KEMANO RIVER REPORT - 1950

APRIL, 1951

KEMANO RIVER SURVEY - 1950

Biological Investigations

I INTRODUCTION

During the summer of 1950, two members of the Fish Culture Development Branch carried out an extensive biological survey of the Kemano River and its tributaries. The purpose of the survey was to determine the salmon spawning potential of the watershed so to better assess the fishery problems that the proposed power diversion to the Kemano might create.

The estimated result of the discharge into the Kemano at Horetzky by a tunnel from Tahtsa Lake involving some 9,400 c.f.s., is an increase in waterflow to approximately five times that at present. Thus, data on the present characteristics of the river, and the nature and degree of salmon spawning both above and below Horetzky Creek, is requisite to any appraisal of the fishery problems that this change in volume and velocity would cause.

II OBJECTIVES OF SURVEY

The survey of the 1950 season was planned to accomplish a number of specific things. Work on these proceeded in the following order:

(1) Construction of trails and blazed routes to make all pertinent areas of the watershed easily accessible by foot. This section of the summer's work also included the establishment of a "permanent" base camp, as well as fly-camp sites out of which the prespawning and spawning surveys of the upper reaches could be made.

(2) Prespawning surveys of the Kemano and its tributaries to obtain data on the general characteristics of the streams and their possible utilization by spawning salmon.

(3) Spawning surveys to gain information on:

a. Characteristics of the Kemano salmon runs, including such information as peak and duration of the migration of the various species.

b. Location and extent of spawning grounds in the Kemano proper.

c. Investigation of all tributary waters with regard to spawning grounds.

The work was begun on May 23 by student biologists N.G. Perret and R. McFadden, in conjunction with the fisheries engineering party under the supervision of R.N. Gordon. From July 21 to September 18, the biological survey was continued by N.G. Perret and S.M. Sager.

III RESULTS

A. General Characteristics of Kemano River.

(i) General Features

The Kemano is a relatively short, tortuous and muddy river having a glacial origin in the coast range, just west of the Nanika Lake region. The valley through which it runs is moderately flat and wide and extends for at least thirty miles, opening on Gardner Canal at Kemano Bay. (See map: Appendix).

The Kemano River is described in 1948 Edition of the B.C. Water Power Investigations Report on the Tahtsa-Kemano Project as "typical of a number of rivers which rise comparatively slowly from the sea for long distances into the Range and then end abruptly in glacier fed basins." The "Water Powers of British Columbia" (1919) report of the Commission of Conservation, describes the class of B.C. coast rivers, of which the Kemano is typical, as having "longitudinal U-shaped valleys, which valleys may be considered as continuations or branches of the inlets, that have become filled with gravel or glacial silt. They are also "characterized, at their mouths, by extensive tide flats and sloughs strewn with logs, roots and other debris. The river usually reaches the inlet by several shallow channels, through gravel bars and glacial silt washed down from the mountains. Even with a small launch great care has to be exercised in approaching these flats." "In their lower reaches, these rivers are usually swift flowing streams obstructed by log jams and numerous 'snags' or 'dead

heads.' They are often difficult to travel and at high water a good deal of danger attaches to the ascent and descent by canoe. The channel is often tortuous and changes from year to year." In discussing possible power sites on the Kemano, the same report states that the "Main stream flows through a low wide valley and there are no power sites below the headwaters where the stream is small."

Horetzky Creek, also named Tachastes Creek, ten miles from Kemano Bay, has been regarded as a focal point in the survey for it is at the mouth of Horetzky Creek that the Tahtsa discharge will enter the Kemano. Generally speaking, it was found that the character of the river is the same both above and below Horetzky Creek.

In following its course to the sea, the Kemano covers a distance probably twice that of its valley length. This meandering is due to the flatness of the valley floor and the diversion effect of log jams. At many locations the river breaks into several channels divided by numerous wooded islets or gravel bars. In all, the main channel of the Kemano is estimated as having a drainage area of 320 square miles.

The generally flat nature of the valley floor is illustrated by the fact that at Horetzky Creek the elevation is 190 feet, giving the river an average drop of 19 feet per mile. It has been estimated that the average grade of a proposed railroad from Kemano Bay to Horetzky

Creek would be only 0.4%. Tidal influence extends for at least a mile up from the mouth.

Log jams are a characteristic feature of the Kemano. However, none of the log jams observed would form impassable barriers to the migration of salmon.

The Kemano valley from the mouth to five or six miles above Horetzky Creek remains essentially unchanged. Large gravel bars, with some mixed sand and gravel bars, are found throughout. At about five miles above Horetzky Creek, however, the Kemano Valley narrows somewhat and continues for another seven miles in a straight north-south direction. (See Map). At the lower end of this straight narrow portion, the gravel of the bars commences to increase in size until at the upper end very large boulders are found. This results, at about the 23 mile point, in a 1/2 mile stretch of falls and rapids in which the valley is very narrow and the water falls over the large boulders in cascades.

Just above the falls the valley again widens, forming a large "bowl" area. The "bowl" is approximately 1/2 mile wide and two miles long, and through the area the river flows in several meandering channels. No investigation was made of the upper region of the "bowl", into which the valley of the source waters opens.

(ii) Opacity and Silting.

The water of the Kemano is muddy with glacial silt, to the degree that it is impossible to see the bottom in depths greater than one foot. Spawning salmon could

be seen only in the shallow rapids and near the banks. The Kemano water is in sharp contrast to the clear water of the Wahoo River, and some of the smaller tributaries, such as Wachwas, Horetzky, and "North One" Creeks. Glacial silt is deposited to some extent in the gravel of bars bordering the main channel and to a greater degree in slow side channels and back eddies.

(iii) Banks and Valley Flora.

The banks of the Kemano are for the most part gravel bars, but in many places these alternate with steeper edged eroded portions. At bends in the river the banks are usually of clay and gravel, and are formed by erosion.

The immediate flora of the river varies, of course, with the type of bank. Generally, the river is bordered by deciduous trees (alder, birch, cottonwood, maple) and shrubs. Where deep erosions have been made into the heavily forested sections, the bank flora is made up of the typical west coast conifer forest.

(iv) Run-off and Precipitation.

