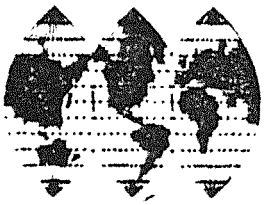
YUKON AGRICULTURE: A POLICY PROPOSAL

by

R.W. Peake and P.H. Walker

Prepared for

THE GOVERNMENT OF THE YUKON TERRITORY



R.W. Peake and Associates Ltd.
Lethbridge, Alberta February 1975

TABLE OF CONTENTS

TABLES

FIGURES

INTRODUCTION

This is a report of a comprehensive study of past and present agriculture in the Yukon leading to the design of an agricultural policy to provide for controlled agricultural development.

The Yukon Territory has a land area in excess of 205,000 square miles, most of which has no potential for agricultural development. Attempts to produce crops and keep livestock preceded the gold rush of the 1890's and glowing reports of home-grown vegetables accompanied the regular annual statements of government surveyors. Most agricultural activity has been confined to pockets of favorable soil and climate along river valleys. Due to the high risk of failure, government support for agriculture has been withheld but land has been made available for those who could provide a reasonable plan of operation and appeared to have some knowledge of farming.

The need for an agricultural policy for the Yukon has become increasingly apparent in recent years. More and more applications for plots of desirable land ranging in size from one acre to several thousands of acres have been made to the Federal Department of Indian Affairs and Northern Development and to the Government of the Yukon Territory. The stated purposes for which the applications are made range from keeping a few chickens to raising large numbers of cattle, growing the crops required to feed them, and having enough native pasture on which to graze them.

Not all of the applications for land are from people who have previous agricultural experience and in fact it is apparent, in some cases, land obtained for agriculture is intended for a non-agricultural purpose and is converted to some other use at the first opportunity.

There is a need for a policy to provide for bonafide agriculture with recognition of the public interest and with responsibility to protect the land from misuse.

PREFACE AND ACKNOWLEDGEMENTS

This report was made at the request of the Government of the Yukon Territory. The suggestions and conclusions contained herein are based on studies of previously published reports, on interviews and discussions with persons and groups with knowledge of, or concern with, agricultural activities in the Territory, and on extensive investigations made on the ground during 1974.

The study was prompted by recommendations made to Commissioner James Smith and the Territorial Government by Dr. A.A. Guitard, Director, Canada Research Station, Swift Current and formerly Beaverlodge, concerning the need for an agricultural policy in the Yukon. Dr. Guitard's continued interest in Yukon agriculture, and his helpful suggestions made during this study, are appreciated.

This study could not have been completed without the assistance and input of a great many individuals.

We wish to express our appreciation to the agricultural public of the Yukon who willingly provided information and experiences, and permitted observation visits on their properties.

Contribution to this study was made by governmental officials, University personnel, and individuals from various parts of Canada and in particular, Ottawa, Edmonton, Victoria, Beaverlodge, and Whitehorse, most of whom are cited in the list of interviews.

Willing assistance was also provided by officials of the State of Alaska and the University of Alaska.

The Director of the Department of Local Government, Mr. W.A. Bilawich, and members of his staff were most cordial and helpful throughout the project.

R.W. Peake, P.Ag.
Lethbridge, Alberta

SUMMARY OF PROPOSALS

The potential for agricultural production in the Yukon is limited by a severe climate with a short growing season, inadequate rainfall and low soil fertility. Grazing leases are in poor condition and further depleted by competition between horses and wildlife. Cattle production is limited by long winters, high feed costs and lack of markets.

Justification for support of agriculture comes from Canada's need to extend production into sub-marginal areas to meet the World's growing demands for food; from the contribution agriculture can bring to the well-being of Northern citizens; and from the fact subsistance agriculture has thrived in the Yukon for seventy-five years.

It is proposed that agriculture warrants further development and that it be made the responsibility of an Agriculture Development Council. The Council will sell the *agricultural rights* of land, approved for agricultural use, to qualified applicants. Lands surplus to the immediate needs of the Council will be developed for community pasture.

It is further proposed that the Federal Government be requested to re-establish an agricultural research program to deal with crops and livestock under Yukon conditions, and to make available the facilities of Farm Credit Corporation, Department of Regional Economic Expansion, and Canada Land Inventory, in the Yukon. Additional recommendations include the establishment of an agricultural advisory service and a subsidized veterinary service.

Grazing leases should be extended to twenty years and improvement of leases encouraged; leases should be fenced and all grazing land supervised; commercial haying rights should be issued.

It is proposed that the procedures of the Federal and Territorial Lands Offices be co-ordinated and there be a single identification system for lands. Responsibility for documenting and finalizing leases should be localized. There should be a central record of land titles and lease agreements in the Yukon.

TERMS OF REFERENCE AND METHOD OF STUDY

The object of this study was to review data and papers relevant to the formation of an agricultural policy for the Yukon Territory. The terms of reference were set forth by the Government of the Yukon Territory in a service contract signed February 5, 1974. The terms of reference and method of study are summarized as follows:

Review papers and data relevant to the formation of an agricultural policy.

Discuss the more important aspects of the project with those knowledgeable of, familiar with, or with experience in the Yukon, including governmental officials and individuals from various parts of Canada.

Discuss relationship of farming and ranching with Yukon officials concerned with wildlife, tourism, social and other related services.

Review the economic aspects of farming and ranching as related to size and security of tenure of land, farm credit, availability of equipment and facilities for production and marketing, land clearing, abundance and suitability of grazing leases.

Conduct field observations on crop and livestock production throughout the growing season.

Assemble a review meeting to assess and co-ordinate the formulating agricultural policy with related services.

Identify areas suitable for agriculture land use and present an agricultural policy for the Yukon.

The method of study closely followed the terms of reference. A list of relevant papers, data and reports reviewed is appended.

Discussions and interviews with officials, groups, and individuals were recorded, and a representative list of persons interviewed is appended.

Field observations and visits to agricultural operations in the Yukon were started in April and continued until November 15th. Visits were made with and without the knowledge of the operator and some visits were repeated.

Representative soil samples were taken from a number of areas and submitted to the Alberta Soil and Feed Testing Laboratory, Edmonton, for determination of suitability of the soil for crop production and for recommendations of fertility adjustments. A summary of analyses and recommendations is appended.

Areas too difficult to reach by ground travel were given a cursory inspection by helicopter or small aircraft.

Public meetings were held in Mayo, Dawson City, Haines Junction, Tagish, and in conjunction with the Yukon Livestock and Agricultural Association, at Whitehorse. Total attendance at these meetings was estimated at 220 people.

An agricultural questionnaire was made available to all interested parties.

PHYSIOGRAPHY

The Yukon Territory lies in the extreme northwest corner of continental Canada. It extends some 775 miles north from the border with British Columbia at latitude 60°N to the Arctic Ocean at latitude 69° 40'N and includes the offshore island of Herschel. Longitude 141°W separates it on the west from the State of Alaska. On the eastern side the Mackenzie Mountains and the Richardson Mountains form the boundary between the Yukon and the Northwest Territories.

The total area of the Yukon Territory is 207,076 square miles, of which 1,730 square miles are inland waters. These figures compare with a grand total for Canada of 3,851,809 square miles and 291,571 square miles of fresh water.

Topography

The main physiographic features of the Yukon Territory are its rolling, wooded hills; its high mountain ranges that reach many thousands of feet above the tree line; its fast-flowing streams; its broad valleys; its clear, cool lakes; and, in the extreme north, the open tundra that slopes toward the Arctic Ocean. Elevations range from nearly twenty thousand feet in the southwest to sea level in the extreme north.

The formidable, snow-clad St. Elias Mountain Range occupies the extreme southwest corner of the Territory. This range contains the highest mountain peaks in Canada, including that of Mount Logan, which rises to 19,850 feet above sea level and is second in height only to Mount McKinley, the highest peak in North America. The St. Elias Mountains with their icy slopes form a massive barrier between the Yukon and the Pacific Ocean to the southwest.

Between the St. Elias Mountains and the Mackenzie Mountains lies the drainage basin of the upper reaches of the Yukon, the fourth largest river in North America. This great river, which rises near the border of British Columbia, stretches almost two thousand miles through the Yukon Territory and Alaska to the Bering Sea.

A large network of rivers, including the Yukon, Teslin, Pelly, Stewart, and many others, form the basin of the Yukon, which occupies most of the southern part of the Territory. The Alsek River in the southwest corner drains a comparatively small area south through the gap in the Coast Mountains to the Gulf of Alaska. In the southeast the Liard River and its tributaries lead away waters south into British Columbia then north into the Northwest Territories to the Mackenzie River system.

From the eastern side of the Territory north of the Ogilvie Mountain Range the Peel River and its tributaries drain in a northerly direction to the Mackenzie River and thus to the Arctic Ocean. In the constricted northwestern part, south of the British Mountains, the Porcupine River leads waters past the Alaska border to the Yukon River and so to the Bering Sea.

Two wide valleys lying end-to-end astride the Alaska Highway between Whitehorse and Haines Junction form a vast lacustrine plain about 80 miles long and from 2,000 to 2,500 feet in elevation. These valleys are formed by the Dezadeash River, which flows west to the Alsek River, and the Takhini, which flows east to the Yukon. Because of its apparent agricultural potential the Dezadeash-Takhini area was subjected to a preliminary soil survey in 1957-58, the results of which were published in 1962.

Climate

The climate of the Yukon is characterized by great variations in temperature that result from the ebb and flow of relatively mild air from the Pacific Ocean in the south and the masses of cold air from the Arctic.

Temperatures generally are frigid in the winter months but pleasantly mild, and at times hot, in the summer. The lowest temperature ever recorded in Canada, -81°F, was registered at Snag, in south central Yukon near the Alaska border, in February, 1947. At the other end of the scale, maximum temperatures of 90°F and over have been recorded at several places in the Yukon on a number of occasions. *(Table 1)*

Average temperatures are higher, and the growing seasons are longer, in the west central part of the Territory than in the south, but in winter average temperatures are higher in the south. Longer hours of daylight and higher temperatures result in a longer growing season at Dawson and Mayo than at Mile 1019, where the frost-free season also is shorter. Killing frosts, although rare in July, can occur in any month anywhere in the Yukon.

For successful crop production in such northern areas as the Yukon four climatic requirements must be met. These are: a period of 80 days free of a killing frost, a vegetative period of 110 days, an accumulation of 1,000 growing degree days, and adequate precipitation during the growing season. (Harris et al)

A killing frost normally is considered to be a temperature of 28°F, or less, measured on a thermometer in a screened cage set four feet above the ground.

The vegetative period, or growing season, is the period during which the mean daily temperature is above 42°F. This is the temperature below which most cool-season crops will not grow.

Accumulated degree days are related to the vegetative period. They represent the seasonal total of heat units above a predetermined mean daily temperature, which in the north is 42°F. The number of degrees above the mean temperature on any one day represents the number of degree days for that day. Adding these daily totals produces the accumulated degree days for the season.

The amount of precipitation received during a growing season should be sufficient to maintain soil moisture at optimum levels for plant growth. In the Yukon this desirable situation does not exist, although there is generally enough moisture in the soil to maintain growth at a low level. About half of the precipitation in the Territory falls during the summer months. but this totals only six or seven inches, an amount insufficient for optimum growth of agricultural crops. *(Tables 2 and 3)*

Soils

A general description of the soils of the Yukon Territory was given in 1947 by Leahey. He indicated that the development of the many different soils that occur in the Territory has been influenced by various factors, the main ones being climate, parent materials, and relief. Vegetation, a fourth factor that influences the type of soil, is an effect of climate.

Because the climate is cool and semi-arid the soils of the Yukon are neither strongly weathered nor deeply leached. Where mean annual temperatures are so low that the subsurface remains permanently frozen (permafrost) the development of soils has been restricted. On soils where permafrost is not present grass may grow under the trees as well as in the open and any growth of moss will be thin, but where permafrost is close to the surface any grass growth will be thin and moss cover, if present, often will be thick.

R.J.E. Brown points out that permafrost is detrimental to all plant growth because the temperature of permafrost is 32°F which is 10° lower than the minimum for growth. Generally, permafrost soils are too cold for plant growth at six to eighteen inches below the surface, although the depth of thaw may be several feet.

The rocks from which the soils of the Yukon Plateau have been formed originated from many sources and because of their hardness the rocks have weathered slowly. Thus, the soils they have formed are shallow.

Leahey points out that except for a large area in the northwest, most of the Yukon was glaciated. In the glaciated part the sedimentary till is coarse, but the alluvial and lacustrine deposits derived from the till are finer in texture.

According to Leahey the important deposits from an agricultural standpoint are the lacustrine and finer-textured alluvial deposits in the glaciated part, and the finer-textured deposits, particularly those of recent origin, and the deeper colluvial deposits in the unglaciated parts of the Yukon.

The chemical composition of the soils in the Yukon varies according to the nature of parent material and type of vegetative cover. Soils of the same texture are more uniform in composition where they have been glaciated than where they have not been glaciated. The glaciated soils have a high content of calcium carbonate and usually are highly basic, whereas the unglaciated soils usually vary more in these respects. Leahey found that the average nitrogen content of the mineral soils in the Yukon was rather low, but that of soils developed under a grass vegetation was comparable with that of the chestnut soils of the Northern Great Plains of North America. This would indicate that additional nitrogen would need to be supplied to the soils if optimum yields were to be obtained. Also, because the climate of the Yukon is semi-arid, it would further indicate that supplementary water in the form of irrigation would be required if the plants were to make full use of the added nitrogen and other nutrients.

The rugged topography, the variability of the climate, and the newness of the soils of the Yukon would require that agriculture, provided that other conditions permitted, would need to be confined to the river plateaux, chiefly those of the Yukon River system and the Dezadeash, and other tributaries of the Alsek River.

A reconnaissance soil survey made by Day of 441,050 acres of the Takhini-Dezadeash valleys in 1957-58 showed that some of the soils in that area are potentially suitable for agriculture. But to this must be added the proviso that climatic, economic, hydrologic, and other important conditions also must be favorable.

Much of the soil in the Takhini-Dezadeash valleys that has agricultural potential is low in organic matter and in nutrients, particularly nitrogen and phosphorus.

Of the numerous soil series in the Takhini-Dezadeash valleys Day suggests that the Croucher soils and those of the Yukon series might be the first, in the area he surveyed, to be

developed for agricultural production. These soils are to be found on either side of the Yukon River between Whitehorse and Lake Laberge. They are irrigable and there is a copious water supply available.

Of the 441,050 acres surveyed by Day about 296,000 acres are listed as being level or irregularly gently sloping, and therefore topographically suitable for agriculture but other considerations greatly reduce this figure.

HISTORY OF AGRICULTURE IN THE YUKON

Although the Yukon has never been seriously regarded as a place where agriculture may be practised there have been times when farming has played a small but important part in the life of its people.

The original inhabitants of the territory sustained themselves by hunting and fishing. They supplemented their diet of meat and fish with fruit and other parts of the plants that grew about them. Such a way of life necessitated much travelling and was not conducive to agricultural pursuits.

The eventual production of crops by man in the Yukon may be said to have had its beginnings in the middle of the nineteenth century with the incursion of traders of the Hudson's Bay Company who came in search of furs.

One of the first trading posts of the Hudson's Bay Company to be established in the upper Yukon was built in 1847 by Alan Hunter Murray. This post, which was to become known as Fort Yukon, was situated at the confluence of the Yukon and Porcupine rivers some one hundred and twenty miles west of the Alaska-Yukon border. Murray knew that he was trespassing on what was then Russian Territory and for a while he lived in apprehension of an attack by the Russians. An attack did not materialize, however, and he and other employees of the Company continued to trade for furs with the native trappers.

In 1848, one year after the establishment of Fort Yukon, another Hudson's Bay Company trading post came into being. This post, named Fort Selkirk by its builder Robert Campbell, was set on an island in the Pelly River not far from where that stream joined the Lewes* to form the Yukon. The island site had to be abandoned in 1852 because of erosion by the swiftly flowing river. That same year the post was rebuilt by John Stewart, Campbell's assistant, in a meadow on the mainland adjoining the river. In the meantime Campbell was on his way back from a trip downriver to Fort Yukon to obtain supplies. Among the items he brought back was a cow that was to supply him and his companions with fresh milk. This initial venture into animal husbandry was to be short-lived. Barely one month after the cow had arrived the post was besieged by unfriendly Chilkat Indians. Campbell and his staff were obliged to abandon Fort Selkirk. It is not recorded what happened to the cow.

*Until 1952 the upper part of the Yukon River from its confluence with the Pelly was known as the Lewes.

Meanwhile, potatoes and other vegetables were being grown successfully at Fort Yukon. In addition, barley is reported to have matured there. The production of these crops is the more remarkable when one realizes that Fort Yukon lies on the Arctic Circle.

The trading post at Fort Yukon remained in operation for nearly twenty years, during which time the Hudson's Bay Company employees continued to enjoy the benefits of home-grown vegetables and cow's milk.

In 1867 an event took place that was to lead to the withdrawal of the trading post at Fort Yukon. In that year the Territory of Alaska was purchased from Russia by the United States. When the new owners of Alaska checked the location of the boundary line two years later their survey confirmed that Fort Yukon was indeed a long way inside their territory. The Hudson's Bay Company was obliged to relinquish its trading post and to set up another one higher up the Porcupine River in what it believed to be its own territory. The new post was named Rampart House. For a while the Company carried on trade there but subsequently this site was found to be on foreign soil and the post was moved a second time to a place now known as New Rampart House just inside the boundary of the Yukon Territory at a point about thirty miles downstream from the Indian settlement of Old Crow. It was near this location that Daniel Cadzow established his 360 acre farm in 1915.

