PRELIMINARY REPORT ON AN EXPLORATORY SOIL SURVEY ALONG THE ALASKA MILITARY HIGHWAY AND THE YUKON RIVER SYSTEM

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Foreword:

This report is intended to only give a general description of the areas examined in 1943 in Northern British Columbia and the Yukon Territory which, in the writer's opinion, have agricultural possibilities. A more comprehensive report covering the entire surveyed area will be written at a later date. Much information, such as soil analyses, which would be useful in assessing the value of the different areas is not yet available.

Objectives of Survey:

Objectives of this survey were:

1. To make preliminary soil survey along the Alaska Military Highway and accessible areas in the Yukon.
2. To outline areas where more detailed surveys would be desirable.
3. Report on present agricultural conditions in the Yukon, particularly with regard to starting a definite program of experimental work.

Organization of the Survey:

The survey was conducted by the Experimental Farms Service, Dominion Department of Agriculture under the auspices of the Committee on Northwestern Agriculture, formed by the Departments of Mines and Resources and Agriculture. The field men were Dr. A. Leahey of the Central Experimental Farm, Ottawa, and Dr. V.C. Brink of the Department of Agronomy, University of British Columbia.

The field men left Fort St. John, B.C. on June 21 and returned to that town on August 13. During that time they covered the Alaska Highway to Mile 256 west of Whitehorse and travelled down the Lewes and Yukon rivers to visit Carmacks, Selkirk, Stewart and Dawson. The writer travelled from Dawson to Mayo by airplane and from Mayo to Stewart by boat.

The carrying out of the survey was greatly facilitated by the courtesy extended to the field party by everyone whom they called on for assistance or advice. Particular thanks are due to the United States Army for its assistance in covering the Alaska Military Highway.

At this time it should be mentioned that travelling on the rivers by the regular river ships, while very comfortable, is not a good means of travelling for the purpose of making a soil survey.

Possible Agricultural Areas:

For purposes of easy reference the possible agricultural areas discussed in this report are listed below.

Northern B.C.

Fort Nelson
Racing River
The Terraces of the Liard

Yukon

Lake Teslin
Atlin and Tagish Flats
Carcross - Robinson Area
Takhini - Dezadeash Valleys

Yukon (Cont'd.)

Carmacks
Selkirk
Yukon River Flats and Islands
Klondyke River Flats
Uplands at Dawson City
Mayo and the Stewart River

Fort Nelson Area

The possible agricultural lands in the Fort Nelson area fall into two distinct groups.

(1) The river flats or floodplains bordering the Prophet, Muskwa and Nelson rivers.
(2) The upland plateau.

The River Flats

The three rivers which unite near Nelson have deep valleys and hence as would be expected the river flats are rarely large but they are quite numerous. The soil on these flats vary from gravels and sands of questionable value to silts and silty clay loams of high fertility. Growing conditions on the silty benches must be good as very large spruce and poplar were found on them. The size of these trees reminded one of a west coast forest. Then on the river flat across from Fort Nelson excellent gardens have been grown for many years on the same piece of land without the benefit of either fertilizers or manures. These facts together with observations on the nature of these soils attest to their high fertility.

For extensive development the river flats have three drawbacks:

1. They are in scattered parcels.
2. Clearing is very heavy.
3. Danger of flooding.

With regard to the latter it should be pointed out that the big flood of 1943 covered even the higher flats to a depth of several feet with water. The large R.C.A.F. garden across from Nelson while not totally destroyed was very badly damaged. While this was supposed to be the worst flood since 1902 many of the flats are lower than the one at Nelson and hence are probably flooded more frequently.

The Nelson Plateau

The Nelson Plateau is an undulating to gently rolling upland area. The limits of this area are unknown but along the Alaska Highway potential agricultural lands extend from the bridge across the Muskwa river to Mile 50 west of Muskwa - a distance of 54 miles by road. The widest part of this area in a north-south direction is probably about 10 miles west of the Muskwa bridge. About 40 miles west of Muskwa the plain is about 10 miles wide and at Mile 50 it pinches out in a bay in the foothills.

The well-drained parts of the Nelson plain are covered with solid stands of Aspen poplar or with Mixed poplar and spruce. Where untouched by fire, and only a relatively small amount of land along the highway has been fire swept, these trees are large, being mostly about 100 feet in height. The level, more imperfectly drained areas are shallow muskeys with small to medium sized spruce.

A short traverse was made through the woods at Mile 24 west of Muskwa. The following estimate was made of these three classes.

60% well drained
30% imperfectly drained
10% muskey

These figures would appear to apply to the land along the Highway.

The soil mantle is heavy, fairly stone free till. Two distinct types of till were observed.

1. Heavy, fairly stone free till with a low content of calcium carbonate.
2. Heavy, shaly till with a large percentage of shale fragments, with little or no calcium carbonate.

