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# ROUTES TO THE YUKON DISTRICT.

Probably no living man is more familiar with the Yukon Basin than Mr. Wm. Ogilvie, Dominion Surveyor.

He concludes a recent interview with the following words:

"We have in the far north land, a vast region comprising from 90,000 to 100,000 square miles (British Territory only) of untold possibilities. Rich deposits we know exist in it, and for ought we know many more equally rich may yet be found. We know now that there is sufficient to supply a population of a hundred thousand people, and I look forward to seeing that number in that country within the next ten years." (New York Sun, Nov. 28, 1897.)

In the the same interview he shows conclusively that the agricultural possibilities of the Yukon Basin are limited to the production of a few hardy vegetables and a limited amount of grazing; that even the hardy grains as rye and oats do not mature.

Mr. Ogilvie thus confirms in a most satisfactory manner the conclusions at which others have arrived on less complete evidence, viz: (1) The minerals of the region, chiefly the gold, will afford employment for a very considerable population, for

many years to come. (2) The country cannot be made to yield the necessary subsistence for this mining population, which will always be dependent on other regions for food supplies.

It is at once evident that the question of paramount importance in the development of the district's resources, is one of transportation. Fortunately the problem of the distribution of supplies is greatly simplified by the thousands of miles of navigable rivers belonging to the Yukon system. This, however, does not materially assist in getting supplies over the coast range into gold region. As the experience of the past summer conclusively proves, the enormous distance by sea and river, the difficulty of trans-shipping at St. Michaels, and the uncertainties of navigation on the lower Yukon, all combine to prevent freight from reaching its destination on the upper river in a single season, or necessitate prohibitory freight rates; another important factor in the problem is the fact that the upper portion of the Yukon is open to navigation from four to six weeks longer than the lower portion. It freezes later in the fall and the ice breaks earlier in the spring. The fearful hardships encountered on the trails from the head of the Lynn Canal to the interior during the past summer show that while these routes were bad enough when traversed by a few hundred miners each season, they are totally inadequate to meet the demands even now made upon them. Clearly better means must be devised for transporting passengers and freight, and particularly the latter, to the gold fields.

The question is thus narrowed down to the practicability of building and operating a railroad from navigable waters on the coast to a navigable branch of the Yukon.

The great mountain barrier which separates the Pacific coast from the Yukon Basin is made up of two ranges, the coast range,

which corresponds to the Cascades in Washington and Oregon, extends northward along the western margin of the main land of British Columbia and Alaska, to the head of the Lynn Canal, where it becomes an interior range and merges with the great Yukon plateau. West of the mainland is a parallel range whose partly submerged summits form the islands of the Alexander Archipelago. This range increases in altitude toward the northwest and beyond the Lynn Canal forms the St. Elias range, the culminating peaks of North America.

More important that the hight of the mountains to be crossed is the altitude of snow line and the amount of the annual precipitation which above moderate elevation is wholly in the form of snow. The precipitation is very great near the coast where the warm moisture-laden winds from the Pacific strike the cold mountain summits, and it decreases rapidly toward the interior. The amount of snow which falls on the seaward side of the St. Elias mountains is probably more than twenty times as great as that which falls on the Yukon Plateau to the north of the range. Now the altitude at which snow remains throughout the year depends chiefly on the two factors (1) the amount of snow fall, and (2) the amount of summer sunshine. The mean annual temperature is a very subordinate factor. The conditions near the coast are favorable for a low snow line, namely a heavy snowfall and a cool, cloudy summer, while in the interior they are favorable for a high snow line, light snow fall, and hot, cloudless summer; hence although the mean annual temperature is very much lower in the interior than on the coast, the snow line is something over 4000 feet higher. It is at once apparent that the nearness or remoteness from the coast of the pass selected for a railroad route is a most important consideration.

Consider now, the possible routes from the coast to the

Yukon Basin: From a map of northwestern North America it appears a direct route could be afforded by the Copper River, its east branch, Scolia Pass and White River to the Yukon. The objections to this route briefly states are (1) glaciers flow from the high coast range that have obstructed the river near its mouth, rendering navigation of this lower portion impracticable and necessitating the construction of a railroad to tide water. (2) Scolia Pass is filled with ice by glaciers flowing in from either side which would make it impossible for a railroad. (3) White River is so obstructed by shallows and canyons that its navigation is wholly impracticable.

