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CHAPTER II

THE YUKON TERRITORY

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THE TERRITORY

Following the Mackenzie river survey in 1944, Dr. Ronald Grant and the writer visited the Yukon Territory in July and August, 1945, to complete the preliminary reconnaissance of northwestern Canada. Though it was already known that the fishery resources of the Yukon Territory were comparatively poor, relative to those of the Mackenzie valley, a survey was required for the proper formulation of fishery regulations for the Territory, as well as for more purely scientific purposes.

The general topography of the Yukon Territory is similar to that of northern British Columbia. Across the southwestern corner the Coast range reaches its maximum elevation. Mount Logan (19,850 feet) lies in the centre of a glaciated region exceeded in size only by the ice-caps of Greenland and Antarctica. Like a wall these great mountains shut off the interior from the moist winds of the Pacific; and though the snowfall on the St. Elias plateau is reliably estimated at 120 feet per annum, the whole interior of the country is semi-arid.

The main northeast boundary is the watershed of the Mackenzie mountains, as yet little explored, but exceeding 10,000 feet in some places. The range is about 500 miles in length, forming the height of land between the Yukon system and the middle part of the Mackenzie valley. It is doubled at its two ends by two tributaries of the Mackenzie, the Peel in the northeast and the Liard in the southeast, which rise on the Yukon side of the range, and together drain about one-quarter of the Territory. The Liard valley also terminates the Rocky mountains, which enter the Territory only as rugged foothills along its southern border.

The southern part of the interior is high land, draining into the headwaters of the Yukon. The valley floors are about 2,000 feet above sea level; mountains between them often exceed 5,000 feet. Timber line is generally between 3,000 and 3,500 feet.

The character of the Yukon itself is very different from that of the Mackenzie. It discharges ultimately into Bering sea, and in its lower 1,200 miles traverses

Alaska. There it becomes a lowland river, broad and muddy, and comparable in size to the Mackenzie. Within the Territory we are concerned only with its headwaters, which rise in cold sub-arctic mountains. The Yukon is first recognized by name at Fort Selkirk, where the Pelley joins the Lewes, but in the minds of most residents it extends up the route of navigation to Whitehorse and beyond: in other words, the Lewes is considered to be the main tributary and is often popularly regarded as being the Yukon itself.

All of these headwaters are swift. From Whitehorse to Dawson the current averages 6 miles per hour, which is twice the speed of the Mackenzie. River steamers make the trip downstream in 36 hours, for a distance of 450 miles, including stops. The return journey takes upwards of five days. For fifty years authors have cited the remarkable journey of the king salmon, the most indomitable of which actually pass Whitehorse, to spawn about 1,800 miles from the sea in McClintock river. Such a journey has no known parallel among anadromous fish. Attention is not drawn to the fact that these salmon buck the current all the way, and, during their 12 weeks of travel, must swim a very minimum of 6,000 miles through the water.

With such a swift current it is surprising that navigation is never broken, all the way up from the sea to Whitehorse. There are two navigable rapids below Carmacks, known as the Five Fingers and the Rink, and certain other swift places where vessels are obliged to warp themselves up on a cable. Above Whitehorse are the long rapids from which the town takes its name, and immediately above them the even more formidable Miles canyon, where the Lewes has cut a trench in a sill of basalt. Above this in turn is an 80-mile chain of lakes from which the river takes its source. Here navigation is again possible, and is carried further by means of a slipway to Atlin lake in British Columbia, the south end of which is more than 100 miles distant from Whitehorse.

The rivers are also cold. The Lewes is clear and slightly greenish; the Teslin or Hootalinqua is slightly turbid; the Pelly and navigable Stewart are very muddy. The chief source of mud, however, is the White river, main outflow from the St. Elias range, which not only starts out as glacier water, but runs through an extensive deposit of white volcanic ash. This ash is of the nature of pumice, and remains long in suspension; it gives the Yukon at Dawson the appearance of café-au-lait.

One of the most curious features of the river is the low hissing sound made by the water, resembling that of water soaking into a fragment of porous earthenware. It is apparently associated in some way with the volcanic ash.

Entering the Territory from the southeast the Alaska highway follows a branch of the Liard, crosses the continental divide at 3,800 feet (the highest point on the road), and drops gradually to Teslin lake. From Teslin there is a low route leading past Squanga lake and through the mountains to the Lewes valley at Marsh lake, and so to Whitehorse. Westward from Whitehorse the road enters a remarkable broad trough, as much as five miles wide, which carries