The soil that has been developed in these tills is a wooded soil but it appears to be only slightly leached. This observation is substantiated by the fact that the surface mineral soil is nearly neutral in reaction.

As might be expected in a glacial till area all the soils are not of the clay till type. In a few places there are stones, particularly in the subsoil and also a few areas of lighter textured soils. However, the great bulk of the land examined has the clay, stone free soil which I regard as good agricultural land.

The agricultural possibilities of the upland plain are absolutely unknown. However, it would seem gardens and field crops could be grown successfully on this land. The great drawback in the very heavy clearing and the fact that in places the well drained soils are cut up to some extent by muskeys.

The Racing River Area

This area, lying about 30 miles west of the eastern boundary of the Rockies, while small may be of local importance as it was the only area in the Rockies that might have agricultural possibilities. The arable area consists of a strip of level land extending along the west side of the Racing River. South of the road this strip is about 2 miles long by half a mile wide while north of the road it is about 1 mile along by a quarter of a mile wide. Altogether this area of level land suitable for cultivation would comprise about 1000 acres.

The soil on this area is a sandy loam overlying gravel to a depth of one to several feet. Most of the area is rather poorly drained at present but the drainage could be easily improved. The surface 6" of soil is black in colour, for the most part, with the subsoil being dark grey. These colours are due primarily to the present poor drainage of the area.

The level sandy loam area is covered with poplar and willow bush and some scattered spruce. Clearing on most of the area would be light.

In addition to the level area there are good grazing possibilities on several thousand adjacent acres. This is an area of low ridges and hills and would require considerable burning before it could be used to full advantage.

This area at present is used as an area for summer and winter grazing by Indians and trappers from Fort Nelson. About 40 pack horses in good condition were seen grazing on this area in 1943.

The Terraces of the Liard River

There are three areas that have agricultural possibilities between the two bridges across the Liard river. These are:

1. The river terrace on the north side of the river at the new bridge across the Liard, Mile 213 from the Muskwa.
2. The terraces between Smith River and the Relay Station, Mile 260 - about 10 miles west of the Coal River.
3. The terraces around Lower Liard Post.

1. The first terrace extends from about Mile 211 to 215 and is from $\frac{1}{4}$ to $\frac{1}{2}$ mile in width. The soil is mostly a deep sandy loam with the surface soil being mostly dark grey, but in some places it is a yellowish to reddish brown in colour. Drainage for the most part is good to excessive. This land is level to undulating and at present is heavily wooded with spruce and poplar.

The area while small may be of local significance as it lies adjacent to the hot springs and the so-called "Tropical Valley". If these springs ever develop into a resort then this relatively small terrace of around 1000 acres should have some practical value.

2. The terrace between the Smith river and Relay Station at Mile 60. This is the largest and best area of terrace land along the Upper Liard. It is about 30 miles in length and varies in width from a quarter of a mile to upwards of two miles. It is similar in some respects to the land around the Hot Springs but it generally has a heavier soil, ranging in texture from a fine sandy loam to a heavy silt loam. The topography is good being level to undulating. The clearing, however, is very heavy, the land being covered with large spruce and poplar. The estimated acreage of this terrace is about 15,000.

3. The terrace around Lower Post. This terrace is several miles long and varies from one quarter to half a mile in width. The soil is generally a fine sandy loam, varying in depth of from six inches to several feet over gravel. The land is fairly level and is covered with young poplar and some willow.

The Lower Liard Post is located in these terraces. Examination of the Hudson Bay Garden on August 2 showed that potatoes and peas were good but carrots, turnips, and cabbage were only fair. This garden had not been watered up to that time and was located on the shallower phase of the soil.

There is probably about 1,000 acres of fair soil on this terrace.

The Yukon

A few general remarks on the soils in the Yukon may serve to assist in giving a broad picture which cannot be gained from the notes concerning the individual areas discussed below.

The climate of the Yukon is dry and as might be expected in no place are the soils weathered deeply. Furthermore while nearly all the soils are covered with trees few signs of a definite leached layer so characteristic of wooded soils in northern latitudes were found. Some incipient development of the characteristic light grey A2 horizon of the podsolic soils was noted under spruce on light textured soils in a few local areas.

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

In the southern part of the Yukon the lands with sandy or intermediate soils appear quite drouthy. However, they do not appear as drouthy as one might expect considering the limited amount of rainfall received. In the central part of the Territory the almost complete coverage of spruce and the mantle of moss appears to make the country a fairly moist one although the precipitation here is only slightly higher than in the southern part.

The surface soils of the Yukon have two prevailing colours depending on drainage conditions. The well drained soils are distinctly reddish brown in colour while the poorly drained and recent soils on the river floodplains are black or dark grey in colour.

Observations indicate that all the mineral soils in the Yukon are comparatively low in organic matter. The mineral plant food is probably at a satisfactory level as most of the soils have been derived from a variety of rocks. The reaction of the soils is satisfactory as only a few of the sandy, non-agricultural soils were decidedly acidic.