Precipitation is high in the Kemano Valley. It has been somewhat conservatively estimated as being an average of 100 inches per annum. The precipitation in the lower reaches of the valley is very likely much greater than this estimated average.

Such heavy precipitation means a high rate of run-off. This is augmented by the snow and ice-fields which are formed in large numbers in the watershed. Rises in

temperature and rainfalls have been found to cause almost immediate rises in the water level of the river.

(v) Temperature Records.

During the survey, daily records were kept of water temperatures of the Wahoo River, near its junction with the Kemano. The temperature here was found to be identical with that of the Kemano. Temperature of the flow over many of the spawning grounds was also recorded.

Table No. i (Appendix) gives the maximum-minimum temperatures recorded from May 23 to September 15. The graph (Appendix) clearly shows the increase from May through to September, with an indication of a slight drop in the early part of September.

The temperature of the water varied from a minimum of 36° (May 26) to a maximum of 57° (August 27)--the latter temperature being recor ed on one occasion only. It is interesting to note that during the month of August when salmon first made their appearance in the river, the temperature ranged from 43° to 57°, or an average of 50°.

No comprehensive records were kept of water temperatures in Kemano Bay and the tributary streams. However, occasional readings were taken and although they represent incomplete data, an average is given here in way of interest.

Kemano Bay - 49° F

Wachwas Creek - 45° F

Waterfall Creek - 53° F

Horetzky Creek - 48° F

(vi) Accessibility

(a) Accessibility of Valley

The valley of the Kemano is fairly accessible by foot, due to the flatness of the valley floor, and the presence of extensive gravel bars. Passage by small river craft can be made only with difficulty because of swiftness, snags, and the inability to see river bottom.

A trail has been blazed and partially cut for a distance of about 23 miles from the mouth, along the north bank. Much of this route utilizes gravel bars and wooded flats along the river bank. At several places small channels are forded in order to shorten trail distances, or to detour bluff regions. An inordinate amount of "Devil's Club", and other dense growths make some portions of the valley extremely difficult for travel on foot.

The south bank was not chosen for trail making as prohibitive bluffs occur at three miles up and at the mouth of Horetzky Creek. Furthermore, a south bank trail would have involved the fording of Seekwyakin River and Wachwas Creek, which might have proved difficult during high run-off periods. However, it may become advisable to overcome these difficulties in subsequent surveys should it be found impossible to make a river crossing to Horetzky Creek from the present trail.

A prefabricated cabin, capable of housing at least four men, was constructed by crew members of the Fisheries Patrol boat "Babine Post" near the confluence of the Wahoo and Kemano, about 1½ miles from the entrance of Kemano Bay. This cabin was used as a base for the surveys of the lower reaches of the Kemano and Wahoo Rivers. Upper portions of the Kemano Valley were surveyed out of fly-camps located at the following points in the valley.

(1) Opposite Wachwas Creek - about six miles up from Kemano Bay.

(2) Just above Horetzky Creek - about 12 miles up from Kemano Bay.

(3) Two miles below falls - about 18 miles up from Kemano Bay.

(b) Accessibility of River to Salmon Migration.

The Kemano River from the mouth to the falls offers no resistance to migrating salmon. The falls are not precipitous and so may be passable to all species of salmon. It is noteworthy, however, that only spring and coho salmon (from fry collections) show evidence of spawning in the "bowl region" above the falls.

Slightly turbulent rapids occur at many locations throughout the course of the river. Neither these nor the large log jams appear to present impassable barriers to migrating salmon.

(vii) Possible Spawning Areas.

The Kemano offers many possible spawning grounds of varying degrees of excellence, both above and below Horetzky Creek.

For much of the valley length, the main and side channels are bordered by extensive gravel bars suitable for spawning. Glacial silt and sand is present in all these areas but not in any great or prohibitive quantity.

Spawning areas are reduced to some extent in the narrow region of the valley (mile 16 to mile 23), where there are relatively few side channels and the gravel is larged sized.

The flat area above the falls has excellent spawning gravel.

Mouths of the tributary streams were found to be ideal spawning grounds in most cases. These areas have been included in the discussion of the tributaries.

B. General Characteristics of Tributaries

(i) Wahoo River

The Wahoo is a relatively small, clear water river flowing into the Kemano at Kemano Bay. Its valley is narrow and for most of the length confines the flow to a single channel.

Falls occur on the Wahoo at about 1/2 mile above the junction with the Kemano and are similar to those found in the upper reaches of the Kemano. They are about 3/4 mile in length and in several sections are

separated by gravel areas. The river below the falls is fairly wide and flat. Tidal influence extends to the falls and at high tide all bars below this point are covered.

Possible Spawning Areas

Good spawning gravel is present from the mouth to the falls. The gravel here is clear and relatively free from sand. Excellent gravel is found in bars just below the falls, where it is clean, loose and of moderate size. The flat sections in between the rapid portion of the falls also present good spawning grounds. Bars of clean, moderately sized gravel commence just above the falls and constitute the banks of the river for about two miles.

(ii) Wachwas Creek

Wachwas Creek enters the south bank of the Kemano at about four miles up from Kemano Bay. It is a swiftly flowing, clear stream with a bottom of fairly large boulders for most of its length, having little of the moderately sized gravel as is found in the Kemano and Wahoo. A box canyon and falls are found about 3/4 mile from the mouth.

Possible Spawning Areas

Good spawning gravel is present in the first 300 yards of the stream. The next 300 yards up are a mixture of boulder and coarse gravel, followed, as far as the falls, by large boulders interspersed with fine gravel.

(iii) Waterfall Creek

Waterfall Creek enters the Kemano from the northwest, originating as a waterfall about 500 feet high, which falls almost directly into a channel of the Kemano. From the base of the waterfall, the stream runs for about 200 yards before entering the Kemano.

Possible Spawning Areas

Waterfall Creek has good spawning gravel throughout the 200 yards from the base of the waterfall to its mouth. The stream bottom is a mixture of fine and moderately sized gravel, free of silt and fine sand.

(iv) "North One" Creek

"North One" Creek is a shallow clear water stream which flows into a side channel of the Kemano, at about one mile up from Wachwas Creek, on the opposite side of the river. Small falls occur at about 800 feet from the mouth. Below these falls the stream is laced with windfalls, none of which appear to form impassable barriers to spawning fish.

