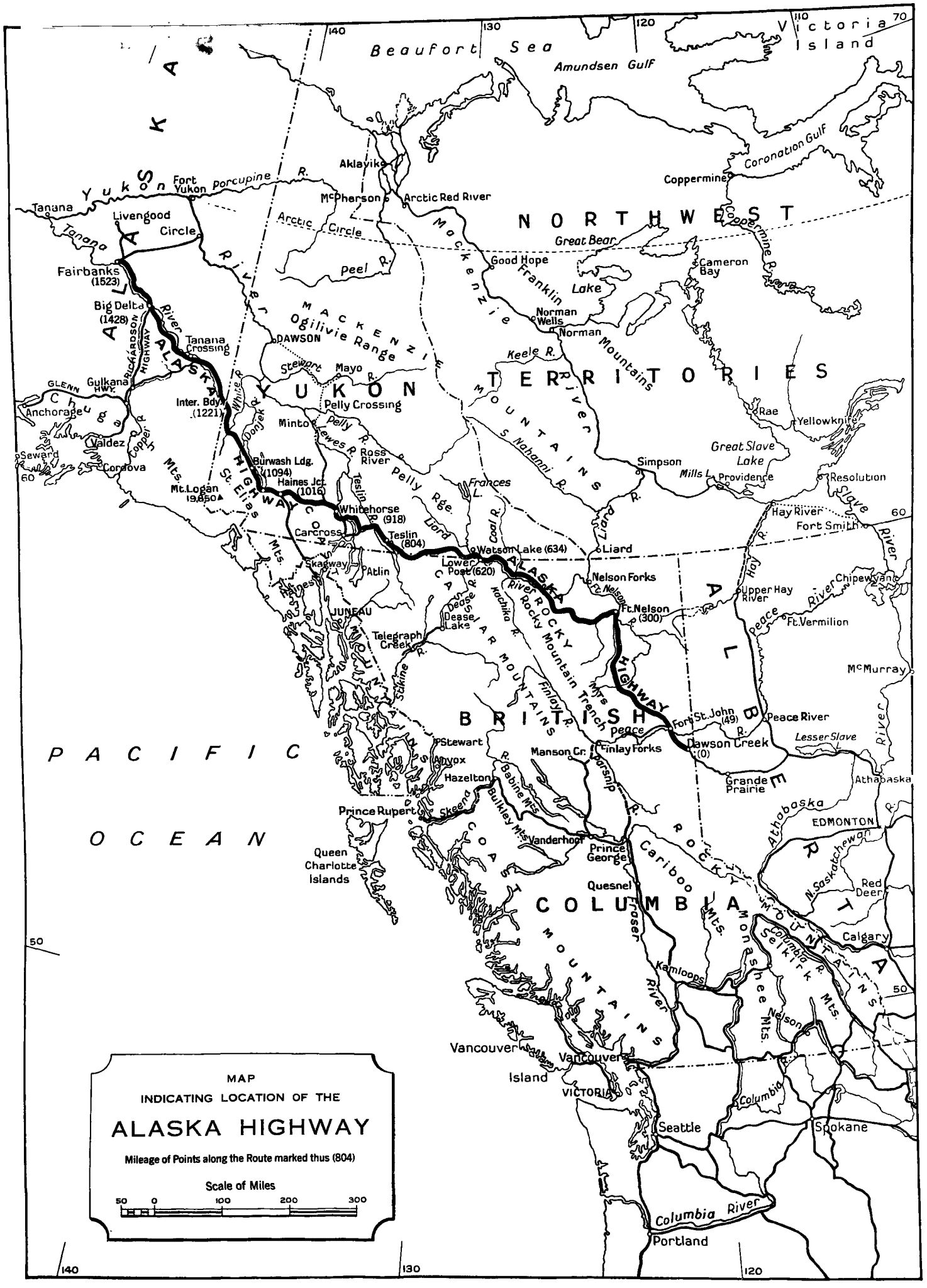
2. Branch Sales Manager, War Assets Corporation, 515 - 8th Avenue West, Calgary, Alberta.

3. Branch Manager, War Assets Corporation Sales Office, 309 Tegler Building, Edmonton, Alberta. (For buildings or material located on Alaska Highway from Dawson Creek, Mile 0.0 to Smith River, Mile 517).

4. War Assets Corporation Sales Office, Whitehorse, Yukon Territory. (For buildings or material located on Alaska Highway from Smith River, Mile 517, to Yukon-Alaska Boundary, Mile 1221).

Business Opportunities

Persons desiring to operate tourist camps, gasoline stations, or other along the Alaska Highway in Canada, are reminded that the tourist business, in this area, is a seasonal occupation. It is therefore apparent that any this nature should be augmented by some other enterprise to be sustaining t year. For further information concerning business opportunities or licence Territory, application should be made to the Controller, Yukon Territory, a or the Territorial Agent, Whitehorse, Y.T.


MAP
INDICATING LOCATION OF THE
ALASKA HIGHWAY
Mileage of Points along the Route marked thus (804)
Scale of Miles
50 0 100 200 300
ALASKA
YUKON TERRITORIES
NORTHWEST TERRITORIES
BRITISH COLUMBIA
ALBERTA
PACIFIC OCEAN
Beaufort Sea
Amundsen Gulf
Coronation Gulf
Victoria Island
Fairbanks (1523)
Big Delta (1428)
Tanana Crossing
Gulkana
Inter. Bdy. (1221)
Anchorage
Valdez
Seward
Cordova
Burwash Ldg. (1094)
Haines Jct. (1016)
Mt. Logan 19,850
Whitehorse (918)
Carcross
Teslin (804)
Watson Lake (634)
Lower Post (620)
Liard
Skagway
Atlin
Haines
JUNEAU
Telegraph Creek
Dease Lake
Stewart
Anyox
Hazelton
Prince Rupert
Skeena
Queen Charlotte Islands
Nelson Forks
Ft. Nelson (300)
Ft. Nelson R.
Rocky Mountain Trench
Kechika R.
Finlay R.
Manson Cr.
Finlay Forks
Fort St. John (49)
Dawson Creek (0)
Peace River
Ft. Vermilion
Upper Hay River
Hay River
Fort Smith
Resolution
Yellowknife
Rae
Providence
Mills L.
Simpson
Norman Wells
Good Hope
Cameron Bay
Coppermine
Aklavik
Arctic Red River
McPherson
Fort Yukon
Tanana
Livengood
Circle
Arctic Circle
Peel R.
Ogilvie Range
Mackenzie Mountains
Keele R.
Great Bear
Great Slave Lake
Franklin
Lake
Mackenzie River
Porcupine R.
Yukon
White R.
Donjek
Stewart
Mayo
DAWSON
Pelly Crossing
Minto
Pelly R.
Lewes R.
Ross River
Pelly Ridge
Liard
Coal R.
Frances L.
Nahanni R.
Slave River
Chipewyan
McMurray
Athabaska
Athabaska R.
Lesser Slave
Grande Prairie
Peace River
Babine Mts.
Bulkley Mts.
Vanderhoof
Prince George
Quesnel
Caribou Mts.
Parsnip R.
Finlay R.
Peace R.
Fraser River
Columbia Mts.
Monashee Mts.
Selkirk Mts.
Nelson Mts.
Columbia R.
Kamloops
Vancouver
Vancouver Island
VICTORIA
Seattle
Spokane
Columbia River
Portland
Calgary
EDMONTON
Red Deer
N. Saskatchewan R.
Athabaska R.
Coast Mts.
Cassiar Mts.
St. Elias Mts.
Rocky Mountains
ALASKA HIGHWAY
RICHARDSON HIGHWAY
GLENN HWY.
Copper R.
Chugach Mts.
140
130
120
110
70
60
50

Similar information concerning business opportunities on sites situated within the Province of British Columbia should be obtained from the Department of Trade and Industry, Victoria, B.C.

Persons wishing to operate bus or trucking services over the Alaska Highway will be required to comply with provincial and territorial regulations. For further information, application should be made to the Department of Trade and Industry, Victoria, B.C., for that part of the highway situated in British Columbia, and to the Controller, Yukon Territory, Dawson, Y.T., or to the Territorial Agent at Whitehorse, Y.T., for the section of the highway in Yukon Territory.

Immigration and Customs Requirements

Citizens of the United States or other countries desiring to settle on lands along the Alaska Highway or elsewhere in Canada should apply to the Director of Immigration, Department of Mines and Resources, Ottawa, Canada, for information concerning immigration requirements.

United States citizens passing through Canada to Alaska do not require passports, and as a general rule will experience no difficulty or delay at the border. They should, however, possess some kind of personal identification.

The admission of rifles and shotguns into Canada is permitted. These must, however, be registered immediately with the provincial police authorities. Fifty rounds of ammunition may be brought into Canada free of duty or deposit. The entrance of semi-automatic or automatic weapons (pistols and revolvers) is prohibited. Ordinary single shot revolvers are admitted to Canada only under permit upon application to the Department of National Revenue, Customs Division, Ottawa, Canada.

Before dogs or other pets are admitted into Canada they must be accompanied by a certificate, signed by a veterinary inspector of the U.S. Bureau of Animal Industry or by a licensed veterinarian of the State of origin, certifying that the animal is free of any contagious disease; also in the case of a dog, that it has not been exposed to rabies within a period of six months of the date of shipment, or has been vaccinated against rabies within the same period.

Personal belongings, settlers' effects, sporting and camping equipment, radios, musical instruments, still and movie cameras with a reasonable amount of film (but not exceeding six rolls), typewriters for personal use, 50 cigars, 200 cigarettes, two pounds of manufac tobacco, small amounts of consumable goods such as one or two days' food suppl oline and oil sufficient for 300 miles of travel, may be brought into Canada fre uty or deposit. There is no limit to the amount of cash one may have in his posses or personal use. Larger quantities of goods or materials must be transporte bond" - that is, under seal from the U.S.-Canada border to the Canada-Alaska bor Trucks carrying goods "in bond" are admitted for passage across Canada only throu customs ports at Coutts, Alberta, Kingsgate, B.C., Pleasant Camp, B.C. (Haines Ro nd Snag, Y.T.

Fish and Game Regulations

An a s or sport fishing permit is required in Yukon Territory, and close seasons mu observed. The fees for such permits are: Resident, $1; Non-Resident, $2. Copies of shing regulations for Yukon Territory may be obtained from the Department of Fisheri Ottawa.

The Yukon Game Ordinance provides that no person shall hunt, trap, injure, kill, shoot at or molest any wildlife within an area extending for a distance of one mile on each side of the Alaska Highway. Hunting and trapping within Kluane Game Sanctuary is prohibited. The privilege of hunting and trapping in Peel River Native Game Preserve is reserved exclusively to the native Indian, Eskimo, and half-breed population. Elsewhere hunting is permitted in season on payment of licence fees as follows:

Resident hunting licence, $1. Non-resident big game hunting licence (Canadian citizens) $75; (Alien), $100. Non-resident game bird licence, $5. Full information concerning the game regulations may be obtained from the Controller, Yukon Territory, at Dawson; the Territorial Agent at Whitehorse, or from the Northwest Territories and Yukon Services, Department of Mines and Resources, Ottawa, Canada.

Regulations governing fishing and hunting in British Columbia may be obtained from the Provincial Game Commissioner, 650 Burrard St., Vancouver, B.C.

Prospecting and Mining

Any person over 18 years of age has the right, with certain reservations, to prospect and mine upon lands in Yukon Territory where the right to mine minerals has not been alienated from the Crown. The fee for recording claims is $10. Copies of the Yukon Quartz and Placer Mining Acts and other mining regulations may be obtained on application to the Controller, Yukon Territory, at Dawson, Y.T.; the Mining Recorders at Whitehorse, Mayo or Dawson, Yukon Territory; or the Northwest Territories and Yukon Services, Department of Mines and Resources, Ottawa.

Information concerning mineral regulations for that section of the Alaska Highway situated within British Columbia may be obtained from the Department of Mines, Victoria, B.C.

Topographical and Geological Maps

Topographical maps of British Columbia and Yukon Territory, including sheets on a scale of 8 miles to 1 inch, of the regions traversed by the Alaska Highway, and geological maps and reports of the region may be obtained from the Mines, Forests and Scientific Services Branch, Department of Mines and Resources, Ottawa. A charge of 25 cents per sheet is made for the topographical maps. Maps of the British Columbia section of the highway may also be obtained from the Department of Lands and Forests, Victoria, B.C.

General Information

Requests for general information concerning all matters relating to Yuko should be addressed to the Controller of Yukon Territory, at Dawson, Y.T.

Information concerning the section of British Columbia traversed by the Highway may be obtained from the Department of Trade and Industry, Victoria, B

Information concerning travel on the Alaska Highway within Alaska may be from the Alaska Road Commission, U.S. Department of the Interior, Juneau, Alas Information concerning natural resources along the highway in Alaska may be ob from the U.S. Department of the Interior, Juneau, Alaska.

ACCOMMODATION AND ROADSIDE FACILITIES AVAILABLE ON THE ALASKA HIGHWAY

MILE	LOCATION		SERVICES AND FACILITIES AVAILABLE	BEDS
0	DAWSON CREEK	B.C.	Hotels, Stores, Meals, Gas and Oil, Repairs	140
49	FORT ST. JOHN	B.C.	Hotels, Stores, Meals, Gas and Oil, Repairs	130
52	CHARLIE LAKE	B.C.	Meals, Gas and Oil	
101	BLUEBERRY	B.C.	Meals, Gas and Oil	4
147	BEATTON RIVER	B.C.	Stores, Meals, Gas and Oil, Minor Repairs	30
171	MASON CREEK	B.C.	Hotel, Meals, Gas and Oil, Minor Repairs	10
201	TRUTCH	B.C.	Meals, Gas and Oil, Minor Repairs	
232.5	PROPHET RIVER	B.C.	Store, Meals, Gas and Oil	20
233	PROPHET RIVER	B.C.	Meals, Cabins, Gas and Oil	
300	FORT NELSON	B.C.	Hotel, Store, Meals, Gas and Oil, Repairs	70
392	SUMMIT LAKE	B.C.	Meals, Gas and Oil, Minor Repairs	30
397		B.C.	Store, Meals, Gas and Oil, Minor Repairs	6
423	RACING RIVER	B.C.	Meals, Gas and Oil	
456	MUNCHO LAKE	B.C.	Meals, Gas and Oil	
533	COAL RIVER	B.C.	Hotel, Meals, Gas and Oil, Minor Repairs	14
620	LOWER POST	B.C.	Hotel, Stores, Meals, Gas and Oil, Minor Repairs	40
632		Y.T.	Camp-grounds	
634	WATSON LAKE	Y.T.	Hotel, Store, Meals, Gas and Oil	40
710	RANCHERIA	Y.T.	Meals, Gas and Oil, Tires	30
733.4		Y.T.	Gas and Oil	
777	MORLEY RIVER	Y.T.	Hotel, Meals, Gas and Oil, Repairs	22
804	TESLIN	Y.T.	Hotel, Store, Meals, Gas and Oil	14
836.6		Y.T.	Meals	10
843		Y.T.	Hotel, Meals, Gas and Oil	16
872	JUDAS CREEK	Y.T.	Cabins, Meals, Gas and Oil - Camp-grounds	10
883	MARSH LAKE	Y.T.	Hotel, Meals, Gas and Oil	30
918	WHITEHORSE	Y.T.	Hotel, Stores, Meals, Gas and Oil, Repairs	100
967	MENDENHALL CREEK	Y.T.	Camp-grounds	
974	CHAMPAGNE	Y.T.	Store	4
996	CANYON CREEK	Y.T.	Meals, Gas and Oil, Repairs	14
1015	HAINES JUNCTION	Y.T.	Camp-grounds	
1022	BEAR CREEK	Y.T.	Store, Meals	4
1094	BURWASH LANDING	Y.T.	Hotel, Store, Meals, Gas and Oil, Repairs	40
1105	KLUANE RIVER	Y.T.	Camp-grounds	
1152	LAKE CREEK	Y.T.	Camp-grounds	
1184	DRY CREEK	Y.T.	Hotel, Meals, Gas and Oil	40
1206	SNAG	Y.T.	Canadian Immigration and Customs	
1210		Y.T.	Meals, Gas and Oil	8
1213	MIRROR CREEK	Y.T.	Camp-grounds	
1221.4	CANADA-ALASKA BOUNDARY			
1226	SCOTTIE CREEK	ALASKA	Store, Gas and Oil	
1270	NORTHWAY	ALASKA	Store, Gas and Oil	
1318	TOK JUNCTION	ALASKA	Meals, Store, Gas and Oil	40
1428	BIG DELTA	ALASKA	Meals, Gas and Oil, Stopover	
1458	RICHARDSON	ALASKA	Meals, Gas and Oil, Repairs	
1523	FAIRBANKS	ALASKA	Hotels, Stores, Meals, Gas and Oil	

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LANDS AND DEVELOPMENT SERVICES BRANCH
DEPARTMENT OF MINES AND RESOURCES
OTTAWA, CANADA

Circular No. 4 February 16, 1948.

FORT SMITH

Fort Smith, gateway to the Mackenzie District of the Northwest Territories, occupies an important place in the administration and development of the Canadian northland. Situated on the Slave River immediately north of the parallel of 60° North Latitude, which forms the boundary between Alberta and the Northwest Territories, this frontier settlement has grown from an isolated Hudson's Bay Company post to a community of about 200 permanent white residents.

Fort Smith occupies a high open bench located about 100 feet above the Slave River, and is surrounded by forests of jack pine, white spruce, poplar, and scattered stands of black spruce. The buildings are mainly of frame construction. Painted white, with red or green roofs and surrounded in many cases with white fences, they form a picturesque community. The settlement is the administrative and commercial centre of the region and contains the offices of the District Agent of the Northwest Territories Administration.

In addition to the administrative buildings, Fort Smith has a hospital, mission day school and public day school, Anglican and Roman Catholic Churches, hotel, Royal Canadian Mounted Police subdivision and detachment, office of the Government Medical Officer, Government liquor dispensary, wireless station, trading posts, and offices and warehouses of transportation companies. The hospital, operated by the Roman Catholic Church mission with Dominion Government assistance, is well equipped, having 40 beds, surgery, and X-ray equipment. The hotel, operated by the Hudson's Bay Company, has room accommodation for about 24 people and dining room service.

Several trading posts, where Indians and other trappers exchange their furs for commodities, are operated in Fort Smith. Most prominent is that of the Hudson's Bay Company, which carries a wide variety of goods, including groceries, dry goods and hardware.

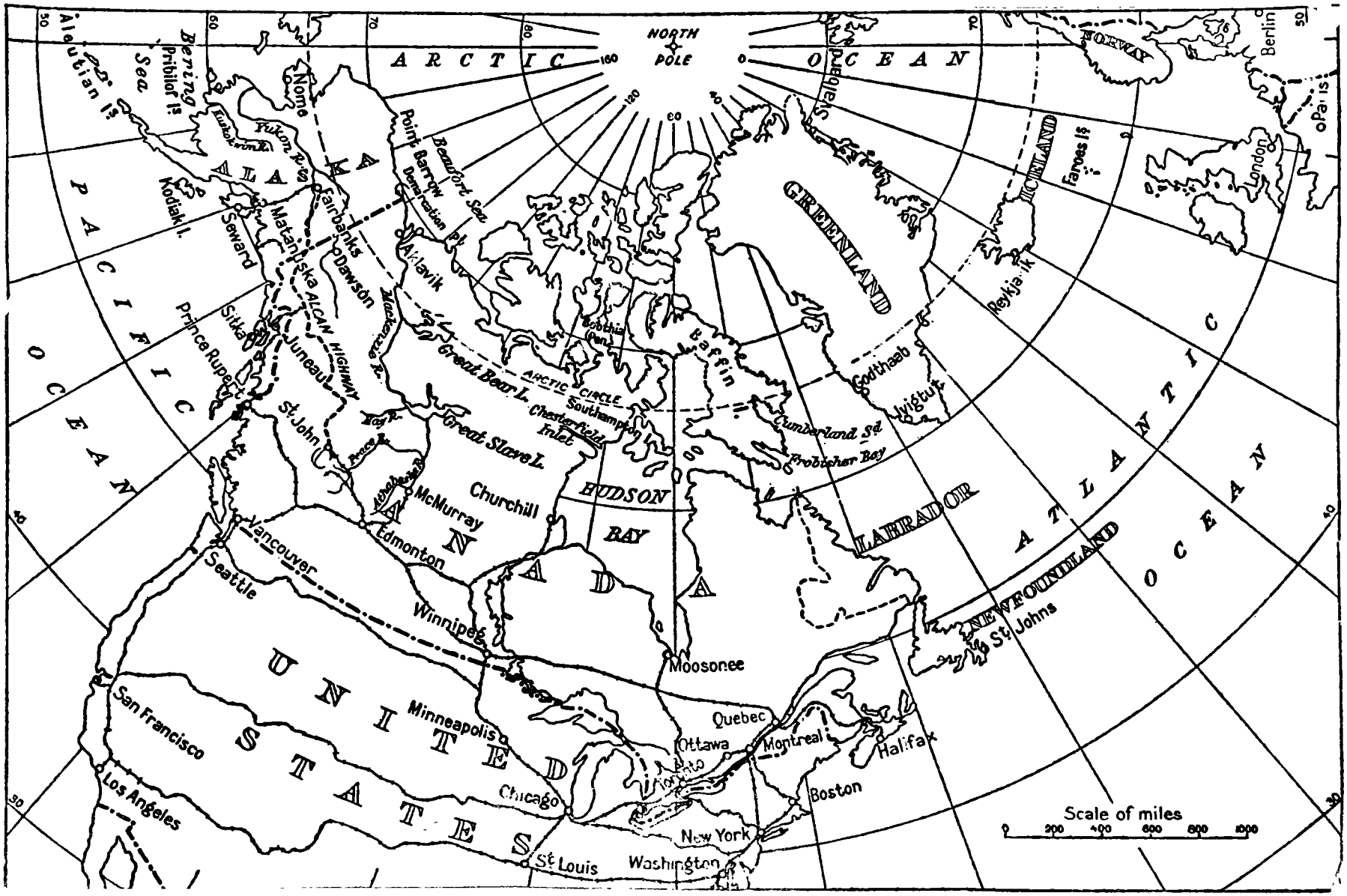
Although situated about 600 miles north of Edmonton by rail and water routes, Fort Smith enjoys many modern conveniences and amenities. Motor car transportation is available to Fitzgerald and other points in the vicinity. Many of the larger buildings are lighted by electricity generated by Delco or diesel power plant systems. A nine-hole golf course constructed on the grounds of the Royal Canadian Mounted Police has the distinction of being one of the most northerly courses in Canada. A privately-owned tennis court furnishes pleasant sport in summer. Drinking water is obtained from spring-fed wells, and water for domestic use is hauled from Slave River or from small lakes in the vicinity.

Modern aerial transportation facilities have brought Fort Smith within a few hours' flying time of Edmonton and other large centres. Fort Smith is served tri-weekly by a service provided by Canadian Pacific Airlines between Edmonton and Yellowknife, N.W.T. A landing field on the outskirts of the settlement provides year-round landing facilities for land-based aircraft. Near the settlement an anchorage is available for airplanes equipped with pontoons.

Fort Smith is served during the season of navigation by river boat transportation. The nearest railhead is Waterways, Alberta--300 miles to the south--which is the terminus of the Northern Alberta Railways. River boats operated by Hudson's Bay Company and Northern Transportation Company provide passenger and freight service between Waterways and Fitzgerald. At Fitzgerald, a 16-mile portage to Fort Smith is necessary because of an unnavigable stretch of the Slave River. Fleets of modern trucks and tractors operated by private transportation companies traverse the portage roads.

From Fort Smith there is uninterrupted navigation to Aklavik near the mouth of the Mackenzie River, a distance of about 1,350 miles. Intermediate points served by the river boats include Resolution, Yellowknife, Hay River, Providence, Fort Simpson, Fort Norman and Norman Wells.

To the west of Fort Smith lies Canada's largest big game preserve, Wood Buffalo Park. It contains an area of 17,300 square miles and lies partly in Alberta and partly in Northwest Territories. Established primarily for the protection of a herd of northern bison, or buffalo, it now forms a vast preserve for many other species of big game and fur-bearing animals.


ARCTIC OCEAN
NORTH POLE
PACIFIC OCEAN
ATLANTIC OCEAN
ALASKA
CANADA
UNITED STATES
GREENLAND
ICELAND
NORWAY
Aleutian Is.
Bering Sea
Pribilof Is.
Nome
Kodiak I.
Seward
Fairbanks
Dawson
Matanuska
ALCAN HIGHWAY
Yukon R.
Point Barrow
Beaufort Sea
Alaska
Aklavik
Mackenzie R.
Prince Rupert
Sitka
Juneau
St. John
Great Bear L.
Great Slave L.
Arctic Circle
Boothia (Pen.)
Baffin
Chesterfield Inlet
Southampton
Cumberland Sd.
Frobisher Bay
Godthaab
Ivigtut
Reykjavik
Faroes Is.
London
Berlin
Paris
Churchill
McMurray
Edmonton
Vancouver
Seattle
Winnipeg
HUDSON BAY
LABRADOR
NEWFOUNDLAND
St. Johns
Moosonee
Quebec
Montreal
Ottawa
Halifax
Boston
New York
Washington
Chicago
Minneapolis
St. Louis
San Francisco
Los Angeles
Scale of miles
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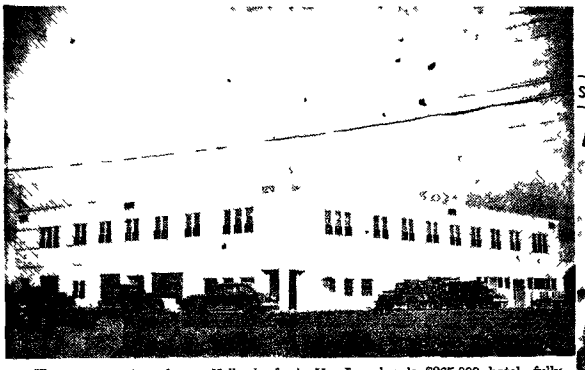
The Globe and Mail

Second Section TORONTO, WEDNESDAY, SEPTEMBER 15 1948. Page

Municipal Face-Lifting Gives Yellowknife New Look of the New North



The nerve centre of new Yellowknife is Vic Ingraham's $265,000 hotel fully modernized with 50 rooms a cocktail lounge seating 230, a beverage room and a coffee shop Several of the rooms have private baths

Fantastic Mining Camp

Original Town Still Stands on Rock, But Signposts of Yesteryear All Gone

By SIDNEY NORMAN

Wrap up your old ideas of Down North and put them away for future reference forget the vividly daubed pictures of pioneer life painted by color seeking magazine writers a few years ago

Yellowknife most northerly gold camp of the Americas, way up above 62 700 air miles from Edmonton—Gateway to the North—has taken on the new look and Canada gives to the world the most fantastically ultra modern mining camp of its age in history And all within less than three years.

Gone are the howling husk es tethered here there anywhere to make day and night hideous gone the wate taxis on the Styx between mainland and Latham Island once so popular as the only approach to the government liquor store and administration offices gone the long lanky water carrier with the milkman's yoke dispensing bay water in five gallon oil cans at one dollar per

The original town on the rock is still there and will always be the waterfront capital Old timers cling to it. The muddy mile way leading to the first Ingraham hotel atop the rock has been down the hotel refurbished and the new building of its well Burns Co and Canadian Pacific Air Lines have touched up the dinginess that was old Yellowknife

Along the shore southerly are the landing platforms of several independent airplane concerns Airships of many makes buzz around off to the Barren Lands or other outpost prospects and when winter comes again pontoons will be doffed for skis and the show will go on

It's a mile west over a fine road built up from muskeg that the real transform ation has taken place There is no other town quite like new Yellowknife nor has there ever been in all mining history The air borne prospector has wrapped up a full load of civilization and taken it with him thanks to a department of government that seems to place a high value upon gold, no matter what others may think of it It is little more than two years also almost coincident with dollar parity that the costly improvements really got under way

Millions have been spent and the end is not yet Out there a new townsite has been laid out on an esker from the glacial age streets graded and sidewalks of gravel laid Sewerage and water systems to defy the Arctic winters are nearing completion at cost of over $1,300 000 Two dozen taxis many trucks and buses flit back and forth from new to old town or out to Giant Negus or Con mines over good roads

As this is written and up till the first killing frost which may come at any time now vegetable and flower gardens flourish The writer only last week ate tomatoes and strawberries ripened in the open and saw many patches of potatoes beets celery cabbages lettuce garden peas and other vegetables indigenous to areas further south growing to maturity

That does not mean that the whole area is growing ground Far from it. But it is true that where loam can be found and enriched growth is rapid in the long warm days of the short summer seasons There are two commercial market gardens—one a few hundred yards from the hospital and the other on the west side of the bay south of the Giant mine A local and eager market awaits all that can be produced

Henry Geiger ch former manager of the Con mine now at Trail was a pioneer in experimentation with Yellowknife soil and his work has lived on and thrived At all three big mines good soil has been found in place or packed in by truck and you now hear mining men boasting as much about their tomatoes strawberries celery or potatoes as of the rich gold strikes of other days

The love of a garden and flowers inborn in most peoples especially those of British descent is stronger than ever down north in a drab land where but a few years ago growth to maturity was considered impossible You now see neat patches of garden stuff and many a little garden and window bright ened by the glow of pansies sweet peas, petunias poppies geraniums and other homey flowers Somehow they have greater value there than anywhere this writer has been

In an air borne land such as Yellow knife petroleum and its derivatives are essentials To meet the great demand which must run to high per capita figures Imperial Oil Co has kept well abreast of the times. Pods years ago its tank farm on Jolliffe Island consisted of 24 tanks with capacity of 300 000 gallons Today there are 68 tanks three of capacity of 350,000 gallons each making total tankage of fuel oil and gasoline 2 000 000 gallons The company blends its own airplane gasoline from Norman Wells base stock and elevate from Calgary Stove oil and diesel sell for 31c ordinary gasoline for 44½c and airplane gasoline for 54½c per gallon

The nerve centre of new Yellowknife is the $265,000 two story hotel built by Vic Ingraham a real pioneer of the north who served a tough apprenticeship up Great Bear Lake way in the early days only to intensify his love for the country and his determination to meet its challenge He has given the north a place unique in mining history modern in every respect, well furnished and particularly well run No brawling or loud language visitors upstairs out by midnight There are 50 rooms several with private baths

On the ground floor occupying space of 120 by 100 feet are a spacious lobby offices for the managerial staff and a store of magazines newspapers and candies a cocktail lounge 65 by 55 feet to seat 230 with bar of mahogany veneer and trexilite and red leather seated aluminum chairs a beverage room 65 by 36 feet, seating 150 with regulation bar a coffee shop 60 by 35 feet with 30 counter seats and tables for as many more kitchen 30 by 30 feet equipped with Frigidaire spick and span using Diesel fuel in the range and electricity in small culinary equipment Another important department is the beer-cooling rooms holding a carload

The coffee shop serves meals that would do credit to many a similar place in Toronto and at prices that are surprising when the distance from supply centres is considered.

It is here the people of the new town and from the mines congregate on social occasions where business and service clubs' luncheons are held where children pop in for their sweets and theatregoers and baseball fans get their snacks when the shows are over

There's a $100 000 movie theatre showing first class pictures modern in every respect, and a good recreation field right in town

Next year an arena, to cost $50 000 with standard hockey ice rink is to be added Headed by a government subscription of half the cost most of the money has already been guaranteed through the efforts of Jerry Murphy an other oldtimer of the north, who says Yellowknife intends to win the Allan Cup the year after a start has been made in practice

But it is in the fine hospital and the new school that citizens take the greatest pride and which best prove the faith in the future of those who have been responsible for the heavy appropriations There is no better hospital anywhere It has 40 beds and an infectious disease ward and is thoroughly equipped with the latest gadgets of the profession It is heated by oil furnace and has a picturesque front on look over Sandy Lake

The cost so far has been over $260 000 subscribed partly by Canadian Red Cross under which it is staffed Northwest Territories Council mining companies of the district such business concerns as Hudson's Bay Burns Co Imperial Oil Canadian Pacific Air Lines, other business concerns and individuals

Dr Stanton who moved in as special physician for Consolidated Smelters in 1937 and has become nothing less than an institution, is in charge No more popular or efficient member of the profession is to be found in the land

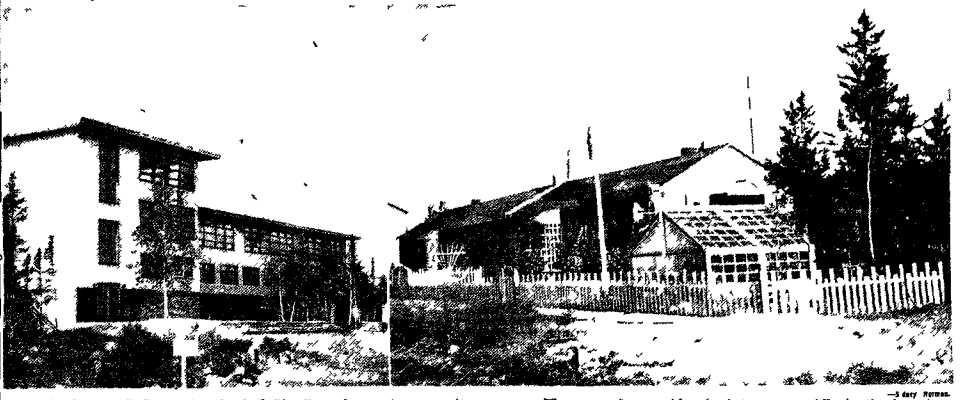
The school has been constructed to take fullest advantage of daylight none too lavish in the long winter days. All grades are taught up to university entry It is steam heated with oil and fluorescently lighted So far it has cost $220,000 with more to come Last year 160 pupils were enrolled this year, 200 are expected

Administration buildings, which include offices for mining recorder Dominion land agent and stipendiary magistrate's court, liquor vendor's store and storage warehouse with four car garage have cost $160 000 while apartments for government staff add up to another $250 000 Across from the theatre is a new $100 000 modernistic Hudson's Bay store Already there are well over 100 residences ranging from under $1 000 to over $10,000 apiece

Water supply is pumped a mile from the bay chlorinated in winter heated and kept in continuous circulation in main lines buried 10 feet below the surface Some rock work has caused delay but the word is that the system will be completed by Nov 1

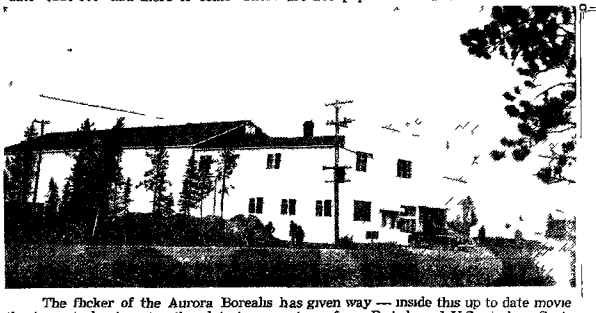
A fine highway of five miles has been built on muskeg to the airport on Long Lake to the west.

Adding the last touch of modernity is the Snare River hydro-electric plant 92 miles northwest of town, that was designed and built by W G (Bill) Stuart



—3 days' Nurses.

In the new Yellowknife school (left) all grades up to university will be taught. Construction takes full advantage of daylight Cost to date $220 000 and more to come There are 200 pupils enrolled this year Flowers and vegetables (right) grow rapidly in the long hours of daylight where soil can be found in the rocky terrain and given well balanced doses of fertilizer



The flicker of the Aurora Borealis has given way — inside this up to date movie theatre at least — to the latest animations from British and US studios Seating capacity about 200 Cost $100,000

The new Yellowknife hospital facing Sandy Lake, is guarantee that the health of the community will be well looked after It cost $260 000, has 40 beds including six bassinets and an infectious diseases ward. It is thoroughly equipped and under direction of Dr Stanton best-loved citizen of the community

LIFELINE OF THE NORTH

To Aklavik, 120 miles north of the Arctic Circle, spring came at last. Like the topmost bud on the highest bough, Aklavik has to wait longest for the rising sap. But last week, eight days overdue, Captain Stoney Thornsteinson of the Northern Transportation Company brought the diesel-driven freighter M.V. "Radium Queen" north down the Mackenzie River into port.

