FRASER RIVER BOARD

PROGRESS SUMMARY OF FISHERIES INVESTIGATIONS TO MARCH 31, 1961

DEPARTMENT OF FISHERIES, CANADA
VANCOUVER, B.C.
APRIL, 1961

PROGRESS SUMMARY OF THE FRASER RIVER BOARD FISHERIES INVESTIGATIONS TO MARCH 31, 1961.

by

FRASER RIVER BOARD BIOLOGICAL STAFF

Department of Fisheries, Canada
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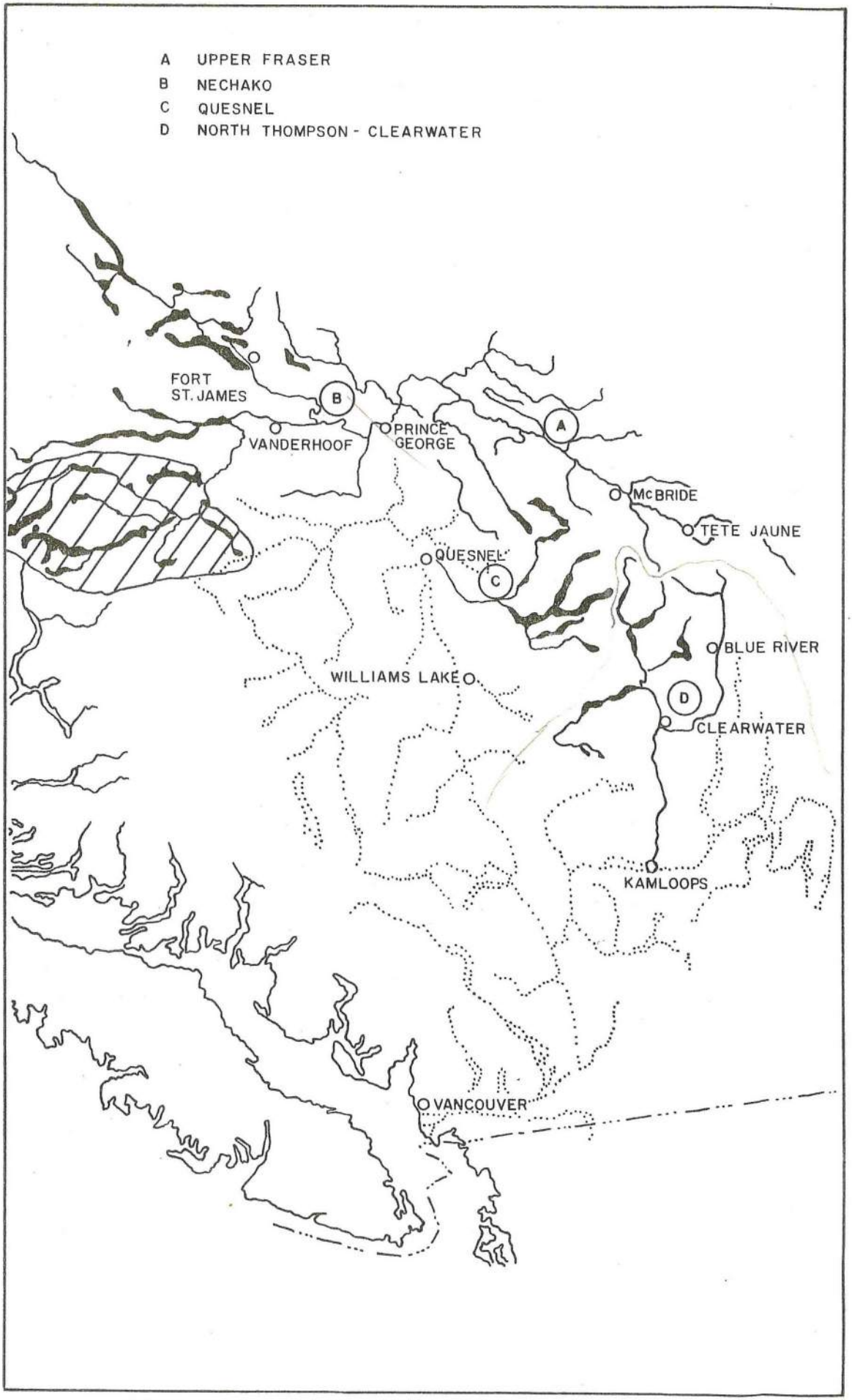
INTRODUCTION

The Fraser River Board was reconstituted late in 1959 with the terms of reference directing the Board to proceed with studies as recommended in their Preliminary Report dated June 1958. The particular sections relating to the fisheries' interests are described as follows :

1. That programs for the collection of basic data relating to the hydrology, meteorology, topography, geology, and fisheries of the Fraser River Basin be further expanded.
2. That a program of surveys of the fisheries' interests related to the partial developments be initiated with a view to determining the facilities needed and their cost, beginning with System A.
3. That programs of fisheries research regarding the effects of dams and flow regulation on fish maintenance, and the possibilities and relative efficiency of various means of artificial propagation be accelerated.
4. That in order to implement number 2 above, it was estimated that it would cost a total of $200,000 for investigations, designs and reports on the fisheries' interests, and a program of three years duration was recommended.

The initial fisheries surveys were directed primarily to the collection of basic biological data on the salmon runs which would be affected by System A, Figure 1. The collection of this data is necessary of course before the investigation can proceed to the study



SYSTEM A AREA, FRASER RIVER WATERSHED

FIGURE 1

of the actual fisheries problems associated with System A.

The following report was prepared for the purpose of recording the basic biological data collected during 1959-60 on the salmon runs to the streams in System A. A program describing the biological surveys scheduled for 1961-1962 is also included in the summary.

DESCRIPTION OF THE 1960 INVESTIGATION

For the fisheries investigations one full-time biologist and one full-time technician were engaged early in 1960, and one full-time technician was employed later in July. In addition to these personnel, eight part-time employees were employed in 1960 for varying periods of time to assist with field work.

The field investigations commenced in 1960 with a study of the migration of juvenile Chinook salmon at two main points within the System. Traps designed to capture young salmonids were installed during May near the mouth of the Clearwater River and in the Fraser River about 20 miles upstream from Prince George. The latter trap was removed at the end of August while the former was operated till early November. A limited amount of young fish-sampling was performed in other rivers and streams by means of small fyke nets.

In addition to sampling the young fish, spawning ground surveys were commenced in mid-summer by teams of two men stationed at each of the areas in the upper Fraser River, centering around McBride and on the upper Fraser-McGregor-Bowron Rivers, and on the Quesnel River system.

Complete ground surveys of all watercourses within these

vast and remote areas were, of course, not possible but many miles were travelled in vehicles, on foot, in riverboats, on horseback, and in aircraft. During the period from mid -August to mid-October a total of 109 hours were flown in helicopters, over most of the major rivers and streams within the System under study. Approximately 5,000 air miles were logged, for the most part just above tree-top height at air speed from 20 to 60 m.p.h. As a result complete coverage of known salmon spawning was obtained, and actual counts of spawners, at the time of the flight, were made in most instances.

Sampling adult migrant salmon in the main stem of the Fraser River in reaches downstream from McBride and Hansard by means of drifting gillnets met with little success but fixed gillnets captured small numbers of salmon near the mouths of the Bowron and Torpy Rivers.

Collections of physical data on river water temperatures were made at four points within the System by means of Taylor Thermograph Recorders. To avoid duplication of these data collections, prior consultations were had with staff members of the International Pacific Salmon Fisheries Commission, who are also obtaining records of river water temperatures.

RESULTS OF THE 1960 FIELD INVESTIGATION

Time of Migration and Spawning -Chinook salmon enter the Fraser River during all months of the year and are caught commercially in the River from February through December. In the same lower-river commercial fishing areas, coho are taken mainly from July through December. At present, knowledge concerning the precise times of passage of the various

runs of each species to their respective spawning grounds within the River system is unknown but information describing the approximate time numbers of each species may spend on the spawning ground is more readily obtainable. Department of Fisheries Protection Officers annually report estimates of spawning escapement, timing and other information on most salmon spawning streams in B.C. These reports for the past ten years have been examined for the entire Fraser River by spawning ground sub-districts and the information concerning time of spawning is shown in Table 1. The average times of the start, peak and end of spawning for each species for each spawning stream reported within each sub-district are given. Also indicated are the number of years between 1951 and 1960 upon which the averages are based.

Insofar as the data permits, the day of the month is indicated in the average. In some cases, however, only the month indicating the start, peak or end of spawning is given and in a few instances the early, middle, or late time of the month is indicated by the corresponding bracketed letter suffix. In Table 1, column 5, the number of years within the ten years of record upon which the average time of the start, peak and end of spawning are indicated. Information on timing for Chinook salmon in some of the Upper Fraser river area streams is based on 1960 Fraser River Board findings.

Distr ibution of Spawning - During the helicopter reconnaissance carried out in the fall of 1960, many waterways were surveyed which were already known as spawning areas for salmon, and numerous areas were covered with the intent of gaining more knowledge on the temporal and spatial

distributions of salmon spawning.

As a first reference to salmon spawning streams located in System A, an index is given in Table 2. This list is complete in so far as present knowledge on species occurrence is concerned, and will be revised upon further findings.

The stream descriptions immediately following have been prepared primarily from observations made during helicopter flight. They essentially describe most areas flown in 1960. In flight observations made on physical features of streams, as they may apply to requirements for salmon spawning, are difficult to assess, since stream gravel size and composition, velocities, conditions and effects of silting etc., are the observers impressions of what may constitute good or poor spawning ground. However, direct observations on fish obviously holding in a given stream area and carrying on pre-spawning activities would indicate positive evidence for spawning. Many miles of streams were flown which appeared to represent excellent and/or poor spawning ground features, but which contained no salmon at time of survey. While it might be reasonable to conclude that in the less suitable appearing stream areas surveyed that no salmon spawning would occur, it should not be judged categorically the case in otherwise excellent appearing but presently reported barren areas. This latter point is mentioned since both Chinook and Coho, unlike other salmon species such as sockeye salmon, are not characteristically present as large spawning groups is fairly distinct and somewhat more restricted spawning areas.

The following notes then, describe the coverage given by helicopter in 1960, together with approximations to probable spawning distribution. Streams are presented in groups as those occurring in

the Upper Fraser areas above Prince George, the Quesnel River area, and the North Thompson River areas in this order. Live and dead counts of adult salmon obtained in spawning areas in 1960 are given in Tables 3,4,5 and 6.

Salmon River - Tributary to the Fraser River entering from the west side approximately 15 miles north from Prince George. The first aerial survey of Salmon river was made on August 19 from the mouth upstream to just below the entrance of the Merton River. On this date no salmon or redds were observed.

On September 7, the river was flown upstream for 85 miles, to about 15 miles upstream from Great Beaver Lake. The lower section of the river, from the mouth of Merton River Confluence (23 miles), is mostly medium sized gravel and apparently hard-packed. One Chinook was seen about 5 miles below the Merton River but no redds were located. The section of the river between the Merton and Muskeg rivers contains little gravel suitable for spawning. For the most part the river passes through mud banks and drains immediate swampy areas. One live Chinook and no redds were observed in the section of river near the southern most reach (8-10 miles upstream from the Merton River). In the Salmon river within a $\frac{1}{2}$ mile of the confluence of the Muskeg river, there are some small patches of gravel. In this area two live Chinooks and several redds were observed. The 20-mile section of the Salmon river between the Muskeg river and Great Beaver creek is mostly swamp drainage and appeared to contain little spawning area. Upstream from the Great Beaver Creek- Salmon River confluence for fifteen miles to the upstream limit of the reconnaissance flight, the stream bottom varies from fine sand and gravel to mud. Three live Chinook salmon and several spawning redds were seen.

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Great Beaver Creek is approximately two miles in length, is mud-bottomed and swampy except for several hundred yards of fine sandy gravel near its juncture with Salmon River. Stream visibility was good but no salmon were observed.

Stuart River - Tributary to the Nechako River and drains Stuart Lake. Surveyed for 10 miles on September 7 from lake outlet downstream to one-half mile below Dog Creek. Presence of Chinooks was confirmed by observing eight fish "finning" in the dark, murky water. Redds were observed one -half mile below Dog Creek, above the upstream end of a small island, and again above a small island approximately three miles up from Dog Creek. Two dead Chinooks were seen in this area.

Willow River - Tributary to the Fraser River entering from the right bank approximately 20 miles north from Prince George. Flows north approximately ninety miles from its head-waters at Jack of Clubs Lake, near Wells, B.C. The lower 30 miles of Willow River, which was extremely muddy, was first flown on August 19, at which time several Chinooks were observed about two miles downstream from the lower Willow River canyon and the proposed new highway crossing.

On September 8 and commencing about 3 miles downstream from the mouth of the tributary stream Georges Creek (35-40 miles from mouth), the Willow River for the next 20 miles upstream was observed to be very muddy but apparently flowing over an all gravel bottom. The next 12 miles of river proceeding upstream would appear unsuitable for salmon spawning (about six miles upstream and downstream from the mouth of Stephanie Creek the Willow River is mud-banked and swampy). The 2 miles of Stephanie Creek draining Stony Lake has an all mud bottom. Stony Lake

contains swampy colored water; the lake edge is comprised of all large stones for its 10 mile perimeter. The inlet stream to Stony Lake from Stephen Lake is also muddy and appears unsuitable for salmon.

It is considered that much of the silt carried downstream by the Willow River originates from the swampy valley area centering around Stony Lake and Stephanie Creek, and possibly also from further upstream to headwaters at the Jack of Clubs Lake.

Jerry Creek - A small tributary of Willow River, flows north, enters west side of Willow River at about 50 miles from Willow River mouth. About 1½ miles of Jerry Creek was flown. This clear water stream is about 20 feet in width with gravel bottom. Salmon were not observed.

Nevin Creek - (Aug. 26) A small tributary entering the Fraser River from the north side, upstream from the confluence of the Raush River with the Fraser, and just north of Raush Valley railroad station.

Nevin Creek, two miles from the highway bridge to its mouth, was only possible to cover by air. The stream is small, heavily overgrown and in the lower section are numerous beaver dams. Visibility was poor. Chinook salmon were observed below the highway bridge by ground personnel.

Fraser River - From McBride upstream to Rearguard Falls the river was flown August 27 at reconnaissance height. Salmon were observed only at the Tete Jaune spawning ground on the Fraser near the confluence of the Fraser and McLennan rivers. Visibility was poor throughout most of the river but was fair however at the Tete Jaune spawning ground which is located in 1½-2 miles of main Fraser River near McLennan-Fraser confluence.

On September 6, two circuits of the Tete Jaune spawning area were made. Visibility was poor to fair. Live and dead counts of Chinook spawners are given in Table 3 .

On August 25 the Hansard-McBride reach of the Fraser River was flown at reconnaissance height. The shallow bars were the only areas where the visibility was fair.

Holmes River - (Locally called the Beaver River). Inclement weather on August 26 permitted flying only about 6 miles of this tributary of the Fraser River, which enters from the north at about 6 miles upstream from McBride, B.C. Salmon were seen above the highway bridge and below the 2nd rapids (about 4 miles from mouth). A landing was made to contact ground survey personnel, at which time a live, completely spawned out female Chinook salmon was removed from the stream for sampling purposes. Stream visibility was fair to good.

The river was surveyed on September 6 from its mouth to a point approximately 30 miles upstream. There are two small falls and rapids within 4 to 5 miles of the mouth. The stream bottom is composed of gravel for at least 20 miles. On August 26 the lower 6 miles of river only were flown and it was judged, from examination of a live Chinook taken from the stream, that spawning was completed by this time. On September 6, the furthest upstream limit on the occurrence of Chinook salmon was about 15 miles, or approximately 2 miles upstream from the mouth of the tributary, Chalco Creek. (The latter is a typical mountain stream and was considered unsuitable for salmon).

The one Chinook salmon sighted at this point on the Holmes River, appeared to be near death and was passively moving downstream. No salmon redds were distinguished from the air further upstream than 6-7 miles from the river's mouth. Visibility was good.

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Morkill River - Tributary to the upper Fraser River, enters the north side, near the C. N. R. Stations Loos and Crescent Spur. The Morkill River was very turbid on September 5 and visibility was poor. The stream was flown from the mouth to about 5 miles upstream beyond the junction with Cushing Creek. (Cushing Creek was flown for about 3 miles to an impassable falls). An impassable obstruction consisting of a 50 ft. falls is located on the Morkill River approximately 2 miles upstream and downstream from the tributaries, Cushing and Forgetmenot Creeks. On the Forgetmenot Creek an impassable falls is located just downstream from its tributary, Wallop Creek. Generally, the Morkill River contains a gravel bottom for more than 15 miles, or from the mouth to about one mile below the junction with Forgetmenot Creek. Presence of Chinook salmon was confirmed by ground party on September 13-15, during a horseback trip to 15 miles upstream.

Goat River - Main tributary of the Fraser River entering from the south near the C. N.R.Stations of Goat River and Rider. The 6-7 miles from the mouth upstream to where Killam and Bounding Creeks enter was surveyed on September 5. This section contains all gravel which looked suitable for spawning purpose. Immediately below these tributaries and where the parent stream enters the Trench and about 5 miles from the Fraser River there are two short canyons with rapids. These canyons would appear to be passable to salmon. Visibility was excellent in this clear running stream.

The upper section of the Goat River was flown on September 6 to the confluence with McLeod Creek (15 miles above section flown September 5). Throughout this section, which flows through a deep valley surrounded by high mountains, the river is swift flowing over large gravel and boulders and is clear. There appears to be little suitable spawning area in the

in the Upper Goat River.

North Star Creek - Surveyed on September 6 for about one mile from mouth and junction with Goat River (flows almost due north). This is a clear, fast flowing mountain stream with little gravel and would appear unsuitable as a spawning stream.

Milk River - Major tributary of the Goat River. Surveyed upstream approximately 15 miles, or about 5-6 miles from headwaters. There is a minor falls obstruction near the mouth and a series of rapids and a rough boulder section for about the first 7-8 miles. Above this the valley opens and the river passes through mountain meadows; the stream bottom here is mostly medium to small size gravel, for 6-8 miles.

McLennan River - Tributary of the Fraser River, entering from the south about 2 miles east from the Tete Jaune C.N.R.station. Surveyed on September 6 from mouth to 15-18 miles upstream to impassable falls on the easterly flowing section, 5-6 miles upstream from the confluence with Swift Creek. Suitable spawning areas are located for about 2 miles above and below the Swift River confluence, near Valemont, B.C. The lower section of McLennan River consists of a mud and sand bottom.

Swift River - Tributary to McLennan River, flows westerly near Valemont,B.C. Surveyed on September 6 from McLennan-Confluence to 2 miles above rail and highway bridges. Extent of possible spawning area 2½-3 miles; with the upstream limit one-half mile upstream from the road and railway bridges. Further upstream for two miles there are canyons with boulders.

Seebach Creek- This lower tributary of the McGregor River was flown August 19 from its mouth up the main stem creek and north and south forks for about 20 miles. Chinook salmon were seen at various points throughout the main river and north fork, and for about 3 miles in the south fork.

Visibility was excellent. Seebach Creek is fairly small, about 25-50 feet in width in the lower reaches. The bottom is comprised of gravel throughout the length of the Creek. Local reports by trappers indicate that ground travel is difficult, which opinion was confirmed by flying over this rather winding stream with much windfall in the lower basin areas.

Ollson Creek- The lower two miles of this creek were flown on August 19 to its common mouth with Herring Creek. Visibility was not good, due mainly to the late-afternoon light conditions. No salmon were observed, nor opinions formulated regarding its potential as a salmon stream.

Bowron River - This rather large river was flown August 19 from a point near Basket Canyon to its mouth a distance of 25-30 miles. The lower reach was difficult to observe but the general impression received was that it is not a spawning area. In many places the banks were mud.

The Bowron was flown upstream on August 20 from near Tenaskli and Saw Creeks to Bowron Lake, 50-60 miles. Salmon (both Chinooks and sockeye) were observed throughout. For Chinooks it is judged that spawning distribution ranges from several miles below the confluence of Haggen Creek to Bowron Lake, with more spawning in the upper reaches.

Haggen Creek - Tributary of Bowron River. The stream was flown on August 20 from mouth to 15 miles upstream or 3 miles below Dominion Creek. A few Chinook salmon were observed spawning. This creek flows crystal clear, gravel is plentiful but interspersed among large gravel and boulders. About 8-9 miles from its mouth are two canyonous areas. A few Chinook salmon were sighted in the lower section of the creek.

Unnamed Creek - Tributary to Haggen Creek - Enters Haggen Creek at a point approximately two miles upstream from its confluence with the Bowron River. The stream flows south and drains from Pinkerton Lake. About two miles from its mouth, a small tributary enters from the east,

on which an impassable falls is located just above the junction. Upstream from the junction the unnamed creek ascends steeply through a mountain pass to Pinkerton Lake. Visibility was good in lower two miles. Chinook salmon were observed on August 20, ½ miles from mouth.

Slim Creek- Originates just east from Pinkerton Lake and flows north, east and again northerly to its juncture with the Fraser River at a point directly south from Guilford station. The creek was surveyed on August 20 downstream from headwaters through contiguous Tumuch and Slim Lakes to Everett Creek confluence, or approximately 15 miles. Visibility fair to good in upper sections, below Slim Lake tall trees to stream margins hinder good stream visibility from the air. Evidence was obtained of heavy spawning between lakes and below Slim Lake to Everett Creek. Chinook salmon were sighted in the latter section.

Slim Creek was flown on September 5 from Tumuch Lake downstream to approximately 10 miles from mouth . Stream bottom in the section of the river below the Everett Creek confluence contains mostly boulders and large gravel. Chinook salmon were again observed below Tumuch Lake for several miles.

Indianpoint Creek - Tributary to Bowron River. The creek was flown on August 20 from mouth to approximately 3 miles upstream from Indianpoint Lake, or 20 miles. Chinooks were observed in a three mile section below Indianpoint Lake.

The spawning area was reflown on September 5 and, in addition, a small unnamed creek which enters Indianpoint creek near the lake outlet was flown upstream for about one mile, but no Chinooks were observed.

Antler Creek - Tributary to Bowron River. The stream was flown on August 20 for three miles from Bowron Lake highway bridge to Bowron River.

Antler Creek enters Bowron River just below the outlet of Bowron Lake. It joins with Summit Creek about one mile below the bridge and for about ½ mile each stream shares a common channel. Downstream from this, to Bowron River, the streams separate with each channel meandering through heavy overgrowth to Bowron River. No salmon were observed on this survey.