The Yukon is essentially a hilly country broken by many mountain ranges. Therefore, agricultural soils are only apt to be found in the valleys and on the lower slopes. Again owing to the latitude of the region it is likely that agriculture is only possible on the lower elevations.

Lake Teslin District

There are several areas around Lake Teslin that have fair soils. These are:

1. The broad ridge between the Morley River and Teslin Village. This ridge has a fairly stone free glacial till soil. It is wooded with mixed spruce and pine.
2. The narrow bench land between the mountains and the lake from Teslin village to the north end of the lake. This area is narrow, being generally ½ to ¾ mile in width and is sloping sharply to the lake. Soils are very mixed being composed of gravel, sand, silt and clay. Probably areas of heavier textured soils are too small for farming purposes but there should be no difficulty in finding areas sufficiently large for gardens.
3. The broad gently rolling to rolling area on the north end of the lake east of Teslin river. This area is several miles across and is probably 8 to 10 miles in length. The soil is lacustrine loam, stone free, weathered to a depth of about 10 - 12". The area carries an open pine stand with the ground vegetation of grass being rather open and sparse.

This area had the appearance of being fairly dry although on July 31 the soil was moist to at least a depth of two feet.

The Tagish and Little Atlin Flats

The flats at the north endof Tagish and Little Atlin Lakes, while not first class, are possible agricultural lands. The Tagish flat is the larger of the two covering about 6000 acres as compared to the Little Atlin flat of about 2-3000 acres. Both flats are very similar in their nature and the following general description will apply to both.

The flats have mixed soils but on the whole tend to have a surface soil of heavy texture. They also tend to be alkaline in spots. The following profile description where samples were taken for analysis gives some idea of the nature of the soil on the flats.

0 - 3" black clay loam to clay
3 - 10" dark grey heavy clay
10 - 14" iron stained sandy loam with salts showing below 14"

The subsoil in all places sampled indicated that the land was poorly drained. However, on July 30 the soil was quite dry to a considerable depth.

The flats are generally covered with poplar and willow brush but many small open grassy areas are present. There are also some clumps of solid spruce. It is reported that the Indians at Carcross winter their horses on the Tagish Flat. It is also reported that near the lake there is a considerable acreage of hay meadows. These, however, were not seen by the writer.

Carcross and Robinson

The agricultural possibilities of this area are very limited. There is little good soil except the few acres farmed by the Mission at Carcross. However, there are some hay meadows near Carcross and at Robinson. Considerable grazing can also be found in this area.

The soils are in general very sandy and this fact coupled with the dry climate makes production of crops in this area impracticable.

The Takhini - Dezadeash Valleys

While on two drainage systems this area lies in one continuous valley from the Lowes river to the Shakwak valley a distance of approximately 100 miles. The valley averages from three to four miles in width to the high hills and mountains on either side. The elevation of the valley floor is not known at the present moment but it probably lies between 2200 and 2400 feet above sea level. The eastern half of the valley is drained eastward into the Lewes river by the

Mendenhall and Takhini rivers and the western half is drained by the Dezadeash river which flows into the Alsek river and thence to the Pacific ocean. Numerous sizeable creeks flow into these rivers from the north and the south. Generally the main rivers flow near the southern edge of the valley.

A picture of the parent materials of the soils in this valley can best be obtained by visualizing this entire valley as being occupied in post glacial times by two lakes. Clays were deposited on the floor of these lakes while near their edges gravel and sand benches were formed. Later these lakes were drained and the present systems of drainage were established. The tributary streams brought down sands and gravels which were deposited along their courses. Erosion of the lacustrine deposits took place to some extent resulting in the redeposition of clays and silts along some of the present river flats.

Thus today we find the main type of soil on the upland position of this valley in a clay soil free from stones and of apparent good quality, while immature clay soils may be found on some of the lower benches near the river. Along the streams and on the valley sides gravels and sands of low agricultural value are present. Then at Champagne there is a stretch of sand, partly duned, completely covering the valley floor for a distance of five to six miles. This valley has a very pleasing appearance both with regard to topography native vegetation and soils. A brief description of each of these features is given below.

The general topography of the valley with a few exceptions is level to gently rolling in an east west direction with an undulating to gently rolling slope to the south. Exceptions to this general statement are the eastern end of the valley, from Stony Creek to the Lewes river which varies from gently rolling to rolling land, the sand dune area at Champagne and the level clay plain just east of Champagne which comprises approximately 15 to 20 square miles.

Much of the valley has a park-like appearance. It was estimated that spruce either in solid stands or in clumps occupied about half the valley, while aspen poplar, willow and open grassy areas covered the remainder. Many of these aspen trees had a stunted appearance. The eastern end of the valley carries considerable pine but these trees only extend westward a few miles past the old ferry crossing on the Takhini river. It should be said that the aspen and willow areas could be easily cleared and most of the spruce stands could be cleared without great cost.

