Vanderhoof
to
Peace River

SIX—

A 40.00

VANDERHOOF TO PEACE RIVER

British Columbia

Canada

DEPARTMENT OF LANDS
HON. THOMAS DUFFERIN PATTULLO
Minister of Lands

Vanderhoof to Peace River

British Columbia, Canada

NORTH from Vanderhoof, on the Canadian National transcontinental railway across Central British Columbia, which runs from Yellowhead Pass to the seaboard at Prince Rupert, a wagon-road suitable for motor traffic, 38 miles long, reaches to Fort St. James, on the southerly shore of Stuart Lake. Beyond to the northward is a large territory with many sections well suited to agricultural settlement and other economic development at present lacking in lines of communication.

A railway across this district would afford transportation to many sections suitable for settlement and mining and general development. At present there are no transportation facilities and development waits upon them. To-day only a scant population of pioneers are scattered in a few places.

In 1920 a reconnaissance survey was made by V. H. Williams, C.E., for the Department of Railways across this portion of the Province. He said:—

"The result of my reconnaissance is that it is quite practical to build a standard-gauge railway through this section of British Columbia, and in no case will any serious difficulties be encountered. Construction for the most part will be extremely light; a gradient not exceeding 1 per cent. can be obtained; very little solid rock exists; good crossings of all rivers and streams were found; and an abundance of gravel for both ballast and concrete-work is to be had practically throughout the entire line. Timber for piling, culverts, and ties is for the most part, however, scarce.

"Leaving the Grand Trunk Pacific Railway at Vanderhoof, the Nechako River is crossed about Mileage 1 to the mouth of Clear Creek. Following Clear Creek for about a mile, the line would come out on a large plateau which extends for about 10 miles and is quite flat. A range of hills extends generally east and west at this point, separating the Nechako and Stuart Valleys. The summit is reached in about 6 miles on a maximum grade of 1 per cent., being 170 feet above the plateau. From this summit to the crossing of the Stuart River there is a fall of 95 feet in a distance of 20 miles. Fort St. James lies about 1½ miles to the north, being Mileage 30.5, elevation 2,225 feet.

"Leaving Fort St. James, the line would run in a north-easterly direction, passing the east of Mount Murray, crossing Ocock River at Mile 49, elevation 2,425 feet. It would now continue in a northerly direction and to the east of Lookout Mountain, crossing Tsilcoh River at Mile 59, elevation 2,535 feet, and continuing northerly to Poison Creek, Mile 67, elevation 2,530 feet. From this point it would be necessary to

follow Poison Creek to Horseshoe Lake, which is on the summit of the Pacific-Arctic Divide. Summit, Mile 92, elevation 3,150 feet. Now following along Horseshoe Lake and Sheshe Nadji Lake to Suschona Creek and Suschona River to the Nation River, Mile 108, and crossing the latter river at elevation 2,800 feet.

"The greatest difficulty to be encountered thus far lies in crossing 12-Mile Mountain and getting from the Nation to the Manson River Valley. This is done by following the north shore of Nation River to a point near the 124th meridian; thence northerly and north-westerly to the head of Gaffney Creek, and following this creek down to Manson River. Head of Gaffney Creek, Mile 128.5, elevation 3,400 feet; junction of Gaffney Creek and Manson River, Mile 147.5, elevation 3,000 feet. From this point the Manson River Valley is followed into the Parsnip River Valley, and thence down to Finlay Forks, Mile 188, elevation 2,000 feet.

"The Parsnip River is crossed at this point, and two alternate routes offer along Peace River to Rocky Mountain Canyon. By crossing to the north side of the Peace advantage is taken of being on a southerly slope, thus eliminating the necessity of protection against snow-slides; however, two bridges across the Peace River would be required. By following the south shore these bridges would be eliminated; several snow-sheds would be required around Mount Selwyn and to the east, but a series of benches, practically natural railway embankments, extend the entire length of the river as far as the canyon. Canyon, Mile 273, elevation 1,800 feet. Passing through the canyon fairly heavy rock-work is encountered, and the main bench above the Peace River is reached at Mile 296, elevation 2,400 feet, at Maurice Creek, opposite Hudson Hope. From this point junction is made with the projected location of the Pacific Great Eastern Railway on the Pine River by following easterly by Sucker Lakes, crossing Moberly River to MacEwan Creek; thence to Pine River, and following up Pine River to the above-mentioned projected location, Mile 344, about 82 miles from Swan Lake.

"It will be noted that a very low gradient is obtained through the Peace River Pass, which is really the Rocky Mountain Canyon, although it lies considerably to the east of the Rocky Mountains. A most peculiar feature will also be noted in connection with this pass—namely, that the controlling point is lower than the country to either the east or west. In other words, a descending grade is encountered in coming from either direction."

Mileage and estimated cost of construction of the projection of the Pacific Great Eastern Railway from Prince George via Pine Pass to Swan Lake is 316 miles, cost $18,000,000. Estimate of cost and mileage of this route would be:—

Vanderhoof to Hudson Hope, 296 miles at $37,500	$11,100,000
Hudson Hope to Pine River, 48 miles at $46,000	2,208,000
Pine River to Swan Lake, 82 miles at $57,000	4,674,000
Total, 426 miles	$17,982,000

"In route via Pine Pass there are no waterways that can be used for the purpose of bringing in supplies or equipment. The route from Prince George via the Parsnip River and Peace River follows navigable waterways practically the entire distance, while the route from Vanderhoof via the Nation River has the advantage of both roads, which are already built for a distance of about 65 miles, which could be extended at a small cost, and river navigation used for balance of way.

"Two alternatives might be considered in connection with a line running into the Peace River country. One from Prince George following the present projected location via Crooked River and Summit Lake; thence down the Parsnip River to Finlay Forks. In connection with this line, however, it would leave the Nechako Valley and the large areas around Stuart River and Stuart Lake and Big Prairie to the north without railway transportation, which is a larger and more fertile tract than that around the Crooked River.

"The other alternative would be to continue down the Nation River to the Parsnip; thence following the Parsnip to Finlay Forks instead of turning north near the 124th meridian to Gaffney Creek and Manson River. This route would be practically the same distance and construction about the same. In this connection, however, it would be necessary to run trial lines over both routes before it would be possible to determine the most advantageous one."

Present travel into this district from Fort St. James, to which motor-cars run from the railway at Vanderhoof, is via the Manson Creek Trail, which was made during the rush to the Omineca placer-diggings in the early sixties, 117 miles long from Fort St. James to Manson Creek. Little or no work was done on this trail for many years until surveyors working in Nation Lake District put the southerly portion into good condition in 1912 and 1913. Most of the bridges were gone, however, and the trail was in poor shape and impassable at high water. During the past two years considerable work has been done under direction of W. Steele, of Manson Creek, to put this trail into better condition.

Until recent years travel into the Omineca and Manson Creek District was via the trail westward from Hazelton to Takla Lake, and thence via Tom Creek and Germansen Lakes to Manson Creek.

In 1871, when the Omineca placers were attracting considerable attention, the stern-wheel steamer "Enterprise" was built at Soda Creek and navigated the Fraser, Nechako, and Stuart Rivers, and thence via Stuart Lake, Tachi River, Trembleur Lake, and Middle River to Takla Lake; but expected travel via this route did not develop, and the steamer, after its initial trip, was taken to Trembleur Lake and left on the lake-shore, where the remains of the hull and what has been left by Indians and others of the machinery still remains. Other than occasional trips made by a number of launches taken into Stuart Lake and small boats, this great connective waterway which offers a navigable route for about 200 miles north from the railway has not been used. The Chinlak

Rapids in the lower 12 miles of Stuart River offer an obstruction, though not an impassable one, and engineers who have made examinations say these rapids can be rendered easily navigable when the river is open at comparatively small expense. A small outlay is also considered necessary to improve the Tachi River. From Takla Landing on Takla Lake distance by rail to Omineca River is about 40 miles and that river can be travelled for 70 miles.

The railway route reconnoitred in 1920 follows to some extent the country traversed by the Manson Creek Trail. A railway traversing this portion of the Province would connect a number of sections in which agricultural settlement would be made possible with communication. The more important sections, going northward from Fort St. James, which would be made accessible to settlement would be the area surveyed in vicinity of Ocock and Tsilcoh River, where about 50,000 acres have been platted; the Nation Lake Plateau in vicinity of Nation Lakes, where surveyors consider at least 250,000 acres are eminently suited for agricultural settlement; and the Parsnip and Finlay Valleys, with upwards of 600,000 acres suitable for agriculture. In Omineca Valley it is estimated that some 80,000 acres are suitable for agriculture; in Osilinka Valley, 20,000 acres; and Mesilinka Valley, about 40,000 acres; in addition to the considerable acreage available in Peace River District.

It would also provide access to the Omineca Mining District and Manson Creek mining regions, in which placer operations have been carried on since 1864, and it is anticipated that with railway communication enabling the taking of modern mining machinery into the district there would be a considerable revival of the mining industry. This district was worked for three years from 1864 by placer-miners, who then left it for the Cassiar fields. In 1871 it again attracted attention and work continued to about 1887, and it has been worked intermittently since. Since 1874 the returns that have been made by miners show $603,790 in gold has been taken from this district. Since 1902 work has been on a small scale, the district being handicapped by its remoteness and inaccessibility, which made operations expensive.

At the mouth of the Ingenika River, which enters Finlay River about 65 miles above Finlay Forks, the Ingenika Gold Mining Company is working a dredging proposition, but owing to lack of transportation little progress has been made. Another gold-dredging outfit is at work at Brennan's Flats on the north side of Peace River, about 7 miles below Carbon Riber, but little progress has been made.

Galena and sulphide ore is found from the Peace south beyond Pine Pass. Mica with large sheets and clear cleavage is found in various places, especially near a low-grade ore-body at Mount Selwyn. Platinum is reported to exist in tributaries of the Finlay, and Mr. Williams, during his survey, was shown a small quantity said to be worth $300 and which was said to have come from this district.

EXTENSIVE COALFIELDS.

With transportation valuable and extensive coal areas will be opened, development of which would be of great importance not only to settlement in this district, but to the Province at large. Coal-beds are known to extend over a wide area. R. B. Dowling, of the Canadian Geological Survey, estimated probable reserves within an area of 160 square miles in vicinity of Peace River, mainly near Hudson Hope and Carbon River, at 1,400,000,000 tons; but exploration has been insufficient to form any reasonably close estimate. Analysis of both bituminous and anthracite samples from near Hudson Hope and Carbon River show that this coal has very high heat units, and its high quality will enable it to compete far afield for railway consumption, to say nothing of steam navigation on the Peace, Athabaska, and other great rivers and lakes of the Mackenzie basin, as well as for industrial and domestic uses required by settlement. A short rail or tramway to the Peace River would enable carriage by scow for 600 miles down-stream on Peace River between Hudson Hope and Vermilion Chutes.

From a few miles west of the Carbon River to the east of Hudson Hope the coalfields exist, and good measures are found at and near both the Carbon River and the Rocky Mountain Canyon. This is for a distance of over 40 miles in an east-and-west direction. Coal has been known for many years to exist along the South Pine River, and it is supposed that these are a continuation of the same deposits which are found on the Peace River. This coal is equal to a high grade of steam-coal from the Welsh fields, and compares favourably with the best West Virginia coals, being altogether of an exceptional high quality for Western America. The regularity of the measures and their freedom from disturbance is remarkable, and the low ash content in the samples taken as they were from outcrops shows the exceptionally clean nature of the seams.

Extension of the coal-measures back from the river is undoubtedly considerable both ways. Selwyn in 1875 reported coal on the South Pine River and locations have been made from the Dominion Block to Pine Pass. On the North Pine coal is also reported north of the Block, so that if measures are continuous between these points the field extends 75 miles north and south without the limit being established in either direction. On the Peace River it extends from near Parle Pas Rapids to near Hudson Hope, and whether this portion is continuous with those north and south, it is reasonable to expect considerable extension north-west and south-east.

Lignite-deposits were reported by Selwyn in 1875 on Parsnip River near the mouth of Pack River. Pieces of drift found on the river-bank were sufficiently large and compact to be fuel if found in thick seams. The northern limit of the Parsnip lignite area is about 3 miles below Nation River, where a rocky ridge crosses the Parsnip and the country

rises on one side to the Rockies; on the other to the Omineca-Parsnip Mountain watershed. F. W. Valleau in 1897 reported finding drift-lignite on Omineca River, 10 miles up.

OIL POSSIBILITIES.

That part of the Province lying east of the main range of the Rocky Mountains and extending northward from about the 54th parallel has for some years been looked upon as a promising field for the discovery of commercial bodies of oil.

The Lower Cretaceous strata of Southern Alberta, in which are found coal and some oil and oil-seepages, have their equivalent in the rolling plains bordering the foot-hills in the Peace River region, and it is to this region that, during the last two or three years, the Government of the Province has been devoting attention by way of geological study and latterly by diamond-drilling. The area in question, including 78,729 square miles, has been reserved from application and alienation while the effort to locate and study the geological formations with a view of determining the existence of suitable structure has been in progress. Field examinations on behalf of the Department of Lands were made in the summer of 1919 by the late J. C. Gwillim, Professor of Mining at Queen's University, and in 1920 by John A. Dresser, Consulting Mining Engineer, of Montreal, and Edmund M. Spieker, Geologist, of Baltimore, Md.

Following the 1920 investigations, diamond-drill equipment was sent to a selected part of the district covered and exploratory drilling has since been carried on. Surface exposures of rock are infrequent over considerable areas of the country, and their correlation is made easier and more certain by the positive results of drilling, while the presence of domes or anticlinal structures favourable to the retention of petroleum may be determined.

Professor Gwillim expressed the opinion that there is possibility of oil existing below some of the favourable structures—most likely beneath the St. John shales, which are impervious enough to hold down oil. The Bullhead sandstones lying below the shales are geologically more or less contemporaneous with or equivalent to the oil-bearing Loon River strata and the Athabaska tar-sands, occurring farther eastward. They also resemble the Kootenay formation of Southern Alberta of much the same horizon, which is believed to be the oil-carrier at Black Diamond field. He considered the Bullhead sandstones as structurally favourable and believed it to be possible, considering the activity of the Imperial Oil Company, that somewhere within the great extent of these Alberta and British Columbia foot-hills an oil discovery of commercial value might be made.

It was on the recommendation of Professor Gwillim that the studies of this area have been continued.

Mr. Dresser examined the area north of Peace River, west of the Peace River Block, and south of Graham River. He also concluded

from his investigation that the shales and sandstones of Cretaceous age characteristic of that region are the geologic equivalent of formations that in some parts of Western Canada are oil-bearing. He states that "the character of the St. John shales strongly suggests that they are oil-bearing, but accumulations of commercial value can only be expected in the porous sandstone-beds within the shales or in the upper parts of the Bullhead sandstones immediately beneath them."