Chinooks were observed September 5 in the section of Antler Creek near the highway bridge. Only a partial survey was made this day due to snow flurries occurring en route from Quesnel to the Bowron River and McBride.

On August 23 aerial coverage was given to lower McGregor River tributaries and the upper Torpy River as follows:

McGregor River - From mouth to approximately 40 miles upstream to juncture with Pass Creek. (Pass Creek enters from the south about 5 miles downstream from Gleason Creek.)

Herrick River - From McGregor-Herrick confluence to impassable Herrick Falls, approximately 20 miles. Visibility was poor in this glacial river and only two Chinook salmon were seen near the mouth of Spakwaniko Creek.

Fontoniko River - Flown from Herrick-Fontoniko confluence up main channel one mile, thence upstream over right fork 2½-3 miles to (two) impassable falls. Left fork was flown to 6 miles upstream but contains mostly boulders and no fish were seen. Visibility was good. Chinook salmon observed in right fork only.

James or Bad Creek - From Herrick-James confluence to Pacific and Portage Lakes, 11 miles. The stream bottom is gravel interspersed with boulders. About three miles from mouth are two impassable falls.

Captain Creek - This creek was flown approximately 13 miles upstream from the Captain-Herrick confluence. Two small falls 3-5 ft. are situated about 7 miles from mouth and are considered passable to salmon.

The stream bottom is gravel interspersed with boulders.

Otter Creek - Flown from mouth (McGregor-Otter confluence) to Otter Lake, approximately 9 miles. Falls, considered impassable are located about 4 miles from mouth. No salmon were seen on August 22.

Logan River - (Local Name) Flows southerly into McGregor River entering McGregor at about 38 miles upstream from mouth. In this good gravel clear flowing stream a series of six-foot impassable falls are located about 3 miles upstream from Logan mouth. No salmon were seen on August 23.

Pass Creek- (Local Name) Flows N. E. and enters McGregor River upstream approximately 3 to 5 miles from Logan River. Surveyed from McGregor-Pass Creek confluence to 5-6 miles upstream to where Pass Creek becomes a swampy and confused drainage. The stream bottom is fine gravel and sand and no salmon were seen on August 23.

Pass Lake and Connecting unnamed Stream flowing into the Torpy River - Located to the north of the westernmost u-shaped bend of the Torpy River. Survey route followed from Pass Creek pass through the McGregor mountains to Pass Lake and one-half mile of river flowing southerly to join with the Torpy River. Pass Lake is approximately three miles long, $\frac{1}{4}$ to $\frac{1}{2}$ mile wide and extremely shallow, especially toward the southernmost end. The exit stream $\frac{3}{4}$ mile long, is mud-bottomed and with broken channels near its confluence with the Torpy River.

Torpy River - Only the two mile section between the stream mentioned last above and the next downstream tributary of the Torpy was flown on August 23. Broken patches of gravel and boulders occur. (The Torpy River rises from the McGregor Mountain Range at about 54°N.lat., 121°W.long., flows a net distance of 24-30 miles in a north westerly direction, bends sharply south and east and flows south-easterly some 50 miles to its

confluence with the Fraser River near Kidd and Urling C.N.R. stations. Locally the upper NW flowing reach of the Torpy is called Raging River. It was not flown.

Keg Creek - (Aug.23) Enters the Torpy River from the NW near the westernmost end of the U-shaped bend of the Torpy River; surveyed from Keg-Torpy confluence upstream a net distance of approximately 8-10 miles. Lower 2-3 miles swampy with fine gravel. In the upper 7 miles where Chinooks were seen the creek bottom contains med-sized gravel, moderate flow and the stream in 20-40 feet in width. (Visibility good). A logging road crosses Keg Creek near the upstream limit of survey and near where an unnamed tributary enters from the south. Above this road, Keg Creek is swampy.

Upper McGregor River - The McGregor River originates in the Rocky mountains and flows a net distance westerly some 125 miles to its confluence with the north side of the Fraser River above Hansard Lake. About 2½ miles above the confluence of the Herrick and McGregor Rivers the McGregor River emerges from a high-walled slate canyon which is approximately 2 miles in length. Through this restriction the glacial silted waters of the McGregor are extremely turbulent, non-navigable but believed passable to adult migrant salmon. (This last opinion is similar to that of Insp. J. Kew in his report of the McGregor River for 1945). The upper McGregor River is considered to be that portion upstream from this canyon.

J. Kew

Above the canyon, the McGregor River was flown on August 24 for a distance of approximately 40-50 miles to the mouth of Kitchi Creek. Throughout the reach the river varies from 50 to 100 feet in width; is confined largely by mud and clay banks and is turbid with glacial melt.

No evidence of salmon was obtained on this survey to the upper McGregor and tributaries.

Gleason Creek - Tributary to upper McGregor River entering from the north. Lower mile section gravel, low water flow. Commencing at the first forks (2 miles upstream from mouth) the main creek channel flows from the east -- for three miles upstream from the forks are boulders and intermittent rapids. Above this for 3 miles the creek passes through mountain meadows and the stream bottom is gravel. Just upstream from where the creek makes its second main forks are impassable fall obstructions on each channel.

Jarvis and Kitchi Creeks - Tributaries to upper McGregor River entering from the north. Both these streams were extremely glacial and were not flown. The mouth of Kitchi Creek is a broad flood plain with several channels and many isolated large gravel bars and boulders; possibly of unstable flow and not suitable for salmon spawning.

Walker Creek - Tributary to the Torpy River entering the Torpy River from the northeast. Goodson Creek flows south and enters Walker Creek approximately 6-7 miles from Walker Creek - Torpy River confluence.

A short section of about one mile of lower Goodson Creek was flown August 24 while enroute south to the Walker and Torpy Rivers from the McGregor River. It appeared unsuitable for salmon. On Walker Creek, for about one mile above the confluence of Goodson Creek, the creek bottom is bouldery. One-half mile below the Goodson-Walker confluence, Walker Creek flows south and there is 3-4 miles of apparently suitable spawning gravel which ends where the creek changes its flow to the east and 1½ miles before joining with the Torpy River. Visibility Walker Creek -- fair-good.

Torpy River - Tributary to the Fraser River entering from the north.

The lower section of the Torpy River below the Walker-Torpy confluence was not flown because it was impossible to see into the stream's turbid waters.

Reconnaissance on August 24 over the Torpy River was made upstream from the Walker-Torpy confluence to Keg Creek, a straight-line distance of approximately 30 miles. In the first 15 miles upstream the water was muddy and visibility poor. In the upper 15 miles below the Keg-Torpy confluence the water cleared slightly, but visibility was generally poor. The Torpy River valley is several miles wide and parallels the Fraser River valley. The river meanders continously throughout this reach, and tributary streams are minor. In the lower 15 miles a number of sightings were made of "red-like-diggings", but no salmon were seen until the water began to clear at a point about 15 miles upstream where Chinooks were observed to be present in the stream to the Keg-Torpy confluence.

Quesnel River - Surveyed on September 1 for 3 miles upstream to Quesnel Forks - visibility poor.

North Fork Quesnel River - (Cariboo River) . Surveyed from Quesnel Forks to Cariboo Lake - visibility poor.

South Fork Quesnel River - Surveyed on September 1 from Forks to Quesnel Lake - visibility poor-fair. Chinook salmon were seen only near the Likely Bridge where there are pools and quiet water areas.

Spanish Creek - Surveyed on September 1 from Spanish Lake to confluence with north fork of the Quesnel River. A steep stream gradient occurs upstream from Spanish mouth and it is not likely salmon would ascend.

Keithley Creek - Stream enters Lake forming alluvial fan. From mouth 3/4 mile is an impassable falls. The mouth area contains gravel. No salmon were seen , September 1.

Little Horsefly River - Surveyed September 1 from mouth to Horsefly Lake. Excellent gravel bottom in most of river.

Horsefly River - Surveyed on September 1 from mouth at Quesnel Lake to impassable falls 2 miles upstream from the junction of McKinley Creek. (Visibility variably poor-good). Most Chinook salmon spawning occurs in the several miles below the Horsefly River Falls.

McKinley Creek- Tributary of the upper Horsefly River entering from the south; drains McKinley, Elbow and Bosk Lakes. Mostly gravel bottom in the sections of the creek up to and beyond McKinley Lake for about 5 miles. Some 4 miles of McKinley Creek below the outlet from Bosk Lake drains swampy country and several beaver dams were seen. (Visibility good in water but hampered by dense marginal stream vegetation..) Chinook salmon were seen in McKinley Creek, below McKinley Lake to mouth on September 1.

Penfold Creek - Flows east and empties into Mitchell Creek about ½ mile to the north of the North Arm of Quesnel Lake. The stream was flown on September 2. Approximately 3½ miles upstream from the mouth of Penfold Creek is an impassable falls. The lower mile is muddy, the stream to the falls has a fine sand and gravel bottom and the water is clear. No salmon were observed on September 2.

Mitchell River - Flows south, drains Mitchell Lake and empties into North Arm Quesnel Lake; approximately 8-10 miles in length. Below Mitchell Lake for about 2 miles are a series of rapids and an impassable falls. The lower several miles to Quesnel Lake is mud-bottomed and greatly meanders through marshes. The mid-section of 4-5 miles has some fine and medium sized gravels . Visibility good over gravel sections. No salmon were seen on September 2.

Cameron Creek - Tributary to Mitchell Creek, entering the latter from the northwest at about midway between Mitchell Lake and the north arm of Quesnel Lake. A series of impassable falls (5-25 feet) occur about one mile upstream from the mouth. Below these the creek bottom is medium sized clean gravel. No salmon were seen on September 2.

Matthew River - Tributary of the Cariboo River, flows westerly and passes through Ghost Lake. Falls at the outlet of Ghost Lake and below are approximately 40-50 ft. in height. Below the falls to Cariboo River for approximately 12 miles, the mean stream width is 50 ft., the water is generally turbid and there are considerable gravel bars which may be suitable for spawning fish. This tributary of the Cariboo River is above the Cariboo Falls and Lake.

Cariboo River - (Between Sandy and Cariboo Lakes). From the impassable falls located below Sandy Lake the river was flown on September 2 to just above the juncture with Cariboo Lake. There are a series of rapids a mile or two below the confluence of Matthew Creek; below these the river flows through many islands, is quite turbid and there appears to be ample spawning gravel. No fish were seen.

Little River - A clean, clear tributary of the Cariboo River entering from the east side just above Cariboo Lake. From the mouth for a distance of about 6-8 miles the river bottom is comprised almost entirely of apparently clean gravel of medium size. The first main tributary which enters Little River from the north has impassable falls $\frac{1}{2}$ mile from its mouth. Commencing at a point 3 miles downstream from where tributary Ishklo Creek enters, there are rapids and the stream bottom becomes quite boulder filled. The survey on September 2 did not proceed upstream of the Ishklo - Little River confluence. Stream visibility in Lower Little River is excellent.

Grain Creek - Enters the lower eastern end of the north arm of Quesnel Lake. This stream was observed on September 2 from the air only near its mouth, which appeared to contain some gravel. The stream gradient from the lake is very steep and suggests it might be restrictive to fish passage. Clear water, visibility good near mouth.

Moffat Creek - Tributary of the Horsefly River entering from the south side near the town of Horsefly, B.C. A small, marshy type creek with little gravel. Passable to fish from mouth to 4-5 miles upstream , but none was seen.

(September 11 - From Quesnel enroute to Clearwater a second aerial survey was made over: The Horsefly River mouth to Horsefly Village, Little Horsefly River, Quesnel River at Likely).

Clearwater River - Helicopter surveys were made over the Clearwater River on September 13, 27, and October 13, 1960. Live and dead counts of Chinook salmon are given in Table 5 . On November 15, a ground party observed five fish in the Clearwater River, near Whitehorse Bluffs, and on November 17, fifteen live and eleven dead fish were observed from fixed wing aircraft in various parts of the river (Table 4). These were believed to be coho salmon, but recoveries of live or dead specimens were not possible, hence species identification remains unconfirmed.

The September 13 flight included coverage of the upper Clearwater from Clearwater Lake to Sundt Falls. No salmon were observed, although about one mile of the Clearwater River, before it flows into Clearwater Lake, appears to contain good spawning ground. Subsequent flights to this upper Clearwater River section, at the time of peak Chinook salmon spawning later in September in the lower Clearwater River, or later in November when coho salmon might be present, were not performed due to other required flight scheduling.

Distribution of Chinook salmon spawning in the Clearwater River in 1960 can be described as the section of river from just below Hemp Creek to Horseshoe Falls, or, 18-20 miles of river. The best spawning ground, evidenced by the greatest concentrations of spawners, was in the Whitehorse Bluffs area for about 4 miles and in the Horseshoe bend area or for about 3 miles of river. Chinook salmon also spawned in the Mahood River, from its mouth to Goodwin Falls. Some spawning also takes place in the Clearwater River from its mouth to several miles upstream and possibly in other sections of the river in more or less isolated gravel bars in swift or "white" water where visibility is poor.

North Thompson River - Helicopter flights were made over various parts of the North Thompson River on September 12, 13, 14, 26, 27, and October 13. The area covered was from the river mouth at North Kamloops to approximately 190 miles upstream to near its headwaters at Stormking Creek. Reference to sightings of salmon were made earlier in this report; these may be found in Tables 3 and 6.

Both Chinook and sockeye salmon were seen holding over gravel at various points within the North Thomson, from Kamloops to Clearwater, with the greatest numbers seen in the river section from Chu Chua to Clearwater (See Table 6). All sightings were made in river margin areas or near mid-channel shallow bars. Total spawning, therefore, is impossible to assess but timing of spawning is indicative from the observations obtained in 1960.

Aerial coverage was given to the following tributaries of the North Thompson River occurring between Kamloops and Clearwater.

Fishtrap Creek - Flown on September 14 for about one mile upstream from mouth. Large gravel and boulders, low water flow.

Louis Creek - Flown upstream on September 14 from mouth to about 10 miles. Dense stream marginal vegetation precluded good aerial observation.

Barriere River - The Barriere River was flown on September 14 and 26. Most of the Barriere River to North Barriere Lake contains spawning ground area. The second flight indicated the area for several miles below North Barriere Lake received the most Chinook spawners in 1960. Tributary streams to North Barriere Lake, Harper and Fennel Creeks, were surveyed. The latter creek, in a 4 mile section up from the Lake has some sections of finer gravels and sand. Harper Creek in 1½ miles to its mouth which is located near the outlet of Barriere River, contains medium size gravel. No fish or evidence of spawning were seen in these creeks, but it is likely some sockeye utilize parts of Fennel Creek.

East Barriere River - Three miles to East Barriere Lake were flown on September 26. Visibility was poor due to heavy overgrowth and near East Barriere Lake much debris and logs are in the river. Chinook spawning may occur in the lower section of this east fork of the parent Barriere River, where some gravel sections were seen.

H aggard Creek - This is a smaller tributary of the Barriere and drains South Barriere Lake. It was not flown, except over the lower 2 miles where it was found impossible to see into the stream because of heavy overgrowth.

Lemieux Creek - Enters from the west near Little Fort. This creek does not lend itself to good aerial observation for fish, but was flown on September 13 for several miles upstream, where a pair of Chinook salmon were observed spawning. An impassable falls is reported to be located about 5 miles from mouth and above which there are no spawning grounds. Coho also spawn in Lemieux Creek, fry being captured there in May 1960, by our staff.

Mann Creek - Enters from the west about 6 miles downstream from the Clearwater- North Thompson confluence. About 2 miles are accessible to fish, the Creek below the highway bridge to the mouth for about 1 mile is the portion in which Chinooks are reported to utilize for spawning in some years. No fish were seen on September 13.

Joseph or Boulder Creek - This stream was flown on September 13. Enters from the east about 5 miles upstream from Little Fort and drains Dunn Lake. The creek contains large gravel in lower 2 miles flown. Chinooks have been reported in this creek in past years. Dunn Creek, the short stream draining Dunn Lake, could not be seen from the air because of trees.

Following the Board's re-interest in the Otter Creek dam site, the North Thompson River, from Clearwater junction to Stormking Creek was flown at reconnaissance height on September 12, and sections of it below Blue River were flown on October 13. As mentioned earlier, evidence of spawning was observed near Messiter, below Porte D'Enfer Canyon. Additionally, reports from Fisheries Officers and others indicate a sport catch of coho and Chinooks, near Birch Island and in the vicinity of Porte D'Enfer Canyon or Little Hells Gate.

No fish were seen on September 12 in the upstream areas above Clearwater to near headwaters or in any tributaries including the Albreda River. Visibility in the main river was generally bad and our early visitation (with respect to time of spawning in the Clearwater River) is noted. A general description may be made from observations taken during the September 12 flight over the upper North Thompson River and tributaries above Clearwater as follows:

Clearwater to Vavenby

Approximately 15 river miles. Some good gravel sections below Birch Island to Clearwater. Coho reported caught by sportsman near Noble Quartz Creek in November 1960. Ten tributaries all of small size with the exception of the Raft River enter this reach of the North Thompson. Raft River has impassable falls about three miles from its mouth, and supports sockeye and Chinook salmon runs. Some of the other tributaries are locally reported to carry a few coho in some years, but the numbers are probably few due to the small size and access of each Creek.

Vavenby to Avola

Approximately 26 miles of River. From Vavenby upstream to about 3 miles above the confluence of Otter Creek, the North Thompson appears to contain mostly boulders and rapid water sections (A wire crossing the North Thompson river, 50' elevation, is located about one mile below the mouth of Otter Creek.) Below Avola for about five miles the North Thompson widens to 500-700 feet in places, and appears to contain sand, mud and gravel bottom. Twenty salmon redds were counted in the river bottom at Avola. In the Vavenby-Avola reach of the North Thompson River, the main tributaries are Reg Christie Creek, Mad River and Otter Creek. Reg Christie Creek has an impassable falls near its mouth but supports a few Chinook and/or coho salmon in some years. Mad River has a steep gradient and many boulders near its mouth and is considered impassable to salmon. It was not flown. Otter Creek was flown for about 2 miles upstream on September 12. Commencing about 1/4 mile from mouth is a canyon; Helicopter flying was difficult but the creek appeared to have rather low water flow and many large boulders. Appears unsuitable

for salmon except in the lower creek section near its mouth.

Avola to Blue River.

Approximately 25 river miles. Below Porte D'Enfer Canyon (which runs for about two miles in length near Messiter and has two rapid flowing points at either end) and below Finn Creek to just below the mouth of Lion Creek, the North Thompson contains gravel bars in which 12 salmon redds or nests were counted on October 13. Above the canyon to Blue River the Thompson has some gravel sections, some mud banks and some bouldery reaches. The tributaries, Lion Creek which is passable to salmon for about 1/2 mile supports coho runs; Finn Creek, in the lower three miles, supports both Chinook and Coho; Cayuse Creek appears unsuitable for salmon and Froth Creek has impassable falls near its mouth but could accommodate fish below these.

Blue River to Headwaters Near Stormking Creek

This section of the river is approximately 46 river miles. Blue River enters the North Thompson from the west near the Village of Blue River. From the mouth upstream the Blue River contains about 7 miles of excellent gravel; on September 12 and October 13, the water was clear and one salmon redd was seen near the mouth. A 40' impassable falls is located in Blue River, just above the confluence of Cedar Creek or about 8 miles from its mouth. Cedar Creek was flown for about 4 miles and found to contain mostly fine sand and gravel, and beaver dams.

North Thompson from Blue River to Thunder River

This section of the stream contains mixed gravel and boulders. Hellroar Creek, a tributary located about 10 miles north of Blue River town, has an impassable falls near its mouth. Thunder River

is a tributary located approximately one mile upstream from Hellroar Creek. From the mouth to highway bridge crossing (about one mile) are some good gravel sections and large boulders; upstream for the next two miles are rapids and small falls; further upstream for 3 miles the valley opens and the river contains mostly gravel. At a point about 1/4 mile below the confluence of a tributary to Thunder River which enters from the south is an impassable falls (about six miles from mouth). Water slightly glacial September 12.

North Thompson From Thunder to Bone Creek

This section of the river contains gravel and sand bars. Bone Creek contains glacial materials and has an impassable falls about one mile from its mouth. Contains some gravel near its mouth.

North Thompson From Bone Creek to Pyramid Creek.

This section of the river contains mainly sections of gravel, sand and mud. Miledge Creek was not flown or surveyed (enters from west above Bone Creek).

The North Thompson From Pyramid Creek to Lempriere Station.

This section of the river contains mainly mixed gravel boulder, and some muddy sections. Near Lempriere R.R.Station Moonbeam Creek and two other smaller creeks enter the North Thompson from the east. The lower reach of Moonbeam Creek appeared unsuitable for salmon. About 2 miles above the confluence of Moonbeam Creek and the North Thompson River, the Albreda River enters from the north. The Albreda River was flown upstream to Clemina Creek.

The Clemina is reported by local CNR personnel** to contain salmon in some years. The section of the Albreda between the mouth of Allan Creek to the North Thompson contains the best gravel and therefore the most likely spawning ground area. On September 12, the Albreda was clear. The Albreda tributaries are: Clemina Creek which has a series of impassable falls about 2 miles upstream from the highway bridge; Allan Creek enters from the west and is essentially a series of rapids for five miles from its mouth; Dominion Creek enters from the east near Gosnell Station and was extremely glacial on September 12, 1960, and was not flown.

The headwaters of the North Thompson River originate from the Columbia Mountains in the Premier Group and the river flows some 30 miles easterly to near Gosnell at which point it changes its direction of flow to the South. This upper reach of the North Thompson was flown on September 12 , to Stormking Creek, or about 18 miles. The part of the river from near Gosnell to the mouth of Lempriere Creek (3 1/ 2 miles) contains mostly medium to coarse size gravels; from Lempriere Creek to Canvas Creek (4 miles), the river meanders through a broad valley; upstream from Canvas Creek to where the flight inspection ceased at Stormking Creek (about 11 miles), the valley continues rather broad (3 - 4 miles); the river bottom consists mainly of finer gravels, sand and mud. N ear Stormking Creek the

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**Mr. Ken West, CNR Agent Red Pass Junction. "Also red fish in Summit Creek (Canoe River - Columbia River drainage) during June to mid-July". These could be Kokanee Salmon .

valley closes, alpine vegetation appears near the valley floor and the river descends steeply from the mountains.

A lumber camp is located on the north side of the North Thompson River several miles downstream from Canvas Creek, about 10 miles from Gosnell.

The tributaries of the upper North Thompson River entering from the south are:

Lempriere Creek

Mainly a rapids and boulder filled stream for about 3 miles from its mouth to an impassable falls.