Soils

The principal type of soil is the mature lacustrine clay. This probably covers about two thirds of the entire valley. This soil varies in its nature depending whether it is covered by grass or by spruce. Hence profile descriptions of each type will be given here. Soil profile taken on burnt over land, at present under bunch grass.

0 - 6" dark brown clay loam pH 7.3
6 - 14" reddish brown granular clay pH 7.4
14 - 18" grey clay with $CaCO_3$ pH 8.3
18 - 24" grey clay with $CaCO_3$ pH 8.4

This profile had the appearance of a dark brown prairie soil. This opinion was agreed to by Dr. Wyatt of the University of Alberta who stated the samples were similar to samples collected in the Dark Brown Soil Zone.

Soil profile under Spruce - no ground vegetation
0 - ½" lichen
½ - 1½" dark brown clay loam pH 6.2
1½ - 3" reddish brown clay loam pH 6.4
3 - 6" Brown clay pH 6.4
6 - 12" yellowish brown clay pH 6.8
12 - 24" grey clay with $CaCO_3$ pH 8.2

It was obvious that the soil under grass contained more organic matter and was more highly oxidized than the soil under spruce. The effect of the spruce was to make the soil more acid, although no definite leached layer had been formed.

As mentioned previously immature clay soils occur on some of the lower benches near the river. These soils while probably not widespread are of local importance and are of value in that they are of considerable value for grazing purposes. A profile sampled near Mile 105 from Whitehorse is probably fairly characteristic of this type of soil.

0 - 4" brown clay with $CaCO_3$
4 - 10" grey clay with $CaCO_3$
10 - 11" black soil - formerly surface soil now buried.
11 - 24" mottled clay, imperfectly drained with $CaCO_3$.

The sands and gravels are not considered to be arable soils although they will furnish considerable grazing.

Agricultural Possibilities

The agricultural possibilities of the Takhini - Dezadeash valley are difficult to properly assess. Perhaps a better valuation can be given after the soils have been analyzed and the ecology studied. At present the writer can only advance the following points for consideration.

The greatest factor against the area is its dry climate and the danger from late spring and early fall frosts. It is true that the valley does not appear to be as dry as Whitehorse - the nearest meteorological station even allowing for the difference in the texture of the soils in the two areas. Then again there may be some significance in the fact that pine only penetrates the valley for a short distance.

The whole area is a virgin one in so far as agriculture is concerned. Gardens have been raised at Champagne, but these have been grown on sand which may receive some seepage water.

It is worth noting that the Indians at Champagne winter out their horses. This would indicate that the native grass is self curing and that the snowfall is comparatively light.

Carmacks

The agricultural soil at this settlement is limited in extent. It is found principally on the terrace formed at the junction of the Nordenskild and Lewes rivers. Predominantly this terrace is composed of fine sands but parts of the terraces are silt and clay. The sandy soils in their native state have a light covering of trees, while the heavier soils have a rather dense growth of trees and shrubs.

The farms of Brown and Dupont are located on fine sand to sandy loam. At maximum development the cultivated fields in these farms did not total more than 50 acres. Both these farms have been abandoned for two years and hence crops could not be observed. However, there were some evidence that these fields possessed a fair productivity. Potatoes, oats and brome hay were the principal crops grown on these farms in the past.

Considerable grazing land can be found around Carmacks, but its utilization will be limited by the small acreage on which to raise winter feed.

Selkirk

Two areas of land with agricultural possibilities were examined near Selkirk.

1. An area of about 100-150 acres lying in a valley about 1½ miles west of Selkirk on the telegraph line. This area was once the site of a farm which was abandoned about 1904. Despite the length of time the fields have been abandoned some of them are still free of bush. The soil is only of fair quality.

2. The river flats along the Pelly river appear to be fairly extensive and to generally have fertile soils. While only one flat was examined, that on which the Pelly ranch is located, it was indicated that other flats lay farther up the river.

The flat at Pelly is several miles long and varies in width up to one half mile. The soil varies from sandy loam to silt loam, depending on the distance from the river. Like many other river flats, these soils overlie gravels which are found at depths of 4 to 10 feet. The surface soil is dark in colour and would appear to be quite productive.

A description of the Pelly ranch will be given later under the section on agriculture.

Yukon River Flats and Islands

Below Selwyn several river flats and islands were seen that had good soils. Most of the flats and islands were covered with silts to a depth of at least several feet. The largest of these flats is probably the one at Coffee Creek - with an estimated area of 1000 acres. Small areas of land are farmed at this creek and at Carlisle and Thistle creeks.

Below the White river benches and islands become more numerous, occurring almost continuously. The writer did not actually see much of this stretch of the Yukon river as the boat trip here was made while he was sleeping, but the quality of the flats and islands were examined at both Stewart and Dawson. These lands, when cleared, would make a very good agricultural land. However, they are in many cases subject to flooding and to erosion by the river. Incidentally, Dawson is situated on one of these river flats, a fact that no doubt accounts for the stories regarding the productivity of the Dawson area.