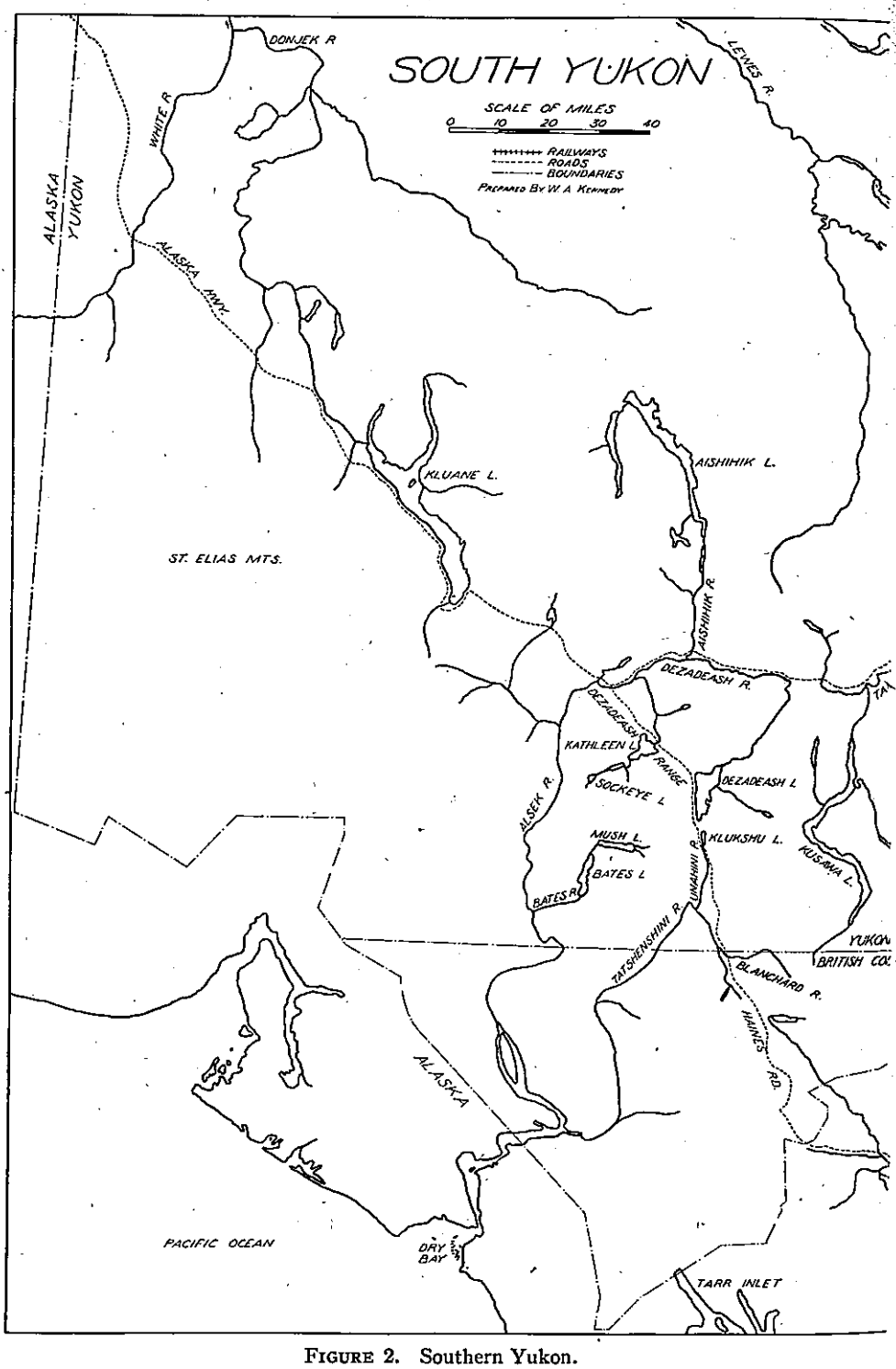

FIGURE 2. Southern Yukon.