Canvas Creek

Only in the lower 2 miles of main valley floor (above which would be impassable for fish), is all clean gravel bottom. The water appeared clean and clear on September 12.

Manteau Creek

An unnamed creek entering from the south between Stormking and Manteau Creeks, and Stormking Creek were not flown. These are mountain streams. One upper North Thompson tributary which enters the river from the north side, Adolph Creek was not flown.

In summary, these aerial surveys were particularly successful since many new Chinook salmon spawning areas were located. Information on spawning distribution for this species was extended by direct observation of fish in the upper Fraser River tributary streams, Slim Creek, Torpy River, Morkill River, Holmes River and in a few other smaller Fraser tributaries. Sightings of Chinooks were also made by personnel on the ground in the main Fraser just downstream from Robson Falls, which is not far distant from Moose Lake and the British Columbia-

Alberta boundary. These sightings of fish above the Tete Jaune spawning ground and Rearguard Falls, which was believed impassable to salmon, extends the upstream distribution and further indicates the widespread fresh water occurrence of this species.

For the North Thompson River, aerial reconnaissances were made over nearly the entire lehgth of the river to near the headwaters at Stormking Creek. This fairly large and often turbid river precludes good aerial observation on fish. However, in the lower reach of the river below Clearwater, spawning was observed in marginal areas for both sockeye and Chinook salmon. While it is difficult to assess total spawning in this section of river, the counts of live and dead salmon made during flights over the river suggest that the number of spawning fish is substantially large. River water conditions upstream from Clearwater are less favourable for fish observation. Evidence of main stem spawning was indicated in the vicinity of Avola and Messiter, just below Porte D'Enfer Canyon or Little Hell's Gate -- a point of difficult upstream passage for fish. Upstream from this canyonous area less evidence of salmon spawning was revealed. One salmon spawning redd seen inside the mouth of Blue River. No positive information, nor confirmation of reports by local people of salmon spawning in the Albreda River, was obtained.

Rather complete aerial coverage was given to waterways in the Quesnel River system, including a first-time helicopter survey of the region upstream from Cariboo Falls at which exists a man-made, rock-cut "fishway". In the region between Cariboo and Swamp Falls no salmon were seen, although many possible spawning grounds are contained in parts of the main Cariboo River and its tributaries , Matthew Creek and Little River.

Age of Maturity of Chinook Salmon

Information regarding the age composition of Chinook salmon for stocks within the various spawning ground areas of the Fraser River

system is scarce for several seasons. First, Chinook salmon tend to spawn in widely distributed areas within the Fraser watershed, and to some degree in the more inaccessible and deeper portions of the stream. Therefore, adequate numbers of scale samples to elucidate age at spawning are difficult, if not impossible, to obtain. Second, interpretation of scale patterns for age is confused by the nature of the early growth of the scale during the fresh and brackish water periods of the life of the fish--some fish may proceed to sea early in their first year, while others migrate seaward as over-yearlings. For scale analyses, the latter group of fish are referred to as ocean type, and the former are referred to as a stream type. Within recent years age sampling of the commercial Fraser River gill-net fishery for Chinook has been performed by staff members of the Fisheries Research Board of Canada and several points have emerged as a result of their studies which may be restated briefly here as follows. Chinook salmon runs to the Fraser River may mature at ages one through six with the predominant age being four years. (Gross examination of the escapement records for the North Thompson sub-area suggests a positive correlation between spawning in year one and in year one plus three.) Of the early season runs of red-fleshed fish sampled, approximately 2/3 were "stream" type fish of predominant ages 4 and 5. For the latter runs of the white-fleshed variety, 3/4 of the samples contained the "ocean" type fish and were mostly 4 years old.

During 1960, scale samples from 133 chinook salmon were obtained by Board personnel and Departmental Officers. These were taken from near-spawning and spawned fish in the following areas:

Upper Fraser River and Tributary Streams (24) - (Holmes River, 1; King Creek, 1; Tete Jaune ground-Fraser River, 4; Morkill River, 2; Seebach Creek,2;

Captain Creek, 1; Bowron River, 13). North Thompson River and Tributary Streams (64)-- (Raft River, 56; Lemieux Creek, 1; Clearwater River, 4; North Thompson River, 3.) Mouth of Nicola River (39). Quesnel River (6).

Scale impressions on cellulose acetate sheets have been made for these scale collections and a complete set of data have been forwarded to the Fisheries Research Board at Nanaimo, B.C. and to the Bureau of Commercial Fisheries, Juneau, Alaska. Both agencies will reply the results of their age analyses which will provide a useful comparison between interpretations of age estimates by different readers.

While it is not anticipated that large numbers of adult scale samples will be collected subsequently, collections will continue to be routine. In addition, effort will be directed toward the collection of significant samples of scales from smolts or over-yearlings in order to provide information on early growth patterns on the scale.

JUVENILE STUDIES

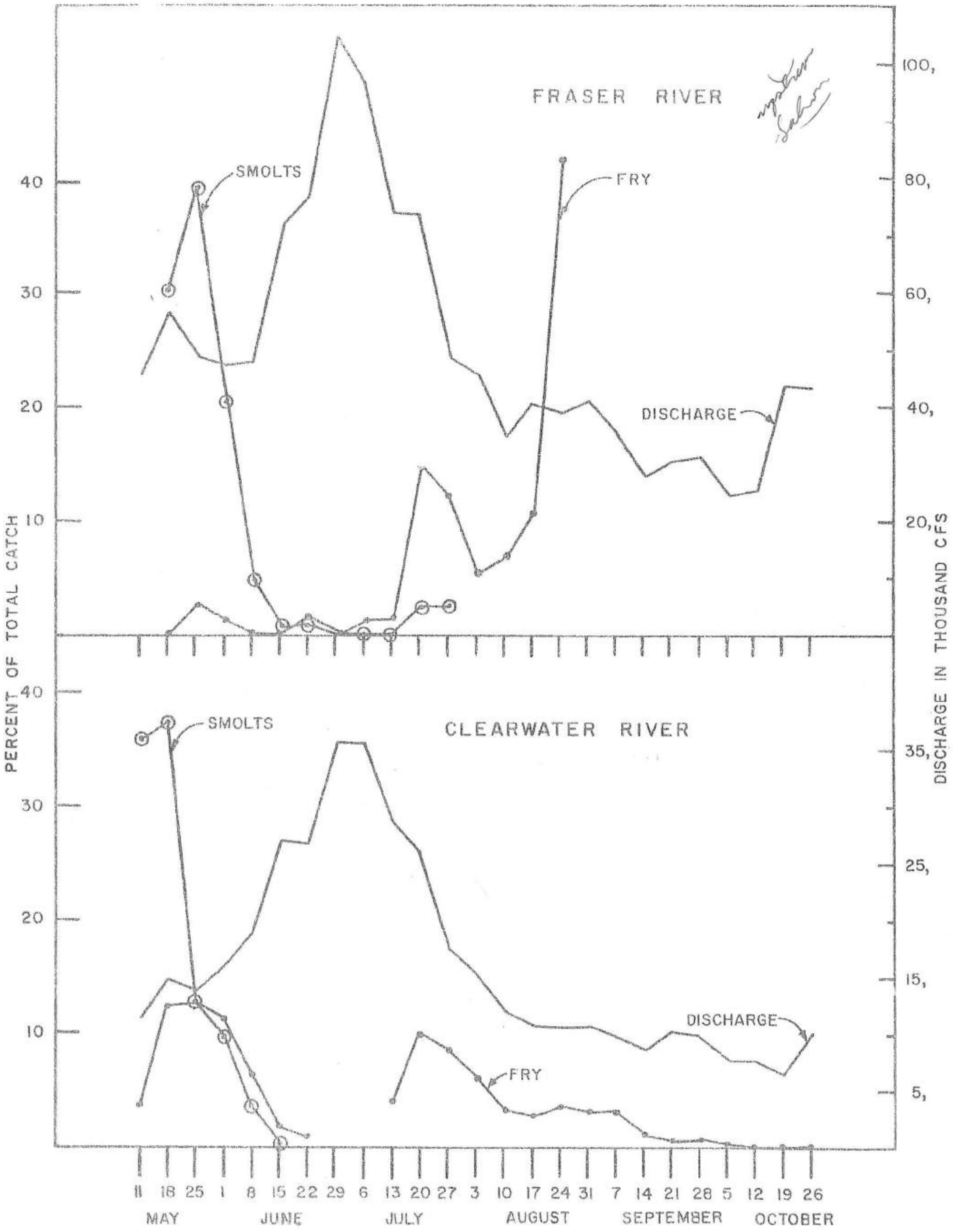
Sampling of downstream migrations of Chinook salmon was undertaken at two locations in relation to Board damsite investigations. The main purpose of sampling was to obtain information on the times of downstream migration and rearing of the young fish. Inclined-plane type fish traps were used which fish a maximum width and depth of 4', or 16 square feet of river. One trap was installed about 1/2 mile below the highway bridge in the Clearwater River, and one was installed off the west bank in the Fraser River about 1/2 mile upstream from the mouth of the Salmon River. Approximate river widths at these two points are 200 ft. and 650-700 feet, respectively. Estimated river velocities over the period of sampling ranged from 3 to 8 or 10fps. As may be seen, the

effective fishing areas of the traps at each location were very small, with the result that the small numbers of fish captured did not permit fish marking and recovery experiments designed to calculate total abundance.

Between May 9 and October 26, 1961, a total of 2,821 juvenile Chinook salmon were captured at the Clearwater River trap. No salmon were captured in the Clearwater trap after October 26 and the trap was removed from operation on November 11, 1960. At the Fraser River trap, between May 19 and August 27, 1960 (when the trap was removed) a total of 219 young Chinook salmon were caught. In each trap small numbers of other species were also captured. The records summarizing the daily catches made at each sampling site are recorded in Tables 7,8,9 and 10. At both sites the majority of the catches were made during the night -- for Clearwater at least 75% of the total number were taken during time of darkness. Because of the more severe operating conditions less sustained operation of the trap over complete 24 hour periods was performed at the Fraser Trap, but a larger percentage of captures were indicated for the dark hours.

The significance of the results obtained from the trap operations may be discussed by reference to the data summary given in Table 10, which is reproduced here as shown in Figure 2. The water discharge curves shown in each panel of the Figure were obtained from Water Resources Branch records, Department of Northern Affairs, for their guaging stations located at the Clearwater River highway bridge and their Shelley station in the Fraser River.

Insofar as young Chinook salmon are concerned, downstream migration from the Clearwater River is probably in process between early- May



YOUNG CHINOOK SALMON, CAPTURED AT THE FRASER AND CLEARWATER RIVERS IN 1960

FIGURE 2

and late-October. It is indicated that fish of the smolt stage (those spending the previous summer and winter rearing in the river) move downstream into the mainstem of the North Thompson River early in the spring and are not available for capture in the lower Clearwater after mid-June. Of the total fry or young-of-the-year, a large percentage were captured by early June. In the Clearwater River the trap was inoperative during the peak period of water discharge. However, early-period catches were declining prior to periods of peak discharge for both sampling sites.

Fraser River sampling showed that fish of the smolt stage may be taken from early-May till late-July with, presumably, more fish of this size in migration down river early in the season.

Sampling of Upper Fraser River Chinook salmon fry indicate a different pattern of catch as compared to a single river output such as the Clearwater River-- relatively fewer fry were captured early in the season. One reason for this result is that after fry emergence in the early Spring, "peaks" of fry migration would occur at sampling sites not far distant from any distinct spawning area; main river sampling at the site selected in 1960 would not reveal an early extensive exodus of fry but rather reflect the effect of mainstem rearing of young fish.

The important result of the young fish sampling studies, at both sites in 1960, is that young Chinook salmon may be in active downstream migration or rearing all months of the year.

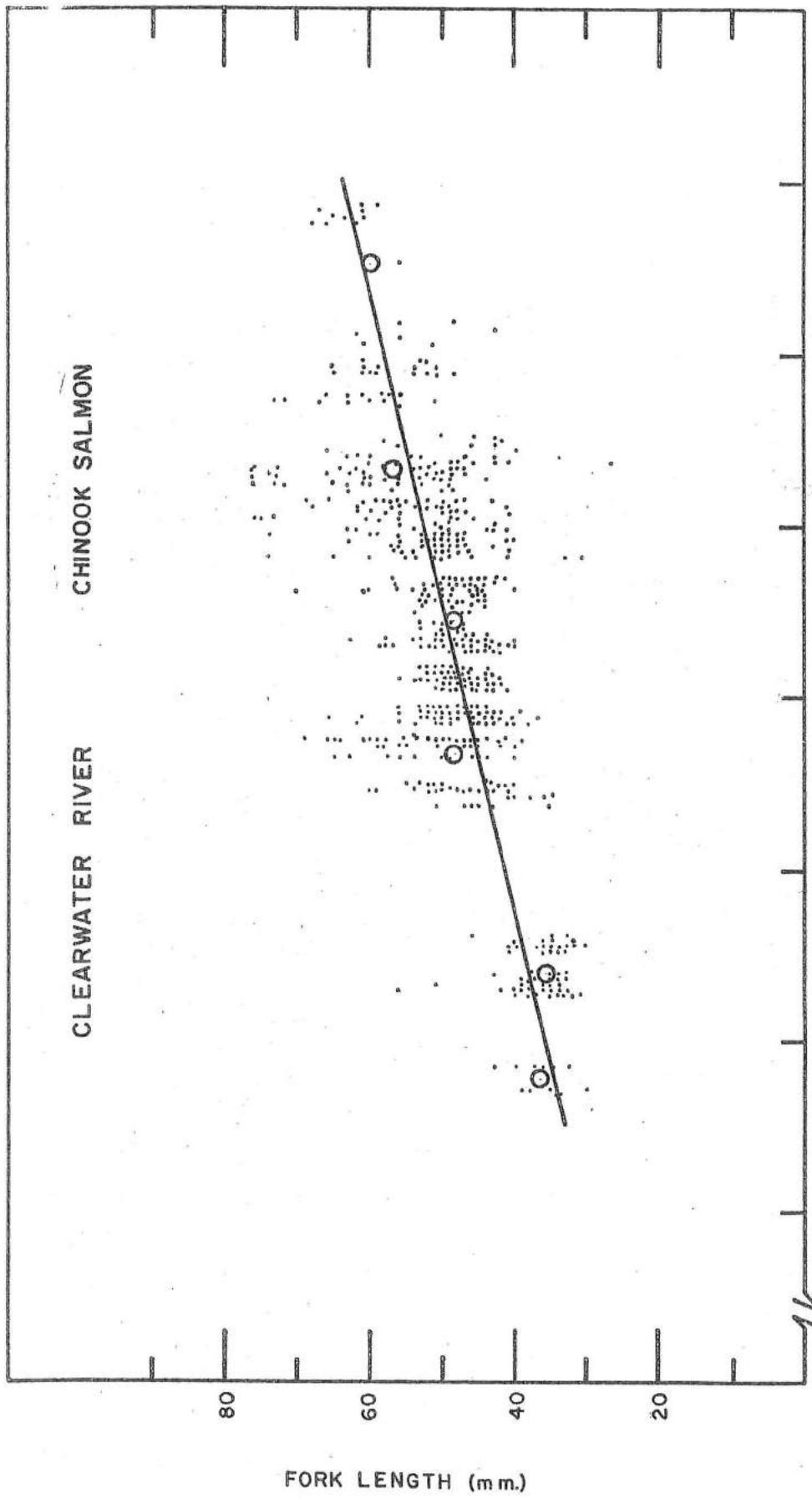
Growth of Young Chinook Salmon

During the course of the trapping operations at the Clearwater and Fraser River sites, length measurements were obtained from a number of juvenile Chinook salmon (fry--young-of-the-year, and smolts--overyearlings). Lengths were recorded in millimetres; mostly from live fish which were

released alive after measuring. Measures of fish length recorded were: Fork length, the distance from tip of snout to fork of tail, and Eye-Hypural length-- the distance from the posterior rim of the eye socket to the posterior edge of the hypural plate. Only a few of the Eye-Hypural lengths were recorded. These data collected during 1960 were arranged in a frequency table and are presented in Table 11, together with measurements recorded from a small number of specimens of other species.

In order to obtain an estimate of the early growth in length of young Clearwater River Chinook salmon, 845 measurements taken between May 22 and October 26 were plotted as shown on the accompanying "scatter" diagram for Figure 3. (The period void of dots from late-June through early-July corresponds to the time of high water elevations in the Clearwater River when the trap was inoperative.)

Examination of the figure shows that the fry in late-May range in length from 30-40 mm. and by late-October fry length exceeds 60 mm. Assuming a linear relation between fish length and time of capture for this first segment of the growth curve, a regression of length on time, employing monthly mean sizes, was computed. (The open circles on the graph represent the mean size of fish measured during the month plotted at the mean time of sampling for the month). A slope or regression coefficient of 0.177 mm./ day is indicated, which corresponds to an average growth in length of 5.5 mm. each 31 days between late-May and late-October. Further assuming this growth constant throughout the winter months, calculated fish size at the early smolt stage the following May would be approximately 96 mm., which falls within the range of lengths recorded for the few smolts measured during May 1960 as shown in Table 11. This would suggest some over winter Clearwater River residence of young Chinook salmon which had been hatched the previous Spring.



GROWTH OF YOUNG CHINOOK SALMON.

FIGURE 3

Length-measurement samples of fish obtained from the Fraser and other rivers in 1960 are too few to estimate growth rates. It is interesting to note, however, the average size of 35.8 mm. for 24 Chinook fry captured from the Raft River (a tributary of the North Thompson River close by the Clearwater River) on May 25-26 compares almost exactly to the estimated length of Clearwater River fry for the same time of year.

Water Temperature Data Collections - River water temperatures play an important role in the freshwater life of salmon species, during times of adult migration and spawning, during egg incubation, and during post hatching stages. Data collections on water temperatures were made during 1960, chiefly by means of Taylor Thermographs. Recorders were installed at the Nechako River near Prince George, the lower McGregor River, near Tete Jaune on the Fraser River and at North Kamloops on the North Thompson River. These data collected during 1960 are shown in Table 12. Similarly, miscellaneous physical data for temperature, water level, and discharge also collected during 1960 are given in Tables 13, 14, and 15.

PROPOSED PROGRAM 1961

The results of the Fisheries investigation in 1959 and 1960, have provided much basic biological data on the salmon runs in System A. It is anticipated that in some of the areas under study, such as the Clearwater River, a firmer basis for answering the fisheries problem should be had upon completion of the 1961 program.

The results of the present work in the upper Fraser River have revealed much new information on the distribution of the Chinook salmon. This fact, together with the continuing problem as to the extent of salmon spawning in the main reaches of the Fraser River above Prince George, has predicated the needs of the 1961 field program to be concentrated in these up-river areas.

The proposed program of fisheries work in 1961 will essentially cover, in brief summary, the following:

1. Sampling downstream migration at the Clearwater River

   The inclined plane fish trap will be operated from early April until June or July. This will complete the seasonal sampling coverage in this area. Use of prima cord explosive, fyke and seine nets, as a collection tool for obtaining young salmon samples will be employed in other areas.

2. Fish Wheel Operation

   By early June it is planned to install at least one, and possibly two, fish wheels in the upper Fraser River above Prince George to sample adult migrant salmon. Complete planning of this operation is contingent, of course, upon capturing fish. The large size of the Fraser River

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with its attendant large discharge and constant flow of debris are major operational obstacles. However, it is hoped more information will be obtained on timing of fish runs, sampling for age and size, or tagging experiments may be performed. In addition to and concurrent with fish wheel operations, fixed gill net sampling of adults in the Fraser River above and below the wheel sites will be done.

3. Adult Migrations and Spawning Stream Surveys.

A program of surveys of spawning areas, principally in the upper Fraser and Clearwater - North Thompson River areas, will be undertaken. Helicopter air craft will be used to make scheduled visits to each spawning ground and to transport ground survey personnel to and from inaccessible river areas.

Temperature data collections established in 1960, together with other routine physical and biological data collections will continue.

TABLES AND FIGURES

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TABLE 1

TIMES OF SPAWNING FOR CHINOOK AND COHO SALMON, FRASER RIVER WATERSHED

CHINOOK SALMON

Stream	Start	Peak	End	No. Yrs. Reported	Remarks
MISSION-HARRISON AREA					
Chehalis River	May 18	June 16	June 17	10	
Douglas Creek	-	-	-	-	No information
Harrison River	Oct.7	Nov.7	Dec.5	10	
Maria Slough	Sep.23	Oct.15	Oct.31	10	
Mystery Creek	-	-	-	-	No information
Slouquet Creek	-	-	-	-	No information
Stave Creek	May 9	June 5	June 25	7	End - 1 report for "Oct"
Tipella Creek	-	-	-	-	No information
CHILLIWACK-HOPE AREA					
Jones Creek	-	-	-	-	No information
Sweltzer Creek	-	-	-	-	No information
Chilliwack River	Mar - July 14	Oct.9	Sept.	10	Contiguous streams inadequate information for Chilliwack & Vedder Rivers
Vedder River					
Coquihala River	-	-	-	-	No information
Slesse Creek	July	-	-	6	
YALE-LYTTON AREA					
Coldwater River	Aug.20	Sep.7	Sep.25	10	
Nahatlatch River	Aug (E)	Sep(?)	Sep.(L)	3	3 start, 3 peak, 3 end
Nicola River	July 8	Sep. 11	Oct.8	10	8 start, 8 peak, 8 end
Spius Creek	Aug.11	Sep.12	Oct.2	10	5 start, 6 peak, 6 end
Stein Creek	-	-	-	-	No information
Spuzzum Creek	-	-	-	-	No information
Yalakom River	June	July	Aug.	9	
SQUAMISH-LILLOOET AREA					
Birkenhead River	April	May	June	9	9 start, 9 peak, 9 end
Seton Creek	Oct.	Oct.	Nov.	6	6 start, 6 peak, 6 end
Cayoosh Creek	Oct.	Oct.	Nov.	6	6 start, 6 peak, 6 end
Portage Creek	Sep.(?)	Sep.(?)	Oct.(?)	10	6 start, 6 peak, 6 end
Gates Creek	Aug.	Aug.	Sep.	4	3 reports August & one report Oct. for start, 3 for Aug. & 1 for Nov. peak, 3 for Sep. and 1 for Nov. end.

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TABLE 1 - Cont'd.

CHINOOK SALMON -Cont'd.