The Klondyke River Flats

Only that part of the Klondyke river valley to Mile 13 east of Dawson was seen. The only agricultural land seen was on the farms of Mr. Fournier at Mile 12 and Mr. Sancoucy's at Mile 18.

Mr. Fournier's farm was on bottom land and is composed of gravel overlaid by black fine sandy loam of varying depths. In many places the gravel is at or near the surface, while in others the sandy loam is several feet deep. The shallower phase of soil is not very productive but the deeper phase appear to produce fairly well.

Mr. Sancoucy's land is on a broader flat than Mr. Fournier's. In general, his land has a deep covering of loam and silt loam over gravel. This land appears to be reasonably fertile.

The flats of the Klondyke river are of poorer quality than those of the Yukon. How much land apart from the two farms visited is suitable for agriculture is not known, but it is believed that the total acreage would not be large. It was noticed that much of the flat bottom land not under cultivation was covered with a thick layer of moss which was frozen solid at 10 inches on July 12.

Uplands at Dawson

While the country around Dawson is very hilly, many of the hills have comparatively gentle slopes, particularly on their lower reaches. Where the lower slopes face southward and are not too steep they would appear to be suitable for agricultural development. As a matter of fact, it was on such slopes that most of the former agricultural development around Dawson occurred in the past. Now the fields that were cleared on the lower slopes have been largely abandoned.

A description of the Sunnydale-Swede Creek area will serve to give a picture of the nature of those lower slopes. This area, lying across the Yukon river from Dawson and up the river a few miles, consists of a series of

gentle slopes, 2 to 3 per cent, sloping down to the Yukon river and being surrounded on three sides by high hills. For the most part this area, comprising between 2000 to 4000 acres of tillable land, is covered with a fairly light covering of spruce and aspen poplar. The soil is generally fairly stone free in the upper foot but becomes very gravelly below that depth. The surface texture of the soil ranged from a fine sandy loam to a loam. Seepage was apparent on many of the slopes and on the affected areas the surface soil was black. Where seepage was not apparent the surface soil was of the usual reddish brown colour.

This area was at one time rather extensively settled, between 300 to 500 acres having been cultivated in the past. Practically all this improved land is in brome grass. Most of this land is now abandoned but a few old timers still live in this area.

Mr. Farr, who conducted experiments for the Experimental Farms Service, had his farm located at the westerly end of this area, being some seven miles from Dawson. The land where the experiments were conducted was on an upland piece of soil where seepage did not occur. The results he obtained should apply to the other tillable land in the area.

While the Sunnydale-Swede Creek area is the largest area of upland tillable soil around Dawson, there are several smaller areas with similar characteristics on both sides of the Yukon. A rough estimate would place the amount of this kind of land adjacent to Dawson at between 4000 to 8000 acres.

This upland soil is not as fertile as the river flats and islands along the Yukon, but it has agricultural possibilities.

Mayo and the Stewart River Flats

The town of Mayo on the banks of the Stewart river lies in a broad basin. Part of this broad basin has a gentle southerly slope. A drive from Mayo to Minto bridge showed that most of the uplands, even with a gentle southerly slope, is covered with spruce with a ground cover of moss under which the soil is frozen at a depth of about one foot. A few small clearings, now abandoned, were seen on this upland. While no doubt some land could be utilized for agriculture on this kind of land the area as a whole offers little possibility for farming purposes.

The Stewart river from Mayot to McQuesten flows through a broad valley. In this valley there are large areas of benchlands sloping or gently rolling to the river. While the topography and lay of these benchlands are similar to that of the Sunnydale-Swede Creek area, they are of doubtful value as, unlike the upland area at Dawson, even the south slopes are covered with spruce and are no doubt frozen at a shallow depth.

The areas that offer the best possibility for agricultural development are the river flats. Most of these flats are covered with a deep layer of silt, but some are sandy and gravelly. There are many of these flats between Mayo and McQuesten including one on which the town of Mayo is built, but from McQuesten to Stewart there are only a few flats. On one of these flats is located the Maisy Mae ranch - the only farm on the Stewart river.

The river flats along this river have generally a heavy cover of spruce with an undercover of deep moss to within a short distance of the river. Under the moss the soil is permanently frozen. The Yukon river flats, while also wooded, do not appear to be frozen as close to the river.

In the Mayo district there are several small areas of unfrozen silt soil along the streams. One such area was seen at the Minto bridge. These areas are valuable in that they provide places where gardens may be successfully grown, but it is doubtful if any of them are of such extent to permit of anything but very small farms.

Grazing Possibilities

The writer of this report made only casual observations on the grazing possibilities of the area traversed, as Dr. Brink was responsible for obtaining such information. However, as a report has not yet been received from Dr. Brink, a few of these observations are given here.