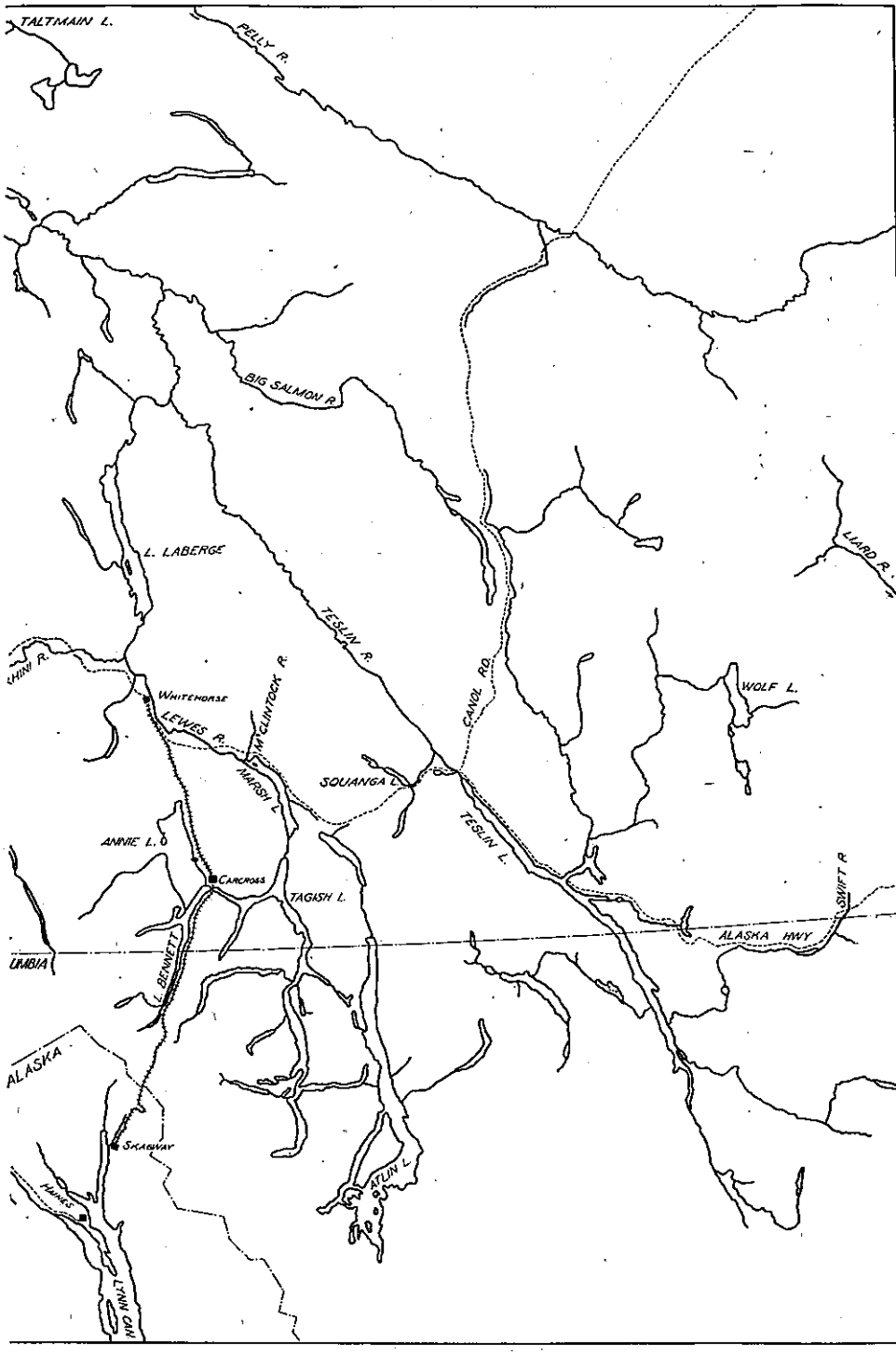

FIGURE 2. Southern Yukon

it along the inner flank of the Coast range clear through to the Tanana valley in Alaska, 300 miles to the northwest. The trough transects all the valleys emerging from the mountains at right-angles; many of the rivers turn to follow it in one direction or the other for some distance, and one, the Kushawulsh, divides to flow both ways; so that, proceeding from Whitehorse, it is used successively by the Takhini (eastwards), Dezadeash (westwards), Bear creek (eastwards), Christmas creek (westwards), Kluane lake and river (westwards), and a variety of small streams as far as the Chisana and Tanana (westwards). Some evidence has been found that this trough, known in part as the Shakwak valley, may have served as a natural route of travel and migration since very early times.

The Dezadeash just mentioned is the main tributary of the Alsek, the only river in the Territory draining to the Pacific. In spite of the fact that it is a toss-up which way the Dezadeash should flow as it enters the trough from the south, it turns west; and, after running peacefully in the trough for 30 miles, cuts through the St. Elias range in a wild and spectacular valley, whose walls in many places rise thousands of feet above its narrow floor. Great glaciers sweep down to it from the mountains. One of these needs only to advance less than a mile to dam the valley at the present day; and it is evident that in quite recent times the Alsek gap was so blocked that a considerable part of the Shawak valley formed a lake, draining either eastward to the Lewes or westward to White river. Old lake terraces are visible at Bear creek and elsewhere. This explains why the Alsek is the only river flowing into the Pacific ocean inhabited by grayling and round whitefish, which it has captured from the Yukon tributaries. Fortunately there seem to be no pike in it.

The Alsek-Dezadeash should be a good salmon stream. Indian tradition relates that not many generations ago salmon abounded in the Dezadeash; and even now there are landlocked rainbow trout and sockeyes in its headwaters. But for a reason still unexplained, which is discussed below, they no longer ascend the main river, but only its tributary the Tatsenshini, which barely enters the Territory.

The northern Yukon Territory is altogether different from the part already described. It is sharply cut off from all contact with the south by a westward branch of the Mackenzie mountains called the Ogilvie range. Some of the peaks are known to exceed 8,000 feet and others may be higher. The range stands right across the Territory not far north of Dawson. During the Pleistocene glaciation the peaks of St. Elias formed the regional centre, from which an ice-sheet extended north across the Yukon basin. The hills all over the southern part show ice-worn surfaces to a height of 5,000 feet; but neither the Ogilvie range, nor parts of the Mackenzie and Richardson mountains, were reached by the ice-sheets, and consequently their contours and general appearance are characteristic, and distinct from those of any other mountain systems in Canada.