Stream	Start	Peak	End	No. Yrs. Reported	Remarks
THOMPSON-SOUTH THOMPSON AREA					
Adams River	Sep.10	Sep.20	Oct.10	9	
Bonaparte River	Aug.(M)	Sep.10	Sep.(L)	10	
Deadman Creek	June (L)	Aug.21	Sep.22	10	
Eagle River	Sep.9	Sep.30	Oct.21	9	
Middle Shuswap River	Aug.17	Sep.21	Oct.5	9	
Lower Shuswap River	Aug.15	Sep.30	Oct.21	10	1 report Nov. for end
Salmon River	July 23	Aug.22	Sep.11	9	
Seymour River	Aug.20	Sep.27	Oct.14	3	3 start,2 peak, 3 end
Thompson River	Aug.28	Sep.24	Oct.6	3	1 report Aug.(E) start, 1 report Oct. end
South Thompson River	Sep.14	Oct.10	Oct.30	8	1 report Oct.(L)-end.
NORTH THOMPSON AREA					
Louis Creek	Aug.(M)	Sep.1	Sep.(L)	10	
Barriere River	Aug.(L)	Sep.(L)	Sep.30	10	
Lemieux Creek	Aug.19	Sep.10	Sep.(L)	10	
Blackwater Creek	Aug.(M)	Sep.8	Oct.1	10	
Clearwater River	Sep.(E)	Oct.1	Oct.(L)	10	
Finn Creek	Aug.(E)	Aug.20	Sep.(M)	10	
North Thompson River	Aug.6	Sep.7	Oct.1	10	
QUESNEL AREA					
Quesnel River	Sep.9	Sep.28	Oct.10	10	Includes N.& S.forks.
Horsefly River	Aug.5	Aug.25	Sep.15	10	
McKinley River	Aug.5	Aug.25	Sep.15	10	
Blackwater (West Road)River	Aug.7 (8 yrs)	Aug.25 (1960)	Sep.15 (1960)	8	"Start" taken from 1938-44,1960
CHILCOTIN AREA					
Chilcotin River	July 14	Aug.7	Aug.21	10	
Chilco River	July 15	Aug.4	Aug.21	10	
Taseko River	July 15	Aug. 4	Aug.22	10	

TABLE 1 - Cont'd.

CHINOOK SALMON - Cont'd.

Stream	Start	Peak	End	No. Yrs. Reported	Remarks
NECHAKO AREA					
Chilako River	July 27	Aug.15(M)	Aug.25(L)	10	
Stuart River	Aug.(L)	Sep.10-15	Sep.(L)	1	
Nechako River	Aug.(L)	Sep.20	Oct.5(E)	10	
Endako River	Aug.(L)	Sep.(E)	Sep.(L)	1	
Stellako River	Sep.(E)	Sep.(M)	Oct.(E)	10	
Ormond Creek	Aug.(L)	Sep.(E)	Sep.(L)	10	
Nadina River	Sep.(E)	Sep.15-20	Oct.(E)	10	
Sowchea River	Sep.(M)	-	-	1	
Tachie River	Sep.(E)	Sep.(L)	Oct.(E)	10	
Kuzkwa River	Sep.(E)	Sep.(M)	Sep.(L)	10	
Kazcheck River	Sep.(E)	Sep.(M)	Sep.(L)	10	
Middle River	Sep. (E)	Sep.(L)	Oct.(E)	10	
Felix Creek	Aug.(M)	Aug.(L)	Sep.11	1	
Sakeniche River	Aug.(E)	Aug.20-31	Sep.(E)	10	
Driftwood River	Aug.(M)	Aug.(L)	Sep.(E)	10	
UPPER FRASER AREA					
Salmon River	Aug.(E)	Aug.(L) Sep.1-15	Sep.(M-L)	8	
Willow River	July (L) Aug.(E)	Aug. (L) Sep. (E)	Sep.(E-L)	8	
McGregor River	Aug.(E)	Sep. (M)	Sep. (E)	10	
Seebach Creek					Trib. to MrGregor River
James Creek					" " " "
Captain Creek					" " " "
Otter Creek					" " " "
Fontoniko Creek					" " " "
Herrick Creek					" " " "
Bowron River	Aug.3	Aug.21	Sep.10-15	9	Captured near river mouth Aug.6-8,1960
Clear Creek					Trib. to Bowron River System
Haggen Creek					" " " "
Indianpoint Creek					" " " "
Antler Creek					" " " "
Torpy River	July 15-Sep.15	Before Aug.24	Sep.(E)	1960 only for peak end	1924-26; 1930-31 reported for start. Present near Mouth Aug.7/60
Keg Creek		Before Aug.23	Sep.(E)	1960 only for peak end	
Slim Creek				1960 only	Present alive by Sep.5
Morkill River				1960 only	Present alive by Sep.15
Holmes River	Prior to Aug. 26		Before Sep.6	1960 only	
Nevin Creek				1960 only	Present alive on Aug.29
McLennan River					Not present during 1960
Swift River					Reported in some years
Fraser River	Aug.(M)	Aug.1-5	Sep.(L)	6	(Tete Jaune)

TABLE 1 - Cont'd.

COHO SALMON

Stream	Start	Peak	End	No. Yrs. Reported	Remarks
MISSION-HARRISON AREA					
Boucher Creek	Oct.21	Nov.26	Jan.10		7 start,9 peak,3 end
Chehalis River	Sep.9	Dec.13	Mar.2		11 " ,11 " ,5 "
Coho Creek	Nov.20	Nov.6	Dec.28	4	
Douglas Creek	Oct.25	Nov.30	Dec.15	1	
East Creek	Oct.25	Nov.25	Dec.15	1	
Gallager Creek	Nov.15	Dec.15	Dec.23	1	
Hawkins Creek	Nov.18	Dec.19	Jan.5		11 " ,10 " ,8 "
Hicks Creek	Nov.19	Dec.19	Feb.6		11 " ,11 " ,3 "
Lagace Creek	Nov.19	Nov.30	Dec.20		4 " ,4 " ,3 "
Maria Slough	Nov.2	Dec.12	Jan.16		11 " ,11 " ,7 " 2 reports for end in Mar.
Miami Slough	Nov.15	Dec.11	Dec.28	4	
Mystery Creek					No Timing Reports
Suicide (Norrish) Creek	Nov.11	Dec.17	Jan.29		10 " ,10 " ,8 "
Purcell Creek	Nov.10	Nov.20	Jan.		2 " ,2 " ,2 " No specific dates for end
Pye Creek	Nov.24	Dec. 9	Dec.25		5 " ,5 " ,5 "
Roulea Creek	Nov.23	Dec.2	Dec.23		
Slouquet Creek	-	Dec.30	-	1	
Squakem Creek	Nov.19	Dec.20	Jan.22		10 " ,10 " ,9 "
Stave Lake	Oct.15	Nov.16	Jan.28		9 " , 9 " ,9 "
Tatham Creek	Nov.24	Dec.13	Jan.11		10 " ,10 " ,10 "
Thompson Creek	Nov.15	Dec. 10	Jan.11		8 " ,9 " ,8 "
Tipella Creek	Nov.15	Nov.30	Dec.30		1 " ,2 " ,1 "
Silver Creek	Sep.12	Dec.15	-		2 " ,1 " ,0 "
Inches Creek	Nov.15	Dec.21	Jan.16		10 " ,10 " ,10 "
20 Mile Creek					
Weaver Creek	Oct.18	Nov.30	Jan.19		10 " ,9 " ,5 "
Whonnock Creek	Oct.25	Nov.26	Dec.25		8 " ,8 " ,5 "
Wilkinson Creek	Nov.1	Nov.30	Jan.4		6 " ,10 " ,6 "
Worths Creek	Oct.31	Dec.6	Jan.4		9 " ,8 " ,
Nicomen Slouth	Oct.11	Dec.6	Jan.9		9 " ,9 " ,8 "
CHILLIWACK-HOPE AREA					
Jones Creek	Dec. 14	-	Dec.5		2 " ,0 " ,1 "
SWELTZER CREEK	Sep. 30	-	-		10 " ,0 " ,0 "
CHILLIWACK RIVER	Sep. 8	Nov.28, 25,Oct.(E)	-		10 " ,3 " ,0 "
VEDDER RIVER	Sep.4	Oct.10	-	1	
COQUIHALLA RIVER	Nov.4	-	-		8 " ,0 " ,0 "
SUCCER CREEK	Nov.9	-	-		9 " ,0 " ,0 "
SILVER CREEK	Nov.6	-	Dec.		

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TABLE 1 - Cont'd.

COHO SALMON - Cont'd.

Stream	Start	Peak	End	No.Yrs.Reported	Remarks
CHILLIWACK-HOPE AREA Cont'd.					
Lorenzetta Creek	Nov.11	Dec. 10	-	9	start, 1 peak,0 end
Popkum Creek	Nov.7	-	-	1	" ,0 " ,0 "
Hunter Creek	Dec.5 ,Dec., Nov.,Nov.	-	-	4	" ,0 " ,0 "
Hatchery Creek	Oct.30	Oct.30	Dec. 1	10	" ,1 " ,1 "
Dunville Creek	Nov.26	Nov.7	-	10	" ,1 " ,0 "
Elk Creek	Dec.10	-	-	1	" ,0 " ,0 "
Sleese Creek	4 Nov; 3 Oct.	-	-	7	" ,0 " ,0 "
YALE-LYTTON (NICOLA) AREA					
Coldwater River	Oct.27	Nov.14	Dec.5	7	" ,3 " ,3 "
Nahatlatch River	Nov.5	Nov.12	Dec.3	4	" ,3 " ,3 "
Nicola River	Oct.18	Nov.3	Nov.30	6	" ,4 " ,3 "
Spius Creek	Oct.29	N ov.15	Dec.5	3	" ,3 " ,3 "
Stien Creek	-	-	-	No Coho	
Spuzzum Creek	Dec.9,Oct.27, Oct.,Oct.	-	-	4	" ,0 " ,0 "
Yalakom Creek	-	-	-	No Coho	
SQUAMISH-LILLOOET AREA					
Birkenhead River	Oct.	Oct.	Nov.	10	" ,10 " ,10 "
One Mile Creek	Nov.	Nov.	Dec.	8	" ,8 " ,8 "
McKenzie Creek	Oct.	Nov.	Nov.	8	" ,8 " ,8 "
Miller Creek	Oct.	Nov.	Nov.	10	" ,10 " ,10 "
Ryan Creek	Oct.	6 Nov., 4 Dec.	9 Nov., Dec.1	10	" ,10 " ,10 "
Salmon River	Nov.	Nov.	Dec.	10	" ,10 " ,10 "
Twenty Five Mile Creek	Nov.	Nov.	Dec.	5	" ,5 " ,5 "
Green Creek	Oct.	Oct.	Nov.	10	,10 ,10 "
Sandy Creek	Nov./58	Nov./58	Nov/58	1	" ,1 " ,1 "
Railroad Creek	Oct.	Oct.	Nov.	4	" ,4 " ,4 "
Johnston Creek	Nov.	Nov.	Dec.	7	" ,7 " ,7 "
Kierstead Creek				No reports since 1949	
Upper Lillooet River	Oct.	Oct.	Nov.	10	" ,10 " ,10 "
Seton Creek	Oct.20/57	Oct./57	Nov.22/57	1	" ,1 " ,1 "

TABLE 1 - Cont'd.

COHO SALMON - Cont'd.

Stream	Start	Peak	End	No. Yrs. Reported	Remarks
SQUAMISH LILLOOET AREA-Cont'd.					
Portage Creek	Oct., Oct. Nov.	Nov., Nov., Oct.	Nov., Dec., Oct.	3	start, 3 peak, 3 end
Gates Creek	2 Oct., 3 Nov.	2 Oct., 3 Nov.	1 Nov., 3 Dec.	4 " , 4 " , 4 "	
Poole Creek	Oct.	9 Nov., 1 Oct.	Nov.	10 " , 10 " , 10 "	
THOMPSON-SOUTH THOMPSON AREA					
Bonaparte River	4 Oct., 1 Sep.	-	1 Oct., 2 Nov.	5 " , 0 " , 3 "	
Deadmans Creek	Oct.18	Nov.9	Dec.4	5 " , 4 " , 3 "	
Adams River	Oct.21	Nov.13	Dec.5	8 " , 7 " , 8 "	
Momich River	Oct.18	Nov.12	Dec.1	3 " , 2 " , 3 "	
Upper Adams River	Oct. 11	Nov. 12	Nov.27	4 " , 3 " , 3 "	
Scotch Creek	Oct.15	Nov. 13	Nov.20	1 " , 2 " , 11 "	
Seymour River	-	-	-	No reports	
Annisty Creek	Oct.22	Nov.12	Dec.5	2 " , 1 " , 2 "	
Granite Creek	Oct.23	Nov. 10	Dec.3	8 " , 7 " , 5 "	
Eagle River	Oct.22	Nov.7	Nov.30	8 " , 7 " , 7 "	
Lower Shuswap River	Oct.28	Nov.17	Dec.7	7 " , 4 " , 5 "	
Salmon River	Oct.15	Nov.5	Dec.3	9 " , 8 " , 8 "	
Middle Shuswap River	Oct.27	Nov.13	Dec.3	9 " , 5 " , 6 "	
NORTH THOMPSON AREA					
North Thompson River	Oct(L) Oct(M)	-	Dec., Nov(L)	2 " , 0 " , 2 "	
Louis Creek	Oct.15	Nov.1	Dec.8	10 " , 10 " , 9 "	
Barriere River	Oct.18	Nov.12	Nov.26	6 " , 5 " , 6 "	
Lemieux Creek	Oct.23	Nov.15	Dec.1	7 " , 6 " , 6 "	
Boulder Creek	Oct.15	-	Nov.(L)	1 " , 0 " , 1 "	
Mann Creek	Oct.12/55	Nov.5/55	Dec./55	1 " , 1 " , 1 "	
Brookfield Creek	Oct.22	-	-	2 " , 1 " , 0 "	Reported only 1936 & 1939
Clearwater River	Oct(E) (L)Oct, Oct.25	Nov.10	Dec., Nov. Dec.6	9 " , 1 " , 3 "	
Raft River	Oct.20	Nov.9	Dec.2	8 " , 5 " , 3 "	

TABLE 1 - Cont'd.

COHO SALMON - Cont'd.

Stream	Start	Peak	End	No.Yrs.Reported	Remarks
Lost Creek	Oct.21	Nov.9	Nov., 4-Dec., Nov.30		5 start , 3 peak, 6 end
Otter Creek	Aug.5	-	-		Reported only in 1937
Mad River	Oct.(L)/52	-	Nov.(L)/52		1 " , 0 " , 1 "
Lion Creek	Oct.27	Nov.10	Dec.2		6 " , 4 " , 5 "
Finn Creek	Nov., July (L), Oct.(M)	-	Nov., Dec., Nov.		3 " , 0 " , 3 "

TABLE 2.

STREAM INDEX- FRASER RIVER SYSTEM A

1. FRASER RIVER AND TRIBUTARY STREAMS UPSTREAM FROM PRINCE GEORGE

Stream	Flowing into	Salmon Species	Page No.
Antler Creek	Bowron River	Chinook	13
Bowron River	Fraser River	Chinook, Sockeye	12
Catfish Creek	Fraser River		
Clear Creek	Bowron River	Chinook	
Castle Creek	Fraser River		
Captain Creek	Herrick River	Chinook	14
Clyde Creek	Fraser River		
Cushing Creek	Morkill River		10
Driscoll Creek	Fraser River		
Dore River	Fraser River		
Dome Creek	Fraser River		
East Twin Creek	Fraser River		
West Twin Creek	Fraser River		
Eddy Creek	Fraser River		
Fraser River	Gulf of Georgia	Chinook, Sockeye	8
Fleet Creek	Fraser River		
Fontoniko River	Herrick River	Chinook	14
Forgetmenot Creek	Morkill River		10
Goat River	Fraser River		10
Goodson Creek	Walker Creek		17
Hankins Creek	Fraser River		
Haggen Creek	Bowron River	Chinook	12
Huckey Creek	Bowron River	Sockeye	
Herrick River	McGregor River	Chinook	14
H erring Creek	Ollson Creek		
Holmes River	Fraser River	Chinook	9
Holiday Creek	Fraser River		
Horsey Creek	Fraser River		
Humbug Creek	Torpy River		
Hungary Creek	Fraser River		
Indianpoint Creek	Bowron River	Chinook	13
James Creek	Herrick River	Chinook	14
Jarvis Creek	McGregor River		17
Jerry Creek	Willow River		8
Keg Creek	Torpy River	Chinook	16
Kitchi Creek	McGregor River		17
Kiwa Creek	Fraser River		
Laselle Creek	Fraser River		
Logan River	McGregor River		15
Merton River	Salmon River		6
Muskeg River	Salmon River		6
McGregor River	Fraser River	Chinook	14,16
McKale River	Fraser River		
McIntosh Creek	Fraser River		
Morkill River	Fraser River	Chinook	10
Milk River	Goat River		11

TABLE 2 - Cont'd.

Stream	Flowing into	Salmon Species	Page No.
McLennan River	Fraser River	Chinook	11
Nevin Creek	Fraser River	Chinook	8
North Star Creek	Goat River		11
Ollson Creek	Fraser River		12
Otter Creek	McGregor River	Chinook	15
Ptarmigan Creek	Fraser River		
Pass Creek	McGregor River		15
Pass Lake and Stream	Torpy River		15
Raush River	Fraser River		
Rearguard Falls	Fraser River		
Robson Falls	Fraser River		
Robson River	Fraser River		
Salmon River	Fraser River	Chinook	6
Seebach Creek	McGregor River	Chinook	11
Snowshoe Creek	Fraser River		
Sus Creek	Bowron River		
Small Creek	Fraser River		
Spittal Creek	Fraser River		
Slim Creek	Fraser River	Chinook	13
Swift River	McLennan River	Chinook	11
Stephanie Creek	Willow River		7
Stony Lake	Stephanie Creek		7
Stephen Lake	Stony Lake		
Tete Creek	Fraser River		
Torpy River	Fraser River	Chinook	15,18
Willow River	Fraser River	Chinook	7
Walker Creek	Torpy River		
Woodall Creek	McGregor River		
Wallop Creek	Forgetmenot Creek		10

2. QUESNEL RIVER AND TRIBUTARIES.

Cariboo (Swamp) River	Quesnel River	Chinook	18,20
Cameron Creek	Mitchell River		20
Cunningham Creek	Cariboo River		
Horsefly River	Quesnel Lake	Chinook, Sockeye	19,21
Harvey Creek	Cariboo River		
Keithley Creek	Cariboo Lake		18
Kimball Creek	Cariboo River		
Little Horsefly River	Horsefly River	Sockeye	19,21
Little River	Cariboo River		20
Mitchell River	Quesnel Lake	Sockeye	19
Matthew River	Cariboo River		20
Moffatt Creek	Horesefly River		21
McKinley Creek	Horsefly River	Chinook	19
Penfold Creek	Mitchell River		19
Seller Creek	Cariboo River		
Quesnel River	Fraser River	Chinook	18,21
South Fork Quesnel	Quesnel River	Chinook	18
Spanish Creek	Cariboo River	Chinook	18

TABLE 2 - Cont'd.

3. NECHAKO RIVER AND TRIBUTARIES.

	Stream	Flowing into	Salmon Species	Page No.
*	Big Creek	Takla Lake	Sockeye	
	Bivouac Creek	Takla Lake	Sockeye	
	Blanchet Creek	Takla Lake	Sockeye	
	Chilako River	Nechako River	Sockeye, Chinook	
	Crow Creek	Takla Lake	Sockeye	
	Casimer Creek	Takla Lake	Sockeye	
	Dog Creek	Stuart River		7
	Driftwood River	Takla Lake	Sockeye, Chinook	
	Dust Creek	Takla Lake	Sockeye	
	Endako River	Fraser Lake	Sockeye, Chinook	
	Felix Creek	Takla Lake	Sockeye, Chinook	
	Forfar Creek	Middle River	Sockeye	
	Fifteen Mile Creek	Takla Lake	Sockeye	
	Five Mile Creek	Takla Lake	Sockeye	
	Forsyth Creek	Takla Lake	Sockeye	
	Frying Pan Creek	Takla Lake	Sockeye	
	Gluskie Creek	Takla Lake	Sockeye	
	Kazchek Creek	Middle River	Sockeye, Chinook	
	Kynock Creek	Middle River	Sockeye	
	Kuzkwa River	Tachie River	Sockeye, Chinook	
	Leo Creek	Takla Lake	Sockeye	
	Middle River	Trembleur Lake	Sockeye	
	Nechako River	Fraser River	Chinook	
	Narrows Creek	Takla Lake	Sockeye	
	Nadina River	Francois Lake	Sockeye, Chinook	
	Nithi River	Francois Lake	Sockeye	
	Ormond Creek	Fraser Lake	Sockeye, Chinook	
	Point Creek	Takla Lake	Sockeye	
	Pinchi Creek	Stuart Lake	Sockeye, Chinook	
	Paula Creek	Trembleur Lake	Sockeye	
	Rossette Creek	Trembleur Lake	Sockeye	
	Stuart River	Nechako	Chinook	7
	Stuart Lake	Stuart River	Sockeye, Chinook	
	Sowchea Creek	Stuart Lake	Sockeye, Chinook	
	Sakeniche River	Takla Lake	Sockeye, Chinook	
	Sandpoint Creek	Takla Lake	Sockeye	
	Shale Creek	Takla Lake	Sockeye	
	Stellako River	Fraser Lake	Chinook	
	Twenty-five Mile Creek	Takla Lake	Sockeye	
	Tachie River	Stuart Lake	Sockeye	
	Trembleur Lake	Tachie River	Sockeye	
	Takla Lake	Middle River	Sockeye	
	Unchi Creek	Francois Lake	Sockeye	
*	Ankwill Creek	Takla Lake	Sockeye	

4. NORTH THOMPSON RIVER AND TRIBUTARIES

	Avery Creek	North Thompson	
	Avola Creek	North Thompson	25
	Allan Creek	Albreda River	28
	Albreda River	North Thompson	24,27

TABLE 2 - Cont'd.