It is pretty much of an accident that Northern Transportation Company belongs to the Canadian Government. Close to frozen Great Bear Lake, only 18 years ago, Prospector Gilbert LaBine, in search of gold, uncovered a vein of curious stuff -- dull red, yellow and black. The Prospector's Handbook called it pitchblende. There, 485 crow-flight miles southeast of Aklavik, Eldorado Gold Mines Limited put up a plant, named it Port Radium, and began to mine the lode. Gilbert and his brother Charles soon started a shoestring river transportation company to bring in supplies and take out their ores. Eldorado would have made history anyhow by breaking the Belgian radium monopoly, but when the world discovered the political value of radioactive ores, the Canadian Government took over Eldorado, lock, stock and barrel.

CASH FROM THE TREASURY

Thus in 1944, the Government got Northern Transportation Company. The Government poured $3,000,000 into the Company to buy new equipment; as a byproduct of atomic politics, Northern Transportation became the main supplier of northwest Canada, from Edmonton to the deep Arctic. Last year, Northern Transportation hauled 35,000 tons of water-freight, not counting oil, and made its first profit for the Government. This year it expects to haul 56,000 tons, gross $2,000,000 of revenue.

From its southermost base at Waterways, Northern Transportation serves not only the Eldorado pitchblende workings, but settlements on 1,600 odd miles of river and on Great Slave and Great Bear Lakes -- both larger than Lake Ontario. The freight for the 565 miles from Waterways to the gold mines at Yellowknife -- across the rough waters of Great Slave -- is $1.90 per 100 lbs. To Aklavik (1,660 miles) the rate is $4.90 per 100 lbs.

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1 From Time Magazine, July 19, 1948.
Time and Life Building,
Rockefeller Center,
New York, 20, N.Y.

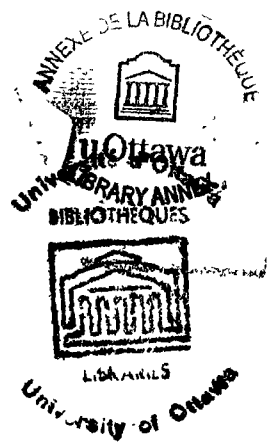
LIFELINE OF THE NORTH

CASH FROM THE TREASURY

The high rates are justified partly by the necessity of making portages (24 miles by trailer around the rapids at Fort Fitzgerald; eight and one half at the St. Charles Rapids for the traffic into Great Bear Lake). They are partly justified by the fact that the rates by air are up to 20 times as high. And they are made necessary by the fact that Northern Transportation has to do its year's work in the four months of open water.

THE CANADIAN NORTH: A GEONOMIC SURVEY.

Thesis presented to the School of Political Science, the University of Ottawa, in partial fulfillment of the requirements for the degree of Master of Arts, by



F. D. Mackenzie, B.A.

Ottawa, Ontario, September 1948.

ACKNOWLEDGEMENTS

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The completion of the research necessary was made possible by the assistance and co-operation of the following:

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Officials of the Department of Fisheries;

The staff of the Library of Parliament;

My wife also has shown great patience.

To all these, we extend our sincere thanks.

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INTRODUCTION

There is to-day an intense interest in Northern Canada. Due to the major developmental projects, undertaken as military objectives during the war when Japan threatened our northwestern areas, the strategic importance of the Canadian North finally stirred the consciousness of the Canadian people and even reached south of the border.

Perhaps the realities of the air age hastened the realization that this vast land, two-fifths of the whole area of Canada, was an open back door which an enemy nation's air fleets might enter at will, on the way to destroy the great centres of population and industry both in Canada and the United States.

Largely as a result of this, there is now a new and increased interest in the Canadian north - a questioning interest - as to its resources, their possibility of exploitation, and what they will mean to Canada in terms of national wealth. There is also the query as to why more has not been done about it all? Why its development has not kept pace with other Arctic regions, such as the Soviet Arctic?

It is the intention of this thesis to outline briefly the natural resources of the Canadian North; to show what stage of development has been reached in their

exploitation; to try in a modest way to determine what might be their ultimate advantage to, and influence on Canada, and to indicate tentatively steps which could be taken to develop these resources for the welfare of the nation.

With this in view, it is proposed to approach the subject by:

(a) defining the various geonomic units of the region to be surveyed;
(b) discussing the physiography, climate and weather conditions found in each unit;
(c) treating the various resources of each region as influenced by topography, climate and distance;
(d) and finally, by attempting to estimate the value which these resources may hold for Canada.

If we succeed in throwing new light on some of these problems, our efforts shall not have been wasted.

CHAPTER I

GEOGRAPHICAL SETTING

The area included in this Thesis will consist of:

The Yukon Territory, which comprises the extreme northwestern part of the mainland of Canada, has an area of 207,067 square miles and is bounded on the north by the Arctic Ocean; on the east by Mackenzie District; on the south by British Columbia (Latitude 60° north) and Alaska, and on the west by Alaska (Longitude 141° west).

The Northwest Territories, embracing the mainland of the Dominion lying north of the 60th parallel of latitude between Hudson Bay on the east and Yukon Territory on the west, together with the islands lying between the mainland of Canada and the North Pole, including those in Hudson Bay, James Bay and Hudson Strait.

The Northwest Territories are divided into three districts for purposes of organization and administration, namely Mackenzie, Keewatin and Franklin. In order to become properly oriented and for map-spotting purposes they are situated as follows: The District of Mackenzie lies directly east of Yukon Territory from the 60th

parallel to the Arctic Ocean and eastward to the District of Keewatin at the 102nd meridian of longitude. The District of Keewatin is, therefore, directly east of Mackenzie and includes all that part of the mainland, excepting Boothia and Melville Peninsulas, lying north of the 60th parallel of latitude, between Mackenzie District (i.e. the 102nd meridian) and Hudson Bay, together with all islands in Hudson and James Bays. Boothia and Melville Peninsulas are included in Franklin District to the north of Mackenzie and Keewatin, and also north of Hudson Bay and Strait. Franklin District thus includes Boothia and Melville Peninsulas, together with the islands in Hudson Strait and the Arctic Archipelago, except those adjacent to the coast of Yukon Territory.

The total area of the Northwest Territories is 1,304,903 square miles, made up as follows: Mackenzie, 527,490 square miles; Keewatin, 228,160 square miles; Franklin, 549,253 square miles. The territory with which we are dealing - Yukon, Mackenzie, Keewatin and Franklin - has an area, therefore, of 1,511,979 square miles, or approximately 39% of the total Canadian landmass.[1]

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1 The Northwest Territories, 1947, p. 3, issued by the Bureau of Northwest Territories and Yukon Affairs, Dept. of Mines and Resources, Ottawa. See also: Canada Year Book, 1943-44, p. 6, King's Printer, Ottawa.

It also seems essential to take the northern tip of Quebec, i.e., the extreme northern part of Ungava into consideration, as part of it lies north of the 60th parallel. It is under the jurisdiction of a provincial government, although surveys and exploration have, up to the present, been carried out by Dominion Government services. As far as climate and weather, geology and most of the other features to be discussed, it compares very closely with the Eastern Arctic. This, added to the above, would bring the total area to 1,516,758 square miles.[2]

Perhaps a more graphic picture of the vast extent of this area may be gained by giving some of the distances north and south, as well as east and west. Along its southern boundary, that is, the 60th parallel, it would be about 1,800 miles from Alaska to Hudson Bay. At its widest part east and west, it would be about 2,600 miles. From north to south, it would measure much the same. This vast area is over 12 times the extent of the British Isles, and

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2 The Northwest Territories, loc. cit.

nearly half of the area of the United States.[3]

While this is not solid land mass (much of the northern portion of the District of Franklin is broken by water), yet the major portion is land, as the total land area of 1,516,758 square miles will attest and as the map on page 5 will illustrate. However, the relative extent of this area, when compared to the whole of the Dominion - or 39% of the total - does give one a clear idea of its vastness and bulk.

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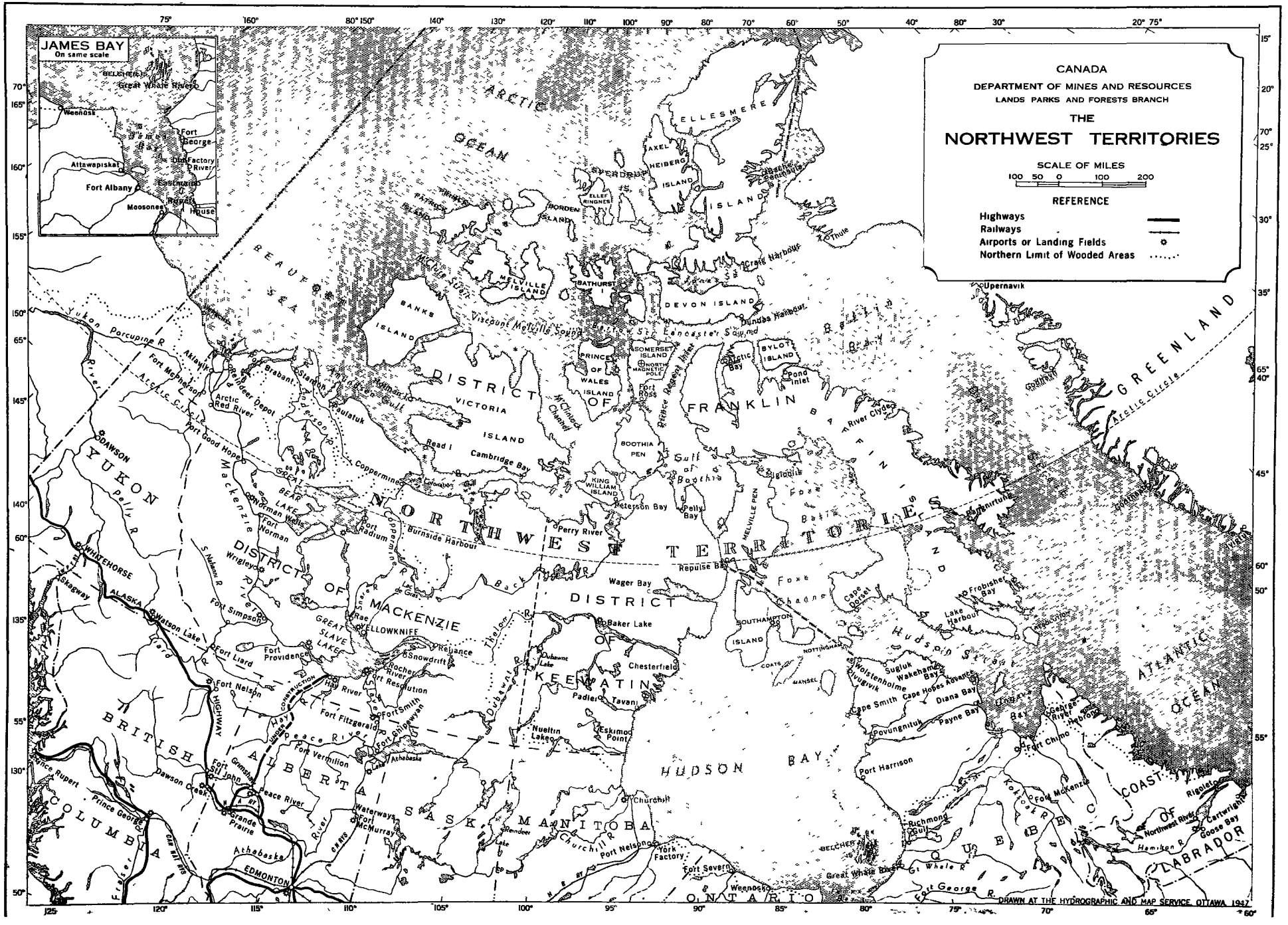
3 C. I. S. Reprints, No. 6, 1946, p. 2, Canada Looks Down North, L. B. Pearson, Foreign Affairs, July, 1946. Copies may be obtained from the Dept. of External Affairs, Ottawa. In this article, Mr. Pearson defines the Arctic as follows: "It includes not only Canada's northern mainland, but the islands and the frozen sea north of the mainland between the meridians of its east and west boundaries, extended to the North Pole. The 1944 Arctic Manual of the United States War Department in its description of the Canadian North follows the usual practice of dividing the territory between the Western and Eastern Arctic. It defines the former as the Arctic mainland coast from Demarcation Point to Boothia Peninsula and the islands to the north. The Eastern Canadian Arctic is defined as the mainland coast from Boothia Peninsula to Labrador and the islands to the north."


CANADA
DEPARTMENT OF MINES AND RESOURCES
LANDS PARKS AND FORESTS BRANCH
THE
NORTHWEST TERRITORIES
SCALE OF MILES
100 50 0 100 200
REFERENCE
Highways
Railways
Airports or Landing Fields
Northern Limit of Wooded Areas
JAMES BAY
On same scale
ARCTIC OCEAN
BEAUFORT SEA
GREENLAND
ATLANTIC OCEAN
HUDSON BAY
DISTRICT OF MACKENZIE
DISTRICT OF KEEWATIN
DISTRICT OF FRANKLIN
NORTHWEST TERRITORIES
YUKON
BRITISH COLUMBIA
ALBERTA
SASKATCHEWAN
MANITOBA
ONTARIO
QUEBEC
COAST OF LABRADOR
DRAWN AT THE HYDROGRAPHIC AND MAP SERVICE, OTTAWA 1947

CHAPTER II

CLIMATE AND WEATHER.

As territorially defined in Chapter I, Northern Canada is a vast expanse of frozen wastes and barren rocky hills, of giant lakes and rivers, endless tundra, and great mountain ranges. In summer, there are extensive areas of green forests south of the tree line, commercial vegetable gardens at Yellowknife, thriving gardens at Fort McPherson, 80 miles from the Arctic Coast, flowers such as arctic cotton and mountain avens bloom in profusion on Baffin Island, the Arctic daisy at Chesterfield Inlet and lupins north of Great Bear Lake. In midwinter, the entire Arctic territory is subject to periods of great cold and there will be temperatures lower than 50° (F) below zero. (The record low temperature for Yukon Territory (81° F) was recorded at Snag in February, 1947).[1]

In summer along the Mackenzie Valley and in other districts, temperatures exceeding 90° or even 95° sometimes occur, and the mean temperature would be about 60°.

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1 All temperatures given are Fahrenheit. The designation will be omitted.

CLIMATE AND WEATHER.

Naturally, in so large an area there are great variations of climate which, in general terms, may be briefly described as follows: Low winter temperatures are carried well up the Mackenzie Valley and the country east to Hudson Bay, south to the Churchill and Nelson Rivers. Very low temperatures sometimes occur in these areas, but the mean temperature is about 30° warmer than that portion of Siberia with the same relative situation.[2]

We are also told on the same authority that long periods of steady cold are of rare occurrence in this Northwestern region because after the passage of a cold wave the wind shifts into a westerly or southerly quarter and the region is rapidly invaded by air of Pacific or southwestern origin with rising temperatures.[3]

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2 Dr. Chas. Camsell, The New North, Canadian Geographical Journal, December, 1946, p.7.

3 There is a great body of literature on the Arctic, some of a contradictory nature, as for instance, the controversy between Stefansson and his critics, among whom is another authority Raould Amundson. This controversy has continued for more than twenty years. But with the work that has been done by Government scientists and other qualified observers, much authentic material is to be had for the gathering.

However, it is not suggested here that the tremendously massive and valuable work done by men like Stefansson and Amundson is not authentic, but, while information from these sources will be used here, the primary sources are the latest reports and findings of our own Canadian scientists, geographers, meteorologists and explorers.

CLIMATE AND WEATHER.

In the southern area the temperature would begin to rise quickly in May, but at the Arctic circle the rapid climb begins later. As we said above, temperatures exceeding 90° occur in the short summer of the Northwest, but the mean temperature would be about 40° depending on position.

It is the intention of this paper to treat the subject of climate in some detail. The Canadian Meteorological Service, Department of Transport, and Royal Canadian Corps of Signals have established meteorological stations throughout Canada's Northland in order to obtain authentic information on climatic conditions. These lonely stations scattered throughout the Canadian Arctic are reached but once a year for servicing. They are great distances from one another and from any white settlement, and are so placed that atmospheric conditions may be measured and this information transmitted to the more southerly stations.[4]

Since the weather in Central North America moves from west to east, and is caused partially by the interplay of air masses from Northern Canada and the Pacific Ocean, weather prediction (e.g. frost danger and precipitation) is strengthened by data

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4 See chart page 8 and List of weather stations page 9.

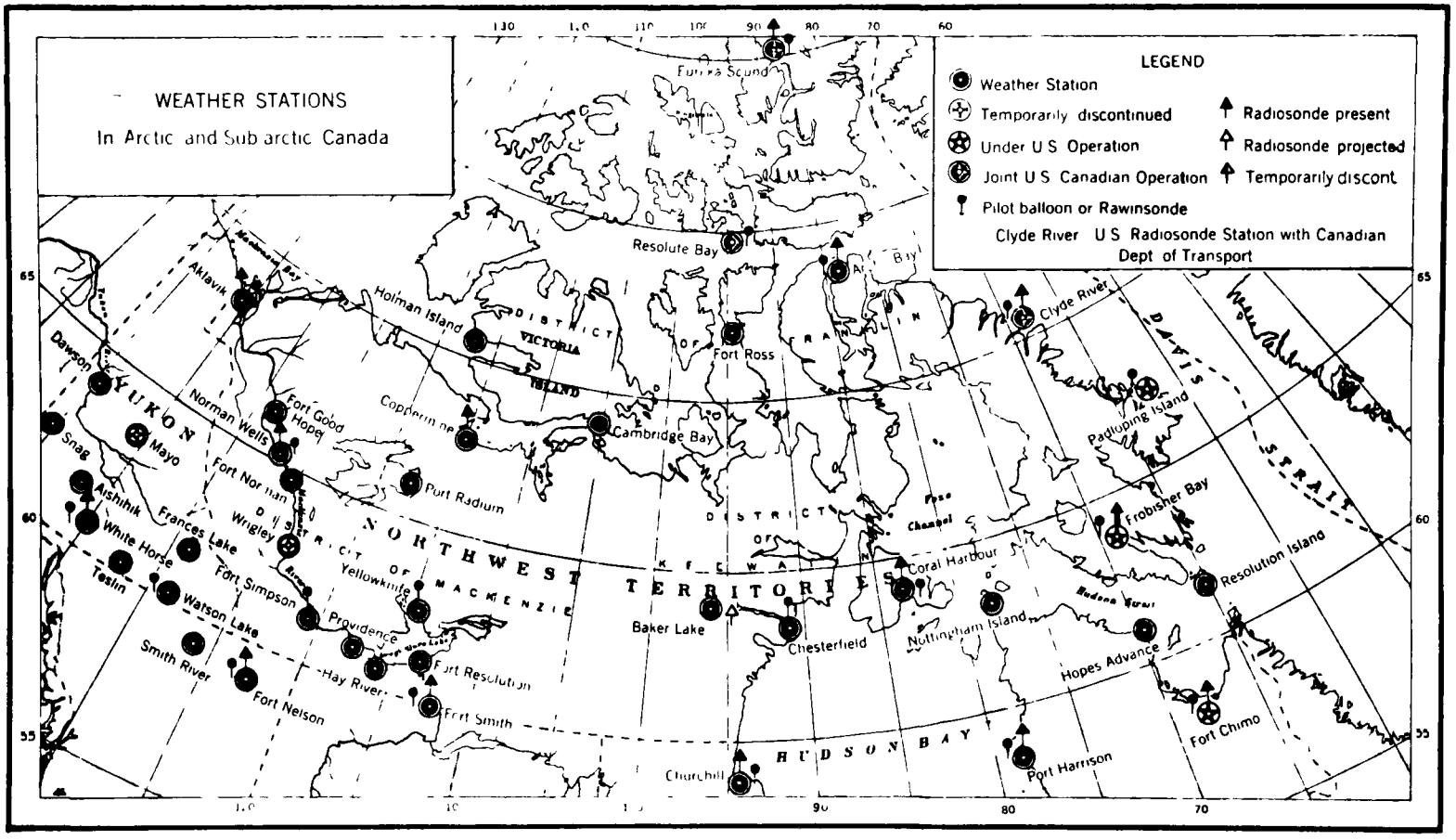

Fig. 1—Distribution of Arctic and Subarctic weather stations in Canada, January, 1948.

Meteorological Knowledge of the Canadian Arctic

Weather Reporting Stations in Arctic and Sub-Arctic Canada, as at January 1, 1948.

Name of Station	Latitude N.	Longitude W.	Altitude ft.	Types of Observa.	Year first surface observations
Aishihik, Y.T.	61 35	137 18	3,170	SI PR	1943
Aklavik, N.W.T.	68 14	134 50	25	S PR	1926
Arctic Bay, Baffin I.	73 16	84 17	15	SI r)	1937
Baker Lake, N.W.T.	64 18	96 05	30	SI P	1946
Cambridge Bay, Victoria I.	69 05	105 00	13	SH PR b)	1928
Chesterfield, N.W.T.	63 20	90 43	115	SH PR a)	1921
Churchill, Man.	58 45	94 07	10	SR R	1884
Clyde River, Baffin I.	70 25	68 17	13	SI PR	1942
Coppermine, N.W.T.	67 49	115 10	193	S (I)	1930
Coral Harbour, Southampton I.	64 11	83 21	1,062	S PR	1933
Dawson, Y.T.	64 04	139 56	8	S (H)	1898
Eureka Sound, Ellesmere I.	89 59	85 25	50	SH PR	1947
Fort Chimo, Que.	58 06	68 38	251	S	1921
Fort Good Hope, N.W.T.	66 15	128 40	1,230	S (H) b)	1897
Fort Nelson, B.C.	58 50	122 30	30	(S)	1934
Fort Norman, N.W.T.	64 54	125 37	519	SI b)	1908
Fort Ross, N.W.T.	61 09	113 03	50	d)	1914
Fort Simpson, N.W.T.	72 02	94 21	415	SI PR	1937
Fort Smith, N.W.T.	61 52	121 00	665	SI	1897
Frances Lake, Y.T.	60 01	120 24	2,425	S (H) pr)	1913
Frobisher Bay, Baffin I.	61 17	129 22	76	SI PR	1941
Hay River, N.W.T.	63 44	68 24	529	SI	1942
Holman Island, N.W.T.	60 51	115 38	30	SH	1893
Cape Hopes Advance, Que.	70 30	117 33	240	SH	1940
Mayo, Y.T.	61 05	69 51	1,625	SH	1928
Norman Wells, N.W.T.	63 35	135 47	290	SH P	1927
Nottingham Island, N.W.T.	65 17	126 56	64	SH PR b)	1944
Padloping Island, N.W.T.	63 07	77 22	130	d)	1928
Port Harrison, Que.	67 06	62 08	66	S (H) P	1941
Port Radium, N.W.T.	58 25	78 02	600	S (H) PR	1921
Providence, N.W.T.	66 05	118 40	529	SI	1942
Resolute Bay, Cornwallis I.	61 20	117 05	...	SH	1942
Resolution Island, N.W.T.	75 41	94 53	127	SH	1928
Smith River, B.C.	61 18	64 30	2,208	SH	1944
Snag, Y.T.	59 30	126 22	1,925	SH P	1943
Teslin, Y.T.	62 22	140 40	2,300	SH PR b)	1943
Watson Lake, Y.T.	60 08	132 47	2,248	d)	1937
Whitehorse, Y.T.	60 08	128 07	2,289	d)	1904
Wrigley, N.W.T.	60 42	135 20	511	S (H) P	1941
Yellowknife, N.W.T.	63 13	123 26	656		1941

SYMBOLS:

a) Position approximate;
b) Broken record;
d) Observations temporarily discontinued;
r) Radiosonde observations to be commenced in near future;
P Pilot balloon or radio wind observations;
R Radiosonde observations.

Surface observations are made and transmitted as follows:
S at the principal synoptic hours (0030, 0630, 1230, 1830 G.M.T.).

I at the intermediate synoptic hours (0330, 0930, 1530, 2130 G.M.T.);

(I) at some but not all of the intermediate synoptic hours;

H hourly throughout the 24 hours;

(H) hourly during part of the 24 hours, or on request.

* Reprinted from Arctic Volume 1, No. 1, Spring 1948, p.41. Journal of the Arctic Institute of North America, 805 Sherbrooke St. W., Montreal, Canada.

regarding northern air mass movements and their characteristics. Practically all transportation in the Northwest Territories - by plane, boat or dog-team, is largely dependent upon the weather and the weather predictions of the Northern stations has been of great service to, and is highly trusted by transport companies and voyagers.

During the 1947 session of Parliament Rt. Hon. C.D. Howe announced in the House of Commons that within the next three years nine new weather stations for long range forecasting would be built above the Arctic circle. They will be operated by Canadians, and the United States will contribute to the original cost and maintenance.[5]

The headquarters station will be at Winter Harbour on Melville Island. It is in operation now. The northernmost station is situated on Eureka Sound on the West Coast of Ellesmere Island, about 700 miles from the North Pole. Already reports have been received from these stations.

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5 House of Commons Debates (Hansard) March 4th, 1947. Bound Volume p. 889, Revised Hansard, 1013 Unrevised, K.P. Ottawa.

CLIMATE AND WEATHER.

Again, on March 25, 1947, Mr. Howe noted a further advance in the plan.[6] They were to establish a chain of "long-range radar aid to navigation" stations in the North. They are known as "LORAN". While these stations are not for purposes of weather forecasting specifically, yet they will be used to gather data on weather and climate as well as carry out their primary purpose of navigation aids.

CLIMATIC REGIONS

The Northwest Territories can be divided into two main climatic regions.[7] There is the true Arctic climatic region and the sub-Arctic climatic region. The Northeastern region, or the Eastern Arctic, including all the islands of the Arctic Archipelago has a true Arctic climate, (as defined by climatologists). All of the region north of a line extending from the mouth of the Mackenzie River, through Amundson Gulf and Bathurst Inlet across Back River to Eskimo point on Hudson Bay, is characterized by a type of climate in which the average temperature of the warmest month is less than 50°, but more than 32°. Average winter temperatures are all below 32°.[8]

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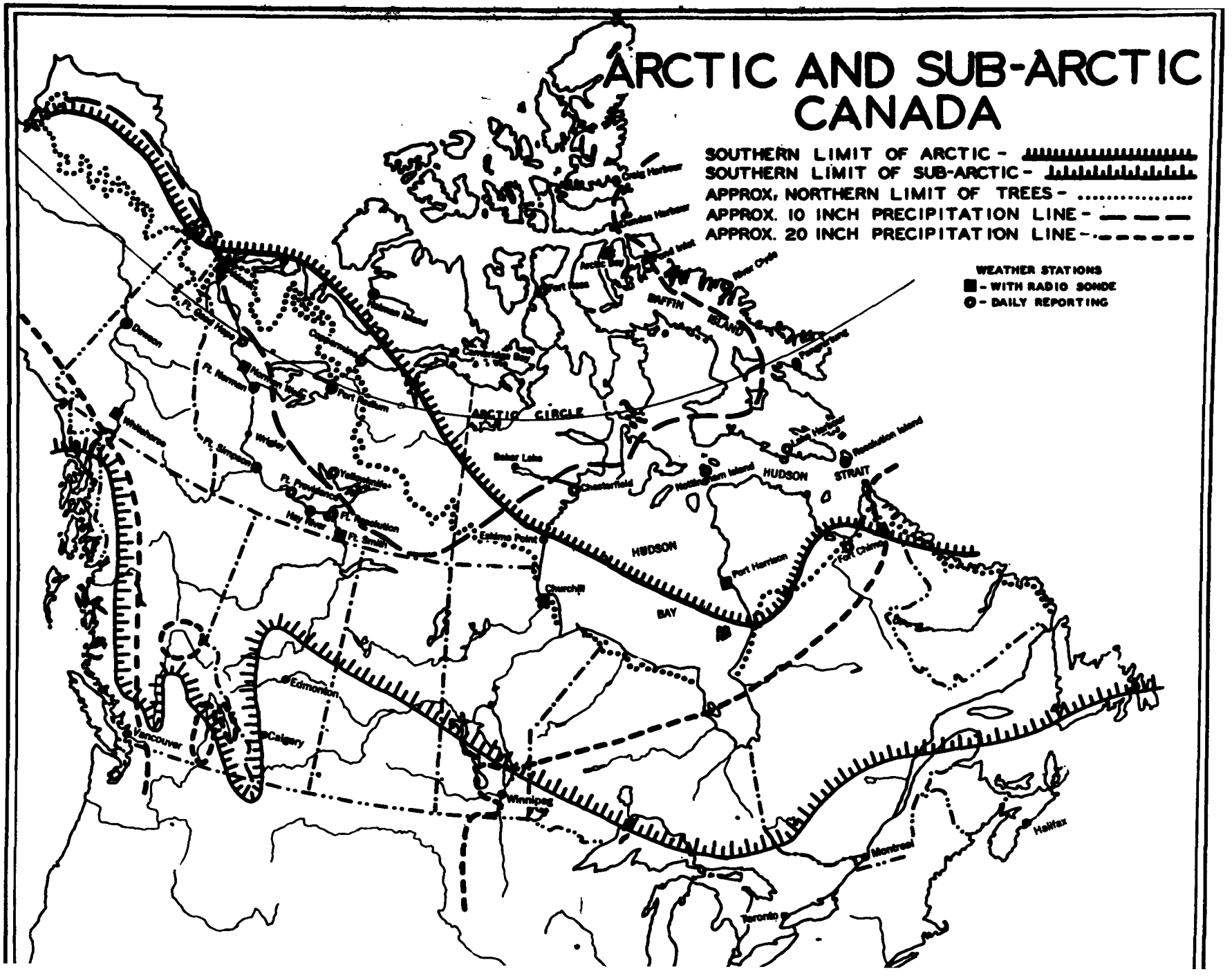
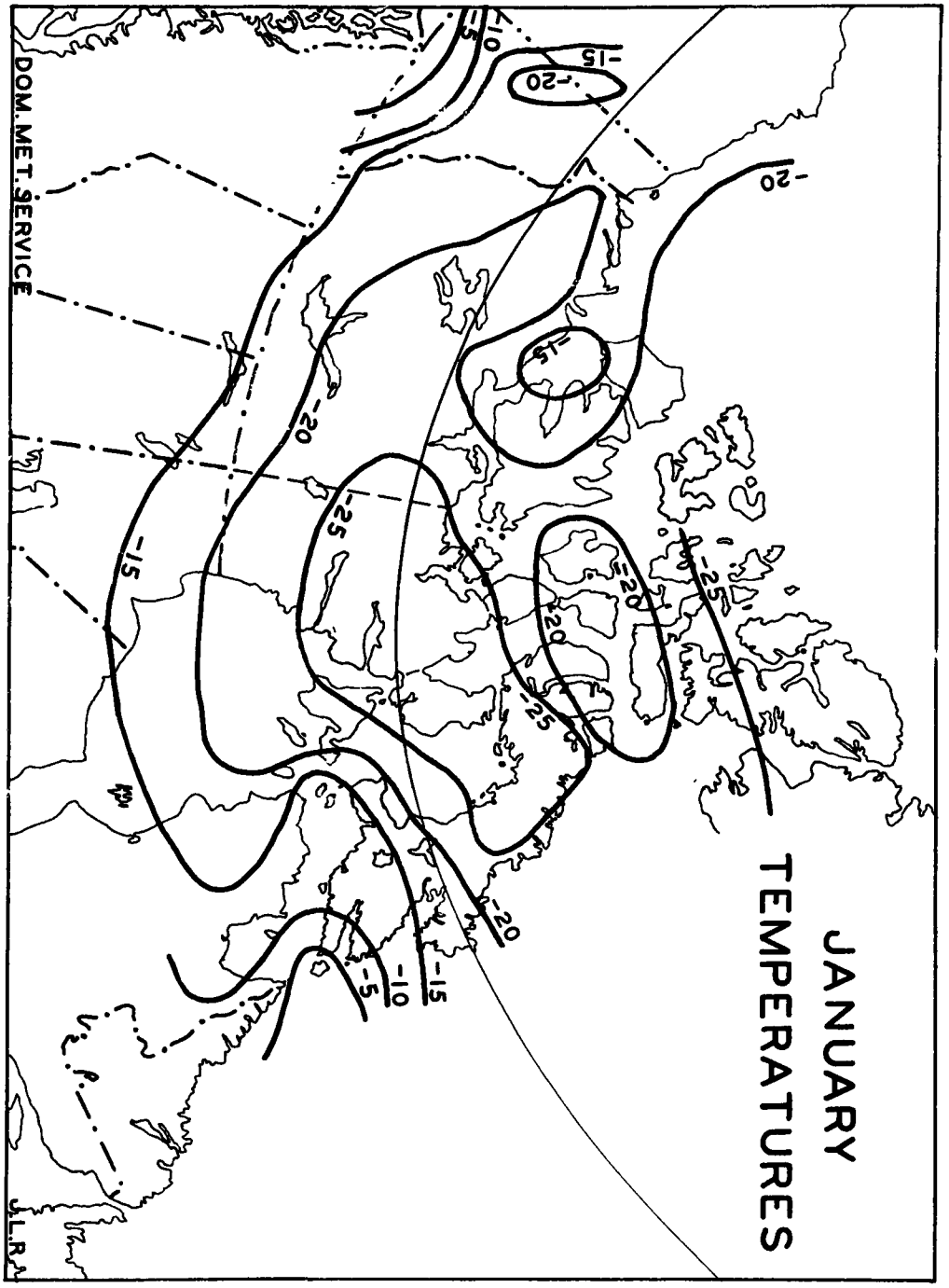
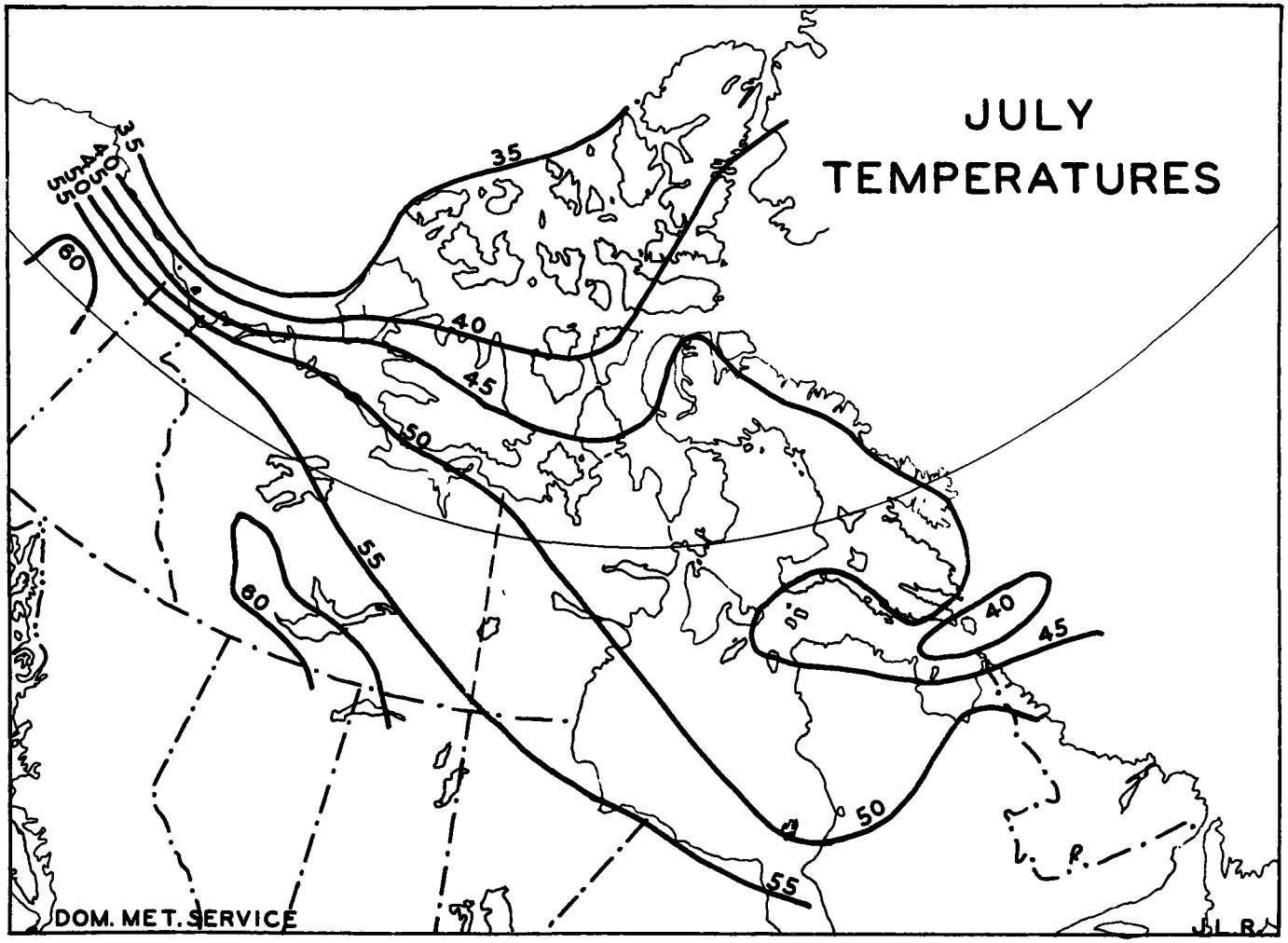
6 House of Commons Debates, Ibid.
7 See chart on p.12.
8 " charts on pages 13,14.