Mr. Spieker's studies were directed to the large area south of the Peace River, in which he examined the formations as disclosed by the Moberly, Pine, Sukunka, and Murray Rivers. He found the same series of sedimentary rocks ranging in age from Triassic to Upper Cretaceous, and expressed the considered opinion that while the Triassic limestones and sandstones offer a possibility of oil and the Pine River shales give some promise, "the St. John shales offer the most nearly ideal conditions that could exist in the absence of definite evidence of petroleum itself." Speaking of the Boulder Creek dome near the south-westerly corner of the Peace River Block, Mr. Spieker in his report observes that "the possibility of oil-bearing horizons below the Bullhead Mountain formation, coupled with the dome-like shape of the structure, presents a geologically attractive situation as far as oil and gas are concerned."

Mr. Spieker examined ten major anticlines in the area covered by him and strongly recommended exploratory drilling. Up to this date no drilling has been undertaken in the region south of the Peace River.

Six diamond-drill holes varying in depth from 1,027 to 2,525 feet have to date been drilled in a small portion of the area suggested by Mr. Dresser in the vicinity of Farrel and Lynx Creeks, some 20 miles north-west of Hudson Hope. The sixth hole, which is the deepest of the series, was completed only last week. These holes have penetrated the St. John shales to a depth of 2,000 feet and in Nos. 5 and 6 have gone into the Bullhead sandstones.

Flows of gas, films of oil, numerous thin seams of coal varying in thickness up to 20 inches, and much bituminous substance have been found in the drill-holes and a vast thickness of shales has been determined which field tests have shown gives oil on distillation throughout. In relation to the extent of these St. John shales, Mr. Dresser says that they extend over a very large area. The formation "is known for 250 miles in an east-and-west direction and has a still greater extent northwards and southwards. It probably underlies nearly all of British Columbia east of the Rockies and a large area in the Province of Alberta."

No reservoirs of oil from which a flow could be obtained have yet been found. It must be remembered that there was no intention on the part of the Government of actually boring for oil as is done with standard drilling rigs. The primary object of the diamond-drilling is the determination of the depth, thickness, attitude, and character of the formations, thus disclosing the geological information in a more precise and valuable way than could be accomplished by exploration of field parties.

The Imperial Oil Company is drilling a standard hole east of Rolla in the bed of Pouce Coupe River, 650 feet below the general plateau-level, and in 1921 drillers struck gas which was reported to have flowed at the rate of 11,000,000 feet a day and increased in volume to three times that amount, when the well was capped. Since the capping there have been strong evidences of gasolene, this substance oozing through the casing-joints, and, though the company has maintained secrecy regarding operations, all reports indicate likelihood of oil being found here. Seepages have been reported along the Pouce Coupe River, and in 1921 a homesteader discovered a place where, at intervals, oil in small quantities gushed out of the shale, this oil, as so far examined, giving promise of high gasolene content.

LAND FOR SETTLEMENT.

A railway route via Fort St. James northward would give access to a number of localities in which are considerable areas suitable for agricultural settlement. Vanderhoof, in Nechako Valley, is the centre of a great connective agricultural tract now being rapidly settled and developed. A creamery has been established and dairying is increasing. The valley extends 15 miles north of Nechako River, where a range of low hills covered with jack-pine forms a divide between the Nechako and Stuart. From about 7 miles south of Stuart River excellent agricultural land extends along the Stuart and Necoslie Valleys, north to what is known as "Big Prairie." This section contains many thousands of acres of good agricultural land with rich soil, with a large percentage of it open or lightly timbered.

OCOCK AND TSILCOH VALLEYS.

North from Fort St. James the route reaches Ocock River, altitude 2,425 feet, in 18½ miles. Ocock and Tsilcoh Rivers, about 2 miles apart, drain a valley including about 45,000 acres of surveyed land adjoining the block of surveys north-east from Fort St. James, and extending north-west to Pinchi Lake and north to Yatzootin Lake. The Manson Creek Trail crosses the westerly part about 2 miles east of Pinchi Lake and the Fort St. James–Fort McLeod Trail crosses the easterly part, reaching Ocock River about 2 miles west of Carrier Lake.

F. A. Devereux, B.C.L.S., who surveyed this area in 1910, said the valley has a fine silt soil resembling that of Nechako Valley. It is timbered chiefly with pine, poplar, and spruce, mostly small and dense. Where timber has been burned off, which occurs in many small patches, the soil has appearance of being very productive, judging from the rank growth of grasses, peavine, etc. Several fine wild-hay meadows occur. Small fruits grow in abundance in localities. The valley is well watered.

A. W. Harvey, B.C.L.S., in 1911 said: "The land at the eastern end of Pinchi Lake is very good, Ocock River running through a large meadow for several miles to its junction with the lake. There is also a considerable amount of good surveyed land at the outlet."

FORT ST. JAMES TO FORT McLEOD.

The trail north-easterly from Fort St. James to Fort McLeod is 82 miles long. Leaving Stuart Lake the ground rises gradually to a low divide, about 2,600 feet in altitude. In the first few miles the trail passes through some fine open meadows, with black loam soil, free from stones, on which hay is cut by the Hudson's Bay Company. Between these meadows are low sandy ridges covered with jack-pine and here and there a few poplar. The soil is too dry for cultivation and too high above the stream-levels to irrigate. Beyond and running to Carrier Lake the country improves and is undulating. Soil is moist sandy loam, in most places free from stones, and covered with poplar, small spruce, and willow, between which is a luxuriant growth of peavine, fireweed, and

SCENE FROM A HILL TO THE NORTH-EAST OF TREMBLEUR LAKE.

grasses. At the south of Carrier Lake the hills rising from the lake are not very steep nor very high and are composed of a sandy loam soil on a gravel subsoil. This grows good grass and peavine and affords good agricultural land. Timber is chiefly poplar, with a few scattered spruce-trees. To the north of the lake the hills are rolling and covered with second growth of jack-pine and spruce, not of commercial size. For the next 2 or 3 miles beyond Carrier Lake along the trail the country is fit for agriculture, with light sandy loam soil easily cleared. Beyond is the valley of Salmon River, the trail following over a sandy jack-pine flat, with poor stony soil. The valley, 60 feet below the flat, about a quarter

of a mile wide, has moist sandy soil capable of cultivation. From Salmon to Swamp River the country is broken, consisting of a series of stony ridges growing stunted jack-pine. There are small swamps and bogs between the ridges. Swamp River is in a valley about a quarter of a mile wide, with many small meadows. Soil is not of sufficient depth for cultivation, but will grow good grass. Between Swamp River and Carp Lake the country is more or less level, with poor sandy soil. It forms the Pacific-Arctic Divide, elevation being about 2,600 feet. Carp Lake, 2,700 feet, lies among hills rising steeply, surrounding country being unfit for cultivation. It drains to War Lake, with banks rising 100 feet to the plateau, and McLeod River flows thence to McLeod Lake, bordered with terraces with dry sandy soil free from stones. McLeod Lake has steep densely wooded shores, rising steeply on the west 400 to 500 feet to the plateau crossed by the trail from Fort St. James. On the east the hills are higher, in places rising 1,000 feet, then sloping down to Parsnip River, some 2 or 3 miles distant.

NORTH-WEST FROM FORT ST. JAMES.

Taking a triangular area with Manson Creek Trail, northward from Fort St. James on the east, and the line of Stuart, Trembleur, and Takla Lakes on the west, and the latitude of 55° 30′ on the north, roughly 2,500 square miles, it is estimated that this area includes broadly 20 per cent. mountains, 30 per cent. ridges and hills, 10 per cent. lakes, and 40 per cent. of undulating country, with elevation ranging between 2,200 and 2,600 feet, averaging about 2,500 feet, including about 250,000 acres of good agricultural land as far as cruised by surveyors, balance of the flat country being jack-pine flats more or less gravelly and crossed by gravel moraine ridges. The area is broken by many isolated mountain ranges, most important being that along east side of Takla Lake, with peaks reaching over 6,000 feet. The Blanchet Range runs 15 miles between North and West Arms of Takla Lake, with several peaks 6,500 feet high. A long flat-topped range runs along to the north of Nation Lakes, merging into the Omineca Mountains. Mount Pope, 4,450 feet, and high isolated mountains in vicinity of Pinchi, Tezzeron, and Inzana Lakes comprise most of the remaining mountains.

The whole plateau country is well watered, there being a maze of small lakes and connecting streams. Meadows and willow bottoms are fairly numerous, but there is almost an entire absence of muskeg; the meadows, though often wet, having hard bottom almost invariably. The many lakes make this section of country of great scenic beauty, the water being crystal clear and the larger lakes have mile after mile of fine pebbly beach. About 300 square miles of this triangle carries the original heavy timber, mostly spruce, with balsam predominating at the higher altitudes. The flat country, once heavily timbered, has been burned over twice in the past forty years, and much of the area is now encumbered with dead and fallen timber and young growth, while areas once burnt clean now

carry a growth of jack-pine, the only trace of the original spruce forest being a few burnt stumps and scattered clumps of timber along the water-courses.

Other than a block of 4½ square miles 7 miles north-westerly from Fort St. James, from 1 to 3 miles south of the lake, the surveys near Pinchi Lake are near the westerly end. The north-east shore of Stuart Lake is unsurveyed from within a mile or two from Fort St. James to vicinity of Pinchi Creek, a swift stream 6 miles long, with a direct fall of 18 feet 4 miles up, which empties Pinchi Lake to Stuart Lake, which lies at 100 feet lower altitude. An Indian village with a small Indian store is located at the creek-mouth.

There are several small flats on Pinchi Lake, but these are limited in extent. Except at the eastern end and outlet of Pinchi River, the lake is surrounded by low rocky hills and there is not much land of value. On the north side several small flats exist, limited in extent.

From Pinchi Creek a block of surveys extends to Kuzkwa River, which drains Tezzeron Lake to Tachi River. The north-east shore of Stuart Lake from Pinchi Village to Tachi River is mainly poplar country and, excepting a few isolated buttes and ridges, fairly flat country running back about 15 miles, and thence extending north-westerly between Inzana and Kazchek Lakes. F. A. Devereux, B.C.L.S., in 1910 said: "About 13,000 acres of very good land were laid out on the Tachi River and about 1,500 on Trembleur Lake, most of which is densely wooded with the usual growth of the country."

Directly north of Tezzeron Lake the country is broken and of little value; but along Inzana Creek the land is exceptionally good, and it is estimated that about 90,000 acres of good agricultural land, undulating, burnt clean and reforesting with willow and poplar, can be found hereabout. Northward the country between here and Nation Lakes is undulating, has numerous lakes, and from report contains some good agricultural areas.

Middle River, which connects Trembleur and Takla Lakes, drains a valley 2 to 6 miles wide, rolling country broken by rocky hills and ridges. Soil is almost entirely light sandy loam, growing small poplar, pine, spruce, and willow. The valley is wide at the south end, narrowing toward Takla Lake. Middle River is a sluggish stream with little current, falling only a few feet between Takla and Trembleur Lakes. The south side of the river has been swept by fire and is covered with heavy windfalls and thick growth of small pine.

The country around the south end of Takla Lake is rough and rocky, except for a tract of fairly flat land along the north-east shore, 7,000 to 8,000 acres; burnt over, with little timber, chiefly small poplar and pine, with patches of thick willow. Soil is sandy loam, with occasional ridges of gravel. The south-west shore is steep, with heavy growth of spruce and balsam. Numerous small streams running into Middle River and Takla Lake, nearly all dry in the late summer.

OCOCK RIVER TO NATION RIVER.

In vicinity of Poison Creek, which the route follows northward over the divide to Nation River, only isolated sections of agricultural land are encountered. The country is largely timbered, rising to the Pacific-Arctic drainage divide near the 55th parallel. Poison Creek drains southward from Horeshoe Lake and sweeps westerly to Tezzeron Lake; the summit, on the ridge between Horseshoe and Sheshenadji Lakes, is at elevation of 3,150 feet. Where Manson Creek Trail and the railway route crosses the country hereabout is too high for general agriculture, but is considered to have possibilities for stock-raising. The ridge-slopes are dotted with small lakes and drained by numerous streams, many dammed by beavers, resulting in some fair meadows, some of considerable extent on which hay could be cut for winter feed. Timber in general is jack-pine. There are many muskegs and spruce bottoms. Soil in general is light sandy loam, but where fire has burned over spruce bottoms a heavy growth of red-top has resulted, and horses of surveyors brought to work in poor condition rapidly fattened on this grass.

Along the Inzana Lake Trail, which branches north-westerly toward Inzana Lake from the Manson Creek Trail and railway route in vicinity of Poison Creek, 28 miles from Fort St. James, is an area of good agricultural land, rolling, mostly brulé, with young growth of poplar and willow. Several meadows are over a couple of hundred acres in extent and a large willow bottom covers 2 square miles. Soil is loam in the lowlands and sandy loam on the ridges.

The vicinity of Poison Creek and eastward across the 124th meridian is heavily timbered, spruce and balsam predominating, large in diameter, up to 36 inches, and generally clear for a considerable height. Near where the headwaters of Salmon River crosses the 124th meridian is a burn about 3 miles wide covered with long, thick, coarse grass. This grass is also found in patches high up on the hill covered by the burn. Seen from a 4,600-foot hill this timber seems to cover the hills and valleys eastward as far as could be seen, though it is probable that in the lower altitudes, in vicinity of Salmon River, a large percentage is jack-pine.

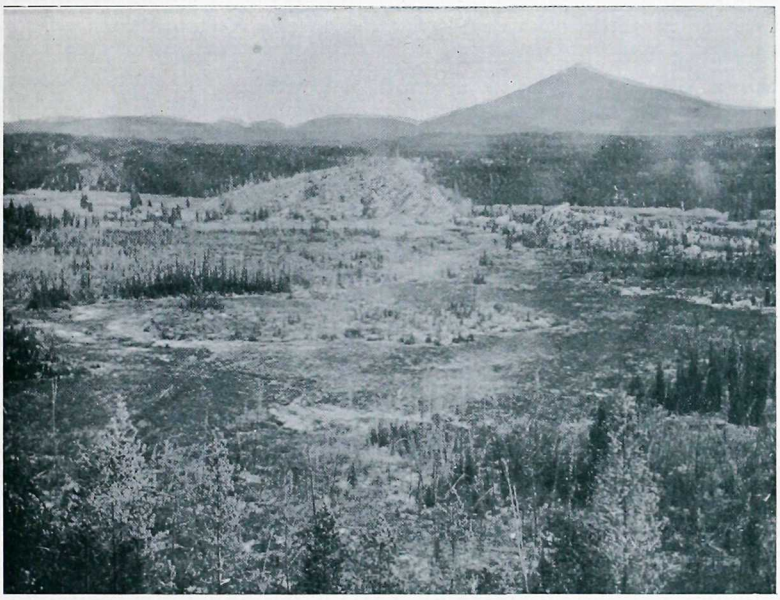
The divide to the eastward is more mountainous, and where the 124th meridian crosses and thence eastward toward for many miles south of Nation River a mountain extends, the higher peaks reaching to 4,690 feet.