A large part of this northern region is not mountainous, but runs out into relatively flat lowland plains, covered with muskeg ponds and traversed by winding

sluggish streams. These join either into the Peel, which drains the northern slopes of the Ogilvies and leads to the Mackenzie, or further north into the Porcupine, a large river exceeding 500 miles in length from its source to Fort Yukon, Alaska, where it joins the Yukon river. The Porcupine is navigable, and in spite of being north of the Arctic circle it is probably the warmest and most productive river in the Territory. Old Crow is the only inhabited place on the Canadian part of it.

From Old Crow the Indians sometimes travel to the shores of the Beaufort sea near Herschel island, encountering no mountains on the way. They reach the northern limit of trees about half way to the sea.

Excepting this northern fringe and the upper slopes and summits of all the mountains, the Territory is covered by northern spruce-poplar forest, broken here and there by small grassy prairies. So dry is the southern part of the country that at lower elevations all south-facing slopes are open and grassy, with only occasional clumps of tall spruce. The thickest forest is found in the bottom lands and on slopes facing away from the sun. (At higher elevations the reverse holds good: the trees grow better and higher up on the south than on the north faces of the mountains, on account of the moisture from melting snow and the difference in length of the growing season.) The forest is poor in species, lacking both the Pacific slope conifers and also such universal northern types as balsam fir, larch and birch. White and black spruce are universal; jack pine is predominant in some places near Whitehorse and in the Liard section, probably only where the ground is unfrozen.

THE SURVEY

Only eight weeks were available for the survey, which had therefore to be a cursory one. A variety of modes of transportation were employed to cover even superficially this Territory of 200,000 square miles, which is four-fifths the size of any one of the three prairie provinces.

From Whitehorse as a base, excursions were made by truck, boat and plane. The first was during the week-end of July 7 to 9, by aircraft to Old Crow on the Porcupine in the northern part of the Territory (67° 35′ N., 139° 49′ W.), about 500 air-miles north of Whitehorse. The following day we crossed to Arctic Red River on the Mackenzie, and from there flew southwest to land for an hour on the Peel about 50 miles above Fort McPherson, where three species of fish new to the Yukon Territory were collected. On the flight back to Whitehorse we recrossed the Ogilvie range by Braine pass, spending the night at Mayo lake.

The following day we embarked with an Indian named Frankie Jim in his 27-foot flat-bottomed boat on a trip down the Lewes and Yukon rivers to Dawson, which occupied exactly a week. Four days were spent around Dawson, and we then flew over to Mayo and made a brief investigation of Mayo lake.

After returning to Whitehorse the rest of our work, with one exception, was done by road. The exception was a flight to examine the inaccessible Alsek

valley from the air in an attempt to discover the falls said to prevent the ascent of salmon in this river. These falls are universally believed to exist, and we met in Whitehorse two prospectors who claimed to have visited them, and who were able not only to locate them precisely on a map, but also to estimate their height at 16 to 18 feet. They were vague about the nature of the valley immediately below the falls, where they said they saw many large bear tracks and quantities of salmon in the water. It is usually held that a narrow canyon exists there, and that consequently by blasting the walls into the stream it might conceivably be possible to convert the falls into a rapids that salmon could mount, thereby opening up a large part of the southwest corner of the Territory to profitable native salmon industry. The site is most inaccessible because of the rugged terrain, steep flanks of the valley, swift waters and large tributary streams entering from the adjacent glaciers; and careful questioning at Bear creek and Klukshu convinced us that no living Indian had actually seen the falls, even in winter.

We flew on August 4 by way of Kusawa, Dezadeash, Mush and Bates lakes, striking the Alsek within a mile or two of where the falls were supposed to be. Since we could see nothing of them, we headed south, following the valley between the mountains, across the British Columbia border. Still finding no falls, our plans had to be revised. The best course would have been to follow the river to the sea and make sure of locating the obstruction; but this would have carried us beyond our maximum cruising range, allowing for the return journey, and would have considerably exceeded our authorized estimate of expense. We therefore turned back, at a place where the valley widened out and the river ran in many channels over the flats for the next 15 miles. Whatever the obstruction is, it must be within a few miles of where the Tatsenshini comes in, close to the Alaska boundary.

We had invited Mr. Geoffery Bidlake of Whitehorse to come with us, so with the pilot there were four of us in the aircraft, each intent on watching the course of the river, which we followed at an altitude of only 1,000 feet. We are all certain that there are no falls within the 60 miles we examined, including all the unmapped section of the river lying in the Yukon Territory.

Turning north, we passed Bates river and over two of the largest glaciers emerging from the western mountains, one of which discharges bergs on the river flats. We then crossed a low divide and landed on the headwater lake of the Alsek river, which curves back on itself like the handle of a crook. This is Sockeye lake, so named by a prospector who told us he had taken small landlocked salmon in it. We searched for these for several hours, ultimately obtaining a good collection of young stages known as " parr ", and incidentally finding specimens of a rare kind of whitefish of small size, known as Coulter's whitefish, and previously unrecorded in the Yukon Territory.

After August 10 we were able to use a 1½-ton truck, in which we traversed the Alaska highway southeast to the Liard valley and the British Columbia border before turning west to explore the Haines road and the western part of

the highway as far as the 141st meridian, which is the Alaska boundary. This occupied the last three weeks of the survey.