ARCTIC AND SUB-ARCTIC CANADA
SOUTHERN LIMIT OF ARCTIC -
SOUTHERN LIMIT OF SUB-ARCTIC -
APPROX. NORTHERN LIMIT OF TREES -
APPROX. 10 INCH PRECIPITATION LINE -
APPROX. 20 INCH PRECIPITATION LINE -
WEATHER STATIONS
- WITH RADIO SONDE
- DAILY REPORTING
ARCTIC CIRCLE
BAFFIN ISLAND
HUDSON STRAIT
HUDSON BAY
Dawson
Whitehorse
Yellowknife
Churchill
Edmonton
Calgary
Vancouver
Winnipeg
Toronto
Montreal
Halifax


JANUARY
TEMPERATURES
DOM. MET. SERVICE
-5
-10
-15
-20
-25


JULY
TEMPERATURES
35
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DOM. MET. SERVICE

CLIMATE AND WEATHER.

That, in climatic terms, is an Arctic Area. In Northern Canada the isotherm delimiting this area is generally slightly north of the tree line. Thus the Districts of Keewatin and Franklin or the Eastern Arctic are a treeless area except for small stunted willows, which grow in sheltered valleys, and in this region the general climatic conditions are those of long, cold winters and short, cool summers.

The remainder of the Northwest Territories and Yukon has what is known as a Humid Continental climate, in which average temperatures for the coldest month are below 32°, but average temperatures for the warmest months are above 50°. Although both of these regions are cold in winter, the chief distinction between them is in summer temperatures with the western sections being much warmer. Now, the climate of this western region is very similar to that which is found in Ontario north of Lake Superior, and in Quebec north of the St. Lawrence. This is called the Sub-Arctic Climatic Region and it should be noted how far south in Canada the Sub-Arctic climate reaches.[9]

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9 See chart on p.12 which shows the isotherms for Arctic and Humid continental climatic regions.

CLIMATE AND WEATHER.

The source area of many of the weather phenomena of the mid-latitude regions of North America and the North Atlantic is in the Canadian Arctic. There are several controls which in the long run maintain differences between the Northeastern and Western districts of the Northwest Territories. The entire Arctic territory during the winter is subject to periods of great cold which are associated with the slow outflow of shallow, dry cold domes of surface air from the Artic Ocean by way of Beaufort Sea. These air masses drift in mid-winter up the Mackenzie Valley to spread out over the Canadian Prairies before showing a tendency to drift eastward. Intermittently, these polar cold waves are replaced for short intervals by warmer air from the North Pacific or from Behring Sea, and as a result, temperatures in the Mackenzie Valley will rise. Therefore, the winters of Mackenzie district and Yukon may be moderately cold or extremely cold and may vary from year to year depending on which of the controls is in command.

In the Eastern Arctic in mid-winter, polar air-masses move southward towards Manitoba and James Bay from the Arctic Ocean. These air masses are kept thoroughly chilled as they pass over the large area of cold water, which moves south and east from the Arctic Ocean through the Arctic Islands to Davis and Hudson straits. This keeps the winters in the Eastern Arctic

more constantly cold, with few mild spells. These mild periods do occasionally occur in winter when Arctic air, somewhat warmed over the Labrador Coast, returns northward to influence southeastern Baffin Island.

In summer air masses from the Beaufort Sea have an eastern movement across the Northwest Territories to the Eastern Arctic. The large body of water in Hudson Bay and among the Arctic Islands remains cold and this, combined with the cold air-drift results in cool summers in the eastern regions. The Government records give the average annual highest temperature as not exceeding 70^{o} north of Chesterfield Inlet, nor exceeding 60^{o} north of Latitude 70^{o}.

It might be well to say a word of explanation about air masses, because modern meteorology is founded on the concept of air masses. The definition of an air mass is given as, a huge body of air (from 100 to 500 miles in diameter) whose physical properties at its source (notably temperature and humidity) are more or less uniform horizontally. Regions of the earth where air masses stagnate long enough to gain definite properties are known as source regions.[10]

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10 Meteorology of the Canadian Arctic, Dept. of Transport, Meteorological Division, Toronto, 1944.

CLIMATE AND WEATHER.

Air masses form in northern source regions and move southward joining the generally eastward movement of air in mid-latitudes, moving across Southern Canada and Northern United States and being modified rapidly in summer, more slowly in winter by contact with the land. The type of air mass will influence the kind of weather along the way. Generally, a cold air mass brings cool, dry, sunny weather, a warm, moist air mass usually cloudy weather. On their boundaries between air masses of different types there is likely to be rainy or snowy weather. Professor Robinson gives five chief source regions as producing air masses which influence the weather of Northern Canada and largely determine its type of climate.[11] He lists them thus -

	Source Characteristics	
Source Region	Winter	Summer
Arctic Ocean West	Very dry cold	Dry cool
Arctic Ocean East	Slightly moist Cold	Slightly moist Cool
Bering Sea	Lower layers moist, moderate cold	Moist, cool
North Pacific Ocean	Lower layers quite moist, mild	Moister than in winter; cooler than air over continent
North Atlantic	Moist, cool	Moist, cool.

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11 Professor J. Lewis Robinson, Weather and Climate of the Northwest Territories, Canadian Geographical Journal, March 1946, p. 127.

CLIMATE AND WEATHER.

The shifting eastward of the cold air masses in summer allows warm air from the North Pacific region or from more southerly latitudes to flow north and northeastward, bringing mild weather to the Mackenzie area. Occasionally summer may become really hot under this influence and the temperature recordings show 90° and over. Then again, some summers the colder air masses from the Arctic may follow a more westerly course and cooler summers will result in the Mackenzie Valley, with more frequent precipitation in the wheat region south of Latitude 60°.

As to the central and northern portion of the Arctic Archipelago, it varies little from purely polar conditions. Temperatures average 25° to 35° below zero in January and only 40° to 42° in July.[12]

Because of its northern latitude the Northwest Territories has long hours of daylight in summer and this is given as a reason for agricultural possibilities in the Mackenzie Valley. Southern Baffin Island in the Eastern Arctic is in the same latitude and has the same long hours of sunlight, but has no agriculture. There are of course other controls. Basically, agriculture

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12 The Northwest Territories, issued by Bureau of Northwest Territories and Yukon Affairs, Dept. of Mines and Resources, 1947, page 13.

is not possible in the Eastern Arctic because there is little if any developed soil and has a very short free frost period in its cool summer; whereas agriculture is possible though not certain in Northwestern Canada, because of the warm air masses, noted above, which raise the summer temperature.

From Government publications,[13] the following comparison of mean temperatures by latitude in Canada and Europe illustrates the climatic difference between the eastern and western sections of the Northwest Territories and compares them with stations near the same latitude in Europe.

	January	July
Near Latitude 60° N.		
Fort Smith, N.W.T.	-16°	60°
Cape Hopes Advance, N.W.T.	- 9°	41°
Bergen, Norway	34°	58°
Marieham, Finland	27°	59°
Near Latitude 65° N.		
Fort Good Hope, N.W.T.	-24°	59°
Pangnirtung, N. W.T.	-19°	46°
Uleaborg, Finland	15°	59°
Jockmokk, Sweden	6°	58°

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13 The Northwest Territories, loc. cit.

CLIMATE AND WEATHER.

Near Latitude 75° N.	January	July
Craig Harbour, N.W.T.	-22°	41°
Bear Island (off Norway)	15°	40°
Near Latitude 80° N.		
Bache Peninsula, N.W.T.	-27°	41°
Quade Hook (Spitzbergen)	7°	40°

PRECIPITATION

Snowfall is not heavy in the Northwest Territories. Because of low winter temperatures, snow remains long on the ground.

Annual precipitation of 10 to 13 inches in the Mackenzie Valley includes 40 to 50 inches of snow, which is about half of the snowfall of the Great Lakes, St. Lawrence and northern New England regions. Rain falls from July to October, but is not very abundant. Precipitation is even less in the Arctic Islands and over the central Arctic mainland, averaging 6 to 9 inches, most of which falls as snow. Southeastern Baffin Island is an exception, since air from the south often rises over this area, bringing an average of approximately eight inches of rain and 70 to 90 inches of snow.[14]

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14 The Northwest Territories, loc. cit.

CLIMATE AND WEATHER.

Yukon Territory has greater variations of climate than has the Northwest Territories. In some years the coldest month has averaged from 40° to 50° below zero, and in other years it may have had an average temperature above zero.[15] These variations of weather are due principally to its geographical location and shape. It is something of a wedge shaped territory with its broad base to the south along the 60th parallel, the south western corner up against the comparatively warm Pacific Ocean and its sharp end (the cutting edge) extending up to the cold Arctic Ocean. When cold air masses from the Arctic Ocean north of Alaska and Siberia move southward over Yukon Territory, temperatures are very low and remain low as long as they remain in the area. If these cold air masses enter the North American continent to the eastward, passing up the Mackenzie Valley, a movement of northward and northeastward relatively mild air from the Pacific Ocean is set up with corresponding mild winter temperatures. Thus these temperatures will vary from month to month and year to year depending on the frequency and duration of the cold air mass movements.

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15 Yukon Territory, History, Administration Resources and Development, W.E. Lothian, 1947. Issued by Bureau of Northwest Territories and Yukon Affairs, Ottawa, 1947. p. 25.

CLIMATE AND WEATHER.

Also the summer temperatures vary according to the predominant air mass movements. Quite hot days will be due to the warmer air from the Pacific Ocean or Alaska or, cool when Arctic air covers the area.

In winter there is a wide range in the mean monthly temperatures from zero degrees at Carcross in the south to -13° at Mayo and -21° at Dawson.[16] An extreme minimum temperature of -81° was recorded at Snag airport in February 1947. Snag is over 100 miles south of Dawson.

Summer, which is characterized by warm days and cool nights has monthly averages of 50° to 60°, the daily maxima usually 80° to 85° has given a recorded temperature of 95° at Dawson.[17] However, killing frosts may occur in any month of the year, but are rare in July. Southern Yukon, although higher in elevation, is free of frosts for a period of about 45 days, while the central section around Dawson has an average of 75 days without frost.

In Yukon the annual precipitation is low, mainly because the St. Elias Mts. of the Coast Range in the Southwest blocks off the moisture from the Pacific.

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16 & 17 Yukon Territory, loc. cit.

CLIMATE AND WEATHER.

An average of nine to 13 inches of precipitation is recorded during the year, of which 35 to 50 per cent is rain which falls during the four summer months.[18] Snowfall occurs most frequently from November to January, averaging about 10 inches monthly. Lesser quantities fall in October and March. Some may be expected in April, May and September.

WINDS

Prevailing wind directions are difficult to determine for the whole region because most of the posts are located in sheltered areas and wind directions are controlled by some topographic influence.[19] Winter winds appear to be predominantly from the north or northeast at the far north stations, and generally from the west or northwest in the Hudson Bay and Strait area. During the summer months the southern half of the region is under the influence of weak cyclones which move eastward across the country and bring a variety of wind directions. Wind velocities are generally low during summer, stronger in winter.

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18 Yukon Territory, loc. cit.

19 J.L. Robinson, An Outline of the Canadian Eastern Arctic, issued by the Bureau of N.W.T. and Yukon Affairs, Ottawa, 1944.

CLIMATE AND WEATHER

FOG.

The prevalence of summer fog is one of the hazards of the coastal regions of the Northwest Territories, especially of the Eastern Arctic. When relatively warm air masses from the land come in contact with the cold Arctic waters of Hudson Bay and the Arctic Islands, condensation occurs, causing fog and low clouds. Stations in Hudson Strait have an average of seven to twelve days in each of the four summer months in which fog is recorded, and as many as fifteen to twenty-five days of fog a month[20].

As the temperatures over sea and land are more equal in winter, fogs are not so frequent. The many summer fogs present a problem for transportation both by water and air, and in that connection will be more fully discussed in Chapter VII.

ARCTIC NIGHT

Before leaving the subject of climate something should be said about the "midnight sun" and the long "Arctic night". There is a common belief that the Arctic is a place of six months darkness and six months daylight. The only place which has six months

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20 J.L. Robinson, loc. cit.

with the sun below the horizon is the geographic North Pole and from there southward to the Arctic Circle, the length of the period of 24-hour darkness lessens progressively. At the Arctic Circle there is only one day in the year when the sun is not visible.[21]

In conclusion what can be said of the future of the Canadian North on which the climate would have a bearing. Much of Yukon and Mackenzie has a climate that taken with topography, soil and mineral wealth, is conducive to settlement and capable of sustaining a considerable population. On the other hand, the climate of the Eastern Arctic combined with the disadvantages of topography and lack of soil makes the region a difficult one for future hopes of exploitation. The climate itself is not as severe as in some other Arctic areas, but the southeasterly direction of weather movement and ocean currents has extended this Arctic climate farther south into the mainland of Canada. The combination of all these influences has brought the Arctic as far south as latitude 62° on the west side of Hudson Bay and to latitude 57° on the eastern coast of the bay.[22]

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21 See appendix No. II for a description of the Arctic night by W.E. Ekblaw, The Polar Eskimo; Their Land and Life, Clark University, Worcester, Mass., 1926.

22 See Chart on p. 12.

CLIMATE AND WEATHER.

This is about 10° or 700 miles south of the Arctic Circle, and about the same latitude as the good farming region of Peace River in Western Canada. Therefore, this area which comprises one-fifth of Canada is definitely handicapped for future development by these unfavourable basic factors of geography. These controlling physical factors should be kept in mind and carefully weighed in any program of future exploitation or development.

CHAPTER III

GEOLOGY AND THE MINING INDUSTRY.

On the basis of its topography and geology, Canada is made up of six geophysical divisions.[1]

The northern portion of Canada with which this paper deals, i.e. Canada north of 60° latitude, is made up of parts of three of these divisions and all of a fourth. The latter is composed of the islands to the north, which form the Arctic Archipelago. On the west, the Mackenzie Mts. and the Coastal Range are the north-eastern portion of the great Cordilleran region which makes up most of British Columbia and the Yukon. The valley of the Mackenzie River right up to the Arctic Ocean, is the northern extension of the interior plains of Central Canada. East of this, extending to Hudson Bay and covering all of Ungava, with which this paper is concerned, is a large tract forming part of the Canadian Shield, or, as it is often called, the Precambrian Shield because the rocks which comprise it are of Precambrian Age. In places, particularly along the Arctic Coast, on the border of the shield, quite large areas of the Precambrian rocks are concealed by a covering of sediments of a younger geological age.

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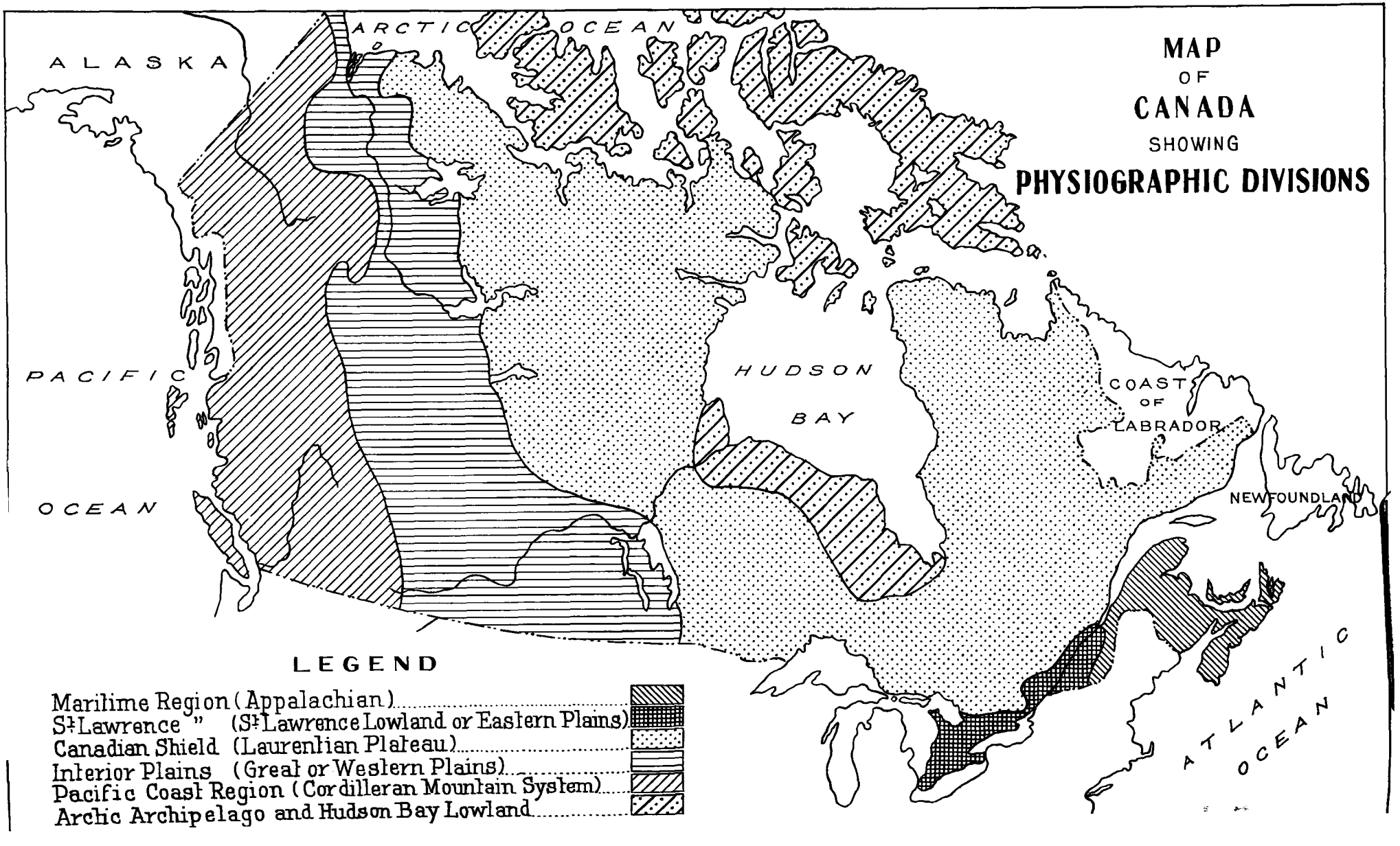
1 See map showing main geological divisions, as given in Geology and Economic Minerals of Canada, Third Edition, 1947, King's Printer, Ottawa, which will be found on the following page.


ARCTIC OCEAN
ALASKA
PACIFIC
OCEAN
HUDSON
BAY
COAST
OF
LABRADOR
NEWFOUNDLAND
ATLANTIC
OCEAN
MAP
OF
CANADA
SHOWING
PHYSIOGRAPHIC DIVISIONS
LEGEND
Maritime Region (Appalachian)
St Lawrence " (St Lawrence Lowland or Eastern Plains)
Canadian Shield (Laurentian Plateau)
Interior Plains (Great or Western Plains)
Pacific Coast Region (Cordilleran Mountain System)
Arctic Archipelago and Hudson Bay Lowland

GEOLOGY AND THE MINING INDUSTRY.

THE CANADIAN SHIELD

"The Canadian Shield is the great region of Precambrian rocks that constitute the central backbone of Canada. It is a crudely shield-shaped area with its base on the Arctic Ocean and narrowing to a point in the United States south of Lake Superior. Its area is approximately 1,800,000 square miles, or about half of all Canada"[2].

The Canadian Shield portion of the Northwest Territories is a region of comparatively low relief, rising gradually from the Arctic Ocean on the north and from Hudson Bay on the east to elevations up to 1,500 feet in its central part east of Great Bear and Great Slave Lakes. The topography is hummocky, made up of ridges and hills separated by depressions which are usually occupied by lakes or muskegs. The many

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2 H.C. Cooke The Canadian Shield, Geology and Economic Minerals of Canada (3rd edition), Bureau of Geology and Topography, 1947, p. 11. In this regard, Cooke likens the Canadian Shield to a peneplain. A peneplain, or almost-plain, is a part of the earth's surface subjected to erosion until reduced to a plain-like surface, regardless of the varying hardnesses of the underlying rocks. As erosion must continue until the surface is reduced nearly to sea-level, it follows that a true peneplain must have lain, when completed, close to that level. As most of the Shield area now lies as much as 1,500 feet or more above sea-level, uplift of the peneplain can be inferred.

lakes are of all sizes and shapes, and quite often have many islands. There are great areas where the land seldom rises as much as 100 feet above the lakes, while in still others the difference of elevation may be more than 1,000 feet. The lakes are the result of the continental ice sheet which spread to the south over the whole region, eroding unevenly in some places and leaving debris in other places. The long continued erosion in late Precambrian time produced the low relief by levelling the mountains that had previously been produced by folding [3].

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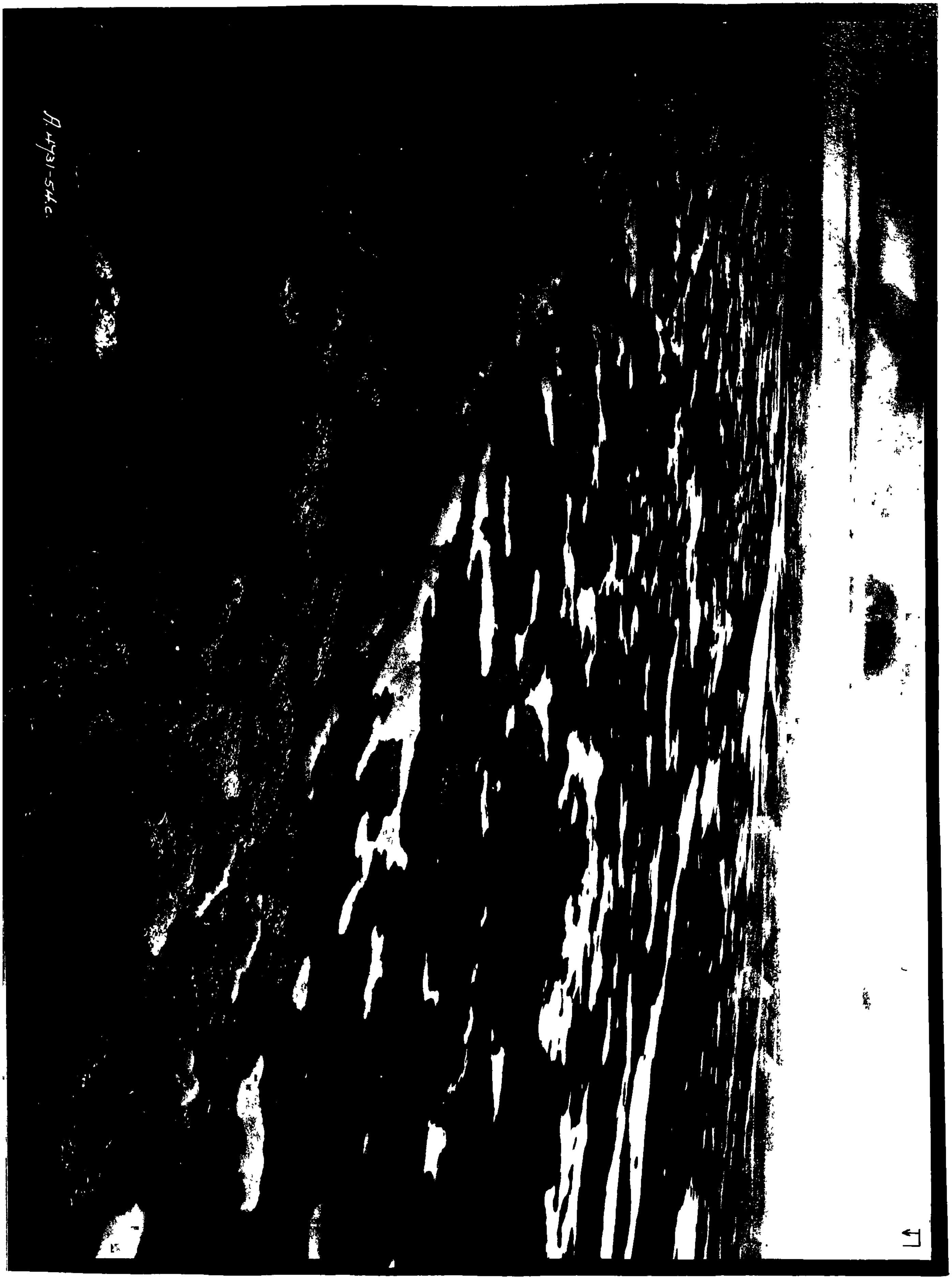
3 Geological Time Scale.

	ERA	PERIOD	CHARACTERISTIC LIFE	TOTAL ESTIMATED TIME IN YEARS
CENOZOIC	Quaternary Div.	(Recent (Pleistocene	Man	1,000,000
CENOZOIC	Tertiary Div.	(Pliocene (Miocene (Oligocene (Eocene (Paleocene	Mammals and modern plants	60,000,000
	Mesozoic	Cretaceous Jurassic Triassic	Reptiles and cycad-like gymnosperms	200,000,000
	Palaeozoic	Permian Carboniferous	Amphibians and Lycopods. (Giant club-mosses)	
		Devonian Silurian	Fishes	
		Ordovician Cambrian	Higher invertebrates	500,000,000
Precambrian	Proterozoic	Keweenawan Huronian	Primitive invertebrates and Algae	
Precambrian	Archaean	Timiskaming Keewatin	Nil	2,000,000,000

Aerial view of the Canadian Shield



GEOLOGY AND THE MINING INDUSTRY

In the Northwest Territories the oldest record of Archaean or early Precambrian era is the accumulation of sedimentary and volcanic rocks.[4]

> "Sedimentary rocks predominate and consist largely of greywacke and slate and their altered derivatives. Volcanic rocks, which are not particularly abundant in Northwestern Canada, include the types commonly known as greenstones, consisting of altered basic lavas, and in places these are altered schists. All these rocks have been extensively intruded by granite."[5]

So extensive is this granite intrusion that it has been estimated that 80 per cent or more of the Shield consists of granite. There are other intrusive igneous rocks relatively small, but still important, such as gabbros, norites, and peridotites.

As can be seen by the Geological Time Scale[6], the Precambrian rocks of the Shield are considered to fall into two main groups separated by a great interval of folding, mountain building, and long continued erosion. The older group known as Archaean is subdivided into an older and a younger sub-group known as Keewatin and Timiskaming. The second great group, the Proterozoic rocks, has been subdivided into Huronian and Keweenawan.

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4 H.C. Cooke, Op. Cit. p. 17.
5 The Northwest Territories, Administration, Resources, Development. Published by Northwest Territories and Yukon Affairs, p. 24.
6 Geological Time Scale - please see previous page.

GEOLOGY AND THE MINING INDUSTRY

The geology of the Canadian Shield has been treated at some length, not only because the Shield covers approximately half of Canada but also because it is known to be very rich in mineral wealth where prospecting has been carried out. Canadian geologists and mining men have reason to believe that the Shield in Northern Canada will, on further exploration, bear out the promise of great mineral wealth that the mining history of the southern part of this geological division has shown, as already very rich mineralized areas have been found in widely separated places.

"In 1939, the last normal year prior to World War II, mines in the Canadian Shield supplied 85% of the gold, 38% of the silver, 86% of the copper, and all of the nickel, radium, platinum, and cobalt produced in Canada"[7]. All of the radium was produced in the territory under discussion as was also a small part of the gold and copper.

INTERIOR PLAINS REGION

West of the Shield is the Plains Region. Most of the rocks in this region or the Mackenzie lowland were laid down in the sea in water of moderate to shallow depths. They range in age from early Palaeozoic to Recent, and have not been intruded by igneous rocks. During some periods fresh or brackish water deposits accumulated in considerable volume.

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7 George Hanson, Geology and Economic Minerals of Canada, Bureau of Geology and Topography, Ottawa, 1947, p.3.

GEOLOGY AND THE MINING INDUSTRY

As previously stated and as the map of Canada showing the main Geological Divisions indicates,[8] the Mackenzie lowland lies between the Canadian Shield on the east and the Cordillera on the west. It extends from Slave River to the Arctic Coast and is the northern portion of the great Interior Plains region. The elevation on the Slave River is about 700 feet and it slopes gradually to the Arctic. The Franklin mountain ridge divides the lowland into two parts north of Fort Simpson, the western part varying in width from 20 to 80 miles contains the Mackenzie River, the eastern part occupies the drainage basin of Great Bear Lake with the exception of the eastern part. Mount Clark of the Franklin Range is the highest summit with an elevation between 3,000 and 4,000 feet.

The Mount Clark formation consists of red quartzites and sandstones of lower Cambrian age. Above this, the formation consists of sandstones and shales with gypsum bearing beds of Middle or Upper Cambrian. The base of the Palaeozoic section along the eastern edge of the lowland belt where these sediments overlap the Precambrian rocks of the Canadian shield, are rocks of Ordovician and

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8 Map, p. 29.

Silurian age. Limestone and dolomite occur along Slave River and west of Great Slave Lake, and continue northward to Great Bear Lake. Silurian strata are also exposed near the mouth of the North Nahanni River, near Norman and on Great Bear River. Beds of Devonian age form the surface rocks over the greater part of the Mackenzie Lowland region. There are also sandstones and shales of Cretaceous age. The beds are largely of marine origin, but in places some of the lower strata carry coal seams. At the mouth of Bear River there are lignite beds with a length of 30 to 40 miles and 20 to 30 miles wide.

"The mineral resources of the Interior Plains includes salt, gypsum, the mineral fuels, lead, zinc, and iron. Petroleum valued at nearly one million dollars was produced at Norman Wells between 1932 and 1943 inclusive. Lignite coal occurs near Norman and on the east coast of Great Bear Lake. Salt and gypsum occur widespread, some deposits have been put to local use. Lead and zinc minerals are found on the south shore of Great Slave Lake".[9]

THE CORDILLERAN REGION

The great Cordilleran region of Western Canada pusnes itself into the Northwest Territories to the west of the Mackenzie River from the Liard on the south to Peel River on the north forming the Mackenzie Mts. and Yukon Territory. The ranges tend to run in a northwest

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9 The Northwest Territories, Administration, Resources, Development. Bureau of Northwest Territories and Yukon Affairs 1947 p. 28

direction and have an elevation up to over 8,000 feet in Mackenzie District. The drainage of this area is towards the Mackenzie. The chief streams are the Arctic Red River, the Carcajou, the Keele, the Root, the North and South Nahanni, all with steep gradients. A physical feature of note is the abrupt escarpment whose top is 2,000 to 3,000 feet above the valley. This appears at the "Great Bend" of the Mackenzie near its junction with the North Nahanni.[10]

"The rocks of the Mackenzie range are chiefly sediments of Palaeozoic age, ranging from Upper Cambrian to Carboniferous. The rocks of the eastern belt are heavily bedded limestones, dolomites, sandstones, and conglomerates".[11]

Very limited exploration has been carried out in this Northwest Territories portion of the Cordilleran region, so not many mineral occurrences have been reported. Iceland Spar has been recovered from deposits in the northern part of the mountains; low-grade iron ores are exposed along the Keele River; and placer gold has been found along the Peel, Nahanni, and Liard Rivers.

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10 C.S. Lord, C.O. Hage and J.S. Stewart - Geology and Economic Minerals of Canada, op. cit. p. 256, etc. and The Northwest Territories, p. 27 or op. cit. p.27

11 The Northwest Territories - loc. cit.

GEOLOGY AND THE MINING INDUSTRY.

In the Yukon, mountain building movements in the Cordillera deformed not only Cambrian and later formations, but also affected rocks of Precambrian age. Most of the region is characterized by numerous bodies of intrusive rock ranging in composition from granite to peridotite, but composed mostly of granodiorite and quartz diorite.

This means that the mountains of Yukon Territory will be more rugged and of a greater elevation than those of the eastern range described above. And this is found to be the case with the Pelly Mts., the Coast Mts., and the St. Elias Mts., of which Mt. Logan reaches 19,850 feet high and several peaks go over 12,000 feet.

Practically all of the Yukon section of the Cordillera is favourable ground for metallic mineral deposits, and nearly all of the metals found elsewhere in Canada are represented there.

In 1939, "the Cordilleran region produced 14% of the gold, 61% of the silver, 70% of the zinc, 13% of the copper, 99% of the lead, 51% of the coal, 96% of the oil, all the bismuth and mercury, and nearly all the antimony and cadmimum produced in Canada".[12]

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12 George Hanson, Op. Cit. p. 4.

That, of course, was for all the Cordilleran region of Western Canada; the production for the Yukon section will be discussed with a summary of mineral production later in the chapter under the proper headings.

THE ARCTIC ARCHIPELAGO

There remains the fourth geological province, the Arctic Archipelago. Comparatively little is known of the geology of this far northern region, although available information suggests that, like the mainland part of the Northwest Territories, a three-fold division into Shield, Plains, and Mountains is warranted. "Not much is known of the interior of the islands as exploration has necessarily been confined to the coasts. Sufficient information has been gathered to provide a general picture of the geography and geology, though this no doubt will be greatly modified by more detailed exploration".[13] The southeastern islands are composed chiefly of crystalline rocks of Precambrian age. Northwesterly, these become overlain by Palaeozoic sandstones and limestones with successive younger strata, including carboniferous coal seams at the surface, similar in age and structure to rocks of the Interior Plains. In the extreme northwestern part there is known to exist intruded Mesozoic rocks extending nearly a thousand miles from northern Ellesmere Island to the southwest.

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13 J.E. Armstrong, Geology and Economic Minerals of Canada, 3rd edition, Bureau of Geology and Topography, 1947, p. 311.

GEOLOGY AND THE MINING INDUSTRY.

"Occurrences of graphite and mica near the southeast coast of Baffin Island have been known for more than 360 years; some mining has been done for both these minerals. Coal has long been mined for local use from a small basin of Tertiary rocks near Pond Inlet on Baffin Island. One hundred miles to the west platinum, nickel, and silver occurrences have been reported from Admiralty Inlet. Iron ores are found in rocks of Proterozoic age on Belcher and Nastapoke Islands in Hudson Bay; at the latter locality they contain appreciable amounts of manganese"[14].

THE MINING INDUSTRY

While we already know that three of the four geological divisions of Northern Canada are rich in mineral wealth, each of the three differs from the other two in the variety and amount of minerals produced and prospective future production. The fourth geological division, the Arctic Archipelago, cannot yet be classed in the production field and will be discussed principally as a future prospect. The Department of Mines and Resources of the Dominion Government give production tables of metals and non-metals dating from 1886[15], for all of Canada, which antedates any production in the territory dealt with here; however, the records of more recent years do give figures for these regions that are of some proportion and give much promise for the future.[16]

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14 The Northwest Territories, loc. cit.
15 The Northwest Territories, p. 35.
16 The Canada Year Book, 1946, pp. 317 to 357. Dominion Bureau of Statistics, Ottawa.

GEOLOGY AND THE MINING INDUSTRY

PETROLEUM

The greatest promise of mineral development in Yukon and Northwest Territories lies in metallics in the Precambrian and the Cordillera, and in oil along the eastern edge of the mountains and on the lower Mackenzie in the northern extension of the Interior Plains region.[17] The petroleum resources offer the greatest opportunities for early development and for increase of population. Dr. J. S. Stewart, one of Canada's expert investigators, has said: "Here, then, we have the essentials for potential oil fields covering an area of over one thousand miles in length. This is probably the largest comparatively unexplored potential petroleum region in North America, and surface evidence of oil in the form of seepage occurs in several places."[18]

In 1920 and up to 1925, oil in commercial quantities was obtained by Imperial Oil Company drillers from wells about 48 miles north of Fort Norman on the Mackenzie River.[19] Owing to lack of a local market and to the great distances from, and lack of adequate transportation facilities to, national and world markets, the wells remained idle for

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17 Canada Year Books, 1940 pp. 302-314; 1941, p.266; 1943-44, pp. 316-317; 1947, p.472.

18 Dr. J.S. Stewart, Petroleum Possibilities in Mackenzie River Valley, N.W.T. The Can. Inst. of Mining and Metallurgy Transactions, Vol. XLVII, 1944. Annual General Meeting, Toronto, Ont. p. 1.