Stream	Flowing into	Salmon Species	Page No.
Adolph Creek	North Thompson		29
Barriere River	North Thompson	Chinook,Coho,Sockeye	23
Boulder (Joseph) Creek	North Thompson	Chinook, Coho	24
Badger Creek	North Thompson		
Butler Creek	North Thompson		
Baker Creek	North Thompson		
Bester Creek	North Thompson		
Berry Creek	North Thompson		
Blue River	North Thompson		26
Bone Creek	North Thompson		27
Brookfield Creek	Clearwater River	Coho	
Clearwater River	North Thompson	Chinook, Coho, Sockeye	21
Crossing Creek	North Thompson		
Chuck Creek	North Thompson		
Cayuse Creek	North Thompson		
Cedar Creek	Blue River		26
Chappell Creek	North Thompson		
Clemina Creek	Albreda River		27
Canvas Creek	North Thompson		29
Dunn Lake	Dunn Creek		
Dunn Creek	Boulder (Joseph) Creek		
Dominion Creek	Albreda River		28
East Barriere River	Barriere River		23
East Barriere Lake	East Barriere River		23
Fishtrap Creek	North Thompson		22
Fadear Creek	Louis Creek		
Fennel Creek	North Barriere Lake	Sockeye	23
Foghorn Creek	North Thompson		
Finn Creek	North Thompson	Chinook, Coho, Sockeye	26
Froth Creek	North Thompson		
Falls Creek	Clearwater River		
Fage Creek	Clearwater River		
Harper Creek	North Barriere Lake		23
Haggard Creek	Barriere River		23
Hellroar Creek	North Thompson		26
Heffley Creek	North Thompson		
Hemp Creek	Clearwater River		
Jones Creek	North Thompson		
Louis Creek	North Thompson	Chinook, Coho, Sockeye	23
Lemieux Creek	North Thompson	Chinook, Coho, Sockeye	23
Leonie Creek	Barriere River		
Lempriere Creek	North Thompson		29
Lute Creek	North Thompson		
Lion Creek	North Thompson	Chinook, Coho	26
Mann Creek	North Thompson	Chinook, Coho	24
Mad River	North Thompson	Chinook, Coho	25
Montanna Creek	North Thompson		

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TABLE 2 - Cont'd.

Stream	Flowing into	Salmon Species	Page No.
Murtle River	Clearwater River		
Mahood River	Clearwater River	Chinook	22
Moul Creek	Clearwater River		
Mud Lake	Mud Creek		
Mud Creek	North Thompson		
Miledge Creek	North Thompson		27
Moonbeam Creek	North Thompson		27
Manteau Creek	North Thompson		29
McCarthy Creek	North Thompson		
North Barriere Lake	Barriere River		
Noble Quartz Creek	North Thompson		25
North Thompson River	Thompson River	Chinook, Coho, Sockeye	(22,25,
Oliver Creek	North Thompson River		(26,27,
Otter Creek	North Thompson	Coho, Chinook 25	(28
Peavine Creek	North Thompson		
Porte D'Enfer Canyon	North Thompson		24,26
Pyramid Creek	North Thompson		
Raft River	North Thompson	Chinook, Sockeye, Coho	25
Reg Christie Creek	North Thompson	Coho	25
Struthers Creek	North Thompson		
Sargeant Creek	Louis Creek		
South Barriere Lake	H aggard Creek		
Serpentine Creek	North Thompson		
Stormking Creek	North Thompson		(22,26,
Spahats Creek	Clearwater River		(28
Shannon Creek	North Thompson		
Sundt Creek	North Thompson		
Tum Tum Creek	North Thompson		
Thunder River	North Thompson		26
Unnamed Creeks	North Thompson		
Vermelin Creek	North Barriere Lake		
White Water Creek	North Thompson		

TABLE 3

SUMMARY FRASER RIVER BOARD CHINOOK SALMON SPAWNING GROUND FISH COUNTS,1960

1. UPPER FRASER RIVER AND TRIBUTARIES ABOVE PRINCE GEORGE

Date	Stream	Live	Dead	Ground or Air Survey	Distribution and Remarks
Aug.19	Willow River	2	-	A	2 mile section below 1st Canyon, river muddy
Aug.19	Seebach	50	1	A	18; main channel from 5 miles up to forks (1 dead) 29; Rt. fork to 15 miles upstream 3; Left fork to 2 miles upstream .
Aug.20	Seebach Creek	0	2	G	Between mile 5-7 from mouth .
Aug.30	Seebach Creek	13	0	G	Redds at almost every riffle to 7 miles up.
Aug.23	James Creek	20	0	A	From mouth to Pacific Lake.
23	James Creek	5	0	G	First 4-5 miles from mouth, not many redds W.T.53°.
23	Herrick Creek	2	0	A	Near mouth of Spakwoniko Creek and 2 miles below H. Falls.
23	Fontoniko Creek	22	0	A	Rt. Fork only - mouth to falls $2\frac{1}{2}$ - 3 miles.
25	Fontoniko Creek	13	0	G	East on Rt. Fork - frequent redds to falls W. T. 49° F.
Aug.20	Bowron River	120	0	A	22; Saw Creek to Haggen Creek. 11; Haggen Creek to Indianpoint Creek. 87; Indianpoint Creek to Bowron Lake.
Aug.31	Bowron River	10	0	G	outlet of Bowron Lake.
Sep. 5	Bowron River	112	2	A	Bowron Lake to 3 miles D/S visibility poor, count not complete.
Aug.20	Indianpoint River	33	0	A	Indianpoint Lake to 3 miles downstream.
Sep. 5	Indianpoint River	44	0	A	Outlet of Indianpoint Lake to 3 miles downstream.
Aug.20	H aggen Creek	3	0	A	7-8 miles up from confluence with Bowron River.
Sep.5	Haggen creek	2	0	A	About 4 miles upstream from mouth and Bowron confluence.
Aug.20	U nnamed Creek	2	0	A	$\frac{1}{2}$ mile from mouth and confluence with H aggen Creek .
Aug.29	Captain Creek	0	1	G	Inside mouth .
Aug.23	Keg Creek	28	0	A	Upper 4-5 miles below Forks.
Aug.20	Slim Creek	33	0	A	Below Tumuch Lake to Everett Creek.
Sep.5	Slim Creek	66	0	A	Below Tumuch Lake to Everett Creek - visibility poor.

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TABLE 3 Cont'd.

Date	Stream	Live	Dead	Ground or Air Survey	Distribution and Remarks
Sep.7	Salmon River	7	-	A	1; 5 miles below Merton River. 1; 8-10 miles Upstream from Merton River. 2; near confluence of Muskeg River. 3; Great Beaver Creek to 15 miles upstream.
Aug.7	Torpy River	2	0	G	From mouth to 500 yds. upstream.
24	Torpy River	24	0	A	Below Keg and Torpy confluence to 15-20 miles downstream. Visibility poor - count not indicative.
26	Holmes (Beaver) River	18	0	A & G	To 6 miles upstream from highway bridge.
28	"	5	0	G	All in pool just below falls approximately 3 miles from highway bridge.
Sep.10	"	1	0	G	In pool just below falls.
Sep.6	"	3	0	A	1 near dead about 4 miles above confluence with Chalco Creek. 2 dying ½ mile above highway bridge.
Aug.29	Nevin (King) Creek	8	0	G	2 at mouth confluence of Fraser 6½ mile below highway bridge.
Aug.23	Fraser River, Tete Jaune	1	0	G	500 yards above mouth of McLennan Creek in Fraser.
25	"	50	0	G	500 yards above McLennan Creek in Fraser.
27	"	45	0	A	South Channel 29; North Channel 16.
30	"	100-150	0	G	500 yards above McLennan Creek in Fraser
Sep.6	"	120	5	A	South Channel 85-3; North Channel 35-2.
		107	11	A	South Channel 74-; North Channel 33-
Sep.11	Fraser River, Tete Jaune	40-50	0	G	500 yards above McLennan Creek in Fraser.
7	Fraser River, Tete Jaune	2	0	G	1 mile above Tete Jaune highway bridge.
		6	0	G	1½ miles below confluence of Robson River (Grand Forks) and Fraser River.
		3	0	G	In pool just below Robson Falls.
13	Morkill River	8	0	G	At mile 7 from mouth (Fraser & Morkill confluence)

TABLE 3 - Cont'd.

Date	Stream	Live	Dead	Ground or Air Survey	Distribution and Remarks
Sep.14	Morkill River	80-100	0	G	From mile 10-13 (heaviest concentration mile 10-11)
15	Morkill River	2	0	G	At mile 15 from mouth. (Estimate of entire Morkill to be in excess of 200 springs)
Sep.7	Stuart River	8	2	A	Lake outlet to Dog Creek .
2.	NORTH THOMPSON RIVER AND TRIBUTARIES				
Aug.26	Raft River	3	0	G	100 yards above Raft River bridge.
Sep.1	Raft River	9	0	G	From Bridge to Falls approximately 1 miles.
1	Clearwater River (also see Table 5)			G	Several observed finning at mouth.
8	" "	4	0	G	1st eddy above highway bridge-east side of river.
14	" "	4	0	G	1st eddy above highway bridge-east side of river.
15	" "	2	0	G	Just below highway bridge.
	" "	0	2	G	At rig site.
27	" "	0	2	G	Highway oridge to mouth -
Sep.20	" "	4	0	G	east side of river. Between Lone Spoon Creek and 8 miles below Horseshoe Falls
Oct.2	" "	2	0	G	1st eddy above highway bridge - east side of river.
13	" "			A	See Table No.5.
Sep.15	North Thompson River	110	0	G	From Clearwater to Mann Creek.
16	" "	2	0	G	3 miles below Birch Island.
29	North Thompson River	19 (40)	0	G	Boulder Creek to Mann Creek; (40) are sockeye salmon.
29	" "	98	4	G	Mann Creek to Clearwater River.
Sep. 23	" "	3	0	G	100 feet above North Thompson and Mann (Blackwater) Creek confluence.
Oct.13	" "			A	12 redds seen at Messiter, 20 redds seen at Avola.
Sep.13	Lemieux Creek	2	0	A	About 4 miles from mouth.
21	" "	7	0	G	From mouth upstream for approximately 6 miles.
Oct.24	" "			G	Numerous redds observed from mouth to highway bridge.
Oct.13	Blue River			A	Redd observed just inside mouth.

-TABLE 3 - Cont'd

Date	Stream	Live	Dead	Ground or Air Survey	Distribution and Remarks
Sep.13	Barriere River	16	0	A	Mouth to bridge.
		10	0	A	3/4 mile above Leonie Creek.
		3	0	A	Just above Bottrell Creek.
		7	0	A	Above Bottrell Creek to Forks (no redds, travelling fish)
14	" "	5	0	A	One mile below North Barriere Lake.
Oct.12	" "	0	11	G	From 4 miles above highway bridge on North Barriere River to approximately 8 miles from Barriere.
Aug.13	Raft River	0	0	G	63°F Spawning 200 yards above
15	" "	0	0	G	58°F and below highway bridge.
17	" "	3	0	G	62°F Peak spawning Sept.1-10,
19	" "	25	0	G	60°F 1960.
22	" "	14	0	G	55°F
26	" "	50	0	G	54°F
29	" "	38			(incomplete count)
31	" "				50°F (turbid water conditions)
Sep.3	" "	87	0	G	50°F
7	" "	76	0	G	52°F
8	" "		19	G	51°F (no live count made)
12	" "	43	26	G	-
19	" "		35	G	- (no live count made)
26	" "	0	0	G	48°F
3. QUESNEL RIVER AREA					
Aug.23	Quesnel River	1	0	G	Likely-200 yards below bridge .
Sep.1	Quesnel River	50-100	0	A	Just below Likely Bridge - 6; Quesnel Forks.
7	Quesnel River	20	0	G	Likely B ridge.
		25	0	G	Boulion Pool - $\frac{1}{4}$ count
11	Quesnel River	20	0	A	Narrows above Likely
		150	0	A	Below Likely Bridge
25	Quesnel River	150	0	G	Likely 150 yards below bridge.
		11	0	G	Boulion Pool
Oct.17	Quesnel River	6	0	G	Likely Bridge
Sep.1	Horsefly River	48	0	A	Falls to 1 mile below bridge.
3	Horsefly River	93	0	G	$\frac{1}{2}$ mile above Forestry Bridge to Jones Farm
11	Horsefly River	3	0	A	About 5 miles from Horsefly River mouth.

TABLE 3 - Cont'd.

Date	Stream	Live	Dead	Ground or Air Survey	Distribution and Remarks
Sep.11	Horsefly River	4	0	G	Off Forestry Bridge.
11	Horsefly River	20	0	A	½ - 1 mile below Black Creek or Forestry B ridge
28	Horsefly River	0	1	G	Above mouth Jones Creek in Horsefly River.
1	McKinley River	15	0	A	Mouth to McKinley Lake
2	McKinley River	17	0	G	From McKinley Lake to Horsefly River
11	McKinley River	8	0	A	Mouth to McKinley Lake

TABLE 4

SUMMARY OF FRASER RIVER BOARD COHO ** SPAWNING GROUND

FISH COUNTS, 1960

Date	Stream	Live	Dead	Ground or Air Survey	Distribution and Remarks
Nov.15	Clearwater River	5	0	G	Whitehorse Bluffs, Donnacher's Cabin (Gill, Kent)
17	"	3	0	A	Highway Bridge to Hemp Creek (Gill, Kent)
		10	11	A	Hemp Creek to Mahood River (Gill, Kent)
		2	0	A	Murtle River to Horseshoe Bend "
		0	1	A	Horseshoe Bend "
		1	0	A	Horseshoe Bend to Horseshoe Falls "
Nov.18	Lion Creek	23	46	G	Mouth to Highway Bridge "
		109	200	G	Highway Bridge upstream 3/4 Mile "
Nov.21	Lemieux Creek	31	11	G	H ighway Bridge to 2 miles above Bridge lake road turns off "

** Coho species unconfirmed in Clearwater River

TABLE 5.

CLEARWATER RIVER CHINOOK SPAWNING COUNTS, OBTAINED BY AERIAL SURVEY, 1960

River Section	Sept. 13 Live	Sept. 13 Dead	Sept. 27 Live	Sept. 27 Dead	Oct. 13 Live	Oct. 13 Dead
Mouth to Highway Bridge	16	-				
Hemp Creek to Mahood River	283	-	209	49		109
Mahood River (mouth to falls)	3	-	38	1		0
Mahood River to Murtle River	13	-		1		
Pools below Murtle Falls	97	-	89	1		
Murtle Falls to Horseshoe	14	-	2			47
Horseshoe	29	-	138	1		
Horseshoe to Horseshoe Falls	6	-				
TOTALS -	461	0	476	53	0	156

TABLE 6

LIVE AND DEAD COUNTS OF SALMON (1) IN THE NORTH THOMPSON RIVER, FROM KAMLOOPS TO CLEARWATER RIVER, OBTAINED FROM FRASER RIVER BOARD AERIAL SURVEYS IN 1960.

Section of River	Distance Miles	Date of Count Sept.14 Live	Sept.14 Dead	Sept.26 Live	Sept.26 Dead	Oct.13 Live	Oct.13 Dead
Kamloops to Barriere River	42	1 (10)	1 (1)	5	19	0	3
Barriere River to one mile south of Chu Chua	13	0	0 (1)	0	0	0	0 (4)
One mile south of Chu Chua to Little Fort	6	8 (81)	7 (1)	0	5 (1)	0 12*	0
Little Fort to Boulder Creek	3	6	0	0	0	0	0
Boulder Creek to Mann Creek	9	136 (570)	1 (4)	6 (109)	2 (1)	0 (4)	2 (0)
Mann Creek to Clearwater River	5	37	4 (3)	111	0	2	1
Totals		188 (661)	13 (10)	122 (109)	26 (2)	2 (4)	6 (4)

(1) Unbracketed numbers are for Chinook salmon; bracketed numbers are for sockeye salmon; the twelve live marked with an asterisk were coho salmon sighted near Little Fort and they were migrating fish.

TABLE 7

DAILY CATCHES OF JUVENILE CHINOOK SALMON CAPTURED 4' x 4' INCLINED PLANE SAMPLING TRAP AT CLEARWATER RIVER BETWEEN MAY 9 AND OCTOBER 26, 1960

Date & Time Set	Date and Time Hauled	Fry		Smolts		Total Accum. Catch
		Daily	Accum.	Daily	Accum.	
May 9th 1600	May 9th 2000	0	0	1	1	1
May 9th 2030	May 10th 0800	6	6	17	18	24
May 10th 0830	May 10th 2200	4	10	6	24	34
May 10th 2230	May 11th 0830	6	16	5	29	45
May 11th 0900	May 11th 2300	6	22	10	39	61
May 11th 2330	May 12th 0730	4	26	29	68	94
May 12th 1100	May 12th 2000	3	29	7	75	104
May 12th 2030	May 13th 0700	7	36	43	118	154
May 13th 1900	May 13th 2200	2	38	7	125	163
May 13th 2230	May 14th 0600	28	66	33	158	224
May 14th 0630	May 14th 2300	15	81	21	179	260
May 14th 2315	May 15th 0800	34	115	27	206	321
May 15th 0815	May 15th 2330	13	128	9	215	343
May 15th 2345	May 16th 0800	17	145	26	241	386
May 16th 0830	May 16th 2400	25	170	13	254	424
May 17th 0015	May 17th 0800	28	198	14	268	466
May 17th 0815	May 17th 2130	7	205	1	269	474
May 17th 2200	May 18th 0600	38	243	18	287	530
May 18th 0615	May 18th 2230	8	251	8	295	546
May 18th 2245	May 19th 0600	24	275	14	309	584
May 19th 0630	May 19th 2400	12	287	4	313	600
May 20th 0015	May 20th 0630	30	317	17	330	647
May 20th 0645	May 20th 2230	9	326	3	333	659
May 20th 2245	May 21st 0700	42	368	33	366	734
May 21st 0730	May 21st 2000	6	374	2	368	742
May 21st 2010	May 22nd 0615	39	413	11	379	792
May 22nd 0630	May 22nd 2245	16	429	6	385	814
May 22nd 2300	May 23rd 0630	41	470	5	390	860
May 23rd 0645	May 23rd 2145	6	476	1	391	867
May 23rd 2200	May 24th 0600	34	510	11	402	912
May 24th 0615	May 24th 2300	15	525	1	403	928
May 24th 2315	May 25th 0530	32	557	4	407	964
May 25th 0545	May 25th 2000	6	563	0	407	970
May 25th 2015	May 26th 0530	29	592	6	413	1005
May 26th 0545	May 26th 2100	1	593	1	414	1007
May 26th 2115	May 27th 0630	36	629	3	417	1046
May 27th 0645	May 27th 2200	4	633	0	417	1050
May 27th 2215	May 28th 0630	27	660	12	429	1089
May 28th 0645	May 28th 2145	8	668	2	431	1099
May 28th 2200	May 29th 0630	33	701	3	434	1135
May 29th 0645	May 29th 2215	15	716	0	434	1150
May 29th 2230	May 30th 0645	14	730	3	437	1167

TABLE 7 - Cont'd

Date & Time Set	Date and Time Hauled	Fry Daily	Fry Accum.	Smolts Daily	Smolts Accum.	Total Accum. Catch
May 30th 0700	May 30th 1800	13	743	1	438	1181
May 30th 1830	May 31st 0830	39	782	23	461	1243
May 31st 0845	May 31st 1800	10	792	3	464	1256
May 31st 1815	June 1st 0900	56	848	3	467	1315
June 1st 0915	June 1st 2300	0	848	4	471	1319
June 1st 2330	June 2nd 0700	28	876	5	476	1352
June 2nd 0730	June 2nd 2330	8	884	0	476	1360
June 2nd 2400	June 3rd 0800	8	892	4	480	1372
June 3rd 0830	June 3rd 1600	2	894	0	480	1374
June 3rd 1630	June 4th 0800	28	922	0	480	1402
June 4th 0830	June 4th 2330	10	932	0	480	1412
June 4th 2400	June 5th 0800	9	941	2	482	1423
June 5th 0830	June 5th 2300	4	945	2	484	1429
June 5th 2330	June 6th 0800	8	953	3	487	1440
June 6th 0830	June 6th 2330	15	968	0	487	1455
June 6th 2400	June 7th 0800	7	975	1	488	1463
June 7th 0830	June 7th 2300	4	979	0	488	1467
June 7th 2330	June 8th 0800	15	994	2	490	1484
June 8th 0830	June 8th 2300	10	1004	1	491	1495
June 8th 2315	June 9th 0800	18	1022	1	492	1514
June 9th 0815	June 9th 2100	0	1022	0	492	1514
June 9th 2130	June 10th 0800	25	1047	4	496	1543
June 10th 0830	June 10th 2030	1	1048	0	496	1544
June 10th 2045	June 11th 0600	12	1060	1	497	1557
June 11th 0630	June 11th 2230	18	1078	1	498	1576
June 11th 2300	June 12th 0500	13	1091	1	499	1590
June 16th 1300	June 16th 2100	3	1094	0	499	1593
June 16th 2115	June 17th 0800	15	1109	0	499	1608
June 17th 0830	June 17th 2200	6	1115	1	500	1615
June 17th 2230	June 18th 0700	9	1124	0	500	1624
June 18th 0730	June 18th 2000	0	1124	0	500	1624
June 18th 2030	June 19th 0800	9	1133	0	500	1633
June 19th 0830	June 19th 2300	0	1133	0	500	1633
June 19th 2315	June 20th 0630	1	1134	0	500	1634
June 21st 0700	June 21st 2100	3	1137	0	500	1637
June 21st 2130	June 22nd 0800	3	1140	0	500	1640
June 22nd 0830	June 22nd 2400	0	1140	0	500	1640
June 23rd 0030	June 23rd 0830	4	1144	0	500	1644
June 23rd 0900	June 23rd 2000	4	1148	0	500	1648
June 23rd 2030	June 24th 0800	0	1148	0	500	1648
June 24th 0830	June 24th 2000	0	1148	0	500	1648
June 24th 2015	June 25th 0800	0	1148	0	500	1648
July 11th 0830	July 11th 2100	7	1155	0	500	1655
July 11th 2130	July 12th 0800	13	1168	0	500	1668
July 12th 0830	July 12th 2145	2	1170	0	500	1670
July 12th 2200	July 13th 0800	8	1178	0	500	1678
July 13th 0830	July 13th 2100	16	1194	0	500	1694
July 13th 2115	July 14th 0800	31	1225	0	500	1725

TABLE 7 - Cont'd.