Not until the coming of the gold seekers to the Yukon in 1873 was there much agricultural activity in the Yukon. By 1875 there were over one thousand prospectors in the upper Liard basin. Within three years other prospectors had begun to enter the Yukon from the Pacific coast over the Chilcoot Pass and were finding gold along the Lewes and Stewart rivers. With this activity came the demand for food supplies, a demand that was met by the opening of more trading posts and by the growing of garden crops.

As the numbers of men increased, mining camps began to spring up. Among the earliest of these was the one at Forty Mile Creek, so named because it was about that distance downstream from the old trading post of Fort Reliance, which in turn was six miles downstream from the river flats on which the city of Dawson was to be built.

The increase in population brought with it the need not only for food supplies but also for transportation facilities. This meant that forage would be needed for the horses that pulled the wagons and sleighs as well as for the cattle that supplied milk and meat for the people.

The greatest agricultural activity that has ever taken place in the Yukon came upon the heels of the gold rush that was initiated by the discovery of gold in Bonanza Creek in 1896.

Within two or three years, over thirty thousand fortune hunters had flocked to the Yukon. During this time several thousands of acres of land were cleared and seeded to agricultural crops. Much of this land was in the vicinity of Swede Creek, which flows into the west side of the Yukon River about five miles upstream from Dawson City. During the boom years around the turn of the century vast quantities of vegetables and forage were raised on farms in the area.

But even before the nineteenth century was over the feverish rush for gold had slowed to a walk. The unsuccessful prospectors were leaving the Klondike. The population dropped rapidly. In the decade between 1901 and 1911 the number of inhabitants in the Yukon Territory fell from 27,219 to 8,512. During this time the demand for and the production of farm produce dropped considerably. Most of the larger farms were abandoned and the production of vegetables became confined mainly to the gardens of the hardy individuals who had elected to remain in the Yukon.

Governmental interest in agriculture in the Yukon was slow in coming. The potential of the Yukon basin for agriculture had been estimated in 1887 by George M. Dawson of the Geological Survey of Canada. He had reported that,

> *". . . chiefly within the drainage of the Yukon River, and for the most part north of the 60th parallel, there exists an area of 60,000 square miles of which a large proportion could be used for the production of crops."*

This statement apparently did not arouse official interest in agriculture in the Territory for many years.

It was not until 1915 that the Dominion Department of Agriculture began to conduct co-operative experiments with interested individuals in the growing of crops in the Yukon. Two years later the Department established an experimental sub-station at Swede Creek, where commercial crop production had flourished many years previously.

The results of the experiments conducted at the Swede Creek sub-station confirmed that a variety of crops can be grown successfully at Latitude 64 degrees north and that yields and quality of the produce compare favorably with those obtained in other parts of Canada a thousand miles to the south.

In 1901 the United States Department of Agriculture had established an agricultural experiment station at Rampart*, lower down the Yukon and some 320 miles west and 100

* Not to be confused with the Hudson's Bay Company post on the Porcupine River.

miles north of Swede Creek. The published reports of that station show that a number of agricultural crops were grown there with varying degrees of success. Among these crops were alfalfa, vetch, oats, potatoes, garden peas, broad beans, turnips, rutabagas, and winter radish. It is probable that the findings of the Rampart station had some influence on the decision of the Canadian government to establish the sub-station on the farm of Mr. J.R. Farr at Swede Creek.

Numerous experiments were carried out at the Swede Creek sub-station. A three-year rotation was established consisting of a hoed crop, grain seeded with clover, then hay for the third year. One object of this rotation was to improve the condition of the soil. It was found that, because of the early frosts in the area, green crops ploughed under in one year do not begin to rot and thus improve the soil until the succeeding year.

Some remarkably high yields were obtained from the test plots at Swede Creek, the equivalent production of wheat in bushels per acre being as high as 60; oats, 134; barley, 66; and peas, 60. Forage crops also were grown with various degrees of success. These included timothy, oats, peas, rye, buckwheat, corn, and sunflowers, alone and in mixtures. Except for the buckwheat, the growth of all these forage crops was reported to be excellent, but in the winter of 1922-23 winterkilling was so severe that perennial forages had to be reseeded.

The Swede Creek sub-station continued to function until the end of the 1925 crop season. There was to be a lapse of twenty years before the Federal Department of Agriculture would resume experimental work in the Yukon.

Success in crop production in the Yukon was not confined to experimental plots. In 1924, wheat seeded on April 27th on a farm near Dawson City was harvested on July 26th, thus maturing within three months. Hay crops were grown at several places in the Yukon at this time, the main varieties being timothy, western rye (slender wheatgrass), and brome. Of these grasses brome proved to be the most dependable and, therefore, was the most widely grown.

During the nineteen-twenties extensive farming operations were being conducted at Pelly farm on the Pelly River near its mouth. It was near here that Fort Selkirk had been established. Grain was grown at Pelly farm and considerable numbers of animals were kept. Elsewhere, hay was being raised in the valley of the Indian River, about twenty miles upstream from Dawson City. One large hay ranch in the valley produced 100 to 150 tons of hay annually.

Vegetables probably were the most successful crops to be grown in the Dawson area in the nineteen-twenties. Among those grown and sold were peas, beans, radishes, green onions, carrots, beets, turnips, parsnips, cauliflower, cabbage, and celery. Tomatoes, cucumbers, and citrons also were grown successfully but had to be raised under glass. It was reported that a large number of pigs and chickens were being raised and that some farmers were raising cattle for beef. Some sheep also were kept.

Another area of central Yukon where vegetables and hay were produced fairly extensively in the nineteen-twenties centered on Mayo. A memorandum sent in 1928 by the mining recorder of the Mayo District to G.A. Jeckell, Acting Gold Commissioner at Dawson, stated that,

> *"Farming and gardening is being carried on quite extensively in and around Mayo by homesteaders and others who have acquired a small acreage. The soil is of a reddish clay and is well adapted for growing potatoes and other vegetables of a very fine quality. With the additional acreage under cultivation last year, the potato and root crop was almost sufficient to supply the local consumption.*
> *Among the homesteaders, Mr. Grant Huffman is probably the most successful farmer. He had over thirty acres under cultivation last year besides summerfallowing some twenty-five acres. Last year as an experiment Mr. Huffman sowed one acre of sweet clover from which he obtained wonderful results, also one acre of Garnet wheat which was well matured before the early frost set in. Most of his crop consisted of the following:-*

Parsnips	*1 ton*
Beets	*1 ton*
Carrots	*1 ton*
Cabbage	*3 tons*
Potatoes	*20 tons*
Rutabagas	*15 tons*
Oat hay	*20 tons*

> *Others worthy of mention were good enough to furnish the following information:-*

	Tons Vegetables	*Tons Oat Hay*
Joe Garon	*8*	*5*
Joe Lelievre	*7*	*4*
Joe Longtin	*6*	*7*
C. Turgeon	*10*	*8*
Snell and Curdhward	*10*	*12*
F. Carscallen	*5*	*Nil*
A. Nicol	*4*	*Nil*
Close Bros.	*20*	*25*
J. Cantin	*4*	*30*

> *Others too numerous to mention about 20 tons vegetables*
> *Good fur catch"*

The final remark on the foregoing report would indicate that the winter occupation of some of these Mayo district farmers was trapping. Others undoubtedly were engaged in mining.

Agricultural activity in the Yukon in the nineteen-twenties was not confined to the Dawson-Mayo areas, however. At Carcross, near the border with British Columbia, crops and cattle were being raised to supply local needs. The Residential School at Carcross was actively engaged in farming.

After the exodus of the gold seekers the population of the Yukon, which had dropped so rapidly, remained at a low level between the two world wars. Aside from other determining factors there was scant need for extensive agricultural operations to feed the four thousand people who occupied the vast territory of over two hundred thousand square miles.

The building of the Alaska Highway in 1942 brought about a tremendous increase in the population of southern Yukon. This temporary increase, consisting largely of personnel of the United States Army, had little effect on the raising of produce in the Yukon for the military had their own sources of supply.

One side-effect of the highway construction was a brief period of activity in which hogs were raised by a local farmer for sale in the immediate area. This was made possible by the availability of large quantities of swill from army camps.

After the Alaska Highway was completed in 1943 the Canadian government once more became interested in the possibilities of agriculture in the Territory. An exploratory soil survey was made of the lands immediately adjacent to the Alaska Highway and parts of the Yukon River system as far down as Dawson. On the basis of this survey E.S. Archibald, the Director of the Experimental Farms Service at the time, estimated that there were a half million acres of arable land, or about 800 square miles, in the Yukon Territory. This area contrasts with the 60,000 square miles that G.M. Dawson estimated in 1887.

In 1944 an area of 800 acres of virgin land in the vicinity of Pine Creek at Mile 1019 of the Alaska Highway was selected as the site for an experimental farm. Some land was broken in 1945 and first seedings made in 1946.

From the standpoints of climate and geography the location of the Experimental Farm, Mile 1019, would appear to be an undesirable one for agriculture. Lying within fifty miles of the vast icefields of the imposing St. Elias Mountains, the highest peaks in Canada, and at an altitude of 2,000 feet, the Farm was subjected in the summer to strong winds that blow from

the Pacific Ocean over the snow-capped mountains. Compared with Dawson, the summers at Mile 1019 are cooler and the growing season is much shorter. In addition, the altitude of Dawson is a full thousand feet less than that of Mile 1019. It was realized, however, that if crops would grow satisfactorily at Mile 1019 they would do so more successfully in more favorable situations in the Yukon.

The Experimental Farm, Mile 1019, continued in operation until 1968 when it and its counterpart at Fort Simpson in the Northwest Territories were closed. During its operation experiments were conducted with animals and poultry, forage and cereal crops, vegetables and flowers.

Beef cattle were found to winter satisfactorily if they were provided with high-board fences or open-faced sheds for shelter. They were fed locally grown forage and provided with mineral supplements and salt.

Pigs were raised without difficulty when housed in a single-storey log building. They required no artificial heat in the winter but a protein supplement was added to their ration. However, unless the protein supplements were produced locally, pig production in the Yukon would be uneconomical because of the high cost of bringing such ingredients into the territory.

The presence of wolves, coyotes, bears, and native dogs ruled out any possibility of raising sheep.

When provided with a properly insulated and ventilated poultry house, laying pullets were brought through the winter on a laying mash of locally produced barley, oats, wheat, and rye. Heat lamps were used to keep the temperature of the poultry house above freezing during the severe winter weather.

Cereals were grown with various degrees of success. The most useful one was oats, which was grown for grain and for forage.

Barley was the earliest maturing of the cereals tested. Some varieties matured and yielded well, producing grain of good quality.

Spring wheat was found to be generally unsatisfactory at Mile 1019 although it has been grown successfully in the Dawson City and other areas since the beginning of the century. On the other hand winter wheat and winter rye were grown at the Farm with some success.

Some varieties of winter grain did winterkill but others matured and yielded well in around 387 days (seeded in August and harvested the following August).

Many of the grasses commonly grown in the agricultural areas of western Canada were grown with fair success at Mile 1019 and in other parts of the Yukon. Grasses did not show much response to applications of fertilizer. As in other places in the Yukon, brome proved to be the best grass for hay and pasture. Crested wheatgrass, western ryegrass, selections of creeping red fescue, and Kentucky bluegrass all performed satisfactorily.

Clovers were grown at Mile 1019 but few were hardy enough to survive the winter. Certain varieties of sweet clover showed some degree of adaptability, especially in the Mayo area. Alfalfa was subject to attacks by the brown root-rot fungus, which extensively affected the purple-flowered varieties. The yellow-flowered alfalfa, *Medicago falcata,* proved more resistant to the fungus and showed some promise as a legume crop.

Several kinds of garden vegetables were tested for their adaptability to the Yukon. Although some proved unsuitable, most of them matured well and were of good quality. Broad beans, beets, carrots, leaf lettuce, onions, parsnips, peas, radishes, rutabagas, spinach, Swiss chard, turnips, and rhubarb were all grown from seed outdoors. Other vegetables could be grown successfully if started in the greenhouse and then transplanted in the garden. In this group were broccoli, cabbage, cauliflower, and head lettuce. Celery was suitable when started in the greenhouse, hardened in a cold frame, then planted outdoors. Cucumbers, peppers, and tomatoes had to be grown entirely in the greenhouse.

During the time that the Experimental Farm was in operation a limited amount of agricultural activity was taking place in the Yukon. But even when this activity was at its peak less than 250 acres were being cropped. In the 1961 census, the number of cattle was given as 222. The total area of land involved in the twelve Yukon farms listed in 1971 was 2,271 acres, of which 1,418 acres were improved.

The total value of farm products sold that year was $18,380. Only three of the farms had annual sales of $2,500 or more and virtually all twelve had to be subsidized by their operators with money from outside sources. In 1974 the picture was about the same. *(Table 4)*

The total area of farms large enough to be listed in the 1971 Canadian census was less than four square miles in the Yukon. This contrasted with a total land area of 205,346 square miles.

LAND TENURE IN THE YUKON

Almost all of the 205,346 square miles of land in the Yukon is vested in the Crown, the majority being administered by the Government of Canada and known as Federal Crown land or Federal Public land. A relatively small proportion of the total land is administered by the Government of the Yukon Territory.

Federal Crown lands comprise all those lands of which the Crown has not yet granted to any person or persons the rights to beneficial use. The Federal Crown lands are administered by the Canada Department of Indian Affairs and Northern Development.

Territorial Crown lands in the Yukon are Crown lands that have been transferred by the Federal Government to the Territorial Government for administration, management and control.

Any person aged 19 years or over may apply for Crown land in the Yukon. There is no stipulation as to the nationality or residence of the applicant. Applicants must undertake to live on the land or to put the land to productive use. Approval is denied if the economics of the proposed use are doubtful or if the area requested is deemed excessive to requirements.

Crown lands are available under lease, lease with option to buy, or for outright sale.

One hinderance to the orderly distribution of Crown land in the Yukon is that less than one percent of the total land area outside settled areas has been surveyed. For this reason no lists of lands for sale or lease are available.

Crown lands available to applicants fall into four categories: 1) Residential, 2) Commerical, 3) Agricultural, and 4) Grazing.

Residential land is designated as Primary Residential and Summer Residential. Primary Residential land ordinarily is within a community and is therefore obtained from the Territorial Government. Applications for Residential land outside community areas, whether for Primary or for Summer Residential purposes, are made to the Canada Department of Indian Affairs and Northern Development and are referred by that Department to the Territorial Government, which is responsible for providing such services as health, education, and welfare for the prospective owners or lessees. Applications for land for Summer Residential purposes are approved only if the requirements of access, environment, areal land use, and the public interest can be met.

Applications for land for Commercial purposes are handled by the Registrar of Companies of the Territorial Government. The amount of land involved must be no greater than is required for the intended purpose.

Land for Agricultural purposes may be obtained by lease, by lease with option to purchase, or by outright purchase. There is no provision for homesteading in the Yukon and no governmental assistance available for agricultural purposes. The amount of land considered sufficient for market gardening is 10 acres. For agricultural purposes up to 640 acres may be leased but sales to any one person are limited to 160 acres except with the authority of a special Order-in-Council.

For grazing, an individual may lease up to 6,400 acres of land on the basis of forty acres of land per head of livestock. Some fencing may be required but no other improvements are allowed.

PRESENT STATUS OF AGRICULTURE

Arable Acreage

The first realistic approach to estimate the agricultural potential of the Yukon was not made until the mid-nineteen-forties. G.M. Dawson's early estimate that a large proportion of 60,000 square miles might be used for production of crops, was based largely on the assumption that because there was extensive agricultural production in Siberia where the climate was more severe than in the Yukon, similar production could be obtained in the Yukon. R.J.E. Brown observed that apparently no consideration was given to cooler summer temperatures, shorter growing season limited by a short frost-free period, low precipitation and infertile soil.

In 1944 Dr. E.S. Archibald placed the area of arable land at around a half million acres. Robinson, in summarizing the potential arable land estimated some 60,000 acres along the Yukon River flats, 100,000 acres in the Takhini-Dezadeash valleys, and 6,000 in the Tagish area.

In 1957 the Research Branch of the Canada Department of Agriculture undertook a reconnaissance survey of the soils of the Takhini-Dezadeash river valleys and the report of that study made by Day, showed that less than 50 percent of the 441,000 acres in the survey area was suitable for cultivation.

Day found the soils of the study area varied widely in their value for agriculture and rated them on the basis of such factors as soil texture, moisture-holding capacity, natural fertility, drainage, permeability, topography and salinity. The good and the fair arable lands made up 205,400 acres while the poor and non-arable land comprised the remaining 235,650 acres. In 1959 Nowosad summed up the potential arable lands of the Yukon to be 294,000 acres mostly confined to river valleys:

Takhini-Dezadeash valleys	220,000
Yukon River and tributaries	60,000
Tagish and Little Atlin	8,000
Dawson area	6,000

No effort was made to estimate the immense area of grazing lands that could contribute to agriculture but not as arable land.

In 1962 the Federal Government appointed a committee to study the possibilities of farming and to make recommendations for agricultural development in the Yukon. The committee, headed by F.S. Nowosad, dealt with availability of arable land, suitability of the soil, climate, land tenure, and economics, and concluded,

". . . lower or less certain yields, along with higher costs, suggests that farming as a commercial full-time operation in the Yukon would have little possibility of success now or in the foreseeable future."

The report further recommended that should the government proceed with agricultural development, the development be confined to lands approved for agriculture by a qualified soil specialist and that the disposition of lands for farming or market gardening be concentrated to simplify servicing. The committee made specific recommendations with respect to locations for farm lands and market gardens.

Location of Farms

As pointed out in the early history of the Yukon, land settlement has been anything but orderly and even at the present time applications are received for land in a number of areas.