The route, crossing the divide at 3,150 feet, follows down Suschona Creek and Suschona River, in the easterly part of a large tract of surveyed land south of Nation River, connecting with the large area surveyed in the Nation Lakes basin. Altitude at junction of Suschona and Nation Rivers is 2,800 feet.

THE NATION LAKES BASIN.

The Nation Lakes basin has approximately 250,000 acres of surveyed land considered suitable for agricultural development and 150,000 acres

or more of unsurveyed land which can be cultivated. The route reconnoitred by Mr. Williams for a railroad would reach Nation River about 5 miles below the outlet of the lower lake in a wide area of arable land drained by Nation River and its tributaries, Suschona River and Weffsicka Creek. Nation River heads in the Kwanika Mountains, and fed by Tsayta Lake, which drains from the mountains near the eastern landing on Takla Lake, it widens into Indata Lake, and flows through two lakes lying east and west—Tchentlo Lake, altitude 2,415 feet, and Chuchi Lake, 2,413 feet. Thence the winding river has a general north-easterly course to Parsnip River, which it enters at latitude 55° 35′ N. at elevation of 2,100 feet. The river varies in width from 150 to 350 feet, is swift, and carries a considerable volume. Leaving the lower lake it



THE NATION RIVER VALLEY.

has a series of boulder-strewn rapids for a few miles and then becomes a large stream, 350 feet wide at the 124th meridian, with rapid current, and at high water has considerable volume. The flow is variable. The river has been found fordable by horses in September where they had to swim in July. It is navigable from the rapids below the lake to a canyon about 15 miles above the confluence with Parsnip River. The valley narrows after crossing the 124th meridian.

Tchentlo Lake, 22 miles long, and Chuchi Lake, 18 miles long, with the connective river 1½ miles long, drain a wide plateau area north and south with a large area suitable for agriculture. J. M. Milligan, B.C.L.S., in 1913 said: "The main valley of the Nation Lakes extends directly

east and west about 60 miles, and with its tributary areas comprises, roughly, 300,000 acres, 85 per cent. of which is available for the various purposes of farming. In considering the possible waste areas, the same conditions prevail here as elsewhere, that when three or four adjoining quarter-sections may carry a high percentage of waste land, other and surrounding quarters will be entirely free. The width of the valley varies considerably, and is narrowest along the lakes, where the land at points is more or less rough, and even rugged where the hills approach the lakes. Speaking of the lands as a whole, and particularly where there are considerable areas, the surface of the ground is of an even character and is broken here and there by the cuts of the larger creeks. Indications tend to show that the whole district has been, until a comparatively short time ago, heavily timbered. Large areas have been deforested, leaving strips of the orginal coniferous growth, principally along lake-shores and on surrounding mountains and hills. The most valuable and predominating tree is spruce, 8 to 30 inches in diameter. A generous proportion of pine, with more or less balsam, is also included. An appreciable percentage of this timber has matured and now shows signs of decay. Ample supplies of good timber, however, exist to more than supply the requirements of ordinary purposes.

"The major portions of the valley have been swept at different times by fire. Windfalls are only encountered in portions that have escaped the main sweep of the flames, and do not prevail, as a rule, to any extent. The areas lying west and south of the second lake and south of and along the Nation River carry a very open growth of small pine, poplar, and willow thickets, which renders clearing possible at minimum cost, and almost any particular piece of land readily accessible.

"The fact that excellent and evenly distributed water-supplies are to be found practically anywhere is in itself a very attractive feature of the country. Almost every quarter-section in the surveyed area is amply supplied by one or more of the numerous creeks, or borders on the shores of a lake. On the larger plateaus, where dry areas may be expected to exist, the network of smaller lakes with their connecting creeks provide an ample supply within easy reach.

"In summing up the merits of a new country, the question of soil is necessarily one of importance. The soil may be characterized generally as a sandy loam; only along the lower levels of the lakes and river is clay noticed to any extent. Along the undulating areas immediately surrounding the lakes, where, as stated before, most of the timber is found, the soil is a loose, light brown loam. This gives way in places to soil of a gravelly nature, containing varying quantities of loose rock, or 'free stone,' on the higher ground. On the bench lands or plateaus, where the main blocks lie, the prevailing soil is a finely divided, dark-brown or reddish-sandy loam. This is of considerable depth in certain areas, as is evidenced by the cuts along the creeks and main river. Large deposits of a whitish silt, probably glacial in origin, are encountered mainly along the Nation River, where cut-banks of 50 to 100 feet in

height have been noted. Other sections carry a soil that is more or less gravelly in parts and contains small loose boulders. Broadly speaking, it may be said that the soils are of a very desirable nature, and the gravelly or rocky areas, where met with, are in the minority, and are so distributed as to result in no depreciation to any particular section of land. As to what agricultural purposes these soils may be best adapted would be determined as a result of more or less experiment in the future. On every hand is evidence that the loams are very fertile. A vigorous growth of grasses, shrubs, and weeds spring up where the fire has opened the country and seed has found its way. Special mention must be made of the smaller wild fruits, which, where found, grow most luxuriantly and bear heavily. Among these is included black and red currants, raspberries, gooseberries, etc.

"In taking up the topographical map of the surveyed areas, and with particular reference to the main block, lying south of and along the Nation River, considerable and disconnected areas of wet swamp or muskeg lands will be noted. Inasmuch as this block comprises about 50,000 acres and includes some of the most promising lands as yet surveyed, a few remarks as to the nature of these swamps may not be out of order.

"As a general rule, these wet lands either carry a growth of small willow and swamp-grasses, or the pure grass without willow, and may perhaps with more truth, in many cases, be called wet meadows rather than swamps. Fewer in number, but generally more extensive in area, are the spruce swamps or muskegs, some of which are covered with a growth of spruce with willow thickets; while others are more open with deep moss, such as are found in almost any part of the Northern Interior.

"As may be seen, these wet lands or swamps are not individually extensive, and except in the cases of small strips of boggy lands along the shores of the smaller lakes, have apparently been formed because of insufficient outlet to the surface waters, as a result of the blocking-up of the outlet. This is effected by natural causes where the flow of water is small, but in the majority of cases, where there are well-defined creeks, it is evident that the water has been dammed back by beavers, as extensive workings, some very old and others new, are to be found anywhere. As a rule the contour of the ground is such as to permit of natural drainage, and, being shallow and of firm bottom, these wet lands lend themselves with little labour to complete drainage.

"These areas must be drained before they are available for the best purposes of farming, and as this may be accomplished in the majority of cases both expeditiously and inexpensively, and considering also the advantages of good soil, easily cleared or already open land, it is reasonable to suppose that these wet lands will, as a rule, prove attractive to intending settlers.

"Perhaps in speaking of the agricultural possibilities of the country generally, and to what kinds or purposes of farming it is best suited, more or less caution should be used in view of the fact that the country

has been under observation for such a short time and only during the warm season; although it is generally conceded that the country as a whole is most advantageous to the comparatively small farmer of the future, and lends itself readily to the various purposes of mixed farming. The following remarks, in addition to the foregoing, may help to form an opinion in the matter.

"The altitude of the main plateaus is about 2,500 feet, or, roughly, 100 feet above the level of the lakes, and compares favourably with that of other valleys where successful farming is being carried on. The same remarks may be made of the latitude, which averages 55° 10′ N. Generally speaking, it could not be said of the country in its present state that it is well adapted for stock-raising. A good percentage of the surrounding hillsides are open and carry a growth of weeds and grass. The winter season would perhaps be a little long. It is suggested, however, that the prevailing open nature of the main areas with the many scattered meadows would amply fill the needs of the small farmer.

"Actual records of climatic conditions are meagre, but weather experienced by surveyors during the two summers spent there was excellent. There was apparent absence of summer frosts. Further records would, of course, be necessary to verify this, but the prevailing impression so far is that summer frosts are light. The presence of the large bodies of lake-waters, the open nature of the burnt areas, and the heat-retaining powers of the sandy loams, also the fact that there are light breezes or winds, would bear out this impression. Mention might also be made of the general absence of overhanging mountains, and also that there are no glaciers which might have a tendency to encourage frosts. Winds in this country seem to be more continuous than is the rule elsewhere, and almost invariably blow from the west in summer and until mid-September, when they change to the south-east at times. Heavy thunder-storms were experienced by surveyors during the first part of September. Although flurries of snow fell about mid-October, the winter snows fall to stay about the end of that month or later, average depth of snow in winter being about 3 to 4 feet on lower levels, and it is all gone by May 1st. Where the growth is of such an open character as to allow free access to the sun's rays, the snow has been known to pass off about April 1st.

"The scenery along the lakes especially is beautiful, and the wide shelving stretches of beach, with their many-coloured sands, will prove an ever-desirable attraction. In the rivers and lakes and their surrounding hills and mountains ample scope is afforded for the fisherman and hunter. At the intake of the Nation River is a particularly favourable spot for fly or bait fishing. Hundreds of rainbow trout, including some Arctic or silver trout, have been caught here in a few hours. In the lakes are the larger lake-trout and Dolly Varden, whitefish and ling. Black bear are fairly common anywhere in the valley, and brown bear

and grizzlies are to be hunted on the higher hills. Moose-tracks are seen toward easterly limits. Caribou herd on the higher plateaus. Opportunities for the trapper are many. At present only a few Indians reap good profit by trapping numerous species of fur-bearers, including beaver, mink, marten, otter, weasel, lynx, and large numbers of musk-rats. Many ground-hogs—a species of marmot—are taken every fall from the open mountain-sides. Although their fur is more or less valuable, they are taken by the Indians chiefly for their fatty meats, which, being dried and smoked, provide food during the trapping season later on. The various species of grouse were plentiful while surveyors were on the ground, and good shooting is afforded each fall when the ducks or geese pass along on their way south.

"The presence of hot springs at the west end of the second lake will no doubt prove of future value.

"The country was prospected for gold-bearing gravels years ago, but no information is at hand to show that any quantity of the precious metal was ever taken out. At present colours may be found in most of the larger creeks, and especially on the bars of Nation River, where work was carried on until comparatively recent years. All of which would tend to bear out the opinion that further prospecting might be attended with some results.

"In contemplating the foregoing remarks regarding the Nation Lake country, one can confidently anticipate what the future offers to the pioneer. Richly endowed by nature, with soil that seemingly can be rendered highly productive at a moderate initial cost, and with conditions generally that are particularly suitable to mixed farming, settlement must be rapid as the various advantages of the country become known and transportation facilities secured."

F. C. Swannell, B.C.L.S., in 1912 said: "There is still much land in addition to that surveyed in the Nation Lakes District, especially to the southward. The soil is mostly loam, but where the country escaped the fire the stand of timber is often too heavy for classification as agricultural land. Nation River occupies a wide trough-like valley composed of jack-pine benches. While considerable of these are gravelly and sandy, yet this is by no means the rule. A cruise from the extreme easterly end of Nation Lake across to the foot of the swift water on the river was through a new growth of jack-pine, but the soil was loam or sandy loam everywhere except on the ridges, which were gravelly. A large area of these jack-pine bench lands lies south-east of here, and if the soil holds as good as the portion cruised, six or seven townships are obtainable—approximately 150,000 acres.

"A large valley draining into Upper Nation Lake parallels Indata Lake on the west and runs nearly through to Tsayta Lake, the north-western lake of the Nation Lakes. Twenty square miles of good land lie here, with much open meadow country. The meadows, however, are generally wet and need draining. Between Upper Nation Lake—

Tchentlo Lake—and Indata Lake, the river, which is very tortuous, traverses excellent bottom land, in most cases burnt clear. Six or eight square miles could be obtained here, augmented by a strip a mile wide along the west shore of Indata Lake. Some five or six sections are obtained at the lower end of Tsayta Lake, as well as a big valley timbered with jack-pine, but in which the soil is sandy to gravelly. The Manson Creek Trail southward from Nation River traverses much undulating to rolling jack-pine country, about 20 per cent. of which has fair soil, the balance being sandy and intersected by gravelly ridges."

With the unsurveyed area of known good land and that included in the surveyed area near Nation Lakes, the extent of arable land in this vicinity will be, conservatively estimated, upwards of 400,000 acres.

NATION RIVER TO MANSON RIVER.

The railway route reaches Nation River at the mouth of Suschona River, about 5 miles below the Lower Nation Lake, 108 miles from Vanderhoof, altitude 2,800 feet, and follows down the northern bank to vicinity of the 124th meridian, where it turns north to cross the mountain divide between Nation and Manson Rivers. The country traversed by Nation River toward the Parsnip is generally rough and broken, the river being in a narrow valley with rock canyons and numerous rapids. Agricultural land is limited to a few scattered flats. Numerous indications of coal have been noted along the river. From Nation River northward to Manson River the main difficulty of this route is encountered in crossing 12-Mile Mountain. Leaving Nation River near the 124th meridian, the route rises north and north-west to 3,400 feet at the head of Gaffney Creek, 20 miles from Nation River; thence it follows down Gaffney Creek, 19 miles, to Manson River, altitude 3,000 feet, and follows down that stream en route to Finlay Forks.

The topography near the route from Nation River to Gaffney Creek is hilly, with many small lakes and muskegs and meadows, too high for agriculture. About 26 miles north of the 55th parallel is a high broken mountain range, through which Gaffney and Munro Creeks drain to Manson River. This range, reaching east to Parsnip River, has many bare rocky peaks, many over 6,000 feet in altitude. Little timber is found above 4,500 feet. On summits of the lower hills in many places are open spaces covered with moss or light grass and studded with a great variety of flowers. Indians say the range is a splendid hunting-ground for caribou. Considerable quartz is seen on this range and nearly all the rivers carry quartz, some of which is gold-bearing. Evidences of prospecting can be found on nearly all the creeks. There is quite an area of timber in this range, spruce, balsam, and jack-pine predominating. Some of it could not readily be worked, but a great deal of it is easily accessible to Manson River.

On the Manson Creek Trail, between 12-Mile Creek and about 15 miles from Manson Creek, is a large area of fine grazing land, the

meadows being numerous and large. The general elevation, however—3,000 to 3,500 feet—precludes the possibility of using this land for any other than stock- or hay-raising purposes.