Date and Time Set		Date and Time Hauled		Fry Daily	Fry Accum.	Smolts Daily	Smolts Accum.	Total Accum. Catch
July 14th	0830	July 14th	2300	8	1233	0	500	1733
July 14th	2320	July 15th	0800	16	1249	0	500	1749
July 15th	0830	July 15th	2200	11	1260	0	500	1760
July 15th	2215	July 16th	0830	14	1274	0	500	1774
July 16th	0900	July 16th	2100	16	1290	0	500	1790
July 16th	2115	July 17th	0800	6	1296	0	500	1796
July 17th	0830	July 17th	2100	16	1312	0	500	1812
July 17th	2115	July 18th	0600	16	1328	0	500	1828
July 19th	0800	July 19th	2200	21	1349	0	500	1849
July 19th	2215	July 20th	0830	24	1373	0	500	1873
July 20th	0900	July 20th	2200	15	1388	0	500	1888
July 20th	2215	July 21st	0930	8	1396	0	500	1896
July 21st	1000	July 21st	2100	22	1418	0	500	1918
July 21st	2115	July 22nd	0800	23	1441	0	500	1941
July 22nd	0830	July 22nd	2100	25	1466	0	500	1966
July 22nd	2115	July 23rd	0830	24	1490	0	500	1990
July 23rd	0900	July 23rd	2100	33	1523	0	500	2023
July 23rd	2115	July 24th	0930	20	1543	0	500	2043
July 24th	1000	July 24th	2100	16	1559	0	500	2059
July 24th	2115	July 25th	0830	15	1574	0	500	2074
July 25th	0900	July 25th	2000	11	1585	0	500	2085
July 25th	2015	July 26th	0830	19	1604	0	500	2104
July 26th	0900	July 26th	1900	10	1614	0	500	2114
July 26th	1915	July 27th	0830	11	1625	0	500	2125
July 27th	0900	July 27th	1900	6	1631	0	500	2131
July 27th	1915	July 28th	0830	17	1648	0	500	2148
July 28th	0900	July 28th	2200	19	1667	0	500	2167
July 28th	2215	July 29th	0900	16	1683	0	500	2183
July 29th	0930	July 29th	1800	8	1691	0	500	2191
July 29th	1815	July 30th	0830	14	1705	0	500	2205
July 30th	0900	July 30th	2100	17	1722	0	500	2222
July 30th	2115	July 31st	0830	14	1736	0	500	2236
July 31st	0900	July 31st	1900	9	1745	0	500	2245
July 31st	1915	Aug. 1st	0900	12	1757	0	500	2257
Aug. 1st	0930	Aug. 1st	2200	13	1770	0	500	2270
Aug. 1st	2215	Aug. 2nd	0800	14	1784	0	500	2284
Aug. 2nd	0830	Aug. 2nd	1900	10	1794	0	500	2294
Aug. 2nd	1915	Aug. 3rd	0830	5	1799	0	500	2299
Aug. 3rd	0900	Aug. 3rd	1900	10	1809	0	500	2309
Aug. 3rd	1930	Aug. 4th	0830	10	1819	0	500	2319
Aug. 4th	0900	Aug. 4th	2130	17	1836	0	500	2336
Aug. 4th	2200	Aug. 5th	0830	6	1842	0	500	2342
Aug. 5th	0900	Aug. 5th	1930	7	1849	0	500	2349
Aug. 5th	1945	Aug. 6th	0830	6	1855	0	500	2355
Aug. 6th	0900	Aug. 6th	2100	16	1871	0	500	2371
Aug. 6th	2115	Aug. 7th	0830	5	1876	0	500	2376
Aug. 7th	0900	Aug. 7th	1900	11	1877	0	500	2387
Aug. 7th	1915	Aug. 8th	0800	7	1894	0	500	2394

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TABLE 7 - Cont'd.

Date and Time Set	Date and Time Hauled	Fry		Smolts		Total Accum. Catch
		Daily	Accum.	Daily	Accum.	
Aug. 8th 0830	Aug. 8th 2100	9	1903	0	500	2403
Aug. 8th 2115	Aug. 9th 0830	6	1909	0	500	2409
Aug. 9th 0900	Aug. 9th 2000	7	1916	0	500	2416
Aug. 9th 2015	Aug. 10th 0830	3	1919	0	500	2419
Aug. 10th 0900	Aug. 10th 1900	5	1924	0	500	2424
Aug. 10th 1915	Aug. 11th 0830	4	1928	0	500	2428
Aug. 11th 0900	Aug. 11th 2000	5	1933	0	500	2433
Aug. 11th 2015	Aug. 12th 0900	3	1936	0	500	2436
Aug. 12th 0930	Aug. 12th 2000	3	1939	0	500	2439
Aug. 12th 2015	Aug. 13th 0830	3	1941	0	500	2441
Aug. 13th 0900	Aug. 13th 2100	3	1944	0	500	2444
Aug. 13th 2115	Aug. 14th 0830	4	1948	0	500	2448
Aug. 14th 0900	Aug. 14th 2000	3	1951	0	500	2451
Aug. 14th 2015	Aug. 15th 0830	3	1954	0	500	2454
Aug. 15th 0900	Aug. 15th 1900	2	1956	0	500	2456
Aug. 15th 1915	Aug. 16th 0830	3	1959	0	500	2459
Aug. 16th 0900	Aug. 16th 1900	4	1963	0	500	2463
Aug. 16th 1915	Aug. 17th 0830	7	1970	0	500	2470
Aug. 17th 0900	Aug. 17th 1900	5	1975	0	500	2475
Aug. 17th 1915	Aug. 18th 0830	4	1979	0	500	2479
Aug. 18th 0900	Aug. 18th 2000	5	1984	0	500	2484
Aug. 18th 2015	Aug. 19th 0830	3	1987	0	500	2487
Aug. 19th 0900	Aug. 19th 2000	7	1994	0	500	2494
Aug. 19th 2015	Aug. 20th 0830	13	2007	0	500	2507
Aug. 20th 2015	Aug. 21st 0830	6	2013	0	500	2513
Aug. 21st 0900	Aug. 21st 1900	7	2020	0	500	2520
Aug. 21st 1930	Aug. 22nd 0830	5	2025	0	500	2525
Aug. 22nd 0900	Aug. 22nd 1900	6	2031	0	500	2531
Aug. 22nd 1915	Aug. 23rd 0830	4	2035	0	500	2535
Aug. 23rd 0900	Aug. 23rd 1930	7	2041	0	500	2541
Aug. 23rd 1945	Aug. 24th 0830	6	2047	0	500	2547
Aug. 24th 0900	Aug. 24th 1915	6	2053	0	500	2553
Aug. 24th 1930	Aug. 25th 0830	4	2057	0	500	2557
Aug. 25th 0900	Aug. 25th 1830	13	2070	0	500	2570
Aug. 25th 1845	Aug. 26th 0830	4	2074	0	500	2574
Aug. 26th 0900	Aug. 26th 2000	7	2081	0	500	2581
Aug. 26th 2015	Aug. 27th 0830	5	2086	0	500	2586
Aug. 27th 0900	Aug. 27th 1830	7	2093	0	500	2593
Aug. 27th 1845	Aug. 28th 0830	4	2097	0	500	2597
Aug. 28th 0900	Aug. 28th 1930	6	2103	0	500	2603
Aug. 28th 1945	Aug. 29th 0830	6	2109	0	500	2609
Aug. 29th 0900	Aug. 29th 1900	7	2116	0	500	2616
Aug. 29th 1915	Aug. 30th 0830	4	2120	0	500	2620
Aug. 30th 0900	Aug. 30th 1900	8	2128	0	500	2628
Aug. 30th 1915	Aug. 31st 0830	4	2132	0	500	2632
Sep. 1st 0830	Sep. 1st 1900	10	2142	0	500	2642
Sep. 1st 1915	Sep. 2nd 0830	3	2145	0	500	2645
Sep. 2nd 0900	Sep. 2nd 1900	7	2152	0	500	2652
Sep. 2nd 1915	Sep. 3rd 0830	4	2156	0	500	2656

TABLE 7 - Cont'd.

Date and Time Set		Date and Time Hauled		Daily	Accum.	Daily	Accum.	Total Accum. Catch
Sep. 3rd	0900	Sep. 3rd	1900	10	2166	0	500	2666
Sep. 3rd	1915	Sep. 4th	0830	4	2170	0	500	2670
Sep. 4th	0900	Sep. 4th	1900	11	2181	0	500	2681
Sep. 4th	1915	Sep. 5th	0830	3	2184	0	500	2684
Sep. 5th	0900	Sep. 5th	1900	7	2191	0	500	2691
Sep. 5th	1915	Sep. 6th	0830	4	2195	0	500	2695
Sep. 7th	0830	Sep. 7th	1900	11	2206	0	500	2706
Sep. 7th	1915	Sep. 8th	0830	4	2210	0	500	2710
Sep. 8th	0900	Sep. 8th	1900	6	2216	0	500	2716
Sep. 8th	1915	Sep. 9th	0830	7	2223	0	500	2723
Sep. 9th	0900	Sep. 9th	1900	5	2228	0	500	2728
Sep. 9th	1915	Sep. 10th	0830	6	2234	0	500	2734
Sep. 10th	0900	Sep. 10th	1900	6	2240	0	500	2740
Sep. 10th	1915	Sep. 11th	0830	3	2243	0	500	2743
Sep. 11th	0900	Sep. 11th	1900	6	2249	0	500	2749
Sep. 11th	1915	Sep. 12th	0830	4	2253	0	500	2753
Sep. 12th	0900	Sep. 12th	1900	4	2257	0	500	2757
Sep. 12th	1915	Sep. 13th	0830	2	2259	0	500	2759
Sep. 13th	0900	Sep. 13th	1900	0	2259	0	500	2759
Sep. 13th	1915	Sep. 14th	0830	2	2261	0	500	2761
Sep. 14th	0900	Sep. 14th	1900	1	2262	0	500	2762
Sep. 14th	1915	Sep. 15th	0830	2	2264	0	500	2764
Sep. 15th	0900	Sep. 15th	1900	1	2265	0	500	2765
Sep. 15th	1915	Sep. 16th	0830	2	2267	0	500	2767
Sep. 16th	0900	Sep. 16th	1900	1	2268	0	500	2768
Sep. 21st	1300	Sep. 21st	1900	1	2269	0	500	2769
Sep. 21st	1915	Sep. 22nd	0830	5	2274	0	500	2774
Sep. 22nd	0900	Sep. 22nd	1900	2	2276	0	500	2776
Sep. 22nd	1915	Sep. 23rd	0830	4	2280	0	500	2780
Sep. 23rd	0900	Sep. 23rd	1430	3	2283	0	500	2783
Sep. 27th	1700	Sep. 28th	0830	5	2288	0	500	2788
Sep. 28th	0900	Sep. 28th	1800	4	2292	0	500	2792
Sep. 28th	1815	Sep. 29th	0830	5	2297	0	500	2797
Sep. 29th	0900	Sep. 29th	1800	2	2299	0	500	2799
Sep. 29th	1815	Sep. 30th	0830	2	2301	0	500	2801
Sep. 30th	0900	Sep. 30th	1800	1	2302	0	500	2802
Sep. 30th	2200	Oct. 1st	0830	2	2304	0	500	2804
Oct. 1st	0900	Oct. 1st	1800	0	2304	0	500	2804
Oct. 1st	1815	Oct. 2nd	0830	1	2305	0	500	2805
Oct. 2nd	0900	Oct. 2nd	1800	0	2305	0	500	2805
Oct. 2nd	1815	Oct. 3rd	0830	1	2306	0	500	2806
Oct. 3rd	0900	Oct. 3rd	1800	0	2306	0	500	2806
Oct. 3rd	1815	Oct. 4th	0830	0	2306	0	500	2806
Oct. 4th	0900	Oct. 4th	1800	1	2307	0	500	2807
Oct. 4th	1815	Oct. 5th	0830	2	2309	0	500	2809
Oct. 16th	0830	Oct. 16th	0800	2	2311	0	500	2811
Oct. 23rd	0830	Oct. 23rd	2400	2	2313	0	500	2813
Oct. 24th	0700	Oct. 24th	1900	4	2317	0	500	2817
Oct. 25th	0700	Oct. 25th	1700	2	2319	0	500	2819
Oct. 26th	0930	Oct. 26th	1630	2	2321	0	500	2821

TABLE 8

DAILY CATCHES OF JUVENILE CHINOOK SALMON CAPTURED BY 4' x 4' INCLINED PLANE SAMPLING TRAP FROM THE UPPER FRASER RIVER, NEAR SHELLEY, BETWEEN MAY 19 AND AUGUST 27, 1960.

Date and Time Set		Date and Time Hauled		Fry		Smolts		Total Accum. Catch
				Daily	Accum.	Daily	Accum.	
May 19	1230	May 19	1930	0	0	9	9	9
May 19	2000	May 20	0810	0	0	8	17	17
May 20	0845	May 20	2000	0	0	13	30	30
May 20	2020	May 21	0730	0	0	2	32	32
May 21	0800	May 21	2100	0	0	12	44	44
May 21	2110	May 22	0700	1	1	3	47	48
May 22	0800	May 22	2200	0	1	7	54	55
May 22	2300	May 23	0700	1	2	3	57	59
May 24	1900	May 24	2200	0	2	2	59	61
May 24	2210	May 25	0700	0	2	1	60	62
May 25	0710	May 25	2000	0	2	14	74	76
May 25	2210	May 26	0800	0	2	6	80	82
May 26	0815	May 26	2100	0	2	11	91	93
May 26	2100	May 27	0800	0	2	2	93	95
May 27	0815	May 27	2300	0	2	6	99	101
May 27	2310	May 28	0900	0	2	2	101	103
May 29	1400	May 29	2000	0	2	4	105	107
May 29	2010	May 30	0800	1	3	3	108	111
May 30	0830	May 30	2230	0	3	1	109	112
May 30	2240	May 31	0800	0	3	1	100	113
May 31	0830	May 31	2400	0	3	1	111	114
Jne.1	0010	Jne.1	0730	0	3	0	111	114
Jne.1	0800	Jne.1	2330	0	3	4	115	118
Jne.1	2340	Jne.2	0930	0	3	4	119	122
Jne.2	0940	Jne.2	2400	0	3	7	126	129
Jne.3	0010	Jne.3	0730	0	3	0	126	129
Jne.3	0745	Jne.3	2300	0	3	1	127	130
Jne.3	2310	Jne.4	0830	0	3	4	131	134
Jne.5	1400	Jne.5	2345	0	3	2	133	136
Jne.5	2400	Jne.6	0800	0	3	0	133	136
Jne.6	0810	Jne.6	2100	0	3	3	136	139
Jne.7	0800	Jne.7	2300	0	3	1	137	140
Jne.10	2215	Jne.11	0715	0	3	1	138	141
Jne.14	0730	Jne.14	2345	0	3	1	139	142
Jne.19	1700	Jne.19	2345	1	4	1	140	144
Jly.6	0900	Jly.6	1430	1	5	0	140	145
Jly.15	0900	Jly.15	1630	1	6	0	140	146
Jly.18	0900	Jly.18	1630	2	8	1	141	149
Jly.19	1200	Jly.19	2300	2	10	0	141	151
Jly.20	0900	Jly.20	1630	3	13	0	141	154
Jly.21	0830	Jly.21	1630	1	14	2	143	157
Jly.22	0900	Jly.22	1530	1	15	0	143	158
Jly.23	0930	Jly.23	1600	2	17	0	143	160
Jly.25	0900	Jly.25	1615	0	17	1	144	161
Jly.26	0900	Jly.26	2230	3	20	0	144	164
Jly.26	2245	Jly.27	0800	0	20	1	145	165

TABLE 8 - Cont'd.

Date and Time Set		Date and Time Hauled		Fry		Smolts		Total Accum. Catch
				Daily	Accum.	Daily	Accum	
Jly.27	0815	Jly.27	1400	3	23	1	146	169
Jly.29	0800	Jly.29	1830	3	26	0	146	172
Jly.30	0900	Jly.30	1400	0	26	0	146	172
Aug.3	2345	Aug.4	0800	3	29	0	146	175
Aug.4	0815	Aug.4	1400	1	30	0	146	176
Aug.8	0900	Aug.8	1600	2	32	0	146	178
Aug.10	1000	Aug.10	1700	1	33	0	146	179
Aug.12	0900	Aug.12	1600	1	34	0	146	180
Aug.13	0930	Aug.13	1430	1	35	0	146	181
Aug.15	1030	Aug.15	1600	3	38	0	146	184
Aug.18	0930	Aug.18	1530	2	40	0	146	186
Aug.19	2045	Aug.20	0900	3	43	0	146	189
Aug.22	0930	Aug.22	1630	5	48	0	146	194
Aug.22	1645	Aug.23	0900	2	50	0	146	196
Aug.23	0915	Aug.23	1600	6	56	0	146	202
Aug.24	1000	Aug.24	1630	4	60	0	146	206
Aug.25	0930	Aug.25	1500	4	64	0	146	210
Aug.26	1200	Aug.26	2000	2	66	0	146	212
Aug.27	0915	Aug.27	1200	1	67	0	146	213
Aug.27	1700	Aug.28	1100	7	74	0	146	220

TABLE 9

FISH SPECIES OTHER THAN SALMON CAPTURED IN 4' x 4' INCLINING PLANE TRAPS AT THE CLEARWATER AND FRASER RIVER SAMPLING SITES in 1960

CLEARWATER

Date	Time	Fine Scaled Sucker	Red Side Shiner	Squaw Fish	Sculpin	Trout	White Fish
May 11 & 12	2330-0730		1				
12 & 13	2030-0239		2				
16	1645-2400	1					
17 & 18	2200-0600	2		1			
18 & 19	2230-0600	1					
19 & 20	2245-0700	1					
22	0015-0615	1					
22 & 23	2300-0630	1					
24	0100-0600		1				
25	2015-2400	1					
26	0015-0520	1		1			
28	0345-0630	2					
29	1015-1415	1					
31	0430-0830	4		1			
Jne. 1	1800-0900	1		1			
1 & 2	2330-2300	2					
4	1845-2300	4					
5	1630-2300		1				
7	1830-2300		1				
7 & 8	2330-2300	4					
9	2315-0800	3					
9 & 10	2130-0800	1					
10	2045-2400		1				
16	2115-2400	1					
17	2430-0800		2				
17 & 18	2230-0700			1			
18	2030-2400	3					
19	0030-0800	1	1				
21	0700-1200	1	3				
22	2130-2400		2				
23	0030-0830		1				
Jly. 11 & 12	2100-0800	1	12				
12 & 13	2200-0800	5	5				
13 & 14	2115-0800	3	14		1		
14 & 15	2320-0800	6	2				
20 & 21	2215-0930	1	3				
21 & 22	1000-0830		3				
22 & 23	0900-0830	3					
23 & 24	2115-0930	1	2				
24 & 25	2015-0830	2	2				

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TABLE 9 - Cont'd

CLEARWATER

Date	Time	Fine Scaled Shiner	Red Side Shiner	Squaw Fish	Sculpin	Trout	White Fish
Aug. 1	0900-1200	2					
2	1900-0830		3				
10	1900-0830		2				
11	1900-0830		4				
12	1900-0830		3				
14	1900-0830		1				
29	1900-0830		4				
30	1900-0830		1				
Sep. 4	0830-1300		3				
29	1300-1800					1	
29 &30	1830-0730						1
Oct. 3	1815-0830		3				
5	1815-0830		1				
10	0830-1300		1				
16	1315-1800		2				
		61	87	5	1	1	1

FRASER				Peamouth Chub *		
May 19	2000-2115		1	1			
22 &23	2300-0700				2		
25 &26	2210-0230			1			
" "	" "			1			
26 &27	2110-0100			1			
27	0110-0800			1			
"	1240-1630		1				
31	0830-1200			2			
May 31-							
Jne.1	2400-0730			1			
Jne.2	2130-2400			2			
5	2140-2345				1		
7	1215-1800				1		
10 &11	2215-0715			1			
19	1840-2030			2			
20	1245-1400			2			
20	1710-2000						
21	1110-1430						1
27	0815-1000						1
"	1220-1420						
Jly.5	0930-1630					1	
26 &27	2245-0800			3			

TABLE 9 - Cont'd

FRASER

Date	Time	Fine Scaled Shiner	Red Side Shiner	Squaw Fish	Peamouth Chub	Trout	White Fish
Aug. 3	1800-2330			2			
3 & 4	2345-0800			1			
5	0800-1500			1			
15	1030-1600		1				
22 & 23	1545-0900		1				
			4	22	4	1	2

* No Sculpin in Fraser Trap Catches.

TABLE 10

NUMBER AND PERCENT OF TOTAL JUVENILE CHINOOK SALMON CAPTURED EACH WEEK OF SAMPLING AT THE CLEARWATER AND FRASER RIVERS IN 1960.

Time Interval	CLEARWATER				FRASER			
	Fry		Smolts		Fry		Smolts	
	No.	%	No.	%	No.	%	No.	%
May 9 - 14	81	3.49	179	35.9				
15 - 21	293	12.61	189	37.9	0	0.00	44	30.1
22 - 28	294	12.66	63	12.6	2	2.70	57	39.0
29 - 4	264	11.37	49	9.8	1	1.35	30	20.5
Jne. 5 - 11	146	6.29	18	3.6	0	0.00	7	4.79
12 - 18	46	1.98	2	0.4	0	0.00	1	0.69
19 -25	24	1.03			1	1.35	1	0.69
26 - 2					0	0.00	0	0.00
Jly. 3 - 9					1	1.35	0	0.00
10 - 16	142	6.12			1	1.35	0	0.00
17 - 23	233	10.01			11	14.88	3	2.05
24 - 30	199	8.57			9	12.18	3	2.05
31 - 6	149	6.43			4	5.41		
Aug. 7 - 13	73	3.14			5	6.75		
14 - 20	63	2.71			8	10.80		
21 - 27	86	3.70			31	41.90		
28 - 3	73	3.14						
Sep. 4 - 10	74	3.19						
11 - 17	28	1.20						
18 - 24	15	0.65						
25 - 1	21	0.90						
Oct. 2 - 8	5	0.28						
9 - 15	0	0.00						
16 - 22	2	0.09						
23 - 29	10	0.43						
	2321	99.99	500	100.2	74	100.12	146	99.87

TABLE 11

LENGTH - FREQUENCY DATA FOR JUVENILE SALMONIDS AND OTHER SPECIES SAMPLED DURING 1960.

Chinook Salmon Fry Sampling From 4' x 4' Inclined Plane Trap, Clearwater River Near Mouth, 1960

X=Size (mm)	May 22	May 26	Total May	June 8	June 9	June 10	June 11	June 12	June 16	June 17	June 18	June 19	Total June
30	1		1						-	1			1
1				1									1
2				1						1	1		4
3		1	1	2	4		2	3	1	3		2	17
4				2	5	1	4	2	2	2			18
35	1	1	2	4	5	1	1	1	1	1	1	2	17
6	4	1	5		2	1			2	2	1		8
7		2	2	3			1			1			5
8	1		1	1	1	1		1					4
9	1		1		1	1	1			2	1		6
40		1	1	1	1					1	1		4
1									1	1			2
2					1								1
3		1	1					1					1
4													
45													
6												1	1
7													
8													
9													
50													
1						1							1
2													
3													
4													
55													
6					1								1
N =	8	7	15	16	21	6	9	8	7	15	5	5	92
Sum fx =	286	261	547	558	764	233	313	283	249	532	182	182	3296
$\bar{x}$ =	35.75	37.28	36.46	34.87	36.38	38.83	34.77	35.37	35.57	35.46	36.40	36.40	35.82

TABLE 11 - Cont'd

Clearwater River Sampling Cont'd.