In addition to gardens, which occur wherever people settle, agricultural operations are found along the Alaska Highway from Watson Lake to Beaver Creek, and on the Klondike Highway from Dawson City to Atlin, the Mayo-Elsa road and the Robert Campbell Highway. Farms may be found in all the major river valleys of southern Yukon. Little use is being made of the findings and recommendations from the reconnaissance soil survey in selecting agricultural or grazing land. Only 4 of 31 applications for agricultural land, made at the Federal Lands Office in the year ending June 1974, were for lands within the surveyed area. The remaining 27, or 87 percent, were for lands in widely scattered areas throughout the Yukon.

Little regard has been given to a Federal Lands Office requirement that applicants submit the results of soil analysis of requested land. Only 6 such analyses have been filed with the applications.

Soil samples taken during this study of land in use or applied for, for agricultural purposes, showed wide variation in soil texture from very coarse sandy soils to fine clay. *(Table 5)* The majority of the soils were open permeable soils of low moisture-holding capacity. Crops grown on these soils would be the first to suffer during dry periods. Some effort was made to cultivate high organic soils and in some cases peat bogs were considered for pasture development. In a few areas good loam soils were encountered, but in all cases the layer of topsoil was shallow.

Fertility

With the exception of especially treated garden soils, analyses showed nitrogen deficiency occurred in all soils sampled. The nitrogen requirement for normal crop production ranged from 40 to 75 pounds per acre, the average being 60 pounds. Fifty percent of the samples showed phosphorus deficiency, and thirty percent potash and sulfur deficiencies. The amount of fertilizer required to provide sufficient nutrients for normal crop production averaged 157 pounds of 34-0-0 per acre where nitrogen only was deficient, or 230 pounds of combined fertilizers where nitrogen and phosphorus were lacking.

High fertilizer costs hamper all production. A six-year-old brome hay field on the N.L. Stevens farm yielded nothing this year because of low fertility. Previous yields were ¾ ton per acre and his best oat crop was estimated at 50 bushels per acre. Stevens is a knowledgeable farmer coming from a Wyoming farm background and with 14 years' experience in the Yukon. He would like to have an inexpensive way to help meet the fertility problem. Analyses of his soil *(Table 5 No. 556)* show the nutrient requirement to be 70 pounds of nitrogen, or 200 pounds of 34-0-0 per acre.

Early grazing and a shortage of nitrogen resulted in no hay crop this year for S. Veerman. Analysis of his soils *(Table 5 No. 959)* showed a need for 150 pounds of 27-14-0 per acre.

Soil tests of native land on the Louis Brown farm near Mayo *(Table 5 No. 1147)* showed a marked deficiency of nitrogen and potash. Brown considers fertilizer to be too expensive for field use but without it there is no production.

Commercial fertilizers produced yield increases in three varieties of bromegrass and three varieties of timothy at the Experimental Farm, Mile 1019, and barnyard manure not only increased yield of hay, pasture and oats, but also improved structure and water-holding capacity of the soil.

On pasture where fertilizer was last applied in 1969, soil tests *(Table 5 No. 558)* showed a marked nitrogen and phosphorus deficiency.

After applying fertilizer on newly developed irrigated land D. Nowlan harvested an excellent crop of oats for greenfeed estimated at 3 tons per acre. Soil tests *(Table 5 No. 699)* showed that his soil contained an adequate supply of all nutrients.

Gordon Yardley uses complete fertilizer on native hay land and maintains annual yields in excess of one ton per acre. He has found yields of bluejoint drop rapidly without fertilizer.

Farther west, L. Allinger has found fertilizer too expensive particularly because the cold climate and extended dry periods make yields unpredictable.

Heavy fertilizer requirements are not limited to the Yukon. Under similar conditions in Alaska, agricultural experts recommend 200 to 400 pounds of mixed fertilizer per acre for field crops, and 600 to 1000 pounds per acre for vegetables annually.

Other factors of equal or more importance than soil structure and fertility were often overlooked by the applicant for farm land. These factors include topography, surface condition, clearing, size of area, and accessibility.

Road construction in the Yukon is costly. The roughness of the terrain, scarcity of equipment, and a fluctuating labor force, have caused road construction and maintenance to be restricted to the main highways and a few important connecting secondary roads. Inaccessibility is one of the main limitations to the use of some of the better lands for agriculture, consequently many requests for agricultural land are for acreages on or near the main highway, while better soils some distance from the highway are ignored. The most notable exceptions are the Pelly River ranch, some 30 miles from a main road, and the Indian River farm, 60 miles from Dawson.

Clearing

Very little of the Yukon lands can be used for cultivation without some land clearing. The natural tree vegetation consists of aspen of various denseness, white spruce, and willow, with some ground birch and black spruce. Sedges and rushes abound in the low-lying wet areas and a number of drought tolerant grasses, forbs, and woody shrubs make up the remainder of the cover. On poor soil of low moisture-holding capacity, growth is retarded as evidenced by some 40 to 60 year old aspen no larger than 2½ inches in diameter and spruce and pine up to one hundred years old no thicker than 9½ inches.

Clearing costs depend on the kind and density of cover and availability of equipment. Because the upper soil layer is shallow, care is required to prevent its destruction and loss when removing tree stumps. One farmer near Carcross paid $200 per acre for tree removal and lost most of his topsoil in the operation. Another operator at Stony Creek estimated his costs at $350 per acre for clearing, burning and breaking.

Officials at the Canada Research Station, Beaverlodge, estimate the cost at $80 per acre on high brushland and from $100 to $200 on tree cover, depending on the density of growth.

Stutt *et al* estimated costs of clearing, piling and burning on land of similar cover in the Upper Mackenzie River area, Northwest Territories, to be from $75 to $80 per acre, while land clearing and breaking for community pastures in British Columbia costs $50 per acre. It is evident that ease of clearing has an important bearing on choice of land for agriculture in the Yukon.

Overdeep plowing can be as harmful as removing the topsoil, and much land has been made unproductive by this faulty operation. Because of the thinness of the topsoil layer, Gordon Yardley after years of handling land in the Yukon has found that all land levelling must be done with great care.

Salinity

Most of the analyses made, show that the soil ranges from neutral to alkaline and that salinity sometimes presents a serious problem. Salinity could be a very serious problem on improperly handled soils, particularly those being irrigated, or requiring drainage. Only two of the soils tested were found to be excessively acid. Toward the southern end of the Mayo road, the incidence of high conductivity (indicative of salinity) and high salt content is noticeable. Analyses of samples taken at Mile 10 *(Table 5 No. 701)* showed a high sodium content and a very high conductivity rating. The land there should be drained and seeded down to an alkali tolerant grass. Soil analyses from Mile 7.5 *(Table 5 No. 552)* and Mile 5 *(Table 5 No. 1150)* also showed high sodium content and therefore only salt tolerant crops should be grown in these areas.

Conductivity rating was high on soil samples from Nowlan's irrigated land *(Table 5 No. 699)*. This serves as a warning that irrigation water be applied with care, and adequate drainage must be provided. Excessive irrigation or ponding would eventually lead to an increase of salts which could ultimately make the land unsuitable for plant growth. High conductivity of the soil tested along the Stewart River near McQuesten *(Table 5 No. 702)* indicate the area should be used for salt tolerant crops.

Saline conditions on land near Mile 951 Alaska Highway, are severe in one area at the present time and will increase if drainage is not provided. Tests *(Table 5 No. 555)* showed that conductivity was high, indicating that the area should be seeded down to perennial salt tolerant grasses.

In the Lewis Lake area, analyses of soil tests from peaty land *(Table 5 No. 967)* showed high conductivity, again dictating the use of salt tolerant grasses.

Soil samples taken in the Mayo *(Table 5 No. 1148)* area and along the Dempster Highway *(Table 5 No. 1144)* proved to be acid. Although these soils were not from agricultural areas, their analyses confirm their acidity, a condition that undoubtedly occurs in many other areas.

Irrigation

In parts of the Yukon, crop production can be enhanced by irrigation. As indicated in *Tables 1 and 3,* precipitation through the country is minimal for crop requirements. The occurrence of the drought point in soils and the need for additional moisture is well documented in Day's soil survey report. Day points out there is a water deficiency of from 6 to 8 inches during the vegetative period. Under these conditions irrigation may account for marked increase in production as, for example, a 341 percent increase in marketable potatoes from the application of 3.5 inches of water at planting time at the Experimental Farm, Mile 1019.

Irrigation on the Nowlan farm is a flood system using runoff from a large shallow lake. The amount of water applied is not measured. In the first year of operation, yield of oat hay was 3 tons per acre.

For some years N.L. Stevens has irrigated brome hay by the flood system from contour supply ditches. Water for this project comes direct from mountain springs at a low temperature. The combination of cold water and nitrogen deficiency could account for the lack of production on this field.

One of the original irrigated hay farms of the Yukon is in the process of being rejuvenated at Tagish, where R. Rose is relevelling and reseeding a field that had been an important source of hay during the nineteen-twenties.

In the Yukon there is a good supply of water for irrigation but development is restricted by high costs and lack of irrigation knowledge.

The use of wells for irrigation has most promise for market gardens where the high cost can be compensated by a saleable cash crop. The suitability of ground water and the amount and ease of obtaining it, is not known.

Gardening

Gardening came into the Yukon with the earliest fur traders of the Hudson's Bay Company, survived the ups and downs of the gold strike, and is widespread wherever people live.

There is much documented evidence of the success of vegetable production in the Yukon. Some of the earliest reports of the Department of Interior record production in the Dawson, Pelly and Mayo areas. According to Weldon Farr, his father's farm at Sunnydale on Swede Creek, where the Canada Department of Agriculture had operated a sub-station for a number of years, produced garden vegetables along with cereal and forage crops in 1917 and continued to produce garden crops and potatoes until 1945. As previously stated, in the late nineteen-twenties enough vegetables were being produced in the Mayo district to supply the local community. The quality of the local product was always considered excellent.

Much of the early research at the Experimental Farm, Mile 1019, was concerned with horticultural crops, including vegetables, fruits and ornamentals. Because of the short growing season and the late spring frosts, best results were obtained with early indoor starting, followed by outdoor transplanting after the danger of frost had passed. Cold frames, and heated and unheated greenhouses made with clear polyethylene, were found to be inexpensive but very effective in starting and protecting seedlings. Clear polyethylene used for a mulch, increased soil temperature, thus stimulating growth during the early part of the season.

Polyethylene was also found to be effective in protecting plants against frosts late in the season. Sprinkler irrigation was also used to offset frost damage and, depending on the rate of application, protected peas, potatoes and beans at temperatures as low as $19^{o}F$.

The interest of land seekers in obtaining land for gardening is indicated by the acreage requested. Ninety percent of the applications for agricultural land made to the Territorial Lands Office during 1974 were for 30 acres or less, and seventy percent of the leases approved previous to 1974 were for 30 acres or less. Of the outstanding applications at the Federal Lands Office for agricultural land to the end of June, 1974, forty percent were for 30 acres or less.

Most of the attendants at the agriculture meetings, and eighty percent of those answering the agricultural questionnaire were, or wanted to be, involved in gardening. At the present time a number of requests have been made for land for market gardening on a commercial scale.

The possibilities for successful market gardening are more limited than appear on the surface. Yukon grown quality vegetables available on the market in a uniform continuing supply will command a good, if not premium price. A number of very commendable home gardens were encountered where excellent quality vegetables were produced, in some instances, surplus to home needs and available for sale. Unfortunately this production is uncertain depending on favorable moisture and growing conditions and therefore not a reliable source of supply for the merchant who must place orders early in the year to ensure delivery. No successful truly market gardens were encountered in the study but it was evident that, with the proper inputs and in the right location, market gardening could be successful. Unfortunately some of the more favorable locations for vegetable growing are a long distance from the major market.

A review of applications for land reveals a high percentage of applicants lack the qualifications for farming or gardening including background knowledge of farming, equipment, or finances. It appears that the real intent in many cases is to obtain land that might later be put to use other than agricultural.

Greenhouse and Hydroponics

Greenhouses of many types and sizes are common in the Yukon. Most of them are small lean-to structures attached to the side of the house. Some are heated, and most are covered with clear polyethylene. These greenhouses serve to start plants and protect them during early spring, and some are used through the season for tomato production. A few are permanent attachments to the home and are heated for early spring growth and are the source of tomatoes and cucumbers of excellent quality.

Previous attempts to operate greenhouses commercially have been without success. However, a new effort is being made a few miles from Whitehorse at MacRae where the Notland greenhouses now cover approximately 2 acres. Bedding plants are grown in the spring, followed by tomatoes and cucumbers.

The Notland greenhouses are constructed of two-by-four framing covered by clear polyethylene, which is useable for the growing season only. Some units are heated by hot air forced under the center bench from a wood-fired heating plant. Others are heated by a single ½ inch hot water line that circles the house. Soil for the greenhouses is brought in from surrounding areas and is of questionable quality. Peat moss is imported from Vancouver at $6.50 per small bale.

During 1974 an effort to produce tomatoes using hydroponics appeared to have promise. The tomato plants were grown in coarse sand and fed by a solution of necessary nutrients. Chemicals were obtained from a druggist, combined in water, and applied to the medium. No analysis of the solution was made so its nutrient value was not known. Nevertheless, the plants thrived and produced a fair crop of tomatoes.

The use of hydroponics, or soilless culture of greenhouse plants, resulted from efforts to overcome soil deterioration and disease build-up in soils. At the Canada Research Station, Saanichton, it was found that soil as a medium for plant roots could be replaced by other materials, so long as nutrient requirements were met. Media that permitted good moisture distribution were found suitable and the most satisfactory ones were sawdust, coarse sand, gravel, peat moss, and shale. Formuli for nutrient solutions are designed to meet the needs of the kind of crop and stage of growth. A number of feeding methods can be used.

Recent development of special fibreglass greenhouses with hydroponic feeding systems testify to the commercial feasibility of this form of production. According to Graham Smith, a house with 3000 square feet of surface will hold 1100 tomato plants and will produce from 17,000 to 24,000 pounds of fruit under Alberta conditions.

Of interest to Yukon residents is an experimental project on year-round production of vegetables in Alaska. Known as Controlled Environment Agriculture (CEA) the quarter acre pilot project is designed to grow salad vegetables (tomatoes, lettuce, cucumbers, and radishes) in a temperature controlled building under fluorescent light, using carbon dioxide produced from propane. Plant nutrients are added to the water and optimum growing conditions are maintained during the growing period. The object is to harvest successive crops, thus maintaining year-round production.

Controlled Environment Agriculture is a cooperative project involving the Federal Government, University of Alaska, General Electric Company, and the Kenai Natives Association Inc. Should the pilot project prove economically feasible, the Kenai Natives Association Inc. will establish a number of growing centers in Alaska to supply vegetables for a steady market and providing employment and business opportunities for its membership. Association President, Alex Shadura, and Horticulturist Dr. Hurtha Guthrie, are optimistic about the results.

Grazing Leases

Land for grazing may be leased from both the Department of Indian Affairs and Northern Development and the Territorial Government. In the case of Federal lands it is on the basis of forty acres per head with the stipulation the land must be used for grazing only, restricting improvements to buildings required for livestock protection. Territorial lands have the same stipulations but are based on a grazing rate of thirty acres per head. Federal lands are leased for five years, while each Territorial lease is for two years renewable for additional two year terms.

The full extent of grazing land in the Yukon is not known but it is extensive, stretches in patches from one side of the country to the other, and constitutes many thousands of acres. Many open areas of good grassland are found in numerous valleys throughout southern Yukon. Partly because of the light snow cover, native horses survive the winters when left to rustle for themselves. From spring on throughout the summer months cattle and horses make rapid gains on the native vegetation. Horses continue to thrive in the fall and go into winter in excellent condition. Research results from Experimental Farm, Mile 1019, show growing calves and steers stop putting on weight as the grass matures in September, and lose weight unless provided with supplementary feed. Some cattle winter-over on late fall grazing, browse and a minimum of feed.

By the end of March 1970, 76 grazing leases totalling 35,000 acres were in effect, each lease averaging 460 acres. At the end of October 1974, thirty-seven applications, representing 29,425 acres averaging 795 acres each, were on hand. The current number of leases in effect and acreage involved is not known, as many leases are in the process of renewal, but the total is large.

If the requirements of the Federal Lands Office are being followed, some 70,000 acres are being leased for grazing purposes. This is based on 40 acres per head for the 1500 horses and 250 cattle in the Yukon. However, some grazing leases are known to have no livestock on them, and some livestock graze where no grazing lease exists.

A great deal of research is required to determine the areas best suited for grazing, and the proper rate of stocking. The condition and grazing potential of the lands available for lease purposes, ranges from very poor to good. The potential of similar range in the Slave River lowlands ranges from no positive value on burned over areas, to 50 acres per head on well developed wooded areas with a fair covering of grasses and forbs. Climax forest has scant

cover and is of little value for grazing, while meadows provide abundant feed. Land leased for grazing in the Yukon has ranged from good meadows of mixed grasses and forbs to burned-over, wooded land covered with dead-fall that has very little grazing value. Dead-fall hampers movement of livestock and on some leases is so thickthat horses become easy prey for wolves. Whereas 40 acres per head would suffice on the best grazing land, no amount of the poorest land would maintain livestock (Wilson). This gives rise to the major complaint of packers that there is a shortage of forage for their horses resulting from the unrealistic grazing rates coupled with restrictions on range improvements. Some ranges are so poor it is not possible for an animal to graze enough daily to sustain life. In many cases animals survive only by wandering at large and finding suitable grazing elsewhere.

The lack of grazing control leads to other problems. Uncontrolled livestock grazing at large cause overgrazing and depletion of the range area. The problem becomes more serious when the livestock move into the winter feeding reserves of wildlife. Wildlife conservation depends largely on availability of adequate feeding areas and emphasis is placed on preservation of winter range. Encroachment on these winter ranges is a major concern of the Games Branch and must be brought under control if the wildlife program is to succeed. Branch superintendent J.B. Fitzgerald states the problem exists because little effort is made to restrict livestock grazing to the land leased for that purpose.