Manson River, which heads in Bald Mountain, the rolling summit of which is crossed by the Manson Creek Trail, which runs north-westerly from the east end of Lower Nation Lake to Manson Creek, drains a generally mountainous area in a narrow timbered valley at altitude of about 3,000 feet, and agricultural land is confined to the lower part, where it merges into Parsnip River Valley. To the north the Wolverine Range extends between it and Omineca River. Manson Creek, which during the early days, when some 2,000 placer-miners were engaged in the region, was a mining centre with the usual stores, sawmills, and other requirements of a mining centre, is now a small settlement with an average population of about twenty people, including a postmaster and sub-mining recorder.

THE OMINECA DISTRICT.

Omineca River, which came into prominence in the sixties, when gold was found on one of the tributaries and about 2,000 miners flocked in, drains through a complex mountain region in its upper part. It joins Finlay River about 15 miles above Finlay Forks, being by far its largest tributary. From the mouth to Black Canyon, about 5 miles, the river is shallow and current swift, the slope of the stream exceeding 10 feet per mile. Numerous gravel-bars and islands, covered in places by huge drift-piles, obstruct the course and divide the stream into many channels. Black Canyon, 1½ miles long, 100 to 200 feet wide, has usually vertical walls, in places over 150 feet high. It is navigable by canoe at low water, but impassable at flood. From Black Canyon to Little Canyon, about 30 miles, the river has grade of about 12 feet per mile. From the head of rapid water to Germansen Landing, 12 miles, with exception of a few small ripples, the current is easy, 2 to 3 miles an hour, and navigable water extends thence to New Hogem, 23 miles—considerably more by following the tortuous channel. At New Hogem a granitic mountain area is reached, extending far into the mountain country, which covers a large region to the westward and north and for some distance southward.

F. C. Swannell, who made a reconnaissance survey of Omineca in 1913, estimated that Omineca Valley held 80,000 acres suitable for agriculture, and its main tributaries, Oslinka and Mesilinka Valleys, 20,000 and 40,000 acres respectively. A. M. O. Gold, who made a forest reconnaissance of the district, exploring 4,075 square miles from the Nation Lakes Plateau on the south to Mesilinka River and the Police Trail, thence to Fort Grahame on the north, westward from Finlay and Parsnip Valleys to the waterway between Stuart Lake and Driftwood River, estimated that 521,950 acres in this area may be classed as farming land—not including the Nation Lakes basin or Finlay and Parsnip

Valleys. The trail from Takla Lake to Manson Creek was crossed by Mr. Swannell, but no good land was found, excepting large meadows on the summit between Takla Lake and Tom Creek and along the head of Kwanika Creek, which, though too high for general agriculture, about 3,900 feet, might be useful for grazing or raising hay. On the old trail from Takla Lake via Fall River to Old Hogem, on Omineca River, are some small areas of good land and one large meadow on the Takla slope. The lower part of Fall River traverses some good land, now largely flooded by beaver-dams backing up small tributary streams.

Old Hogem, now only a name on the map, was a mining camp of the sixties. Germansen, discoverer of the Germansen Creek placers, was known as Old Hogem, because he charged $45 for a sack of flour ground at Williams Lake from frozen wheat and for other goods in proportion. When Germansen left a new storekeeper established himself at New Hogem, and the camp shifted there, farther down-stream near Duck Creek. From Old Hogem to about 10 miles below Germansen Landing the valley of the Omineca is wide and flat, soil excellent, and numerous meadow-like expanses occur, approximately 80,000 acres being available here for agricultural settlement. The river is navigable and in the early seventies boats carried supplies on this part of the river to Germansen Landing, at the mouth of Germansen River, which drains from Germansen Lake, westward to about 5 miles from Manson Creek, thence north to Omineca River. The site of the old mining town of Germansen is about 3 miles up from the Omineca. A sawmill was operated at the canyon about 3 miles below Germansen Lake. There were also sawmills near Manson Creek.

Placer-mining began on Vital Creek, a tributary of Silver Creek, by miners who went overland from Cariboo and by the trail from Hazelton. When R. G. McConnell, Canadian Geological Survey, explored Omineca and Finlay River Districts in 1893, Mr. Vital and a couple of men were still at work there. Little prospecting was done in the beginning and three years elapsed before a Hazelton Indian found gold on Tom Creek. About $100,000 was taken from it. During the next few years Germansen, Manson, Slate, and Lost Creek diggings were found and became scenes of busy mining camps. Holloway's Bar on Germansen Creek, the Golden Hill, and other claims are still pointed out as large producers. On Manson, Discovery, and Mosquito Bars the Kenny and Brown claims paid big dividends. Lost and Slate Creeks had three rich claims and about 2,000 miners were scattered about the creeks. Germansen and Manson Creek were the "towns," with bar-rooms, gambling-saloons, dance-houses, etc., stores and sawmills in the vicinity, and one winter Manson Creek had a theatrical troupe, despite the isolation. A large number wintered in the district, drifting, getting out timbers, trapping, etc. Pack-trains brought in supplies in the fall, and for a time pack-trains connected at Old Hogem with boats which ran down Omineca River to Germansen Landing. The work was carried on busily for three years, and one March an Indian appeared at a saloon

door at Manson Creek with a letter which told of rich finds in Cassiar. In a day or two Omineca was deserted. Until 1879 Vital and other creeks were given over to Chinese. Successive companies made what they considered fortunes and returned to China. In 1879 there was a revival, and in 1887 the miners were again attracted to other fields. Only a few old-timers remained, and in 1895 the whole population consisted of three or four prospecting parties, a few Indians, and twenty Chinese. Since then work has been done on comparatively small scale. Some efforts have been made by companies to get in machinery, but the transportation difficulties have, as yet, proved too great.

The following table shows the placer returns for this district from 1874 to 1913:—

Year.	Amount.	Year.	Amount.
1874	$38,000	1898	$15,000
1875	32,040	1899	8,600
1876	No returns.	1900	12,527
1877	„	1901	19,100
1878	„	1902	40,000
1879	36,000	1903	28,000
1880	45,800	1904	11,600
1881	39,300	1905	10,000
1882	25,330	1906	10,000
1883	21,000	1907	10,000
1884	12,000	1908	20,000
1885	16,500	1909	15,000
1886	17,600	1910	15,000
1887	13,000	1911	10,000
1888	No returns.	1912	8,000
1889	„	1913	6,000
1890	„	1914	6,000
1891	„	1915	12,000
1892	„	1916	17,000
1893	„	1917	12,000
1894	„	1918	8,000
1895	„	1919	8,000
1896	„	1920	3,000
1897	„	1921	3,000

This shows that since 1902 the industry has fallen away and is now not very important. The district has always been handicapped by its remoteness and inaccessibility, which made it very expensive to operate.

Much ground throughout this district is known to be auriferous, but will remain unworked until transportation facilities are provided. At present it is very difficult to get in supplies or machinery, every pound having to be taken in by pack-horse or toboggan. With a railway prospectors consider there would be a considerable development in lode-mining. The rocks exposed at the Black Canyon consist of gneiss, mica, schists, quartzites, and limestones. Resting on these, but apparently confined to the valley, are soft conglomerates, shales, and sandstones, holding plant remains, either Cretaceous or Tertiary. Farther up hard unfossiliferous limestones occur. These are succeeded by gneisses and mica-schists followed by shales, quartzites, and conglomerates, evidently Lower Cambrian; then by limestones again. Above the limestones and exposed all along the river from Germansen Landing to New Hogem is a great series of green rocks, distinctly foliated in places, but often

passing gradually into a massive eruptive-looking variety. Interbedded with it are bands of dark shales, limestone, serpentines, and in one place a red magnesite; at New Hogem granites come in, exposed to Old Hogem, and a couple of miles along the trail to Vital Creek they are replaced again by the green and dark schists, which are exposed until the valley of Takla Lake is reached, when Cretaceous conglomerates and sandstones again occur. The green and dark shales constitute the gold-bearing rocks of the district. Indications of coal have been found in various places and lignite reported from the upper part of Duck Creek.

In 1909 the Kildare Company, which held fourteen hydraulic leases on Slate Creek, worked twenty men and cleaned up about $10,000. In 1913 this company took in machinery by pack-train and in 1914 located a pay-streak, the portions passed through the sluice-boxes yielding $30 a cubic yard. The Omineca Gold Mines, Limited, took up fourteen leases on Quartz and Vital Creeks in 1913, and G. H. Knowlton and associates, of Vancouver, twenty-one leases on Silver Creek and Omineca River, and began a road from Takla Lake to Old Hogem to facilitate taking in dredging machinery. Value of the ground tested by drills was reported better than 60 cents a yard. Work was suspended during the war and has not since been resumed on any scale.

The report of the Resident Engineer of the Department of Mines for 1921 said: "Another placer-field which attracted considerable attention at one time is what is known as the Omineca; this consists of the Manson and Ingenika sections of Omineca Mining Division. Certain rich creeks in these sections were worked many years ago and intermittent mining was carried on until recent years. With the decline of gold-mining during the war years and the lack of prospectors in the hills, the district was virtually abandoned and now there is but a small production from it.

"There is in this part of Omineca Mining Division a very large area to be thoroughly prospected for placer gold. The country lying at the headwaters of the Skeena, Stikine, and Finlay Rivers should yet yield some rich placer-gold creeks, and it would not be surprising if the next great placer stampede was to this section. Around the old placer-workings of the Manson and Ingenika sections there is undoubtedly much low-grade ground which would pay to work by modern methods, but the handicap of lack of transportation has so far prevented much development of this nature. At the present time the means of access to these sections is by pack-trail from Hazelton or Fort St. James, and distance from the railway is over 200 miles. It is obvious that only the richest of placer-gravels could be worked with any chance of success. The field, however, is a promising one for testing the possibilities for large-scale hydraulicking and dredging, as, if sufficient pay-ground was found, the transportation could be materially improved by the construction of a wagon-road."

To the present prospecting has been almost entirely confined to placer gold. Leads of copper ores and galena have been discovered close

to Manson Creek and would be worked were transportation facilities bettered. On the Police Trail from the site of Fort Connolly via Mesilinka River are conical mounds or "kettles." The Big Kettle, close to the upper part of Omineca River, a conical mound 15 feet high and 25 feet in diameter, has a vent or fumarole 6 feet in diameter filled to 5 feet of the rim with soft earth resembling hæmatite, emitting gas intermittently which suffocates birds and mice. About an acre or more nearly is built up of a spring-deposited rock resembling travertive.

THE BIG KETTLE, OMINECA DISTRICT.

Many mineralized springs seep out, forming stagnant pools and oozy patches of reddish and yellow mud.

F. A. Valleau, for many years Gold Commissioner, who prospected the district considerably, said: "Although it must rightly be classed as mountainous, there are along its many rivers beautiful valleys opening out in places to thousands of acres of the richest ground, heavily timbered in parts, and again patches of open prairie are found." Agriculture has been so far confined to small garden-patches where miners on Manson,

Germansen, and Tom Creeks grew cabbage, turnips, lettuce, onions, etc., with good results. With transportation it is anticipated that not only an area large in the aggregate could be formed, but the companies who expended considerable money to develop claims, but were forced to abandon work by the great expense and difficulty of getting in supplies, would resume. Mr. Valleau said: "All that the district needs is communication to make it one of the best of districts either for mining or as a place for home-seekers. The Omineca, with its rich deposits of gold, coal, timber, rich lands, water-powers, magnificent scenery, and good hunting and fishing, would not long remain the *terra incognita* it is to-day with advent of a railway."

OSILINKA AND MESILINKA RIVERS.

The Osilinka and Mesilinka Rivers are the main affluents of the Omineca River. The Osilinka gains about 25 miles up and is separated from the Omineca by a high unexplored mountain area. Mr. Swannell, B.C.L.S., estimated that the valley, which is well timbered, holds about 20,000 acres which could be cultivated. The Mesilinka, which joins about 5 miles lower down, and averages about 100 feet in width and 7 feet in depth and running about 5 miles an hour, has about 40,000 acres of agricultural land in its valley. The river has numerous rapids, but only one canyon, about a mile from the mouth. Between Osilinka and Mesilinka Rivers are mountains reaching 5,000 to 6,000 feet. The Mesilinka River often splits into several channels and has many bars covered with piles of driftwood.

The Police Trail crosses from the Upper Omineca by a mountain pass to Tutizzi Lake and Tutizika River, a tributary, and thence follows down the Mesilinka to a point about 24 miles from Fort Grahame, when the river sweeps south-eastward to the Omineca and the trail crosses north-eastward via Factor Ross Creek to Fort Grahame. The pass from Omineca River to Tutizzi Lake, 4,000 feet, is choked with huge boulders alternative with patches of muskeg, and on either side are high broken glacier-bearing mountains 7,000 feet high. At the head of Tutizzi Lake is a small area of meadow and bottom, but no land of value is found along the lake. In Mesilinka Valley the land, excepting a narrow strip of river-bottom, is sandy to gravelly. To the south the country rises in benches mostly burnt clean. The valley narrows after turning southward, the easterly limit being a high rounded range dividing it from the Finlay Valley. Here and there are patches of good bottom and some large benches, but no compact area of good land. There are no meadows.

Throughout the Omineca region surveyors and explorers agree that summer frosts are absent until late in September in the river-valleys of average altitude of 2,200 feet. The fertility of the soil is vouched for by a luxuriant natural growth, especially noticeable in the sub-irrigated cottonwood river-bottoms. Climate does not vary much over the whole region. Winter is severe, but weather generally bright and bracing.

Extreme hot weather is seldom encountered in summer, the summer average being about 56°. Rainfall is about 35 inches.

FINLAY FORKS.

Finlay Forks is a small settlement situated at a strategic point where the Parsnip River from the south-eastward and Finlay from the north-westward, draining part of the great intermontane trench west of the Rockies, meet to form the Peace River, which flows eastward to join the Mackenzie basin. The Parsnip-Finlay Valleys lie in general direction of about 30° west of north. The Rocky Mountains, which cross Peace River farther east, swing north-westward to the north and cross the 124th meridian about 6 miles north of the 56th parallel. There is now a small settlement at Finlay Forks and vicinity. A store is operated at Finlay Forks and one a short distance to the westward. A sub-mining recorder is located here. F. Tupper, B.C.L.S., who surveyed a number of lots near here in 1916, said: "In my opinion there is room for a large settlement." The lots then surveyed cover 8,573 acres in immediate vicinity of Finlay Forks. Lots 7459 to 7468, near Pete Toy's Bar, are exceptionally good, lightly timbered with poplar and willow, with considerable open places luxuriantly vegetated; Lots 7469 to 7475 are thickly covered with spruce and cottonwood, not over 2 feet in diameter, fairly dense and difficult to clear, but the soil is good, a dark loam with clay subsoil; Lots 7468 to 7476 front on Parsnip River, elevated benches covered with dead stumps; other lots are similar to the group in Lots 7469 to 7475. Soil is good throughout.