Possible Spawning Areas

The distance from the mouth to the falls is excellent spawning gravel, composed chiefly of clear, granite gravel.

(v) Seekwyakin River

Seekwyakin is the largest of the tributaries of the Kemano, and like the latter, is clouded by glacial silt. This river flows into the main channel of the Kemano almost at right angles at about eight or nine miles above

Kemano Bay and about two miles below Horetzky Creek Valley. The character of the Creek bottom differs from that of the Kemano in that fairly large-sized boulders are found throughout.

From the mouth to approximately a mile upstream, Seekwyakin River meanders over a large gravel delta through which many smaller channels have been formed. The Creek opens on to this delta from a long straight canyon which continues for 1/2 mile upstream. The canyon is about 75 feet wide and has sheer walls rising about 200 feet above the water. It was impossible to follow the stream bed in the canyon so that all observations of this section were made from the top of the canyon walls.

Above the canyon for a distance of at least three miles the valley widens to 1/2 mile. After this, the valley again narrows to form a second canyon area.

Possible Spawning Areas

Portions of the gravel delta at the mouth of Seekwyakin River, and in particular, the smaller channels, have a fair amount of moderately sized spawning gravel. This gravel is found between larger rocks.

The gravel at the bottom of the canyon appears to be adequate for spawning, and is covered with water at all times.

Fairly extensive gravel bars form the banks of the river above the canyon. The small shallow side channels of this portion afford the best spawning areas of the

creek.

(vi) Horetzky Creek (Tachastes Creek)

Horetzky Creek is a small clear water stream flowing into a side channel of the Kemano, about ten miles up from Kemano Bay. The valley of this creek is somewhat obscure and runs in approximately the same direction as does the Kemano valley up to that point. At the level of Horetzky Creek the Kemano Valley turns somewhat sharply to the north-west.

At is confluence with the Kemano, Horetzky Creek is sandy bottomed and deep. The south bank here is a sheer rock wall formed by a mountain between the Horetzky Creek valley and Seekwyakin Valley.

The investigation of Horetzky Creek was made as far as the falls and canyon which occur at about 3/4 mile up from the mouth. For 1/4 of a mile below the falls, the water is very swift and flows over large boulders between which there is little spawning gravel. The high ground here is of moderately sized gravel which could be used as spawning gravel during very high water periods only. Below this region the creek breaks up into several small channels flowing through a deciduous tree flat. The gravel in these channels is mostly small and entirely free of silt. The streams reunite and run over several hundred yards of excellent spawning gravel near the mouth and to the junction with the Kemano.

Possible Spawning Areas

Excellent spawning grounds are found in Horetzky Creek, from the point where the stream breaks into small channels down to the mouth.

(vii) "South Fork"

The "South Fork" is a name given to a stream which presumably flows from a prominent valley entering the Kemano about two miles above Horetzky Creek. No investigation was made of this valley, due to the lack of time, and the difficulty of making a river crossing at this point.

(viii) "North Fork"

The Creek termed the "North Fork" enters the north bank of the Kemano about three miles above Horetzky Creek. This is a swift, comparatively clear stream, flowing from a short, high-ridged valley. A glacier which forms what appears to be the head waters of this creek is visible on a south-westerly bearing about one mile further up the Kemano.

Possible Spawning Areas

Good spawning gravel extends from the mouth to about 200 yards upstream. It was noted that on July 27, the temperature of this stream was 45°, as compared to 48° in the main channel of the Kemano.

C. Characteristics of Kemano River Salmon Migration.

(i) Fry Distribution

During the prespawning survey, a special effort was made to examine the entire Kemano Watershed for the

presence of salmon fry, so as to have an insight into the extent and distribution of the spawning. As a result, fry from various locations were collected and preserved. This data is presented in Table II.

Chum and coho were the only species of fry found, with the very great majority of these being coho. It is noteworthy, as seen Table II, that chum salmon were found in May only.

Coho fry were found throughout the Kemano and its tributaries, including above the falls in both the Kemano and Wahoo.

(ii) Salmon Escapement (See Table VI for Resume of Escapement Data).

Exact counts of numbers of spawning salmon in the Kemano River and its tributaries were impossible because of the opacity of the water and extent of the river. However, several spawning grounds where the water was clear enough to make live and dead counts were observed on an average of once a week. From these observations, a general idea of the density of spawning in the valley was gained as well as the duration and peak of the migration.

(a) Chum Salmon Escapement (Table III gives data collected at several areas on chum salmon spawning).

Commencement

The first indication of chum salmon in the Kemano River was on August 6 when these salmon were seen finning

in the main channel and a deep backwater 2½ miles up from Kemano Bay. Chum salmon were first seen in the Wahoo on August 7. The first specimens seen on actual spawning grounds were on August 17, at Hub 50. The first dead spawned-out salmon was taken on August 21, in the Wahoo River.

The first counts of spawning chum salmon were made on August 16, when a survey of the spawning grounds along the north bank was made for a distance of 14 miles from Kemano Bay. The spawning grounds encountered on this and subsequent survey were characteristically shallow and slow moving waters with moderately sized gravel. On this first extensive survey it was noted that spwaning had progressed to the egg deposition stage.

Peak:

The peak of the run in the Kemano and its tributaries was reached by the second week in September.

Temperature Range:

Chum salmon appeared to have a spawning temperature preference of 51° - 57° F, or an average of 53° F. This is noticeably higher than the temperature found for spring salmon.

Spawning Areas:

Redd digging by the females of this species took place in all gravel conditions from mud to coarse gravel and in water ranging from backwater pools to rapidly flowing channels. No apparent preference was shown for

clear or silty waters. During low run-off periods, many of the smaller channels and tributaries were too low to allow spawning. At these times the spawners moved back into the larger channels of the Kemano. On several occasions chum salmon were found spawning near the shore in the main channels of the Kemano.

Specific chum salmon spawning areas are:

1. Kemano - From the mouth to the falls, in the main channel, but showing a preference for the slower moving side channels.
2. Wahoo - From the mouth to the falls.
3. "Waterfall Creek" - In the first 100 yards.
4. "North One Creek" - At mouth.
5. Horetzky Creek - From mouth to falls.

N.B. No chum salmon were seen spawning in Wachwas Creek or Seekwyakin River.