19 The Canada Year Book, 1943-44, p. 316.

several years. The discovery of radium-bearing and silver ores in the Great Bear Lake region in 1930, and subsequent development of the "finds" led to a demand for oil products and was further intensified by large-scale developments in the Yellowknife region following the gold discoveries of 1935.[20]

The history of oil production in the Northwest Territories goes back many years. Early explorers had known of seepage of petroleum along the Mackenzie River, and the first report of work done by the Geological Survey of Canada in this region during 1887-88 noted petroleum indications. In 1914, three petroleum claims were staked along the Mackenzie River near Bosworth Creek, about 48 miles north of Fort Norman. These claims later were acquired by the Northwest Company, a subsidiary of Imperial Oil Ltd., and in 1919 drilling equipment was shipped to the site now known as Norman Wells. Among the four wells drilled up to 1925, one proved to be a producer of oil in commercial quantities.[21]

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20 The Northwest Territories, Administration, Resources, Developments. Op. Cit. p. 31.

21 The Northwest Territories, p. 31.

As stated above, the lack of local demand caused these wells to remain idle until the mining of pitchblende commenced at the Eldorado property on Great Bear Lake in 1933. This, together with the discovery and mining of gold in the Yellowknife district, greatly increased the demand for petroleum products. Imperial Oil Limited brought in two more wells in 1939 and 1940. The capacity of the four producing wells was then about 450 barrels of oil daily. In 1940 a new refining plant was installed at Norman Wells and in 1943 the capacity of the refinery was increased from 840 to 1,000 barrels of crude oil per day; its products included aviation and motor gasoline, light and heavy diesel oils, and fuel oil. The shipment of oil and gasoline to the mines at Great Bear Lake had commenced in 1932, and in 1937 a pipe line was laid along the south bank of Great Bear River for a distance of eight miles to overcome the portaging of oil around a series of rapids.

With the outbreak of war between the United States and Japan in 1941, the petroleum industry at Norman Wells expanded rapidly. The danger of a Japanese invasion of Alaska and the Pacific Coast with the threatened interruption of tanker shipments of vital oil products to ports of that region, turned the attention of

United States military authorities to the Mackenzie River field, and the Canol Project was undertaken by the United States following an agreement with the Government of Canada. This involved: (a) an extensive program of drilling and development to increase the production of the field to supply the requirements of the Armed Forces in Canada and Alaska and for use along the Alaska Highway; (b) the construction of a pipe line to convey crude oil from Norman Wells to Whitehorse, Yukon Territory; and (c) the erection of an oil refinery at Whitehorse.[22]

Construction work on the Canol Project proceeded through 1942 and 1943. By January 1, 1944, a total of 32 wells had been completed by the Imperial Oil Company under contract with the United States Government.[23] Of these wells, 25 yielded oil in commercial quantity. With the four drilled prior to the Canol Project, this made a total of 29 producing wells in this field by January 1, 1944.

By March, 1945, the new wells had been increased to 67, with 60 producing oil in commercial quantity, and when, on order of the United States Government, drilling

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22 The Northwest Territories, p. 32.
23 The Canada Year Book 1943-44, p. 316.

had ceased and the refinery at Whitehorse had closed down about April 1, 1945, deliveries of oil by pipe line at the refinery had reached a maximum of 4,000 barrels daily.

This Norman Wells field, prior to 1942, produced a total of 118,895 barrels. During the life of the Canol Project production was 1,858,447 barrels. The total production of the Norman Wells field to December 31, 1946, was 2,231,936 barrels[24].

The greater part of the oil now produced at Norman Wells goes to the Eldorado Mine on Great Bear Lake and to the mines of Yellowknife. Deliveries by water and pipe line over portages, to these workings reached a new high in 1946.

Wells drilled in the Norman area have outlined a field of more than 4,000 acres in extent, with an estimated recoverable reserve of 36,250,000 barrels of petroleum[25]. A large part of the field is under the Mackenzie River between the north bank and Bear Island. There are producing wells on Bear Island and on a small sand bar called Goose Island. From the centre of the oil field at the mouth of Bosworth Creek on the north bank of the river, to Bear Island, is one and a half miles. At Norman Wells the river, including islands, is three miles wide.

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24 The Canada Year Book 1946, p. 351.
25 The Northwest Territories, p. 32.

GEOLOGY AND THE MINING INDUSTRY

The Norman Wells field is only one of several in the Northwest Territories known to Canadian geologists. There are: the Arctic Red River area, 250 to 300 miles north of Norman Wells; the Wind River basin of the Yukon, north of latitude 65° and 250 miles west of Fort Norman; oil seepages have been found about the western arm of Great Slave Lake and exploratory wells have been drilled on the north side of the arm at Windy Point, and 15 miles south of the arm on Hay River where exploratory drilling was lately carried out.

The following table[26] of quantities and values of crude petroleum produced, 1936-46 might be of interest.

Year	Bbls.	$
1936	5,399	26,995
1937	11,371	56,855
1938	22,855	68,565
1939	20,191	50,477
1940	18,633	37,265
1941	23,664	47,328
1942	75,789	108,477
1943	293,750	400,201
1944	1,223,675	632,587
1945	345,171	136,303
1946	223,000	287,000

While oil possibilities in the Mackenzie River basin are unlikely to see immediate development, and the Norman Wells field is reported not large enough for profitable pipe line distribution to any distance - to Whitehorse,

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26 The Canada Year Book, 1946, p. 472.

e.g. - under present conditions, certain factors invest the northern oil potentialities with a new significance. These include (a) the depletion in recent years of United States oil reserves; (b) possibilities for selling oil to Russia for navigation needs in the Arctic; (c) recent developments in gold mining in the Yellowknife area; (d) the possibilities for copper mining near the Coppermine River, well within the Arctic Circle; (e) the general possibilities for a much expanded mining industry in the Northwest Territories; and (f) proximity to the North American-Asia air route. In any case, these known, developed fields are valuable reserves against future needs. Further exploratory drilling and development may increase the reserves enormously.

RADIUM AND URANIUM

On the west side of the Shield sedimentary rocks in large quantity begin to appear in the group of oldest rocks. Much of the sedimentary material is undoubtedly volcanic ash, but other parts are quartzites, slates, and other normal types. Very commonly the sediments have been sheared, re-crystallized, and converted into sedimentary gneisses. Between Athabaska and Great Bear Lakes, the oldest rocks, variously termed the Tazin, Yellowknife, and Point Lake-Wilson Island groups, are mainly altered sediments with minor amounts of lavas.

Apparently it is not yet established as to whether these are the oldest known Archaean, or fall into a later Archaean group. It is in these groups that are found the radioactive elements[27].

The history of the radium and uranium find in the Northwest Territories and its development to the present time is an interesting story. The Eldorado radium-silver mine was on record for thirty years in a Geological Survey of Canada report as an occurrence of cobalt bloom, too distant to be of commercial value, until an intelligent prospector who had worked in the cobalt field of Ontario recognized its significance. In 1900, J.A. Mackintosh-Bell, of the Geological Survey of Canada, observed the stain of "cobalt bloom and copper green" on the rocks of MacTavish Arm. It was too late in the season to investigate the geology in detail and it was thirty years later before the mineral possibilities of the area were established[28].

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27 H.C. Cooke, "The Canadian Shield", Geology and Economic Minerals of Canada 3rd Edition, 1947, p. 23. Bureau of Geology and Topography, Ottawa. In this respect, Cooke says:

> "Research on the radioactive elements has shown that they break down, through a succession of changes, into two ultimate products, helium and lead; and that this change occurs at a uniform rate, the speed of which has been measured. If, therefore, the relative proportions of the radio-active elements and the lead or helium produced by their decomposition can be accurately determined, the length of time needed for that amount of decomposition can be calculated".

28 H.C. Cooke, Op. Cit. p. 89.

GEOLOGY AND THE MINING INDUSTRY

Several parties prospected the Hunter Bay and Sloan River area in 1929. Among them was Gilbert LaBine, a prospector trained in the Cobalt area of Ontario. He noted evidence of silver and copper at Echo Bay on this trip and returned the next spring to make the great discovery of pitchblende at what is now known as LaBine Point, at the mouth of Echo Bay. Supplies were secured, development commenced and veins rich in silver and pitchblende determined.[29]

With his samples, LaBine returned to Ottawa where officers of the Department of Mines and Resources confirmed the high quality of the pitchblende, the ore of radium and uranium. A suitable process for the extraction of radium from the ore was worked out by the metallurgists of the Department and plans made for the commercial development of the deposits. The company known as the Eldorado Gold Mines, Limited, erected a mill on the property at LaBine Point, Great Bear Lake in 1933, and established a refinery at Port Hope, Ontario. "In May, 1933, the first gram of radium was produced at the refinery, and by the end of that year the company was in steady production. Within a short time Canada had become one of the two important producers of radium in the world. The result was a decline in the price of this

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29 The Northwest Territories, 1947, p.33.

substance from $70,000. to $25,000 a gram. To meet the problem of transportation, the company gradually developed a system involving the use of power boats, barges, oil tankers, and aircraft, now known as Northern Transportation Company Limited."[30]

By the time World War II began in September, 1939, radium production had become a well established industry. In the years 1933 to 1937 the refinery at Port Hope, Ontario, produced 53.808 grams of radium valued at $1,525,600., and 508,296 pounds of uranium salts valued at $706.500. Figures for later years have not been made public.[31] Operations at the mine were suspended in 1940 owing to the disorganized world market. At first the Eldorado mine was worked for radium, which is a disintegration product of uranium, and the by-product uranium salts was used in giving yellow and brown colours to glass and glazes. In 1939, scientists succeeded in splitting the uranium atom and this fission brought out the tremendous possibilities, particularly at that time, in application to military operations, the necessity to safe-guard all supplies of uranium

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30 The Northwest Territories, 1947, p. 33.
31 H. C. Cooke, Op. Cit. p. 89.

available.[32]

In 1942, the mine was re-opened and it now produces uranium from which radium and the new elements plutonium and neptunium are derived from its fission.

In 1944, the Dominion Government expropriated all properties and assets of the Company and organized a crown company : Eldorado Mining and Refining (1944) Limited. Extensive additions and enlargements have been made to the plant and workings. The mill has a capacity of 100 tons of ore in 24 hours, and the concentrates are shipped by air and other modes of transportation to the refinery at Port Hope where radium, uranium salts and other products are made. As was noted previously, all information relating to amounts produced has not been published since 1941. The Eldorado Company is one of the foremost producers of uranium in the world, and, while radium is now a by-product, it is nevertheless extremely valuable.

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32 C.I.S. Reprint No. 7, 1946. From Mining in the North by J.P. deWet, in the Beaver, 1946: "Uranium (element No. 93) is the white, lustrous metal, the "fission" or bursting of whose atoms is over ten million times more violent than the bursting of a molecule of a modern high explosive. This is the property which under suitable controls made the atomic bomb possible and the use of atomic energy an actual fact. How to effect the fission of an atom and control and use the energy produced is perhaps man's greatest discovery."

GEOLOGY AND THE MINING INDUSTRY

The development at the Eldorado Mine has been accompanied by an extensive program of prospecting and geophysical surveys in the surrounding area along with hydro-electric development, road construction, air fields, radio and weather stations. The work of the Geological Survey has included survey parties engaged in detail work in the Great Bear Lake area on radio active ores; four-mile reconnaissance mapping in the Camsell River area, southeast of Great Bear Lake with particular attention to radio active ores; four-mile geological mapping in the Lac de Gras area, 200 miles northeast of Yellowknife, where some interesting gold finds have been made; one-mile geological mapping in the Indian Lake area, and detailed geological mapping in the Negus-Giant gold belt.

GOLD AND OTHER MINERALS.

The early history of the Yukon and the Northwest Territories is more closely connected with the fur trade than with mineral exploration. The Hudson's Bay Company was chartered in 1670 and the North West Company of Montreal, a rival organization, was founded in 1784. They joined forces in 1821 and by 1848 had established operations well into what is now the Yukon. On the other hand, 1873 seems to be the earliest date that notice was taken of prospectors in that region. "By 1875 the entire upper Liard Basin was being prospected with more

than 1,000 miners in the field."[33] The prospecting invastion moved on west and north; 1878, 1880, 1885, 1886 and 1892 are dates that mark arrival of parties in various areas and with some notable strikes of pay gold. In 1886 such were made on the Lewes River, Stewart River and Forty-mile River. In 1892, the Sixtymile field was located. The greatest strike of all, however, and the one that made the Klondike world famous was made on August 17, 1896, by George Carmack, a prospector. When news of the rich find reached the outside, the rush was on. Settlements sprang up overnight. Dawson in two years "mushroomed" from nothing to a city of 25,000. By the spring of 1899 all creeks of any importance in the Klondike had been staked. Even the hills were taken up and proved to be immensely rich and made fortunes for their owners. Between 1897 and 1904, inclusive, more than $100,000,000. in gold was obtained from the placers of Klondike creeks, and the greater part of it by primitive mining methods.[34]

Placer mining has produced the great percentage of gold in Yukon Territory. In 1905 dredging was introduced and large annual production continued with diminishing returns due to exhaustion of the richer grounds until

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33 W.F. Lothian, Yukon Territory, 1947, p. 7.
34 The Northwest Territories, p. 8.

1923, when further exploration located new reserves and the rise in the price of gold quickened the revival of placer mining, and by 1939 the value of annual production had increased to more than $3,000,000.[35]

Due to the great wealth of gold which the creeks contained and placer's greater facility in mining, lode mining in Yukon has not attained the importance of placer mining. Whitehorse and Mayo areas have produced most of what has so far been found. In the Mayo region there are the Mayo silver-lead veins that are exceedingly rich, the Silver King property on Galena Hill and the Keno Hill properties, all of which are good producers. Lode gold has also been mined in the Klondike and Carmacks districts and discoveries made at Victoria and Nansen Creeks.[36]

Construction of the Alaska Highway through Southern Yukon has brought prospectors in along the route and drilling is being done by the Hudson Bay Exploration and Development Company and by other companies.

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35 C. S. Lord, C. O. Hage, and J.S. Stewart, The Cordilleran Region, Geology and Economic Minerals of Canada, (Third Edition) 1947, pp. 222, 224, 231, 234, 262, 263, 264, 265 and 266.

36 W.F. Lothian, op. cit. p. 36.

GEOLOGY AND THE MINING INDUSTRY

Lode discoveries have been made in many other parts of Yukon, of gold, silver, lead, copper and antimony, and tungsten concentrates were shipped from several locations in 1941 and 1945. Tin was found in the Mayo district in 1941.[37]

For Yukon the following is a summary of mineral production from figures released by the Dominion Bureau of Statistics:[38]

	1943	1944	1945	1946	Total productio to end of 1946.
Gold	$1,584,660	$916,913	$1,221,258	$1,664,260	$213,813,104
Silver	23,690	13,788	11,824	26,124	21,021,058
Lead	7,347	4,758	5,976	3,520	4,389,604
Copper					2,711,695
Coal					803,192
Tungsten	10,122	3,780			18,315
Antimony					173
	$1,625,891	$939,319	$1,239,058	$1,693,904	$242,757,141.

"To date production of minerals in Yukon has come from a few rich deposits. No area has been thoroughly prospected and little drilling has been done except for placers...much of the geology of the areas that have so far received little active attention is favourable for the occurrence of minerals. This factor, together with the variety and widespread distribution of the lode and placer prospects, suggests the possibilities for expansion in mineral development. Mining is, and will continue to be,

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37 C.S. Lord, C.O. Hage and J.S. Stewart, Op. Cit. pp. 284, 285.

38 W.F. Lothian, Op. Cit. p. 38.

the main export industry of Yukon Territory. It is an industry closely associated with transportation. Viewing transport possibilities broadly, it will be seen that most of the Yukon is located within 500 miles of the ocean port of Skagway. The greater portion of the Territory, therefore, can be made one of the most accessible parts of Canada to world-wide ocean transport."[39]

Prospectors on their way to the Yukon "Klondike" in 1896 were the first to prospect for gold in the Northwest Territories. These parties were treking through to the Klondike as their main objective and did not spend a great deal of time or labour on the search; nevertheless some placer gold and lead were discovered in the Mackenzie Mountains, lead-zinc deposits on Great Slave Lake, and gold at Yellowknife Bay, but this did not lead to general mining activity. It was only after the discovery by Gilbert LaBine on Great Bear Lake in 1930 and the later gold strike in the Yellowknife River Area in 1933 and 1934 that there developed a "gold rush" in 1935, and staking extended, east, north and west of Yellowknife Bay for a distance of 70 miles.[40] Claims were developed and a number of properties became producing mines.

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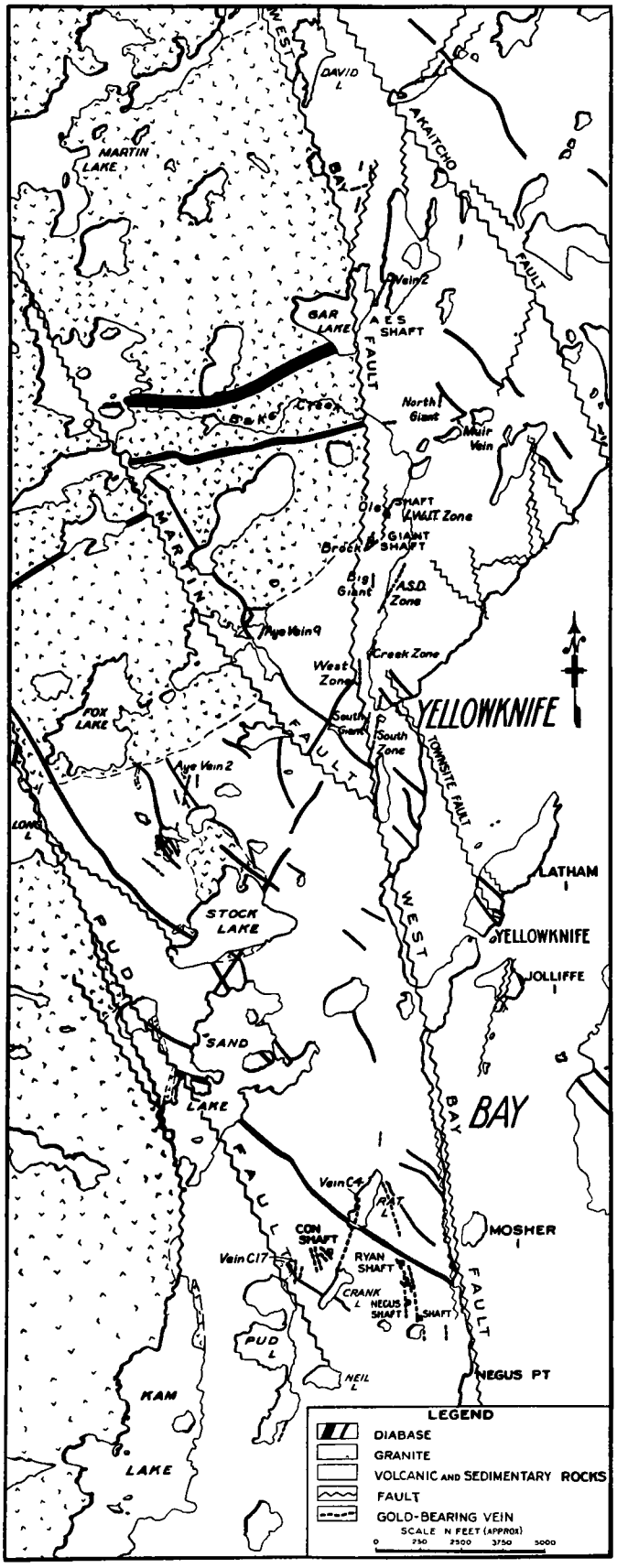
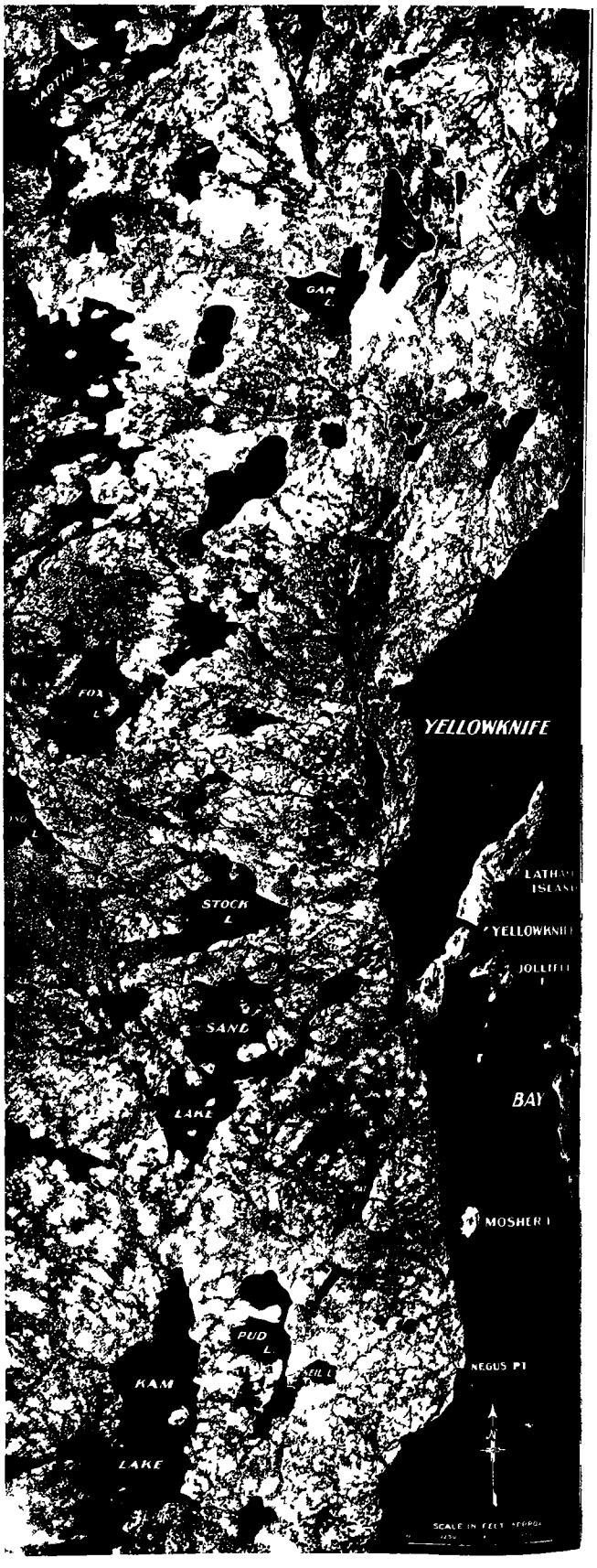
39 W.F. Lothian, Op. Cit. p. 38.
40 The Northwest Territories, Op. Cit. p. 34.





On the left is a Geological Survey map of the west side of Yellowknife Bay. On the right is an R.C.A.F mosaic of the same country. Note the immense West Bay Fault almost bisecting the area.

GEOLOGY AND THE MINING INDUSTRY

Most of the deposits of Northwest Territories are in Yellowknife mining district, northeast of the north arm of Great Slave Lake. The rocks are known as the Yellowknife group. Gold-bearing veins are found in both the lavas and the sediments. Those in the sediments are mainly bedded veins and veins introduced along the fractured axes of the folds.[41] Nearest the granite they consist of quartz carrying feldspar and tourmaline. The Con-Rycon came into development in 1938 and the first gold brick produced in the Northwest Territories was poured there in September of that year. The Negus came into production in February 1939. Two small mines, the Ptarmigan and Thompson-Lundmark commenced milling in 1941, but wartime conditions compelled all four to close; the latter pair in 1942 and 1943, the former pair in 1943 and 1944 respectively. Giant Yellowknife Gold Mines shipped some ore before suspending operations in 1940.

However, the above mines and some others,[42] before operations were interrupted by lack of labour and other causes due to war, progressively increased the production of gold in the Yellowknife district between 1938 and 1942

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41 H.C. Cooke, Op. Cit. p. 55.

42 Slave Lake Gold Mines Limited, (now Philmore Yellowknife Gold Mines Limited) on Outpost Islands; Camlaren property at Gordon Lake; (and) Ruth Mine in Francois Lake area.

in which year gold to the value of $3,826,000 was mined, and silver production, a by-product of gold-mining operations, was valued at $9,500 for the same year.[43]

"Neither tantalum nor columbium has been mined in Canada. During the field season of 1943, however, many pegmatite dykes were found by officers of the Geological Survey in the Yellowknife - Beaulieu area of the Northwest Territories, and these contain so much of the mineral tantalite-columbite that a new mining industry may prove practicable."[44] Thus the cautious Dominion Government scientist speaks, and again: "Some tungsten has been obtained from the deposit on Outpost Islands, Great Slave Lake. The ore, however, is a gold-copper-tungsten-tin complex and difficulty has been encountered in producing a satisfactory tungsten concentrate."[45] Had he been a mining promoter or even the average journalist, there was sufficient data at his command to write a glowing prospectus or a colorful story of future wealth to be taken from our northern regions and he could easily be within the bounds of probability.

The rush has not just commenced; it has been on for several years. Many mineral occurrences are known in the

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43 The Northwest Territories, pp. 34,35.
44 H. C. Cooke, Op. Cit. p. 90.
45 H.C. Cooke, Op. Cit. p. 91.

GEOLOGY AND THE MINING INDUSTRY

Shield area of the Northwest Territories, the west boundary of which is marked roughly by the Slave River, the east shore of the north arm of Great Slave Lake, the Marian River, the Faber-Hardisty-Hottah string of lakes, the east shoreline of Great Bear Lake and thence in a westerly curving line to Darnley Bay on Beaufort Sea.

Yellowknife settlement, (population 3,000 June 1, 1946), is an overcrowded boom town, and the heavy influx of miners and prospectors during the early months of 1946 taxed the food supplies available before the opening of navigation.[46] Gold, the precious metal that men throughout the ages have sought, fought for, and perished for in a hundred different ways, again is the irresistible magnet that attracts the adventurous. In the Yellowknife District, claims have been staked solidly in a narrow area of volcanic rocks roughly twenty-two miles north and south, and from one to five miles wide lying between sedimentary rocks on the east and granite on the west. But actually the Yellowknife-Beaulieu area of the Northwest Territories north of Great Slave Lake, that is favourable to prospecting for metals, is roughly five thousand square miles in extent, and only the scantiest portion has been prospected -- to say nothing of geological surveys.

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46. Yellowknife, Northwest Territories, Canada, General Information, Department of Mines and Resources, Bureau of N.W.T. and Yukon Affairs, Ottawa, Canada.

GEOLOGY AND THE MINING INDUSTRY

Gold occurrences are wide-spread in a region extending two hundred and fifty miles northward from the east arm of Great Slave Lake. Recently rich outcrops were found at Indian Lake, one hundred and twenty miles north of Yellowknife settlement. In 1936, rich quartz veins were found near Gordon Lake about forty minutes flying time from Yellowknife. The Sunset Lake section, seventy-five miles east from Yellowknife, had some thirty square miles staked during the first two months of 1936.

Gold occurrences are known also along the west coast of Hudson Bay on Wager Bay, Chesterfield Inlet, Term Point, south of Rankin Inlet, and Ferguson River. Gold has also been found in samples taken near Fort Ross on the northernmost tip of the North American mainland.[47]

Copper minerals are common around Coronation Gulf and south to Great Bear Lake. Spectacular finds of native copper many years ago gave the Coppermine River its name. In 1945 and 1946, diamond drilling was done to investiage a copper deposit near Willow Creek, west of the Coppermine River, fifty miles north of the Arctic Circle and forty miles south of the Arctic Ocean.

The copper occurs in the copper-sulphur combination, or sulphide, called chalcocite, one of the most important copper-ore minerals. The great United States copper mining

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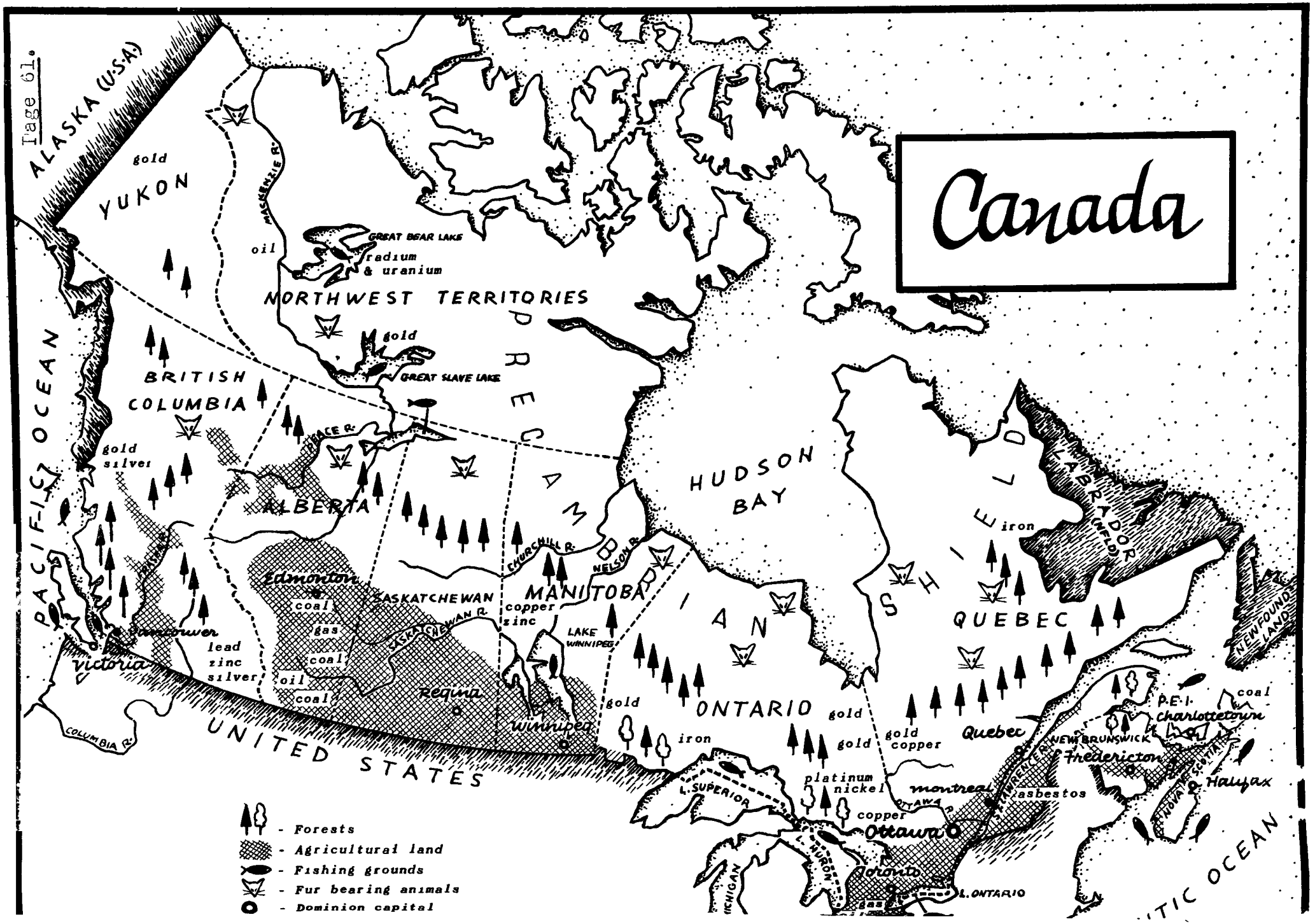
47 See map on page 61.


Canada
ALASKA (U.S.A.)
YUKON
gold
MACKENZIE R.
GREAT BEAR LAKE
oil
radium
& uranium
NORTHWEST TERRITORIES
gold
GREAT SLAVE LAKE
PRECAMBRIAN SHIELD
BRITISH COLUMBIA
gold
silver
PEACE R.
ALBERTA
HUDSON BAY
LABRADOR (NFLD.)
iron
Edmonton
coal
gas
coal
oil
coal
SASKATCHEWAN
SASKATCHEWAN R.
CHURCHILL R.
NELSON R.
MANITOBA
copper
zinc
LAKE WINNIPEG
QUEBEC
NEWFOUNDLAND
PACIFIC OCEAN
Vancouver
lead
zinc
silver
Victoria
COLUMBIA R.
Regina
Winnipeg
UNITED STATES
gold
ONTARIO
gold
iron
gold
gold
copper
Quebec
P.E.I.
coal
Charlottetown
NEW BRUNSWICK
Fredericton
platinum
nickel
montreal
OTTAWA R.
asbestos
ST. LAWRENCE R.
copper
Ottawa
NOVA SCOTIA
Halifax
L. SUPERIOR
L. HURON
Toronto
gas
L. ONTARIO
ATLANTIC OCEAN
- Forests
- Agricultural land
- Fishing grounds
- Fur bearing animals
- Dominion capital

camps at Butte, Mont., Morenci and Clifton, Ariz., Bingham, Utah, Miami and Ely, Nev., and Kennecott, Alaska were founded on Chalcocite in porphyry rocks.

The following catalogue of other mineral occurrences in the Northwest Territories has been compiled by Canada's geological survey men, and this includes the Canadian Eastern Arctic. A copper-nickel sulphide body containing metals of the platinum group occurs at Rankin Inlet, on the west coast of Hudson Bay. Platinum, nickel and silver have been found in samples from Admiralty Inlet in Northwestern Baffin Island. Cobalt and nickel are present in Great Bear Lake ores, and also are found on the east arm of Great Slave Lake. Lead and zinc minerals are found south of Great Slave Lake. Chromite, the ore of chromium has been reported from eastern Baffin Island, Melville Peninsula and the Coppermine River. Molybdenite is found in the Yellowknife area and is reported from Hottah Lake near Hudson Bay.. Tungsten has been recovered from the gold ores of Great Slave Lake region as has also tantalum, columbium, beryllium, and lithium minerals, as stated previously.[48]

It must not be assumed from this glittering catalogue that the Northwest Territories are the prospectors' and miners' paradise. Not every prospect turns out to be a producing mine, nor even a large percentage. Nevertheless,

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48 H. C. Cooke, Op. Cit. pp. 90,91.

every producing mine has at one time been only a prospect.

Today, the whole Northwest Territories appears to be at the commencement of a new age of exploration to be followed by developments on a grand scale. Mining on countless occasions has been the forerunner of new colonization; and miners have led the pioneers to settlement and civilization, to new jobs, homes and fortunes for men and women.

On Saturday, February 21st, 1948, the Dominion Bureau of Statistics was reported in the Ottawa Journal as having released the day previous the gold production figures for the year 1947.[49] Production was given by provinces with totals for 1946 in brackets as follows:- Northwest Territories 60,000 (23,400) fine ounces; Yukon 48,900 (45,300).

IRON AND COAL.

Iron and coal are almost as necessary to civilized man as is food, for this is pre-eminently the age of coal, iron and steel. The machinery that fabricates the necessities of life, the locomotives and cars that distribute them by land, and the ships that transport them over the sea are all made largely of iron. Our houses, both wooden and concrete, our bridges, and most other structures; how would they stand without the iron and steel? Today there is more than ever being used and the known reserve deposits are being depleted. The supply remaining in such great fields as the Mesabi range in Minnesota and the iron ranges in Michigan is year by year declining and the end of this supply is only a few

49 Ottawa Evening Journal, Ottawa, Canada, Sat. Feb. 21, 1948.

years hence.

Canada has not as yet been a large producer of iron ore, but because of her proximity and easy access to the rich American and Newfoundland supply, comparatively little has been done to develop her own resources of the ore. Also, many of the known ore bodies are either inaccessible, up to the present, or are too poor in iron content to make mining of these ores commercially profitable, while the higher grade ore is still in supply.[50] The Districts of Thunder Bay and Rainy River in the western part of the Province of Ontario have known areas of low grade iron ore besides high deposits like that of Steep Rock Lake near Atikoken, now in production. Ontario also has the Helen Mine near Michipicoten Harbour on Lake Superior, which has supplied a considerable portion of the ore for the steel mills at Sault. Ste. Marie over a period of years.

Since the U.S. reserves of iron ore are rapidly being depleted, the iron and steel interests are already doing exploration work farther afield. One such area is in Northern Quebec and along the Hamilton River in Labrador, where rich deposits cover a probable area of 12,000 square

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50 The Canada Year Book 1939, p. 340; 1940, p. 337.

miles and is one to rival the great deposits of the world. The Hollinger North Shore Exploration Company in two years has spent $2,000,000 in trenching, diamond drilling and tunnelling operations to establish the extent of ore. Four other companies have commenced exploration. Eventual development of the Hollinger Company alone in this area is estimated to cost $300,000,000.

It is known that the same geological formation of iron bearing deposits have been traced as far north in the interior of Ungava as Fort Mackenzie and even past Fort Chimo to Ungava Bay.[51] This, of course, is in the territory we are discussing which includes Ungava north of 60° and the islands of Hudson Bay and Straits; it is in fact part of the Eastern Arctic, of the Northwest Territories, within the Canadian Shield.