The length of the grazing season plays an important part in the productiveness of the grazing lease. The grazing season in the Yukon varies according to the depth and length of snow cover and the ability of the desirable forage species to withstand grazing pressure. Although steers and calves declined in weight after three months of grazing at the Experimental Farm, Rod Tait has shown that they can survive on a mixture of slough grass and browse utilizing tender willow and poplar during the winter. Continuous and excessive grazing reduces plant vigor, lowers the carrying capacity of the range, and eventually destroys the desirable species which are then replaced by unpalatable weedy types.

The open range area in the Klusha valley has a fair covering of shrubs, mosses, forbs and grasses, and appears to have a grazing rate for cattle of 60 to 65 acres per head. About the same acreage per head is required at the Pelly River ranch where the topography of the range varies from steep dry hillsides, to river flats. The Bradleys find the best summer range has a grazing rate of 20 acres per head for four months.

Damage caused by overgrazing, mainly by uncontrolled horses, is not always evident. Overgrazing is so serious that wildlife is being pushed farther and farther back into the

wilderness in search of food. Now only rarely may wildlife be glimpsed from the highway. Horses, however, frequent the highway and are a constant threat to the safety of the traveller.

Livestock

The extensive cheap grazing areas of the Yukon have attracted some farmers into livestock production over the years. During the gold rush period the Klondike dairy farm operated successfully near Dawson and ceased operations only when it was unable to meet the requirements of pasteurization. The Pelly River ranch produced beef for the Dawson market as early as 1915. Later, cattle were raised in the Carcross area.

The Experimental Farm, Mile 1019, obtained cattle first in 1948 and when these were found to have brucellosis they were replaced with a new herd in 1951. Research provided a number of pertinent facts about livestock production in the Yukon, the most important of which concerned the long, eight month feeding period. Bred cows required 16 pounds mixed hay per day throughout winter. Calves gained an average 2.4 pounds per day and weighed 550 pounds at weaning. Steers gained 1.5 pounds per day on pasture. The cattle wintered outside and natural protection appeared as effective as a high-board fence or open-faced barn.

The experience of Yukon farmers in raising cattle has varied over the years. In the Burwash area, L. Allinger ran fifty head of cattle for a number of years but found that despite rapid summer gains, the feeding period was too long and feed costs were too high. He considers this part of the Yukon too cold for livestock production. Rod Tait, at Haines Junction has confidence in the viability of livestock production and is desirous of more land to expand his operation. S. Veerman at Carcross, and the Bradley Brothers of the Pelly River ranch, have been in the cattle business longer than any other ranchers now in the Yukon. Veerman raises some feed but must buy hay that is often of questionable quality, but high price. The Bradleys use most of their cultivated land for oat hay and even in dry years can cut 1½ tons per acre. Steers at the Pelly River ranch weigh 800 pounds at 18 months. This ranch is one of the oldest in the Yukon and has been operated by the Bradley Brothers for 20 years.

Louis Brown raises West Highland cattle on his farm on the Stewart River near Mayo. Hay production there is limited by cold, wet weather, low fertility and labor shortage. Consequently, the outlay for wintering stock is high. After 40 years in the Yukon, Mr. Brown concedes that the adverse elements of climate, wolves, labor shortage, equipment

costs and lack of markets all but eliminate any chance of successful livestock production.

More recent comers to the Yukon are optimistic about cattle raising.

Joe Chouinard has fifty head of cattle on his farm along the Watson River, and the David Harders have twenty-four head on their Ten Mile ranch between Carcross and Tagish. The Ten Mile ranch has a long history for beef production. Former owner Gordon Yardley ran fifty head of cattle on this ranch.

Yardley brought in yearlings each spring, ran them on grass, finished them as grass and hay fed cattle, and sold the beef in Whitehorse. Grain feeding and wintering were eliminated and all hay was raised on the farm. Under this program the enterprise was successful.

Horses

Horses play an important part in the economy of the Yukon, making the lucrative trail and pack horse hunting business possible. Although there are approximately 1500 horses in the country, only about half of these are used commercially. No effort has been made to upgrade or maintain the quality of trail and pack horses and while there is no evidence this is necessary, it seems obvious efforts in this regard would be beneficial. This year Marlin McNeil introduced ten head of quarter-bred horses on his Indian River ranch. In a country so dependent on horses this would appear to be a progressive move.

Hay Production

Good quality hay is very much in demand in the Yukon. The winter feeding period for livestock is determined by the length and severity of the winter, and the availability of winter grazing areas. Unfortunately, winter grazing is scarce and consequently the winter feeding period is long and costly. Imported hay carries the added costs of transportation raising the price to between $120 and $150 per ton. Quality is not a condition of sale and frequently the delivered product is of poor quality and low nutritive value. Livestock production cannot succeed in the Yukon if it depends on imported feed.

Forage species were studied for hay and pasture purposes at the Experimental Farm, Mile 1019. Best hay yields were from fertilized stands managed so the plants developed adequate food reserves for winter survival. Many cultivated grasses produced satisfactorily including bromegrass, intermediate, slender, Western and crested wheatgrass, Russian wild ryegrass, creeping red fescue, Kentucky bluegrass, reed canarygrass, and timothy. The search for suitable legumes was without success.

Throughout the Yukon there are many natural meadows, some of which have a favorable combination of vegetation, moisture, and soil condition to make them suitable for hay production. Vegetation on meadows varies with the moisture level. Generally the more nutritive and palatable species occur on the dry meadows but these in turn seldom produce enough to make a hay crop. Wet meadows are dominated by species of sedges and rushes and are invaded by willows and brush. The combined feeding value from wet meadows is low and it drops lower by the time they are dry enough to harvest. Native grasses do not withstand regular cutting and although fertilized, the yields steadily decline. Declining yields are frequently accompanied by a change in vegetation with an increase of weeds and unpalatable species. The widespread increase of wild barley (foxtail) in hay meadows is a good example of this type of invasion.

Despite these limitations there are many favorable locations where good quality hay could be harvested, and with proper management hay production can be successful. A change in regulations to permit the sale of hay harvested from non-agricultural leases, could provide the necessary incentive to increase hay production in the Yukon.

ECONOMIC POTENTIAL FOR AGRICULTURE

The economic potential for agriculture in the Yukon has been particularly well documented and stated by D.W. Carr & Associates in a study conducted in 1968. Dr. Carr summarized his findings for agriculture thus,

> *"The physical environment in the Yukon does not favour ordinary farming operations because the topography of much of the suitable soil areas is too rough and uneven for large-scale machine operations; the soil is podzolized, infertile and low in productivity; the climate tends to be adverse in its short, cool growing season, its drouth, its soil permafrost, and its long cold winters; and its location disadvantages are costly. In brief, most field crops cannot be ripened or matured and are too frequently damaged by frost; native grasses are widespread but do not grow abundantly because of the short, cool summer and the shortage of precipitation; the costs of producing cattle or sheep are excessive because the grazing season is short and the season when they must be sheltered and fed indoors tends to be quite long; and garden produce can be produced but with less certainty than where climate is less extreme.*
>
> *These adverse physical conditions are reflected in the economic results of farming. Thus the low productivity of the land is reflected in high costs and low profits. In addition, because of the high costs of in-bound transportation, the costs of inputs of supplies and materials (fertilizers, repairs, etc.) tend to be higher than in the major farming areas. These higher costs of inputs more than offset the higher prices received.*
>
> *Yet, in terms of profitability, one of the greatest disabilities of farming in the Yukon is its unsuitability for the large-scale, specialized new technology that has now taken over most of agricultural production in Canada. The Yukon lacks both the large areas of level, well-drained stone-free land that has now become essential for large-scale specialized, mechanized and profitable production of field crops. For effective livestock production the Yukon lacks the climate and the highly productive grazing lands necessary for profitable operations."*

COST OF ESTABLISHING A FARM

One of the attractions Yukon has for aspiring farmers is vast areas of low priced land. This feature often clouds the fact that establishing a farm is an expensive business and in the Yukon where transportation over long distances adds to the costs of equipment and supplies, the capital investment and operation costs may never be recovered.

The cost of establishing a farm in Canada varies with the type and size of farm, location, soil type and terrain. There are many types of farms in Canada from fruit, grain and livestock and various combinations of each. Most common in the West are the large grain farms, extensive cattle ranches and combination cattle-grain farms with fewer specialized beef cattle, dairy, hog, and poultry farms. British Columbia still has a number of fruit farms. Each has a different requirement for capital investment and examples of the investment and operating statements for representative farm enterprises is presented in a cost study conducted by S.W. Garland.

Because Yukon farming conditions are unique, there are no fully comparable examples elsewhere, although the small cattle ranch of the short grass region of Alberta is reasonably close.

The short grass region is the treeless semi-arid area with from 11 to 13 inches precipitation, hot summers, high evaporation, and cold winters. Water is limited and is frequently provided by wells and dugouts. The carrying capacity averages 50 acres per head and very little land is cultivated. The average operating statement for 26 small ranches in the study is summarized as follows:

Number of ranches in study	26
Number of breeding cows	46
Number of animal units	55
Number of animal units per man equivalent	41
Average size of ranch	2,520 acres
Land use:	
Improved land:	
Area in grains	310
Area in forage and roughage	60
Area in summerfallow	265
Unimproved land:	
Area in grazing	1,840
Area in wild hay	10
Area in waste	35

Ranch capital: Land and buildings	$41,500
Machinery	9,500
Livestock	10,800
Equipment, supplies and miscellaneous	2,600
Total capital	64,400
Ranch receipts: Crops	4,700
Livestock and livestock products	4,510
Other	660
Total cash receipts	9,870
Produce used in home	180
Total receipts	10,050
Ranch expenses:	
Expenses (less hired labor)	4,360
Hired labor	120
Total cash expenses	4,480
Depreciation	2,110
Total expenses	6,590
Return to operator and family for labor and capital	$ 3,460

Despite the fact this is a study of small cattle ranches, half the income is from crops, mainly wheat. There are a number of small livestock units in the Yukon where cultivated land is devoted entirely to pasture or hay crops requiring a lower capital investment for machinery and equipment. Nevertheless, the capital investment could be expected to exceed $50,000 at the time of this study, 1965, and would be considerably more based on current livestock prices.

Land development in the Yukon is as difficult and costly as in the adjoining State of Alaska, where, according to the Alaska Department of Natural Resources, a 25 acre vegetable farm costs $1200 to $1500 per acre to develop, and a 100 head dairy farm requires an investment of from $900 to $1500 per head, with the estimated total investment averaging $150,000.

LIMITATIONS TO AGRICULTURAL PRODUCTION

1. Arable Land — Yukon has a land area exceeding 131,400,000 acres of which less than 3/10 of one percent is known to be arable. On the basis of agricultural and soil surveys to date, the estimates of arable land total less than 300,000 acres.

2. Low Soil Fertility — Tests conducted on the arable soils show a marked nutrient deficiency throughout the Yukon. Analyses show the average fertilizer requirement to be 157 pounds per acre of nitrogen fertilizer 34-0-0 or 230 pounds per acre of combined fertilizer where nitrogen and phosphorus were lacking. The high cost of fertilizer to overcome this deficiency places a severe burden on the farmer.

3. Soil Texture — Coarse and sandy soils are common and are low in productivity because of low moisture-holding capacity. These soils are dependent on a uniform supply of moisture which may be obtained only by irrigation.

4. Topography — The surface of the land in the Yukon is generally rough and uneven. Much of it is rugged. Only a portion of the better soils occur on land topographically suitable for farming.

5. Clearing — The vegetative cover of the Yukon varies from a sparse shrub and moss cover, to heavy wooded vegetation. The more productive soil zones, the only ones suitable for agriculture, have some degree of tree cover. The cost of land clearing increases with the density of the cover. In the Yukon, where both labor and equipment are at a premium, land clearing costs may be prohibitive.

6. Location — Because the Yukon is located at the extreme end of Canada's transportation system, the costs of bringing in needed supplies, equipment, repair parts and services, add greatly to the costs of production. Agricultural supplies and services are not now available, but if they are made available they will carry the additional costs of transportation.

7. Climate — Notwithstanding the fact that grain crops have matured and livestock have survived, the climate of the Yukon is not favorable for either the growing of crops, or livestock. The number of frost free days varies throughout the country and fluctuates from year to year. Dawson, with the longest average number of frost free days, has 15 days less than Beaverlodge, Alberta. The vegetative period, when temperatures are

42^{o}F and over, is 19 days less at Dawson than at Beaverlodge. Although long days of summer compensate slightly for the short growing period, they cannot compensate for the low temperatures that place a major restriction on plant growth. Severe winters restrict plant survival to only the hardiest of perennial crops. The cold climate also means that much of the food intake is required to maintain body heat, thus placing a heavy financial burden on livestock production.

Precipitation for crop production is minimal, and during some seasons is insufficient to sustain plant growth. Irrigation to compensate for moisture shortage is limited to areas of water supply, and is expensive.

8. Legislative Limitations — Grazing leases at present are for such limited time and are so insecure, livestock production is discouraged. Leases do not allow such improvements as water development, clearing, weed control, irrigating, reseeding, or understocking to permit rejuvenation of the range.

9. Labor — Labor in the Yukon is generally a seasonal enterprise and unfortunately the major labor demands coincide with farm labor needs. Agriculture cannot compete with industry or welfare for labor.

10. Markets — The Yukon population is the main market for agricultural products and is limited to approximately 25,000. Major markets outside the Yukon are at such distance the transportation costs of produce are prohibitive.

11. Farm Credit — At the present time Farm Credit Corporation does not operate in the Yukon. Regulations governing the granting of credit by the Corporation stipulate:
    1) applicants must have title to the land
    2) the major portion of income must be from the farm

    No other source of credit is available.

12. Grazing Areas — Land for Grazing purposes is leased on the basis of 40 acres per head. No consideration is given to the condition of the lease and no information is available on the proper stocking rate for the area. Grazing is not controlled thus the actual stocking rate is not known.

13. Greenhouse Operation — The high cost of electricity for light, and fuel for heat, restricts greenhouse operations to the growing season.

14. Services — Many of the choice farm sites are in isolated pockets some distance from main roads and in areas lacking schools, roads and electricity.

15. Initial Investment — The high cost of establishing a farm in the Yukon is a deterrent to agricultural development.

SUMMARY

The findings of this study confirm the conclusions made by previous agricultural workers and committees that there were some 300,000 acres arable land in the Yukon but because of low yields and high cost, farming had little chance to succeed.

At the outset, only a few of the aspiring farmers used the recommendations of the Soil Survey Report and the Agriculture Committee in selecting land. Many farms are located on poor soil both from the point of view of surface condition and fertility. Few operators have adequate knowledge of farm operations and fewer have sufficient equipment or capital to operate successfully.

The one crop most in demand is hay and its production is seriously restricted by the high cost of much needed fertilizer.

Gardens for home use are numerous and some produce a wide variety of high quality vegetables. Interest is keen for the establishment of market gardens but none exist at present.

Grazing leases are in poor condition and the terms of lease do not permit improvements. Because grazing is not confined to leases, there is unrestricted grazing by horses, with serious encroaching on wildlife reserves.

Cattle production is limited by cold winters, short grazing season, high feed costs, and lack of marketing facilities.

Heavy capital investment, the high costs of inputs, labor and transportation, the low yields and limited markets make farming financially unsound.

JUSTIFICATION FOR AGRICULTURE

The conclusions on Yukon's agricultural potential as determined by this study confirms previous findings, that agriculture is not an economically sound enterprise at the present time and survives only as subsistance agriculture without regard for financial gain or even payment for labor, or it is a part-time effort and the major income is derived from some other source. Justification for support of agriculture must be on some basis other than as a commercial enterprise and it may be found first in the demand for increased food production from a shrinking farm area.

At the present time commercial agriculture enjoys an enviable position in Canada's economic scheme. How long this can continue is a question confronting Canadian authorities. Dramatic changes have taken place in Canada's farm style in the past decade. Small family style farms are being replaced by large-scale farm enterprises.

In the 25 years from 1941 to 1966 there was a 33 percent decline in the number of farms in Canada from 677,500 to 430,500 while at the same time land in agriculture increased from 55,823,648 acres to 66,733,000 acres. The farm labor force dropped more than 50 percent between 1941 and 1966 from 1,186,000 to 544,000, but Kulshreshtha and Holub have shown that improved productivity per man compensates for the reduced labor force. Between 1948 and 1970 the output per man in agriculture increased 200 percent and in non-agriculture 76 percent.

Encroachment by industrial and other land use programs that are now expanding into agricultural lands at an alarming rate, is cause for concern in many areas of Canada. New four-lane freeways that stretch across the country take up 25 to 40 acres per mile.

Much land is being converted to recreational use and in recent years foreign investment has bought up large tracts of farm land at prices above the true land value. Ordinary irrigated land in southern Alberta has been sold for more than $1000 per acre while wheatland in the Drumheller district has been sold to European investors at $500 per acre to be used for other than agricultural purposes.

Coinciding with the reduction of farm land is a demand for increased production to meet the ever increasing need of the developing countries. At the 1974 World Food Conference, Canada increased its pledge of support by one million tons of food per year for the next three years. Even with our best technology and with the liberal use of fertilizers, we must

consider bringing more land into production to meet these demands. Even as we strive to meet the present needs, the world population is increasing at the rate of 77 million per year, or 200,000 per day. Norman Borlaug, world renowned agronomist, stated that to produce the grain needed to feed these additional people requires another twenty million acres of land each year. Many countries have no more land to put under the plow. There is little question that sub-marginal lands and farming that was considered non-profitable by present day standards, will be reconsidered as population pressure and food demands increase. To deny the use of sub-marginal lands in the face of such need is not consistent with Canada's pledge to help meet the problem of the world food crisis.