From Copper River eastward to the Alaska River, which flows into Dry Basin, the St. Elias mountains present a wholly impassable barrier between the coast and the interior. Little is known concerning the latter stream except that it is very rapid and obstructed in its lower course by canyons and by glaciers flowing down from the high coast mountains which it traverses.

A further objection to this route is the absence of a harbor at the river mouth.

The next passes eastward of the Alaska River are those at the head of Lynn Canal, the Chilcatm, Chilkoot and White Passes. All of these are comparatively low; White Pass being about 2500 feet above sea level, and Chilkoot Pass 1000 feet higher. Their southern approaches, however, are extremely steep and lying within the coast belt of heavy precipitation, they are buried under a great depth of snow in winter, fifty and sometimes sixty feet accumulating in a single season. This snow is a distinct advantage for foot packers or for sledges, as it covers the rugged surface, and when compacted in the late winter and early spring forms a smooth, hard surface, on which travelling is com-

paratively easy. It would form, however, a serious obstacle for a railroad even if a practicable grade could be secured. In the early winter before the snow has become compacted, avalanches are of frequent occurrence, and it is doubtful if any structures could be made to withstand them. While tributaries of the Yukon are reached by the Chilkoot and White Passes, within a remarkably short distance from the Pacific, it is a considerable distance to continuous steamboat navigation. The lakes and upper Lewes serve the purpose of the miners canoe, but to avoid several trans-shipments of freight it would be necessary to continue a railroad to a point on the Lewes below the White Horse Rapids. This would increase the distances of thirty-five miles by the White Pass or twenty-three miles by the Chilkoot Pass to over 125 miles in order to reach navigable water of the river.

Continuing southward the next break through the coast range is the Taku River which enters the head of Taku Inlet a short distance south of Juneau. This stream heads upon the interior plateau far to eastward of the coast range. The pass from its head waters to the Yukon drainage is therefore beyond the coast belt of heavy precipitations and although it is higher than those of the head of Lynn Canal, being a trifle under 5000 feet, it is by no means so near the line of perpetual snow. The comparative advantages of this route are so great that they may profitably be considered in some detail. The route is naturally divided into three sections each of which presents a different set of problems. These are (1) from tide water at the head of Taku Inlet to Nahkana, at the head of navigation of the Taku, about eighty miles. (2) From Nahkana to Lake Ahklin, (Teslin) eighty miles. (3) From Lake Ahklin (Teslin) to the mouth of the Teslin River, 220 miles.

At a former geologic period when the land stood much higher than now, the Taku River had a deep valley through the

coast range. When the land subsequently sank the river was drowned. Its valley formed a deep, narrow tidal estuary. The river bringing down great quantities of sand and gravel gradually filled the upper portion of this estuary above sea level, the Taku Inlet being the as yet unfilled lower portion. Hence the character of the river. It meets no rocky obstructions for many miles above its mouth. It meanders through a level, wooded flood plain which extends from side to side of its extremely steep sided valley. It rarely occupies a single channel but is obstructed by many low wooded islands and gravel bars. The river is free from ice about six months in the year. Its navigation during this period presents only such difficulties as are common to rivers of this type. Without doubt eighteen inches and possibly two feet of water could be depended on even at the lowest stages in the fall; since it would not be necessary for the boats to go out to sea as in the case of those plying on the lower Yukon, they could be built with special reference to lightness of draft and large tonage. If future developments should demand it, the level valley of the river would afford an excellent route for a railway. Several glaciers reach the valley level, but there are broad stretches of gravel flats between the ice and the river.

The second section of the Taku route from the head of river navigation to Lake Ahklin (Teslin) is through a country which presents no serious difficulties to the construction of a pack trail, a wagon road or a railroad. The best location for a railroad would probably be practically that of the present Indian Trail from the confluence of Cloclohee and Nahkana Rivers; the trail follows the latter for a distance of twelve miles to the mouth of its principal tributary, the Salmon River, a clear mountain brook coming from the northward; at this point the trail leaves the Nahkana and ascends the tributary and within eight miles makes a rise of 2100 feet. From tide water to this point the route has

been in narrow, steep-sided valleys, but here the character of the country undergoes a complete change. For the next thirty-eight miles the route traverses broad shallow valleys with altitudes between 3000 and 4500 ft. They have gentle slopes and are generally wooded though the timber is not large and is often interspersed with open glades and meadows. This typography is evidently the result of long continuous erosion while the land stood relatively much lower than now. This long period of low level preceded the period of great elevation, during which the present gorges were cut. The latter has been so short that the smaller streams have not yet been able to trench their old valleys. It is this fact which would render the construction of railroad through this country such a simple matter. When once these high valleys have been reached there are no abrupt changes in slope and no deep gorges to bridge.