We are told that an iron formation hundreds of feet thick on the islands of Richmond Gulf on the east side of Hudson Bay and on the mainland has been known for a long time.[52] A similar formation occurs on the Belcher Islands farther north. The formation is similar to that forming the rich

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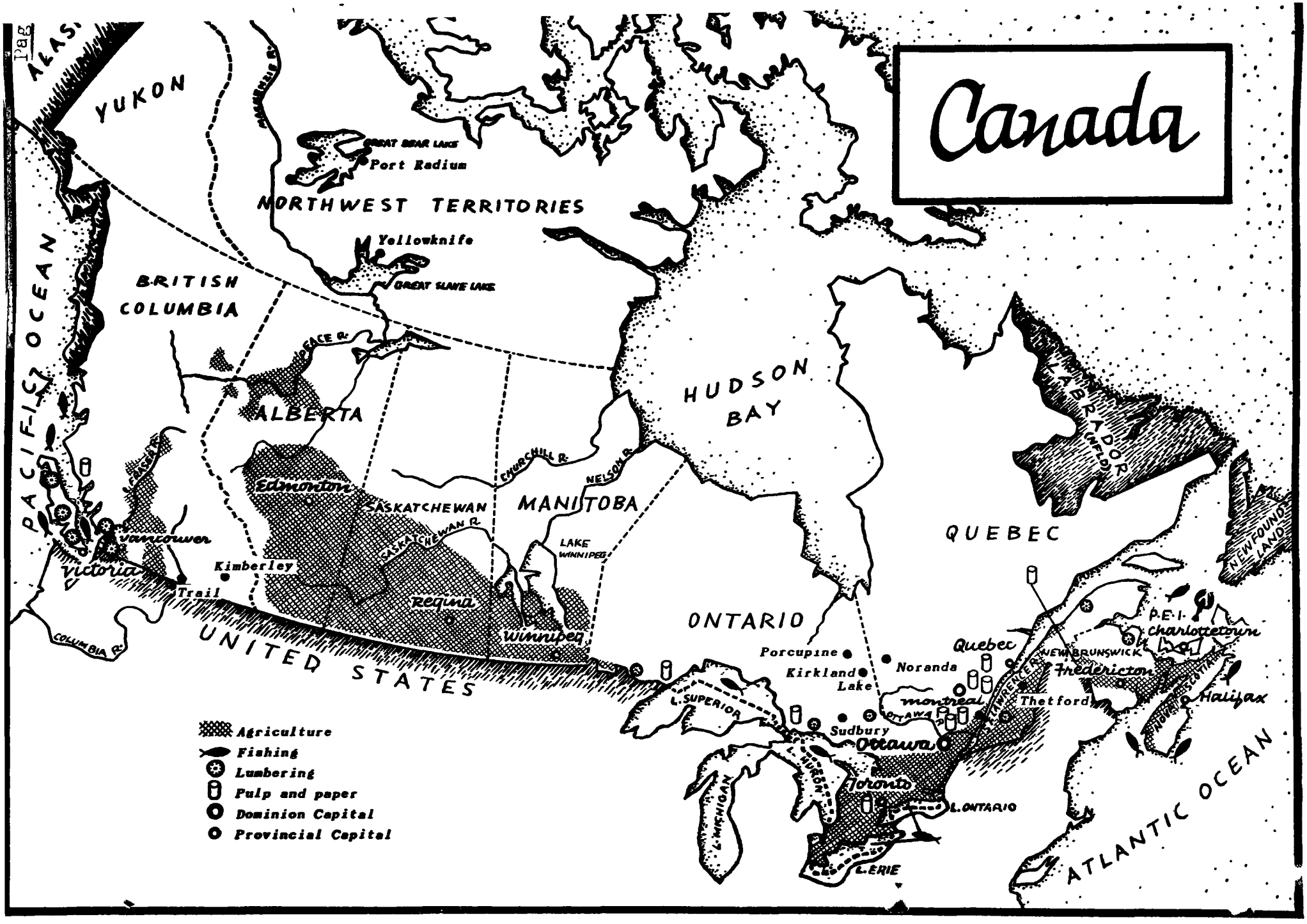
51 Low, A.P. Report on Exploration in the Labrador Peninsula, Geological Survey of Canada, 1895. See map Canadian Resources p.66 and map of Northwest Territories.

52 H.C. Cooke, Op. Cit. p. 26.


Canada
ALAS.
YUKON
PACIFIC OCEAN
MACKENZIE R.
GREAT BEAR LAKE
Port Radium
NORTHWEST TERRITORIES
Yellowknife
GREAT SLAVE LAKE
BRITISH COLUMBIA
PEACE R.
ALBERTA
HUDSON BAY
LABRADOR (NFLD.)
FRASER R.
Edmonton
SASKATCHEWAN
CHURCHILL R.
NELSON R.
MANITOBA
QUEBEC
NEWFOUNDLAND
SASKATCHEWAN R.
LAKE WINNIPEG
Vancouver
Victoria
Kimberley
Trail
Regina
Winnipeg
ONTARIO
Porcupine
Kirkland Lake
Noranda
Quebec
NEW BRUNSWICK
Fredericton
P.E.I.
Charlottetown
COLUMBIA R.
UNITED STATES
L. SUPERIOR
montreal
OTTAWA R.
ST. LAWRENCE R.
Thetford
Halifax
NOVA SCOTIA
Sudbury
Ottawa
L. HURON
L. MICHIGAN
Toronto
L. ONTARIO
L. ERIE
ATLANTIC OCEAN
Agriculture
Fishing
Lumbering
Pulp and paper
Dominion Capital
Provincial Capital

Mesabi range of Minnesota. Samples tested at the Ore Dressing and Metallurgical Laboratories of the Department of Mines and Resources found that the iron content was relatively high, 43%, "but that it was very difficult to separate by the common methods of concentration" and therefore until such time as a suitable method of separation was evolved, it did not seem suitable for commercial recovery of iron at present.[53]

Baffin Island is the largest of the Canadian Arctic islands. Its area of slightly over 200,000 square miles is about equal to the area of the Province of Manitoba. The range of mountains along its northeast coast is the highest range of Eastern North America, with altitudes of 10,000 feet. Observers speak glowingly of its majestic, picturesque scenery. There are evidences of iron at River Clyde, Arctic Bay, Cyrus Field Bay, Cameron Point and S.W. Bylot Island.[54]

Near Great Slave Lake there are iron formations, "consisting of beds of oolites of hematite in a siliceous and calcareous matrix and is associated with volcanic material."[55]

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53 E.S. Moore, The Iron Formation of Belcher Islands, Hudson Bay, Journal of Geology, Vol. 26, 1918, pp. 412-438.

54 J.L. Robinson, Mineral Resources and Mining Activity in the Canadian Eastern Arctic, Canadian Geogrphical Journal, August, 1944, pp. 16 to 21.

55 H.C. Cooke, Op. Cit. pp. 27,28,29,30, 69 and 78.

These formations are similar to the Lake Superior formations known as the Animikee iron formation, and have been located in different parts of the Northwest Territories, along the Arctic Coast and on the islands to the north. Some of these deposits are situated on what are known as the Iron Islands 35 miles northeast of Resolution.[56]

Coming to Yukon Territory it is found that iron deposits of igneous origin are abundant in the southwest. The phosphorus content is low so that the deposits are of Bessemer quality. Farther north, both hematite and magnetite are found on Cathedral Creek on the Yukon-Alaska boundary, on the Tatonduk River, the Hart River and Stewart River.[57]

Coal is perhaps the most important of all minerals. Its necessity in everyday life is recognized in every sphere of activity within the community; in domestic life for heating and cooking; in industry and in transportation for heating and power. In fact, the ramifications of the use of this one product are universal. What, then, can be said of the deposits and distribution of coal in the Canadian North?

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56 W.C. Bethune, Canada's Western Northland, 1937, p. 159.
57 C.S. Lord, C.O. Hage, and J.S. Stewart, Op. Cit. pp. 293, 294 and 295.

GEOLOGY AND THE MINING INDUSTRY

The Canadian Shield is conspicuously lacking in coal and oil. Such deposits were the products of animal and vegetable life and if life existed at all in Precambrian time, it had not progressed to the stage where it would leave recognizable remains.[58] We must, therefore, look elsewhere than in the Shield for coal deposits, and these are to be found in the Cordilleran region of the Yukon and Mackenzie,[59] in the central plains region of the Mackenzie,[60] and in the rocks of later geological periods in the mixed geological region of the Arctic Archipelago.[61]

Coal produced in the Yukon is used to meet the local needs, which are small and uncertain. It has come from five localities, namely, Rock Creek on the Klondike River, Coal Creek on the Yukon River, Granite Creek on the Duke River, Carmacks and the Whitehorse-Wheaton area. In the first three areas the coal is Tertiary lignite, and in the other two areas good bituminous coal of late Mesozoic age has been found.[62]

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58 See Geological Time Scale.
59 C.S. Lord, C.O. Hage, and J.S. Stewart, Op. Cit. pp. 228-231, 230, 240, 256-258, 295-299.
60 G.S. Hume, Geology and Economic Minerals of Canada, (3rd Edition) 1947.
61 J.E. Armstrong, Op. Cit. pp. 311, 318, 322, 324.
62 W.F. Lothian, Op. Cit. p. 37.

The following table[63] gives the probable area of deposits in square miles and the probable reserve (approximate estimate) in thousands of tons for both Yukon and Northwest Territories.

District.	Area square miles.		Thousands of tons.
Yukon	2,840	∠ A. & B.	250,000
		∠ L.	4,690,000
Northwest Territories	300	L.	4,800,000

The records of coal produced in Yukon shows a peak in 1910 of 16,185 tons from one area near Carmacks. Since 1921 production in only one year, i.e. 1924 has exceeded 1,000 tons. Of course this was for local markets only.[64]

In the Northwest Territories out-crops of lignite occur in several places along the Mackenzie river and the southern and western shores of Great Bear Lake. Locations under lease are situated twenty miles above Norman on the west bank of the Mackenzie, on the Peel Channel approximately eleven miles north of Aklavik, and near Etacho point and McVicar arm on Great Bear Lake. The Norman location has been operated in a small way. The coal seams outcrop in bluffs along the shore and inland for half a mile. The coal has the chemical

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63 ∠ A - Anthracite, B - Bituminous, L - Lignite, Canada Year Book, 1934-35, p. 413.

64 Canada Year Book, 1934-35, p. 414.

character and physical appearance of the Saskatchewan lignites and ranks with them.[65] Other areas of coal are known to outcrop or lie just beneath the surface of the ground along the Arctic coast, particularly in the vicinity of Kittigazuit and of Cape Parry.[66] While this coal is a lignite, its value as a local fuel is extremely important, particularly on the coast where no other wood than drift material is available. As we noted on page 70, the Canada Year Book 1934-35 edition gives probable reserves as 4,800,000,000 tons as an approximate estimate.

As has been said previously the Arctic Islands are devoid of wood except drift wood. Also there is no developed water power. It will then be seen at once how valuable and important the numerous coal deposits may be in the future. The lignite of Tertiary age near Pond Inlet, Baffin Island, has been known and utilized for several decades.[67] There are various exposures of other beds inland and along the coast in the vicinity of the main workings which are on Salmon River. This suggests quite extensive beds of coal in this area. Chemically the coal is of good quality, however, its physical property of easy crumbling makes long distance

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65 W.C. Bethune, Op. Cit. pp. 73-160.
66 F.H. Kitto, Op. Cit. pp. 81, 120.
67 J.L. Robinson, Op. Cit. p. 21.

transportation difficult. Locally the coal has been used for a quarter of a century by the Hudson's Bay Company and more recently by the Roman Catholic and Anglican Missions.

There is also a high grade lignite on Parry Islands that has been utilized by exploration expeditions. It crops out in many places. The value of this coal, so far distant from other sources of supply, will mean much to the future of the north. A list of other Arctic Islands bearing coal deposits follows:-

Axel Heiberg, Banks, Bathurst, Ellesmere, Melville, Byam Martin, Edmund Walker and Prince Patrick.

In a region so far from developed supply, and so inaccessible except by air for the greater part of the year as the Arctic Islands are, one can readily understand how important these many Arctic coal deposits are for the future.

Summary of Geology and Mining

The Ottawa Journal of March 9, 1948, carried a Canadian Press news item from Toronto in which Dr. H.L. Keenleyside, Deputy Minister of Mines and Resources of the Dominion Government, is reported to have said he could:

> "forsee an era of demand for base metals and fuels that should guarantee Canadian producers for a lifetime. Because of this demand for oil, coal, copper, lead, zinc, nickel and gold, the problem of future supply becomes all important".

Those are the basic mineral needs for a large industrial peace time program. In addition, such minerals as graphite,

barite, quartz, talc, limestone, sulphur, fluorspar, brucite, mica, tungsten, molybdenum, and chromium, are needed not only in peace, but also in war.

As mining is Canada's second largest primary industry, the progress it makes has an important bearing on the expansion of the Canadian economy as a whole. The progress during the past quarter century has been particularly impressive.

> "Non-ferrous base-metal production in 1942, for instance, was almost ten times greater than in 1921, and gold production during the same year showed more than a five-fold increase in quantity and close to a ten-fold increase in value. There have been marked increases also in the production of the fuels and of the non-metallic minerals. Every industry, in fact every phase of Canadian endeavour, has benefitted from this growth. It has opened up new avenues of employment for Canadian workmen; it has provided new outlets for the products of Canadian farms and forests and of Canadian manufacturing plants; it has provided the railways with new sources of revenue; and it has paved the way for the settlement of areas that would otherwise have probably remained largely unsettled"[68].

The tremendous war effort made by Canada in World War II was, on the industrial side, made possible only by the mineral resources and mineral production of the Dominion.

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68 Canada Year Book 1946, p. 313.

But, mining is a wasting industry. The greater the production, the greater the depletion of those resources. As the known sources of supply becomes exhausted, new sources must be searched out and located. Otherwise the mining industry must die and the whole economy of the country will suffer.

Thus we see how important are the mineral resources of the Canadian North. Of the minerals mentioned by Dr. Keenleyside in his Toronto address, and those added as being essential both in peace and in war, it has been shown in this chapter that, even though only an infinitely small part of the area has been thoroughly prospected, all those minerals already are known to be present in Yukon and North-west Territories, distributed widely and often in abundant supply.

As the resources of areas already producing, are depleted, the resources of the North are waiting to be prospected and developed.

CHAPTER IV

FUR INDUSTRY

The history of Canada, especially in its early period, is largely the history of the fur trade which, with its colour and romance, is a story of absorbing interest. "The centre and soul of the economic system in New France was the traffic in furs."[1] Even before the colony contained more than a handful of settlers, the profit-making possibilities of this trade were recognized. It grew rapidly even in the early days, and for more than a hundred and fifty years was the mainspring of discovery and development.[2] It furnished New France with its sinews of war and peace. Beginning on the St. Lawrence, this trade moved westward along the Great Lakes to the head-waters of the Mississippi and on to the western plains. It grew to large proportions, and did not weaken, nor did the traders' hold on these western lands relax until French military power ebbed and New France was finally overthrown.

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1 William Bennett Munro, Crusaders of New France, The Chronicles of America Series, Yale University Press, New Haven, 1918, p. 155.

2 W.L. Grant, The History of Canada, London. William Heinermann, 1919, pp. 35,36.

FUR INDUSTRY

It was a French fur-trader who first saw the mountain barrier of the Rockies rise above the sky-line. For many years Pierre la Verendrye had pushed farher and farther west, partly in search of furs, partly driven on by his own restless heart. In 1733 he built a fort where the City of Winnipeg now stands, and in 1739 went so far west that he came within sight of the foothills of the Rockies. In 1752 a relative, De Niverville, founded Fort Jonquiere at the very foot of the Rockies.

The first expedition to Canada financed by English capital was in response to the lure of the fur trade; it voyaged to Hudson Bay about the year 1662. This venture was promoted by Radisson and Groseilliers, two French "coureurs de bois" who had travelled in the rich fur country north of Lake Superior, had sought to rouse interest in France, but being repulsed turned to England. The charter of the "Adventurers of England Trading into Hudson's Bay" followed in 1670, Prince Rupert becoming the first governor of "The Great Company."[3]

By the Peace of Utrecht (1713), the vast basin of the rivers draining into Hudson Bay passed into the hands of Great Britain. But the Hudson Bay Company, to which the government was entrusted, did little or nothing for

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3 W.L. Grant, The History of Canada, pp. 72-75, also Richard Finnie, Canada Moves North, Toronto, MacMillan Company of Canada, 1948, p. 26.

inland exploration, finding it paid better to establish posts, or factories as they were called, at Nelson, Churchill, and other suitable spots on the shores of the Bay, where the Indians brought their furs to barter for the goods which came in yearly ships.

After the Seven Years War, which was ended by the Treaty of Paris in 1763, there commenced, about 1771, a period of intense competition among the fur traders now swollen to an army.[4] About 1783, a number of rival traders united to form the "Northwest Company" with its headquarters at Montreal. Finding the best sites on the Bay in the possession of their rivals, the new Company struck boldly inland, sending its factors ever farther and farther afield, and bringing its furs down to Montreal by many a winding river and across many a rough portage. Of these the most celebrated were Grand Portage from Lake Superior to the Pigeon River and the Lake of the Woods, and Methye Portage, called by the French, Portage la Loche, leading from the Churchill system to the Athabaska and the Mackenzie. Alexander Mackenzie was of this company and while so connected made his two famous exploration journeys, the one down the river, which bears his name, to its mouth on the Arctic, the other over the Rockies to the Pacific.

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4 Sixty Years of Canadian Progress 1867-1927. Publication of the Department of Trade and Commerce, 1927, pp. 84-86.

FUR INDUSTRY

The competition between the new organization and the Hudson Bay Company was quite as keen as before, but in 1821 after many years of strife, the two were finally joined under the name of the older company. In 1869, the Company surrendered its quasi-governmental functions to Canada, in consideration of extensive grants, and became a trading concern pure and simple. It may well be said that the fur trade occupied and held the great western domain of the Dominion till such time as settled government became feasible, and for this it must always receive due recognition.

All this time explorers and traders had been going farther afield and bringing more territory within their operations. A chain of posts was established by the North West Trading Company along the Mackenzie waterways at intervals of about one hundred and fifty to two hundred miles. This system was continued and expanded by the Hudson's Bay Company, following the amalgamation of the two companies. The trading posts were situated in strategic places and later became, in many instances, settlements. Not only did this expansion take place in what is now the Mackenzie District and Yukon Territory, but also along the coasts of the mainland and the islands of the Eastern Arctic, where the Revillon Frères Trading Company and the Hudson's Bay Company operated until the latter company absorbed the former in 1935-36. In the Eastern Arctic the bulk of the trading is

done by the Hudson's Bay Company. In the Mackenzie District, however, there are a number of independent traders.[5]

From the early days until 1939 when the value of fur production was exceeded by that of minerals, fur trading continued to be the most important industry in the Northwest Territories. The trapping of fine furs is still, and is likely to continue to be, the chief occupation of most of the native population. White trappers are not numerous in the Northwest Territories. "While the number of trapping licenses issued each year remains between 500 and 550, the actual number of active trappers is much smaller. About 20% of the furs traded are caught by white trappers, and this percentage appears to remain fairly constant."[6]

Throughout its history the fur trade of Canada has been essentially an export business. The bulk of Canadian furs, assembled at scores of trading posts which long preceded the advance of settlement, were exported in raw state chiefly to England, but also to Germany, the United States and Russia. Almost 50% of the furs sold at

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5 M.J. and J.L. Robinson; Fur Production in the Northwest Territories, Canadian Geographical Journal, January 1946, pp. 5,7. Also in The New Northwest edited by C.A. Dawson, p. 134,135. University of Toronto Press, Toronto. Also The Northwest Territories, 1947, p. 20.

6 M.J. & J.L. Robinson, op. cit., also The New Northwest, op. cit. p. 139.

the famous London Auctions came from Canada.

The ancient channels of the fur trade were radically shifted by the general disruption of commerce during World War I.[7] America entered more prominently into the primary marketing of furs, and today the long established London and Leipzig sales must compete with strong companies intent on directing Canadian pelts to the auctions held periodically at Montreal, Winnipeg, Edmonton, Vancouver, St. Louis and New York. The Montreal and Winnipeg auctions have grown to considerable dimensions.

Montreal is recognized as an international fur market, and at the sales held there in 1936 the pelts sold numbered 868,164, while the value amounted to $5,397,042.00.[8] Through the medium of the Canadian fur auctions, grading and marketing of furs have been placed on a scientific footing, resulting in more or less stabilized prices to the benefit equally of trapper, breeder, manufacturer, distributor and consumer.

During the past twenty-five years, immense improvements have been made in the dressing, dyeing and finishing of furs.

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7 Canada Year Book, 1938, p. 316.

8 Canada Year Book, 1943-44, p. 273.
Note - Value of fur production in the Territories - Year 1944-45 - No. of pelts taken 258,931, Value: $1,743,710. The Northwest Territories, 1947, p. 20.

FUR INDUSTRY

"In 1942, the 18 fur-dressing and dyeing plants in Canada treated 18,913,432 fur skins, the chief kinds being rabbit (3,150,189), muskrat (1,833,456), and squirrel (1,304,872)[9].

"The number of plants engaged in the manufacture of fur goods - coats, capes, scarves, muffs, etc. - numbered 484 with a total output in 1942 valued at $32,147,114"[10].

"The Northwest Territories contain some of the best fur environment of Canada, producing pelts of prime value"[11]. Some of its advantages are: (1) its great area - more than one-third of the Dominion; (2) its cold climate - best quality of fur; (3) its maze of lakes, rivers and other waterways; (4) its absence of other economic activities over wide areas which preserves the primeval conditions preferred by wild animals.

From the standpoint of value, white (Arctic) fox pelts are usually in the lead in the Northwest Territories and Yukon. Chief among the other furs of economic importance are muskrat, beaver, ermine, coloured foxes, mink, marten, lynx, otter, fisher, skunks, wolves, and wolverine, squirrel and bear[12].

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9 Canada Year Book 1943-44, p. 273.
10 Canada Year Book 1943-44, p. 273. ✓ A deluxe example of an all-Canadian fur product, both pelt, manufacturing and designing, was the exquisite beaver coat given to Princess Elizabeth as one of the Canadian wedding presents.
11 M.J. and J.L. Robinson, Op. Cit. p. 5.
12 M.J. and J.L. Robinson, Op. Cit. pp. 7-13.

FUR INDUSTRY

The value of fur production in the Territories during the years 1940 to 1945 as determined by the Dominion Bureau of Statistics[13] is as follows:

Year	No. of Pelts Taken	Value
1940 - 41	447,547	$2,301,054.
1941 - 42	445,336	2,840,701.
1942- 43	385,440	3,165,107.
1943 - 44	297,633	2,199,132.
1944 - 45	258,931	1,743,710.
Yukon		
1943-44	78,005	467,189.
1944 - 45	87,292	669,217.

It is interesting to note the variation in the number of pelts from year to year in the figures as listed above. Taken over a longer period of years there is shown to be a very noticeable fluctuation in the numbers of the various species. Careful study has been made and continues to be made by the Dominion Government in co-operation with Oxford University in an effort to ascertain their causes.[14]

Apparently the cyclical fluctuations are due to natural causes, but the biologists who have long studied the problem are not yet certain. They may be due to a straight predatory-prey relationship, an intestinal disease of changing virulence, or, a combination of these and other factors.[15]

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13 Canada Year Book, 1947.

14 The Northwest Territories, issued by the Bureau of Northwest Territories and Yukon Affairs, Ottawa, 1947, p.p. 20, 21, also Canada Year Book, 1939, p. 238.

15 C.H.D. Clarke, A Biological Investigation of the Thelon Game Sanctuary, Museum Bulletin No. 90, Dept. of Mines and Resources, Ottawa, 1940, pp. 63-73. Also: A.L. Rand, Mammals of the Eastern Rockies and Western Plains of Canada, Nat. Museum Bulletin No. 108, Dept. of Mines and Resources, Ottawa, pp. 20-24.

The cycle on which the fluctuations occur differ in larger and smaller animals, the former over a period of 9.6 years and the latter over a period of 4.2 years. This of course affects the amount of food available for the larger carniverous animals.

This whole matter of fluctuations of wild life numbers is a question of grave concern. Are the numbers of fur bearing animals in the wild, becoming less over a long period of time? This is very important to the natives of the Territories. It is important to the fur trade in general, which in recent years has been maintained by the establishment of fur-farming.

With regard to Native Game Preserves and conservation of wild life, a number of preserves have been established in the Northwest Territories and the Administration has also instituted conservation regulations designed to protect the declining fur-bearing animal population. Two long-term objectives have been kept in mind in framing the Northwest Territories Game Regulations and establishing the game preserves: (1) the welfare of the native population, and (2) the economical harvesting of the fur crop.[16]

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16 M.J. and J.L. Robinson, Op. Cit. p. 4, & p. 137.

FUR INDUSTRY

Both these objectives are furthered by the establishment of the game preserves and the game regulations. Trapping within these preserves, because it is the basic industry of the native population, is confined to Indians and Eskimos and to half-breeds leading the life of natives, with the exception of such white trappers as were already operating in the areas at the time they were established as preserves. The preserves are listed below:

Name	Date Established	Area in square miles.
Yellowknife	Sept. 22, 1923.	70,000
Slave River	Sept. 22, 1923.	2,152
Peel River	Sept. 22, 1923.	3,300
Arctic Islands (land area)	July 19, 1926	772,302
Mackenzie Mountains	May 3, 1938.	69,440
		917,194

Hunting and trapping is prohibited entirely in: (a) Thelon Game Sanctuary in Eastern Mackenzie District, comprising 15,000 sq. miles; (b) Twin Islands Game Sanctuary in James Bay, has an area of 55 sq. miles.

Thelon Game Sanctuary has the largest herd of musk-ox remaining on the mainland of North America.[17] Of the estimated 1,200 on the Canadian mainland in 1937, "a very definitely known 300 of these are in the Thelon Game Sanctuary."[18]

Wood Buffalo Park was established mainly to preserve a herd of wood buffalo. It has an area of 17,300 sq. miles, of which 3,625 sq. miles are in the Northwest Territories, and contains many other species of big game and fur-bearing animals.

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17 The Northwest Territories, p. 21.
18 C.H.D. Clarke, A Biological Investigation of the Thelon Game Sanctuary, Op. Cit. pp. 73-84, specifically p. 79.

FUR INDUSTRY

Hunting and trapping licenses are restricted as to issuance to British subjects, who, prior to May 3, 1938, had taken up permanent residence in the Northwest Territories and who are dependent upon hunting and trapping for a living. Licenses may be issued to the following persons only:

(1) Residents of the Northwest Territories, as defined by these Regulations, who on the 3rd May, 1938, held hunting and trapping licenses and who continue to reside in the Northwest Territories;

(2) The children of those who have had their domicile in the Northwest Territories for the past four years, provided such children continue to reside in the Northwest Territories.[19]

It is seen from the foregoing that a strong attempt is being made as far as the fur trade is concerned, to protect the welfare of the native population and preserve the fur-bearing animals. The game regulations tend to keep the number of white trappers in the Northwest Territories at a comparatively low figure. The number of licenses issued each year[20] remains approximately 500, and the actual number trapping is much smaller.[21] An interesting table of average percentage of each fur-bearer taken by white trappers is given herewith:

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19 Extracts from Northwest Territories Game Regulations.
20 See Page 86 for administration and game regulations.
21 M.J. and J.L. Robinson, Op. Cit. p. 6 and 139.

NORTHWEST TERRITORIES
GAME REGULATIONS

□ WHITE – OPEN SEASON ■ BLACK – CLOSE SEASON

KIND OF FUR OR GAME	JAN.	FEB.	MAR.	APR.	MAY.	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
BEAVER GENERALLY	■	■	■	■	■	■	■	■	■	■	■	■
BEAVER, AREA DESCRIBED IN SECTION 6 OF REGULATIONS	■	■	□	□	■	■	■	■	■	■	■	■
FOX, NORTH OF TIMBER LINE	□	□	□	■	■	■	■	■	■	■	□	□
FOX, SOUTH OF TIMBER LINE	□	□	■	■	■	■	■	■	■	■	□	□
OTTER, NORTH OF ARCTIC CIRCLE	□	□	□	□	15 ■	■	■	■	■	■	□	□
OTTER, SOUTH OF ARCTIC CIRCLE	□	□	□	□	■	■	■	■	■	■	□	□
MUSKRAT, NORTH OF ARCTIC CIRCLE	■	■	□	□	□	1 ■	■	■	■	■	■	■
MUSKRAT, SOUTH OF ARCTIC CIRCLE	■	■	□	□	□	■	■	■	■	■	■	■
LYNX, MINK, FISHER	□	□	□	■	■	■	■	■	■	■	□	□
BEAR, POLAR	□	□	□	□	□	■	■	■	■	□	□	□
BEAR, BARREN GROUND AND GRIZZLY	□	□	□	□	□	■	■	■	□	□	□	□
MOOSE, DEER, MOUNTAIN GOAT	□	□	□	■	■	■	■	■	□	□	□	□
CARIBOU, MOUNTAIN SHEEP	□	□	■	■	■	■	■	■	□	□	□	□
PTARMIGAN	□	□	□	□	■	■	■	■	□	□	□	□
PRAIRIE CHICKEN & ALL GROUSE & PARTRIDGE EXCEPT PTARMIGAN	■	■	■	■	■	■	■	■	□	□	□	□
WILD GEESE, BLACK BRANT, WILD DUCK	■	■	■	■	■	■	■	■	□	□	14 ■	■
PELICANS, SWANS, CRANES	■	■	■	■	■	■	■	■	■	■	■	■
~~MARTEN~~, BUFFALO, MUSK-OX, WAPITI OR ELK	■	■	■	■	■	■	■	■	■	■	■	■

11th June

Martin – Open season Nov 1 - Mar. 1

APRIL 1, 1947

FUR INDUSTRY

	1932-35	1940-43
Red Fox	39	42
Lynx	29	23
Mink	22	23
Muskrat	15	20
Ermine	25	20
Beaver	12	19
Marten	15	10

In conclusion we wish to state that, indelibly associated with the earlier periods of Canadian history, fur resources merit a rank among the natural assets of the Dominion immeasurably higher than is suggested solely by the monetary value of the fur trade. It was the quest for fur that led the explorer over a great portion of the territory now embraced within the Dominion, and for several centuries the fur trade played a unique role in shaping economic as well as political developments. "Until the early years of the nineteenth century, the export of furs from Canada exceeded in value those of any other single product."[22] As said before, the fur trade occupied, held and governed, the great northwestern domain of the Dominion, until such time as settled government was prepared and able to take over, and for this must be given due credit.

With the coming of the settler, the lumberman and the miner, the fur traderhas long since lost his commercial pre-eminence, but Canada is still conspicuous among fur-producing countries and, Northern Canada plays an important part in keeping her in that prominent position.

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22 A.W. Currie, Economic Geography of Canada, Toronto, the MacMillan Company, 1947, p. 381.

FUR INDUSTRY

From the standpoint of the welfare of the native population, fur production is the leading industry of the north and is likely to continue to be into the forseeable future. This should not be forgotten and wild life conservation policies should be developed giving these factors fullest consideration.

The North Pacific Planning Project committee, who have made a study of the present and future development of the Mackenzie District and Yukon Territory, have summarized their findings in a program for a future policy that is applicable to the whole Canadian North. They recommend and we quote as follows:[23]

> "1. Protection of outstanding areas to provide nuclei where all faunal elements may be preserved and tourist needs met, and where scientific observation would be unimpaired by local disturbances.
>
> "2. Protection, under close management, of wild life subsistence resources to the end that they may serve primarily the needs of the population, especially native families depending almost entirely on game for food.
>
> "3. Management of all beaver and muskrat areas.
>
> "4. Integration of forest and wild life conservation in fire prevention and control.
>
> "5. Continuous biological investigations of the entire.....region.
>
> "6. Investigations looking to the restoration of fine fur animals in the present beaver areas.....

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23 Canada's New Northwest - The North Pacific Planning Project, The King's Printer, Ottawa, 1947, pp. 18, 19.

"7. Investigations leading to the development, under management, of the many muskrat marshes throughout the Northwest region, looking also to areas favouring the stocking of beaver."

The above policy should be made applicable to the whole Canadian North.

CHAPTER V

WATER POWER RESOURCES.

Water power is among the chief natural resources of Canada, and its development in recent years has contributed materially to swell the volume of Canadian production in every line of activity.

What is the evidence that Yukon and the Northwest Territories have a potential in water power that will be of importance in the development of our northern natural resources? Is there water power of sufficient magnitude to satisy the need in the field of mining development, and other commercial and domestic requirements as they emerge?

Although we are told that "no comprehensive examination of the water power possibilities of Yukon Territory has been undertaken"[1], and while the same may be said with regard to the Northwest Territories, nevertheless there is an abundance of reliable information available to assure one that there are great stores of power possibilities only waiting to be harnessed.

The Yukon Territory, as seen in Chapter I lies in the Cordillera Region and so the amount of water power which is theoretically possible is very great.[2] The geographical factors are favourable; sufficient rainfall especially

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1 W.F. Lothian Yukon Territory 1947, Department of Mines and Resources, Ottawa, p. 38 and 39.
2 A.W. Currie, Op. Cit. p. 302.

in the southwest; rough mountainous terrain, making for steep gradients and a good flow of water; and the rocky terrain makes a stable foundation for the construction of storage dams which are very necessary to secure an adequate and continuous flow of water at all seasons of the year.[3] The question of how much of the available power will actually be utilized will be determined by engineering and economic forces, which, of course, holds true for any region.

We do know that in Yukon Territory reconnaissance investigations have been carried out by the Dominion Water and Power Bureau of the Department of Mines and Resources and the Whitehorse and Mayo districts give indications of "quite substantial magnitude". There are some very great rivers in the territory, uniform in descent as to be navigable in their lower reaches only, but in great measure having possibilities of power development especially in their upper reaches.

Up to the present, water power development has taken place in connection with placer gold mining operations. On the Klondike River, about 26 miles above Dawson, the Yukon Consolidated Gold Corporation owns and operates a hydro-electric plant, with a capacity of 15,000 horse-

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3 The Water Power Resources of Canada and their Utilization, Canada Year Book, 1940, pp. 353-64.

power which transmits to its own operations, to other mines and to the city of Dawson. Reconaissance investigations, spoken of above, have indicated undeveloped water power resources on the Lewis River, near Whitehorse, on the Stewart River, on Janet Creek and to the north on the Peel River.[4]

In the Northwest Territories, we find a different situation, or to be more accurate, different situations, because this covers a much greater area. Some of it is mountainous like the Yukon, e.g. much of the country west of the Mackenzie River and the islands of the eastern Arctic. Much of it lies within the Shield, having that type of topography; part of it is tundra, as along the western coast of Hudson Bay. However, much of the Arctic islands area, as we have already seen, is a combination of all three geological and topographical formations.[5] This in a way duplicates the rest of Canada's hydrographic developments as can be seen from the following description:

"Canada's geological formations, climate and topography have resulted in: the creation of great fresh water

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4 W.F. Lothian, Op. Cit. p. 38 & 39.
5 In Chapter II.

areas; the gathering of the resultant run-off into river systems; and the concentration of river flow into natural reservoirs and power heads, or at least into areas where such can be economically created by artificial means."[6]

As noted previously, the amount of reliable information on water power possibilities has been greatly increased in recent years through aerial photographic surveys and mapping and geological exploration. Many important rivers and lakes have been mapped and their available power possibilities estimated, in fact, some with reasonable accuracy.

Power surveys of the Yellowknife River had been made in 1937 and the Consolidated Mining and Smelting Company developed the site mentioned above between Bluefish and Prosperous Lakes, about 20 miles north of Yellowknife settlement. This, commenced in 1940, was the first water power project to operate in the Northwest Territories. "The power equipment consists of a turbine rated at 4,700 horse-power and generator of 4,200 kilovolt-ampere capacity."[7] On January 15, 1941, power delivery from this source was commenced to the Con, Rycon, Negus and Ptarmigan mines, is also available for distribution in Yellowknife settlement, and supplies power to the Thompson-Lundmark mines east of Yellowknife River.

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6 Canada Year Book, 1940, p. 354.
7 The Northwest Territories, 1947, p. 38.

WATER POWER RESOURCES

With the increase in mining activity in the Yellowknife District in 1945, it became necessary to find additional sources of power and harness them in order that the mining properties being brought into development might be operated. Already Consolidated Mining operated a power plant at Bluefish-Prosperous Lakes, but it was incapable of taking on further loads. Reconnaissance surveys were made by the Dominion Water and Power Bureau of the Snare, Emile, Marion, and Lockhart Rivers. The Giant-Yellowknife Gold Mines also made power surveys on the Snare River System.