X=Size (mm)	July 11	July 13	July 14	July 15	July 20	July 22	July 23	July 26	July 27	July 28	July 29	Total July
32												
3												
4												
35	1	1										2
6		2										2
7									1			1
8		3						1				4
9							1			1		2
40		3		1	1	1		1	2			9
1		3	3	1			2	1				10
2				3		1	1		1	1		7
3	1		3	1				1	3	2		11
4			3		1		1	4	2	2	6	19
45	1		3		1	2	3	1		1	1	13
6	1		1		1	2	1	1	3	1	4	15
7	2		3			2	1			4	3	15
8			3				3		1	3	3	13
9			3		4		4	1	2	2	5	21
50			2	1	2		4	2	1	2	3	17
1	1		1	1		2	2	1	2	2	3	15
2			3	3			1		1	1	2	11
3				2					1	1	1	5
4			1		1		2	1				5
55				1		1	2					4
6					2	1		2		1		6
7											1	1
8					2	4	1					7
9			1			1	1					3
60			1				1					2
1							1		1			2
2								1				1
3					1							1
4							1					1
65					1		1					2
6							1		1			2
7												
8												
69							2					2

N	=	7	12	31	14	17	17	37	18	22	24	32	231
Sum fx	=	314	464	1477	668	881	862	1918	817	1044	1139	1540	11124
$\bar{x}$	=	44.85	38.66	47.64	47.71	51.82	50.70	51.83	45.38	47.45	47.45	48.12	48.15

TABLE 11 - Cont'd.

Clearwater River Sampling Cont'd.

X=Size (mm)	Aug. 1	Aug. 2	Aug. 3	Aug. 4	Aug. 5	Aug. 8	Aug. 9	Aug. 10	Aug. 11	Aug. 12	Aug. 13	Aug. 15	Aug. 16
32													
3													
4													
35													
6													
7													
8													
9													
40							1	1					
1	1						2						
2		1	1			1	3						
3	2	1		1		1	2	1					
4	2	2	1	2	2	2	1	1	1				1
45	2	2	2			1		1					
6	3	2	3	1	3	1	3	2	1			1	1
7	4	1	4	1	5	2	1	2	1	1	1	1	
8	5	1	2	1	1		2	1		1			
9	3	4	4	3	5	1	3	1		2	2	1	3
50	1	1	3	2	2		2	1	1	1	1	1	1
1	2		2	1	1		1	1	1		1		
2			1	1	2		2						
3			2		1		1	1		1	1		1
4			2					1				1	
55													
6			1										
7							1						
8							1	1					
9							1						
60													
1													
2													
3								1					
N =	25	15	28	13	22	9	27	16	5	6	6	5	7
Sum fx =	1170	696	1368	622	1062	407	2308	784	238	296	299	246	340
$\bar{x}$ =	46.80	46.00	48.85	47.84	48.27	45.22	49.10	49.00	47.60	49.33	49.83	49.20	48.57

TABLE 11 - Cont'd.

Clearwater River Sampling Cont'd.

X=Size (mm)	Aug. 17	Aug. 18	Aug. 19	Aug. 20	Aug. 21	Aug. 25	Aug. 26	Aug. 27	Aug. 28	Aug. 29	Aug. 30	Aug. 31	Total Aug.
30													
1						1							1
2													
3						1							1
4													
35													
6													
7													
8													
9													
40			1						1				4
1						1	1		1		1		7
2													6
3					1			1			1	1	12
4	1	1	1	2	1						1		22
45	1	1	1	1	1								13
6		1	1	1	2	1							27
7	1			2	1		1	2	1	2			34
8	1			1	2		1	1	1	2			23
9	2	1	1	1	3	1	2	1	2	1	3	1	51
50	2	2	1	2	4	1	2	2	1	1	1		36
1	1			1	5	1	1	1	1	2		1	24
2	2	1	1						1				11
3	1	2		1				2	1	1	2		18
4			1			1	1				1		8
55						2							2
6			1				1	1	1	1		1	7
7				1	1		1	1					5
8													2
9										1			2
60			1			1				1			3
1			1										1
2											1		1
3									1		1		3
4													
65						1							1
6													
7													
8													
9													
70			1										1
1													
2													
3													
4						1				1			2
N =	12	9	12	13	21	13	11	12	12	13	12	4	328
Sum fx =	590	442	627	631	1026	664	552	604	599	693	610	199	16053
$\bar{x}$ =	49.16	49.11	52.25	48.53	48.85	51.07	50.18	50,33	49.91	53.30	50.83	49.75	48.94

TABLE 11 - Cont'd.

Clearwater River Sampling Cont'd.

X=Size (mm)	Sept. 1	Sept. 2	Sept. 3	Sept. 4	Sept. 6	Sept. 7	Sept. 8	Sept. 9	Sept. 10	Sept. 11	Sept. 12	Sept. 13	Sept. 14
40												1	
1		1	1							1			
2													
3				1						1	1		1
4							1						
45													
6	1									1			1
7		1		1				1	1		1		
8	1	1		1						1			
9	1	1	2		1	1	1	1	1	1			
50		1	1	2	1		1	1					
1			1				1	1		2			
2			1	1				1	1				
3	1	1		1		1	1		2		1		
4			1						1		1		
55				1									
6	1	1	3	1		1	1			1			1
7			2	1	1								
8		1		1			1		1				
9	1			1									
60		1				2	2			1	1		
1	1			1		2	1	1					
2		1	1						2		2		
3					1	1		1			1		
4									1				
65						1							
6				1				1				1	
7													
8			1										
9				1									
70													
1													
2						1							
3	1					1		1	1				
4								1					
75	1												
6	1					1	1	1	1				
N =	10	10	14	15	4	12	11	11	12	9	8	2	3
Sum fx=	596	524	758	824	219	749	618	662	703	445	444	106	145
$\bar{x}$ =	59.60	52.40	54.14	54.93	54.75	62.41	56.18	60.18	58.58	49.44	55.50	53.00	48.33

TABLE 11 - Cont'd.

Clearwater River Sampling cont'd.

X=Size (mm)	Sept. 15	Sept. 16	Sept. 21	Sept. 22	Sept. 23	Sept. 27	Sept. 28	Sept. 29	Total Sept.
40									1
1									3
2	1								1
3	1								5
4									1
45									
6		1							4
7									5
8						1			5
9									10
50		1							8
1				1		1	1		8
2						1		1	6
3								1	9
4						1	1		5
55									1
6		1	1		1				13
7					1				5
8	1			1	1				7
9						1	1		4
60				1		1			9
1					2	2	1	1	12
2									6
3				1	1				6
4									1
65						1	1		3
6					1				4
7				1					1
8									1
9									1
70									
1									
2				1					2
3				1					5
4									1
75									1
6									5
N =	3	3	1	7	7	9	5	3	159
Sum fx =	143	152	56	444	422	511	290	166	8977
$\bar{x}$ =	47.66	50.66	56.00	63.42	60.28	56.77	58.00	55.33	56.45

TABLE 11 - Cont'd

Clearwater River Sampling Cont'd.

X=Size (mm)	Oct. 1	Oct. 2	Oct. 3	Oct. 4	Oct. 5	Oct. 16	Oct. 23	Oct. 24	Oct. 25	Oct. 26	Total Oct.
43				1							1
4											
45											
6											
7											
8											
9					1						1
50											
1											
2	1										1
3											
4											
55											
6		1			1	1					3
7											
8											
9										1	1
60											
1	1					1		1	1	1	5
2			1				1				2
3											
4								2			2
65								1			1
6							1				1
7									1		1
8							1				1
N =	2	1	1	1	2	2	3	4	2	2	20
Sum fx=	113	56	62	43	105	117	196	254	128	120	1194
$\bar{x}$ =	56.50	56.00	62.00	43.00	52.50	58.50	65.33	63.50	64.00	60.00	59.70

TABLE 11 - Cont'd

Chinook Salmon Fry Sampling from 4' x 4' Inclined Plane Trap, Fraser River, near Salmon River, 1960.

X=Size (mm)	July 15	July 18	July 19	July 20	July 21	July 22	July 23	July 25	July 26	July 27	July 29	Total July
40							1		1			2
1												
2												
3	1											1
4												
45				1			1		1	1		4
6												
7												
8										1		1
9												
50			1			1			1	1		4
1												
2			1									1
3												
4												
55		2		1							1	4
6												
7												
8												
9												
60				1	1						1	3
1												
2												
3												
4												
65								1				1
6												
7												
8					1							
9												
70					1					2		3
1												
2												
3												
4												
75		1										

N	=	1	3	2	3	3	1	2	1	3	5	2	24
Sum fx	=	43	185	102	160	198	50	85	65	135	283	115	1278
$\bar{x}$	=	43.00	61.66	51.00	53.33	66.00	50.00	42.50	65.00	45.00	56.60	57.50	53.25

TABLE 11 - Cont'd.

Fraser River Sampling Cont'd.

X=Size (mm)	Aug. 4	Aug. 8	Aug. 10	Aug. 12	Aug. 13	Aug. 15	Aug. 18	Aug. 20	Aug. 22	Aug. 23	Aug. 24
40						1	1			1	
1											
2											
3											
4											
45	1									1	
6											
7											
8											
9											
50		1		1	1	1	1	2	1		1
1											
2											
3											
4											
55	1					1		1	1	5	
6											
7											
8											
9											
60	2								2	1	
61											
2											
3											
4											
65			1						1	1	1
6											
7											
8											
9											
70											2
N =	4	1	1	1	1	3	2	3	5	9	4
Sum fx =	220	50	65	50	50	145	90	155	290	485	255
$\bar{x}$ =	55.00					48.33	45.00	51.66	58.00	53.88	51.37

TABLE 11 - Contd'.

Fraser River Sampling Cont'd.

X=Size (mm)	Aug. 25	Aug. 26	Aug. 27	Total Aug.
40				3
1				
2				
3				
4				
45				2
6				
7				
8				
9				
50	1			10
1				
2				
3				
4				
55	1			9
6				
7				
8				
9				
60	1	1		7
1				
2				
3				
4				
65	1		1	6
6				
7				
8				
9				
70				3
N =	4	2	1	40
Sum fx =	230	130	65	2225
$\bar{x}$ =	50.75	65.00		55.62

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TABLE 11 - Cont'd.

LENGTH DATA FOR OTHER SPECIES AND LOCATIONS OF CAPTURE, 1960

Date	Location	Species	Number	Length (mm)	Remarks
May 12	Clearwater River	Red Side Shiner	1	79	Preserved sample
May 19	Fraser River	Red Side Shiner	1	60	Preserved Sample
May 19	Fraser River	Squaw Fish	1	46	No sample
May 22	Clearwater River	Fine Scale Sucker	1	135	Preserved Sample
May 22	Clearwater River	Fine Scale Sucker	1	66	Preserved Sample
May 22	Clearwater River	Fine Scale Sucker	1	64	Preserved Sample
May 25-26	Raft River	Chinook	4	34)	
			6	35)	Taken by Fyke Net -
			5	36)	Sample Preserved
			7	37)	
			2	38)	
June 22	Lemieux Creek	Coho	2	27)	
			3	28)	
			1	29)	Fyke Net -
			2	30)	Preserved Sample
			1	31)	
			1	33)	

LENGTH DATA, CHINOOK SALMON SMOLTS, FROM CLEARWATER AND FRASER RIVER TRAPPINGS, 1960

Date	Location	Fork Length (mm)	Eye-Hypural Length (mm)
May 22	Clearwater River	98	87
		92	83
		92	83
		86	76
		87	79
		91	82
		78	68
		84	75
		80	72
		-	72
		-	83
		-	75
		-	87
		-	82
		-	93
		-	90
		-	89
		-	79
June 8	Clearwater River	-	89
		-	89
June 9	Clearwater River	-	89
		-	92
		94	85
		93	82
June 10	Clearwater River	-	99

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TABLE 11 - Cont'd.

Length Data, Chinook Salmon Smolts, From Clearwater and Fraser River Trappings, 1960 Cont'd.

Date	Location	Fork Length (mm)	Eye-Hypural Length (mm)
June 10	Clearwater River	-	83
		-	88
		-	91
May 19	Fraser River	78	-
		77	-
		82	-
		82	-
		83	-
		81	-
		73	-

TABLE 12

MAXIMUM, MINIMUM AND MEAN DAILY WATER TEMPERATURES RECORDED IN 1960, BY TAYLOR THERMOGRAPH RECORDERS, AT: TETE JAUNE BRIDGE-FRASER RIVER, NEAR CHURCH'S MILL-MCGREGOR RIVER, CARIBOO BREWERY, PRINCE GEORGE-NECHAKO RIVER, AND FROMTHE NORTH THOMPSON RIVER NEAR NORTH KAMLOOPS, B.C.

FRASER RIVER- TETE JAUNE

Date		Maximum	Minimum	Mean	Date		Maximum	Minimum	Mean
Installed July 14,									
1960 @ 1530-2400		52	49	50.5	Aug.	23	53.5	49.5	51.5
July	15	52	47	49.5		24	51	49	50.0
	16	53	48	50.5		25	52.5	49.5	51.25
	17	52.5	48.5	50.5		26	53.5	49.5	51.5
	18	53	49	51		27	53.5	50	51.75
	19	53	49	51		28	50.5	48.5	49.5
	20	54	47	50.5		29	53	48.5	50.75
	21	56	50	53		30	52.5	48.5	50.5
	22	53	49.5	51.25		31	52	50	51.0
	23	50	46.5	48.25	Sep.	1	53	47.5	50.25
	24	50	46	48.0		2	54.5	49.5	52.0
	25	49.5	47.5	48.5		3	54	48	51.0
	26	57	49	53		4	51.5	49	50.25
	27	56	49	52.50		5	49.5	47.5	48.5
	28	56	49	52.50		6	48	46.5	47.25
	29	56	50	53.00		7	51	46.5	48.75
	30	57.5	51.5	54.5		8	51.5	45.5	48.5
	31	54	51	52.5		9	52.5	45.5	49.0
Aug.	1	56	50	53		10	53.5	47.5	50.5
	2	57.5	54	55.75		11	53.5	48.5	51.0
	3	58	54	56		12	53.5	48.5	51.0
	4	55.5	49.5	52.5		13	54.5	49.5	52.0
	5	53.5	49	51.25		14	51.5	46.5	49.0
	6	54.5	49.5	51.5		15	51	47	49.0
	7	55	48.5	51.75		16	50	45	47.5
	8	58.5	51.5	55		17	51	47	49
	9	58.5	52	55.25		18	49	48	48.5
	10	58.5	52.5	55.5		19	48	46.5	47.25
	11	58.5	52.5	55.5		20	48.5	45.5	47.0
	12	56.5	52.0	54.25		21	50	46.5	48.25
	13	53	50	51.5		22	49	47.5	48.25
	14	50.5	48.5	49.5		23	50	48.0	49.0
	15	54	47.5	50.75		24	49	47.5	48.25
	16	52.5	50.0	51.25		25	49	45.5	47.25
	17	52.5	49	50.75		26	49	44.5	46.75
	18	52.5	50	51.25		27	48.5	45	46.75
	19	54.5	51	52.75		28	49.5	45	47.25
	20	54	50.5	52.25		29	49.5	45.5	47.5
	21	52.5	51.5	52.0		30	49.5	46	47.75
	22	54	51.5	52.75	Oct.	1	48	45.5	46.75

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TABLE 12 - Cont'd.

FRASER RIVER - TETE JAUNE

Date		Maximum	Minimum	Mean	Date	Maximum	Minimum	Mean
Oct.	2	47	43.5	45.25				
	3	47.5	46	46.75				
	4	49	46.5	47.75				
	5	49	46	47.5				
	6	48	46	47				
	7	48.5	45.5	47				
	8	47	45	46				
	9	45	41.5	43.25				
	10	46	42.5	44.25				
	11	46.5	43.5	45				
	12	46	44.5	45.25				
	13	45	43.5	44.25				
	14	45	43.5	44.25				
	15	46.5	44.5	44.50				
	16	46.0	45	45.50				
	17	46.5	44.5	45.50				
	18	44.5	42.5	43.50				
	19	45.5	42.5	44.0				
	20	46	44.5	45.25				
	21	46.5	45.5	46.0				
	22	45.5	44	44.75				
	23	45	44.5	44.75				
	24	45	43	44.0				
	25	45	44	44.5				
	26	45	44	44.5				
	27	44.5	43.5	44.0				
	28	44	43	43.5				
	29	43	42	42.5				
	30	42.5	42	42.25				
	31	42.5	42	42.25				
Nov.	1	43	40	42				
	2	40.5	39	39.75				
	3	40	38.5	39.25				
	4	40	39	39.5				
	5	-	-	-				
	6	-	-	-				
	7	-	-	-				
	8	-	-	-				
	9	38	37.5	37.75				
	10	39.5	37.5	38.5				
	11	39	38.5	38.75				
	12	-	-	-				

TABLE 12 - Cont'd.

MCGREGOR RIVER - CHURCH'S MILL

Date		Maximum	Minimum	Mean	Date		Maximum	Minimum	Mean
Installed July 11 ,									
1960	@ 1230-2400	49.5	48	48.75	Aug.	25	49.5	48.5	49
July	12	51	49.5	50.25		26	49	48.5	48.75
	13	52	51	51.50		27	49.5	48.5	49
	14	52	50	51		28	49	48	48.5
	15	52	50	51		29	48	46	47
	16	52.5	50	51.25		30	46.5	46	46.25
	17	52.5	51	51.75		31	47.5	46.5	47
	18	52.5	50	51.25	Sep.	1	47.5	46.5	47
	19	53	50.5	51.75		2	47	45.5	46.25
	20	53	51	52.50		3	48	45.5	46.75
	21	52	51	51.50		4	47.5	46.5	47
	22	52	51.5	51.75		5	46.5	46	42.25
	23	52	49.5	50.75		6	46	44.5	45.25
	24	49	46	47.50		7	45.5	44	44.75
	25	49	46	47.50		8	46.5	45	45.75
	26	53	49	51.0		9	48	45.5	46.75
	27	55	53	54.0		10	49	47	48
	28	56	55	55.5		11	50	47.5	48.75
	29	56	55	55.5		12	50.5	48.5	49.5
	30	56	55	55.5		13	51	48.5	49.75
	31	56	54.	55		14	50.5	49.0	49.75
Aug.	1	54	52	53		15	49	47.5	48.25
	2	54	52	53		16	47.5	45.5	46.5
	3	55	54	54.5		17	46	45.5	45.75
	4	55	54.5	54.75		18	46	45.5	45.75
	5	54	53	53.5		19	45.5	45	45.25
	6	53.5	52.5	53		20	46.5	45.5	46.0
	7	55.5	52.5	54		21	45.5	45	45.25
	8	58	54.5	56.25		22	46	45.5	45.75
	9	58	54.5	56.25		23	46	45	45.5
	10	59	56	57.5		24	-	No record	-
	11	58	57	57.5		25	45	-	-
	12	57	55.5	56.25					
	13	55.5	52.5	54					
	14	52.5	50	51.25					
	15	51	49	50					
	16	50	49	49.5					
	17	50	49.5	49.75					
	18	49.5	49	49.25					
	19	50	48	49					
	20	49.5	48.5	49					
	21	49.5	48.5	49					
	22	49.5	49	49.25					
	23	49.5	47.5	48.5					
	24	49.5	49	49.25					

TABLE 12 - Cont'd.

NECHAKO RIVER - PRINCE GEORGE

Date		Maximum	Minimum	Mean	Date		Maximum	Minimum	Mean
Installed May 19, 1960 @ 1645-2400		47	46.5	46.75	July	4	64.5	62.5	63.5
May	20	47	46	46.5		5	66	63.5	64.75
	21	46	45	45.5		6	67.5	65	66.25
	22	45	44	44.5		7	67.5	66	66.75
	23	45	44	44.5		8	66	64.5	65.25
	24	46	44	45		9	66	63	64.5
	25	48	46	47		10	65	63	64
	26	49.5	48	48.75		11	65	62	63.5
	27	50	49	49.5		12	66	63	64.5
	28	49.5	49	49.25		13	66	64	65
	29	49	49	49		14	67	64	65.5
	30	49	48	48.5		15	66	64	65
	31	49	48	48.5		16	66.5	63.5	65
June	1	49	48	48.5		17	67	64	65.5
	2	49.5	48.5	49		18	68	65	66.5
	3	50.5	49	49.75		19	69	65	67
	4	51	49.5	50.25		20	68	65	66.5
	5	50	50	50		21	67.5	65	66.25
	6	50	49.5	49.75		22	66.5	65.5	66
	7	49.5	49	49.25		23	65.5	64	64.75
	8 (card change)	Record	confused.			24	65	63	64
	9	49	47	48		25	66	63	64.5
	10	49	49	49		26	67.5	63.5	65.5
	11	50	49	49.5		27	69	65	67
	12	49	48.5	48.75		28	70.5	66.5	68.5
	13	50	49	49.5		29	72	68	70
	14	49.5	49	49.25		30	73	69	71
	15	49.5	49	49.25		31	72	70	71
	16	50	49	49.5	Aug.	1	73.5	70	71.75
	17	49	49	49		2	74	71	72.5
	18	49	48	48.5		3	72.5	70	71.25
	19	49	48	48.5		4	72.5	69.5	71.0
	20	49.5	48.5	49		5	70	67.5	68.75
	21	50	49	49.5		6	69.5	66.5	68
	22 (card change)	57?	50.	53.5		7	69.5	65	67.25
	23	57	56	56.5		8	71	65.5	68.25
	24	58	57	57.5		9	72	66.5	69.25
	25	59	57	58		10	73.5	68	70.75
	26	60	58	59		11	74.5	69	71.75
	27	60.5	59	59.75		12	73	68.5	70.25
	28	63	60	61.5		13	69	66.5	67.75
	29	65	62.5	63.75		14	68	65	66.5
	30	66	64	65		15	67	63	65
July	1	66	64	65		16	66	63	64.5
	2	64	63	63.5		17	63	62	62.5
	3	64	63	63.5		18	65	62	63.5

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NECHAKO RIVER - PRINCE GEORGE

Date		Maximum	Minimum	Mean
Aug.	19	69.5	61.5	65.5
	20	63	60.5	61.75
	21	60.5	59.5	60.0
	22	60	59.5	59.75
	23	61	59	60
	24	61	58.5	59.75
	25	60.5	58.5	59.5
	26	60	59	59.5
	27	60	58.5	59.25
	28	58.5	56.5	57.5
	29	58	56.5	57.25
	30	57.5	51.5	54.5
	31	57.5	56	56.75
Sep.	1	57.5	55.5	56.5
	2	57.5	55.5	56.5
	3	58	55.5	56.75
	4	58	55.5	56.75
	5	56.5	55	55.75
	6	55.5	54.5	55.0
	7	57.5	53.5	55.5
	8	58.5	55.5	57.0
	9	59.5	57.0	58.25
	10	60.5	57.5	59.0
	11	61.5	57.0	59.25
	12	62	58.5	60.25
	13	62	59.5	60.75
	14	61.5	59.0	60.25
	15	59.0	56.0	57.5
	16	57.5	55	56.25
	17	55	54.0	54.5
19	18	- - - 55	55.0	53.5 53.5 54.25 54.25
	20	55	52.5	53.75
	21	56	52	54.0
	22	55.5	54.5	55.0
	23	55.5	54	54.75
	24	55	53.5	54.25
	25	54	52.5	53.25
	26	54.5	52.5	53.5
	27	54	52	53
	28	54.5	51.5	53
	29	54.5	51.5	53
	30	54.5	52.5	53.5
Oct.	1	54.5	52	53.25
	2	54.5	52.5	53.5
	3	53.5	52.5	53.0
	4	53.5	52	52.75
	5	54	51.5	52.75
	6	52	51	51.5
	7	51	49.5	50.25
	8	51	47.5	49.25
	9	48.5	46.0	47.25
	10	51	45	48
	11	47	45	46
	12	50	45	47.5
	13	49	44.5	46.75
	14	46.5	44.5	45.5
	15	48	45.5	46.75
	16	48.5	46.5	47.5
	17	50.5	45.5	48.0
	18	46.5	43.5	45.0
	19	48	45.5	46.75
	20	50.5	44.5	47.5
	21	51.5	45.5	48.5
	22	47.5	45	46.25
	23	47.5	46.5	47.0
	24	51	45	48.0
	25	50.5	45.5	48
	26	45.5	43.5	44.5
	27	44.5	41.5	43.0
	28	45.5	41.5	43.5
	29	44	41.5	42.75
	30	44.5	41.5	43.0
	31	44.5	42	43.25
Nov.	1	44.5	43	43.75
	2	44.5	42.5	43.5
	3	44	41.5	42.75
	4	45.5	43	44.25
	5	45	43	44

Removed

14	11 A.M.	37° F.
18	4 P.M.	36.5° F.
29	3 P.M.	32.0° F.