Possibilities of grazing in northern British Columbia are decidedly limited as the country is rather densely wooded and has only a sparse growth of poor grass under the trees. Grazing possibilities are even poorer in west central Yukon - that is from Selkirk north. However, from Selkirk south the possibilities of grazing gradually become better. Fairly good grazing can be found under the trees. The utilization of this grazing will be dependent on the possibilities of producing winter feed for cattle in that area.

In connection with grazing it is interesting to note that horses are wintered out on the Tagish flats, at Burwash Landing and at Carmacks. Even at Selkirk very little winter feeding is done for horses. However, at this place winter feeding is only possible on rather steep open southerly slopes as the snow is too deep on level land.

Agriculture

During the course of the survey attention was given to the condition of gardens and farms wherever such existed. Farmers were interviewed regarding their experiences and observations were made regarding the type of farming and the growth of crops.

Gardens

With regard to gardens, it would appear that successful gardens can be grown any place in the Yukon where good soil can be found. This conclusion was based on the following observations.

Teslin Village

A few small gardens - growth fair. Gardens very weedy.

Carcross

Garden at Mission poor. This appears to be due to poor methods rather than poor soil.

Whitehorse

Many excellent gardens. Soil has to be imported in most cases as the soil is very gravelly and poor. However, some gardens are thriving on the natural soil where it is of a silty nature. Gardeners claim their greatest hazard is from early June and late August frosts. These do not occur every year.

Burwash Landing

Gardens only fair but soil rather poor.

Selkirk

Gardens poor at the post owing to poor quality of soil. However, the Pelly ranch has a very good garden on river deposited sandy loam.

Stewart

Fairly good gardens although somewhat late.

Dawson

Many excellent gardens in the town.

Mayo

Good gardens near the river.

A Mr. Brame of Mayo informed the writer that at Duncan Creek in the Mayo district he had successfully grown in his garden, peas, lettuce, rhubarb, carrots, beets, cauliflower, cabbage, brussels sprouts, parsnips, celery, broad beans, radish, Swiss chard, turnips, parsley, pepper grass, and of course, potatoes. This is about the list of vegetables observed growing in Yukon gardens. For some reason most gardeners report failures with string beans.

A pleasing feature with respect to horticultural crops is the large number of small greenhouses seen at Whitehorse, Dawson and Mayo. In the summer these greenhouses are largely devoted to the production of tomatoes and cucumbers, but in early spring they are used to a considerable extent in starting such vegetables as cabbage and cauliflowers.

Gardening has reached such proportions in Dawson that one farmer's complaint that farmers had little market in the town for their garden produce would appear to be entirely justified. The same remark holds true to a lesser degree at Mayo, but of course does not apply to Whitehorse at the present time.

General Farming

The picture with regard to general farming is less clear and more confusing than with gardening. In fact, the writer after reviewing all the evidence is still undecided whether or not general farming is practical in the Yukon.

The writer endeavoured to interview and examine the properties of any farmer in the Yukon who is seriously attempting to make a living from the land. These were few in number. The following notes will provide some information with regard to the type of farming now being conducted in that region.

Farr Farm - Swede Creek

Mr. Farr is now dead and his son, who inherited the property does not appear to be interested in farming. Consequently the place is very neglected although some farming is still being conducted there. For this reason and also for the fact that this farm was the site of experimental work, it is included in these notes. Most of Farr's Farm is located on the lower upland slopes. With regard to soil, it was a good place to conduct experimental work as both bottom and benchlands are present on the farm. However, the farm is at the end of a poor trail and it is doubtful if many people ever saw the experimental work.

In 1943 all the cultivated land was in hay with the exception of about 3 acres of potatoes, 3 acres of wheat and 2 acres of oats. The potatoes appeared to be healthy although very weedy. Farr's hired man stated that the land was becoming low in fertility and that the yields were much lower than formerly. Potatoes had been grown on the same land for 5 or 6 years and the hired man stated that the upland soil wouldn't stand up to that much cropping without being manured or fertilized.

The wheat was only knee high on July 11, but in full head. Yield was estimated at 10-12 bushels per acre. This wheat is raised for chicken feed.

Live stock on this farm at the present time is limited to one horse and a few chickens.

A. Fournier - Dawson

Mr. Fournier is located 12 miles east of Dawson in the Klondyke Valley. He has about 80 acres under cultivation, most of which is in brome grass. This year he also has some oats for green feed, but intends to seed down all his land to brome grass.

Mr. Fournier manages a small dairy farm. Milk is sold for 25 cents a quart and cream for 40 cents a half pint. Although he is only milking ten cows

he cannot dispose of all his milk and cream in Dawson, even though he is the only dairy farmer in that district. Surplus cream is made into butter for which he finds a ready market.