An agreement was reached early in 1946 between the Federal Department of Mines and Resources and the Giant Yellowknife Mines, Limited, for the initial construction of a power development of some proportions on Snare River. Contracts were let for construction of the dam and power house and arrangements were made to have built the necessary power equipment. The first stage of this development situated about 90 miles northwest of Yellowknife settlement will have a capacity of 8,000 horse-power. Further development of this project, when required, will provide a capacity of more than 30,000 horse-power.

WATER POWER RESOURCES

Work on this project has made excellent progress and some of the equipment has already arrived and been installed. The heavy supplies and equipment must be hauled over winter roads by land, river and lake and the winters of 1946-47 and 1947-48 were and will be utilized for this purpose, with great loads being hauled to the site from Grimshaw, Alberta, and from Yellowknife, Rae, and other places on the shores of Great Slave Lake. The power-house was constructed during the summer of 1947 and the installations will be made in the summer of 1948 and power will be available by the autumn of 1948.

The stupendous nature of the obstacles to be surmounted in a development of this kind, so far from railroads and water-connected lines of transportation, is glimpsed to some extent when one estimates effort involved in the transportation alone.[8]

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8 From a brief account in the Ottawa Journal of March 29, 1948, the following quotation should help make this apparent.
Tractor Ends 325-Mile Haul of Heavy Equipment over Ice.

Hauled by tractor train 325 miles over the ice of Great Slave Lake, $380,000 worth of heavy equipment for the Snare River power project has arrived at the dam-site, the Mines and Resources Department announced Wednesday.

The dam-site, on Spruce Lake, is 95 miles northwest of Yellowknife in the Northwest Territories.

(continued on next page)

WATER POWER RESOURCES

The Northwest Territories had large areas surveyed in recent years by aerial methods so that the fall and drainage of the principal rivers are well established. Preliminary estimates show that a total of 280,000 horse-power could be made available under conditions of ordinary minimum flow with about 690,000 horse-power normally available for six months of the year. Up to the present, as stated previously, 4,700 horse-power has already been developed and another 8,000 horse-power will be available this year, 1948.[9]

What are some of the other rivers available for power development? There is the Lockhart flowing into

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8 (continued)
Four tractors hauled the 220 tons of equipment on 25 10-ton sledges along the west side of Great Slave Lake from Hay river to Frank channel and then inland 70 miles to the site. It was first moved by truck from the end of the railway at Grimshaw, Alta., to Hay river.

The tractor train was one of the largest and much the most valuable shipment ever made by tractor train across the ice of the lake. It included an 8,000 horse-power turbine, generating equipment and other material too heavy to be flown in.

The journey started on March 16 and ended on March 28. It was under W.G. Stuart, resident engineer on the project, who led the way in a snowmobile. Aerial observers made daily flights over the ground party, reporting their progress and helping to select the best route.

9 The Northwest Territories, p. 39.

Great Slave Lake at the east end. In 25 miles this river drops 700 feet and has excellent storage basins to equalize the flow of the rivers. From the south, the Taltson-Tazin River system enters Great Slave Lake and has many rapids and falls, one, the Twin Gorge fall, having a descent of 130 feet. Hay River entering Great Slave Lake to the southwest has two power concentrations.

Farther north, Great Bear River flows from Great Bear Lake to the Mackenzie River at Fort Norman, and in doing so, cuts through the Franklin Mountains where there are rapids with a high degree of power potential. Also, to equalize the flow, it has behind it the vast basin of Great Bear Lake with an approximate area of 12,200 square miles, the largest of the lakes wholly within Canada.[10]

Surveys on Camsell River, flowing into Great Bear Lake, shows that at White Eagle Falls, 4,000 horse-power to 10,000 horse-power is available for development. This is adjacent to mining area.

The South Nahanni River has Virginia Falls with a power capacity of from 5,000 to 12,500 horse-power. There are power possibilities on the Laird, the Keele,

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10 Reindeer Grazing in Canada, A.E. Porslid's report to Dominion Government 1929. p. 19.

the Arctic Red and the Peel Rivers. Also a number of rivers flowing into the Arctic Ocean east of the Mackenzie River appear to have considerable possibilities for future power development. These include the Coppermine, the Back and many smaller rivers. Several rivers flowing into the Hudson Bay have power possibilities, but up to the present surveys have not been undertaken in that connection as the necessity for quantity power supplies has not arisen.

On the Slave River, near Fort Smith, it is estimated that from 222,000 to 506,000 horse-power could be developed, and would be available for use in the Northwest Territories.

Until more is known of the possibilities of economic development of the other natural resources in the Yukon and Northwest Territories, it is difficult to estimate the market requirements for power. The further development of mineral resources would appear to offer the most likely outlet. From the brief survey made in this chapter it will be seen that in the Yukon and the Northwest Territories there is available for development sufficient water power resources for all forseeable future requirements.[11]

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11 Mackenzie River and Arctic Drainage, Tables I and II, will be found on the next page.

TABLE I

Mackenzie River and Arctic Drainage

River	Tributary of	Estimated Capacity in Horse-power. At Ordinary Minimum flow.	At Ordinary Six Month's Flow.
Liard River	Mackenzie River	400,000	1,500,000
South Nahanni River	Liard River	5,000	13,000
Nation River	Parsnip River	17,800	17,000
Nation River	Parsnip River	22,900	22,900
Nation River	Parsnip River	20,700	20,700
Nation River	Parsnip River	18,200	18,200
Peace River	Slave River	118,000	412,000
Peace River	Slave River	25,000	70,000
Athabaska River	Lake Athabaska	10,600	38,400
Athabaska River	Lake Athabaska	88,600	320,000
Slave River	Great Slave Lake	142,500	324,000
Slave River	Great Slave Lake	80,000	182,000
Hay River	Great Slave Lake	3,800	19,000
Hay River	Great Slave Lake	1,400	7,000
Snare River	Great Slave Lake	14,200	14,200
Snare River	Great Slave Lake	8,300	8,300
Yellowknife River	Great Slave Lake	2,450	3,600
Yellowknife River	Great Slave Lake	1,400	2,100
Beaulieu River	Great Slave Lake	750	1,390
Beaulieu River	Great Slave Lake	720	1,310
Beaulieu River	Great Slave Lake	950	1,720
Lockhart River	Great Slave Lake	4,300	6,200
Lockhart River	Great Slave Lake	100,000	150,000
Snowdrift River	Great Slave Lake	12,000	18,000
Talston River	Great Slave Lake	2,180	5,430
Talston River	Great Slave Lake	3,540	8,850
Talston River	Great Slave Lake	5,420	13,500
Talston River	Great Slave Lake	5,900	14,700
Talston River	Great Slave Lake	5,600	14,350
Talston River	Great Slave Lake	2,860	7,150
Talston River	Great Slave Lake	5,020	12,600
Talston River	Great Slave Lake	17,350	43,500
Talston River	Great Slave Lake	8,750	22,000
Talston River	Great Slave Lake	6,350	15,800
Tazin River	Talston River	3,760	9,400
Camsell River	Great Bear Lake	4,100	6,200
Great Bear River	Mackenzie River	11,600	34,700
Coppermine River	Coronation Gulf	12,400	18,500
Totals - Mackenzie and Arctic Drainage		1,194,400	3,398,500

TABLE II

Yukon River Drainage

Lewes River	Yukon River	9,000	9,000
Pelly River	Yukon River	800	2,800
Stewart River	Yukon River	7,300	21,800
Mayo River	Stewart River	2,400	7,200
Janet Creek	Stewart River	240	720
Totals - Yukon River Drainage		19,740	41,520

WATER POWER RESOURCES

The requirements of Norman Wells and the present mining operations in the Great Bear and Great Slave Lakes districts are being fully met and any future mining development in the neighborhood of the Snare, Yellowknife, Beaulieu, Lockhart, Talston, Great Bear, Camsell or Coppermine Rivers could be fully serviced with power from installations on the known sites of the rivers named. It is thought that the proper course to be pursued in the development of power resources in the Territories would be for the Dominion Government within its jurisdiction, to make systematic investigations of power resources only in those areas where natural resources are revealed whose economic development would require adequate supplies of power.

CHAPTER VI

AGRICULTURE - FORESTRY - FISHERIES

This Chapter includes Agriculture, Forestry and Fisheries. Agriculture and Forestry are kindred industries, especially as Canada, in places, is beginning to treat her forests in a scientific manner by budgetting the annual cutting, re-planting cut over areas, and generally following conservation methods with approved silvicultural practice.

Since fishing is a great food production industry, as is agriculture, it also is discussed here.

The climate has been dealt with in Chapter II, but will be touched on from time to time in this Chapter, as it intimately affects agriculture. Suffice it to say at this point that the Mackenzie climate is characterized by cold winters, short, moderately warm summers, and light precipitation. Covering the whole basin, the typical mean summer (June, July, August) temperatures at Fort Smith in the south and Fort Good Hope at the Arctic Circle, separated by over 6° of latitude, are considerably warmer because the summer isotherms have a north, south trend.[1] While the northern regions have a low average summer temperature, this is compensated for by the relatively long hours of sunlight. Summer frosts are one of the hazards that must be faced, but

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1 Wm. Dickson, Northern Agriculture, Dominion Department of Agriculture, University of Toronto Press, 1947, pp. 133-156.

frosts occur during summer months on the western plains in newly broken soils even down to the International Boundary, After some years of cultivation there is less danger from summer frosts, even where the sub-soil is permanently frozen.

Some farming and gardening has been carried on in the Northwest Territories for many years along the banks of the Mackenzie and its various tributaries. Sir Alexander Mackenzie in 1789 stated that "on the lower Athabaska river, Peter Pond had as fine a kitchen garden as he had ever seen in Canada. In the years that followed, traders and missionaries planted vegetables at points much further north."[2]

Some pioneer farmers were left by the Klondike gold rush. However, the chief credit for the extension of experiments in grain and vegetable growing to far northern points such as Aklavik in the delta of the Mackenzie River and Coppermine on the Arctic Coast to the east must go to the missionaries. As early as 1911, arrangements were made by the Dominion Department of Agriculture for experimental work to be undertaken by the Oblate Missions at Fort Smith, Providence and Resolution, Northwest Territories, and at Good Hope in 1928. In 1915, an experimental farm sub-station was commenced at Swede Creek, Yukon, and substantial fields

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2 W.C. Bethune, Canada's Western Northland, 1937, Dept. of Mines and Resources, Ottawa, p.p. 73-81.

of barley and oats were ripened successfully.

In 1930, the late W.D. Albright, Superintendent, Experimental Farm, Beaverlodge, Alta., made a summer survey of gardens and farming operations along the Mackenzie River as far north as the delta and at Coppermine and Bernard Harbour on the Arctic Coast. His report[3] is tremendously interesting and encouraging as to what can be done along this line in a region popularly considered to be altogether unsuitable. He found horses thriving on the range along the 60th parallel; crabapples ripening beside Great Slave Lake; potato vines at Simpson, 392 miles north of the International Boundary, growing an inch and a half a day, and tomatoes ripening out-of-doors two years out of ten; winter eggs secured from domestic fowl at Providence and Simpson; common wild fruits occurring to Arctic tide-water; potatoes and cabbages regularly planted at points down the Mackenzie almost to its mouth; garden produce grown in the Bear Lake mining field, rhubarb for table use, and cereals sufficiently mature to reproduce, raised in the Mackenzie delta; vegetables grown at Coppermine and Bernard Harbour on the Arctic Coast. On July 4, 1930, Garnet wheat at the Oblate Mission near Fort Smith stood hip-high and later ripened well.

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3 W.D. Albright, Gardens of the Mackenzie, Geographical Review, Vol. XXIII, No. 1, January, 1933.

Some of his conclusions summarized, follow:

> Cropping in the Mackenzie will be essentially confined to the sedimentary lowland. Practically all the soils of agricultural value are believed to have been the product of alluvial deposit and water assortment. The arable area is conjectural and the area of reasonably dependable crop land much more so.
>
> We must remember that he was making a flying trip - that he travelled more than 4,000 miles by air visiting only the actual spots where vegetables, fruit or grain was being grown. Later surveys, experiments and tests will tell with what success farming operations can be carried on the plains and plateaus at distances from the streams and rivers.

Following the formation of the Inter-departmental Committee on Northern Agriculture in February 1943, further investigations were undertaken by Dr. A. Leahy's party on soil surveys along the Alaska Highway in Yukon, the Liard River and the Mackenzie to Aklavik during the years 1943 to 1945 inclusive.

In 1944 and 1945, F.V. Hutton's party made a survey of agricultural possibilities in the Mackenzie River Basin. Their two reports provide much fuller and more definite information than was formerly available.

The Hutton party commenced on July 1, 1944, and examined the following districts:-

Fort Simpson	Aklavik
Norman Wells	Fort Norman
Fort Good Hope	Eldorado
Arctic Red River	Yellowknife
Fort McPherson	Fort Smith

Fort Fitzgerald.

AGRICULTURE - FORESTRY - FISHERIES

The following main factors were considered in the survey:-

1. Type of soil and area in the district.
2. Number and thrift of gardens.
3. Main types of native plants and trees.
4. Main types of introduced plants and thrift of same.
5. Amount and kind of livestock and feed for same.

A general summary of findings for the whole area, with recommendations, is contained in the report and the more pertinent findings will be summarized very briefly. As to soils:-

> "The soils at Norman Wells, Fort Good Hope, Arctic Red River, Fort McPherson and Fort Norman were all excellent, having a black loam covering of several inches over a clay sub-soil....The Simpson soil is much more sandy in nature, and the older gardens were showing need for fertilizer.....The Aklavik soil which represents most of the delta is apparently quite lean and plants grown thereon show great response to fertilizer. The soil at Yellowknife was generally quite good, but variable as to depth, texture and reaction. The Fort Smith soil was the sandiest observed at any point, but it is productive where water is added. Fort Fitzgerald soil was good, being a yellowish clay loam on which the main trees are white poplar...The soil areas at each point falling under the descriptions given are not large, but if broken and properly managed will produce at least ten times what is now being grown."

The latter statement is indeed very interesting as will be seen when compared with their actual findings at all points in the way of growth and production on the plots already cultivated.

> "Good gardens were seen growing at all points listed..... at the northern settlements leaf vegetables and peas were thrifty.....The types of trees and small plants is one of the best indications of good agricultural soil. It was noted at every point that where there

was a thrifty stand of aspen poplar and birch the soil was good, and where this had been cleared good gardens were in evidence. Spruce and balsam poplar will grow on good land, but will also thrive on poor soil.[4]"

The report goes on to describe how imported tame grasses and clovers flourish at all points where planted, and the authors suggest that more extensive trials would be of value.

"Excluding Smith and Simpson, livestock is scarce or absent. About 12 cows and five horses are kept at Simpson. These are fed from local cultivated hay and green grains. About 27 head of stock are kept at Smith and fed largely on locally grown grain."

The report also speaks of Dr. Livingstone's herd of cattle which then consisted of five cows, two heifers, one bull and four calves. This is at the farthest north settlement mentioned in the foregoing list, Aklavik. Richard Finnie describes this as the Mackenzie District's most interesting agricultural experiment.[5] This herd is fed on local forage crops. The report further states that:

"Common vegetables, such as lettuce, spinach, radish, cauliflower, cabbage, kale, peas, carrots, beets, turnips, and potatoes can be grown in quantity at all points mentioned, although the root crops are somewhat less successful at Aklavik, due to the high permanent frost line. Green beans are produced successfully at all points except Aklavik, most seasons. Tomatoes, cucumbers and corn are hazardous crops at most points north of Smith, although the first two produce well under glass at all places tried. Perennial vegetables, except rhubarb, were conspicuously absent. Flowers were growing in all settlements, but were mostly annuals. Perennial flowers were very scarce, due to climate or lack of

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4 F.V. Hutton, Report on Agricultural Possibilities in the Mackenzie River Basin, July and August, 1944. Dominion Experimental Farms, Dominion Dept. of Agriculture, Ottawa.

5 Richard Finnie, Canada Moves North, The MacMillan Co. Toronto, 1948, p. 161.

> introduction. Delphiniums and pansies were found at nearly every settlement. Cultivated strawberries were found as far north as Norman Wells. Native fruits were found at all points."[6]

The report recommends that arrangements be made with interested people at each of the settlements to receive, plant and cultivate the following seeds, supplied by the Dominion Department of Agriculture:[7] perennial vegetables (rhubarb, asparagus, chives, spinach), hardy strawberries, currants, gooseberries, blueberries, raspberries and cranberries; flowers such as peonies, delphinium, dianthus, hollyhock, iris, lilies and tulips. There are sufficient native shrubs, but hardy trees such as American elm, green ash and Manitoba maple should be tested. Also the common grasses and clovers should be tried in land cleared of trees and underbrush.

The only livestock extension recommended was the encouragement of goat raising at each settlement. Due to the price which would have to be charged for locally produced dairy products, it was thought very doubtful if such produce could be supplied from imported feed. One wonders if it would be necessary to import a large fraction of stock feed. At other places in the report it is inferred, if not specifically

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6 Hutton Report, pp. 1,2,3.

7 Action was taken and the Hutton Report of 1945 describes arrangements and first year's results.

stated that in many places wild grasses grow in profusion and that tame grasses grow well where planted; that oats and other grains have been grown with some success even in the Mackenzie Delta near Aklavik according to the Albright report of 1930 quoted above. In fact, Albright states that small samples of Aklavik grain were unofficially rated at Edmonton as follows: Legacy Oats, No. 2 Feed; Alaska Oats, No. 1 Feed; Lapland barley, No. 4 Canada Western; Garnet wheat heads were of good form and size, though the grain was immature. "The samples attracted attention at the World's Grain Exhibition at Regina."[8]

Following Albright's survey, Lawrence of the Dominion Experimental Farms, reported that in 1935, before river break-up, plots at Aklavik were seeded to grain on May 26th on ground thawed only two or three inches. When harvested September 10th after a cold and backward season, the oats and barley were rather green, and the wheat quite green.[9] In the following table, the results are summarized:-

VARIETY AND CROP	STRAW LENGTH Inches	GRADE OF GRAIN
Prelude Wheat	30	Feed
Olli Barley	25	No. 6 Canada Western
Peatland Barley	32	No. 6 Canada Western
Cartier Oats	28	No. 3 Feed
Legacy Oats	24	No. 3 Feed

8 Richard Finnie, Canada Moves North, Op. Cit. p. 154.
9 W.C. Bethune, Canada's Western Northland, Op. Cit. p. 81. Wm. Dickson, The New Northwest, Op. Cit. pp. 171, 172.

In view of the Albright report, the Lawrence report, Dr. E.S. Archibald's article in the Canadian Geographical Journal of July 1944, on "Agricultural Lands in the Canadian Northwest", Prof. J. Lewis Robinson's article "Land Use Possibilities in Mackenzie District, N.W.T." in the same journal of July 1945, the various reports of church missions, one wonders why the Hutton report of 1944 should express doubt of the Mackenzie District being able to produce sufficient food of adequate variety for the production of dairy products to equal the requirements of the population now and in the forseeable future.

In the opinion of the writer who has had some practical experience in dairy foods production in a sub-Arctic region, (basing his opinion on available reports) it would appear to be unnecessary to import stock food in any quantities.

It is unnecessary in this Chapter to discuss the reindeer industry, a successful livestock experiment being carried out in the Mackenzie District. It is dealt with at some length in Appendix No. I.

The report recommends very strongly, and it would appear very wisely, the location of a government demonstration station in the district well north of 60° and their choice would be Norman Wells. It is also suggested that Illustration stations should be established at Yellowknife, Aklavik,

Fort McPherson, Arctic Red River, Fort Norman, Fort Good Hope and Fort Vermillion, and other points as settlements and population increased and the need arose. Advice was furnished to residents engaged in gardening, and a number were selected as co-operators and furnished with samples of suitable seeds, roots and plants. So far, this program has been commenced with preliminary experimental work in agriculture in the vicinity of Yellowknife in 1945 and 1946, and plans made for the establishment of agricultural experiment sub-stations at Fort Simpson and Yellowknife in 1947.

The Report of 1945[10] describes in detail the extensive experimental program based on the findings and recommendations of the 1944 report as carried out in 1945. The plan outlined was "for workers to spend the summer months conducting experimental work, visiting co-operators and generally assisting and encouraging settlers in gardening. Co-operators chosen in 1944 and located in the settlements were to be sent collections of vegetable and flower seeds, roots and perennial vegetables and flowers, potato eyes and strawberry plants. Fertilizer, insecticides and literature pertaining to the culture of plants in the area were also included."

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10 Report on Agricultural Possibilities in the Mackenzie River Basin, Summer of 1945 by F.V. Hutton, Experimental Farms Service, Dominion Department of Agriculture, Ottawa.

AGRICULTURE - FORESTRY - FISHERIES

[11]

Mackenzie River Basin Survey - July and August, 1944.

Chart showing acreage used for agriculture, horticulture, the estimated potential acreage, and the problems observed at each point.

Location	Acreage used for agriculture	Acreage used for horticulture	Potential acreage	Problems encountered
Fort Simpson	90 acres in tame hay and grain	15	500 to 1000	Need for fertilizer, grasshoppers, spruce sawfly, onion maggot, cutworms, currant fruit fly, potato diseases.
Norman Wells	None	1	500 to 1000	Cabbage root maggot, onion maggot
Fort Good Hope	None	6	20	
Arctic Red River	None	2	10 to 15	Short season
Fort McPherson	None	1	10 to 15	Chickweed
Aklavik	25 acres green oats and native pasture	15	100	Need for fertilizer. Cabbage root maggot.
Fort Norman	1 acre of oats 10 to 15 acres wild hay	6	60	Onion maggot, cabbage root maggot.
Eldorado	None	Insignificant	1	Lack of soil
Yellowknife	15 acres wild hay	10	180	Onion maggot, cabbage root maggot. Some acid soils.
Fort Smith	100 acres wild hay 35 acres grain	10	500	Lack of water; disease in raspberries; cabbage root maggot; cutworms; grasshoppers.
Fort Fitzgerald	10 acres green oats	6	500	Diseases of raspberries.

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[11] From - Report on Agricultural Possibilities in the Mackenzie River Basin, 1944, by F.V. Hutton, Dominion Experimental Farms, Ottawa, Canada.

AGRICULTURE - FORESTRY - FISHERIES

Plans were made to start the season's work about May 15th, but due to a very late break-up, activity commenced the last week in May.

The following seeds and other material was sent to all the 32 co-operators located in the basin, generally several varieties of each type of seed. Number of varieties in each case in parenthesis.

[12]

SEEDS

Asparagus	(2)	Carrots	(3)	Onion	(4)	Squash	(2)
Beans	(5)	Cauliflower	(2)	Parsnip	(2)	Summer Turnip	(2)
Beets	(2)	Chives	(1)	Pears	(8)	Tomatoes	(2)
Broccoli	(1)	Corn	(4)	Radish	(2)	Vegetable Marrow	(1)
Brussels Sprouts	(1)	Cucumber	(2)	Rutabaga	(2)	Wheat	
Cabbage	(5)	Lettuce	(3)	Spinach	(3)	Oats	
						Barley	

PERENNIAL FLOWERS

14 varieties.

Annual Flowers

5 varieties.

Bulbs, Tubers and Roots

Lilies (2) Potatoes (1) Asparagus (1) Rhubarb (2) Peonies (2) Iris (2) Strawberries (1).

To summarize a very complete and comprehensive report, the chart[13] on the next page indicates in concise form, the vegetables recommended to be grown at each settlement.

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12 From - Report on Agricultural Possibilities in the Mackenzie River Basin, 1944, by F.V. Hutton, Dominion Experimental Farms, Ottawa, Canada.

13 From - Report on Agricultural Possibilities in the Mackenzie River Basin. (Chart on next page.)

	1st Class	2nd Class	3rd Class	4th Class	5th Class
Fort Smith	X	X	X	X	X
Fort Simpson	X	X	X	X	
Yellowknife	X	X	X		
Fort Norman	X	X	X		
Norman Wells	X	X	X		
Fort Good Hope	X	X	X		
Arctic Red River	X	X			
Fort McPherson	X	X			
Aklavik	X				
	Broccoli	Potatoes	Beans	Marrow	Corn
	Brussels Sprouts	Beets		Cucumber	Squash
	Kale	Parsnip		Onions	
	Cabbage	Peas		Tomato	
	Cauliflower	Chives			
	Carrots				
	Lettuce				
	Turnip				
	Spinach				
	Swiss Chard				
	Rhubarb				
	Rutabaga				
	Radish				

AGRICULTURE IN YUKON

The 1941 census shows that there were only twenty-six farms, in the Yukon Territory. These had a total area of 2,781 acres.

This is a very small fraction of the total land area of the Yukon, but this is understandable when the physiography of the territory is taken into account. It is a region of hills and mountains separated by a network of large valleys. These along the main rivers spread out in a great branching system, which in turn drains similar large valleys occupied by small streams. It is in these valleys that agriculture is possible and this is principally characteristic of the central plateau region.

AGRICULTURE - FORESTRY - FISHERIES

Not only is the Yukon Territory handicapped as to the extent of agricultural area by physical features; it is otherwise handicapped agriculturally by other geographic factors. "Climatically the Yukon is probably less favoured than the lower-elevation valleys of the Mackenzie River system."[14] The reason is that the Yukon plateau has a much higher elevation, temperatures are lower both in winter and summer as indicated in Chapter I, mean monthly summer temperatures of 50 to 60 degrees and mean daily maximum temperatures rise to 65 to 73 degrees on a monthly average during the summer. Also the average annual precipitation is light, because the Yukon Territory is cut off from the Pacific inflow of moisture-laden air by its high mountain ranges.

Dr. A. Leahy of the Dominion Experimental Farm Service made exploratory surveys along the Alaska Highway to Kluane Lake and down the river route from Whitehorse to Dawson in 1943.[15] Herewith some quotations from his report:

"The climate of the Yukon is dry.

"The Yukon is known as a region of permanently frozen soils. However, in the southern Yukon, that is from Teslin Lake to Lake Kluane, unfrozen soils are the rule, not the exception. North from Whitehorse frozen soils become more common - first on the northern slopes, then on the level land and finally, in the Dawson and Mayo districts, even the southern slopes are apt to be frozen at a shallow depth unless they have been cleared by man or fire. West of Kluane Lake frozen soils are also the rule even on southern slopes.

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14 J. Lewis Robinson, Agriculture and Forests of Yukon Territory, Canadian Geographical Journal of August, 1945.

15 Wm. Dickson, Northern Agriculture. The New Northwest, C.A. Dawson, Editor, The University of Toronto Press, 1947, pp. 173-180.

AGRICULTURE - FORESTRY - FISHERIES

"The preliminary soil survey conducted in 1943 shows that west of the Rocky Mountains there are no large blocks of land fit for general agriculture. However, insofar as soils are concerned, areas of land suitable for agriculture can be found within reasonable distance of any present settlement or any likely future settlement.

"The largest block of arable land in the Yukon lies in the Takhini-Dezadeash Valleys. In addition this is the best land seen in the southern Yukon, that is from Selkirk south. The river flats of the Yukon have a more fertile soil and may have almost as large a total acreage. However, they occur as scattered parcels along probably 300 miles of river front. This is a serious disadvantage in building up a farming community, but it is an advantage in that some arable land is apt to occur near any development work on the Yukon River."
16

Estimated acreage of arable lands in the western Yukon according to Leahy are:-

Upland soils - Dawson	6,000 acres
Flats along Yukon River and its tributaries	60,000 acres
Takhini-Dezadeash Valley	120,000 acres
Tagish and Little Altin flats	8,000 acres
	194,000 acres

Agriculture in the Yukon developed at the beginning of the present century to supply food to the sudden influx of a mining population in search of the wealth of the Klondike. Early settlers found that they could successfully produce field crops and vegetables during the long summer days in spite of the far northern latitude. The high prices of food made general farming economically possible.

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16 Wm. Dickson, Northern Agriculture, p. 176.

AGRICULTURE - FORESTRY - FISHERIES

Following the peak years of the mining boom the population of the Territory declined and this resulted in a shrinking of the local market and the abandonment of many farms. While general farming declined, gardening and horticulture increased and became almost a self-sustaining industry.[17]

Of the 26 farms listed in the 1941 census and totalling 2,781 acres, only two were larger than 300 acres, one-third of the total farms were under 50 acres. All the farms were run by owners.[18] The farms were classified as follows:

Grains and hay	5
Potatoes, roots and other field crops	6
Vegetables, fruit, nursery	3
Livestock	2
Subsistence	3
Part-time	6
Mixed farming	1

The minor importance of present agriculture in the Yukon and its decline, is illustrated by the following statistics:[19]

	1941	1931
Total farm value	$85,440	$127,459
Area in acres	2,781	5,197
Area under crops	511	778
Number of farms	26	41
Farm population	42	74
Number of horses	90	62
Number of cattle	52	72
Number of swine	72	41
Number of chickens	138	224

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17 W.F. Lothian, Yukon Territory, Bureau of Northwest Territories and Yukon Affairs, Ottawa, 1947, p. 41.
18 J. Lewis Robinson, Agriculture and Forests of Yukon Territory, p. 67.
19 J. Lewis Robinson, Op. Cit. p. 69.

AGRICULTURE - FORESTRY - FISHERIES

General farming at present in the Yukon is in poor condition while gardening is an established and flourishing activity.[20] The ordinary varieties of vegetables raised successfully include peas, lettuce, rhubarb, carrots, beets, cauliflower, cabbage, brussels sprouts, parsnips, celery, beans, radish, Swiss chard, turnips, parsley, broccoli, pepper grass and, in large quantities, potatoes. Small fruits grow wild in great profusion and are preserved in quantities.

Experimental work in the form of co-operative trials has been conducted in Yukon by the Dominion Department of Agriculture since 1915. An experimental sub-station was opened in 1917 at Swede Creek about six miles west of Dawson. Following the survey of 1943 a new experimental sub-station was established near the Alaska Highway at Pine Creek about 106 miles west of Whitehorse in the Takhini-Dezadeash Valley. The 1946 results were encouraging, but further trials must be made before definite and final estimates can be arrived at concerning this district's future agricultural possibilities.

FUTURE POSSIBILITIES

As in the Mackenzie District, the future of agriculture in Yukon is closely linked with the development of other resources, and probably will always be dependent on mining -

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20 J. Lewis Robinson, Op. Cit. p. 67.

the chief industry - for the profitable disposal of farm produce. Agricultural settlers are not being encouraged, however, until more is known about the climate, soils, and other characteristics of the region.

Past experience would not seem to point to an early marked increase in the volume of agricultural production in the Canadian North unless there is a great increase in population. A controlling factor, of course, being local cost of production as compared to the cost of importing food supplies. If there is a great increase of population caused by a marked increase in mining or by government stimulation of population on geo-political grounds, agricultural activities will certainly increase, and there is sufficient soil resources for a greatly increased food supply. With the increased assistance of the Dominion Department of Agriculture with its able staff of experts, northern agriculture should be able to produce sufficient quantities as the future will require.

FORESTS

The forest resources of the Yukon are available for greater exploitation if increase in population warrant. South of latitude 65 degrees, in an area of about 110,000 square miles, it is estimated, from reconnaissance field work and aerial photographs, that about 15 per cent of the region may

be considered as normally growing forest; 35% is classed as unproductive forest or scrub; leaving the remaining 50% as water, tundra or barren.[21] The timber areas are in strips along the chief rivers and so have high local accessibility. "It is possible," Prof. Robinson writes, "that these Yukon forest resources could sustain an annual cut of 50 to 100 million board feet under present conditions - a large and important reserve for future development."

That there has been an increased amount of timber used in the past ten years is shown by the table below:[22]

Year	Board Feet	Cords
1934 - 35	67,000	9,739
1935 - 36	185,000	11,946
1936 - 37	483,760	16,401
1937 - 38	400,000	19,677
1938 - 39	671,576	17,888
1939 - 40	351,157	15,387
1940 - 41	306,000	19,531
1941 - 42	300,000	12,847
1942 - 43	1,305,000	13,658
1943 - 44	1,408,657	20,403

It can be seen from above that the amount of timber cut is but a small part of that which is produced by the forests.

As to varieties of timber, white spruce is the most common species and makes up the bulk of all important stands. Aspen poplar, balsam poplar and birch are common

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21 J. Lewis Robinson, Op. Cit. pp., 70,71.
22 Canada Year Book 1946, p. 274.

and not growing to a large size, they are usually used for fuel wood. There is also some lodgepole pine, alpine fir, black spruce and tamrack in limited quantities.

In the Mackenzie District of the Northwest Territories there are areas which support excellent forest growth. However, there is no forest industry in the usual sense of that term, nor is there any prospect of such an industry developing on a considerable scale; nevertheless, since timber resources are also necessary for any future expansion of population, many of these forested areas should be so maintained rather than cleared for agriculture. The principal tree species are aspen and balsam poplar, white and black spruce, white birch, tamrack and jack pine. The eastern part of the Northwest Territories is practically devoid of forests as it is beyond the tree line, whereas in the Mackenzie District the northern boundary of the tree line lies along the Arctic Ocean and in this district there are several areas of forested land, varying in nature from scattered clumps of stunted conifers and birches near the northern limits of tree growth to fairly heavy stands of poplar and spruce in the vicinity of the larger rivers.[23] These forests are of value chiefly as a source of building materials and fuel for use by the local population, and as a favourable environment for fur-bearing and game animals.

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23 The Northwest Territories, 1947, p. 49.

AGRICULTURE - FORESTRY - FISHERIES

Some of the chief stands of merchantable timber are found along the Slave River, the Cameron Hills, the Liard Valley, the Mackenzie lowland between Fort Simpson and Fort Norman, with scattered blocks to the west along the Canol pipe line.[24]

> "Owing to the high cost of transportation, most of the lumber used in the Northwest Territories is of local manufacture. Small (portable) sawmills, usually equipped with planing machines, are operated at various points on Slave River, Great Slave Lake and Mackenzie River. Most of the lumber sawn is white spruce, and the wood of this species is used for all parts of buildings. It is also in demand for boat building and for almost every other purpose for which lumber is used."[25]

No estimates of the amount of reserve timber are available, but it is known that present cutting rates are having little effect upon the total forest reproduction. The annual cut of timber in the Mackenzie District for the period 1933 to 1944 is shown in the table following:[26]

Year	Board Feet	Linear Feet	Cords
1933-34	201,884	41,052	85
1934-35	341,644	23,923	5,589
1935-36	289,320	50,732	5,788
1936-37	364,253	66,940	5,683
1937-38	599,804	57,372	13,277
1938-39	946,743	38,108	12,167
1939-40	763,756	45,762	11,025
1940-41	1,012,826	82,079	9,760
1941-42	1,748,649	29,660	17,656
1942-43	1,760,863	27,230	18,594
1943-44	963,024	252,856	11,184

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24 J. Lewis Robinson, Land Use Possibilities in Mackenzie District, N. W.T., Canadian Geographical Journal, July 1945, p. 32.
25 The Northwest Territories, 1947, p. 49.
26 J. Lewis Robinson, Op. Cit. p. 45.

Again it should be stressed that, for the sake of the forests themselves and for their future supply of merchantable timber; for the sake of the future of agriculture; for the protection of game and fur on which depend a large proportion of the population for their livelihood, every care should be taken to conserve the timber blocks whether scrub or merchantable.

FISH

Fish of several varieties are abundant in Yukon and the Northwest Territories with the exception of Hudson Bay, where fish are very scarce.

In Yukon, the "tyee" and dog salmon ascend the Yukon River and the Porcupine River and provide a valuable fishery for the native Indian population. Five species of salmon - king, humpbacked, sockeye, coho and dog contribute to an important Indian fishery at Klukshu on the Tatshenshini River, in which also are steelhead trout. Great lake trout, cisco, landlocked steelhead trout and sockeye salmon are plentiful in Southern Yukon. Other species are Dolly Varden, Arctic grayling, inconnu, northern chub, northern pike, sucker, sculpin, trout-perch, and Mackenzie whitefish.

The 1946 Canada Year Book gives the value of fish products for the Yukon by years as follows:-

1939 - $4,867.	1942 - $3,056.
1940 - 4,994.	1943 - 2,495
1941 - 6,652	1944 - 3,131.