TABLE 12 - Cont'd.

NORTH THOMPSON RIVER - NORTH KAMLOOPS

Date	Maximum	Minimum	Mean
Installed July 25, 1960 @ 1900-2400	57.0	56.5	56.75
July 26 0300-0800	56	56	56
" 27 0200-0600	57.5	57.5	57
" 28 0200-2400	59.5	57.5	58.5
" 29 0001-2400	60.5	59.5	60.0
" 30 0001-2200	61	60.5	60.75
" 31		No record.	
Aug. 1	-	-	-
2	60.5	60	60.25
3	60	59.5	59.75
4	59.5	59.5	59.5
5	59.5	59	59.25
6	59	58.5	58.75
7	58.5	59.5	59.0
8		No record.	
9	-	-	-
10	-	-	-
11	63.5	62.5	63
12	-	-	-
13	62.5	61.5	62
14	-	-	-
15	59	58	58.5
16	59.5	59	59.25
17		No record.	
18	60	59.5	59.75
19	60	59.5	59.5
20	59.5	59	59.25
Aug. 21 - Sep.6 inclusive		No record.	
Sep. 7	57.5	54.5	55
8	54.5	54	54.25
9	54.5	54.5	54.5
10	55	54.5	54.75
11	55.5	55	55.25
12	57	55.5	56.25
13	-	-	-
14	57	57	57
15	57.5	57	57.25
16	57.5	57.5	57.5
17	57.5	56	56.75
18	56	55.5	55.75
19	-	-	-
20	-	-	-
21	-	-	-
22	-	-	-
23	-	-	-
24	-	-	-
25	-	-	-
26	51	50.5	50.75
27	51.5	50.5	51
28	51	50.5	50.75
29	50.5	50	50.25
30	51	50.5	50.75
Oct. 1	51.5	50.5	51
2	-	-	-
3	52	52	52
Oct.4-Nov.21 inclusive		No record	
Nov. 22	38	36	37
23	38	36	37
24	38	37.5	37.75
25	39	38.5	38.75
26	39	38.5	38.75
27	38	37.5	37.75
28	-	-	-
29	-	-	-
30	-	-	-
Dec. 1	-	-	-
2	-	-	-
3	36.5	36	36.25
4	-	-	-
5	37	36	36.5
6	38.5	36.5	37.5
7	38	37	37.5
8	37.5	35.5	36.5
9	38	36.5	37.25
10	37.5	36.5	37.0
11	39.5	35.5	37.5
12	37.5	36.5	37.0
13	38.5	37.0	37.25
14	39.5	37.0	38.25
15	37.5	35.0	36.25
16	35.5	35.0	35,25
17	40.0	35	37.5
18	39.0	37.5	38.25
19	39.5	37	38.25
20	39	36	37.5
21	38.5	39.5	36.5
22	36	35.5	35.75
23	35.5	35	35.25
24	35	35	35
25	35.5	35	35.25

TABLE 13

MAXIMUM, MINIMUM AND MEAN DAILY WATER TEMPERATURES RECORDED BY MAX-MIN THERMOMETERS AT THE CLEARWATER AND FRASER RIVER SAMPLING SITES IN 1960

CLEARWATER RIVER

Date	Maximum	Minimum	Mean
May 10	-	42	-
11	46	42	44
12	44	42	43
13	44	42	43
14	44	42	43
15	43	41	42
16	44	42	43
17	44	42	43
18	44	42	43
19	45	41	43
20	44	42	43
21	43	42	42.5
22	43	42	42.5
23	44	41	42.5
24	45	41	43
25	44	42	43
26	46	42	44
27	44	42	43
28	44	42	43
29	47	43	45
30	48	44	46
31	48	44	46
Jne 1	46	44	45
2	48	44	46
3	46	44	45
4	48	46	47
5	48	46	47
6	48	46	47
7	48	46	47
8	48	44	46
9	48	44	46
10	50	44	47
11	50	46	48
12	50	48	49
13	52	48	50
14	50	46	48
15	50	46	48
16	49	46	47.5
17	49	46	47.5
18	50	46	48
19	48	46	47
20	48	44	46
21	48	46	47
June 22	48	44	46
23	48	44	46
24	48	46	47
25	50	47	48.5
26	51	47	49
27	51	48	49.5
28	52	48	50
29	52	50	51
30	52	51	51
July 1	54	50	52
2	52	50	51
3	52	50	51
4	52	50	51
5	53	50	51.5
6	54	50	52
7	53	50	51.5
8	54	50	52
9	54	50	52
10	54	48	51
11	54	50	52
12	55	50	52.5
13	56	52	54
14	56	52	54
15	56	53	54.5
16	58	54	56
17	58	54	56
18	58	53	55.5
19	58	54	56
20	58	54	56
21	58	54	56
22	58	54	56
23	58	54	56
24	58	54	56
25	58	54	56
26	58	54	56
27	58	54	56
28	59	54	56.5
29	59	54	56.5
30	58	54	56
31	58	54	56
Aug. 1	57	54	55.5
2	57	54	55.5
3	58	54	56

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CLEARWATER RIVER

Date	Maximum	Minimum	Mean
Aug. 4	59	58	58.5
5	60	58	59
6	60	58	59
7	60	58	59
8	60	57	58.5
9	60	58	59
10	62	58	60
11	62	59	60.5
12	63	60	61.5
13	62	60	61
14	63	60	61.5
15	62	60	61
16	62	60	61
17	63	60	61.5
18	63	60	61.5
19	63	60	61.5
20	60	58	59
21	60	58	59
22	60	58	59
23	60	58	59
24	60	58	59
25	60	58	59
26	59	57	58
27	59	57	58
28	58	56	57
29	58	56	57
30	58	56	57
31	58	56	57
Sep. 1	58	56	57
2	58	56	57
3	59	56	57.5
4	58	56	57
5	58	55	56.5
6	58	55	56.5
7	58	55	56.5
8	58	55	56.5
9	58	55	56.5
10	58	55	56.5
11	58	55	56.5
12	57	54	55.5
13	57	55	56
14	57	55	56
15	56	55	55.5
16	56	55	55.5
17	-	-	-
18	56	54	55
19	56	54	55
Sep. 20	56	58	55
21	55	53	54
22	55	53	54
23	55	52	53.5
24	54	52	53
25	52	51	51.5
26	52	51	51.5
27	52	50	51
28	52	50	51
29	52	50	51
30	53	51	52
Oct. 1	52	50	51
2	52	50	51
3	51	50	50.5
4	52	50	51
5	51	50	50.5
6	51	49	50
7	51	49	50
8	50	48	49
9	50	48	49
10	50	49	49.5
11	50	49	49.5
12	50	49	49.5
13	50	49	49.5
14	51	49	50
15	51	49	50
16	52	50	51
17	52	50	51
18	52	50	51
19	52	50	51
20	51	50	50.5
21	50	48	49
22	50	48	49
23	50	48	49
24	50	48	49
25	50	48	49
26	50	48	49

FRASER RIVER

Date		Maximum	Minimum	Mean
May	20	46	44	45
	21	46	44	45
	22	45	43	44
	23	46	44	45
	24	47	43	45
	25	46	43	44.5
	26	49	47	48
	27	49	48	48.5
	28	49	47	48
	29	49	48	48.5
	30	49	47	48
	31	48	46	47
June	1	47	46	46.5
	2	47	46	46.5
	3	48	47	47.5
	4	47	46	46.5
	5	49	47	48
	6	49	48	48.5
	7	49	48	48.5
	8	50	46	48
	9	49	48	48.5
	10	50	49	49.5
	11	49	47	48
	12	51	50	50.5
	13	52	51	51.5
	14	50	49	49.5
	15	49	48	48.5
	16	50	49	49.5
	17	48	47	47.5
	18	49	48	48.5
	19	47	45	46
	20	47	47	47
	21	48	47	47.5
	22	50	49	49.5
	23	49	47	48
	24	49	48	48.5
	25	51	48	49.5
	26	49	49	49
	27	49	48	48.5
	28	49	48	48.5
	29	49	48	48.5
	30	48	45	46.5
July	1	50	45	47.5
	2	50	45	47.5
	3	49	48	48.5

Date		Maximum	Minimum	Mean
July	4	49	48	48.5
	5	50	47	48.5
	6	50	50	50
	7	49	48	48.5
	8	52	51	51.5
	9	52	51	51.5
	10			
	11			
	12			
	13			
	14			
	15			
	16			
	17			
	18			
	19			
	20			
	21			
	22			
	23			
	24			
	25			
	26			
	27			
	28			
	29	60	58	59
	30	60	58	59
Aug.	1	60	58	59
	2	60	58	59
	3	60	58	59
	4	60	58	59
	5	60	56	58
	8	60	58	59
	9	60	58	59
	10	62	58	60
	11	60	58	59
	12	60	56	58
	13	60	58	59
	14	-	-	-
	15	62	57	59.5
	16	60	56	58
	17	60	58	59
	18	60	56	58
	19	60	54	57
	20	54	52	53

Note: Thermometer out of order - July 10 - 28 - No record

TABLE 13 - Cont'd.

FRASER RIVER

Date		Maximum	Minimum	Mean
Aug.	21	54	50	52
	22	54	50	52
	23	56	52	54
	24	54	52	53
	25	54	52	53
	26	54	52	53
	27	54	50	52

TABLE 14

WATER HEIGHTS RECORDED AT THE CLEARWATER AND FRASER RIVER SAMPLING SITES IN 1960

CLEARWATER RIVER

Date		Time	Gauge	Date		Time	Gauge	Date		Time	Gauge
May	9	1600	1.85	June	8	0800	4.30	June	18	1800	6.65
	10	0800	1.90		8	1330	4.30		19	0800	6.50
	11	0830	2.20		8	1800	4.35		19	1200	6.50
	12	0800	2.65		8	2300	4.35		19	1800	6.50
	13	0700	3.25		9	0800	4.40		20	0630	6.20
	14	0630	3.45		9	1200	4.45		20	2100	6.10
	15	0800	3.45		9	2100	4.45		21	0800	5.90
	16	0800	3.35		10	0800	4.55		21	1200	5.90
	17	0800	3.35		10	1200	4.55		21	2100	5.90
	18	0630	3.35		10	1600	4.60		22	0800	5.85
	19	0630	3.30		10	2030	4.60		23	0830	6.10
	20	0700	3.35		11	0600	4.90		23	1200	6.10
	21	0730	3.45		11	1000	5.00		23	1600	6.15
	22	0630	3.45		11	1200	5.00		23	2000	6.30
	23	0630	3.35		11	1430	5.05		24	0800	6.60
	24	0630	3.20		11	1800	5.20		24	1200	6.60
	25	0600	3.05		11	2030	5.25		24	1600	6.75
	26	0600	3.00		11	2300	5.30		24	2000	6.80
	27	0630	3.10		12	0100	5.35		25	0800	7.50
	28	0630	3.05		12	0500	5.45		25	2000	7.85
	29	0630	3.00		12	0930	5.60		26	0800	8.10
	30	0645	3.05		12	1130	5.70		26	1200	8.10
	31	0830	3.50		12	1400	5.75		26	1600	8.10
	31	1830	3.60		12	1800	5.75		26	2200	8.10
June	1	0900	3.75		12	2100	5.75		27	0800	8.10
	1	2300	3.95		13	0830	5.95		27	2000	8.15
	2	0730	4.05		13	1100	5.95		28	0800	8.15
	2	1530	4.15		13	1530	6.00		28	2000	8.15
	3	0800	4.25		13	1800	6.10		29	0800	8.25
	3	1300	4.30		14	0730	6.40		29	2000	8.35
	3	2330	4.30		14	1030	6.40		30	0800	8.55
	4	0800	4.30		14	1530	6.50		30	2000	8.65
	4	1200	4.28		14	1930	6.50	July	1	0800	8.75
	4	2300	4.25		15	0800	6.60		1	2000	8.75
	5	0800	4.20		15	1200	6.60		2	0800	8.70
	5	1200	4.17		15	1600	6.65		2	2000	8.50
	5	1600	4.13		15	2000	6.65		3	0800	8.50
	5	2300	4.10		16	0730	6.70		3	2000	8.30
	6	0800	4.10		16	1200	6.75		4	0800	8.10
	6	1200	4.10		16	2000	6.80		4	2000	8.00
	6	2330	4.17		17	0800	6.95		5	0730	7.85
	7	0800	4.25		17	1200	6.95		5	2000	7.80
	7	1720	4.25		17	1800	7.00		6	0800	7.70
	7	2300	4.30		18	0700	6.75		6	2000	7.70

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TABLE 14 - Cont'd.

CLEARWATER RIVER

Date		Time	Gauge	Date		Time	Gauge	Date		Time	Gauge
July	7	0800	8.00	Aug.	16	0830	2.35	Sep.	30	0730	1.60
	7	1930	7.95		17	0830	2.35	Oct.	1	0830	1.55
	8	0800	7.95		18	0830	2.35		2	0830	1.45
	8	2000	7.85		19	0830	2.40		3	0830	1.40
	9	0800	7.65		20	0830	2.45		4	0830	1.55
	9	2000	7.45		21	0830	2.40		5	0830	1.45
	10	0800	7.20		22	0830	2.45		6	0830	1.40
	10	2000	7.00		23	0830	2.50		7	0830	1.35
	11	0730	6.75		24	0830	2.45		8	0830	1.30
	11	2100	6.50		25	0830	2.45		9	0830	1.20
	12	0800	6.30		26	0830	2.40		10	0830	1.15
	12	2000	6.35		27	0830	2.45		11	0830	1.05
	13	0800	6.30		28	0830	2.45		12	0830	1.00
	14	0800	6.30		29	0830	2.45		13	0830	1.00
	15	0800	6.55		30	0830	2.45		14	0830	1.00
	16	0830	6.55		31	0830	2.40		15	0830	0.95
	17	0830	6.45	Sep.	1	0830	2.40		16	0830	0.90
	18	0600	6.40		2	0830	2.35		17	0830	0.90
	19	0830	6.40		3	0830	2.25		18	0830	0.90
	20	0930	6.30		4	0830	2.15		19	0830	0.85
	21	1000	5.90		5	0830	2.10		20	0830	0.80
	22	0830	5.70		6	0830	2.10		21	0830	0.70
	23	0900	5.40		7	0830	1.95		22	0830	0.90
	24	0930	5.20		8	0830	1.85		23	0700	1.20
	25	0830	4.75		9	0830	1.70		24	0700	1.55
	26	0830	4.25		10	0830	1.60		25	0700	1.95
	27	0830	4.00		11	0830	1.50		26	0900	2.25
	28	0830	4.05		12	0830	1.45				
	29	0900	4.35		13	0830	1.35				
	30	0830	4.15		14	0830	1.15				
	31	0830	3.95		14	1300	1.10				
Aug.	1	0900	4.05		15	0830	1.00				
	2	0800	4.15		16	0830	0.90				
	3	0830	4.25		17	0830	0.80				
	4	0900	4.00		18	-	-				
	5	0830	3.90		19	0830	0.65				
	6	0830	3.70		20	0830	0.85				
	7	0830	3.55		21	0830	1.35				
	8	0830	3.35		22	0830	1.75				
	9	0930	3.15		23	0830	2.15				
Aug.	10	0900	2.95		24	0830	2.50				
	11	0900	2.45		25	0830	2.40				
	12	0900	2.45		26	0830	2.05				
	13	0830	2.40		27	0830	1.75				
	14	0830	2.35		28	0830	1.65				
	15	0830	2.30		29	0830	1.55				

TABLE 14 - Cont'd.

FRASER RIVER

Date		Time	Gauge
May	20	0800	1.9
	21	0800	2.6
	22	0700	2.3
	23	0700	1.8
	24	1900	1.3
	25	0700	.9
	26	0800	.25
	27	0830	.32
	28	0530	.5
	29	1700	.46
	30	0800	.5
	31	0800	.8
June	1	0730	.62
	2	0500	.9
	3	0745	1.4
	4	0830	1.0
	5	1600	.2
	6	0800	0.0
	7	0800	.34
	8	0800	1.4
	9	0800	1.5
	10	0800	1.4
	11	0700	1.5
	12	1430	2.5
	13	0800	3.1
	14	0730	3.4
	15	0800	3.7
	16	0730	3.9
	17	1845	4.4
	18	0800	5.0
	19	1430	3.6
	20	0730	2.8
	21	0800	2.4
	22	0800	2.7
	23	0800	3.6
	24	0800	4.4
	25	0800	5.4
	26	1500	7.1
	27	0600	6.3
	28	0800	6.2
	29	0800	6.6
	30	0830	7.1
July	1	0800	-
	2	1430	6.9
	3	1430	6.1
July	4	1400	5.5
	5	1430	4.8
	6	1400	4.6
	7	1400	4.4
	8	1400	4.6
	9	0900	4.7
	10	?	3.0
	11	0800	2.6
	12	0900	2.2
	13	0900	2.5
	14	0930	2.8
	15	0900	2.6
	16	1000	3.0
	17	1100	3.2
	18	0900	3.5
	19	1200	3.2
	20	0900	3.0
	21	0830	3.
	22	0900	2.8
	23	0930	1.8
	24	-	-
	25	0900	.8
	26	0900	.2
	27	0800	.3

TABLE 15

PHYSICAL DATA OBTAINED DURING SPAWNING STREAM SURVEYS, 1960

Stream	Date	Temperature	Velocity F.P.S.	Flow C.F.S.	Location
Blue River	Oct. 6	42°	3	90	Highway Bridge
	Oct. 25	40°	3	90	Highway Bridge
Bowron River	Sep. 26	49°	1	40	Bowron Lake Bridge
Clearwater River	May 16	42°			Outlet of Clearwater Lake
Clearwater River	Nov. 15	44°	5		Whitehorse Bluffs
Captain Creek	Aug. 29	46°			Near Mouth
Dome Creek	Aug. 7	47°		200	Railway Bridge
Finn Creek	Sep. 28	40°		50	Near Mouth
Fontoniko River	Aug. 25	49°			East Fork Spawning Ground
Goat River	Aug. 8	53°	5	500	Railway Bridge
Horsefly River	July 10	55°	1.5	600	Horsefly Village
	Aug. 19	57°	1.5	600	Horsefly Village
	Sep. 2	48.5°	2		Forestry Bridge
Little Horsefly River	July 17	65°	1	150	Olson Ranch Bridge
	Aug. 19	64°	1	150	Olson Ranch Bridge
Horsey Creek	Aug. 30	43°	4-5	75	Highway Bridge
Holmes River	Aug. 23	46°	4-5	250	Highway Bridge
	Aug. 30	43°	4-5	250	Highway Bridge
James Creek	Aug. 23	53°			4-5 miles from Mouth
King Creek	Aug. 23	45°	5-6	100	Highway Bridge
	Aug. 30	42°	5-6	100	Highway Bridge
Lemieux Creek	May 21	44°	6	200	Highway Bridge
Lion Creek	Sep. 28	44°	1	300	Highway Bridge
	Nov. 18	41°	1	300	Highway Bridge
Morkill River	Aug. 8	58°	4	150	At Mouth
	Sep. 13	50°	7-8	500	9 miles from Mouth 6 P
	Sep. 14	47°	7-8		10 miles from Mouth 10
Mitchell River	Sep. 16	50°	2	600	Near Mouth
McKinley River	July 16	65°	3	270	Near Road Bridge
Otter Creek	Aug. 29	52°			Near Mouth
Quesnel River	July 27	57°			Boulion Pool
	Aug. 23	59°	4		Likely Bridge
	Aug. 30	57°	4		Near Quesnel Village
	Sep. 7	57°			Likely Bridge
Quesnel River	Sep 7	54°			Boulion Pool
	Sep. 25	53°			Likely Bridge
Quesnel River	Aug. 23	54°	8		Near Spanish Creek
North Fork	Sep. 8	49°			Near Spanish Creek
Seebach Creek	Aug. 30	50°			5 miles from Mouth
North Thompson River	Nov. 18	33°			Near Lion Creek
Torpy River	Aug. 1	54°	4	1000	N ear Mouth

Note: Velocity and flow measurements are estimates.