During our investigations we travelled about 2,500 miles by road, 500 miles by water and 2,200 miles by air.

FISHERIES

Salmon in the Yukon river

Both king and dog salmon reach the Yukon Territory. The kings enter the mouth of the river in Norton sound early in June, and take about three weeks to make the first 1,250 miles to Dawson, where the run is expected to begin about June 28. The date varies from year to year: in 1945 the first was taken on July 9. The main run lasts only a week or ten days, after which the condition of the stragglers rapidly deteriorates.

Above Dawson progress is slower. July 10 is the established date for the beginning of the run at Fort Selkirk, though, being ten days late this year, they had not arrived when we were there on the 14th. (We actually saw the first on the 16th at Ogilvie, less than 50 miles above Dawson.)

By the time they pass Fort Selkirk they have already been a month in fresh water, and there is an increasing proportion of red and scabby fish no longer fit for human food. Beyond this post they have therefore a negligible economic value, and are netted and trapped only sporadically by the Indians. Considerable numbers actually reach lake Lebarge and Whitehorse in the first half of August; we found and collected salmon parr in many small creeks as far up as lake Lebarge. They are said to choose the same particular creeks year after year, and to avoid others. The two most remote from the sea regularly frequented by king salmon are said to be Richthofen creek, entering the west side of lake Lebarge, and McClintock river, entering the foot of Marsh lake. I examined two king salmon parr caught by rod and line above Whitehorse rapids.

A considerable king salmon fishery exists below Dawson, past Moosehide and Forty-mile to the border. Indians fishing for themselves require no licence. They use short gill-nets of 6- to 8-inch mesh, set in eddies. The majority of the fish are filleted, smoked and dried for winter use.

In the commercial fishery the commonest device is an ingenious trap known as a fish-wheel, for which eleven operating licences, costing $30.00 each, were issued in 1944. From the mountain above Dawson City three fish-wheels were visible in 1945, one of which we visited and examined closely.

A hollow-square raft is moored in a strong current a few yards out from the bank. Each side of the raft forms a catwalk, in the middle of which is a 3-foot upright post bearing one end of the 12-foot axle. The axle and its bearings are wooden, made from spruce trunks. Bolted radially to the axle are wooden frames covered with chicken-wire, each shaped in the form of a hollow scoop, about 10 feet square. Some wheels have three or four scoops, forming the blades of the

wheel. The one we examined had a pair of paddle-boards alternating with two opposite fish-scoops.

As the wheel is slowly rotated by the current, making two to three revolutions per minute, each frame in turn dips about 6 feet under water. The concave or hollow side is downstream; and in rising again to the surface it traps any fish which happens at that moment to swim against it. As it now swings up into the air, the fish slides inwards towards the axle, and is diverted to one side or the other by sloping gutters meeting at the centre, to fall into collecting boxes placed under the ends of the axle on the catwalks.

Considerable quantities of fish are taken during the run. The boxes are emptied daily. Sixty-four salmon, weighing between 4 and 20 pounds, and totalling some 500 pounds, were removed from the trap we visited; and on the previous day there had been 81. Each trap probably takes upwards of 2,500 pounds of king salmon during a good season like 1945, so that the total catch of eleven wheels is in the neighbourhood of 25,000 to 30,000 pounds. Added to this is the gill-net catch, almost impossible to estimate, since we did not travel down the most productive part of the river below Dawson. The Indian population, however, is naturally concentrated in this region, and may account for an additional 5,000 to 10,000 pounds caught in nets.

Both fish-wheels and nets also catch small quantities of other fish, especially humpbacked or Nelson's whitefish, inconnu, dog salmon and grayling. The total value of these miscellaneous species alone would not be sufficient to pay for the costs of operating the wheel on the Yukon, but it would be interesting to see one set up for trial at the Ramparts or Arctic Red River on the Mackenzie.

Relatively little of the salmon catch is sold. Fresh and dressed it fetches 13 to 15 cents per pound in Dawson City, up to the capacity of the Northern Commercial Company's freezer, which is about 3,500 pounds. Relatively little, not more than 250 pounds, is retailed fresh. The hotels, transportation company and a few private buyers rent cold storage space until the cold weather comes in November; the trading company also retails fish right through the winter, until the following May or June.

It is apparently cheaper to supply the needs of Whitehorse from British Columbia or Alaska via Skagway than to bring salmon up from Dawson, on account of the lack of cold storage space on the river boats. There is therefore no export of salmon from Dawson.

There seems to be little doubt that the Yukon salmon fishery has declined within living memory, almost certainly on account of operations lower down in Alaska. On the Porcupine at Old Crow we were told that before 1914 their salmon run was sufficiently large to justify a fishery during the second week of July. Now, although the Old Crow Indians are active fishermen, they take no more than 20 king salmon a year in the whitefish nets, and have long abandoned the use of salmon nets.