AGRICULTURE - FORESTRY - FISHERIES

In the Northwest Territories the following varieties are found:-[27]

Arctic char	- plentiful and important food supply.
Whitefish	- plentiful in streams of mainland, mainstay for explorers.
Arctic cod	- widely distributed in Franklin district.
Newfoundland-cod	Hudson Strait and Frobisher Bay.
Halibut	- Eastern Arctic.
Flounder	- Coronation Gulf.
Inconnu	- most of large rivers west of Anderson River.
Grayling	- widely distributed - not valuable as food.
Suckers	- dog food.
Cisco, Tullibee, Lake Herring	- plentiful James Bay, Hudson, Arctic Coast.
California Herring	- abundant, nettled, Cape Bathurst.
Lake Trout	- excellent food fish - most large lakes in Mackenzie and Franklin. Reach a weight of 60 lbs.
Pike or Jackfish	- from Alaska to Cape Bathurst.
Smelt	- Arctic Red River - important food there.

In the area roughly east and north of Great Slave Lake,[28] there is sufficient fish to supply the local needs of the natives but, before any commercial fisning operations are undertaken, a full investiation of all factors involved should be carried out. Of course until such time as rapid transportation is available, commercial fishing will not be a matter of concern. For the area at the moment under discussion, that may be a long time in the future, as it is remote both from the consuming centres and from transportation facilities.

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27 The Northwest Territories, pp., 47,48.

28 G.H.D. Clarke, A Biological Investigation of the Thelon Game Sanctuary, National Museum of Canada, Bulletin No. 96, p. 112.

AGRICULTURE - FORESTRY - FISHERIES

There remains the great valleys of the Mackenzie River and its tributaries from the northern boundary of Alberta to the Arctic Ocean.

During 1944 and 1945 the Fisheries Research Board of Canada:

> "made an extensive survey of the fisheries resources of Yukon and Northwest Territories. These studies indicated that of all the waters examined, only Great Slave Lake and possibly the lower Mackenzie River contain large fish populations. As an outgrowth of these studies Great Slave Lake was opened for commercial fishing in 1945 when 1,500,000 pounds of fish were taken. There have been larger amounts in succeeding years. Professor Rawson of the University of Saskatchewan has continued for a fourth year his study of the biology of the lake. This investigation has provided us with detailed knowledge of a northern lake, and the study of fish population from the beginning of large scale fishing operations provides a unique opportunity of following the influence of commercial exploitation."[29]

Herewith is detailed information on the commercial fishing catch in Great Slave Lake for the summer of 1946. A catch of 2,500,000 pounds of whitefish and trout was established and the total catch reported is contained in the following tables:[30]

	Round weight Lbs.	Dressed weight Lbs.
Whitefish	896,766	758,847
Lake trout	1,377,242	1,147,211
Inconnu	113,032	96,505
Totals	2,387,040	2,002,563

The above table covers commercial fishing on Great Slave Lake.[31]

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29 Annual Report of the Fisheries Research Board of Canada, 1947, Dept. of Fisheries, Ottawa, pp., 7,&8.

30 17th Annual Report of the Dept. of Fisheries, 1947, King's Printer, Ottawa, p. 42. (Round weight as distinguished from dressed weight.)

31 17th Annual Report of the Dept. of Fisheries, p. 42.

(Continued on following page.)

AGRICULTURE - FORESTRY - FISHERIES

The following table gives in detail the estimated catch for domestic consumption by the population around Great Slave Lake, approximately 1,800 persons and 4,000 dogs.

The table:[32]

	Persons using fish	Fish consumed by man (lb. per year)	Dogs (No.)	Fish eaten by dogs (lb. per year)	Total fish consumption (lb. per year)
Resolution	675	126,000	1,300	470,000	596,000
Big Buffalo R.	1		10	100,000	100,000
Hay River	60	12,000	100	36,000	48,000
Big Island & Slave Point	≠	75,000		225,000	300,000
Rae	700#	25,000	2,000	150,000	175,000
Yellowknife	200	36,000	400	144,000	180,000
Reliance	4	#	15	10,000	10,000
Snowdrift	144	21,000	200	50,000	71,000
Talston (Rocher) River	75	14,000	225	80,000	94,000
TOTALS	1,859	309,000	4,250	1,265,000	1,574,000

≠ For use at Providence and Simpson.
\# 700 for one month, a few for whole year.

On the Mackenzie River, north of Great Slave Lake, Professor V.C. Wynne-Edwards of McGill University, Montreal, P.Q., reported to the Fisheries Research Board of Canada on his investigation of 1944.[33]

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31 (Continued) NOTE: The fishery employed 60 licensed fishermen operating from 22 boats. An estimated 50,000 yards of gill-net were used. In addition, a staff of over 100 was employed at the plant in handling and processing the catch. The plant was located at Gros Jap, some 50 miles east of Yellowknife and over 600 air miles north of Edmonton, Alberta. The frozen fillets were taken by refrigerator barge to the rail-head at Waterways, Alberta, via the Slave and Athabaska Rivers and the Fort Smith Portage.

32 North West Canadian Fisheries Surveys in 1944-45, (Various Authors) Fisheries Research Board of Canada, Dept. of Fisheries, Ottawa, p. 65.

33 V.C. Wynne-Edwards, North West Canadian Fisheries Surveys in 1944-1945. The Mackenzie River, pp. 30-31, K.P. Ottawa.

He concluded that the fish population is sufficient for commercial development for export from the lower river and delta, but that the difficulties of transportation presently obtaining would make freighting costs prohibitive and such a venture impractical. He estimates the amount of fish used for dog-feed only, at present in the Mackenzie Valley as being in the neighborhood of 6,000,000. pounds annually.

Professor R.B. Miller of the University of Alberta investigated Great Bear Lake, the fourth largest lake on the continent. He found four fisheries on the lake, but concluded it was not suitable for a commercial fishery. He gives a rough estimate of the annual take in the following table:[34]

1.	Port Radium	- 3,000 pounds.
2.	Keith Arm	- 500,000 pounds.
3.	Johnny Hoe River	- 1,600,000 pounds.
4.	Whitefish River	- 100,000 pounds.

In conclusion it may be said that the rivers and lakes of the Yukon and Northwest Territories generally supply abundant fish for the present population of both man and dogs and that for the domestic requirements the amount taken does not deplete the supply. In fact, in most instances, many more fish could be taken without endangering

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34 R.B. Miller, North West Canadian Fisheries Surveys in 1944-1945, Great Bear Lake, pp. 31-43, K.P. Ottawa.

the necessary quantity of breeding stock. In most cases, besides being the principal item of dog-feed, fish constitute the chief and most readily procurable source of protein in the diet of the human population.

It is pointed out that the Yukon fisheries are of considerable importance to the people living there, but it is doubtful if there will be any fish for export. For Great Slave Lake it is estimated there should be a commercial production of 5,000,000 pounds a year in addition to present domestic requirements. It is doubtful if Great Bear Lake should be fished commercially while the Mackenzie has fish in commercial quantities, but markets are too remote for practical purposes. The indications are that Beaufort Sea has fish in commercial quantities, but as in the Eastern Arctic sufficient information is lacking, both of a practical and scientific nature on which to base a sound judgment on the matter.

GENERAL CONCLUSION

Throughout the vast expanses of northern Canada, climatic, physiographic, and geological conditions control the immediate possibilities of agriculture. Much of the information obtainable is of a tentative nature but by careful searching and checking reasonable judgments may be arrived at.

AGRICULTURE - FORESTRY - FISHERIES

The Eastern Arctic can be disregarded entirely as having any agricultural value either now or in the forseeable future. It lies beyond the tree-line and hence is lacking in forests. It may at some future time produce valuable fisheries, but information of any extensive or scientific nature in that respect is lacking at the present time.

A great part of the Mackenzie area lies beyond the limit of promising agricultural development, and yet there are many favoured localities that have practical agricultural possibilities such as the Liard River and Fort Simpson districts, as well as the Mackenzie delta. Most agricultural practice has been confined mainly to gardening and future expansion will depend on local demand. There are some unfavourable factors such as low rainfall and a permanently frozen sub-soil in the far northern sections, but there is the compensating factor of the long hours of warm summer sunlight.

In our discussion, we have named many favourable localities both for agriculture and forestry. We have come to the conclusion that a much larger population in Mackenzie could be supplied by local agriculture and fisheries for most of their food requirements.

AGRICULTURE - FORESTRY - FISHERIES

In the Yukon, as in Mackenzie district, the future of agriculture is closely linked with the development of other resources for the profitable disposal of farm produce. Here again mining seems to be the industry that will endure, is likely to expand, and will continue to support agriculture. Souther Yukon, as we have seen, can expand its agricultural production to meet any reasonable increase in local requirements. The same situation obtains with regard to forest and fish products, although an exportable surplus of these does not appear to be likely.

CHAPTER VII

TRANSPORTATION

MACKENZIE DISTRICT

Samuel Hearne was the first explorer to enter the Mackenzie region although he stopped short of the "great" river. As an employee of the Hudson's Bay Company, he trekked overland in 1771 from Fort Churchill and reached the mouth of the Coppermine River. He was the first European to reach the Polar Sea by land. But the route he followed could not become a trade route as it was too difficult overland to take enough provisions by winter dog sleds to more than keep the party alive with what food by way of game and fish could be secured along the way.

In those early days it was necessary to have a water route for transportation of supplies into the far wilderness, and fur cargoes to the outside world. And it was lakes and rivers which served as the transportation routes first to the Mackenzie District and later to the Yukon. Alexander Mackenzie in 1789 started from Fort Chipewyan on Lake Athabaska and canoed to the mouth of the Mackenzie on the Arctic Ocean, a distance of over 1,500 miles, opening up for the fur trade a tremendous territory lying along one of the great rivers of the continent. This became the accepted route to and from this territory and was reached originally from York Factory on Hudson Bay by Churchill

TRANSPORTATION

MACKENZIE DISTRICT

River to where the Methye Portage[1] traversed the intervening land to the Clearwater River which flows into the Athabaska River. From here the Slave River flows to Great Slave Lake, whose outlet, the Mackenzie River, flows to the Arctic Ocean. For over a hundred years the Methye Portage was the only route used into the Mackenzie District. The mode of transportation was canoe and York boats in summer, dog teams in winter.

In 1875, Edmonton was first reached by river-steamer along the North Saskatchewan River. In 1883 the Canadian Pacific Railway reached Calgary and in 1886 a wagon road was completed between Edmonton and Athabaska Landing and the railway was built from Calgary to Edmonton in 1891 which finished both the steamer traffic on the North Saskatchewan, also the use of the Methye Portage route.

In 1914 work was begun on a railway from Edmonton to Waterways, three miles from McMurray. It was in operation by 1919, and completed in 1926. Since 1921 almost all freight has entered the Mackenzie District via Waterways.

When in 1915 the railroad reached the town of Peace River, the Peace River route to the Slave was used temporarily.

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1 See Chapter III

MACKENZIE DISTRICT

An alternative route from Edmonton to Great Slave Lake is being completed this summer (1943); the Peace River Railroad to Grimshaw and an all weather road from Grimshaw to Hay River on Great Slave Lake. It is over this road that the heavy equipment for the electric development on the Snare River north of Yellowknife town was hauled last winter.

Still another water route to the Mackenzie is the Liard River and Fort Nelson River from Fort Nelson on the Alaska Highway in northern British Columbia. The Liard River empties into the Mackenzie River at Fort Simpson and the soils along the valley of the Liard should prove valuable for farming operations as this area has a slightly warmer climate than the Mackenzie proper.

The routes so far mentioned, serve the trading posts along the Mackenzie River system. These posts from the south are Fort Smith (1874)[2] on the Slave River; Fort Resolution (1800) and Hay River (1868) both on the south shore of Great Slave Lake; Fort Providence (1862); Fort Simpson (1804) where the Liard enters the Mackenzie; Wrigley (1877); Fort Norman (1810); Fort Good Hope (1805); Arctic Red River (1891); Fort MacPherson (1840) on the Peel River 28 miles from the Mackenzie; and Aklavik (1912).

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2 The date following each name refers to the year of its establishment.

TRANSPORTATION

MACKENZIE DISTRICT

Aklavik is considered the terminus of the Mackenzie River route, but since 1936, posts along the Arctic Coast and on the adjacent islands have been serviced from the Mackenzie.

Much of the recent increased activity in the Mackenzie District comes from prospecting and mining in the Great Slave Lake and Great Bear Lake areas and in the vicinity of Norman Wells. This makes necessary water transportation routes on these two large lakes in order to service the mining communities and the trading posts along their shores and beyond on the rivers which enter at various points, e.g. Rae, near the head of the North Arm of Great Slave Lake. This post has the largest Indian population in its vicinity of any of the Mackenzie District posts. It has the largest settlement, Yellowknife, as a neighbor, (almost 60 miles as the crow flies). The direct route from Great Slave Lake to Great Bear Lake (with 46 portages) passes through Rae. All these points are served by the Yellowknife Transportation Company, (chiefly freighting to Yellowknife), Dow (D'Aoust) Brothers, and the McInnes Products Corporation.

The other large lake, Great Bear Lake, also has great transportation troubles, not alone because of the

great distances on the lake, but also because of the number of portages, there being some sixteen to twenty handlings of freight between Port Radium and Edmonton. And Edmonton is neither the origin nor destination of Port Radium freight.[3] The Northern Transportation Company serves Great Bear Lake.

Two companies do most of the water carriage in the Mackenzie District. These are the Northern Transportation Co. mentioned above and Mackenzie River Transport, a department of Hudson's Bay Company. The first began as an offshoot of Canadian Airways in 1931, was taken over by White Eagle Mines in 1934, and by Eldorado Mining and Refining in 1936. The Dominion Government took this last named Company over in January 1944, and with it the Transportation Company. The Hudson's Bay Company, of course, has freighted in these regions from the beginning of the fur trade by canoe and York boat, and later by river steamer.

Before leaving water transportation in Mackenzie District it might be useful to give the distances from Fort Smith to the points along the Mackenzie River route proper. Three hundred and three miles must be added to get the distances from waterways.[4]

Res-delta, near the mouth of the Slave River ..... 174 miles

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3 The New Northwest Territories, p. 208.
4 The New Northwest, p. 212.

TRANSPORTATION

MACKENZIE DISTRICT

Fort Resolution..... 204 miles.
Hay River.....279 miles.
Fort Providence..... 357 miles.
Fort Simpson..... 513 miles.
Wrigley..... 665 miles.
Fort Norman..... 817 miles.
Norman Wells..... 867 miles.
Fort Good Hope..... 990 miles.
Arctic Red River.....1204 miles.
Fort McPherson.....1258 miles.
Aklavik.....1358 miles.
Tuktoyaktuk.....1545 miles.

The following table illustrates amounts of freight (in tons) moved on the Mackenzie waterways in recent years:[5]

Year	Northbound to Waterways	Southbound to Waterways.
1938	19,003	4,766
1939	16,521	4,996
1940	15,108	2,273
1941	19,364	3,123
1942	31,500	2,981
1943	21,817	1,297
1943 (U.S. Army)	25,552	
1944	22,552	8,377.

As in every section of the Canadian North, following 1925, the airplane has played a prominent part in transportation in the Northwest Territories, especially in Mackenzie District. In fact, some claim that "the greatest single factor in the large scale development of the Far North has been the airplane".[6] Especially this may be true in the mining industry, both on the side of prospecting and on the side of actual operation. The great number of lakes and rivers in the north make it possible for the airplane, equipped with skis in winter and pontoons in summer, to take advantage of these natural landing

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5 J.L. Robinson, Water Transportation, etc. Op. Cit. p. 254.
6 Richard Finnie, Canada Moves North, p. 92.

places (the lakes and rivers) far out in the bush or other wilderness places as the occasion requires, long before it is possible to have air ports and runways laid down. The history of bush flying in Northern Canada is a thrilling story, not yet fully told.[7]

The airplane has been of great assistance in other ways; in carrying freight, passengers and mail to distant points, and especially it is proving of great service in mapping the vast northern spaces.[8] However, it is not the complete solution to the transportation problem. It may handle the greater part of the passenger business, the light parcel service and the mails, but it cannot yet handle bulk freight except at prohibitive cost, and some not at all.

The Canadian Pacific Air Lines have taken over the independent companies and now operate a regular schedule and contract side trips as opportunity occurs.[9]

One of the roads not mentioned so far is the road part of the Canol project from Norman Wells on the Mackenzie River to Whitehorse, Y.T. This road was built to serve the pipeline. Only about 200 miles of this was gravelled and it

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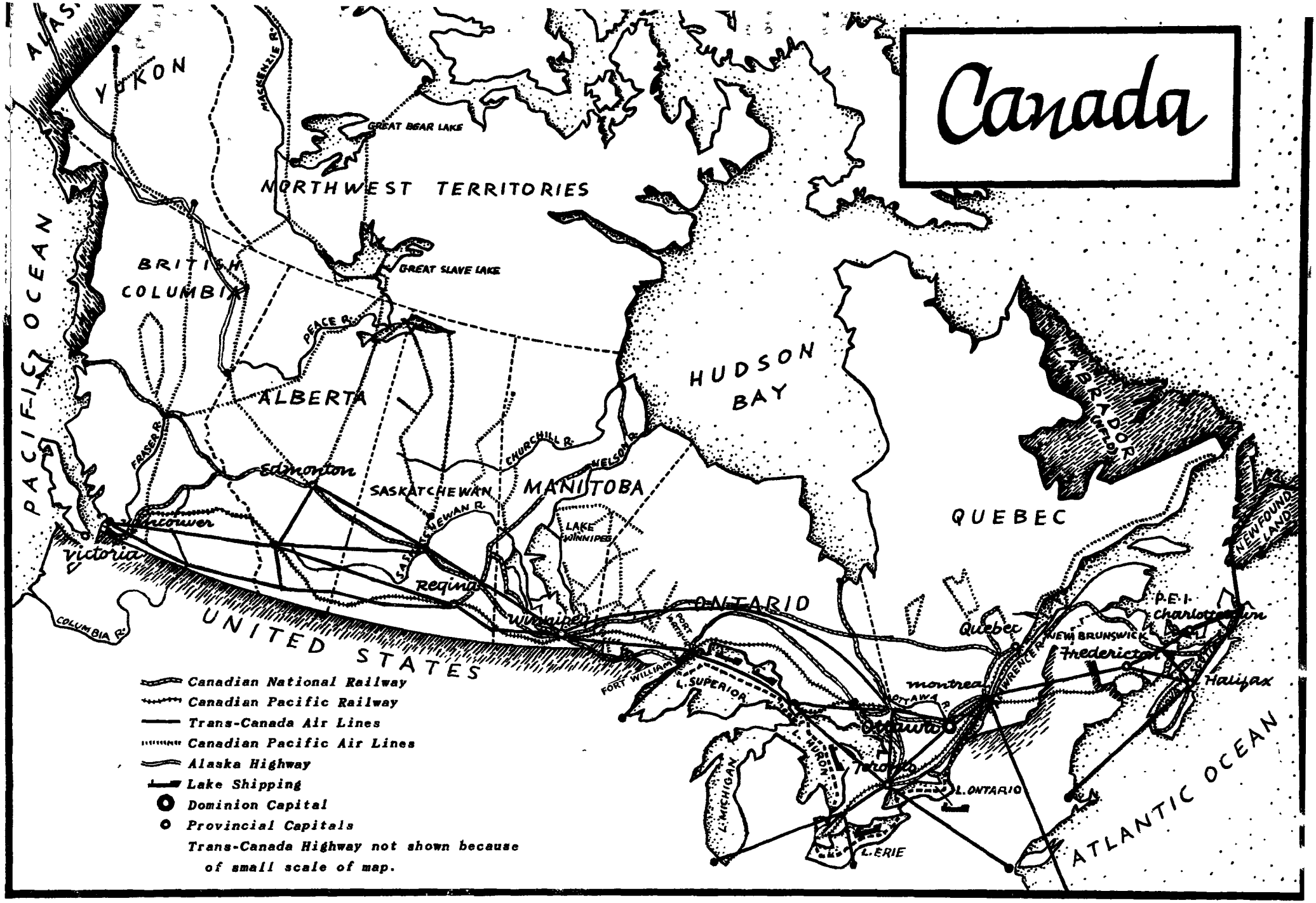
7 J.A. Wilson, Gentlemen Adventurers of the Air, The National Geographic Magazine, Nov. 1929, p. 597-642.

8 See Appendix IV on Mapping; Aerial Surveys continued; Record Air Photo Survey.

9 For 1948 Summer Time Tables and Tariff Schedules see Appendix III.


Canada
ALASKA
YUKON
MACKENZIE R.
GREAT BEAR LAKE
NORTHWEST TERRITORIES
GREAT SLAVE LAKE
BRITISH COLUMBIA
PACIFIC OCEAN
PEACE R.
ALBERTA
HUDSON BAY
LABRADOR
FRASER R.
Edmonton
CHURCHILL R.
NELSON R.
SASKATCHEWAN
MANITOBA
QUEBEC
NEWFOUNDLAND
Vancouver
Victoria
SASKATCHEWAN R.
LAKE WINNIPEG
Regina
Winnipeg
ONTARIO
P.E.I.
Charlottetown
Quebec
NEW BRUNSWICK
Fredericton
COLUMBIA R.
UNITED STATES
PORT ARTHUR
FORT WILLIAM
L. SUPERIOR
montreal
ST. LAWRENCE R.
Halifax
OTTAWA R.
Ottawa
L. HURON
L. MICHIGAN
Toronto
L. ONTARIO
L. ERIE
ATLANTIC OCEAN
Canadian National Railway
Canadian Pacific Railway
Trans-Canada Air Lines
Canadian Pacific Air Lines
Alaska Highway
Lake Shipping
Dominion Capital
Provincial Capitals
Trans-Canada Highway not shown because of small scale of map.

is very likely to fall into complete disrepair owing to the abandonment of the Canol project.

YUKON TERRITORY

Just as the Mackenzie River and its tributaries have been carrying the traffic of the fur trade for more than 150 years and in recent years traffic connected with mining and other developments in the Mackenzie District, so in the Yukon the story of transportation links another great river, the Yukon, with mining, (especially the historic Klondike strike) and the gold-mining industry of the territory.

> "Both the Mackenzie and Yukon Rivers are broad and long and rank with the ten greatest river systems of the world. The series of rivers and lakes which makes up the Mackenzie Waterway has a total length of 2,500 miles from the headquaters on the Finlay River in the Rocky Mountains (a length almost equal to the width of Canada), and drains a basin with an area of about 700,000 square miles (one-quarter of the mainland area of Canada). In North America the Mackenzie River system is exceeded in length and drainage area only by the Mississippi-Missouri system of central United States. Yukon River is 1,979 miles long from the neadquaters of Nisutlin River in the Mackenzie Mountains (714 miles in Canada and 1,265 miles in Alaska) and has a drainage basin of 320,000 square miles (127,000 square miles in Canada)."[10]

The historic approaches to Yukon Territory are as follows:

In 1840 Robert Campbell of the Hudson's Bay Company was the first white man to have entered the present Yukon Territory. He went by the Liard River, the Frances, the Pelly to its junction with the Yukon.

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10 J.L. Robinson, Water Transportation in the Canadian Northwest, The Canadian Geographical Journal, November 1945, p. 237.

TRANSPORTATION

YUKON TERRITORY

In 1846, J. Bell, a Hudson's Bay Company man entered from the North. He ascended the Peel River from the Mackenzie to Fort McPherson, then up the Rat River and over the divide, and down the Bell River to the Porcupine and down it to the Yukon.[11] While both these routes are practical for canoes they are both too long for commercial transportation. The Yukon itself of course is a good waterway, but the distance from its mouth on Berhing Sea, and the difficulties of navigation prevents it from competing successfully with the routes from the south, and the Alaska Highway only recently completed. From the south the White Pass and the Chilkoot Pass parallel each other from tidewater at Skagway. For the traveller on foot during the Klondike gold rush the Chilkoot Pass was the more practicable and therefore most travelled, but since the railway was opened and until the coming of air travel, practically all freight and all passengers entered Yukon by the White Pass route.

Two air lines now enter Yukon. Canadian Pacific Air Lines reach Whitehorse from Fort St. John, B.C., a junction of lines from Edmonton and Vancouver. Pan-American Airways land in Whitehorse from Seattle and Juneau, and go on to Fairbanks, to which point Canadian Pacific Airlines also fly.

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11 Stefansson followed this route by canoe in 1907 in order to get to a telegraph line by shortest possible route and time.

TRANSPORTATION

YUKON TERRITORY

A word about the White Pass and Yukon River route appears necessary. From Skagway a narrow-guage railway (three feet in width) climbs up a 3.9 per cent grade for 16 miles to the summit of White Pass, thence past Lake Bennett and on to Whitehorse and navigation on the Yukon River system, with connections to Dawson, Carmack, Stewart and Mayo.

The total length of the railway from Skagway to Whitehorse is 110 miles. Because it passes through territory under different political jurisdictions the White Pass and Yukon route is the title under which four existing companies operate. These are, the Pacific and Arctic Railway and Navigation Company (Alaska), the British Columbia Yukon Railway Company (British Columbia), the British Yukon Railway Company (Yukon), and the British Yukon Navigation Company (Yukon). All these companies have common shareholders and officials, and are so unified as to have but one common bank account. It is primarily British financed.

Freight tonnage handled in Yukon is illustrated by the following table.[12]

	1939	1941
Whitehorse-Dawson	5,871	6,207
Mayo-Whitehorse	11,012	2,865
Dawson-Nenana, Alaska	1,240	1,532

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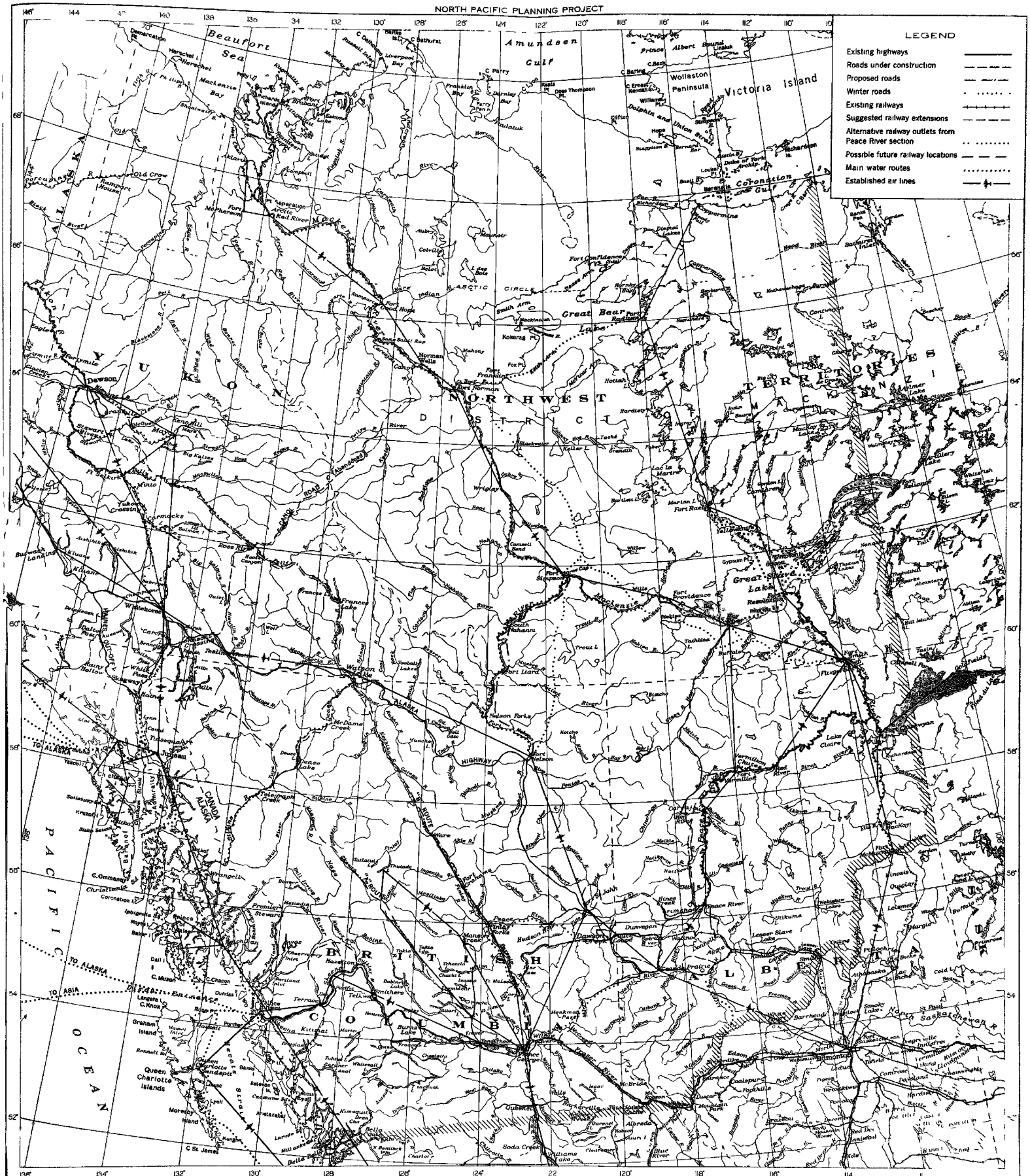
12 J.L. Robinson, Water Transportation in the Canadian Northwest, Op. Cit. p. 254.

NORTH PACIFIC PLANNING PROJECT



TRANSPORTATION

Scale 1/5068800 or 1 Inch to 80 Miles

Miles

80 0 80 160 240

TRANSPORTATION

ALASKA HIGHWAY AND CANOL

Both the Canadian Pacific Railway Company and the Canadian National Railway Company[13] operate steamship services the year round from Vancouver to Skagway, calling at intermediate points. Tourist attractions draw many people to the Yukon, and as time goes on, the volume of traffic is very likely to increase especially with the opening of the Alaska Highway and the general improvement in transportation facilities.

ALASKA HIGHWAY AND CANOL

In World War II following Pearl Harbour, the Japanese forces threatened the whole west cost of North America and made their approach in the North Pacific with Alaska as their first main objective which was to be their base of future operations.

Canada had already established what was and is known as the North West Staging Route - a series of well-equipped and up-to-date air ports and landing fields. In order to meet the anticipated Japanese invasion via Alaska, the United States undertook to build the Alaska Highway from Dawson Creek, British Columbia, to Fairbanks, Alaska, a distance of 1,523 miles. It passes through Whitehorse and follows closely the North West Staging Route. So much has been written about this great under taking that more will not be said at this time except to say that the Dominion Government has taken over control and it will be maintained by the Dominion.

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13 The Prince George, largest passenger ship ever built on Canada's west coast, was just put in commission this summer by Canadian National Steamships' Pacific Coast Service.

It gives another all weather road to the Yukon and already has opened up the southern area to exploitation of the territory's natural resources. On Tuesday, March 16, 1948, with a view to facilitating the development of the resources of the Yukon Territory north of the Alaska Highway, Parliamentary approval of an expenditure of $400,000 for the improvement of the Mayo-Minto section of the Whitehorse-Mayo-Dawson road was asked in the main estimates tabled in the House of Commons.[14]

THE EASTERN ARCTIC

Summer transportation for the population of the eastern Arctic is almost wholly by water, and except for air transport, this is the only method of getting into the area during the short summer season. The chief industry so far in the eastern Arctic is the fur industry and apart from government services, the main problem is to supply the trading post and bring out the fur catch.

The eastern Arctic may be approached both by the Atlantic route from the southeast or by way of Hudson Bay and the Hudson Bay Railway through the Port of Churchill. When the R.M.S. "Nascopie" was on her annual summer supply trip to the far Northern islands,[15] she would come into

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14 C.I.S. Bulletin of March 19th, 1948. Vol. 3, No.19, p.4.

15 The R.M.S. "Nascopie" foundered July 21, 1947, off Cape Dorset on her annual northern supply trip. She had made the trip annually since 1912. To replace her, a larger ship to cost $2,000,000 is under construction at Levis, P.Q. to be completed in 1949.

THE EASTERN ARCTIC

Hudson Bay from the Atlantic through Hudson Strait, call at Churchill, go north via Fort Ross to Craig Harbour and back south via the eastern coast of Baffin Island, calling at all posts en route distributing supplies to the Hudson's Bay posts, as well as to independent traders, servicing the R.C.M.P. detachments with both personnel replacements and supplies, and carrying the government officials, doctors and scientists of the Eastern Arctic Patrol.[16]

Another ice-breaker which serves as a dependable means of transportation is the C.G.S. "N.B. McLean" of the Department of Transport. She aids ships in the navigation of the Hudson Bay route. Commencing early in the spring it enters Hudson Strait and sees that all navigation aids, such as buoys, lights, and direction finding stations are working properly. It patrols the route during the season giving aid, instructions and information as to ice conditions to ships sailing the route. The only other large ships in the eastern Arctic during the summer are the grain and cargo vessels travelling the Hudson Bay route to Churchill. During World War II this trade lapsed. Previously these ships would average 10 to 15 in a season.

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16 See Appendix IV Eastern Arctic Patrol.

TRANSPORTATION

THE EASTERN ARCTIC

Many smaller vessels, both sailing schooners and motor or steamer craft run between posts on the Bay and among the islands. Schedules and routes are controlled by ice conditions and weather, especially at the beginning and end of the navigation season. Problems of weather are chiefly those of summer fog and storms in autumn. There has been no need for an elaborate transportation system in the eastern Arctic, and knowledge of these limitations is necessary before planning any travelling in the area.[17]

Winter transportation in the eastern Arctic is almost entirely by dog-team and sled. The Eskimos have used this method of travelling for centuries and white men have adopted it as the logical means of travel. The "highways" are the miles of sea ice sometimes rough, sometimes smooth. This being so, movement in winter is along the coast as it is in summer. This method of winter travel is used by police, missionaries and traders, and anyone else finding it necessary to go from place to place.

All season transportation within the Arctic is possible only by airplanes. There are no railroads within the Arctic. The Hudson Bay Railway operates trains for the Canadian National Railway to Churchill, and the T. & N. O. to Moosonee on James Bay, but both roads terminate south of parallel 60°.

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17 See Chapter I.

THE EASTERN ARCTIC AND CONCLUSION

Flying has been successful in the Eastern Arctic and is probably the best method of making the region more accessible. Lakes are so plentiful that airplanes fitted with pontoons in summer and skis in winter have landing fields at their convenience. There are short periods at freeze-up in autumn and break-up in spring when the planes cannot operate, but several weeks would cover these periods. Fog and overcast, which is common in summer is another obstacle to regular summer flying. The stormiest region is not within the Arctic, but on the margin of and within the temperate zone. The winter is actually the best season for flying in the Arctic, that is, late winter and early spring, when there are sufficient hours of sunlight, clear air, and high ceilings.

CONCLUSION

Transportation is one of the main keys to the development of the Canadian North. There is no doubt that in the vast area north of the provinces, which comprises 41% of Canada's total area, a great wealth of natural resources, minerals, furs, fish, agricultural soils, water power, oil, await development. Development cannot proceed faster than transportation facilities permit. Would it be preferable to wait until development forces an adequate transportation system covering the whole north, i.e. frequent, reasonably

priced, faster services; the construction of roads and railroads especially into Mackenzie District or to push the road and railroad into the territory ahead of development, thus bringing a more rapid and less costly utilization of the natural resources to be developed. This has been done many times in Canada and has paid handsome dividends. For example, the T. & N. O. was pushed north from North Bay into what in those days was considered by most people a wilderness waste. It resulted in the finding of some of the richest and most extensive mining area in Canada - perhaps in North America, with the added result of great wealth, building up the cities to the south, especially Toronto and Montreal.

While the developments around Great Slave Lake may not yet demand that a railway be pushed forward to its shores, it would seem that at the rate of increase and expansion, in mining especially, a railway will be a necessity in the near future.

The all-weather highway to Hay River from Grimshaw, on the Northern Alberta Railways will be completed during the summer of 1948. This will not only be an achievement in construction, it will be of immense value to the whole Mackenzie Valley and the Great Slave Lake area.

TRANSPORTATION

CONCLUSION

A proposed road, an all-weather highway that is very important could commence at Fort Nelson on the Alaska Highway and follow the Liard River to the Mackenzie River at or near Fort Simpson. It might then be extended as required to connect with the mining fields north of Great Slave Lake. Such a highway would serve a number of useful purposes. It would tap the rich and extensive timber resources of Liard Valley, making them more readily available to the Mackenzie Valley which is more scantily timbered. It would make available to the Mackenzie District the future agricultural production of the Liard valley, considered "the most equable of the far-northern valleys". It would also have the effect of increasing the navigation period and so the transportation value of the Mackenzie River by making early and late sailings possible to and from Fort Simpson.

The all-weather highway from Grimshaw to Hay River overcomes the rapids and portages between Waterways and Great Slave Lake but, the highway to Fort Simpson will also overcome the difficulty of coping with unfavourable ice conditions on Great Slave Lake. Again it has a strategic value as a link between the Alaska Highway and the Mackenzie River system of water transportation.