F. Tupper, B.C.L.S., said: "I think the land around Finlay Forks is very suitable for agricultural purposes. There is a large tract of really good land there besides the area surveyed, room for a large settlement. The largest stretch extends westward to foot-hills of the Wolverine Mountains, 15 to 20 miles. It is timbered with spruce, cottonwood, poplar, etc. Where spruce occurs clearing is somewhat heavy, but there are stretches where only poplar and willow occur, with open patches of peavine and other growth, where clearing would be very light. The country is well watered, apart from the main river, by Manson River and tributaries and several small lakes. Good stock-water can be obtained in numerous sloughs and swamps, while in localities away from creeks a good supply should be obtained in wells at shallow depth.

"At Finlay Forks, on many of the pre-emptions, vegetables, such as potatoes, turnips, onions, lettuce, rhubarb, etc., of very fine quality are being successfully grown; but as most of the settlers have only been there about three or four years, cultivation up to date has been on a very small scale. As there is no market available at the present time, the settlers are only growing sufficient for their own use. As far as the soil is concerned, I am convinced that the country is eminently adapted for the growth of all kinds of root-crops, and I think oats and barley would probably do well. Hogs, stock-raising, and dairying should also in time be very profitable.

"Although the country round Finlay Forks is, in my opinion, so suitable for settlement, cultivation on a large scale is not likely to be attempted without railway communication. At the present time the district is most inaccessible. The only way in which the settlers can get in supplies is by boat or canoe from Giscome Portage down the Crooked, Pack, and Parsnip, a distance of about 200 miles, or else from Hudson Hope, which means poling or lining boats against a strong current and several portages round rapids, etc., for about 100 miles. Without railway transportation, I am afraid farming will not prove a profitable industry in these parts."

The settlers all speak very highly of the climate, but no records have been kept. Average rainfall is said to be about 15 inches. The summer season is short, but the days are long and warm. Summer frosts occur, but probably will to large extent disappear, as elsewhere, with settlement. Timber around Finlay Forks and along Peace River is spruce, poplar, cottonwood, and a little pine in places; spruce would only be suitable for building cabins, fences, etc., and supply is plentiful, while there is abundant supply of other varieties for fuel.

Placer-miners worked in this vicinity to some extent in early days, notably at Pete Toy's Bar, and sporadic work on a small scale has been carried on in recent years.

FINLAY AND PARSNIP VALLEYS.

The Finlay and Parsnip Valleys, in these lower portions, have a large area of land suitable for agriculture. F. C. Swannell, B.C.L.S., who said he had no hesitation in predicting a great future for them, estimated that between the mouth of the Nation River in Parsnip Valley and Ingenika in Finlay River Valley, upon a conservative basis, at least 500,000 acres are available.

From about 17 miles below Nation River north to the Omineca is a very large stretch of generally level rolling country lightly timbered with spruce, pine, poplar, and birch, bounded on the east by the Parsnip and Finlay Rivers and on the west by a high mountain range. Average width of this tract is about 15 miles. Soil is chiefly a light sandy loam. Southward the valley narrows. Near the mouth of Pack River there is a low flat about a mile wide between benches 150 feet high, the river wending from side to side, broken by sloughs and islands; these and the river-flat are generally heavily timbered, the benches lightly covered, portions being swept by fire. Between the Pack and Nation the east side is rough and broken. Excepting the river-flat and a few small benches, it is unfit for agriculture. North from Nation River the country is rough and broken on both sides. On the west a range of hills, rough and heavily timbered, 700 to 800 feet high, extends 16 miles. To the west of these hills is a wide valley extending to the main range forming the western boundary of the Parsnip-Finlay Valley. It is rough and well timbered, excepting a large wet swamp, 10 or 12 miles long, commencing

at a small lake about 1½ miles from Nation River and following the course of a stream which enters Parsnip River 17 miles below Nation River. Below this the valley widens into a broad comparatively level tract and holds considerable arable land.

The Parsnip joins the Finlay close to the 56th parallel and about 7 miles east of the 124th meridian. Near their junction the Finlay is somewhat larger than the Parsnip. Manson River enters the Finlay about a mile west of the confluence. At all stages of water both main rivers are good for small boats and could be navigated for considerable distance. On account of almost entire absence of rock along the banks the thread of the stream shifts from year to year, forming numerous islands, sloughs, and sand-bars. In places cut-banks up to 150 feet high occur along the rivers.

T. A. McElhanney, B.C.L.S., said: "In vicinity of the junction the valley extends from the foot of the Rocky Mountains on the east to the Wolverine Mountains on the west, a distance of about 20 miles. From the Omineca to about 15 miles up the Parsnip the valley maintains this width, when it narrows to width of 2 to 5 miles. All of this may not be considered agricultural land for immediate settlement. It does, however, represent closely the area which might eventually be brought under cultivation on improvement of transportation facilities and building of roads to give access to the waterways. Reports from different sources agree that there is agricultural land along the Finlay for distance of 100 miles above the Omineca, and that the valley averages 6 miles in width. A more detailed survey will probably show in the two valleys an area suitable for agriculture of between 500,000 and 600,000 acres, the greater portion of which is within 5 miles of either river. Settlement will be continuous, as there is probably no place in about 140 miles of waterway where settlement on one side of the river is not practicable."

Nature of soil varies, though practically the whole extent has one common feature—absence of rock in place or large boulders. This renders cultivation easy when the timber and brush is cleared. On the western side, in the area most directly affected by detritus from the Wolverine Range, soil contains a large percentage of fine mica sand. It was noticed that when fire had run in this district the soil was pretty well burned and rendered almost barren. In near vicinities of the rivers there is a much greater depth of sandy loam and humus. In a great many places where fire had run, the soil, though burned considerably, was not stuffed, evidence of which was found in the abundant growth of grass, peavine, and vetch.

Generally speaking, there is not much meadow. Reports agree that there is a greater percentage of open meadow farther up the Finlay, affording splendid opportunities for stock-raising. A settler in this area could readily find a location where a fair percentage of his land could be easily cleared and made to produce. Potatoes and other vegetables of good quality have been grown at Finlay Forks, and oats ripened without

injury by frost. Wild fruits grow abundantly, cranberries, gooseberries, red and black currants, blackberries, and raspberries.

On the northern slope of the hill range between Manson and Parsnip Rivers is considerable valuable timber, principally spruce, balsam, and pine. Much runs as high as 30 inches in diameter and is of good quality and height. It could be easily logged to Manson River, which has sufficient water for a few months at high water to float timber to the junction. Besides saw-timber there is a great deal suitable for ties and poles. There is also quite an extent of land west of Manson River and south of Finlay and Omineca Rivers which would classify as timber lands. The timber is not large or of as good quality as the hill timber, but is easily accessible to the rivers as the country lends itself to road-building. Poplar, birch, and cottonwood are scattered through the area, principally in river-bottoms.

A small pioneer settlement has been maintained for the past ten years in immediate vicinity of Finlay Forks. With a railway this point, situated as it is at the junction of the rivers, similarly as Prince George is situated at the junction of the Nechako and Fraser, will doubtless become a townsite, and with navigable waterways for considerable distance on both Finlay and Parsnip a large area could be brought into contact with the railway by steamship services. Such transportation services would not only serve settlement, but would enable mining development on a much larger scale on the Ingenika River and elsewhere where mining operations are now being carried on at considerable expense due to present remoteness.

MINING RESOURCES OF FINLAY DISTRICT.

With railroad transportation it is anticipated that this district would be the scene of considerable mining activity. J. D. Galloway, Resident Mining Engineer, in 1921 said: "For many years it has been known that the sands and gravels of the Peace, Finlay, Ingenika, and other rivers in the district are gold-bearing. This gold is, as a rule, fine, and some at least may be classified as flour gold. As would be expected, gold content of the gravels varies greatly, and only at certain places along these rivers is the ground rich enough to be considered workable. There are, however, believed to be many areas in which the gold content is probably sufficient to make the gravels desirable dredging-ground. In some places natural concentrations, as on bars, etc., have been worked on a small scale with rockers by individuals, but no large production has been made. During the past few years, however, a number of companies have been testing certain areas with a view to installing dredges for working the ground, and it is expected that some of these prospects will before long reach the production stage.

"The Tanisto Mining and Development Company, Limited, commenced testing a number of placer leases on Ingenika River in 1920 with a drilling outfit. Results were reported satisfactory and further work

was carried on in 1921. The Peace River Gold Dredging Company has a number of leases on Peace River, and following satisfactory tests in the past two years are considering putting a dredge on the property. Several large blocks of leases on Peace River are held by W. A. Aubin and preparations for testing the ground are under way.

"Along Peace River and some tributaries surface croppings of coal-seams and coal formation indicate a considerable coalfield. A report, 1912, by C. F. J. Galloway shows that cropping out along the Peace are a number of seams of bituminous coal of excellent quality. The seams described in the report vary in width from 2 to 4 feet, but larger seams are known to occur in the field. Practically no development has been done, as up to the present there has been no inducement to do so. Without railway transportation there is, of course, no market, and development must wait until at least railway-construction is definitely assured. The field is, however, a valuable potential asset and will probably be developed in the near future." The writer also refers to the indications of possible oilfields.

There was some excitement in 1907 and 1908 over gold finds on McConnell Creek and Ingenika River, and McConnell Creek was then staked from end to end, but the following year there was little work done, and since one or two miners have worked there with satisfactory results each season. In 1917 the attention of dredging companies was attracted to the Ingenika and also to Peace River, and since work of testing with drills has been carried on. J. D. Galloway, Resident Mining Engineer, in 1921 said it would not surprise him if the next great placer stampede was to this section.

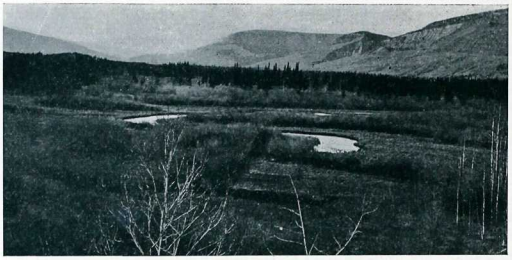
R. G. McConnell, Canadian Geological Survey, said the geological section afforded by the Finlay for the first 150 miles follows the strike of neighbouring mountains and shows occasional sections of the gneisses and mica-schists of which they are built. Numerous sections of conglomerate and plant-bearing shales and sandstone similar to those found on the Omineca above the Black Canyon are also exposed along this part of the river. After bearing to the west the Finlay cuts through green schists, then in apparently conformable descending section through limestones and calc-schists, quartzose shales and conglomerates, and gneisses and mica-schists, probably archæan. The latter rest on and dip away from coarse-grained granite and diorites, the eastern boundary of which follows the western shore of Thutade Lake. The green schists are probably a continuation of the gold-bearing schists of the Omineca, but if so the band becomes narrower toward the north.

He said: "Gold was found along the Finlay and on all streams coming in from the west, in some places in quantities to deserve attention of the prospector. No gold was found on streams flowing from the Rockies above Little Canyon. The section drained by the Finlay has never been prospected to any extent owing to the difficulty and expense of access, and the same may be said of the greater part of the Omineca

country also. I have little doubt, judging from the gold indications met with in the hurried explorations, that if easier and cheaper communication was opened up paying gold districts would be discovered."

UPPER FINLAY VALLEY.

Fort Grahame, a Hudson's Bay Company's post, is located on Finlay River about 65 miles above Finlay Forks. In 1914 F. C. Swannell started from here on an exploration of the Finlay and Ingenika Valleys, and cruised an area of about 5,000 square miles between latitudes 56° 30′ and 57° 45′ westward from the Rockies to longitude 126° 30′. The region is mountainous, about 400 square miles being considered agricultural land. Average elevation of main river-valleys is between 2,200 and 3,000 feet, mountains rising 3,000 feet higher, and higher ranges with glacier-bearing peaks exceeding 10,000 feet. He found in this 5,000-mile area a scant population of a dozen prospectors and a couple of small nomadic



LOOKING UP MOBERLY PASS, PEACE RIVER DISTRICT.

bands of Sikanni Indians. No attempt at agriculture had been made, except a little desultory gardening at Fort Grahame. The Finlay Valley, however, as far north as 57° 30′ contains probably the largest compact area of excellent land remaining unexploited in British Columbia, and both soil and climate render it particularly desirable for settlement. Its present remoteness and consequent difficulty and expense of obtaining supplies is the chief drawback. A railway touching Peace River and a steamboat on the Upper Peace, Parsnip, and Finlay would make the whole of the Finlay-Parsnip Valley readily accessible. Steamers now run on Peace River in summer to Hudson Hope, near where the canyon, 25 miles long, bars navigation. From the canyon to Finlay Forks the Peace River is good, excepting two short rapids, the Parle Pas and Finlay. On Finlay River there is no obstruction for 170 miles, excepting Deserters Canyon, 35 miles above Fort Grahame and 100 miles from Finlay Forks.

Mr. Swannell said: "Excluding Finlay Valley above Prairie Mountain as being at too high an altitude for such areas of good land as exist to be of value economically, there remains between Grahame and this point 300 square miles of good land. Ninety square miles of this is river-bottom, excellent soil, but generally too heavily timbered with spruce and cottonwood to be classified as farming land. Besides, this bottom land is continually being eroded, the river often shifting half a mile in a season. These bottom lands are also much cut up by sloughs. This leaves 210 square miles of bench lands, mostly in the first 50 miles above Grahame. There are 75 square miles of good land in the first 40 miles up the Ingenika, excluding 10 miles of fine spruce timber. Climate is rather less severe in winter than in Nechako Valley and snowfall in the Lower Finlay light. Rainfall is abundant. There is almost entire absence of summer frosts in the main Finlay Valley."