Further justification for support of agriculture is based on the fact that farming, while not encouraged, has been permitted contrary to the recommendations of previous studies. In 1962 when the Committee on The Possibilities of Development of Agriculture in the Yukon Territory found that farming as a commercial full-time operation in the Yukon would have little possibility of success now or in the foreseeable future it offered three main courses of action to meet the requests for land;

1. To permit no further agricultural settlement since once farmers are partly established it would be very difficult not to accede to requests or demands for assistance.
2. To give no encouragement or assistance to settlement, but to inform settlers of difficulties faced — and permit settlement in a community pattern.
3. If the decision is to proceed with agricultural development, definite patterns of land settlement will have to be followed and certain kinds of assistance will have to be provided in order to achieve a reasonable degree of success in farming or maket gardening.

Since 1962 — Agricultural settlement has been permitted

No assistance has been provided

No pattern of land settlement has been followed

The Government of Canada in a brochure on the acquisition of Crown land, points out the deficiencies of soil and climate for agricultural production and the attendent difficulties of transportation costs and lack of markets, but nevertheless offers land for farming and grazing. Agricultural land description and the procedure for obtaining it, is also published in Prospectus, North of 60.

The former Minister of Indian Affairs and Northern Development, the Hon. Jean Chretien, reaffirmed the government's policy on Northern Canada in March, 1972, and stated, in part,

". . . the needs of the people in the North are more important than resource development".

He stated the number one item of the government's national objectives in the North was,

". . . to provide for a higher standard of living, quality of life and equality of opportunity for Northern residents by methods which are compatible with their own preferences and aspirations."

He also pointed out that on economic grounds non-renewable resources will be developed and with development, settlements, some of which (mining towns, etc.),

". . . will have relatively short life span unless the local economy is diversified mainly by encouraging renewable resource development. On social grounds (people wanting to stay where they are for example) the government will continue to provide community infrastructure and services. This will bring forward problems of the future when the population will have expanded beyond the capacity of the local economy to support it, unless renewable resource development, light industry and tourism, are encouraged and assisted. In some cases such development may be uneconomic."

Any major undertaking in the Yukon involving unrenewable resources, transportation, highways, pipelines, will generate pressure for other land use including agriculture and recreation.

Agriculture may well be justified for its contribution to the well-being, comfort, and provision of amenities to the residents of the Yukon. Little consideration has been given by policy makers for this phase of agriculture, but in Alaska, where agricultural development has yet to make a significant impact, attention is now being focused on the *way of life* aspect. Dr. Wayne Burton has devoted a great deal of research to this relationship to agriculture, termed *agroeuthenics,*

". . . a concept that deals with development of human well-being and quality of life, by enhanced living conditions derived from increased production and consumption of wild gather and/or domesticated plant and animal products or services in a modernized ecosystem."

Burton considers the value of agricultural production in the North is of major importance and cannot be measured solely in terms of food value. Added benefits are derived from the knowledge that milk or red meat can be or is produced in your own area. Benefits come from the improvement of environment through flowers, fresh vegetables, lawns and recreation facilities. These all add up to making life more liveable in the North.

Benefits are shared by the major employers, industry and governments when the tenure of the employee becomes more permanent resulting from improved *way of life* amenities. The cost of replacing employees whose families are disillusioned with northern life and its shortage of normal amenities, is a contributing factor to the higher cost of living in the Yukon.

Finally it must be pointed out that agriculture is established in the Yukon and it is a reasonable assumption it will continue with some diversification. During this study, interest in farming was evident from the many inquiries received, the good attendance at the agriculture meetings, and the continued growing membership of the Yukon Livestock and Agricultural Association.

PROBLEMS OF LAND USE AND LAND TENURE

The basic agricultural resources of soils, climate and water are present in the Yukon. While suitable soils are limited in extent, there are sufficient in combination with acceptable climate and potential for irrigation development, to warrant agricultural development under controlled conditions. Every precaution must be exercised to restrict agricultural development to the areas and soils best suited for that purpose.

Canadians have a long and painful record of reclaiming once settled lands that were found unsuited for agriculture. In many provinces marginal lands have gone through a compelte cycle of being broken, farmed, abandoned and finally reclaimed by the government. The most tragic example of that occurrence was the massive farm failure in the prairies of Manitoba, Saskatchewan and Alberta. Lands that were termed too dry for farming by Capt. J. Palliser in the 1850's were made available for settlement and farmed during the early nineteen-hundreds. The persistant drought, hot winds and the sun, starting in 1920 and continuing intermittently into the early 1930's put an end to a dream of prosperity. Millions of acres were left abandoned, some to drift barren for years before natural vegetation crept back to heal the wounds. Governments spent large sums of hard-come-by money to resettle the defeated farmers and their families and much more to reclaim the abandoned lands and return them to productive usefulness.

Not only did the farmers fail, but those who had settled with them to build towns with stores and services were also doomed.

During those years of settlement, long days of manual labor were put into gathering and lifting stones onto a stone-boat, dragging them slowly across the field by horses and piling them along fence lines. Long lines of stone zigzag across the prairies today as a grim reminder of a lost labor. With present day equipment and power, breaking and stone removal is a simple farm operation but in the opening of the prairies it was, to some, a life sentence of hard labor.

In the settling of the prairies there was a great urgency to get started, created by an influx of anxious immigrants. Vast acres of grassland with growth standing knee high, had all the appearance of fertile soil and abundant moisture. The government would have been powerless to withhold the land even if it had endorsed the Palliser report.

This tragic section of history of the prairies should serve as a guide for the approach to use of Yukon lands. Knowledge and techniques are available to determine the suitability of the soil and the manner in which it should be used and common sense tells us that machines, not man, should slave at tree and stump removal to prepare the land for the plow.

It is equally important that the areas to be used should fall into a land-use pattern consistent with the needs and wishes of the people but mindful of the consequences of careless abuse of the ecology. Drifting sands in the vicinity of Carcross are evidence of consequences of removing the fragile protective cover.

Public pressure for land for recreational use is growing in Canada and there is a building disapproval of the leasing or selling of large tracts of land for grazing purposes for very little revenue. At best, the principal of absolute rights or absolute control by owner or lessee is seriously questioned and in some areas multiple use of land is becoming mandatory.

Concern in the Eastern provinces is focused on foreign ownership of large sections of recreational land. In Nova Scotia, 700,000 acres of such land, much of it seashore, is now owned by Americans. A similar problem exists in Prince Edward Island and efforts are now being made to limit sales to foreigners to 10 acres each. At the same time a Land Bank Corporation buys up farm land and holds it for agricultural purposes. Ontario has suffered most loss of agricultural lands largely because industrial and urban development spread into the best farm areas. To curtail speculation on farm land being held for development, Ontario now imposes a 50 percent tax on the sale of unimproved real estate. Foreign ownership is discouraged by being subjected to a speculation tax and in addition a Land Transfer Tax of 20 percent is imposed on any real property acquired by any non-resident of Canada.

Manitoba is in the process of buying back privately owned lands to reconvert them to recreational purposes.

Saskatchewan has taken a firm stand to protect the family farm style and to prevent foreign ownership of agricultural lands. The Saskatchewan Land Bank Commission buys back farm land giving priority to those farmers who have reached retirement age of 65, widows or incapacitated farmers. Lands bought up are resold for agricultural purposes.

Concern for alienation of farm land for urban development in Alberta has prompted the establishment of the Alberta Land Use Forum, which is currently studying the problem in that province. One of the items under study is *"the extent, if any, to which the historic right of a land owner to determine the use and disposition of agricultural property ought to be restricted."*

British Columbia is particularly concerned over the preservation and retention of its agricultural lands. Less than 4 percent of the land west of the Rocky Mountains is arable agricultural land and only one percent suitable for orchard land.

Control of lands is now the responsibility of the Environment and Land Use Committee and the main objective is to preserve farm land, and stop land speculation.

In the Northwest Territories the unresolved Native Land Claims places a restriction on land sales and land use plans. Aboriginal claims not yet placed may take priority over land deals made at this time so that there is no assurance that sales are in truth finalized. In effect, this places a freeze on land transactions which will not be lifted until the Native Land Claims are settled.

Among the other demands for land across Canada, recreational needs are prominent. Canadians have developed concern for the way of life attitude and now question the policy that placed all emphasis on production, most of which has little or no bearing on their welfare. During this study in the Yukon, some tracts of land suitable for agriculture appeared to have outstanding potential for recreation and if developed for that purpose would have a much greater impact on the well-being of the citizens as a whole.

It must be obvious that some of the lands most suited for agriculture would fall within the traditional hunting and trapping areas of the Native people. The security of such areas must be assured as also the designated wild life feeding ranges. The selection of agricultural lands must be in complete harmony with land use plans and an agricultural policy must complement and co-ordinate with a land use policy.

The problems across Canada associated with land ownership, and dissatisfaction of citizens with a policy permitting absolute control by the owner, have raised serious doubt as to the wisdom of allowing outright purchase of land in the Yukon. During this study it was apparent that certain lands purchased as agricultural lands were never used for that purpose and it is a reasonable assumption the intent was one of land speculation. In other cases, sales were completed although the purchaser failed to meet the development requirements. The practise of selling single acre home sites adjacent to leased land has created a pin-cushion pattern of deeded islands throughout the country.

Land titles are important, however. They provide security of tenure, pride of ownership, and a vehicle for borrowing working capital. By comparison, tenure by lease is without

security*, is not accepted as security for loans and does not permit development.

Land leasing is a form of exploratory agriculture, particularly in areas of unknown potential, and may lead to further permanent development. It could also leave the land in a depleted, run-down condition.

A prime requirement for an agricultural policy is the provision of security of tenure of the land for agricultural purposes while at the same time establishing safeguards against misuse and diversion of purpose.

* Yukon leases can be cancelled in thirty days. British Columbia no longer sells agricultural land but leases it for 45 years renewable for an additional 21 years thereby allowing for a father-to-son continuance.

YUKON AGRICULTURE POLICY

Farming in the Yukon is not an easy occupation and success will depend on the farming knowledge and ability of the applicant, and the choice of land having favorable soil and climatic features. It is not in the best public interest to make land of questionable productivity available nor to permit applicants lacking in understanding of agriculture to settle on undeveloped land. Even with the most favorable conditions the risk of failure is present. The main objective of the Policy is to permit agricultural development where soil and climatic features exhibit potential for production on land not involved in a more important land use program. The Policy will encourage only those applicants with the necessary qualifications.

The physical and chemical nature of soils varies in any area, at times with abrupt wide variations and at times slowly and gradually. It is unwise to generalize and assume uniformity of the soil. The only means of determining the true nature of any area is by a study conducted by a soil scientist. Such a study will determine the potential of the soil for crop production and will detect unfavorable conditions such as fertility deficiency, salinity, and poor texture. An understanding of soil conditions is absolutely essential for the planning and use of land for agricultural development. In the Yukon the only area that has been studied for soil conditions is the block of land that stretches along the Takhini and Dezadeash river valleys between Whitehorse and Haines Junction. Less than half of the 440,000 acres surveyed is classified as fair to good arable land and only a portion of the arable land is considered to have good potential for agriculture. Nevertheless, it is the only area of known potential and it is within this area the first agricultural development should proceed. As soil surveys are conducted in other areas, additional lands may be declared suitable for agriculture.

It is Proposed:

1. that a block or blocks of land selected by the Agriculture and Land Use Committee for potential crop and livestock production, and free of other land use commitments, be made available to the Agriculture Development Council for agricultural development.

2. the Agriculture Development Council will establish the pattern and location for development and the tenure and conditions of land transactions.

3. the Agriculture Development Council will place selected land in a development program which will include surveying and delineating major roads. Land needed immediately for agriculture will be cleared and broken.

4. the Agriculture Development Council will approve the transfer of title on the following bases:
   a) the title will be for *Agricultural Rights* (this is a clear title to the use of the land for agriculture, under stated conditions, and provides for establishment of a permanent home and auxiliary buildings)
   b) the applicant is a Canadian citizen, 19 years of age or older, physically fit, and has lived two complete years or more in the Yukon Territory
   c) the applicant has the personal qualifications of knowledge and understanding of agriculture, and initial finances as required by the Agriculture-Land Use Committee
   d) the proposed operation is judged a viable agricultural enterprise by the Agriculture-Land Use Committee
   e) upon receipt of payment for the *Agricultural Rights* plus the cost of development inputs of surveying, clearing, breaking, etc.

5. that land in the development program not required immediately for agricultural use be fenced and used as a community pasture for the summer pasturing of horses or other livestock and released for agricultural use as required

6. that lands not placed under the jurisdiction of the Agriculture Development Council may be leased for agricultural or grazing purposes provided they are approved for agriculture or grazing by the Agriculture-Land Use Committee. Leased land may be included in future agricultural development programs

7. that the Federal Government be requested to assist in the agricultural development of the Yukon by:
   a) Research — There is a primary need to resume agriculture research to solve present problems and to pave the way for eventual expansion of agriculture in the Yukon. Emphasis must be directed to applied

research in a program to provide practical answers to farm problems. Because growing conditions in the Yukon are unique from the rest of Canada as well as the rest of the agricultural world, research must cover both the development of crops and livestock, and design of agronomic and animal husbandry practices.

There is an urgent need for development of crops suitable for the Yukon, in particular short season cereals, hardy legumes for soil improvement and feed, forage crops for hay and seed production, and an appraisal of native vegetation for agricultural uses. The fragile soil cover unique to the Yukon requires the development of special cultural practices for land preparation, fertilization, irrigation, weed control, and management. Research is needed to develop methods of reclamation and revegetation of eroded, denuded, and industrial disturbed areas. Because of the potential importance of livestock, basic information is needed with major emphases on feeds and feed requirements, winter management, and an appraisal of breeds of cattle for Northern conditions.

Related research on reforestation by the Lands and Forest Service should be conducted in conjunction with agricultural research using common facilities and equipment.

b) Advisory Service – The advisory service will provide information for farmers, stockmen, gardeners, and home owners. It will advise on range management and on carrying capacity of rangeland, and will serve as a diagnostic center for diseases, weeds and insects, interpret soil analyses reports, and make fertilizer and other soil improvement recommendations.

c) Introduction of Other Government Facilities – The Canada Land Inventory should be expanded to include those areas of the Yukon now used for agriculture and those areas that show promise of usefulness as indicated by preliminary observation. This involvement will necessitate additional reconnaissance soil surveys.

Farm credit – Provision is required to make the facilities of Farm Credit Corporation available to land users in the Yukon. This may necessitate a change in the requirements of Farm Credit Corporation, in particular,

Title to the land (Title to *agricultural rights*)

Major portion of the income (reasonable portion of the income)

Acceptance of the Agriculture Development Council as co-signer for the loan.

In the last case the loan to be controlled and spending supervised by the Agriculture Development Council.

Department of Regional Economic Expansion — Certain aspects of the DREE program are required in the Yukon. In particular, the facilities of the Agricultural and Rural Development Administration, for the development and operation of community pastures are required.

Also of interest in the Yukon is the Special ARDA Program to create employment for Native people. Known as the Native employment incentive program, it is designed to assist establishment of enterprises employing Native people by making grants up to 50 percent of capital cost or $30,000 for each job created.

Veterinary Service — A subsidized veterinary service for livestock health and marketing, and for the health of all other domestic animals is required.

8. that certain amendments and changes be made in the present lease regulations and administration procedures:

   a) Legislation — Certain legislation changes are required to provide for better use of lease land. The most natable detriments to lease usage are:

      Limited tenure — grazing land should be leased for a three year period for fencing, water development and livestock accumulation, and renewable for seventeen years if development requirements have been met.

      Restrictions on improvements — credit should be given for permanent improvements to the leased area for water development for domestic, stock watering, and irrigation purposes, and for clearing and brush control.

      Provision is needed to encourage maximum use of natural hay meadows by granting commercial haying rights on unclaimed land,

and encouraging improvement of hay land through drainage, weed control, fertilizing, and reseeding.

Requirements that must be enforced include:

1) fencing to ensure that all stock are restricted to the area leased for that purpose, and
2) grazing supervision to prevent overgrazing and other misuse of grazing areas

b) Administration — Co-ordinate the Federal and Territorial Lands Offices procedures and institute a single identification system for lands. Decentralize responsibility and authority for documenting and finalizing leases so they can be completed in Whitehorse.

Institute a central record of land titles and lease agreements in the Yukon.

DEFINITIONS AND DISCUSSIONS

Agricultural Enterprise: a viable agricultural enterprise must be of sufficient size and capable of sufficient production to make an economic return. This will vary with:

a) Kind of agriculture followed

b) Land capability

c) Amount of support (investment)

Size varies for different types of farming

Market garden	10 - 20 acres
Greenhouse	5 - 15 acres
Mixed Livestock and Feed	320 acres plus grazing lease
Hay land	320 acres plus
Part-time farming	160 acres plus
Part-time gardening	10 - 15 acres plus

Small holdings for residential purposes only or country-style living should be completely excluded from an agricultural policy as they cannot qualify as an agricultural enterprise. Provision for small holdings should be made in some other category.

Agricultural Land: those lands that have been appraised by an approved soil survey and/or by an appointed agrologist and are found to have the physical and climatic features to make them usable for the production of agricultural crops and/or livestock.

Agricultural Rights: will entitle the holder to complete and continuous use of the area for the production of agricultural products provided the methods of operation are not harmful to the usefulness of the land, that farming practices are not contrary to the regulations of the Agriculture Development Council and that the requirements for taxes and other charges are met when due. The Agricultural Rights will permit the use of the land for agricultural production only, and any attempt to divert or change the land use to some other purpose will result in forfeiture of the rights. The holder of Agricultural Rights may build a home and supplementary buildings on the land, and may make other improvements for enhancement of his enterprise but such permanent improvements are then attached to the Agricultural Rights of the land and no subdivision to free them can be made. Recovery for improvements comes from increased value of the Agricultural Rights. If land use reclassification necessitates the withdrawal of the Agricultural Rights, the owner will be compensated in cash or in kind for loss of land, improvements and earning power.