Mr. Fournier imports all the oats and bran he needs for winter feeding at a high cost. He thinks it would be possible to ripen oats but he does not own a threshing machine. Moreover, Mr. Fournier claims that Yukon oats have little feed value, being mostly hull - a normal 100 pound bag only weighing about 75 pounds. Under these circumstances he believes it more profitable to devote all his improved land to the production of brome hay.

Brome yields from ¼ to 2 tons per acre on this farm depending on the age of the stand. This difference due to age of stand was strikingly illustrated by comparison of a two year old stand with a four year old stand. Old stands are rejuvenated by discing.

Sancoucy Farm

This farm is located about eighteen miles east of Dawson in the Klondyke Valley. There is about 100 to 120 acres of improved land, all of which, except for a small garden patch, is under hay. Most of this is brome which does fairly well, but about 2 acres have been seeded down to timothy. However, past experience indicates that timothy dies out after two or three years.

While Mr. Sancoucy keeps a few cows, his principal source of income has been from the sale of hay. Up to now he has sold annually between 50 to 75 tons of hay to the Yukon Gold Corporation for a price of 50 to 60 dollars a ton. This has given him a fair source of income, but he is now interested in the possibilities of beef production as he believes the market for hay may disappear.

Like other Yukon farmers, Mr. Sancoucy supplements his farm income by hauling or cutting wood and by doing other outside work.

The Maisy Mae Ranch

This ranch or farm is located about 30 miles up the Stewart river from Stewart and lies at the mouth of the May Creek. It is owned and farmed by a Mr. H. Skelton who is still quite active despite the years and the loss of a leg.

While the property was not examined except from the river, Mr. Skelton was seen further down the river where he was cutting wood for the river steamer. He has about 100 acres of improved land, all of which is in brome grass. At present he has about 16 head of cattle and some horses. Sources of farm income are not known, but probably a few head of cattle are sold for beef and perhaps a market exists for a few tons of hay.

The Pelly Ranch

The Pelly Ranch, located up the Pelly River about four miles from Selkirk, is owned by a Mr. Wilkinson who bought the property, equipment, and some stock four years ago for $6500. The equipment included a fairly complete line of farm machinery including a threshing machine.

The Pelly Ranch consists of several hundred acres of which about 200 are cleared and cultivated. Brome hay is the main crop but several acres are in wheat, oats, barley and alfalfa. The stands of grain this year are very irregular, the barley being the best crop. The reason for the poor wheat crop may be due to the fact that frozen seed from the 1942 crop was used, while the patchiness of the oat crop may be due to poor farming methods. The wheat is Marquis, the oats some Australian variety, and the barley is an awnless variety. There is no doubt that more suitable varieties for the Yukon are in existence.

Yields of grain were apparently much better in 1942 than they promised to be this year. Wheat yielded about 30 bushels to the acre, although rather badly frozen. The seed was sown for the first time last spring and a good catch was obtained, although the competition from Lamb's quarters was severe.

Farm income has been derived from the sale of beef, garden produce, and from wintering the pack ponies of the Geological Survey. The local market is small but some produce may be shipped down river to Dawson.

Mr. Wilkinson is very enthusiastic concerning farming possibilities in the Yukon and is certainly the farmer who is making the most serious attempt to conduct general farming in that region. His farm is not in good shape, but he realizes this fact. He stated that the farm was in bad shape when he purchased it and he has not yet had sufficient time to make all the necessary improvements.

Summary and Conclusions

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

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

Gardening is fairly well established in the Yukon, particularly in the towns, but general agriculture is in its infancy and is generally in an unsatisfactory condition. While no doubt improvements could be made in horticultural crops by the introduction or development of more suitable varieties the problems associated with horticulture in so far as truck crops are concerned are not acute. However, serious problems exist in the field of general farming both with regard to production and marketing.

The future of the Yukon depends on a number of factors but it would seem reasonably certain that the low ebb in population was reached during the past decade. At least it would appear that recent developments in south-western Yukon would lead to a larger and more permanent population in that area. Hence, some concrete steps to aid in the development of agriculture in the Yukon appear to be warranted.

Recommendations with Regard to Experimental Work on Agriculture in the Yukon

The following recommendations are presented for the purpose of discussion.

1. The establishment of an Experimental Substation with a resident officer-in-charge.
2. Co-operative experiments in horticultural crops particularly with gardeners living in town.
3. Co-operative experiments in field crops with farmers.
   These co-operative experiments to be under the supervision of the officer-in-charge of the Experimental Substation.
4. Providing assistance to farmers for the purpose of obtaining suitable implements and live stock. This does not necessarily involve direct financial assistance.
5. The conduction at an early date of an agricultural economic survey to study markets, transportation and other economic factors affecting agriculture.

No recommendations are offered regarding experimental work in Northern British Columbia. It is suggested, however, that some experimental work be

considered for both the Fort Nelson area and the terraces of the Liard. Work in the former area could be supervised from Beaverlodge while that on the latter area could be supervised by the officer stationed in the Yukon.