TRANSPORTATION

CONCLUSION

Another project in land transportation that was considered during the early years of the war was a military railroad to connect the Canadian rail system with the rail system of Alaska. This went to the length of having a route surveyed.[18] The survey followed the Rocky Mountain Trench, which provides "easy gradients and a straight alignment with few natural obstructions", from a junction with the Canadian National Railway near Prince George, B.C. into Yukon Territory.

Due to the improvement in the Pacific war situation, the project was not proceeded with. This project, no doubt, will be carried out at a future date. It is very important to the United States, in the development of Alaska and in its defence. It would be important to northern British Columbia and the Yukon by giving access to some of the most promising mineral territory in western Canada. To both Canada and the United States it would be most valuable in its effect in controlling freight costs as against sea route and highway freight rates.

From the economic and social standpoint alone, apart altogether from the strategic and international implications, greatly improved transportation facilities are essential now, especially in Yukon Territory and Mackenzie District.

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18 Canada's New Northwest, p. 11.

CONCLUSION

The area covered in the Thesis comprises all of Canada north of 60° north latitude, a land mass of 1,516,758 square miles, or more than 39% of Canada's total area. It includes the Yukon Territory, Mackenzie, Keewatin and Franklin Districts, together with the tip of Ungava and the islands in Hudson Bay, James Bay and Hudson Straits. It is a vast territory, equal to half the area of the United States, and 12 times the area of the British Isles.

In this extensive mass there are great varieties of climate. Generally the region can be divided into two climatic zones - Arctic and Sub-Arctic. The division is just north of the tree-line.

Since the source area of many weather phenomena of the mid-latitude regions of North America and the North Atlantic is in the Canadian Arctic, the establishing of many weather stations there has been of great assistance in weather forecasting. While the climate is severe and trying at times, it has been proven that it is far from impossible for those who learn how to meet the conditions. It is felt that weather and climate may be a handicap, but not to a degree that would prevent the Canadian north from being developed more fully.

Unfortunately, only a very small part of the area has been thoroughly explored and prospected; however, the mineral wealth already found is known to be great indeed. In the

CONCLUSION

southern Yukon, in the Mackenzie District, gold, oil, copper, lead, zinc, nickel, coal, radium and uranium among many other minerals, are being mined, and search by Government and private sources is being intensified.

The Eastern Arctic has yet to be prospected. Little has been done here, but again the geology of this region whose land mass is largely made up of islands, would lead one to believe that mining will eventually become its chief industry. The climate and soil are not conducive to agriculture, and the eventual value of the fisheries has not yet been established. Fur will continue to be the main industry until mining and fishing come into utilization. Mining would suffer less from climatic and weather difficulties than other industries.

The fur trade over the whole area continues to be of great value to the north and to Canada, and will doubtless become increasingly so. Trapping and hunting still form the main occupation for the native population. They will no doubt continue to gain most of their livelihood from these sources.

The extent to which agriculture in Yukon Territory and Mackenzie District will grow in the future will depend on the development of other resources. The expansion of mining

CONCLUSION

will make it impossible to exploit the areas suitable for agriculture since the high cost of imported foods will make competition of local farm products economically possible and profitable. There is sufficient land with good soil content to satisfy any developments that are likely to occur in the forseeable future. That appears to be true for the forests also. The fisheries cannot only supply domestic requirements, some waters like the Great Slave Lakes also have an exportable surplus. More waters have a surplus over domestic needs, but are not yet close enough to suitable markets, owing largely to lack of transportation facilities.

Transportation is perhaps the main key to the development of the Canadian North. Development cannot proceed faster than transportation facilities permit. To open up this vast area, assistance should be given by the Dominion Government in the building of transportation requirements where surveys and thorough investigation have shown that sufficient wealth in natural resources exist.

In conclusion, it would seem that the Canadian North will not develop in its entirety immediately, but the potential resources are such that a great future is assured.

APPENDIX I

THE REINDEER INDUSTRY

The Northwest Territories Administration has undertaken, with success, a most interesting livestock development, in the establishment of an extensive reindeer herd, and reindeer herding industry, in the territories east of the Mackenzie River Delta.

The reindeer, a European and Asiatic member of the deer family, is closely related to the North American caribou. Both sexes have antlers. The general colour is gray-brown, lighter on the neck and belly. The muzzle is hairy, ears and tail short and the neck maned on the underside.

Reindeer have long been domesticated in northern Europe and Asia, but the North American caribou have apparently never been so utilized. In Lapland and Northern Siberia, the reindeer furnishes skins for tents and clothing, milk and flesh for food, and has great endurance and speed as a draught animal. Wild reindeer are still found from Northern Scandinavia to eastern Siberia[1]. They wander through the tundra and over treeless mountains, periodically migrating from one feeding ground to another. They are browsing animals, scraping away snow to reach lichens which are their chief winter food.

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1 The National Encyclopaedia: P.F. Collier & Son, New York, cf. Reindeer.

THE REINDEER INDUSTRY

Up to the middle years of the 19th century, caribou ranged the northern tundra in vast herds, and provided skins for tents and clothing, and meat for the Eskimo's food. This, along with seals, whales, walrus and fish, formed the principal basis of subsistence of these people living between the Delta and Coppermine River[2].

As seen in Chapter IV, there has been in this century an increasing demand for fur with consequent higher prices. This has led to a more intensive drive for fur and a chain of trading posts was established along the Arctic seacoasts. There followed a gradual change in the habits of the Eskimo.

With the arrival of traders, the introduction of modern firearms and unlimited supplies of ammunition, the result to the game supply of the country soon became disastrous. While the native no longer depends exclusively on game for his food supply, in the early days hunting with arrow and spear involved so much hard work and laborious stalking that only the animals actually needed were killed. When a native, with his high-powered rifle, now happens to come across a large band of caribou he is likely to continue shooting long beyond his actual requirements. There naturally followed

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2 R.A. Gibson, Canada Year Book 1943-44, p. 17, K.P. Ottawa.

destruction of the great herds or a change in the routes of migration to more isolated regions of those herds that escaped decimation.

> "In the days before the locating of traders on the Arctic coast the larger part of the Barren Ground caribou migrated north in the spring and crossed to the Arctic islands before fawning season, and when the straits froze over again in the fall re-crossed to the mainland, where better winter pasture was found near the edge of the timber. The object of this seasonal migration was obviously to avoid predatory animals and insects during the fawning season. Owing to the fact that hunting along the Arctic coast is now more intensive, due to the use of rifles and to changes in method, the wary caribou have entirely changed their migrational routes. Now the northward trek turns to the east before reaching the coast and the herds spend their summers in the interior",[3] far to the east of their old pasture ground.

Caribou are still relatively abundant in the Eastern Arctic regions[4], and their migrations which extend as far south as Northern Manitoba, provide food and skins for the thinly scattered human population in this vast area. But the Eskimo population of the northern Mackenzie area, with the consequent scarcity of Caribou, became dependent on trapping to obtain a medium of exchange to buy food and clothing which, of course, caused their living conditions to vary with fluctuations in the supply of fur-bearing animals and the price of furs. The result was sufficient at times for their needs; at other times there resulted great scarcity and destitution.

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3 A.E. Porslid, Reindeer Grazing in Northwest Canada, The King's Printer, Ottawa, 1929. From the Foreword by O.S. Finnie.

4 Harry J. Hargrave, Arctic Livestock, The Country Guide, March 1948, Winnipeg, Man., p.5.

THE REINDEER INDUSTRY

The Administration had been concerned for some time with the conditions in which the natives found themselves, and with the object of broadening the basis of subsistence for them considered the possibilities of building up the numbers of the larger animals. To this end, in 1919 the Dominion Government appointed a Royal Commission on the reindeer and musk-ox, to study the possibility of establishing industries based on these animals in the Arctic and sub-Arctic regions of the Dominion[5].

A vast amount of information was assembled and studied and, in 1922, the Commission recommended the establishment of experimental herds of reindeer in locations to be selected. Following this report a number of investigations were conducted with the Grenfell Mission reindeer herds, first in the Canadian Labrador and later when transferred to the island of Anticosti[6].

"Somewhat similar conditions to those in the Canadian North prevailed in Alaska" sixty years ago, "and great success has been attained there by the introduction of domesticated reindeer from Siberia"[7]. Late in the 19th Century, because of the white man's slaughter of the walrus and whales, the Eskimos of the North Alaskan coast were threatened with

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5 R.A. Gibson, Op. Cit. p. 18
6 A.E. Porsild, Op. Cit. (Foreword) p. 6.
7 A.E. Porsild, loc. cit.

starvation. To establish a new food supply, the United States government in 1889 imported a small herd of Siberian reindeer, with a party of Laplanders to teach the Alaskans how to give the animals proper care. By 1903, the 550 reindeer imported had increased to 5,000, the Eskimo tribesmen readily learning to care for them. In 1914, there were 62 herds and 47,266 reindeer, and in 1930 the number had increased to 600,000 largely belonging to Eskimos. Thousands of carcasses are sent each year to be sold as reindeer meat in the United States.

With this successful experiment under similar conditions before them, the Canadian Government undertook an extensive investigation to ascertain if areas in northern Canada would be suitable for reindeer pasturage, and in April 1926, Mr. A.E. Porsild, a botanist experienced in Arctic conditions, was appointed to make the survey. Before studying the Canadian range, Mr. Porsild and his brother visited Alaska to study the herds there and the conditions under which the reindeer industry was carried on. They made very complete inspections and studies, and the same winter travelled around the Alaskan Coast from Pastolik on Norton Sound via Wales, Point Hope and Point Barrow to Aklavik, Canada, a distance of 1,600 miles, by dog team.

They then made a thorough survey of the grazing possibilities of the area lying between the Yukon-Alaska Boundary on the west, Coppermine River on the east, Great Bear Lake on the south and the Arctic Ocean on the north.[8] This was completed between 1926 and 1928, and included two winters and three summers in the field, during which time exclusive of railway and steamboat travelling, an aggregate of 15,000 miles was travelled by dog team, canoe, motor boat and snowshoes. Extensive biological and botanical collections were brought out, comprising about 15,000 herbarium specimens of vascular plants, 500 specimens of cryptogams, zoological specimens, and about 1,000 photographs. The report showed that some parts of the region were very suitable for maintaining reindeer. Two separate areas, one between the Alaska-Yukon Boundary and Franklin Bay, the other north of Great Bear Lake, were estimated to be capable of supporting several hundred thousand head. The report called "Reindeer Grazing in Northwest Canada"[9] is a story equal in interest to any novel we have read in years.

With the favourable reports in and studied, decision was made and steps taken to arrange for purchase from, and delivery by an Alaskan reindeer company of 3,000 reindeer, to a selected range in Canada near the mouth of the Mackenzie River, which later became a reindeer reserve.

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8 R.A. Gibson, Op. Cit. p. 18.
9. A.E. Porsild, loc. cit.

Mr. A.E. Porsild was retained to go back to Alaska and select the animals for the overland drive. The herd he collected, some 3,447 in all, consisted of 2,890 does, 307 bucks, and 250 steers[10], the latter being for food and draught purposes. The drive was in charge of Andrew Bahr, veteran Lapp reindeer herder, who was assisted by a number of other Lapps and several Eskimos[11].

The herd was assembled near the head of Kotzebue Sound, northwestern Alaska, where the drive to Canada was commenced in December, 1929. Supplies were drawn on sleds by reindeer and by dog teams. Many difficulties were encountered. Some of the animals returned to their home range. Blizzards, intense cold, wolves, straying, accidents, and other obstacles impeded progress. The losses to the herd were severe, but were recouped to some extent by the fawn crop each year.

"The drive from Alaska to the Mackenzie Delta proved to be an epic in the annals of Northern travel. The route selected was northeasterly across the Brooks Mountains to the Head-waters of Etivluk River, down Etivluk and Colville Rivers to the Arctic coast, and thence eastward to the delta of the Mackenzie"[12].

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10 R.A. Gibson, Op. Cit. p. 18.
11 The Northwest Territories, 1947, p. 22.
12 R.A. Fibson, Op. Cit. p. 19.

During spring, the herd halted for the fawning season and for the summer months they were allowed to rest and leisurely graze so that their strength would be regained for the next winter's trek.

And so the long, difficult journey progressed, the losses of the herd being partially compensated for by the yearly crop of fawns. The reindeer arrived in Canadian territory in the spring of 1933. It was thought that the Mackenzie could be crossed the next winter, but owing to the unsuitable condition of weather and ice the crossing was not accomplished and delivery made until March 1935. "The total number of deer delivered was 2,370 made up of 1,498 does, 611 bucks, and 261 steers". It was estimated that less than 20% was original stock[13]. The epic drive had been successfully completed.

In preparation for the herd's reception, corrals were constructed on the Arctic coast at Kittigazuit, buildings erected for the staff and supplies. Headquarters for the supervision of the reindeer fieldwork is situated about 40 miles inland on the right bank of the east channel of the Mackenzie River, about 75 miles from Aklavik. By 1939, radio equipment was installed andmany other improvements added.

The corrals which are used for the annual roundup are now located on Richard's Island, the principal summer range.

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13 R.A. Gibson, loc. cit.

THE REINDEER INDUSTRY

Here the animals are counted and classified about the end of July. The fawns are marked by nicking the ear, the hide being too thin for branding as in cattle. The breeding stock is selected as to quality and proportional numbers, the surplus animals selected and cut from the main herd for slaughter.

> "During the period of development, 1935-1946, large quantities of reindeer products, chiefly meat and hides, were utilized by the herders and others directly connected with the reindeer industry. Substantial donations of reindeer meat were made to mission hospitals and residential schools which care for the native population. Surplus products were sold to white and native residents of the region"[14]. Some skins were shipped to the Eastern Arctic to fill the lack of caribou hides that are used for the manufacture of winter clothing and bedding.

In 1931, three Lapp herders and their families were brought from Norway to assist in handling the deer on their arrival and to train native Eskimos as herders. The training has proceeded steadily and branch herds have been established under native management. Only Eskimos who have served as apprentice herders are entrusted with herds, and they receive the herds under an arrangement whereby they return to the government an equal number of animals from the increase.

The main reserve comprises about 6,600 square miles including summer and winter ranges. The summer range is in the coastal area including Richards Island and is well supplied with shrubs and grasses. This is an ideal location for the fawning

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14 The Northwest Territories, 1947, p. 23.

season and for summer pasturage, as the Arctic breezes tend to keep the flies and other insect pests under control. The winter range lies inland and is well supplied with reindeer lichens which is the main winter diet of the deer.

The branch herds, at present two in number, have been established from the increase of the main herd, the first near Anderson River, the other near Horton River. Both these herds are under native management. The primary purpose of the reindeer industry in Canada is to help the natives support themselves, hence young Eskimos and Indians are trained in the work with the intention of establishing a number of herds under native management, at suitable locations. The total increase of the reindeer has exceeded 12,000 head and according to the latest reports, the three existing herds now number more than 9,000 head. The difference in number is accounted for by the animals slaughtered and the hides and meat disposed of as previously stated.

Some of the reindeer characteristics are interesting. The feet are large and broad, much like a cow's, and are very useful for pawing snow in the winter to uncover their feed. Reindeer can cope successfully with over a foot of hard, drifted snow, digging up good sized pieces of reindeer moss and eating them on top of the snow.

Reindeer herds, when they are being handled, especially when coralled, or at any time when disturbed, have the peculiar habit of forming a compact body and moving, or milling, in a

circular direction. Some herds travel to the right when milling and others to the left, following the practice of their forbears. The Canadian reindeer herds invariably mill in a counter clockwise direction and this has to be taken into consideration when building corral wings to assist in corralling the animals. In a large herd, especially when confined to a holding corral, some animals may be lying down in the centre of the herd while those on the outer perimeter are travelling at a good clip. These semi-domesticated reindeer are of a nervous disposition and are more so perhaps because they are not frequently corralled and handled.

Reindeer meat could be described as somewhat similar to both beef and mutton. It does not have much of the wild, gamey flavor of venison or antelope, and when properly cooked makes a tasty meat dish that can be relished for long periods without interruption. A well-fleshed carcass carries one or two inches of pure white fat over the entire back and makes steaks or chops of the first order. A fat three-year old reindeer steer, the age they reach maturity, makes the choicest eating.

An average full grown animal stands 42 inches high and measures six to seven feet from nose to tip of tail. "The dressed weight of the deer in the Canadian herds averages about 170 pounds for prime steers and 140 pounds for aged does."[15]

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15 The Northwest Territories, loc. cit.

THE REINDEER INDUSTRY

The hide of the reindeer is an exceedingly useful product in the far North. Fawn skins are prized for making inner parkas worn with the fur next to the human skin. At three to four months of age, reindeer fawns have a thick coat of very fine hair which is as warm as any fur, and has the added advantage of being unusually light of weight. Adult reindeer hides are valued for bedding, being used to make sleeping bags as well as outer parkas. When tanned they make buckskin which is useful for clothing and many other purposes.

Owing to the tendency for reindeer to stray off and fall prey to wolves and other predators, continuous herding on a 24-hour-a-day basis is essential both summer and winter. Actual herding is done entirely on foot over a type of country that is poor footing by any standards. Boats are used to supply herd camps in summer, while dog team or reindeer team is used in winter.

Reindeer herders usually work in teams of two or three, and stay on duty 24 hours at a time. They may have a small tent available for shelter while they boil a pot of tea and have a bite to eat. In the summer the herders are assisted by the continuous daylight, but flies and mosquitos combined with tough walking represent some of the difficulties encountered. In the winter unending darkness and frequent storms tend to make difficult the problem of holding the herd intact.

Constant vigilance is necessary to guard the herd from straying or from wolves. This should be self evident where a large herd of 3,000 animals may spread out over miles of northern tundra.

"The extent to which reindeer herding may be developed in northern Canada depends to a large extent on whether a sufficient number of natives accept the herder's mode of life"[16]. Due to the high prices for fur the young natives turn to trapping as more lucrative and less monotonous and trying. As a result, there is a scarcity of herders. This in turn has retarded progress in the development of a group of native herders capable of managing reindeer herds and is one of the reasons more herds have not been established.

This industry represents a unique phase of livestock management in Canada. Many problems have been encountered in trying to evolve a policy suited to local conditions; in developing and maintaining a field organization to supervise and handle the herds; and in keeping up the necessary equipment and supplies in the remote areas where reindeer are herded.

Reindeer are providing a convenient and dependable source of food and clothing and form a valuable reserve against

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16 The Northwest Territories, loc. cit.

periods of shortage in other necessities. As the natives learn to depend more and more on the herds of reindeer for subsistence they will become independent of fluctuations in the supply of game and price of furs, and thus achieve a more stable economic life than is possible under ordinary conditions which govern their nomadic existence along the Arctic coast of Canada[17].

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17 The Northwest Territories, loc. cit.

APPENDIX II

ARCTIC NIGHT[1]

"The period of so-called Arctic night begins on October 21st when even at noon-day the sun does not rise above the horizon in the due south. After the sun has first disappeared it lights the southern sky quite brightly for several hours each day, but this daily period of twilight rapidly shortens and grows fainter, until by mid-November only a noonday flush indicates south. Even this soon fades away and for almost two months Ellesmere Island is a land of darkness.

"This Arctic night is not so dark nor so disheartening as the imagination of temperate and tropical peoples is wont to picture it. For ten or twelve days of every month the moon circles the sky; the brilliant stars revolve around Polaris almost at the zenith and the light from the moon and stars is reflected from the glittering snow-and-ice fields.

"Then about mid-January the soft rose and gold of the noonday flush re-appears on the southern horizon and waxes longer and brighter each day until at noon on Februay 21st the upper limb of the sun, large and red, gleams soft and brigh above the southern horizon for a few moments. The sun has come back. The long night is over. The next day the whole sun appears and seems to roll along the horizon for a few minutes; the next day it has risen quite above the horizon and covers an arc of several degrees; in the next few days the time and the arc lengthen fast.

"The time of sunshine lengthens each day, and night grows lighter, until on April 21st there is no sunset. The sun merely dips down to the horizon due north at midnight, and begins at once to rise to another circle a little higher than the day before. Day by day the sun rises in the sky until in mid-June the full glory of the Arctic day floods the whole top of the world within the Arctic Circle."

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1 W.E. Ekblaw, The Polar Eskimo; Their Land and Life, Clark University, Worcester, Mass., 1926.

APPENDIX III

CANADIAN PACIFIC AIR LINES

Vancouver - Edmonton - Whitehorse - Fairbanks - Whitehorse

Dawson

Read Down			TABLE 1		Read Up	
Tue. Thurs. Sat.	Daily Exc. Sun.	Daily Exc. Sun.		Daily Exc. Mon.	Daily Exc. Sun.	Tue. Thurs. Sat.
4.30		9.05	Lv. Vancouver..PT Ar.	9.10		10.25
6.45		11.35	Ar. Quesnel.....Lv.			8.20
7.25		1.10	Ar. Prince George Lv.	6.50		7.45
		1.10	Ar. Fort St. John Lv.	5.10		
	11.40		Lv. Edmonton...MT Ar.		8.30	
	1.25		Ar. Grande Prairie Lv.		6.55	
	1.30		Ar. Fort St. John Lv.		4.50	
	2.15		Lv. Fort St. John Ar.		4.10	
	3.40		Ar. Ft. Nelson..PT..Lv.		2.55	
	4.40		Ar. Watson Lake YT..Lv.		f	
	6.30		Ar. Whitehorse.....Lv.		10.55	
	9.30J		Ar. Fairbanks.....AL Lv.		6.10J	
	Tue., Fri.				Tue., Fri.	
	10.00		Lv. Whitehorse.....Ar.		3.10	
	11.20		Ar. Mayo.....Lv.		1.50	
	12.20		Ar. Dawson City YT. Lv.		12.50	

J - Wednesday only.

Connections at: (Fairbanks to all points in Alaska.
(Edmonton to Eastern Canada and United States points.
(Vancouver to United States Pacific Coast Cities.

CANADIAN PACIFIC AIR LINES

EFFECTIVE JUNE 1, 1948

Edmonton - Peace River - McMurray - Yellowknife - Coppermine

Read down		TABLE 4	Read up	
Tues. Fri. only	Daily Exc. Sun.		Daily Exc. Sun.	Mon. Thurs. only
10.00	8.00	Lv. Edmonton.....Ar.	6.50	8.45
11.45		Ar. Grande Prairie.....Lv.		7.10
12.00		Lv. " " .....Ar.		6.55
12.40		Ar. Peace River.....Lv.		6.15
1.10		Lv. " " .....Ar.		5.55
T2.05		Ar. Fort Vermillion.....Lv.		5.00th
T2.20		Lv. Fort Vermillion.....Ar.		4.50th
3.20		Ar. Hay River.....Lv.		3.50
3.35		Lv. Hay River.....Ar.		3.35
	9.40	Ar. McMurray.....Lv.	5.10	
	9.55	Lv. " .....Ar.	4.55	
	11.35	Ar. Fort Smith.....Lv.	3.15	
	11.50	Lv. " " .....Ar.	3.00	
	12.30c	Ar. Resolution.....Lv.	2.25T	
	12.35c	Lv. " .....Ar.	2.20T	
	1.10	Ar. Yellowknife.....Lv.	1.40	2.40
	51-h		52-R	
	9.00	Lv. Yellowknife.....Ar.	4.00	
	10.00	Ar. Fort Rae.....Lv.	3.00	
	11.00f	Ar. Indian Lake.....Lv.	2.00f	
	1.00	Ar. Port Radium.....Lv.	12.00	
	3.00	Ar. Coppermine.....Lv.	10.00	

Edmonton - McMurray - Norman Wells - Aklavik

Read down			TABLE 5	Read up	
Sat. fol'g 1st & 3rd Friday.	1st & 3rd Friday Monthly.			Tue. fol'g 1st & 3rd Friday.	Mon. fol'g 1st & 3rd Friday.
	6.30	Lv.	Edmonton.....MT Ar.	5.55	
	8.10	Ar.	McMurray.....Lv.	4.15	
	8.30	Lv.	McMurray.....Ar.	4.05	
	10.10	Ar.	Fort Smith.....Lv.	2.25	
	11.25	Ar.	Hay River.....Lv.	1.10	
	f12.10	Ar.	Providence.....Lv.	f12.25	
	12.20	Ar.	Fort Simpson.....PT. Lv.	10.15	
	2.35	Ar.	Norman Wells.....Lv.	8.00	
1.00		Lv.	Norman Wells.....Ar.		12.30
f			Good Hope.....		f
f			Arctic Red River.....		f
f			Fort McPherson.....		f
4.30		Ar.	Aklavik.....Lv.		9.00

CANADIAN PACIFIC AIR LINES

ONE-WAY PASSENGER FARES

TABLE 1	Edmonton	Seattle	Prince George	Vancouver	Whitehorse
Dawson City	$120.00	$131.90	.....	$125.00	$45.00
Edmonton	.....	.....	$30.75	.....	75.00
Fairbanks	110.00	130.90	98.50	124.00	35.00
Fort Nelson	40.75	63.90	27.00	57.00	36.50
Fort St. John	25.75	48.90	12.00	42.00	51.50
Grande Prairie	18.75	.....	12.00	.....	58.50
Vancouver	.....	6.90	30.00	.....	89.00
Quesnel	.....	.....	6.50	26.00	70.00
Whitehorse	75.00	95.90	63.50	89.00	.....

TABLES 4,5	Edmonton	McMurray	Norman	Peace River	Simpson
Edmonton	.....	$ 30.00	$161.00	$21.00	$126.00
Fort Smith	$ 66.00	36.00	120.00	.....	85.00
Hay River	66.00	66.00	95.00	45.00	60.00
McMurray	30.00	.....	161.00	.....	126.00
Providence	88.00	88.00	91.00	.....	38.00
Resolution	261.00	70.00	.....	.....	.....
Aklavik	80.00	240.00	.....	.....	.....
Yellowknife	.....	80.00	.....	60.00	.....

APPENDIX IV

EASTERN ARCTIC PATROL[1]

Seven Vessels Employed:

Seven vessels will be used to carry supplies to posts in the Eastern Arctic this summer, the Hon. James A. MacKinnon, Minister of Mines and Resources, announces in a statement giving details of the 1948 Eastern Arctic Patrol.

These ships will visit all settlements, medical centres, R.C.M.P. detachments, trading posts, missions, and weather and radio stations in the Far North. In former years the Patrol was carried on by R.M.S. "Nascopie", which was lost on a reef off Cape Dorset last year.

First vessel to leave for the Northland will be the M.V. "Regina Polaris", owned by the Hudson Bay Vicariate Transport Limited, which will sail from Montreal on July 10 to visit the settlements in the Hudson Bay area and on the south side of Hudson Strait and Ungava Bay.

S.J. Bailey will represent the Northwest Territories Administration as Administrative Officer on the "Regina Polaris", and will conduct inspections at the various settlements, paying particular attention to welfare conditions among the Eskimos.

Aboard the "Regina Polaris" will be Dr. H.W. Lewis, of the Department of National Health and Welfare, who in the capacity of Medical Superintendent for the Eastern Arctic, will give

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1 From - Canadian Weekly Bulletin, Information Division, Dept. of External Affairs, Ottawa, July 16, 1948.

necessary medical treatment to the natives at the various ports of call. Medical inspection trips to Baffin Island posts have been made earlier this year.

The M.V. "Terra Nova" which was chartered by the Hudson Bay Company, will sail in August to the settlements along the eastern and northern coasts of Baffin Island. Alex Stevenson will be the Administrative Officer.

The other vessels carrying Government supplies will be the M.V. "Eskimo", owned by the Hudson Bay Company, which will serve Lake Harbour, Frobisher Bay, and certain other posts in Hudson Strait and Hudson Bay, the M.V. "Clarenville", which will be used by the Hudson Bay Company to help supply the northern Baffin Island trading posts, the M.V. "Earl Trader", also operated by the Hudson Bay Company, sailing from Sydney, N.S. with supplies for Baker Lake, N.W.T., the Baffin Trading Company's N.V. "Ice Hunter", which will visit the Ungava Bay posts, and the Government ice-breaker, "N.B. McLean", carrying supplies from Churchill to Southampton Island.

NORTH MAGNETIC POLE

Aerial Surveys Continued:

Scientists from the Dominion Observatory in Ottawa leaving Ottawa by an R.C.A.F. Canso amphibian, are to continue last year's aerial magnetic surveys aimed at fixing position

of the Magnetic North Pole announces the Hon. James A. MacKinnon, Minister of Mines and Resources.

The joint Mines and Resources-R.C.A.F. expedition hopes to determine with greater exactness the position of the North Magnetic Pole, known to be located in the northwestern part of Prince of Wales Island as a result of last summer's "Operation Polco", when the R.C.A.F flew a similar group north. In addition, it will be gathering sufficient data to enable completion of the first reliable magnetic charts of Canada's Arctic regions.

Accompanying the party, which will spend about two months in the Arctic islands, will be two scientists appointed by the Geographical Bureau, Department of Mines and Resources.

(continued on page 172.)

EASTERN ARCTIC PATROL

In charge of the magnetic work will be Paul H. Serson of Ottawa. A veteran of three successful trips to the Arctic, including last year's survey, Mr. Serson will use instruments of his own design which received initial tests last summer on "Operation Polco". He will be assisted by Ralph D. Hutchison of Toronto, a senior student at the University of Toronto, who saw five years' service as a lieutenant in the Royal Canadian Navy during the Second World War.

Scientists being sent north by the Geographical Bureau are John Carroll, an engineer on the staff of the Topographical Survey of Mines and Resources and J.L. Jenness, of the Geographical Bureau staff. Mr. Carroll who will assist the magnetic party by determining precise latitude and longitude of each site visited, will also aid Mr. Jenness in making a geographical reconnaissance of the sourrounding area. The pair will study landforms, vegetation, wildlife, tides, currents, ice conditions, and other aspects of the physical geography of the area, and will record locations of archaeological sites and other evidence of former native occupation. Tney will also take air and land photographs to supplement their own observations. Mr. Jenness is the eldest son of Dr. Diamond Jenness, whose membership in the Canadian Arctic Expedition of 30 years ago, led by Dr. Vilhjalmur Stefansson, is recorded in the name of an island near Borden Island, which may be visited again this summer.

EASTERN ARCTIC PATROL

Among the islands on which sites for magnetic observations have been selected are Victoria, Banks, Melville, Bathurst, Prince Patrick, Borden, and Ellef Ringnes. They lie within an area bounded by the parallels of 70 and 80 degrees, north latitude, and the meridians of 100 and 125 degrees west longitude. The region is one of the least known parts of the Canadian Arctic, and has not been studied by scientists since Dr. Stefansson went there.

The expedition, like the predecessor last summer, will call for skillful flying on the part of the R.C.A.F. crew. Each landing site will have to be reconnoitered carefully before putting the Canso down on the water. Even where ice-free stretches of water are encountered, the crew must be alert against the danger of wind changes forcing ice packs shoreward, trapping the flying boat. The trip will mark the "farthest north" reached by the flying boat, as far as sustained operations are concerned.

RECORD AIR PHOTO SURVEY:

R.C.A.F. photo survey aircraft, having taken advantage of good weather conditions, have broken all records for aerial photographic coverage of Canada. With the expected photographic season somewhat more than half over, planes of the R.C.A.F.'s two photo survey squadrons have rolled up an impressive total of more than 456,000 square miles.

EASTERN ARCTIC PATROL

Total coverage for 1947 was slightly over 400,000, the largest single season's operation since the R.C.A.F. began the job of covering the Dominion by aerial photography in 1921. In that year 281 square miles was done by Air Force photo planes.

Officers of 22 Photo Wing, which controls the operations, are cautious about making predictions of total coverage by the end of the season, pointing out that weather conditions, extremely capricious in the Far North, play a big part in the work. In some northern areas only a week or two of suitable photographic weather is normally encountered. They expect, however, that well over 500,000 square miles will have been done by the end of the summer, and that 600,000 is a possibility.

Although operations are taking place in many parts of Canada this year, greatest individual coverage by areas has taken place in Labrador, the western portion of Northern Quebec, and Baffin Island. Nearly all of Labrador has been photographed this year, a total of 118,000 square miles having so far been done. About two-fifths of Baffin Island, amounting to 107,000 square miles, has been done.

APPENDIX V

MAPPING THE NORTHLAND [1]

The Canadian Government on April 11, 1947, said that owing to the rapid surge of civilian postwar development in the Northwest Territories and Yukon there has resulted an unprecedented demand for good maps of these areas and necessitated speeding up the Dominion's mapping programme.

The enormous task of mapping Canadian territory, at present rests largely with the two government departments: the National Defence Department's Army Survey Establishment and the Topographical Survey of the Department of Mines and Resources. These and other departments co-operate in surveys for their mutual benefit while all the printing is done by the Army. The Dominion Lands Survey and the Hydrographic Map Service assist with information in connection with legal surveys and coastal charts.

This year the Air Force will photograph 700,000 square miles of unmapped Canadian territory. These photographs or films are processed by the R.C.A.F. before the surveyors go into the field. While the bulk of Canadian territory has been covered by aeronautical charts, and used for flying purposes, only about 5% of the country has been covered with one inch to the mile scale maps and 30% by four miles to the inch. This has been the work of about 40 years, and will give some idea of the immensity of the job to be done. For the making of a map is a long difficult process and although air photography and modern equipment have provided a few short cuts, there is no easy way.

Twelve flights of 30 photos each are necessary to cover one inch to the mile sheet. But photographs of the country are not maps. To locate the correct position of the photo on the earth's surface, interpret the detail, show the relief, insert details such as power and telephone lines, classify roads (in settled sections of country) etc., etc., is a laborious process and the area that took only a few hours to photograph may take four or five experienced men more than a year to produce a finished map sheet.

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1 From - The C.I.S. Weekly of April 11th, 1947, page 243.

MAPPING THE NORTHLAND

Air photos must be tied into known or fixed points on the earth's surface, therefore field work is an essential of all map making. Sometimes these points are established by astronomic observations, but only where triangulation points, established across the country by the Geodetic Survey, do not exist. Triangulation points are generally marked by copper bolts in concrete monuments, of which the exact latitude and longitude is obtained. All surveys are begun from these points.

Having completed the topography on the photos, it is necessary to compile the information on each photo into one plan. This is a lengthy process involving skilled craftsmanship and the use of several complicated precision optical instruments. Finally a compilation showing map detail in various colours is produced. This compilation is photographed and the draftsman is supplied with a blue impression on a paper mounted zinc plate, one plate for each colour to be printed.

After the drafting is completed, the plates are photographed and advanced prints made. These are carefully examined and corrections made before the final map sheet is printed. The printing may take place anywhere from a year to 18 months after the first air photos were taken.

APPENDIX VI

CLIMATE AND WEATHER[1]

The torrid averages warmest of the zones, but the earth's greatest heat is not found there. The Antarctic averages coldest, but does not contain the coldest spot. The north temperate zone holds the records both for extreme heat and extreme cold.

The hottest known place on earth, with a recorded 136° in the shade, is Azizia, Tripolitania (in Libya, N. Africa) more than 600 miles north of the northern edge of the torrid zone. In the new world the hottest place is Death Valley, Calif., about 900 miles north of the Tropic of Cancer with a recorded 134° in shade. The coldest known spot is Oimekon, Siberia, more than 200 miles south of the Arctic circle. Both hottest and coldest places are on low ground. Coasts do not run to extremes like interiors. Point Barrow (Alaska) e.g. goes from - 56° to 76°; range of 132°. The range on Arctic Islands other than continental Greenland is on their coasts similar to that of Point Barrow; but the range is greater in their interiors, if they are large. On the pack ice the range is least of all. At the North Pole the range probably runs from about 55° to 45°, a spread of about 100°.

In Northern Polar Zone there are great intensities of heat and cold though it does not quite reach extremes. Fort Yukon (Alaska) a few miles north of the Arctic Circle, 100° in shade. Coldest Oimekon (Siberia) 200 miles south of the Arctic Circle - 94°. The range at Fort Yukon in American Arctic from 100° to 71° or 171°. Fort Good Hope (Mackenzie District) on the Mackenzie River, about 25 miles south of the Arctic Circle would probably be the approximate American Arctic Range; its minimum in 1944 was given as lower than any known Alaskan or Canadian Arctic spot, 79°. The gap from that figure to Fort Yukon's 100° F. is 179° - probable American Arctic range.

The temperature range of the North temperate zone is about 225°. (The U.S. comes in with a range of around 200° from Riverside Wyoming, 66°, to Death Valley, Calif., 134°.

Snag, Y.T. - 81.4° - February, 1947.

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1 From - Arctic Manual, p. 38.

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