Title to Agricultural Rights provides the owner with a vehicle for legal transactions but it restricts the holder from misuse of land and conversion of land use.

Based on the assumption the desire of the applicant to farm is genuine the concept of Agricultural Rights is sound.

Agriculture Development Council: will be responsible for the development, improvement, management, size and sale of Agricultural Rights of land or lands designated Agricultural Lands by the Agriculture-Land Use Committee.

Agriculture-Land Use Committee: will appraise the agricultural potential and suitability of the land for the production of agricultural crops:
will assess the qualifications of applicants for agricultural land for agricultural knowledge and ability, and to appraise the viability of the proposed enterprise:
will define the major land use of the area and approve or reject the use for agricultural purposes.

Grazing Land: those lands that in their natural state are considered to have the physical and climatic features to make them suitable for the production of livestock.

Development Program: it is assumed those desirous of obtaining agricultural land do so in order to farm. Obviously the quicker it can be used for that purpose the better. Attention has been drawn to the lack of equipment for clearing and breaking and need for knowledge and care in these operations. A properly equipped and trained unit under the Agriculture Development Council will be able to clear and break better at considerable saving, than individuals with minimum equipment and funds.

The area will be completely surveyed before being made available but no road development will take place until the needs are determined after settlement. Development will be concentrated to minimize the costs of services.

The holding stage for land not in demand for farming will be as a community pasture. It is proposed this plan should be submitted to the Department of Regional Economic Expansion with the request that DREE undertake the development and management of the pasture.

Foreign Ownership: foreign ownership of agricultural lands has suddenly become one of the most contentious issues before Provincial Governments. In most provinces the extent of foreign ownership is not known, because nationality is not a condition of purchase, but it is rapidly increasing and in many cases creating a false exaggerated value on land. Fear is expressed in some circles that land will not be available for future generations of Canadians.

The amount of good land in the Yukon is limited and it is proposed that its use be restricted to Canadians and immigrants in the actual process of becoming Canadians. The extent of foreign interest in the Yukon is indicated by desk inquiries at the Federal Lands Office. In a random sample of 84 enquiries for land between July 27 and August 10, 1974, 24 percent were from non-Canadians. Yukon citizens accounted for 46 enquiries, other Canadians 18, Americans 18 and Europeans 2.

Many people visit the Yukon for the first time during the summer and during that period some make application for farm land with the intention of becoming permanent residents. This decision may change after a winter and therefore it is recommended that applications for land be accepted only from those who have decided to stay after spending at least two complete years in the Yukon.

Research: agricultural research in the Yukon should not depend on the status of commercial agriculture but should proceed to develop a wide base of data for present and future needs. In the early years of sugar beet research at the Lethbridge Experimental Station, data were accumulated between 1908 and 1922 before there was sufficient solid evidence to attract the interest of the Utah-Idaho Sugar Co. to southern Alberta. Similarly when Western Canada faced serious soil drifting in the nineteen-thirties, 17 years of data on cultural practices had been accumulated and soil drift control principles were immediately available.

The location for agricultural research depends on the primary purpose of the research, the suitability of the soil and climatic conditions, for crop and livestock production, proximity to auxiliary services, and accessibility to the visiting public. In the Yukon where the primary object of the research will involve problems of both irrigated and non-irrigated agriculture, it is necessary to find the desired combination of suitable soils and climatic conditions in the proximity of a continuing, accessible water supply.

Administration: duplication of responsibility and regulations by the two government lands offices has given rise to confusion and dissatisfaction. To improve this situation there should be a single system or at least complete co-ordination and co-operation between the two units. This will require a single system of identification of land parcels.

There should be decentralization of administration and authority for the preparation and authorization of leases. The passing of material between Whitehorse and Ottawa is time consuming and unnecessary. The lease policy should be well defined and should allow for on-the-spot decisions. This will expedite lease agreements which now require up to three months to complete.

There is need for a record of deeded and leased land in the Yukon. This information is readily available from the Territorial Lands Office from an up-to-date card system but is not available from the Federal Lands Office or the Land Titles Office. A central clearing point for land information would have a great deal of merit.

Veterinary Services: the kinds and extent of animal diseases in the Yukon are not known and there are no provisions for the detection of diseases in either domestic livestock or native fauna, nor are there facilities for the isolation, quarantine or treatment of diseased animals. In the interests of public health, inspection services are needed to guarantee the standard of purity of locally produced animal products sold to the public.

Veterinary services are needed for the protection of grazing areas and for screening of animals entering community pastures.

Regulatory inspection services should be established for the movement of livestock into and out of the Yukon. These are normally supplied by the office of the Veterinary Director General of the Canada Department of Agriculture.

Because of the importance of horses and dogs in the Yukon in addition to the growing cattle population, a subsidized service of veterinary medicine is warranted. The service could be provided by one veterinarian assisted by one or more technicians.

LIST OF PERSONS INTERVIEWED

Acton, B.K. — Economist, Canada Research Station, Vancouver, British Columbia

Acton, D.F. — Soil Scientist, Canada Research Station, Saskatoon, Saskatchewan

Adamson, R.M. — Research Scientist, Canada Research Station, Saanichton, British Columbia

Allinger, L. — Merchant-Farmer, Burwash Lodge, Burwash Landing, Yukon Territory

Andal, Dr. M.E. — Economic Advisor, Farm Credit Corporation, Ottawa, Ontario

Anderson, C.H. — Research Scientist, Canada Research Station, Swift Current, Saskatchewan

Andrews, P. — Chief, National Air Photo Library, Energy, Mines and Resources, Ottawa, Ontario

Armstrong, Ervin — Farm worker, Yukon Territory

Bishop, Dr. C.J. — Research Co-ordinator (Horticulture), Research Branch, Department of Agriculture, Ottawa, Ontario

Bradley, Hugh — Rancher-Farmer, Pelly River Ranch, Pelly Crossing, Yukon Territory

Brandon, L.V. — Regional Manager, Water, Lands and Forests, Indian Affairs and Northern Development, Whitehorse, Yukon Territory

Brewster, W. — Outfitter, Haines Junction, Yukon Territory

Brink, Dr. V.C. — Professor Plant Science, University of British Columbia, Vancouver

Brown, Mr./Mrs. Louis — Farmer-Rancher, Mayo, Yukon Territory

Burton, Dr. Wayne — Professor of Economics, University of Alaska, Palmer, Alaska

Campbell, A. Glen — Employee, Resources Management Officer, Forest and Land Management, Beaver Creek, Yukon Territory

Carr, Dr. D.W. — Economist, D.Wm. Carr and Associates Ltd., Ottawa, Ontario

Chapman, Dr. C.H. — Health of Animals Branch, Canada Department of Agriculture, Lethbridge, Alberta

Chouinard, J. — Farmer, Annie Lake Road, Yukon Territory

Clement, D. Code — Assistant Planner, Oldman River Planning Commission, Lethbridge, Alberta

Clement, Howard L. — Regional Economic Expansion, Victoria, British Columbia

Coombs, D.B. — Director, Land Evaluation and Mapping Branch, Environment Canada, Ottawa, Ontario

Currie, Mrs. Barbara — Secretary, Yukon Livestock and Agricultural Association, Tagish, Yukon Territory

Davidson, D.A. — Director, Territorial and Social Development Branch, Indian Affairs and Northern Development, Ottawa, Ontario

Day, J.H. — Soil Research Institute, Canada Research Branch, Department of Agriculture, Ottawa, Ontario

Doak, Leonard G. — Program Manager, C.E.A. Kenai, Alaska, General Electric Company, New York, U.S.A.

Dunker, John — Land Management, Alaska Division of Lands, Fairbanks, Alaska

Evans, G.C. — Head, Policy Development Unit, Land Administration Section, Indian Affairs and Northern Development, Ottawa, Ontario

Falle, A. — Construction Contractor, Yukon Territory

Farr, Weldon — Retired, Dawson City, Yukon Territory

Fitzgerald, J.B. — Director, Games Branch, Yukon Territorial Government, Whitehorse, Yukon Territory

Fumerfelt, Mr./Mrs. J. — Employee, Department of Highways and Public Works, Yukon Territorial Government, Destruction Bay, Yukon Territory

Gray, R.J. — Manager, Valley Feeders Ltd., Lethbridge, Alberta

Guitard, Dr. A.A. — Director, Canada Research Station, Swift Current, Saskatchewan

Guthrie, Dr. Hurtha — Horticulturist, Controlled Environment Agriculture Project, Wildwood Base, Kenai, Alaska

Hennig, A.M.F. — Research Scientist, Canada Research Station, Beaverlodge, Alberta

Heydorf, M.F. — Farmer, Dawson City, Yukon Territory

Hotte, Vic — Operator, Davis and Burrard Outfitters, Haines Junction, Yukon Territory

Howard, Mrs. Helen — University of Alaska Muskox Project, Fairbanks, Alaska

Hudson, Dr. S.C. — Consulting Economist, Hull, Quebec

Johnston, A. — Range Ecologist, Canada Research Station, Lethbridge, Alberta

Klassen, W. — Games Branch, Yukon Territorial Government, Whitehorse, Yukon Territory

Klebesadel, Dr. L.J. — Agronomist, Agricultural Research Service, U.S.D.A. Palmer, Alaska

LaBrash, Paul — President, Yukon Livestock and Agriculture Association, Whitehorse, Yukon Territory (at time of interview)

Laing, Senator Arthur — Vancouver, British Columbia

Lessard, Elsie — Market Gardener, Carcross-Tagish, Yukon Territory

Leweke, V.L. — Farmer-Rancher, Porter Creek, Yukon Territory

Livesey, J.O. — Merchant, Beaver Creek, Yukon Territory

Mair, Winston — Regional Economic Expansion, Victoria, British Columbia

Migocovski, Dr. B.B. — Director General, Canada Research Branch, Ottawa, Ontario

Mitchell, Dr. W.W. — Professor of Agronomy, University of Alaska, Palmer, Alaska

McColl, Frank — Assistant Chief, Water, Lands, Forest and Environment Division, Indian Affairs and Northern Development, Ottawa, Ontario

McDiarmid, A. — Farmer-Garage Operator, Mayo, Yukon Territory

McIntosh, W.F. — Head, Operations and Land Transactions Unit, Land Administration Section, Indian Affairs and Northern Development, Ottawa, Ontario

McIntyre, Gordon — Registrar of Land Titles, Indian Affairs and Northern Development, Whitehorse, Yukon Territory (at time of interview)

McNeil, Marlin — Farmer-Rancher, Indian River Ranch, Dawson City, Yukon Territory

Naysmith, J.K. — Forestry, Indian Affairs and Northern Development, University of British Columbia, Vancouver

Notland, S. — Greenhouse Operator, Whitehorse, Yukon Territory

Nowlan, D. — Game Farm Operator, Whitehorse, Yukon Territory

Omotami, A. — Employee, Yukon Territorial Government, Whitehorse, Yukon Territory

Palmer, Dr. A.E. — Retired, Former Director Canada Research Station, Lethbridge Alberta

Paquin, C.E. — Director of Lands, Province of Alberta, Edmonton, Alberta

Phillips, D. — Employee, White Pass and Yukon Route, Carcross Road, Yukon Territory

Pringle, W.L. — Research Scientist, Canada Research Station, Beaverlodge, Alberta

Purnell, Dr. G.R. — Deputy Minister of Agriculture, Province of Alberta, Edmonton, Alberta

Retallack, T. — Supervisor of Lands, Indian Affairs and Northern Development, Whitehorse, Yukon Territory

Riddick, Dr. J. — Manager, Arctic Land Use Research Section, Indian Affairs and Northern Development, Ottawa, Ontario

Rivera, Flavio — Owner Dezadeash Lodge, Haines Road, Yukon Territory

Rose, Russel — Farmer, Tagish, Yukon Territory

Seidler, W. — Employee, White Pass and Yukon Route, Whitehorse, Yukon Territory

Shadura, Alex — Director, C.E.A., Kenai Natives Association Inc., Kenai, Alaska

Sinder, W.J. — Manager, International Harvestor Co., Whitehorse, Yukon Territory

Smith, Graham — Hydroponics, Bemco Farms, High River, Alberta

Spangelo, Dr. L.P.S. — Director, Canada Research Station, Beaverlodge, Alberta

Steele, Jack — British Columbia Representative on A.R.D.A., Victoria, British Columbia

Stevens, N.L. — Farmer-Employee, City of Whitehorse, Yukon Territory

Stevenson, Mrs. Louella — Farmer (Wife, Captain Dick Stevenson), Dawson City, Yukon Territory

Stutt, R.H. — Consulting Economist, Ottawa, Ontario

Tait, R.M. — Farmer-Employee, Yukon Territorial Government, Haines Junction, Yukon Territory

Taylor, Roscoe L. — Agronomist, Agricultural Research Service, U.S.D.A., Palmer, Alaska

Thiedt, J. — Whitehorse, Yukon Territory

Tomlin, Dr. D.C. — Animal Science, University of Alaska, Fairbanks, Alaska

Trevor, Bryon — Regional Manager, Water, Forests and Lands, Indian Affairs and Northern Development, Whitehorse, Yukon Territory

Tsukamoto, J.Y. — Manitoba Department of Agriculture, Brandon, Manitoba

VanVeen, A. — Employee, White Pass and Yukon Route, Whitehorse, Yukon Territory

Veerman, Mrs. C. — Wife-Farmer, Carcross Road, Yukon Territory

Vickers, L.G. — Instructor, Carcross Community School, Carcross, Yukon Territory

Wells, Dr. K.F. — Veterinary Director General, Health of Animals Branch, Canada Department of Agriculture, Ottawa, Ontario

White, Paul S. — Special Assistant to the Minister, Indian Affairs and Northern Development, Ottawa, Ontario (at time of interview)

Williams, R.W. — Lawyer, Davidson and Williams, Lethbridge, Alberta

Wood, Dr. V.A. — Chairman, Alberta Land Use Forum, Province of Alberta, Edmonton, Alberta

Woodward, Dr. J.C. — Assistant Deputy Minister, Canada Department of Agriculture, Ottawa, Ontario

Woolsey, Bill — Operator Grader Station Quiet Lake, Yukon Territory

Yardley, Gordon — Farmer-Contractor, Whitehorse, Yukon Territory

REFERENCES

Acton, B.K. and E.D. Woodward. 1959. Cattle Ranching in British Columbia. Canada Department of Agriculture.

Alaska Department of Natural Resources. 1973. Facts About Alaska Lands. Anchorage.

Alaska Rural Development Council. 1974. Alaska's Agricultural Potential. Cooperative Extension Service, University of Alaska, Fairbanks. 152pp. & maps.

Alaska Soil Conservation Services et al. 1972. A Vegetative Guide for Alaska. U.S.D.A. SCS Portland.

Alberta. Municipal Affairs. 1973. Towards a New Planning Act for Alberta. Government of Alberta. Edmonton.

Alberta. 1974. Legislation, Policies and Functions. Alberta Lands Division.

Archibald, E.S. 1944. Agricultural Lands in the Canadian Northwest. Canadian Geographical Journal, Vol. 29, pp. 41-50.

Borlaug, Norman E. 1974. Millions Could Die (Interview), Readers Digest, Dec. 1974.

British Columbia. 1969. The Beef Cattle Industry of British Columbia. Ministry of Agriculture. Victoria, B.C.

British Columbia. 1972. Environment and Land Use Committee, Victoria, B.C.

Brown, R.J.E. 1970. Permafrost in Canada, Its Influence on Northern Development. University of Toronto Press.

Burton, Wayne E. 1974. Meeting the Needs of Tomorrow's Agricultural and Agroeuthenics Development in Alaska — The Public Sector. University of Alaska, Palmer, Alaska.

Calder, Ritchie. 1957. Men Against the Frozen North. Geo. Allen and Unwin Ltd.

Canada. Department of Agriculture. 1954. Progress Report, 1945-1952, Experimental Substation, Whitehorse, Yukon Territory. Canada Department of Agriculture, Ottawa.

Canada. Department of Agriculture. c.1957. Research Hi-Lites, 1955-56, Whitehorse Experimental Farm, Mile 1019, Alaska Highway, Yukon Territory. Mimeo.

Canada. Department of Agriculture. c.1959. Research Highlights, 1957-58, Whitehorse Experimental Farm, Mile 1019, Alaska Highway, Yukon Territory. Mimeo.

Canada. Department of Agriculture. 1963. Progress Report, 1953-1959, Experimental Farm, Mile 1019, Alaska Highway, Yukon Territory. Canada Department of Agriculture, Ottawa.

Canada. Department of Agriculture. 1966. Research Report, 1960-1964, Experimental Farm, Mile 1019, Alaska Highway, Yukon Territory. Canada Department of Agriculture, Ottawa.

Canada. Department of Agriculture. 1969. Research Reports, 1967, 1968, 1969. Research Station, Beaverlodge, Alberta. Canada Department of Agriculture, Ottawa.

Canada. Department of Agriculture. 1970. Farming in Canada. Canada Department of Agriculture, Ottawa.

Canada. Department of Agriculture. 1974. Soilless Growth or Hydroponics. Canada Department of Agriculture, Ottawa.

Canada. Department of Agriculture. 1974. The System of Soil Classification for Canada. Publication 1455. Information Canada.

Canada. Department of Indian Affairs and Northern Development. 1972. Yukon – Background Information on the Yukon. Information Canada, Ottawa.

Canada. Department of the Interior. 1897. Agricultural Capabilities of the Yukon Basin. *In* p. 33-36, Information Respecting the Yukon District from the Reports of Wm. Ogilvie, Dominion Land Surveyor, and from Other Sources. Government Printing Bureau, Ottawa.

Canada. Department of the Interior. 1916. The Yukon Territory – Its History and Resources, Chap. XII, Agriculture, p. 206-213. Mining Lands and Yukon Branch, Canada Department of the Interior, Ottawa.