Suggested Locations for Experimental Work on Agriculture in the Yukon

The location of an Agricultural Experimental Station in the Yukon is one that deserves serious consideration. The concensus of opinion in the Yukon appears to be strongly in favour of such a station being located in the Dawson district. However, the writer would recommend that this station be established in the Takhini or Dezadeash valleys west of Whitehorse. There are a number of reasons for this recommendation.

1. The Whitehorse area promises to have a substantial and permanent population.
2. No farming is carried out in this area. Development of farming below Stewart would not materially aid in providing cheaper and fresher food for the southwestern Yukon as it is just about as practical to ship foodstuffs from Vancouver as up the river several hundred miles.
3. Some information is already available on farming possibilities along the Yukon river. None is available for the Whitehorse district.
4. Whitehorse is the logical headquarters for an agricultural specialist who may be expected to give service not only to the Yukon districts but also to north-western British Columbia.
5. The most important reason for locating a station west of Whitehorse is that if agriculture proves to be feasible there is an area of about 200 square miles in one block that could be farmed. In addition to this there are large areas of adjacent land that could be used for grazing land. This area at present is serviced by the Alaska Highway which traverses the valley throughout its entire length. Other roads leading from this valley are the Haines cut-off, the trail to Carmacks and a new road under construction to the Aishinik airfield.

If agriculture does not prove feasible in the Takhini - Dezadeash valleys then it is doubtful if any agricultural development in southwestern Yukon is possible.

On the other hand, if agriculture can be successfully practised in these valleys this fact would have a great favourable effect on the development of at least the western half of the Yukon Territory. The question is of sufficient importance to warrant careful investigation by the responsible Federal Department.

ESTIMATED ACREAGE OF ARABLE LANDS IN
NORTHERN BRITISH COLUMBIA AND THE WESTERN YUKON

District	Area	Type of Clearing
Fort Nelson	500,000	Heavy
Racing River	1,000	Light
Terraces of the Liard	17,000	Heavy
Tagish and Little Atlin Flats	3,000	Light to Medium
Takhini - Dezadeash Valley	120,000	Light to Medium
Flats along Yukon River and its Tributaries	60,000	Heavy
Upland Soils - Dawson	6,000	Light to Medium

The above figures are given for purposes of comparison as even approximate acreages for several areas are difficult to determine.

CLIMATE

Some climatological data are given below for sites in northern British Columbia and the Yukon. Data for several other stations in British Columbia and northern Alberta are included for purposes of comparison. The figures given for summer readings include May, June, July, and August.

Location	Number of Years	Yearly Precip.	Summer Precip.	Mean Yearly Temp.	Mean Summer Temp.	Frost Free Period
Fort St. John	12	15.7	8.4	25.0	56.8	108
Fort Nelson	5	13.9	6.6	30.2	57.4	103
Watson Lake	5	15.3	6.6	27.9	53.1	62
Carcross	29	9.0	3.1	29.2	49.9	43
Whitehorse	1941	11.1	3.0	30.5	51.4	-
Whitehorse	1942	10.3	5.1	31.6	53.9	-
Whitehorse Av.	2	10.7	4.1	31.1	52.7	48
Carmacks	11	11.3	5.1	23.7	51.5	74
Dawson	41	12.6	5.3	22.8	54.3	79
Swede Creek	11	9.7	4.2	24.0	53.8	66
Mayo	11	11.4	5.6	24.6	53.1	68
Fort Vermilion	28	11.7	6.6	27.0	55.2	87
Vanderhoof						40
Smithers						38

The above figures indicate that the climate in the Yukon is near the limit for successful agricultural production, both from the viewpoint of summer precipitation and length of frost free period.

CENSUS DATA ON YUKON AGRICULTURE

The following data were taken from the 1941 Census of Agriculture, preliminary figures. These data are of interest in that they give some quantitative data on the present status of agriculture in the Yukon. They also indicate the decline in this industry since 1931.

Farm Values and Acreages in the Yukon

	1941	1931
Total Value	$85,440	$127,459
Land	20,700	59,000
Buildings	21,400	25,400
Implements	14,900	13,700
Livestock	28,440	24,059
Area in farms	2,781 acres	5,197 acres
Area under crop	-	778
Number of farms	26	41

Number of Farms by Size in Acres - 1941

Total	1-50	51-100	101-200	201-299	300-479	480-639
26	9	8	7	-	1	1

Livestock

Kind	Number	Value	Value per Head
Horses	90 (62)	21,645	240.50
Cattle	52 (72)	5,215	100.00
Swine	72 (41)	1,240	17.00
Chickens	138 (244)	340	2.45

(Figures in brackets are corresponding figures for 1931)

Farm Population

Totalled 42 - 29 men and 8 women with 5 children under 14 years of age. In 1931 the farm population totalled 74 persons.

Eleven farms hired help for a total of 339 weeks at a total cost of $9,190 or $27.00 per week.