(b) Spring Salmon Escapement. (Table IV gives data on spring salmon spawning at several areas).

Commencement:

The first evidence of spring salmon in the Kemano watershed was on August 7, when a large dead salmon was found in the Wahoo River just below the falls. This salmon was apparently killed in attempting to ascend the falls, as it was found in two halves wedged in large rocks just below the first falls. On examination, the fish proved to be an immature male.

It should also be noted here that spring salmon were reported by members of the fisheries engineering party in the Wahoo during the first week in July. On this occasion three or four springs were noticed in the Wahoo below the falls. It would appear then, that Spring salmon arrive in the Kemano early in July, but reach no great numbers until August.

Springs were first seen in the Kemano River proper on August 17 in a very swift section of the river about seven miles up from the mouth. Due to the very muddy condition of the water, an accurate count was impossible and it was also difficult to determine their condition.

The first dead spring salmon was found on August 21, one quarter of a mile from the mouth, on a sandbar exposed during low tide. This specimen was a large spawned-out male.

Peak:

The peak of the spring run was apparently reached during the first week in September. It is interesting to note that the commercial fish packers in Gardner Canal reported the peak of the spring run there had been reached by August 8.

Spawning Areas:

The spring salmon were found to spawn throughout the Kemano River from the mouth to the region above the falls, usually in fast water where the gravel is medium to large. Springs were also found in many of the large and small channels. No Springs were seen in any of the

slow side channels, back eddies or sloughs which were found to be the typical spawning locations of chum salmon.

Springs also spawned in all of the larger tributaries. Some of these were clear water streams, so that this species appear to have no special preference for either muddy or clear water.

Spawning spring salmon were observed in the following areas of the tributaries:

1. Wahoo - In gravel bars between sections of the falls, and above the falls - fair numbers.
2. Wachwas - From mouth to falls ($\frac{1}{2}$ mile).
3. Seekwyakin River - From mouth region to about five miles above the mouth.

Spring salmon spawning grounds in the Kemano and its tributaries have several common features - either clear or silty water with medium to fairly large gravel, swift water, and at least one foot in depth.

Spawning Temperatures.

Spring salmon were found spawning in waters of 48 - 51°.

Estimation of Numbers.

Due to the muddiness of the Kemano, no accurate count of spawning spring salmon was made. The numbers seen and recorded indicate that the run was not of large proportions. Information procured from commercial fish packers in Gardner Canal show that the season's catch was small, suggesting a correspondingly small river escapement.

(c) Pink Salmon Escapement (Table V gives data on pink salmon spawning at several areas).

Commencement:

Pink salmon appeared in Kemano Bay on August 8. On this date a specimen was caught in a gill net set in the centre of the bay. By outward appearances, at least, this salmon had not reached spawning condition.

The first appearance of pink salmon in any quantity was on August 21, when seven or eight were found in the Wahoo River just below the falls.

The run did not appear in the upper reaches of the Kemano until the first week of September. On September 9, large numbers of spawning pinks were seen in the gravel of the mouth of Horetzky Creek.

Peak:

The peak of the pink salmon migration appeared to have been reached by the second week in September. It may be of interest to note that the height of the pink run in Gardner Canal was much earlier -- about August 14.

Spawning Areas:

Pink salmon in the Kemano watershed appear to have a preference for smooth clear water a foot to two feet in depth, and with bottoms of medium sized gravel. On one occasion only were pink salmon seen in a swiftly flowing section of the Kemano. Due to the siltiness of the water, it was impossible to determine whether or not these fish were actually in the process of redd digging.

Pinks were noted in the following specific areas:

1. Kemano - a few were seen in a shallow side channel of the Kemano near Horetzky Creek mouth. No pinks were noticed in the main channel.
2. Wahoo - A large number were found spawning in the Wahoo, between the mouth and the falls.
3. Horetzky - A large number of pinks were found spawning in the mouth region of this creek, and for at least 1/4 mile up from the mouth.

No pink salmon were found in Wachwas Creek, "North one Creek," or Seekwyakin River up to September 12. No survey of the Kemano above-Horetzky was made after this date, but it is assumed that pinks spawn in the above-Horetzky region.

(d) Coho Salmon Escapement

All spawning data of this species has been drawn from fry collections. No coho had arrived in the Kemano during the period of the survey. Coho fry were found in all spawning areas observed, with the exception of "North One Creek", and "Waterfall Creek."

The fry collections indicate that Coho salmon have an almost universal distribution in the Kemano and spawn in large numbers (See "Fry Distribution")

(iii) Redds and Seeding

It is felt that in this discussion of redds and seeding of the Kemano migration, mention should be made of the

threats to good seeding by fluctuations in run-off and super-imposition.

The general effect of fluctuations in run-off appears to be that many of the shallow spawning grounds are in a precarious situation. A number of these spawning areas were discovered to become dried up after spawning had taken place, while in others, the water level dropped to such an extent that further spawning was prevented.

In most of the spawning grounds, super-imposition was evident. This was especially so in the chum grounds. In all the spawning grounds, spawners were present throughout the runs, thus, out of necessity, super-imposition and scouring took place, since the areas were none too large.

(iv) Extent of Predation

Predation in the Kemano watershed may not be any greater than in other spawning rivers of comparable size. Black bear and grizzly bear are present in large numbers and evidence of their predation was found throughout the spawning period. Bald headed eagles are found in extraordinarily large numbers in the Kemano Valley, and destruction of some of the spawners along the river shore appears to be attributable to these birds. Gulls and ravens were also found feeding on the carcasses of salmon. No coarse fish species were noted in the Kemano waters. Of the game fish, dolly varden were found in largest numbers.

IV DISCUSSION AND CONCLUSIONS

It was found impossible to make an exact count of the number of spawning salmon in the Kemano. This was because of the opacity of the river, the vastness of the spawning grounds, and the impracticability of constructing a counting fence. However, extensive surveys were carried out and did succeed in establishing definite data on such things as the commencement, peak, duration and extent of the salmon migration. This information has been presented in the text of the report under species headings. Data was also gathered on general physical characteristics of the Kemano River and some of its more important tributaries.

As a result of the summer's survey, the following conclusions can be made regarding the spawning potential of the Kemano River.

(1) The 1950 salmon run into the Kemano was of moderate proportions.