The same informants stated that the dog salmon arrive at Old Crow, likewise in very small numbers, soon after July 1, and ahead of the kings. This is difficult to credit, since at Dawson the dog salmon are six weeks behind the kings, running during the last two weeks of August. Dog salmon have little economic value, since their condition deteriorates immediately upon entry into fresh water.

In summary of the Dawson salmon fishery, it may be said to have great local importance, providing one of the main protein foods of white men, Indians and their dog-teams throughout the year. It might bear somewhat heavier exploitation, if local demands were to increase; but there can never be any reason to export salmon from the Territory, since the potential production is negligible compared with that of many less remote rivers in British Columbia and Alaska.

Salmon in the Alsek Tributaries

As already explained, the main Alsck-Dezadeash river is closed to salmon by some unknown obstacle near the Alaska border. There might be an impassable fall, or perhaps ice-tunnels under a glacier tongue. Judging by the Yukon, the muddiness of the water is no deterrent to salmon.

This deficiency seriously affects the Indian population in the southwest Yukon. Formerly, according to tradition, there was a salmon industry throughout the main river and its spreading tributaries in the Shakwak valley, covering almost 2,000 square miles of territory. These waters now contain rainbow trout, which is a landlocked steelhead; and, as previously mentioned, landlocked sockeye salmon, similar to the well-known kokanee of British Columbia, occur in the uppermost lake of the Alsek. The presence of these fish provides evidence of former access from the sea; but it is by no means impossible, as Dr. C. H. D. Clarke has pointed out to me, that they entered the system, not by the Alsek itself, but by its tributary the Tatsenshini. Salmon and steelheads are still able to run up the latter river, which enters the Alsek not far from the sea and below the obstruction; and one of its sources, the Unahini, rises close to Dezadeash lake, from which it is separated by a lowland divide not many feet in elevation. In the recent past the Dezadeash river may have captured Dezadeash lake from the Unahini, and the sockeyes and rainbow trout with it. There are thus two alternative explanations for the presence of sockeyes and rainbows in the upper Alsek, though if the Indian tradition is well founded, the simpler explanation is probably correct.

These Indians have their present headquarters at Champagne, where the Dezadeash emerges into the Shawak valley, 56 miles west of Whitehorse on the highway. They are a coastal tribe, speaking a different language from the natives of Kluane and the Yukon valley; and each summer they migrate to a fishing camp at Klukshu, near the head of the Unahini, to catch salmon. Not all can engage in this limited fishery, and they have come to rely largely, therefore, on moose hunting to feed themselves and their dogs. In consequence, the stock of moose has been seriously reduced, and any hunting by tourists and other white people is really taking the food out of the Indians' mouths.

This large corner of the Territory is now set aside as the projected St. Elias National Park, containing the most majestic mountain country in Canada, and still richly supplied with game, including mountain goats and bears of three species. It would be in the interests of the park as well as of the Indians to spare the moose along its fringe in the Shakwak valley by re-establishing the Alsek salmon run, if this were at all possible. At the same time the entire watershed would be opened to steelhead trout, an unrivalled attraction to sportsmen.

At present all five species of salmon, as well as steelhead trout, are taken in the vicinity of Klukshu. The steelheads arrive first in June, followed by the king salmon, weighing mostly between 9 and 15 pounds, which run throughout July. With the kings are a few humpbacks, weighing 5 to 9 pounds, amounting to about 1% of the catch by weight in mid-July. There were still a few humpbacks at the time of our second visit on August 20, several weeks after the kings had ceased to run.

At the latter date the main run of sockeyes was on; and we understood that the Indians were still looking forward to the arrival of cohoes in September. It was difficult to obtain accurate information from people uncertain of the proper designations of the numerous and confusing English names. We saw no dog salmon on either visit; but since we caught their parr at Klukshu, it is presumed that they also arrive in September. Dr. C. H. D. Clarke informs me that he saw cohoes at Klukshu in July and August, 1943, and that their run was over by mid-August, so it is very possible that we missed them between our two visits.

The time-honoured methods of fishing at Klukshu are by gaffs and traps. Though illegal under the existing regulations, a gaff is actually the most reasonable implement to use. The Unahini is a small creek, and with a gaff on a 16-foot pole it is easy to reach the middle and in many places right across to the further bank. The water is clear and shallow, enabling a man to pick only the best fish. Traps and nets, on the contrary, are non-selective, and kill many salmon in a condition so poor that they have to be thrown away. There is little danger of wounding fish with the gaff, because they have no chance of escape. Moreover the Indians depend on the conservation of salmon for their livelihood; their customary practices have been tested by time, and are not any more likely to deplete the stock now than they were in the past.

After fighting their way up 2,000 feet above sea-level in a distance scarcely exceeding 100 miles, some of the salmon are badly battered when they reach Klukshu. The river bed is thick with spawn, on which numbers of Dolly Varden trout are continually feeding. Some salmon ascend past the Indian village into Klukshu lake, in the mouth of which short nets are set. There are also weir-type traps made of small staves, but these contained nothing on either of our visits, though we examined in all over 100 salmon in the round, freshly taken from them. Naturally we did not see the gaffs in use, because they are known to the Indians to be illegal; but we examined them, and observed too that at least half the fish drying on the stages had wounds in the flesh.