The Finlay is exceedingly crooked, cut into many channels, with numerous drift-piled bars, and erosion during high water is rapid. Although actual distance from Grahame to the Ingenika is 14 miles, by river it is fully 20 miles. Three-quarters of a mile below the Ingenika the first rock-exposure is noted, a jutting reef on the right bank which at high water forms a whirlpool. The alluvial bottom land, mostly timbered with spruce and cottonwood, varies from 1½ to 2 miles wide, and the valley averages 6 miles in width, rising on the east in a succession of benches, the highest 250 feet above river-level. The land is uniformly good, loam or clay loam, and very seldom sandy. Timber is mostly jack-pine and poplar. A pack-trail runs along the east side, keeping to the benches to avoid the heavily timbered and slough-cut bottom lands. Excepting a creek 50 feet wide, 2 feet deep, 8 miles from Grahame, and three smaller creeks, the bench lands are without water other than an occasional swamp. Nine miles above Grahame are several large swampy meadows surrounded by excellent bottom land, but without draining they appear of little value. For 10 miles above Ingenika River the Finlay retains the same characteristics as below—tortuous, badly cut by bars and sloughs. Five miles below Deserters Canyon, however, it gathers into one channel 250 yards wide and northward reaches the mountain-slope on the east. On the west the mountains are 8 miles back, but good land extends only 2 miles from the river and then changes to undulating burnt country full of small lakes and pot-holes and much broken by gravel ridges.

Deserters Canyon, the only bar to navigation in 175 miles, is a gorge 1½ miles long, with cliff walls of varying height to 130 feet. It is 160 feet wide at the head, but broken in midstream by huge rock fragments. At low water it can be run safely by canoe, but two riffles being at all bad. At high water, however, navigation is impossible for anything but large boats on account of heavy swells, swirls, eddies, and whirlpool. A good portage-trail exists on the west side, where the Klondikers built windlass and skids in 1898. Above Deserters Canyon the river maintains width of 250 feet, making several large bends westward, with high cut-

banks at the bends. A few miles from where Akie River enters is a network of islands, bars, and channels; in one place the river-bed being half a mile wide. Twenty miles above the canyon the stream again gathers in one channel, islands being occasional to Russel Creek, 72 miles above Grahame. Thence for 13 miles to Paul Creek the river has several large loops. The valley narrows to 3 miles. Above Paul Creek the stream skirts the mountains on the east side. Kwadacha River enters 96 miles from Grahame and Fox River 3 miles beyond, a small stream which occupies the north-westerly trend of the main valley; the Finlay here abruptly leaving this valley and coming from the west in a narrow gap between mountains until after passing the foot of Prairie Mountain, where the river is in a wide valley paralleling its original course. At 115 miles from Grahame the mountains close together at Long Canyon, 5 miles in length, in two places in which the river is cut into narrower channels 30 and 60 feet wide. Bad water occurs for half a mile and canoes are lined up at low water, and at high water a portage is necessary. There is no portage-trail. For 5 miles above the canyon the river is swift, shallow, and broken by riffles. It has average width of 150 yards. At 125 miles from Grahame the stream turns abruptly from the north, in Cascade Canyon, the main valley continuing westward and meeting the Finlay again above the canyon, which is full of shallow rocky rapids and 2 miles up has a 25-foot drop in a series of wild cascades. Above the gorge-like canyon the valley is again wide, with an eastern continuation across to Fox River, in places having width of 3 miles, but excepting a couple of square miles of meadow and bottom north-east of Cascade Canyon and small bottoms in loops the land is not of value, being stony and gravelly and denuded of soil by forest fires which have swept the whole upper valley. From Porcupine Creek the river is a succession of shallow, boulder-strewn rapids. Above Thudaka River, a mountain torrent, the river comes from the south-east, and after a couple of small cascades falls through Reef Canyon, 2½ miles long, into vertical walls.

Above Reef Canyon the rough country through which the river has cut its way changes to alluvial flats occupying an ancient lake-basin; the river, widened to 300 yards, having sluggish flow and the bed is reed-choked and shores muddy. On either hand are large flats thickly covered with willows and full of beaver meadows and ponds for a mile from the river. This lake-like expanse is about 5 miles long and lies north and south. At the head the current again becomes perceptible and the river is soon a swift-flowing stream full of gravel-bars and islands between high mountains. Twelve miles above Reef Canyon Thudegade River enters from the west and 2 miles farther Delta Creek from the east. A horse-trail from Lake Thutade leaves the Finlay here, follows up Delta Creek, crosses the summit and down Bower Creek, reaching the Finlay again a mile below Long Canyon. At Delta Creek the Finlay is 125 feet, running swiftly over a gravel bottom. It continues swift and full of bars and islands until in latitude 57° 17′, 165 miles from Grahame,

the valley narrows and swings in between the mountains from the southwest.

Above Delta Creek for about 12 miles are some fairly level benches with small grass-bordered lakes, but the whole country is destitute of soil, and thence to the source in Thutade Lake bordering country is rough, intervening area to the mountains being covered with benches or ridges of washed boulders and gravel, evidently remains of a great glacial talus which filled the valley. There is little soil on the hills, boulders and a small quantity of decayed vegetable matter and moss, with poor, scarce timber, chiefly spruce. The river, which leaves Thutade Lake in a canyon 4 miles long with a fall 60 feet high at the end, with swift water above and below, is 100 feet wide below the falls, 6 to 8 feet deep, with current of about 10 miles an hour. For some distance below the falls the banks are sloping and there is a little bottom land. Then the banks become precipitous and the trail leaves the river and crosses benches 300 feet above; thence for 9 miles traverses rough country to Canyon Creek, after crossing which some bottom land occurs with some beaver meadows, and after a few miles over boulder-strewn country runs over the bench lands to Delta Creek.

Between Thutade Lake and McConnell Creek, a branch of Ingenika River, on which in 1908 some placer-mining excitement occurred, and where occasional mining has since been carried on in a small way, is a low flat summit with some small lakes, some draining to Thutade Lake, others to McConnell Creek.

INGENIKA RIVER.

Ingenika River, the main affluent of the Finlay, enters about 14 miles by air-line above Grahame, 29 miles by river. It is crooked, full of sloughs, about 120 yards wide at the mouth, with clear water and swift current. The valley, fairly straight, runs a little north of west for 55 miles. To the foot of the first canyon, 80 miles up-stream, there is a fall of about 500 feet, 375 feet in the upper 35 miles, and it is difficult to pole canoes up owing to " sweepers " and overhanging bushes preventing lining.

A characteristic of the Lower Ingenika Valley is the continuous line of grassy and scarped terraces bounding the valley-bottom proper on the north. Arable lands which extend to about 50 miles up aggregate about 50,000 acres. The river is tortuous, wending from side to side of the valley-bottom and forming many sloughs and islands. The bottoms are excellent land, lightly timbered with poplar, alder, and pine and patches of spruce bottom. The higher benches are mostly covered with pine, the loam soil here inclining to sandy. Twenty miles up Swannell River enters from the south. This stream bends sharply to the west about 4 miles up and forks about 5 miles farther on. Between it and the Ingenika a large area of bench land is included, only broken by an occasional rocky ridge. Several lakes, meadows, and muskegs occur. The bench land is generally sandy, however, and westward runs up into

a large plateau covered with jack-pine thickets and, against the mountains to the south, open spruce-swamps. At Pelly Creek, 40 miles up, a long mountain parallels the river on the south for 30 miles, being only cut through once by a transverse valley. To the north Mount Pelly rises, the range continuing westward without a break to the North Fork. Above Pelly Creek the river is very crooked, looping through heavily timbered spruce bottoms. About 10 miles of timber occur here, with much willow and alder bottom and large open spruce-swamps. About 41 miles up the valley has been denuded by fire and the river blocked with fallen timber, resulting in a shifting bed and new channels, the whole width of the river being blocked 56 miles up. From here the river fast becomes a series of riffles, shallow rapids, and drift-piles, the whole valley being fire-swept, and the mountains on each side become more rugged and close in. At 70 miles up the river-grade becomes 46 feet in a mile, and 5 miles beyond is a canyon ending in a chute with a drop of 15 feet through a gap 25 feet wide. Above, the river improves for a few miles, but bordering country is rough.

Swannell River is 80 feet wide and swift. The South Fork heads in a wide valley paralleling the Finlay and running through to the Omineca, containing Mesilinka River for the larger part of its course. At the divide between the Ingenika and Omineca waters several long lakes occur. Pelly Creek, the largest affluent of the Ingenika, occupies a deep mountain-bordered valley. Tucka Valley has considerable areas of meadow and bottom, but the amount is too limited and altitude too high for the land to be of value agriculturally. Wrede Creek has practically no land, the only large flat, at 2,900 feet, at the first forks, being a stony barren. The North Fork has a comparatively wide valley with large meadows continuing northward for 20 miles. The Ingenika sweeps in from the south-west beyond this fork, following the foot of a long unbroken mountain.

Russel Creek, the first tributary of the Finlay of size on the right north of Ingenika River, occupies a valley which, continuing beyond the head of the creek, becomes the valley pirated by the Finlay after breaking through at Long Canyon.

Akie River, which joins the Finlay from the east, 12 miles above Deserters Canyon, has no agricultural possibilities, nor has Paul Creek. There is no agricultural land on Kwadacha River, excepting at its mouth and between it and Fox River, which drains a valley above 5 miles wide. Ten square miles at the mouth are burned clean; the soil, however, is sandy and farther up becomes gravelly.

TIMBER QUANTITIES.

Parsnip River drainage-basin, 4,492 square miles, with 23 per cent. above timber-line, carries 7,382,500,000 board-feet of saw-timber, including 36,912,000 feet of Douglas fir, 1,476,500,000 feet of balsam, 5,536,875,000 feet of spruce, and 332,213,000 feet of lodge-pole pine. Stands exceeding 10,000 feet per acre cover 21 square miles and 5,000 to 10,000 feet per

acre 1,001 square miles. It is estimated that 175 square miles are suitable for agriculture.

Finlay basin covers 18,861 square miles, with 67 per cent. above timber-line. The timber stand is computed at 3,518,400,000 board-feet, of which 2,638,800,000 feet is spruce. Of the forest area, a stand of 5,000 to 10,000 feet per acre occurs on 263 square miles. The arable area is estimated at 356 square miles.

FINLAY FORKS TO HUDSON HOPE.

Hudson Hope is a Hudson's Bay post on the north side of Peace River at the western border of the Peace River Block. Below Hudson Hope Peace River widens out and flows with uniform current through a valley cut deep across the surrounding plains. Distance from Finlay Forks to Hudson Hope is 92 miles, 72 miles to the head of Rocky Mountain Canyon, which bars navigation, and thence 20 miles to Hudson Hope; Fort St. John is 51 miles lower down and Dunvegan, Alberta, 117 miles beyond; thence to Peace River 61 miles, this point being linked with Edmonton by the Edmonton, Dunvegan & British Columbia Railway. At McLennan this railway branches westward to Spirit River, from where it branches south to Grande Prairie, and a westerly extension has been located, but not built, from Spirit River to Pouce Coupe, in the Peace River Block, connecting with the original proposed projection of the Pacific Great Eastern Railway, which runs north-east from Fort McLeod via Misinchinka River and Pine Pass and Pine River to Murray River; thence eastward to Pouce Coupe and south to Swan Lake. The route surveyed by Mr. Williams northward from Vanderhoof to Finlay Forks follows down Peace River to Hudson Hope, 48 miles from the Pacific Great Eastern projection at Pine River, the distance thence to Swan Lake being 82 miles. Steamers run during summer to Hudson Hope.

Finlay Forks is at Mile 188 from Vanderhoof and there are alternate routes on either side of the Peace. By crossing to the north side advantage could be taken of a southerly exposure, eliminating necessity of protection against snow-slides; however, two bridges across the Peace would be required. By following the south shore the bridges would not be needed, but several snow-sheds would be required around Mount Selwyn and to the east. On this side a series of benches, natural railway embankments, extend to the canyon, Mile 273, in which some fairly heavy rock-work would be necessary. The main bench above the Peace, altitude 2,400 feet, is reached at Maurice Creek, opposite Hudson Hope, Mile 296. The Williams route from here crosses eastward across Moberly River to MacEwan Creek and Pine River, and southward up that stream to Mile 344 of the original projection, at a point 82 miles from Swan Lake.

Mr. Williams in his report said: "Following down Peace River to Hudson Hope, agricultural possibilities are rather limited on account of the narrowness of the bench on either side. Only four settlers were

encountered, but results which these had obtained would come up to the expectations of the most optimistic. At Beattie's ranch on the north side, 20 miles above Rocky Mountain Portage, tomatoes were ripened on vines out-of-doors from seed sown outside. Vegetables and fruits grown at Hudson Hope would compare most favourably with those grown on Vancouver Island.

"From the upper bench at Hudson Hope on the north side of the Peace, at elevation of about 2,400 feet, practically all the land in a north-easterly direction to Vermilion Chutes is good land for mixed farming.

"Following in a south and easterly direction from Hudson Hope via Moberly Lake to South Pine River, very few have as yet come in, and practically all those who filed on homesteads have since left, claiming that farming in this district was unsuccessful on account of summer frosts. This section contains large stretches of commercial timber, being the only section which has escaped being burnt. No timber of consequence is found between Finlay Forks and Hudson Hope."

Peace River, leaving Finlay Forks, flows northerly for about 8 miles through what is practically the valley of the Finlay, and then bends eastward, cutting through the main range of the Rockies in a narrow valley for 40 miles with little bordering land. Leaving the mountains the valley widens gradually, and small flats and benches lightly covered with poplar and pine occur along the river. The mountains bounding the valley decrease rapidly in height and slopes are open and grass-covered. Reaching Rocky Mountain Canyon, about 80 miles from the forks, the river bends sharply south, leaving the main valley, which continues easterly into width of about 2 miles, and returning to it at Hudson Hope, about 12 miles from the head of the canyon. The river between Finlay Forks and the canyon is navigable for steamers at every stage of water, the only obstacles being Finlay and Parle Pas Rapids. The former could be improved greatly by removing the rocks which obstruct the stream; the latter present little difficulty to navigation.

F. Tupper in 1916 surveyed a number of pre-emptions between Finlay Forks and Hudson Hope; one at mouth of Carbon River, eight at a point known as Branham's Flat, one at 20-Mile Creek, four at 12-Mile Creek, altogether 2,395 acres. He said: "There is very little good land along this part of Peace River, which is the passage of the river through the Rocky Mountains. These lots consist of areas of flat land along the river, held by trappers who ply their calling along the river and tributaries in winter, and in spring and summer grow sufficient vegetables, etc., for their own use. There is not sufficient good land at any point to make anything in the way of a settlement worthy of the name."

A. W. Harvey, B.C.L.S., said that between where it enters the Rockies and the canyon there are not over 25,000 acres of agricultural land bordering Peace River, about half covered by coal licences.

W. Wright, B.C.L.S., 1916, said that in the area between Finlay Forks and the Rocky Mountains the country was similar to the Lower

Finlay-Parsnip Valley, level benches with second-growth timber, sandy loam soil, clayey in places. From about 6 miles from the head of Peace River to Ottertail River, 38 miles, there is practically no agricultural land, mountains rising abruptly. There are small patches at mouths of Wicked and Barnard Rivers and good spruce scattered along mountain-sides and near Clearwater and Ottertail Rivers. Below Ottertail River the valley widens and there are strips of good land on either side.