(2) Salmon spawning in the Kemano is extensive, occurring both above and below Horetzky Creek and in the major tributaries.

(3) Springs, chums, pinks, and coho have been found to spawn in the river, with the chum occurring in greatest numbers.

Coho salmon had not appeared in the river during the period of the survey (September 18) but from the evidence of the coho fry distribution, it is apparent that this species spawn in good numbers everywhere in the river and

its tributaries.

(4) The relative flatness of the valley floor and consequent meadering of the river allow for extensive spawning gravel bars.

(5) Several features of the Kemano River are contrary to good spawning conditions.

(a) siltiness of the water

(b) fluctuations in water flow

(c) super imposition and scouring

Records on hand from the Department show that an estimated average of 76,000 salmon spawned in the Kemano each year over a 10-year period (1938-1948). The number of each species in this estimation is as follows:

Springs	-	1,100
Coho	-	15,700
Chums	-	20,000
Pinks	-	39,400

From observations, it is felt that the 1950 run did not approach the estimated figures as given above. The catch in Gardner Canal did not reach expected proportions, also suggesting that the run in the Kemano was not large.

Results of Power Discharge and their Effects on Salmon Migration.

The 9,400 c.f.s. of regulated discharge which is to enter the Kemano at Horetzky will almost certainly bring about considerable changes to present favourable spawning conditions in that river.

The following are some of the estimated changes in the river that the increase in flow will produce and the

possible effect of these changes on the salmon run.

1. Increased volume and velocity of flow, causing
   (a) Erosion and the formation of large quantities of sand, mud, and gravel, which will inevitably cause the silting over of spawning grounds.
   (b) Flooding, to depths unsuitable for spawning.
   (c) A physical barrier to migration of salmon to the suitable spawning grounds above Horetzky Creek.

2. Changes in temperature, presumably an increase, and other physico-chemical disturbances detrimental to successful salmon propagation.

V RECOMMENDATIONS

The summer's survey was not designed to determine specific remedies for fishery problems, but rather to gauge the potential of salmon spawning in the Kemano. However, it is evident that should the Tahtsa discharge become a reality, channelization of the Kemano might be required to maintain stable conditions below Horetzky Creek.

It is recommended, then, that further studies be made on the Kemano and its tributaries with particular reference to the physical features in order to more accurately determine the effects of the Tahtsa Lake discharge. With this data, one would be in a better position

to decide upon methods of either eliminating, overcoming, or minimizing the resultant potential losses to the fisheries caused by the increase in river flow, volume, and velocity.

VI SOME SUGGESTIONS FOR FURTHER BIOLOGICAL SURVEYS

Should it be decided that additional data on the Kemano salmon migration is required, the following recommendations are submitted. It is recommended that--

(1) The survey include four men, and that it commence early in June.

(2) The first month and a half be spent in recutting the north bank trail, cutting a trail to spawning grounds on the south bank, and the construction of a permanent shelter at the level of Seekwyakin River or Horetzky Creek. This shelter could be constructed in the form of a log-cabin used to store equipment and serve as base for surveys of upper reaches.

(3) During the actual spawning survey, two men be assigned to the north bank and two men to the south bank. In this way, the entire valley could be covered bi-monthly.

TABLE I

DAILY MAXIMUM MINIMUM TEMPERATURES OF KEMANO RIVER
(Recorded 6:00 p.m. Daily in Wahoo River)
(Near Confluence with Kemano)

DATE	MAX.	MIN.	AV.	DATE	MAX.	MIN.	AV.
May 23	44	40	42	July 6	50	42	46
24	46	38	42	7	50	40	45
25	44	38	41	8	50	42	46
26	42	36	40	9	48	42	45
27	43	40	41.5	10	47	42	44.5
28	41	39	40	11	47	42	44.5
29	40	39	39.5	12	47	42	44.5
30	44	37	40.5	13	48	42	45
31	43	37	40	14	49	43	46
June 1	44	37	40.5	15	50	43	46.5
2	48	37	42.5	16	51	43	47
3	45	41	43	17	52	44	48
4	42	37	39.5	18)	49	43	46
5	44	37	40.5	19)			
6	47	37	42	20	50	43	46.5
7	46	38	42	21	54	44	49
8	48	37	42.5	22	54	44	49
9	46	38	42	23	54	44	49
10	47	38	42.5	24	54	44	49
11	48	38	43	25)			
12	50	38	44	26)			
13	50	40	45	27)	52	43	47.5
14	50	40	45	28)			
15	49	39	44	29)			
16	48	40	44	30)	52	43	47.5
17	48	40	44	31	50	43	46.5
18	48	40	44	Aug. 1	51	45	48
19	48	40	44	2	50	44	47
20	46	40	43	3)			
21	46	40	43	4)	49	43	46
22	48	40	44	5)			
23	50	42	46	6	48	44	46
24	51	42	46.5	7	48	44	46
25	52	41	46.5	8	52	44	48
26	56	41	48.5	9	54	44	49
27	48	40	44	10	54	46	50
28	47	42	44.5	11	55	46	50.5
29	48	42	45	12	55	45	50
30	48	41	44.5	13	55	45	50
July 1)				14	54	46	50
2)				15	52	46	49
3)	52	41	46.5	16)			
4)				17)	52	45	48.5
5)				18)			

TABLE I (Cont'd).

DATE	MAX.	MIN.	AV.	DATE	MAX.	MIN.	AV.
Aug. 19	52	47	49.5	Sept. 1	51	44	47.5
20	55	46	50.5	2	51	44	47.5
21	55	46	50.5	3	51	44	47.5
22)	57	42	52	4)	51	45	48
23)				5)			
24)				6	48	43	45.5
25)				7	48	43	45.5
26)				8)			
27)	54	44	49	9)	50	43	46.5
28)				10)			
29	49	45	47	11)			
30	51	45	48	12	50	45	47.5
31	48	44	46	13)	52	46	49
				14)			
				15	53	47	50

TABLE II

FRY DISTRIBUTION - KEMANO RIVER - 1950.