After they are caught, the salmon are strung on a line and made fast to a stake in cold running water. In due course they are taken up, split, and hung on stages made of poles, the process being exactly the same as that for whitefish described on p. 27. Here, however, smoking and drying are simultaneous. The stage is roofed over with canvas or brush, and surrounded by a 4-foot wall of logs. This makes a square house with a 2-foot space all around between the walls and roof. On the floor a poplar fire smoulders. The constant smoke serves to discourage blow-flies, whose eggs have time to develop if drying is too slow.

Owing to language difficulties and the lack of a trading-post or any experienced white resident, it was impossible to determine the total catch. Looking around on August 20, I estimated there were about 2,000 pounds (wet weight) of fish on the stages. Bales of dried fish had no doubt already been cached, out of the way of dogs and bears, and were no longer in sight. From the standpoint of the natives this is a substantial and important industry.

We did not visit Dalton Post, where the Unahini flows into the Tatsenshini. It lies some miles off the Haines road, and is approached only by a pack-horse trail. There is a similar fishery there, between the Post and the Tatsenshini falls at the British Columbia border, also conducted entirely by natives for local use.

The Blanchard river is another tributary of the Tatsenshini, entering from the east along the provincial boundary. A young prospector described to us the run of salmon he had seen at the end of July, at the point where the Haines road crosses the stream; but on August 20 we found neither adults nor young at that place.

Whitefish, Lake Trout, Least Herring and other Species

The Indian population of the Yukon Territory is very much smaller than that of the Mackenzie valley, reflecting in part the general scarcity of fish. The white population, on the contrary, is much greater, on account of the wealth of mining resources. There are thus relatively few sled-dogs to be fed, particularly in the southwest Yukon where both Indians and prospectors make extensive use of pack-horses.

On the other hand, a number of white residents have in the recent past engaged very profitably in the fur-farming industry, which demands a constant supply of fish to feed the foxes and mink.

Fishing permits to use gill-nets for domestic or commercial purposes numbered 23 in 1944. Most of the fishing is done in the larger lakes, including Teslin, Tagish, Marsh, Lebarge, Ethel (but not Mayo lake), Tatlmain, Kathleen, Dezadeash and Kluane. Indians require no licences, and fish wherever they may live.

In the lower end of Kluane lake, near Burwash Landing, lake trout and Nelson's whitefish are the most important species. Here the water is relatively shallow; but at the south end a depth of 270 feet has been found, and the fish taken are chiefly round whitefish and lake trout, with an occasional inconnu. It may be added that both king and dog salmon reach Kluane lake in small numbers, but their condition is very poor.

In lake Lebarge an Indian chief named Jim Boss was engaged all summer in commercial fishing, almost exclusively for Nelson's whitefish, with an occasional trout and Mackenzie whitefish. He supplied the river boats, but had great difficulty in disposing of the rest of his catch in Whitehorse, where the market is spoilt by imported salmon and halibut.

Marsh, Tagish and Bennett lakes form a very extensive chain with many long arms. The principal fox and mink ranches were at Carcross and Tagish; and for these enormous quantities of fish were taken from the lakes, amounting at the peak between 1925 and 1935 to some thousands of pounds a week. There is no doubt in my mind that this is the direct cause of the present depletion of these lakes. The principal species taken were Nelson's whitefish, lake trout and least "herring" or cisco. Fishing is now so poor that most of the fur ranches have closed down.

Least herring easily pass through the 4-inch gill-nets used to take Nelson's and round whitefish, lake trout, suckers, pike and burbot. They are particularly abundant in the narrows at Tagish and Carcross.

A word of explanation may be given here on the subject of the "tezra" or "tizareh," a fish renowned in the Yukon for its palatability and delicate flavour. In the days of the winter mail-stages, which ended about twenty years ago, whitefish caught by Indians in Minto lakes were carried frozen to Dawson and Whitehorse, and known by this Indian name. Actually the tezra is the Mackenzie whitefish; it enjoys an equal reputation along the Mackenzie, and is quite possibly the finest freshwater table-fish in Canada. It is rarer in the Yukon than in the Mackenzie, though by no means confined to Minto lakes.

NOTES ON THE FISHES

The Yukon Territory is a region interesting from the biological standpoint because of the varied connections and relationships of the fishes found in its waters. When studying the distribution of animal and plant life in Canada one must always bear in mind that this part of the North American continent has but recently emerged from the Pleistocene Ice Age; and not so very long ago, geologically speaking, most of the Dominion was covered by continental ice-sheets of great thickness, producing conditions under which neither animals nor plants could survive. A process of recolonization has therefore been going on in recent times from regions which escaped glaciation; and in the case of fishes it has been greatly aided by the fact that the glaciers temporarily disturbed the normal drainage systems, and often, during their retreat, dammed up immense lakes which permitted fish to pass from one watershed to another.