PEACE RIVER DISTRICT.

Summarizing the agricultural areas outside the Peace River Block, in which the chief settlement is located, notably in the Pouce Coupe District at the south-east, where over 2,000 are located, Professor J. C. Gwillim in 1919 said: "Concerning agricultural land, there are within the limits of British Columbia, north and south of Hudson Hope, a few partly wooded prairies and some steep, grassy hillsides on the north

FORDING THE HALFWAY RIVER, PEACE RIVER DISTRICT.

banks of the rivers. The main country is thickly wooded with small timber, chiefly spruce, jack-pine, and poplar.

"The most desirable flats or wintering-places for stock and feed are already partly taken up by squatters, as at Halfway River, Hudson Hope, Moberly Lake, Pine River, and its south and east branches, Lone Prairie between the latter, and Flat Creek, farthest south of all.

"These places are all valley lands or deep depressions, mostly less than 2,000 feet above sea-level. Lone Prairie, one of the most elevated (2,400 feet), is a considerable tract of partly wooded flats nearly surrounded by mountains, an area of about 30 square miles, in which are half a dozen settlers. There are also extensive tracts of easily cleared land on the South Branch of Halfway River, 44 miles north of Hudson Hope, and on the western side of Kiskatinaw or Cutbank River, south-west of Pouce Coupe.

"The greater part of this country, if cleared of its forest-growth, which is useless as timber, would afford good grazing land, while the

valley-flats would furnish hay and wintering-places, especially those which are visited by Chinook winds.

"On Lone Prairie, Mr. Wartenby, one of the settlers, told me he fed his cattle for only ten days during the winter of 1918–19. This place used to be a favourite wintering-place for Indian horses.

"The present situation of this area as regards agriculture now is: Some stockmen on Halfway River; settlers who produce little or nothing about Hudson Hope, having little market; and a few trapper settlers, squatters, and absentees on Peace River above Hudson Hope, near Moberly Lake, and at Sukunka River, Murray River, on Lone Prairie, at Flat Creek, and along the western side of Kiskatinaw River. These people cannot sell produce, nor have they much stock, excepting one case on Halfway River. The country has only Indian trails; hence those who hold the land must risk a living by trapping or other occupations.

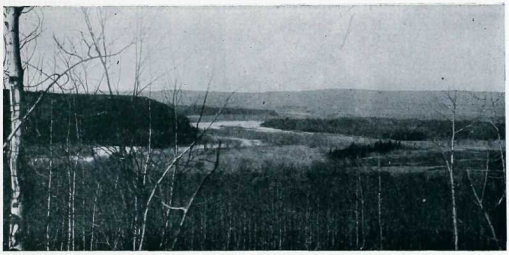
"The main highway of the country is the Peace River. This avenue of approach from the eastern railway connections and from the west by way of Fort George and the Parsnip River has a considerable traffic of a frontier character, placer-miners, prospectors, trappers, and other adventurers, or exploration parties."

In the south-east portion of the Block there is considerable settlement and two towns, Pouce Coupe and Rolla—over 2,000 people being stated to be in this part. Smaller settlement exists near Fort St. John. Beyond the Alberta boundary are many rapidly settling districts with considerable population, and Grande Prairie, Pouce Coupe, Spirit River, Fort Vermilion, and Lake Saskatoon have become renowned for their productive capabilities, and the large region from White Mud River to Dunvegan Crossing westward to Hudson Hope offers a vast area for settlement. Last year lands tributary to the two railways produced about 3,000,000 bushels. Recently considerable fishing industry was inaugurated in the Mackenzie River basin, a cannery being established on Lake Athabaska, employing 100 men. There are from 25,000 to 30,000 cattle in the district, 7,000 horses, 6,000 sheep, and 12,000 hogs. During 1920, in Peace River Land District, homestead entries, soldier grants, and sales totalled 1,395.

That a considerable coal-mining industry would be developed with transportation facilities is consensus of opinion of all experts who have examined the large coalfield near Hudson Hope and Carbon River, and geologists consider chances of oil production are good. Placer leases are held at several points along Peace River and dredging companies are operating, ground having been tested by drills in the past two years and one company is arranging to take in a dredge. The district has not been prospected to large extent and few occurrences of mineral in place are known, but it is considered possible that in addition to the known deposits of placer gold and coal, and probably petroleum, important ore-bodies may be discovered in the Rockies. About 1900 a number of low-grade quartz claims were located on Mount Selwyn and some prospect-

work was done for a couple of seasons, when, owing to distance from transportation, work was abandoned. With exception of the westerly part of this district, formations likely to produce metals are deeply covered with Cretaceous shales and sandstones, and these in many places by still younger formations.

Charles Camsell, Canadian Geological Survey, said springs of natural gas and tar rising at several points in Peace River Valley suggest reservoirs of both substances at depth in the rocks below. Drilling has been undertaken and in a well near Peace River a heavy flow of gas was struck at a little over 1,000 feet. Beds of gypsum 10 to 50 feet thick are exposed near Peace Point on both banks of Peace River, and it is estimated 217,000,000 tons are favourably situated for mining. Salt is associated with the gypsum north of Peace Point and hopes are entertained for finding of potash in association with the salt and gypsum as in certain parts of the world.



LOOKING UP HALFWAY RIVER.

"While all the mineral deposits are still in undeveloped state, it has been fairly satisfactorily proved that there is a large amount of coal, gas, and gypsum, and settlers can be assured of adequate supply of coal and gas for fuel and power and of gypsum for building purposes as soon as there is sufficient demand to warrant development."

Hudson Hope may be roughly taken as the eastern boundary of the foot-hills and eastward the country is physiographically part of the great plains, cut by the river-valleys, which are at varying depths below the plateau. The Peace is 800 to 1,000 feet below a plateau at 2,200 to 2,400 feet elevation, and tributaries heading largely in marshes on the plateau are in valleys which become more defined and deepen as they descend to the main stream. East from Hudson Hope to the Alberta boundary, extending some 36 miles north and south of the Peace, is the Peace River Block, a rectangular area of 3,500,000 acres which was conveyed to the Dominion, and lands within it are administered by the Dominion

Surveyed areas outside the Block are north from Peace River 14 miles, adjoining the western boundary of the Block; near Halfway and Cameron Rivers at the north-west of the Block; near junction of Blueberry and North Pine River at the northern boundary; near Moberly River at the western boundary; on South Pine and Pouce Coupe Rivers at the south-east near the Alberta boundary.

PEACE RIVER BLOCK.

Peace River Block lies north and south of Peace River, which divides it roughly in equal portions. North Pine and Halfway Rivers are main tributaries from the north and Moberly, South Pine, and Kiskatinaw from the south, all having their headwaters beyond the Block. Many settlers have taken up lands in the Block during the past few years, and in some districts, notably near Rolla, in Pouce Coupe District, there is considerable settlement. Mr. Doucet, of the Dominion Forestry Branch, estimates that 1,160,000 acres are available for agriculture. The timber stand is estimated at 4,545,000,000 board-feet, of which 1,921,000,000 feet is in stands of over 10,000 feet per acre on 259 square miles, and 1,762,000,000 feet on 410 square miles in stand of 5,000 to 10,000 feet per acre.

Pouce Coupe, at the south-east of the Block, is a town of 300 to 400 people, with banks, hotels, telegraph, land offices, etc., and directories credit its vicinity with population of 1,500. It has two sawmills, good stores, churches, school, etc. The nearest railway communication is at Spirit River, 65 miles distant. Rolla, 15 miles north, has about 600 people in its vicinity, farming and stock-raising, and oil explorations are being carried on in the vicinity by the Imperial Oil Company. It has two banks, two general stores, hardware and other stores, lumber-yard, etc. The wagon-road from Grande Prairie runs north from Pouce Coupe via Rolla to a steamer-landing on Peace River, and several steamers which ply between Peace River Crossing and Hudson Hope in summer land supplies at this landing.

The Pouce Coupe District comprises several townships of gently rolling prairies and a number with scattered bluffs and light woods. Extent of the choice area is about 25 by 40 miles. It is an excellent ranching district; an elevated plateau about 2,400 feet in elevation immediately east of the Rocky Mountains and foot-hills. Soil is very rich and wild hay and peavine grow abundantly. Influence of the warm "Chinook" winds is marked. They sweep through the mountain passes throughout the district from time to time during winter, sometimes removing the snow and giving pleasant respite from the cold. Wheat and all ordinary grains, grasses, and vegetables yield abundantly.

Fort St. John, on a small flat at foot of rugged banks 800 feet high on the north bank of the Peace, established decades ago as a fur-trading post, is centre of a small but growing settlement on the plateau to the north, fairly level land, largely open or lightly wooded, with good soil and luxuriant wild vegetation. North Pine River enters 20 miles east in

a deep valley, and its tributaries, with deep ravines, break up much of the country and make it too rough for grain-growing. Those valleys and hillsides afford good grazing. Dominion surveyors say that taken as a whole this district is well adapted to mixed farming and ranching. In 1914 G. B. Milligan, B.C.L.S., reported about sixty settlers hereabout, and the number is now said to be about 100.

VICINITY OF HUDSON HOPE.

In vicinity of Hudson Hope, adjoining the westerly boundary of the Peace River Block and extending 14 miles north from Peace River, about 45,000 acres, drained by Lynx and Portage Creeks, were surveyed by G. B. Milligan, B.C.L.S., in 1912. He said this area is well watered by the forks of Lynx Creek and their branches, excellent mountain streams. There are also numerous swamp meadows carrying water for the greater part of the season. Chinaman's Lake is in a slight depression about a

HALFWAY RIVER, PEACE RIVER DISTRICT.

mile from the foot-hills, surrounding country being mostly covered with small willow, poplar, and alder, with a few spruce. Forest fires have devastated this country. The larger timber, excepting isolated clumps, has disappeared, and under present conditions of brulé and light windfall, with second growth of poplar and willow, clearing is light. Large areas have been almost entirely cleared by the fire, and grasses of wild varieties, peavine, bluejoint, etc., have taken root, and as it cures standing, affords considerable winter feed.

The two stores at Hudson Hope, which hitherto were merely trading outposts for Indian trade, have increased stocks to meet expanding demands of travellers and settlers, about forty of whom have taken homesteads in the immediate vicinity during the past summer (1912).

This area lies on a nearly level plateau about 500 feet above Peace River and includes practically all the available land between the Peace River Block and the foot-hills to the west. Top soil varies, being mostly a few inches of black loam and in places sandy loam with clay subsoil.

SOUTH OF PEACE RIVER BLOCK.

To the south, adjoining the western boundary of the Block, about 6,000 acres are surveyed near Moberly River and a large area extending westerly up the South Pine. This river heads in Pine Pass. The mountains, lowering as the river is descended, are generally close to the river, but leave some fertile flats in the bends. At intervals the mountains are 2 or 3 miles distant, leaving room for valleys of larger extent, on which natural hay meadows alternate with patches of timber. Agricultural lands in the valley, including that part within the Block, are computed at 130,000 acres. Mean elevation is about 2,400 feet. General character of the soil is black leaf-mould with sandy loam or clay subsoil, appearing to be well adapted for garden produce and oats, and the rich wild hay in the meadows and grass on the hill-slopes would allow cattle-raising on a moderate scale. Surveyed land outside the Block is largely in the area known as the Burns Block at the south-west corner.

There is no settlement on Sukunka River. On Murray River, another tributary of the South Pine, there are small settlements at Cowic and Wolverine Creeks, the former 72 miles and the latter 80 miles from Pouce Coupe, the nearest town. Apart from farming, the only industry is trapping. On open area up the creeks, as among the scattered poplars and willows, soil is black loam with sandy clay subsoil. Wheat ripens and oats are a sure crop, but as no threshing is possible with present means of transport, the wheat is used chiefly for chicken-feed and oats for green food to cattle and horses. Excellent potatoes are grown, but judicious location is necessary to ensure them against frost. All ordinary garden vegetables do well in the short but hot summer. The open spaces afford good wild hay and where meadows can be irrigated they can be cut year after year. Settlement areas being small and transportation lacking, profitable wheat-raising cannot be expected, and, as cattle must be fed in winter, mixed farming is considered the most likely industry. Range cattle will feed through all but the hardest winters.

Kiskatinaw River heads in some marshes and is comparatively sluggish. Like other streams, its valley deepens into descent, also those of the tributaries. Ascending the creeks areas of open land with excellent soil are found, but nowhere is there room for settlement of over 100 to 200 people without clearing off the timber. Excluding these fertile areas up the creeks and flats at their mouths, with occasional strips in the valleys, the country is mountainous. About 86 square miles have been surveyed near Kiskatinaw River, south of the Block.

To the eastward 165 square miles have been surveyed, extending 14 miles west from the Alberta boundary north and south of Swan Lake, including considerable good lands in the southern extension of the Pouce Coupe Prairie.

The country in vicinity of Swan Lake is rolling, with long even slopes. From Swan Lake, in southerly part of Township 26, a long gentle

slope rises to the south boundary of the township. This elevation holds, generally, through Township 27, in a gently sloping rolling series of low hills, practically all of which could be put under cultivation. A few small creeks with good water probably run throughout the year. Soil is rich loam over clay and sandy clay. In burnt-over areas the surface soil has been burned to the clay, but with heavy growth of grasses, peavine, etc., it is evident that such places are resuming their original fertility. It is primarily a dairying district. Cattle require feeding in midwinter months, 2 tons of hay per head being considered sufficient. Garden produce of excellent quality can be grown. While not much has yet been done with grains in the immediate vicinity, there is no doubt that wheat and oats can be successfully raised. The Pouce Coupe District, which has practically the same climatic conditions, is fast becoming famed for its grain. The greater part of this district is covered by small poplar and willow-brush, more or less dense. Considerable open stretches occur. Some spruce and tamarack of good size grow north of Swan Lake. To the south, through Township 27, the growth becomes more dense. The road to Pouce Coupe and via Rolla to Peace River from Grande Prairie, on the Edmonton, Dunvegan & British Columbia Railway, passes through the district, distance from the railway being about 72 miles. There is a weekly mail service to Pouce Coupe, the nearest post-office.

HALFWAY RIVER AND VICINITY.