SAMPLE NO.	AREA OF COLLECTION	DATE	SPECIES	NUMBER COLLECTED
1	Wahoo-near mouth	May 20	Chum	1
2	Kemano-near mouth	May 27	Chum	7
			Coho	8
3	Kemano-2 mi. from mouth	May 29	Chum	1
4	Wahoo-above falls	June 2	Coho	4
5	Kemano-3 mi. from mouth	June 5	Coho	2
6	Kemano-5 mi. above Horetzky	July 27	Coho	14
7	Kemano-10 mi. above Horetzky	July 28	Coho	9
8	Kemano-above falls	July 28	Coho	3

TABLE III

DATA COLLECTED ON KEMANO CHUM SALMON DURING RIVER SURVEYS

DATE	LOCATION	DETAILS	WATER CONDITIONS	TEMP. (°F)
Aug. 6	Kemano R., backwater opp. Hub 37	Several finning	Silty, quiet	46
6	Wahoo R., mouth to falls	Small number	Clear	47
8	Kemano Bay	Two caught in gill net		48
11	Wahoo R., below falls	Small number	Clear	
14	Kemano R., backwater	Finning	Silty	49
16	Kemano R., small stream and backwater at H.51	Large number, spawning	Clear, slow	52
16	Kemano R., side channel H. 49 - H. 55	Small number, 1 dead	Silty	51
16	Kemano R., small stream & backwater at H.105	Large number, spawning	Clear, slow	52
16	"North One" Creek	Small number	Clear, fast	57
17	"Waterfall Creek" mouth & backwater	Large number spawning	Clear, slow	57
17	Kemano R., small side channel, 4 miles above Seekwyakin	Small number spawning	Silty	55
21	Wahoo R., below falls	Large number, 1 dead	Clear	51
25	Kemano R., clear backwater and stream mouths at H.51 and H.105	Very large number spawning 5 dead	Clear	52
26	Kemano R., clear side channel, 5 miles above Horetzky	Large number	Clear	

TABLE III (Cont'd.)

DATE	LOCATION	DETAILS	WATER CONDI-TIONS	TEMP. (°F)
Aug. 26	Kemano R., H.115	Large number	Clear	
27	Kemano R., side channel and stream, 11 miles above Horetzky	Small number	Clear	
28	Kemano, 6 miles above False, H.51 and H.105	Small number	Silty	
Sept. 1	Kemano, small streams and backwaters	Very large number, 3 dead	Clear	
2	Kemano, H.105 to Horetzky Creek	Large number 7 dead	Clear and Silty	

TABLE IV

DATA COLLECTED ON SPRING SALMON
DURING RIVER SURVEYS

DATE	LOCATION	DETAILS	WATER CONDITIONS	TEMP. (°F)
Aug. 7	Wahoo R., immediately below falls	One dead immature male	Clear	47
9	Wahoo R., immediately below falls	3 or 4 seen, in good condition	Clear	48
17	Kemano R., side channel, at H.114	Small number, spawning in shallow rapids	Silty	48
21	Kemano R., 1/4 mile from mouth	Small number, in swift water	Silty	51
21	Wahoo R., in falls and above	Fair number, spawning	Clear, fast	51
25	Kemano R., rapids of side channel	Near H. 96, large number	Silty, fast	48
27	Kemano R., 1 mile below falls	Small number, poor condition	Silty, fast	49
27	Kemano R., above falls	Fair number, spawning	Silty, fast	49
28	Kemano R., mouth of "North Fork"	One, poor condition	Clear, slow	
Sep. 8	Seekwyakin R., mouth to 5 miles	Small number, spawning	Slightly silty	
9	Wachwas Creek, mouth to falls	Fair number, spawning	Clear	47

TABLE V

DATA COLLECTED ON KEMANO PINK SALMON
DURING RIVER SURVEYS

DATE	LOCATION	DETAILS	WATER CONDI-TIONS	TEMP. (°F)
Aug. 3	Kemano R., 1/4 mile from mouth	One, (finning)	Silty, fast	49
8	Kemano Bay	Caught in gill net, good condition		
21	Wahoo R., immediately below falls	Fair number	Clear	51
28	Wahoo R., below falls	Large number, spawning	Clear	51
Sept.9	Horetzky Creek, near mouth	Large number	Clear	51
"	Kemano, side channel near Horetzky Creek	Fair number (count impossible)	Silty, rapids	49

TABLE VI

SALMON ESCAPEMENT
MIGRATION AND SPAWNING TIMES

SPECIES	MIGRATION TIME	SPAWNING TIME	LOCATION OF SPAWNING
Chum	Aug. 1 - Sept.30	Aug. 17 - Sept.30	Side channels, and tributaries
Spring	July 15 - Sept.30	Aug. 15 - Sept.30	Main channels and certain tributaries
Pink	Aug. 1 - Sept.30	Aug. 21 - Sept.30	Tributaries only
Coho	Sept. 1 - Nov.	Sept. - Nov.	Throughout watershed

KEMANO RIVER SURVEY - 1950

Biological Investigations

Kahoe R. at low Tide. Looking upstream. May 1960.

Kashwax Cr. Near Mouth. Looking upstream. Aug.

Spawning gravel at mouth of Waterfall Cr.

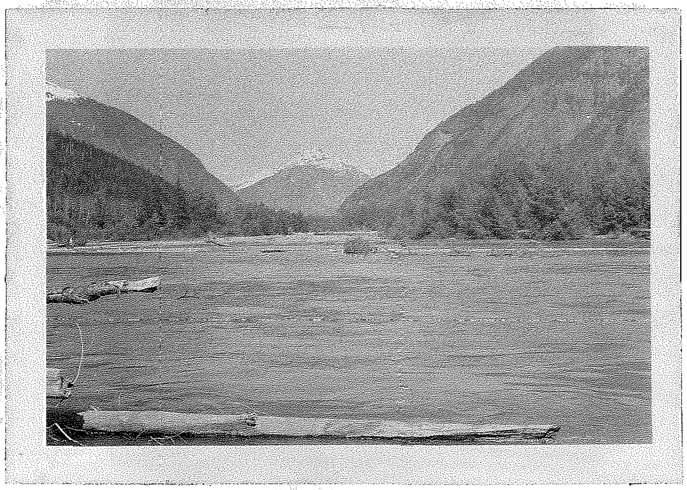
Sashayaktn R. ½ mile from mouth. Just below box canyon.

Pink salmon spawning area 200 yds. from mouth . looking upstream on Horetzky Cr.