Canada. Department of the Interior. 1926. The Yukon Territory, Chap. VII, Agriculture, p. 63-64. Northwest Territories and Yukon Branch, Canada Department of the Interior, Ottawa.

Canada. Department of Mines and Technical Surveys. 1957. Marl Deposit near Mayo. *In* p. 433-434, Geological Survey of Canada Memoir 284. Queen's Printer, Ottawa.

Canada. Department of Resources and Development. 1950. Yukon Territory – A Brief Description of its History, Administration, Resources. Issued by Northern Administration, Canada Department of Resources and Development, Ottawa.

Carder, A.C. 1965. Northwestern Canada's Climate: Its Effect on Crop Growth and Development. Agricultural Institute Review, Vol. 20 Part 3, p. 20-22, May-June, 1965.

Carr, D.W. and F.W. Anderson. 1968. The Yukon Economy – Its Potential for Growth and Continuity. Vol. 1. Final Report. A Report Prepared by D. Wm. Carr and Associates Ltd., for Canada Department of Indian Affairs and Northern Development and the Government of Yukon Territory. Queen's Printer, Ottawa.

Census of Canada. Canada Year Books.

Collins, F.H. 1955. The Yukon Territory — A Brief Presented to the Royal Commission on Canada's Economic Prospects by F.H. Collins, Commissioner of Yukon Territory, at Edmonton, Alberta, on November 22, 1955. Queen's Printer, Ottawa.

Cruikshank, Julie. 1974. Through the Eyes of Strangers: A Preliminary Survey of Land Use History in the Yukon During the Late Nineteenth Century. Report to the Yukon Territorial Government and the Yukon Archives.

Dawson, G.M. 1888. Report of an Exploration in the Yukon District, N.W.T. and Adjacent Northern Portion of British Columbia, 1887, by G.M. Dawson, with Extracts Relating to the Yukon District from a Report of an Exploration in the Yukon and Mackenzie Basins, 1887-88. Dawson Bros. Montreal.

Day, J.H. 1962. Reconnaissance Soil Survey of the Takhini and Dezadeash Valleys in the Yukon Territory. Research Branch, Canada Department of Agriculture, Ottawa. 78 pp. with map.

Dinkel, Donald H., Wayne E. Burton and Clayton R. Oslund. 1973. Controlled Environment Agriculture (CEA). Agroborealis, July 1973.

Faulknor, C.V. 1964. The Cowpunchers of Pelly River. Canadian Geographical Journal, Vol. 66, Part 6, pp. 188-197, December, 1964.

Fitzgerald, J.B. 1973. The Role of the Yukon Game Branch in Relation to Land Use. Game Branch, Yukon Government, Whitehorse. Mimeo. 7pp.

Garland, S.W. 1969. Establishing a Farm in Canada. C.D.A. Publication 1403. Canada Department of Agriculture, Ottawa.

Godfrey, T.J.R. 1969. Multiple Use of Parklands. Paper Presented at Yukon Northern Resource Conference, Whitehorse, April 9, 1969. B.C.-Yukon Chamber of Mines, Vancouver, British Columbia. Mimeo. 10pp.

Gordon, J.H. 1969. National Parks and the Yukon. Speech Presented at Yukon Northern Resource Conference, Whitehorse, April 9, 1969. Canada Department of Indian Affairs and Northern Development, Ottawa. Mimeo. 15pp.

Gubbels, G.H. 1963. Gardening in the Yukon. C.D.A. Publication 1192. Canada Department of Agriculture, Ottawa.

Gubbels, G.H. 1971. Response of Cabbage Grown North of Latitude 60°N to Plastic Mulch, Ridging, and Row Orientation. Canadian Journal of Plant Science, Vol. 51, pp.17-20, 1971.

Gubbels, G.H. 1972. Effects of Plastic Mulch and Row Spacing on Carrots Grown North of Latitude 60°N. Canadian Journal of Plant Science, Vol. 52, pp. 660-661, 1972.

Gubbels, G.H. 1972. How to Build a Plastic Crop Shelter or Greenhouse. Publication 1337. Canada Department of Agriculture, Ottawa.

Guitard, A.A. 1968. Recommendations Concerning an Agricultural Policy for the Yukon Territory. Research Branch, Canada Department of Agriculture, Beaverlodge, Alberta. Mimeo. 4pp.

Guitard, A.A., R.L. Taylor, J.C. Brinsmade, J.A. Gilbey, J.A. Newman, and J.Y. Tsukamoto. 1965. Growth of Spring Cereals in Northwestern Canada and Alaska. C.D.A. Publication 1220. Canada Department of Agriculture, Ottawa.

Hamilton, Walter R. 1964. The Yukon Story. Mitchell Press Ltd., Vancouver, Canada.

Harris, R.E. 1970. Gardening on Permafrost. C.D.A. Publication 1408. Canada Department of Agriculture, Ottawa.

Harris, R.E., A.C. Carder, W.L. Pringle, P.B. Hoyt, D.G. Faris, and P. Pankiw. 1972. Farming Potential of the Canadian Northwest. C.D.A. Publication 1466. Canada Department of Agriculture, Ottawa.

Hemstock, C.A., and G.A. Cook. 1971. Yukon Bibliography Update 1963-1970. Occasional Publication No. 8-1. Boreal Institute for Northern Studies, University of Alberta, Edmonton.

Johnson, Bruce B. 1974. Farmland Tenure Patterns in the United States. U.S.D.A. Washington, D.C.

Johnston, A. 1975. Land Use and Rural Subdivision in Alberta. In Press.

Joyce, T.F. 1971. Provincial Agricultural Legislation in Western Canada. Agriculture Canada.

Kendrew, W.G., and D. Kerr. 1956. The Climate of British Columbia and the Yukon Territory. Queen's Printer, Ottawa.

Kulshreshtha, S.N., and V. Holub. 1973. An Aggregate Econometric Model of Canadian Agriculture. Department of Agricultural Economics, University of Saskatchewan, Saskatoon.

Lavkulich, L.M. 1973. Physical Environmental Studies, Watson Lake, Yukon Territory. (1971-72) (1972-73) Canada Department of Indian Affairs and Northern Development, Ottawa.

Leahey, A. 1953. Factors Affecting the Extent of Arable Lands and the Nature of the Soils in the Yukon Territory. *In* p. 16-20, Proceedings, Vol. 5, Pacific Science Congress 7th, New Zealand, 1949.

Leechman, D. 1950. Yukon Territory. Canadian Geographical Journal, Vol. 40, pp. 240-267.

Lothian, W.F. 1950. Yukon Territory — A Brief Description of its History, Administration, Resources, and Development. Northern Administrations, Canada Department of Resources and Development, Ottawa.

Lotz, J.R. 1964. Yukon Bibliography, Preliminary Edition. Yukon Research Project 1. Northern Coordination and Research Centre, Canada Department of Northern Affairs and Natural Resources, Ottawa. Mimeo.

Maas, E.F. and R.M. Adamson. 1971. Soilless Culture of Commercial Greenhouse Tomatoes. Publication 1460. Canada Department of Agriculture.

Mason, E.B.B. and R.M. Adamson. 1973. Trickle Watering and Liquid Feeding System. Publication 1510. Canada Department of Agriculture.

Mathews, R. 1968. The Yukon. Rivers of America Series. Holt, Rinehart, and Winston, New York, Chicago, and San Francisco.

McConnell, R.G. 1890. (A Note on Fort Yukon) *In* pp. 134D-135D, Annual Report (New Series) Vol. IV, 1888-89, Geological and Natural History Survey of Canada, Ottawa.

McCourt, E. 1969. The Yukon and Northwest Territories. Macmillan of Canada, Toronto.

Mining Recorder, Mayo District. 1928. A Report to G.A. Jeckell, Acting Gold Commissioner, Dawson, Yukon Territory. (Unpublished)

Murray, J.M., J.S. Rowe, F.G. Olfert, D.M. Gubbe. 1973. Hydrologic and Ecologic Studies Related to Land Use Near Watson Lake, Yukon Territory. Canada Department of Indian Affairs and Northern Development, Ottawa.

Naysmith, J.K. 1973. North of 60 — Toward a Northern Balance. Canada Department of Northern Affairs and Northern Development. Information Canada, Ottawa.

Nowosad, F.S. 1959. Agriculture in the North. Transactions of the XII B.C. Natural Resources Conference, Harrison Hot Springs, British Columbia, November 18-20, 1959. Mimeo.

Nowosad, F.S. (Chairman) 1962. Report of the Committee on the Possibilities and Development of Agriculture in Yukon Territory. Canada Departments of Agriculture, Northern Affairs, and Natural Resources.

Nowosad, F.S. 1970. A Handbook for Northern Gardeners. C.D.A. Publication 1081. Canada Department of Agriculture, Ottawa.

Ogilvie, Wm. 1898. The Agricultural Capabilties of the Yukon Basin. *In* p. 58 at seq. The Klondike Official Guide. Hunter, Rose, Co., Ltd., Toronto.

Oldman River Region. Preliminary Regional Plan 1974. Oldman Regional Planning Commission. Lethbridge, Alberta.

Organisation For Economic Co-operation and Development. 1973. Agricultural Policy Reports. OECD Paris.

Palliser, Captain J. 1863. The Journals, Detailed Reports and Observations, Relative to the Explorations by Capt. Palliser of That Portion of British North America. Queen's Printer, London.

Robinson, J.L. 1945. Agriculture and Forests of Yukon Territory. Canadian Geographical Journal, Vol. 31, Part 2, pp. 53-72, August, 1945.

Saskatchewan. 1973. Final Report of the Special Committee on the Ownership of Agricultural Lands, Regina.

Stefansson, Evelyn. 1957. Here is the Far North. Charles Scribner's Sons, New York.

Stutt, R.A., J.H. Day, and K. Rasmussen. 1969. Report on the Potential of the Slave River Lowlands for Agriculture and the Feasibility of Developing a Viable Cattle Ranching Industry in the Area. Canada Department of Agriculture, Ottawa. Mimeo.

Thompson, H.A. 1962. Temperature Normals, Averages, and Extremes in the Yukon Territory and the Northwest Territories. *In* pp. 308-312, Arctic, December, 1962.

Ward, E. Neville and Valerie Cranmer. 1974. Canada Has Land "Crises" From Sea to Sea. Canadian Geographical Journal. December 1974.

Wilson, D.B. 1974. The Grazing Steer. Lethbridge Research Station Weekly Letter No. 2127. Lethbridge, Alberta.

Woodward, J.C. 1974. Canadian Production Potentials. Proc. Canadian Farm Economics, Vol. 9 No. 1, 1974. Ottawa.

Yukon Territory. Statistical Appendix to the Annual Report of the Commissioner 1970-71. Government of the Yukon Territory.

Zazlow, M. 1971. The Opening of the Canadian North, 1870-1914. McClelland and Stewart Ltd., Toronto and Montreal.

Zoltai, S.C. and W.W. Pettapiece. 1973. Studies of Vegetation, Land Form and Permafrost in the Mackenzie Valley. Terrain, Vegetation and Permafrost Relationships in the Northern Part of the Mackenzie Valley and Northern Yukon. Information Canada Cat. No. R72-7973.

TABLE 1

TEMPERATURE AND PRECIPITATION AT FOUR YUKON STATIONS

	TEMPERATURE °F						PRECIPITATION		
	Mean January	Mean July	Highest on Record	Lowest on Record	Average date of freezing temps. (32° or lower)		Total all forms inches	Snowfall inches	Ave. no. of days - all forms
					Last in Spring	First in Autumn			
Dawson	-19.5	59.9	95	-73	May 26	Aug. 27	12.81	53.7	120
Snag Airport	-18.7	57.0	89	-81	June 18	Aug. 9	14.16	55.3	118
Watson Lake Airport	-13.6	58.9	93	-74	May 30	Sept. 3	17.01	89.5	153
Whitehorse Airport	- 2.0	57.3	94	-62	June 5	Sept. 1	10.24	50.3	118

Source: Canada Year Book 1973

TABLE 2

GROWING PERIOD AND PRECIPITATION AT SELECTED STATIONS

STATION	KILLING-FROST-FREE PERIOD, 28°F						VEGETATIVE PERIOD, 42°F				Degree-Days	Precipitation
	No. of Years	Longest in Days	Shortest in Days	Average in Days	Average date		No. of Years	Ave. No. of Days	Ave. Date Started	Ave. Date Ended	No. of Degree Days	May - Sept. 1865-1969 (Inches)
					Last in Spring	First in Autumn						
Dawson	29	142	63	119	May 17	Sept.12	10	136	May 5	Sept.18	1636	7.10
Mile 1019	22	86	16	52	June 21	Aug. 14	21	122	May 19	Sept.19	605	6.00
Mayo Landing	30	121	32	96	May 25	Aug. 25	10	138	May 6	Sept.21	1349	6.74
Teslin	20	126	74	94	June 2	Sept. 3	10	138	May 9	Sept.24	1159	6.19
Watson Lake	28	145	76	118	May 19	Sept.13	10	144	May 6	Sept.27	1574	8.38
Whitehorse	20	143	94	118	May 19	Sept.13	10	143	May 6	Sept.26	1437	5.77
* Beaverlodge, Alberta	22	166	111	134	May 8	Sept.14	10	155	Apr. 30	Oct. 2	2085	10.53
* Grande Prairie, Alberta	20	170	98	131	May 8	Sept.15	22	155	May 2	Oct. 4	1931	7.95
* Peace River, Alberta	15	153	111	130	May 14	Sept.21	14	148	May 3	Sept.29	2120	6.91

Source: Canada Department of Agriculture Publication 1466
Farming Potential of the Canadian Northwest

*Established agricultural areas for comparison

TABLE 3

MONTHLY AND ANNUAL NORMALS OF MEAN DAILY TEMPERATURE (°F) FOR SELECTED STATIONS IN THE YUKON TERRITORY

STATION	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	ANN. MEAN	YRS. OBS
Aishihik	- 6.2	0.4	10.4	24.1	40.5	50.2	53.5	49.8	40.9	26.3	8.4	- 4.1	24.5	17
Dawson	-17.6	-11.1	5.7	29.4	46.6	56.9	59.8	54.5	43.5	26.4	2.5	-12.9	23.6	30
Haines Junction	- 5.6	2.0	15.9	29.4	42.1	50.8	53.8	50.6	42.4	28.2	10.9	- 2.6	26.4	16
Mayo Landing	-13.3	- 5.5	11.3	31.0	46.3	55.7	58.4	53.4	43.4	28.4	5.2	-10.0	25.4	30
Snag	-18.5	- 8.7	7.7	26.6	44.6	54.0	57.0	52.2	41.1	22.0	- 1.0	-16.3	21.7	17
Teslin	- 3.0	4.8	17.9	30.3	43.6	53.0	56.2	52.8	45.1	32.9	17.6	4.2	29.6	17
Watson Lake	-11.5	- 1.5	14.0	31.3	45.9	55.7	59.1	55.3	46.3	32.3	9.2	- 7.4	27.4	22
Whitehorse	- 0.6	6.7	18.3	31.7	45.5	54.6	57.5	54.3	46.3	33.3	17.2	4.9	30.8	18

Source: Thompson, H.A. 1962. Temperature normals, averages and extremes in the Yukon Territory and the North West Territories. Arctic. Dec., 1962, p. 308-312

TABLE 4

NUMBER, AREA AND USE OF FARM LAND, YUKON TERRITORY, SELECTED YEARS[1]

ITEM	UNIT	1931	1941	1956	1961	1966	1971
Number of farms	Number	41	26	16	15	9	12
Number of commercial farms[2]	Number	n.a.	n.a.	4	2	2	3
Total area of farms	Acres	5,197	2,781	3,997	8,072	3,680	2,721
Improved Land	Acres	778	511	634	954	463	1,418
Unimproved Land	Acres	4,419	2,270	3,363	7,118	3,217	1,303
Crops — Wheat	Acres	8	—	23	42	—	1
Oats	Acres	63	27	52	77	20	88
Barley	Acres	n.a.	n.a.	15	4	—	—
Hay	Acres	558	392	88	104	108	127
Potatoes	Acres	69	47	17	12	4	6
Vegetables	Acres	5	1	9	5	2	—
Livestock — Horses	Number	62	90	172	230	17	42
Cattle	Number	72	52	104	206	98	146
Milk cows	Number	n.a.	n.a.	7	16	9	20
Hens and Chickens	Number	224	138	296	358	635	857

[1]Based on unpublished data from the Census of Agriculture provided by the Dominion Bureau of Statistics, Ottawa. No data were available from the 1951 Census.