At the north-west of the Peace River Block, in the valley of Halfway River and tributaries and vicinity, 57,000 acres were surveyed by G. B. Milligan, B.C.L.S., in 1912. Lots 1407–1313 in Halfway Valley lie about 5 miles south of Halfway River and on the south side of the valley of Kobes Creek, the general slope being north to Kobes Creek. The first bench from Kobes Creek rises about 60 feet, and from this bench the ground rises gradually for about half a mile to a ridge forming the south boundary of the watershed of Halfway River. In places the soil is covered with moss with appearances of muskeg, but when digging down the soil under the moss is found rich black loam, in places 18 inches deep, with clay subsoil. Growth throughout is principally second-growth poplar, willow, and alder, with patches of spruce and pine. The land is drained by small streams originally from seepage-water along low hills to the south. Lots 1440–1442 along Kobes Creek have excellent meadow along lower flats for most part open. Growth is light poplar and willow. Upper benches are covered with heavier jack-pine, poplar, willow, and spruce. Soil is all sandy loam. Lots 1430–1437 are chiefly high land on either side of the ridge between Halfway River and Kobes Creek. The top of the ridge is covered with dense jack-pine, alder, and willow, and soil is light and gravelly. The south slopes toward Kobes Creek are gradual; growth is mostly scattered clumps of poplar, alder, and willow, and there is also excellent growth of peavine and grass. Slopes to Graham River have dense alder, willow, and windfall and light and gravelly soil. Good bottom land is found on Lots 1431 and 1433.

The land surveyed between Halfway and Graham Rivers is mostly level bench and contains some excellent land, the strip along Graham River being mostly open meadow with clumps of small willow and poplar, with peavine and grass. Soil is black loam with clay subsoil.

North from Halfway River benches slope up to undulating plateau country broken by the valleys of a number of small creeks draining south-easterly to the Halfway. Some settlers engage in stock-raising in vicinity of the river. A low rolling plateau extends northward to the headwaters of Cameron River. This stream, flowing south-easterly to Halfway River, and a number of tributary creeks draining in the same direction, are in valleys well below the general surface. The country rises in benches, mostly narrow, to undulating plateau, broken in places by low hills. Part is lightly wooded with poplar, aspen, and willow, with patches of heavier timber, mostly spruce. A large portion is open, or partly open, growing rank peavine. Soil is mostly clay loam on clay subsoil, with mossy top in places, notably on a number of small dry muskegs.

At the junction of Cypress Creek and Halfway River, about 45 miles up from where Halfway River enters the Block, about 12,000 acres have been surveyed on benches rising from Halfway River and Cypress Creek. A large proportion of the surveyed area is flat, partly marshy bench land with mossy surface, but can be easily drained. Soil is sandy to clay loam. Part of the area is covered with poplar and willow, part with spruce. A flat strip adjoins Halfway River for some distance. The Police Trail from Fort St. John via Halfway River to Fort Grahame follows up Cypress Creek and crosses the Rockies by way of Laurier Pass.

NORTH OF PEACE RIVER BLOCK.

In 1913 and 1914 G. B. Milligan, B.C.L.S., made a reconnaissance survey north of the Peace River Block to the northerly limits of the Province. About 18,000 square miles were explored, north to 59° 17′ between the Alberta boundary and foot-hills of the Rockies. Mr. Milligan said an outstanding feature was uniformity of surface. There is absence of prominent hills and mountains, and although it is more or less undulating, the whole region may be spoken of as a huge plateau. The country rises gradually from the bench north of the Peace at 2,100 feet to the watershed between the Peace and Nelson River drainages at 3,500 to 3,700 feet, their summit lying east to west about 57° 30′ N. Viewed from the summit looking north and east, the country gradually subsides from its rough and broken character at the summit to that of low rounded ridges which merge into the general level of the vast plateau. Until the latitude of Kotcho Lake is reached the country rises in no place to what may be called a hill, although the general slope to the north is gently undulating. North from Kyklo River the country rises again gradually to hills which, extending north-westerly, form the height of land between Fort Nelson and Black River; the westerly boundary of the plateau region is formed by a line of broken flat-topped hills extending

north-westerly between Prophet and Nelson Rivers. These hills are sharply defined and rise abruptly 1,000 feet above the plateau.

A feature of this area is that, with exception of along river-valleys, the region is covered with moss from a few inches to 6 feet deep. When the moss has been burned off grass 2 to 4 feet high grows. When drained and the moss removed the greater proportion will be found cultivable.

Taking the total area explored at 18,000 square miles, about a quarter lies south of the summit and is drained by North Pine River and to small extent by a stream flowing easterly to Alberta. The main stream draining the northerly slope is the Fort Nelson River, following north-west to the Liard; Hay River, flowing north-east to Great Slave Lake, also drains a portion of the area to the east.

North Pine River, leaving the broken country in foot-hills of the Rockies, turns southerly and flows across the Block to Peace River, about 40 miles below Fort St. John. The valley becomes more defined as it flows through the plateau, the banks being half a mile apart and 500 feet high where it enters the Block, and tributary streams similarly head in swamps on the plateau surface, the valleys becoming narrow and deep as they approach the North Pine. The river-bottom is roughly three-quarters of a mile wide and contains some good land with alluvial loam soil. Blueberry River, the largest tributary, joins a few miles north of the Block.

The only areas surveyed north of the Block are several townships near the junction of the Blueberry and North Pine, and some stretches of excellent agricultural land are found here. Surveys cover about 36,000 acres. East of the North Pine is considerable extent of plateau containing land suitable for agricultural purposes, and roughly 250,000 acres could be brought under cultivation with little labour. North of this area the country rises north gradually to the summit and becomes less attractive as farming land, there being numerous marshes and bogs permanently unsuitable for agricultural purposes.

FORT NELSON PLATEAU.

Fort Nelson River is the drainage of a prairie area east of the Rockies physiographically similar to the prairie land of the Great Canadian Plain, of which it is a western extension, elevation varying from 2,500 to 3,000 feet at the south at the divide between the Peace and Liard drainages to 1,600 to 1,800 feet at the north. The region has large areas of open grass lands. A considerable portion is now badly drained. Some of the stream-banks are a few feet above the general level and there are wide stretches of muskegs and swamps. Early explorers' descriptions of Northern Albertan areas now growing grain were similar to those given by surveyors who have made reconnaissance surveys of this area, and it is considered that when settlement reaches it the land will be drained and brought under cultivation. Experiments in these latitudes and farther north leave no doubt that the growing season has sufficient length and warmth to ripen wheat, oats, barley, and all ordinary root-crops and

vegetables. These have been successfully grown for many seasons at Fort Liard, latitude 60° 10′ N. At present the area is remote from transportation. The only settlement is at Fort Nelson, a Hudson's Bay post near the mouth of Muskwa River. Garden produce is grown on a small scale on a near-by clearing and Indians grow potatoes. Freight charges now on supplies are 22 cents a pound. A few trappers and Indian bands are the only residents. The Fort Nelson River is navigable and also the Liard.

North of 59° 15′ to the northern boundary of the Province is an extensive area drained by Black River, flowing westward to the Liard. This area is not explored, but Indians report it similar in character to the area farther south, a region of swampy flat country, much of the surface covered with moss, with strips of hay meadows along Black River.

Along Fort Nelson River and considerable distance up the Fontas and Sikanni some good spruce and cottonwood fringe the riverways in patches seldom over half a mile wide. There is a marked absence of rock-exposures and little is known regarding minerals. Trappers report seeing coal-seams on the Upper Sikanni. Samples of gypsum have been picked up on the southern part of the plateau. Where rock-exposures occur along the main rivers rock is usually dark clay shale, occasionally showing signs of clay ironstone. There is considerable game. Moose are fairly well distributed. In parts of the plateau they range in herds. Wood-buffalo, once plentiful, are seen near headwaters of Hay River and are reported by Indians in Black River vicinity. Fort Nelson is considered an important fur-trading post.

MISCELLANEOUS STATISTICS.

Table of Distances.

(Williams Railway Survey.)

		Miles.
Vanderhoof to	Fort St. James	30.5
,,	Ocock River	49.0
,,	Tsilcoh River	59.0
,,	Poison Creek	67.0
,,	Summit, near Horseshoe Lake	92.0
,,	Manson River	147.5
,,	Finlay Forks	188.0
,,	Rocky Mountain Canyon	273.0
,,	Hudson Hope	296.0

Peace River.

	Miles.
Head (Finlay Forks) to head of Rocky Mountain Canyon	71
Head of Rocky Mountain Canyon to Hudson Hope (foot of Canyon)	20
Hudson Hope to Fort St. John	51
Fort St. John to Dunvegan	117
Dunvegan to Peace River (Crossing)	61
Peace River (Crossing) to mouth of Notikewin (Battle River)	96
Mouth of Notikewin to Carcajou Point	59
Carcajou Point to Fort Vermilion	93
Fort Vermilion to Vermilion Chutes	50
Vermilion Chutes to mouth (Slave River)	188
Total	807

Edmonton, Dunvegan & British Columbia Railway.

	Miles.
Edmonton to Smith	130.8
Smith to High Prairie	103.5
High Prairie to McLennan	27.9
McLennan to Smoky	32.0
Smoky to Spirit River	63.0
Spirit River to Grande Prairie	49.8

Central Canada Railway.

	Miles.
McLennan to Reno	23.8
Reno to Peace River	24.7

Total Distances.

		Miles.
Edmonton to	McLennan	262.2
„	Peace River	310.7
„	Spirit River	357.2
„	Grande Prairie	407.0
„	Hudson Hope	540.0

Canoe Route.

Prince George to Hudson Hope.

	Miles.
Prince George to Summit Lake (overland)	32
Summit Lake	4
Summit Lake to Fort McLeod via Crooked River and McLeod Lake	65
Fort McLeod to Finlay via Pack and Parsnip Rivers	115
Finlay to Rocky Mountain Portage via Peace River	72
Rocky Mountain Portage to Hudson Hope	14
Total	302

R.N.W.M. Police Trail.

		Miles.
Fort St. John to	Cypress River	97
„	Laurier Pass	114
„	Devil's Canyon	154
„	Ospika River	172
„	Herchmer Pass	180
„	Fort Grahame	208
„	Fort Conolly	324
„	Junction with Telegraph Trail	377

Boats on the Peace River.

The principal boats plying on the river are shown in the following table. These provide practically a weekly service during the summer.

Boat.	Owner.	Description.
"D. A. Thomas"..	Peace River Development Corporation—Transport Department	Stern-wheel steamer; capacity, 250 passengers, 300 tons freight.
"Northland Call"	Ditto	Stern-wheel steamer.
"Athabasca"	Hudson's Bay Company	Stern-wheel steamer.
"Lady Macworth"	Peace River Development Corporation—Transport Department	Twin-screw gasolene-launch.
"Pine Pas"	Peace River Navigation Co., Ltd.	Gasolene river-boat.

Settlement and Development Statistics, 1920.

Particulars.	Land Districts.		Total.
	Peace River.	Grande Prairie.	
No. quarter-sections of Dominion lands surveyed (approx.)	.....	.....	66,000
No. quarter-sections of Dominion lands disposed of (approx.)	.....	.....	10,000
No. homesteads recorded during year of 1916	494	836	1,330
" " " 1917	567	900	1,467
" " " 1918	367	533	900
" " " 1919	770	856	1,626
No. grazing leases in good standing	88	75	163
Area in acres	46,079	76,325	122,404
No. timber berths in good standing	8	12	20
Area in acres	77,382	98,737	176,119
No. petroleum and natural-gas leases in good standing	1,464	22	1,486
Area in acres	305,807	6,003	311,810
No. coal claims in good standing	1	8	9
Area in acres	40	180	220

*Crop of 1919, Peace River District.

Section.	Oats.	Wheat, Barley, Rye, etc.	Total.
	Bu.	Bu.	Bu.
Waterhole	1,316,250	315,000	1,631,250
Spirit River	370,500	94,500	465,000
Grande Prairie	1,950,000	525,000	2,475,000
Donnelly, etc.	130,000	70,000	200,000
Pouce Coupe	72,150	22,050	94,200
Totals	3,838,900	1,026,550	4,865,450

* Department of Agriculture, Edmonton.

Grain-elevators.

Edmonton, Dunvegan & British Columbia Railway Company.

Station.	Owner.	Bushel Capacity.
Picardville	Gillespie Elevator Co.	E–30,000
Westlock	Farmers' Co-op. Elevator Co.	E–33,000
"	United Grain-growers, Ltd.	E–35,000
High Prairie	Gillespie Elevator Co.	E–30,000
Donnelly	"	E–30,000
Spirit River	"	E–30,000
"	Alberta Pacific Grain Co.	E–35,000
Sexsmith	Gillespie Elevator Co.	E–30,000
"	Alberta Pacific Grain Co.	E–35,000
Clairmont	"	E–35,000
"	Gillespie Elevator Co.	E–30,000 E–10,000
"	N. Bawlf Grain Co.	E–20,000
"	United Grain-growers, Ltd.	E–35,000
Grande Prairie	Gillespie Elevator Co.	E–30,000
"	Alberta Pacific Grain Co.	E–20,000
"	United Grain-growers, Ltd.	E–35,000

Central Canada Railway.

Peace River	Gillespie Elevator Co.	E–30,000
	Total	533,000

Timber by Drainage-basins.

(Commission of Conservation Report.)

Drainage-basin.	Area.	Timber.	Density, 5,000–10,000 Feet per Acre.	Over 10,000 Feet per Acre.
	Sq. Miles.	Board-feet.	Sq. Miles.	Sq. Miles.
Stuart, Nation, and Salmon ..	10,761	6,959,600,000	692	122
Parsnip	4,492	7,382,500,000	1,001	21
Finlay	18,861	3,518,400,000	263	...
South Pine	8,761	6,625,200,000	943	...
Peace River Block	5,487	4,545,000,000	410	259
North Pine and Halfway	6,090	134,400,000	28	...
Fort Nelson	38,938	778,400,000	158	...
Totals	93,390	29,943,500,000	3,495	402

Species.

Drainage-basin.	Douglas Fir.	Balsam.	Spruce.	Lodge-pole Pine.
	M. Bd. Ft.	M. Bd. Ft.	M. Bd. Ft.	M. Bd. Ft.
Stuart, Nation, and Salmon...	804,360,000	695,960	4,697,540	761,740
Parsnip	36,912	1,476,500	5,536,875	332,213
Finlay	.....	70,368	2,638,800	1,656,300
South Pine	.....	331,260	4,637,640	1,276,000
Peace River Block	.....	.....	3,269,000	.....
North Pine and Halfway	.....	.....	134,400	Cottonwood.
Fort Nelson	.....	.....	700,560	77,840

Area available for Agriculture.

(Commission of Conservation Report.)

Drainage-basin.	Sq. Miles.
Stuart, Nation, and Salmon	1,022
Parsnip	175
Finlay	356
South Pine	220
Peace River Block	1,817
North Pine and Halfway	600
Fort Nelson	....
Total	4,190

3002000137769
FC3843.4.V36 1920

Printed by WILLIAM H. CULLIN,
King's Printer, Victoria, B.C.