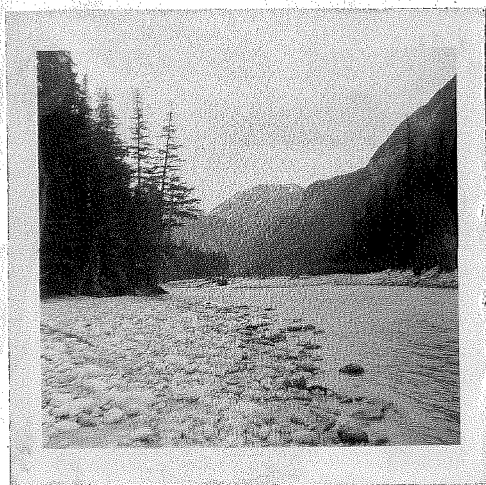
Horetzky Cr. Falls in background.

Looking upstream. 6 mi. from
mouth of Kemano River.

Spring salmon spawning area
7 mi. upstream.



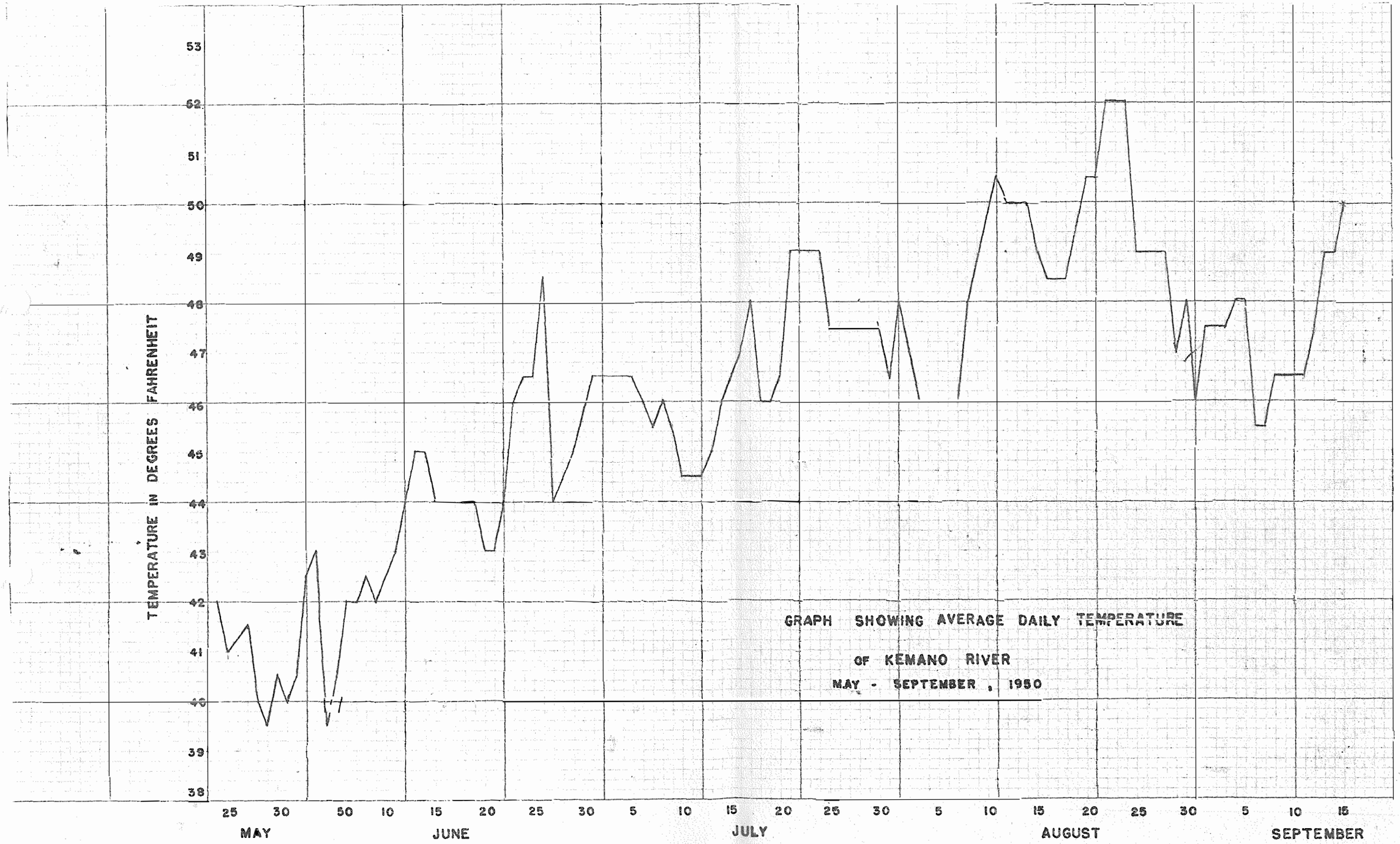
"The Jaws" in background, with
Horetzky Cr. at right. Seekwyakin
R. valley at left.



Kemano R. 18 mile upstream

Upper Kemano. 21 ½ miles upstream.
Note falls.

View of region above
falls.