[2]Commercial farms include all farms reporting $1,200 or more ($2,500 or more in 1966 and 1971)

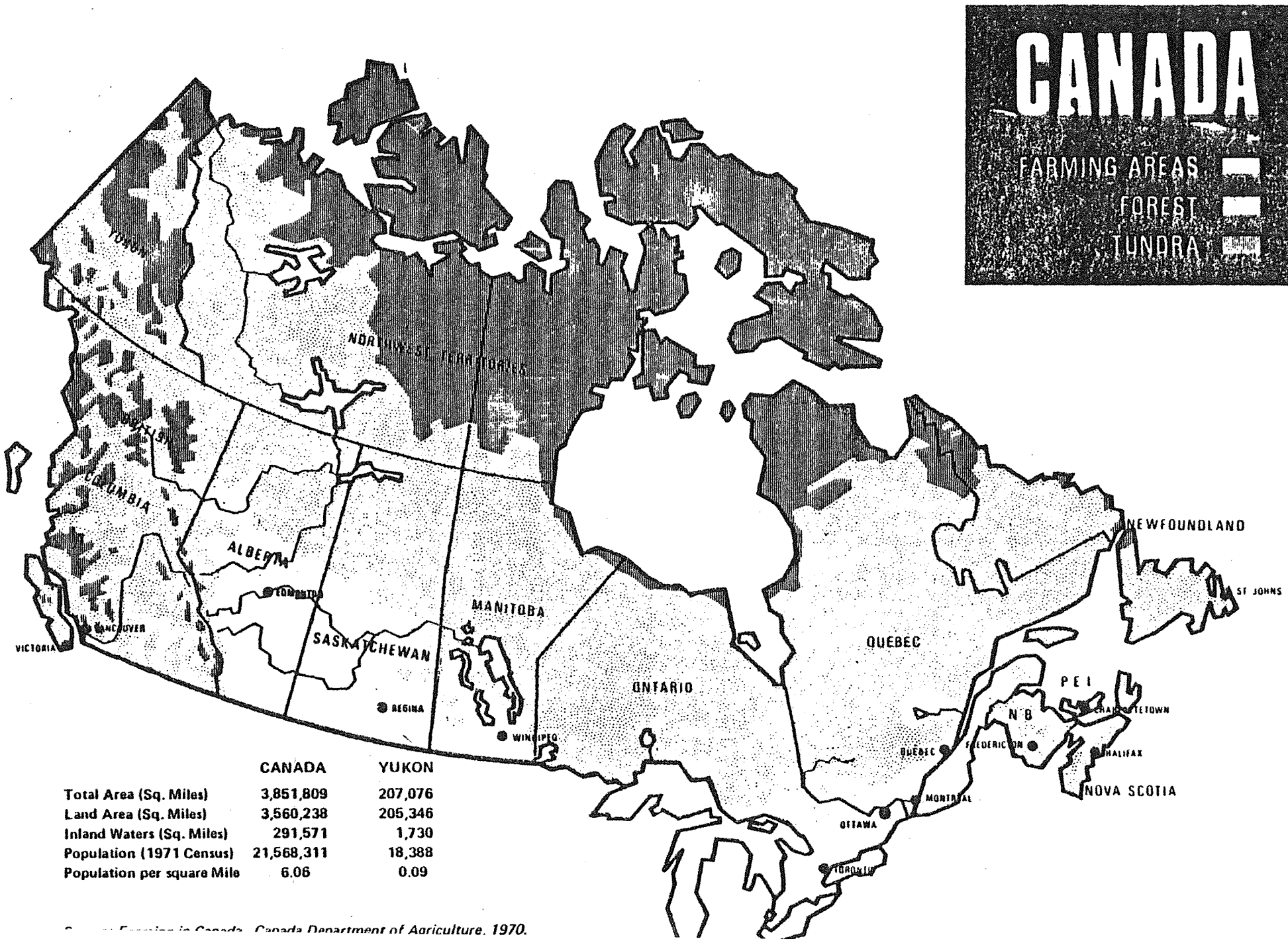
TABLE 5 – SUMMARY OF SOIL TEST RESULTS

TEST NO.		TEXTURE	pH	CONDUCTIVITY	%	AVAILABLE NUTRIENTS: lb./Acre (1) N	P	K	NUTRIENT REQUIRED: lb./Acre (2) NITROGEN	PHOSPHATE	POTASH	SULFUR	FERTILIZER RECOMMENDED (3) KIND	lb./Acre	GENERAL LOCATION
550	A	Clay Loam	8.2	1.4	M-	1	75	275	85	0	0	0	34-0-0	101	7 Mayo Rd.
	B	Clay Loam	8.8	0.7	M-	1	05	275							
551	A	Clay Loam	7.7	0.6	M-	1	1[illegible]	30%	70	0	0	0	34-0-0	203	7 Mayo Rd.
	B	Clay Loam	6.6	0.3	L	2	[illegible]	230							
552	A	Loam	8.1	2.5	M-	19	[illegible]	790	40	0	0	0	34-0-0	118	7 Mayo Rd.
	B	Loam	8.3	1.6	M-	16	30	404							
553	A	Clay Loam	6.8	0.2	L-	2	121	55%	75	0	0	15	34-0-0	221	2 Takhini Hot Springs
	B	Clay Loam	6.7	0.1	L	2	61	20%							
554	A	Clay Loam	6.8	0.6	M	6	51	1560	65	0	0	0	34-0-0	191	949 Alaska Highway
	B	Clay	8.0	0.6	M-	3	222	167%							
555	A	Loam	6.4	0.3	M-	4	21	420	85	15	0	0	34-0-0	100	951 Alaska Highway
	B	Clay	6.8	0.4	M	3	[illegible]	520					27-14-0	100	
556	A	Clay	7.5	0.4	M	6	47	640	70	0	0	0	34-0-0	203	955 Alaska Highway
	B	Clay	7.4	0.3	M-	7	12	550							
557	A	Clay	7.0	0.3	M-	1	46	730	65	0	0	0	34-0-0	192	955 Alaska Highway
	B	Clay	7.3	0.3	M-	3	[illegible]	580							
558	A	Sand	6.6	0.2	M-	2	26	425	55	15	0	0	34-0-0	80	1010 Alaska Highway
	B	Sand	6.5	0.2	M-	3	10	320					27-14-0	100	
559	A	Clay Loam	7.4	0.5	M-	40	201	66%	0	0	0	0			1010 Alaska Highway
	B	Clay	7.5	0.6	M-	40	97	115							
560	A	Clay	6.0	0.2	M-	1	10	320	15	45	0	0	18-46-0	100	1010 Alaska Highway
	B	Loam	6.0	0.2	M	1	[illegible]	225							
561	A	Sand	6.7	0.4	M-	4	[illegible]	125	65	30	15	0	13-13-13	100	6.5 Carcross Rd.
	B	Loam	7.4	0.5	-	1	[illegible]	75					27-14-0	200	
562	A	Coarse Sand	6.7	0.2	M-	1	108	150	35	0	20	0	13-13-13	150	21 Atlin Rd.
	B	Coarse Sand	6.5	0.2	-	4	116	115					21-0-0	50	
563	A	Coarse Sand	6.2	0.1	L-	1	50	245	35	0	15	0	13-13-13	100	877 Alaska Highway
	B	Coarse Sand	6.1	0.1	-	1	64	145					21-0-0	50	
564	A	Clay	6.8	0.3	M	6	11	630	60	0	0	0	34-0-0	176	940 Alaska Highway
	B	Clay	7.7	0.6	-	6	12	630							
565	A	Clay Loam	7.0	1.0	M-	61	171	300	0	0	0	0			2 Takhini Hot Springs
	B	Clay Loam	7.1	0.7	-	16	126	300							
700	A	Loam	6.5	0.2	M-	6	09	110	60	25	15	0	14-14-7	200	Gravel Lake
	B	Clay Loam	6.8	0.1	-	4	00	80					34-0-0	100	
701	A	Clay Loam	7.6	5.9	M-	19	17	1010	40	15	0	0	27-14-0	100	10 Mayo Rd.
	B	Clay Loam	8.4	0.5	-	12	30	1004					21-0-0	70	
702	A	Clay Loam	7.6	0.6	M-	6	25	85	40	15	20	0	6-24-24	100	Watson
	B	Clay Loam	7.2	0.4	-	5	21	70					34-0-0	100	
703	A	Sand	7.7	0.6	M-	6	00	210	40	40	15	0	14-14-7	200	Summerdale
	B	Sand	7.9	0.6	-	5	00	150					21-21-0	50	
704	A	Clay Loam	7.7	0.7	M-	6	06	275	55	15	15	0	14-14-7	200	Summerdale
	B	Clay Loam	7.9	0.7	-	3	00	145					27-14-0	100	
576	A	Clay Loam	8.0	0.8	M	80	3	110	0	45	15	0	6-24-24	200	Pelly River
	B	Clay Loam	8.1	0.7	M	76	3	100							
577	A	Loam	7.8	0.8	M-	80	60	165	0	0	0	0			Whitehorse
	B	Loam	7.7	1.2	M-	80	92	165							
900	A	Sand	7.0	0.2	L-	14	27	255	40	15	0	15	27-14-0	100	12 Carcross Rd.
	B	Sand	7.5	0.4	M-	4	14	170					21-0-0	70	
901	A	Sand	7.3	0.2	L-	1	5	230	60	20	0	15	27-14-0	150	19 Carcross Rd.
	B	Clay Loam	7.5	0.2	L-	0	5	270					21-0-0	100	
903	A	Coarse Sand	7.9	0.3	M	4	173	300	45	0	0	0	45-0-0	100	Rose River
	B	Coarse Sand	8.1	0.3	M-	0	50	105							
904	A	Clay Loam	8.7	0.2	L-	1	75	240	70	0	0	0	34-0-0	200	Faro
	B	Sand	8.6	0.2	L-	1	16	130							
905	A	Peat	5.6	0.1	L-	1	181	115	70	0	20	15	13-13-13	150	317 Campbell Rd.
	B	Sand	5.0	0.1	-	0	77	100					34-0-0	150	
906	A	Peat	7.6	3.2	M-	80	5	485	25	55	0	0	18-46-0	130	10 Carcross Rd.
	B	Peat	7.7	2.8	M-	80	0	175							
908	A	Clay	7.6	0.6	M-	2	37	850	70	15	0	0	27-14-0	100	950 Alaska Highway
	B	Clay	7.3	0.3	M	1	15	665					34-0-0	100	
1140	A	Clay Loam	6.9	0.2	L-	0	82	360	70	0	0	10	34-0-0	200	Lake Laberge
	B	Clay Loam	7.7	0.2	L-	0	47	190							
1141	A	Sand	7.0	0.4	L	-0	0	125	70	35	0	10	17-34-0	100	Long Lake
	B	Sand	9.1	0.1	L-	0	0	145					34-0-0	150	
1142	A	Clay Loam	7.2	0.4	L	0	59	225	70	0	0	10	34-0-0	200	Long Lake
	B	Clay Loam	8.6	0.2	L-	0	74	190							
1143	A	Loam	7.5	0.3	-	0	40	760	70	0	0	10	34-0-0	200	9 Mayo Rd.
	B	Sand	7.0	0.2	L-	0	21	230							
1144	A	Loam	5.3	0.1	-	0	4	90	70	30	30	15	6-24-24	125	Pumpster Rd.
	B	Loam	5.0	0.1	L-	0	0	85					34-0-0	175	
1145	A	Clay Loam	5.0	0.2	M-	10	11	100	50	25	20	0	6-24-24	100	Dawson
	B	Clay Loam	5.9	0.4	M-	10	6	80					34-0-0	130	
1146	A	Clay Loam	6.7	0.5	M-	45	19	110	15	15	20	0	13-13-13	150	Dawson
	B	Peat	6.0	0.7	M-	8	12	75							
1147	A	Coarse Sand	6.0	0.1	M-	0	117	110	50	0	20	15	13-13-13	150	Mayo
	B	Coarse Sand	5.7	0.1	L-	0	166	90					34-0-0	100	
1148	A	Coarse Sand	6.4	0.1	L-	0	47	90	50	10	10	15	6-24-24	100	Mayo
	B	Sand	5.0	0.1	-	0	13	80					14-0-0	120	
1149	A	Coarse Sand	6.1	0.1	-	0	77	155	50	0	10	0	34-0-0	147	9 Mayo Rd.
	B	Coarse Sand	6.5	0.1	-	0	74	80							
1150	A	Clay Loam	7.4	0.5	M	0	64	240	60	0	0	0	34-0-0	176	6.5 Mayo Rd.
	B	Clay Loam	8.4	0.0	M-	7	12	200							
1151	A	Sand	7.9	0.4	M-	0	120	490	60	0	0	0	34-0-0	176	0.5 Mayo Rd.
	B	Clay Loam	8.0	0.5	M-	0	100	170							

(1) Depth of 0 inches

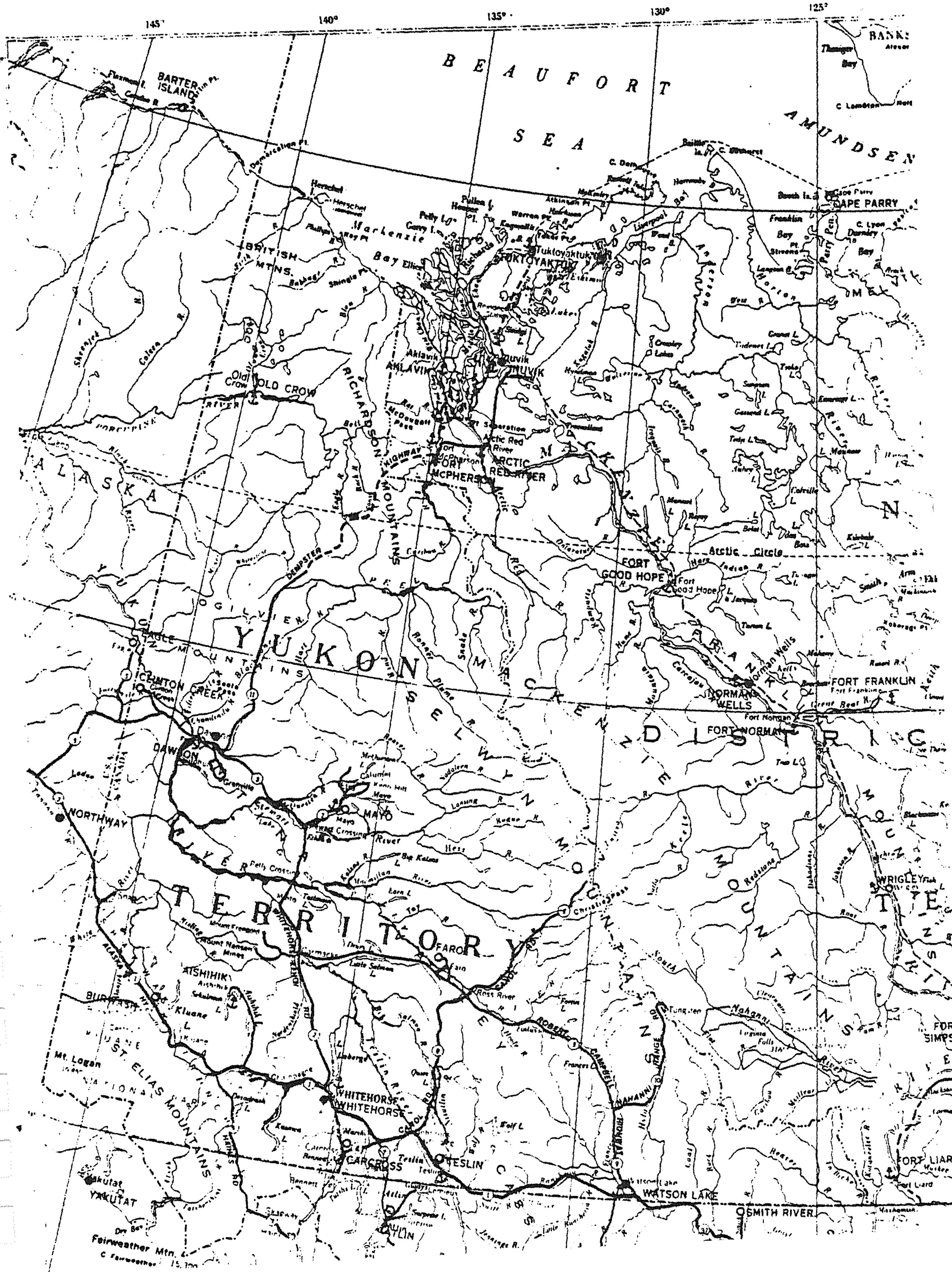
(2) N. - Nitrogen. P. - P2O5. K. - K2O.

(3) Soil test recommendations are intended for maximum level of production and do not include other factors such as limited capital, choice of crops or varieties, risk of frost, hail, or drought, non controllable factors such as weeds, diseases, insects. The data show the fertilizer required to completely overcome deficiencies of tested soils but is not intended as recommendations. It shows only a single example of fertilizer needed to provide the required nutrients. A complete table of conversion of nutrients to fertilizer is provided in, "How to Get More From Your Soil Test Results", Soil and Feed Testing Laboratory, Alberta Department of Agriculture, Edmonton.



	CANADA	YUKON
Total Area (Sq. Miles)	3,851,809	207,076
Land Area (Sq. Miles)	3,560,238	205,346
Inland Waters (Sq. Miles)	291,571	1,730
Population (1971 Census)	21,568,311	18,388
Population per square Mile	6.06	0.09

Canada Department of Agriculture, 1970.



145°
140°
135°
130°
125°
BEAUFORT
SEA
AMUNDSEN
BANKS
BARTER ISLAND
Herschel
Mackenzie Bay
BRITISH MTNS.
TUKTOYAKTUK
Tuktoyaktuk
CAPE PARRY
Franklin Bay
Horton
INUVIK
Inuvik
AKLAVIK
Aklavik
OLD CROW
Old Crow
RICHARDSON MOUNTAINS
FORT MCPHERSON
Fort McPherson
ARCTIC RED RIVER
Arctic Red River
DEMPSTER
HIGHWAY
ALASKA
Arctic Circle
FORT GOOD HOPE
Fort Good Hope
OGILVIE
PEEL
YUKON
EAGLE
CLINTON CREEK
DAWSON
NORMAN WELLS
Norman Wells
FORT FRANKLIN
FORT NORMAN
Fort Norman
MACKENZIE
DISTRICT
SELWYN
MOUNTAINS
MACKENZIE MOUNTAINS
NORTHWAY
MAYO
Mayo
Stewart Crossing
Pelly Crossing
TERRITORY
FARO
Faro
WRIGLEY
Ross River
AISHIHIK
BURWASH
Kluane
Mt. Logan
ST. ELIAS MOUNTAINS
KLUANE NATIONAL PARK
WHITEHORSE
Whitehorse
CARCROSS
TESLIN
Teslin
WATSON LAKE
Watson Lake
SMITH RIVER
FORT LIARD
Fort Liard
YAKUTAT
Yakutat
ATLIN
Fairweather Mtn.
CAMPBELL
ROBERT
CANOL RD.
HAINES RD
Tungsten
Nahanni