About fifty-eight miles from Nahkana this rolling plateau is abruptly terminated by an escarpment which forms the western margin of a broad level valley, extending northwest and southeast; the escarpment is a smooth, wooded slope and would present no special difficulties for the location of a railroad. The valley is probably twenty miles broad, extending to a similar escarpment along its northern border. It is heavily wooded having the best spruce timber in the Yukon Basin, and contains a vast number of lakes of which the largest is Ahklin (Teslin.) Its surface is slightly rolling and composed chiefly of sand and gravel. The valley was evidently at some time, not very remote, occupied by a large glacier. During a pause in the retreat, a great mass of ice occupied the valley as far down as the lower end of Lake Ahklin (Teslin.) Gravel washed down from the glaciers which filled the valley to the south, and when the ice was removed, acted as a dam holding back the waters and forming the lake.

The third section of the route consists of Lake Ahklin (Tes-

lin) and the Teslin (Hootalinqua) River. These occupy the axis of the Yukon Basin, and a rational nomenclature would continue the name of Yukon up to the lake. The lake is a beautiful sheet of water about ninety-five miles in length and from six to ten miles in breadth. Its waters are comparatively clear, even when its affluents are in flood, showing that none of them have glacial sources. Almost exactly in the centre of the valley, but west of the lake, is an isolated group of mountains, somewhat higher than the valley escarpments, and hence forming a conspicuous landmark. These were named the Dawson Peaks, in honor of the well-known Canadian geologist and explorer.

From the northwestern end of the lake to the mouth of the Teslin River is ninety-one miles in an air line and 125 miles by the river. The broad valley has been deeply filled with gravel doubtless, while its upper portion was filled with a glacier, and the river has subsequently cut a channel in the gravel nearly 500 feet deep towards its mouth, and 100 feet at the lake. Its flood plain is one to two miles broad bordered by high bluffs, between which the river meanders. The river flows generally in a single channel with a depth rarely less than five or six feet, and a uniform current of three to four miles. Together with the lake and the Lewes, as far down as the Five Finger Rapids, it affords the longest stretch of entirely unobstructed navigation found on any of the Yukon's tributaries. In case future developments should require the continuation of a railroad over this section of the route, an exceptionally favorable location would be found on the broad gravel terraces which extend from the river channel to the valley escarpments on either side. The method by which the congested traffic on the routes at present employed could be relieved and another winter of famine prevented, is as follows:

Some company with sufficient capital should this winter build

a number of light draught river steamers suitable for navigation of the Taku. As soon as the ice permits in the spring these should be put in commission on making frequent trips from Juneau to Nahkana. The first freight carried up the river should be horses and workmen to construct a pack trail from Nahkana to Ahklin (Teslin), a task which a moderate force could accomplish in two or three weeks. A small sawmill set up at the lake would supply lumber for barges in which freight could be sent down to the gold fields until the steamers should be brought up from the lower Yukon to perform that service. A pack trail, however, is only a temporary make shift, and if sufficient capital can be secured, the construction of a railroad should be begun at once. When the central section of eighty miles is in operation, and the steamers making connection at either end, passengers and freight could be transported from Juneau to Dawson in three or four days, and for a small fraction of the rates at present charged. It may be asserted with perfect confidence that the company which is first able to accomplish this will have the best paying claim yet located in the Yukon District.

The only rival of the Taku route is the Stykeen. This is the next river south of the Taku heading upon the interior plateau and cutting through the coast range. The conditions here are almost precisely the same as on the Taku route, and like the latter, its second section at the southern end of the Ahklin (Tesliu.) The principal disadvantage of the Stykeen route is its greater length. Both the river and the overland sections are about seventy-five miles longer than the corresponding sections of the Taku trail, and it does not appear that it has any advantages over the latter to compensate for this decided disadvantage.

C. WILLARD HAYES,
U. S. Geological Survey,
Washington, D. C., Dec. 4, 1897.

NOTE.—Dr. Charles Willard Hayes, the writer of this report, is employed in the U. S. Government Geological Survey Department, and has been recently detailed to accompany the surveying party just despatched to re-survey the route of the Nicauraugua Canal. He is now stationed at Greytown, Nicauraugua.