GRAPH SHOWING AVERAGE DAILY TEMPERATURE

OF KEMANO RIVER

MAY - SEPTEMBER , 1950

6 inch PHOTO INDEX MOSAIC

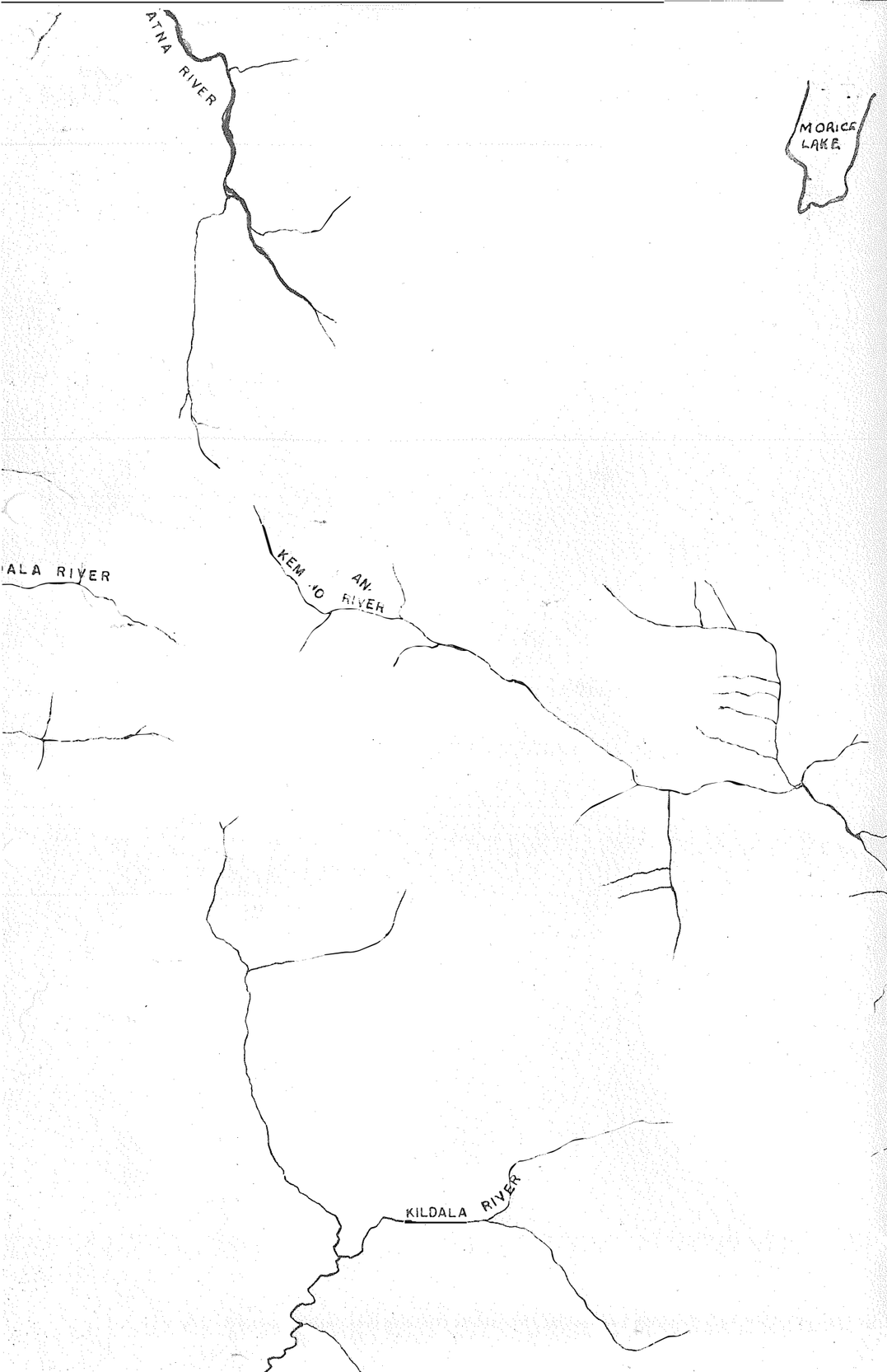
KITIMAT ARM - KEMANO RIVER

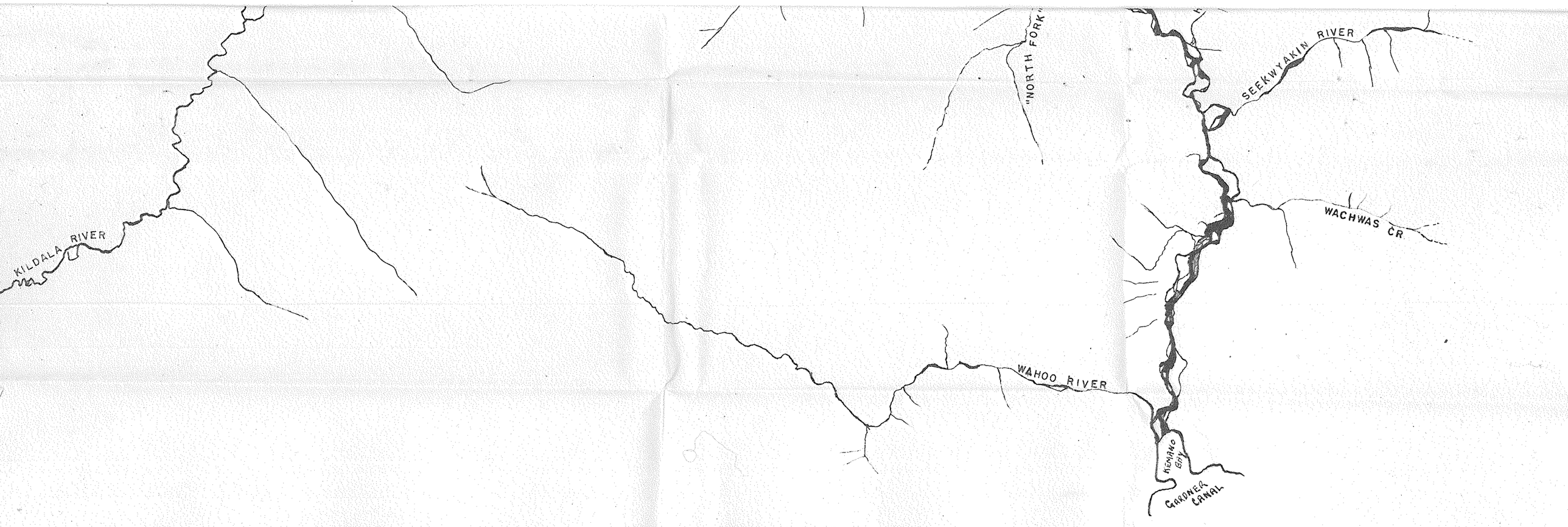
BRITISH COLUMBIA

(FROM A PHOTOGRAPH FOR THE **BRITISH COLUMBIA INTERNATIONAL ENGINEERING COMPANY** BY

PHOTOGRAPHIC SURVEYS (WESTERN) LIMITED

JULY & AUGUST, 1949




KILDALA RIVER
"NORTH FORK"
SEEKWYAKIN RIVER
WACHWAS CR.
WAHOO RIVER
KEMANO BAY
GARDNER CANAL
APPROXIMATE SCALE OF MILES
0 1 2 3 4 5 6