The Yukon Territory has been recolonized from three sources, namely (i) the "Middle West", a comprehensive area which for general purposes means the Mississippi valley and Great Lakes; (ii) the Pacific slope, and (iii) the Bering sea region, in which, on both Alaskan and Siberian shores, extensive areas entirely escaped glaciation. In the majority of cases it is possible to assign any particular

species of fish to one of these three categories. Naturally the Bering sea group have had the best opportunity to repopulate the Yukon system: some of them may have survived the entire glacial epoch in the lower part of the river itself. They are the group discussed in the Mackenzie chapter (p. 28), namely the inconnu, Nelson's and the Mackenzie whitefish, Lauretta and least cisco or herring and the western burbot; to these the pond smelt may now be added. None of them has yet been able to extend its range in North America east of the Mackenzie and Anderson.

The Pacific slope species include the king salmon, dog salmon, and Dolly Varden trout. The rare Coulter's whitefish (see p. 12) is also included here; it has not actually been found in the Yukon watershed, but only in the Alsek up to the present time. Elsewhere it has been discovered in two localities in British Columbia and two in southwest Alaska.

The third, typically American, group has spread very widely over the northern part of the continent from its refuge area of survival in the "Middle West." The Rockies have effectively prevented its members from crossing to the Pacific watershed almost everywhere; but a few pioneers have reached the Yukon system, perhaps by the Liard or Peel rivers, which, though tributary to the Mackenzie, nevertheless rise in the interior of Yukon Territory; they may have exchanged parts of their drainage, or otherwise given opportunity for the fish to reach the Yukon. Into this group fall the lake trout, arctic grayling, round whitefish, northern chub, trout-perch and common sculpin. The lake trout has crossed the continental divide elsewhere, for example into the Fraser river system of British Columbia. Both this species and also the round whitefish and grayling have gone a step further than the Yukon in colonizing the Alsek-Dezadeash, which, as already mentioned, has the distinction of being the only river draining into the Pacific proper known to contain round whitefish and grayling. It is not difficult to see how their migration took place, since the Takhini, flowing to the Yukon, and the Dezadeash come within about 6 miles of one another in the broad Shakwak trough previously described; and the presence of a former lake, filling the trough and connecting the two systems when the Alsek gap was ice-blocked, is clearly indicated.

There remain two species probably but not certainly belonging to the continental or "Middle West" group, namely the northern sucker and northern pike. Both occur widely in Canada from the Atlantic coast northwestward, like many members of the continental group; both are absent from the Pacific watershed: but they occur also in eastern Siberia (the pike extending as far west as Europe), and in this they resemble the Bering sea group. In fact, the species must have survived in both regions, without becoming differentiated into recognizable local races during their isolation. Consequently we cannot now be sure from which source the Yukon has been repopulated. The pike is an outstanding example of invariability: in spite of its immense circumpolar range, and the fact that the glacial period must have split it into several isolated stocks for very long periods,

specimens from Ireland are identical with those from Quebec, twelve thousand miles "overland" in a direct line. Other species with a wide distribution in New and Old Worlds, for example the round whitefish, grayling and burbot, have under similar circumstances differentiated into two or more subsidiary regional forms.

CONCLUSIONS

The Yukon fishery resources will probably never be exploited for export to outside markets, because they are insignificant compared with those of neighbouring British Columbia; in fact fresh salmon, halibut, etc., are actually imported to Whitehorse from the Pacific coast at the present time. The fisheries are nevertheless of substantial local importance, both to Indians and white residents, the majority of whom live in regions too remote to receive regular shipments of perishable foods.

There is, however, a great opportunity for developing sport fishing for tourists, to whom the Yukon is now more accessible than ever before. In a setting of mountains of exceptional grandeur and beauty, in a summer climate which is genial and dry, there are many good rivers and lakes accessible without great trouble or expense. "Bluefish" or grayling are often so plentiful that they may be taken on a fly at the rate of thirty an hour. Dolly Varden trout, though the least sporting of the native char, can likewise be caught on a fly in the eastern section and in the Tatsenshini. In the Dezadeash and Alsek there is first-class rainbow trout fishing; and all the lakes contain lake trout, and often large "jackfish" or pike.

The fact that rainbow trout are confined to the Alsek watershed is merely a natural accident; there can be no doubt that they would thrive almost anywhere in the southern Yukon if they could be established. There seems to be no objection to making the experiment, so successful in many much less favourable parts of the continent; but for this purpose a trout-farm or hatchery would be required. An attempt to introduce rainbow trout, by importing 25,000 eggs from British Columbia and planting them in the Klondike at Dawson, was made by the Hon. George Black, M. P., some years ago, but it was not successful. In a hatchery it is possible to rear the fish to yearling size, when they are strong enough to look after themselves and can be distributed readily by truck or plane. If such a hatchery were contemplated, the Whitehorse district would be the most favourable location, adjacent to the railway by which the necessary supplies of food and equipment could be delivered.

It is intended very shortly to revise the Fishery Regulations for the Territory, making proper provision for the development of sport fishing, and for the enlistment of expert local advice in its control and administration. A great expansion of the tourist industry in this hospitable and supremely beautiful country may be confidently expected.